

IMPERIAL PARK CABLE ROUTE, NEWPORT

Flood Consequence Assessment



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REPORT

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1 INTRODUCTION

Project Brief

- 1.1 RPS Consulting Services Ltd ('RPS') has been commissioned to prepare a Flood Consequence Assessment (FCA) to support a proposed cable route between a substation and data centre in Newport, approximate postcode NP10 8BE.

Assessment Procedure

- 1.2 The aim of the FCA is to outline the potential for the site to be impacted by flooding, the impacts of the proposed development on flooding in the vicinity of the site, and the proposed measures which could be incorporated into the development to mitigate the identified risk.
- 1.3 The report has been prepared in accordance with the guidance detailed in the Planning Policy Wales and Technical Advice Note 15 (TAN15): Development and Flood Risk. Reference has also been made to the Newport City Council Preliminary Flood Risk Assessment (PFRA) and Local Flood Risk Management Strategy (LFRMS).
- 1.4 This report has been prepared in consultation with Natural Resources Wales (NRW) and Newport City Council as Lead Local Flood Authority (LLFA). The site is located within the Caldicot and Wentlooge Levels Internal Drainage District.
- 1.5 The desk study was undertaken by reference to information provided / published by the following bodies:
- NRW;
 - Newport City Council;
 - British Geological Survey (BGS);
 - Ordnance Survey (OS); and
 - Dŵr Cymru Welsh Water.

2 PLANNING POLICY

National Planning Policy

Technical Advice Note (TAN) 15: Development Flooding and Coastal Erosion (2025)

- 2.1 TAN 15 provides technical guidance to supplement the policy set out within Planning Policy Wales in relation to development and flooding and coastal erosion. It 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. It also provides advice on the consequences of the risks and adapting to and living with flood risk. It does not take precedence over other Technical Advice Notes and should be considered alongside other planning policies. This document replaces Technical Advice Note 14, published in 1998 and Technical Advice Note 15, published in 2004.
- 2.2 In relation to flood risk, TAN 15 indicates that the Assembly has a duty to ensure that development is sustainable and does not create problems for future generations. Managing flooding has an important role to ensure sustainable development by: guiding developments to locations with little or no risk from river, tidal or coastal flooding, managing consequences of flooding where developments can be justified and making provision for climate change.
- 2.3 The Flood Map for Planning is the starting point for consideration of flood risk in the planning system. The map uses flood zones to indicate the degree to which land is at risk of flooding from rivers, the sea, surface water and small watercourses. TAN15 outlines the actions that should be taken when considering development in the different flood zones. The Flood Map for Planning displays predicted future flood risk under the central climate change estimate.
- 2.4 FCA is required for any development proposal located fully or partly in Surface Water and Small Watercourses - Flood Zones 2 and 3. An assessment should also be undertaken for development on sites outside of these zones, but which has the potential to affect the course of surface water and/or excess water from ordinary watercourses. Planning authorities may provide specific local advice on this issue in Development Plans. Planning authorities should ensure any new development adjacent to Flood Zones 2 and 3 for Surface Water and Small Watercourses is appropriately set back to allow for extreme flood events. Detailed Flood Consequences Assessments, will be required to consider a range of climate change scenarios, including upper end estimates, making reference to the Welsh Government guidance on climate change allowances for planning purposes.
- 2.5 TAN 15 sets out the prime objectives of FCAs as developing full appreciation of;
- The risk and consequences of flooding on the development; and
 - The risk and consequences (i.e. the overall impacts) of the development on flood risk elsewhere.
- 2.6 FCAs must allow for a range of potential flooding scenarios up to and including the flood probability of 0.1% in any year. An allowance for climate change must be made in line with current Welsh Government Guidance.
- 2.7 The FCA can also be used to establish whether appropriate avoidance or mitigation measures could be incorporated within the design of the development to ensure that over its lifetime, development minimises risk to life, damage to property and disruption to people living and working on the site, and does not increase flood risk elsewhere.

- 2.8 The approval of SuDS for a new development by the SAB is independent of the planning process. New developments of more than one dwelling or where the area covered by construction work equals or exceeds 100m² require approval from the SAB before construction can commence. Adoption and management arrangements, including a funding mechanism for maintenance of SuDS infrastructure and all drainage elements, must be agreed by the SAB as part of this approval. This will ensure that SuDS infrastructure is properly maintained and functions effectively for its design life.

Planning Policy Wales Edition 12, 2024

- 2.9 Planning Policy Wales Edition 12 sets out the land use planning policies of the Welsh Government. Chapter 6 – Distinctive and Natural Places outlines the Welsh Government's objectives in terms of addressing water and flood risk.
- 2.10 Section 6.6 of Planning Policy Wales addresses water and floor risk. The relevant guidance is summarized below:

- The planning system should:
 - protect and improve water resources and quality by promoting and encouraging increased efficiency and demand management of water as part of new developments;
 - ensure that the infrastructure networks, including nature based solutions on which communities and businesses depend is adequate to accommodate proposed development, and takes into consideration the impacts of climate change, so as to minimise risk to human health and the environment and prevent pollution at source;
 - ensure sustainable drainage systems are an integral part of design approaches for new development; and
 - ensure the protection of the quantity and quality of surface and ground water supplies is taken into account as part of development proposals.
- Water resources and quality must be taken into account from an early stage in the process of identifying land for development and redevelopment.
- Ensuring the implementation of nature based solutions through green infrastructure provision is a key preference and protecting river corridors should be maximised. The identification of managed wetland and riparian buffer zones should be a key output of assessments to improve water quality, by reducing pollution and securing a net benefit for biodiversity and improving the attributes of ecosystem resilience.
- New development should be located and implemented with sustainable provision of water services in mind, using design approaches and techniques which improve water efficiency and minimise adverse impacts on water resources, including the ecology of rivers, wetlands and groundwater and thereby contributing towards ecological resilience.
- Planning authorities should secure better management of drainage and surface water so as to tackle these issues by:
 - ensuring sustainable drainage systems are incorporated into development enabling surface water to be managed close to or at source; and
 - ensuring connection to the sewer in sewered areas and by minimising the proliferation of private sewage systems.
- New developments of more than one dwelling or where the area covered by construction work equals or exceeds 100 square metres also require approval from the SuDS Approval

Body (SAB) before construction can commence. This will ensure that SuDS infrastructure is properly maintained and functions effectively for its design life.

- The provision of SuDS must be considered as an integral part of the design of new development and considered at the earliest possible stage when formulating proposals for new development.
- Planning authorities should adopt a precautionary approach of positive avoidance of development in areas of flooding from the sea or from rivers. Surface water flooding will affect choice of location and the layout and design of schemes, and these factors should be considered at an early stage in formulating development proposals.
- Development should reduce, and must not increase, flood risk arising from river and/or coastal flooding on and off the development site itself. The priority should be to protect the undeveloped or unobstructed floodplain from development and to prevent the cumulative effects of incremental development.
- In areas of flood plain currently unobstructed, where water flows in times of flood, built development should be wholly exceptional and limited to essential transport and utilities infrastructure.
- Development should not cause additional run-off, which can be achieved by controlling surface water as near to the source as possible by the use of SuDS.
- The ability of emergency services to respond to flood events should be taken into account when considering if a development in a flood risk area is appropriate. This may involve consultation with emergency planners, local resilience forums and other professional partners such as fire rescue, police and ambulance services.

- 2.11 Planning Policy Wales is supplemented by a series of Technical Advice Notes (TAN). TAN15 provides technical guidance on development and flood risk.

Local Planning Policy

Newport Local Development Plan

- 2.12 The Newport Local Development Plan 2011-2026 was published in January 2015, and contains the following Policies relating to flood risk and drainage:

“SP3 Flood Risk

- 2.13 *Newport’s coastal and riverside location necessitates that development be directed away from areas where flood risk is identified as a constraint and ensure that the risk of flooding is not increased elsewhere. Development will only be permitted in flood risk areas in accordance with national guidance. Where appropriate a detailed technical assessment will be required to ensure that the development is designed to cope with the threat and consequences of flooding over its lifetime. Sustainable solutions to manage flood risk should be prioritised.*

SP4 Water Resources

- 2.14 *Development proposals should minimise water consumption, protect water quality during and after construction and result in no net increase in surface water run-off through the sustainable management of water resources by:*
- i. The use of sustainable drainage systems;*
 - ii. The reuse of water and reduction of surface water run-off through high quality designed developments;*

- iii. *Careful consideration of the impact upon finite water resources, particularly in terms of increased pressures on abstraction and the impact of climate change.*
- iv. *Ensuring development is appropriately located and phased so that there is capacity in the waste water, sewerage and water supply as well as the protection of water quality.”*

- 2.15 An update to the Newport Local Development Plan is currently being prepared however it has not been adopted.

Preliminary Flood Risk Assessment

- 2.16 A Preliminary Flood Risk Assessment (PFRA) was produced by URS/Scott Wilson in 2011 for Newport City Council and was reviewed in 2017. The PFRA is aimed at providing high-level overview of flood risk from all sources of flooding within the local area, including consideration of surface water, groundwater and ordinary watercourses. Relevant information has been referenced throughout this report.

Local Flood Risk Management Strategy

- 2.17 A Local Flood Risk Management Strategy (LFRMS) was produced in 2014 by Newport City Council as the designated LLFA. The LFRMS aims to understand the risks of various flooding sources that Newport may face, take proactive steps to mitigate these risks, raise awareness across communities and prepare for any such event. Local flood risk is any flood risk that derives from surface runoff, groundwater, or ordinary watercourses. Relevant information has been referenced throughout this report.
- 2.18 A draft LFRMS 2024-2030 has been released containing updated information on flooding from the various sources in Newport.

Climate Change

- 2.19 The Technical Advice Note 15: Development and Flood Risk (TAN15)¹ states that when considering new development proposals, it is necessary to take account of the potential impact of climate change over the lifetime of development. Residential development is assumed to have a lifetime of 100 years, while a lifetime of 75 years is assumed for non-residential developments. To ensure future development can provide a safe and secure living and /or working environment throughout its lifetime, national planning policy requires proposals in areas of high flood risk to be accompanied by an assessment of flooding consequences to and from the development, taking into account the impacts of climate change.

Peak River Flows

- 2.20 The projected peak river flow change is a range, with the highest estimate equally likely to occur as the lowest estimate. For this reason, it is recommended that the central estimate, or change factor, for the 2080s for the relevant river basin district is used to assess the potential impact of climate change as part of a flood consequence assessment (FCA) and to inform design levels. The site is located in the Severn River basin district.

¹ [Flood Consequences Assessments: Climate change](#)

- 2.21 In addition to the change factor, an assessment of risk should be made using the upper end estimate. The information derived from this assessment should be used to inform mitigation measures that help to ensure the long-term resilience of the development.

Table 1. Changes to river flood flows for Severn River basin district (use 1961-90 baseline)

Upper Estimate	25%	40%	70%
Central Estimate	10%	20%	25%

Sea Level Allowances

- 2.22 The science behind climate change projections for sea level rise has changed substantially in recent years. The guidance was updated in September 2021² to reflect the higher central allowance (70th percentile) and upper end allowance (95th percentile) of RCP28.5. This reflects an increase in global mean surface temperature of around 4.3°C by 2100.
- 2.23 Table 2 displays the estimates of cumulative uplift for sea level rise for Neath Port Talbot local authority area to 2100 and 2120 (to reflect the 100yr lifetime of development for residential development). The allowances are derived using the UKCP18 2100 dataset.

Table 2. Estimated mean sea level rise (in metres)

70 th	0.85	1.01
95 th	1.11	1.33

- 2.24 Guidance states that development proposals should be assessed against the relevant regional 70th percentile to inform design levels. An assessment should also be made against the 95th percentile to inform mitigation measures, access and egress routes and emergency evacuation plans.

² [Flood Consequences Assessments: Climate change](#)

3 CONSULTATION

Natural Resource Wales

- 3.1 The FCA has been prepared in consultation with the Partnership and Strategic Overview Team at NRW.
- 3.2 NRW has provided the Caldicot and Wentlooge (2016) model as well the River Ebbw (2018) Integrated Catchment Model. The information provided by NRW is included in Appendix A and is summarised in Section 6.
- 3.3 NRW confirm the site benefits from flood defences in the form of an Embankment (EMB1501349), last inspected on the 9th January 2025 and was graded at Condition Grade 3 (Fair).

Internal Drainage District

- 3.4 The site is located within the Caldicot and Wentlooge Levels Internal Drainage District (IDD). Consultation with the IDD has been undertaken as part of the assessment. A response was received on the 18th June 2025, is summarised below and included in Appendix B.
- As the site is located in the Gwent Levels Internal Drainage District (IDD), there may be a requirement to seek a Land Drainage Consent for works within c.8m of a IDD watercourse.
 - For the FCA they will need to consider the requirements of TAN 15 Technical Advice Note 15: Development, flooding and coastal erosion where Figure 2 sets out the technical requirements of a FCA.
 - There are no main rivers within the area covered by the proposed cable route, so no Flood Risk Activity Permit (FRAP) required.

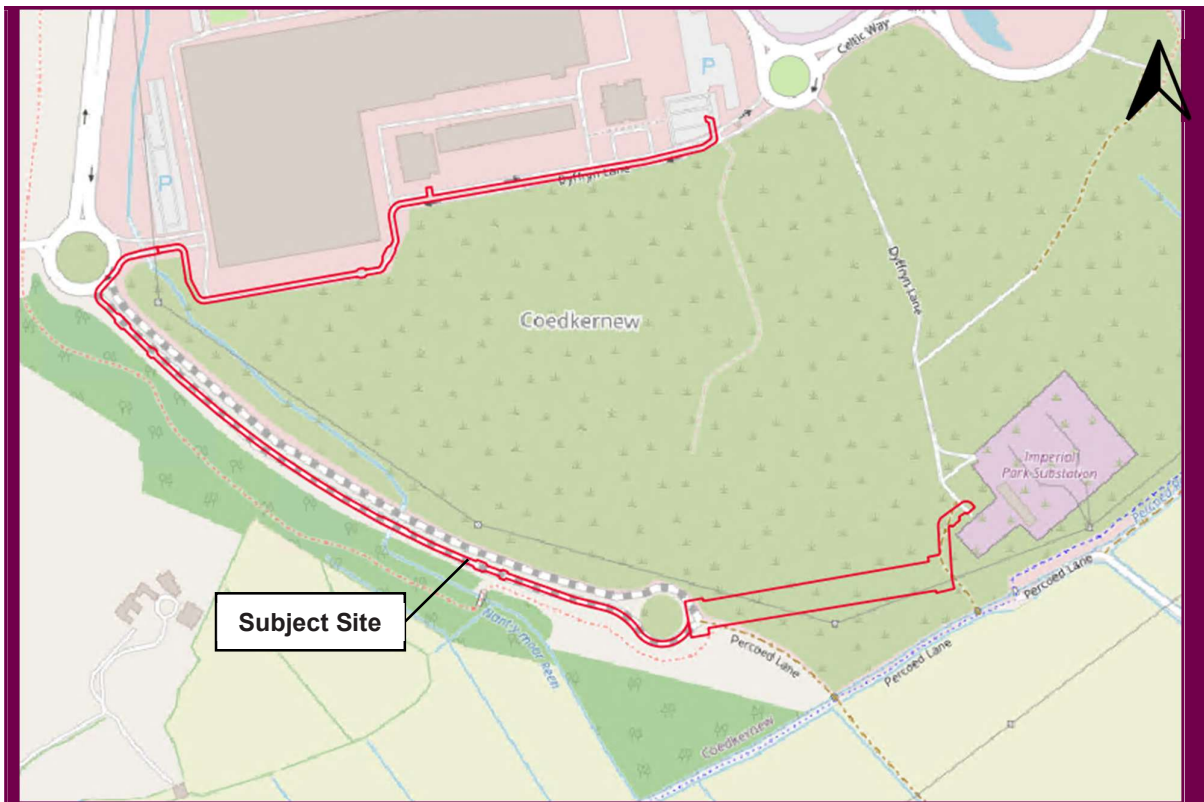
Newport City Council

- 3.5 Newport City Council has been contacted regarding flood risk at the site and requirements for the development. At the time of writing a response is awaited.

4 SITE DESCRIPTION

Site Description

- 4.1 The cable route runs from a substation located at National Grid Reference ST 28525 83639 to a data centre located at National Grid Reference ST 27781 83970. The site is elongated in shape. The site location is presented in Figure 1.



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Figure 1. Site Location

- 4.2 The cable route will run alongside the existing Percoed Lane along the foot/cycleway and through greenfield undeveloped land, beneath existing ditches at the start and end of the route to the south and north respectively.
- 4.3 The point of connection is a proposed new substation next to the existing National Grid Imperial Park Substation.
- 4.4 The site is approximately 70% hardstanding where the cable follows the existing road infrastructure but is greenfield in the remaining parts of the route.
- 4.5 OS mapping shows the cable route crosses 3no. small surface water ditches which adjoin to the Percoed Reen. The cable route also crosses the Nant-y-Moor Reen where it is culverted beneath the existing access road.

Surrounding Land Uses

- 4.6 To the east of the site is Imperial Park 400kV National Grid Substation, accessible via Duffryn Lane. To the southeast of the site is the Percoed Reen, beyond this appear to be agricultural fields.

- 4.7 Vegetated ground is seen both east and west of the proposed cable route, and existing industrial sites are to the north.
- 4.8 The site is located within the Gwent Levels- St Brides Site of Special Scientific Interest (SSSI). The site is not within a Special Area of Conservation (SAC) or Special Protection Area (SPA).

Topography

- 4.9 LiDAR levels on site show the ground falls generally southeast through the site, sitting at a maximum of approximately 11.89 m AOD (Above Ordnance Datum) in the northwest and falling to a minimum of approximately 5.68m AOD in the south of the cable route. The LiDAR is presented in Appendix C.

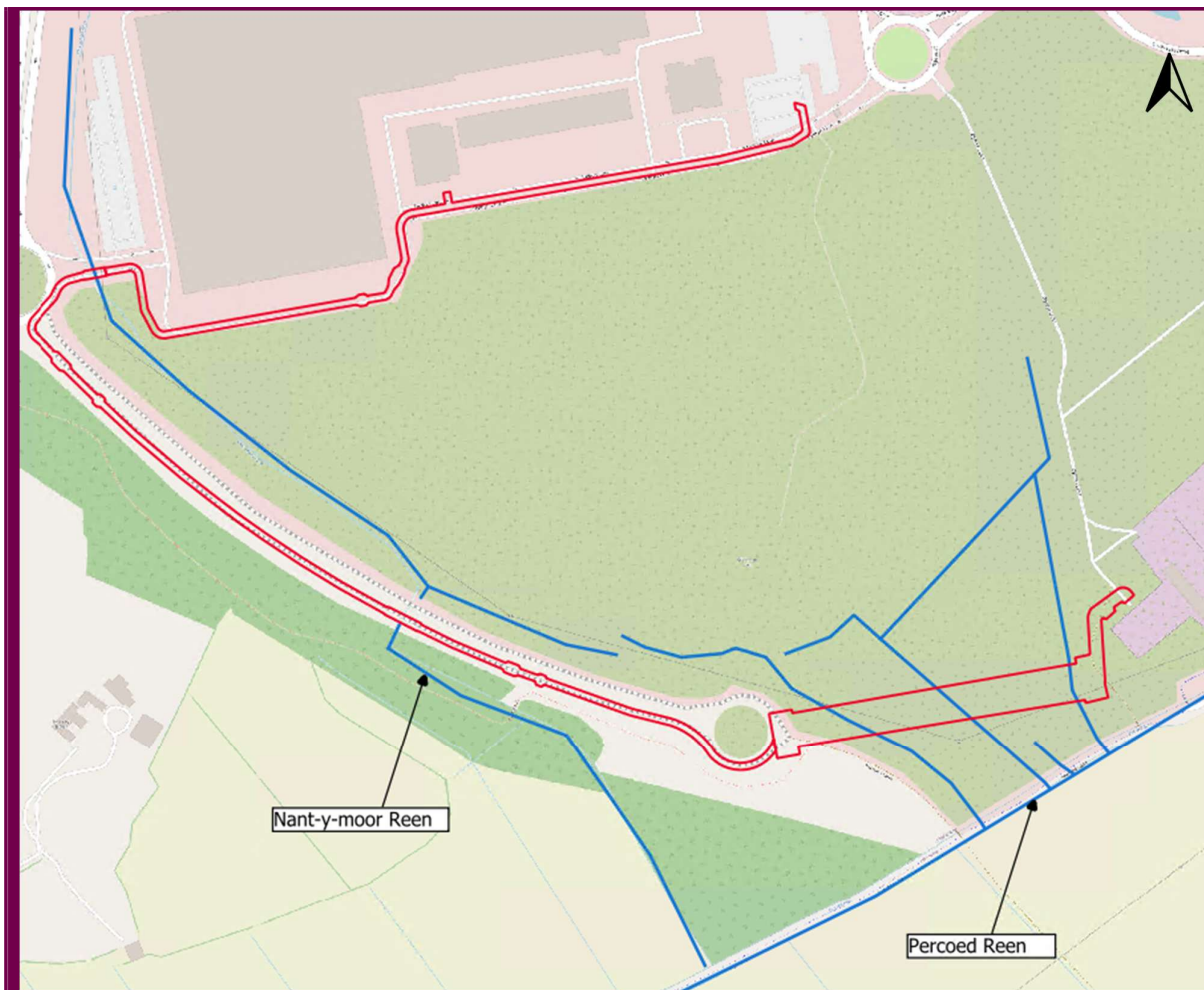
5 PROPOSED DEVELOPMENT

- 5.1 It is proposed to install a cable route between a proposed substation and data centre. Development plans are shown in Appendix D. An application for the proposed substation has been submitted separately.
- 5.2 Horizontal Directional Drilling (HDD) is proposed as the method of crossing existing ditches. Drilling will take place below the bed level, a suitable distance below is to be confirmed by Newport City Council.
- 5.3 Assumptions for the cable route at the time of writing are as follows:
- HDD entrance and exit pit size – 20m x 40m.
 - Likely vehicular / machinery access points to site – via access roads on Dyffryn Lane + access point at Road to Nature.
 - Estimated construction duration – 6 months.
 - Other temporary infrastructure locations – joint bay locations – approx. 500m chainage, 15m x 25m per bay.
- 5.4 The proposed development includes the installation of a below ground cable and can be classified as 'less vulnerable' within TAN15.
- 5.5 As the development is a cable route, it is considered that all development will be below ground and after construction, the surface will be restored and there will be no changes to the existing surface topography.
- 5.6 Due to the nature of the development the use of Sustainable Drainage Systems (SuDS) is not considered to be required.

6 HYDROLOGICAL SETTING

Nearby Watercourses

- 6.1 OS mapping indicates the proposed cable route crosses 3no. field ditches which adjoin to the Percoed Reen, located just south of the cable route. It also crosses the Nant-y-Moor Reen where it is already culverted beneath the existing road.
- 6.2 The Caldicot and Wentlooge Levels, which comprise a series of drainage channels and reens, is located to the south of the site. The reen network is shown to discharge into the River Usk/ Usk Estuary. OS mapping indicates elevation within the Caldicot and Wentlooge Levels is approximately between 5 – 7 m AOD.
- 6.3 Nearby watercourses are shown below in Figure 2.



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Figure 2. Nearby Waterbodies

Fluvial Flood Risk Classification

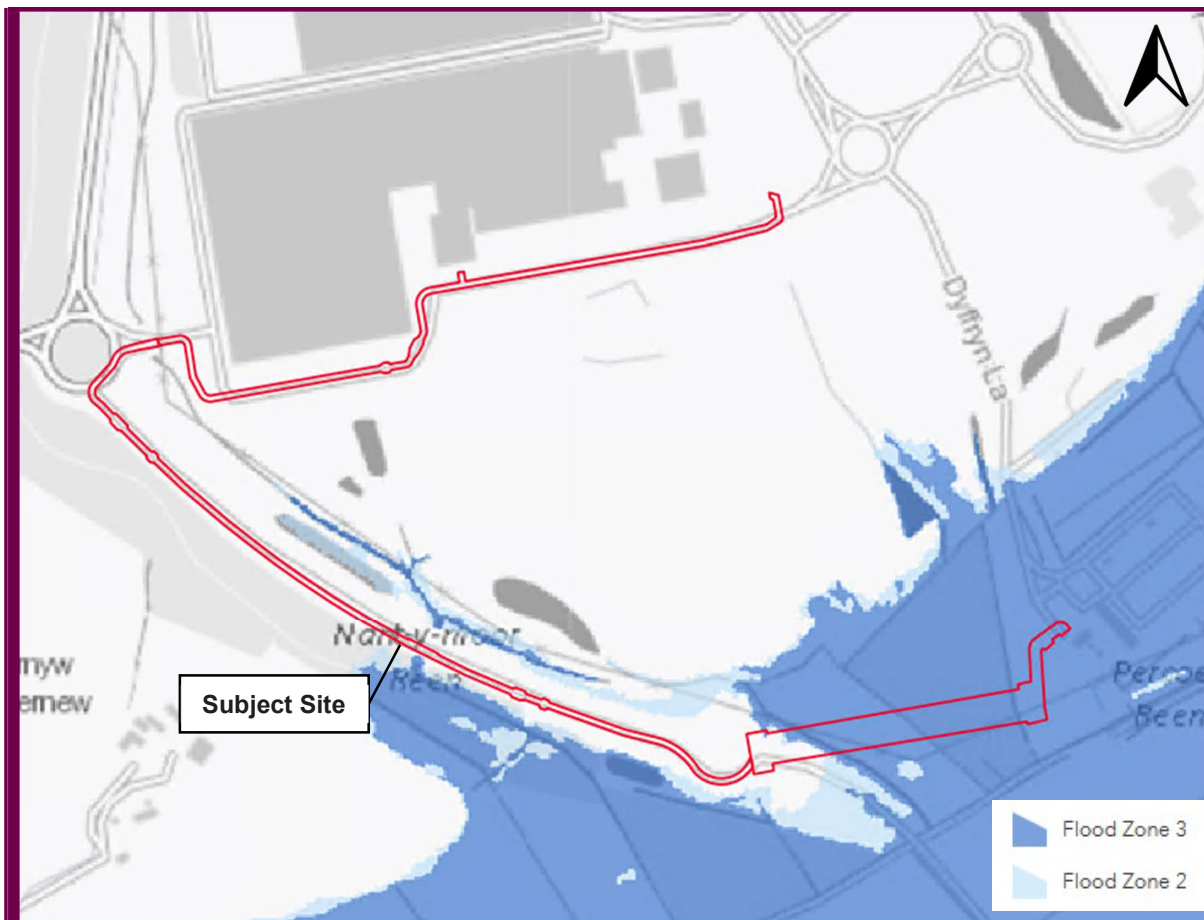
- 6.1.1 The NRW Flood Map for Planning Flood Map for Planning (FMfP) divides Flood Risk into the following categories:

- **Flood Zone 1** are areas with a less than 0.1% (1 in 1000) chance of flooding from rivers and the sea each year, including the effects of climate change.
- **Flood Zone 2** are areas with a combined 0.1% risk of flooding from rivers and the sea including climate change.
- **Flood Zone 3** are areas with a combined 1% risk of flooding from rivers and the sea including climate change.

6.4 These Flood Zones take account of the anticipated impacts of climate change.

6.5 The cable route passes through fluvial Flood Zones 2 and 3 in the south near the proposed substation. The remainder of the cable route passes through area classified as Flood Zone 1.

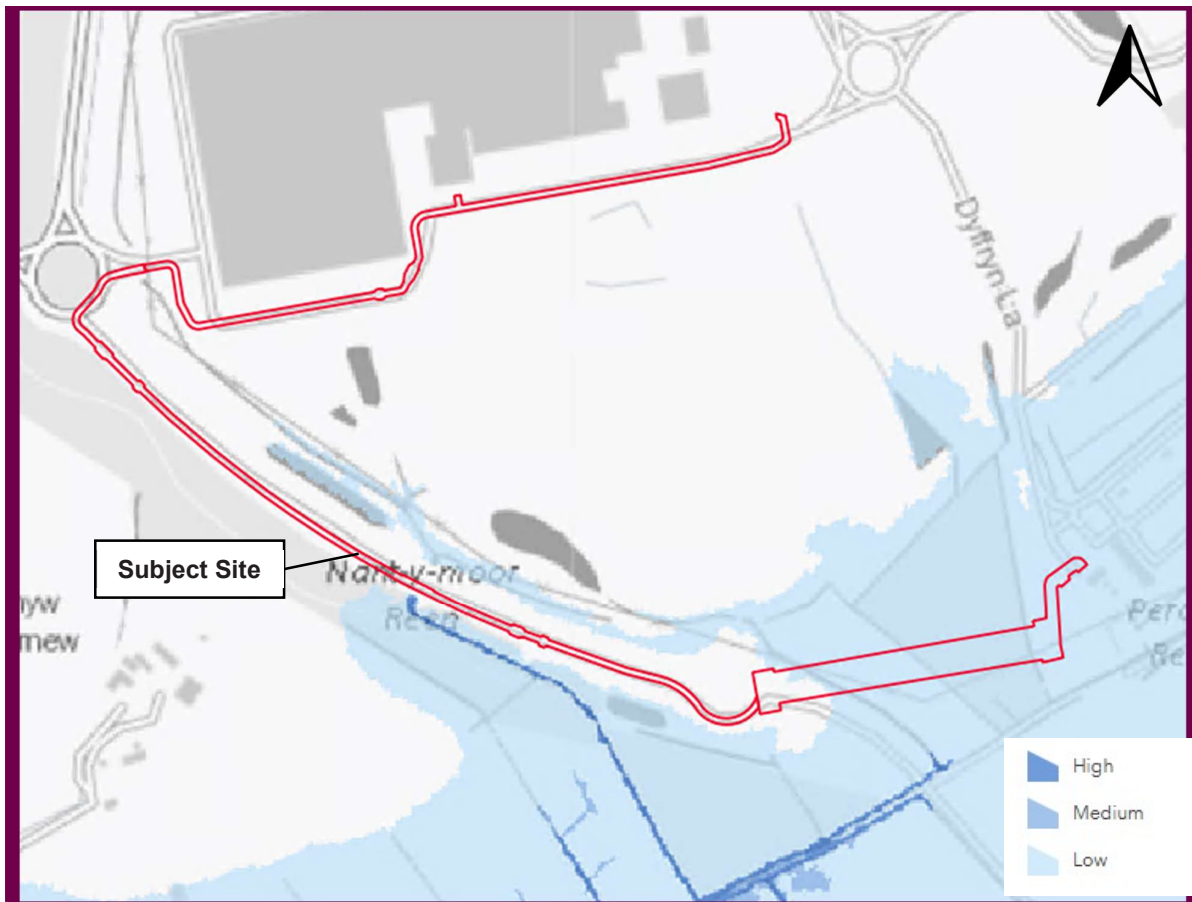
6.6 The NRW FMfP is included as **Figure 3**.



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Figure 3. NRW Flood Map for Planning (Fluvial / River Flooding)

6.7 The NRW's Flood Risk Assessment Wales Mapping indicates that areas in the south of the site are at low risk (chance of flooding of between 1 in 1000 (0.1%) and 1 in 100 (1%)) of flooding from fluvial sources when flood defences are taken into consideration. The NRW Flood Map for Fluvial Flooding is included in Figure 4.



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Figure 4. NRW Flood Risk from Rivers Map

- 6.8 The south of the site is shown on NRW mapping to be in a TAN15 defended zone where defences are shown to have a standard of protection of 100 years (2023) against flooding from rivers.

NRW Fluvial Flood Modelling

- 6.9 As part of the assessment, NRW provided the River Ebbw (2018) Fluvial Model which included gridded results for the following design scenarios:
- Present day: 1 in 2 year, 1 in 5 year, 1 in 10 year, 1 in 30 year, 1 in 50 year, 1 in 75 year, 1 in 100 year, 1 in 200 year and 1 in 1000 year defended scenarios. The undefended 1 in 100 year and 1 in 1000 year were also provided.
 - Future scenario (2117): 1 in 100 year +25% (central allowance) and the 1 in 100 year +70% (upper end allowance) defended scenarios.
- 6.10 The model outputs are included in Appendix A and summarised below.
- 6.11 The site is shown to be flood free during the defended 1 in 100 year +25% (2117 central allowance) event. Flooding is confined to the Percoed Reen 150m east of the site. Depths near the Reen sit between 0.25m and 1m.
- 6.12 During the defended 1 in 100 year +70% (2117 upper end allowance) scenario, flooding is seen in the southeast of the cable route. Depths in the flooded area sit mostly between 0.25m and 1m, within

the ditches present depths sit between 1m and 1.5m. Shallower depths of up to 0.25m are seen where the cable reaches Percoed Lane.

- 6.13 Extents and depths remain similar during the modelled 1 in 100 undefended present day scenario. During the 1 in 1000 year present day undefended scenario, extents increase slightly but depths increase to mostly 0.25m to 1m for the majority of the impacted area.
- 6.14 Once constructed, the cable route will be entirely below ground and therefore will not be impacted by the flood event. During construction, site users should sign up to receive text warnings if a flood is expected (see below in paragraph 6.45) and should not access the site if a warning is received.

Fluvial Inundation Times

- 6.15 Raw model outputs for the defended 1 in 100 2117 +25% (central allowance) and defended 1 in 1000-year present day scenarios from the River Ebbw (2018) model were provided by NRW. As the site is not impacted by the 1 in 100 year +25% climate change event, the present day 1 in 1000 year results were used to gain an understanding of inundation times on site.
- 6.16 During the defended 1 in 1000 year scenario, flood waters do not reach the site until after the 14 hour 40minute after the start of the event. This shows that the lag time of the flood event is relatively long.

Tidal Flood Risk Classification

- 6.17 The NRW's FMfP (for the sea) identifies that the majority of the cable route is classified as Flood Zone 3, whereby the annual probability of flooding is greater than 1 in 200-year (0.5%). Areas in the north also pass through areas of Flood Zone 2 (0.1% to 0.5% (1 in 1000 to 1 in 200) annual probability of flooding from the sea).
- 6.18 The NRW Flood Map for Planning (Tidal/Sea) is included as 5.

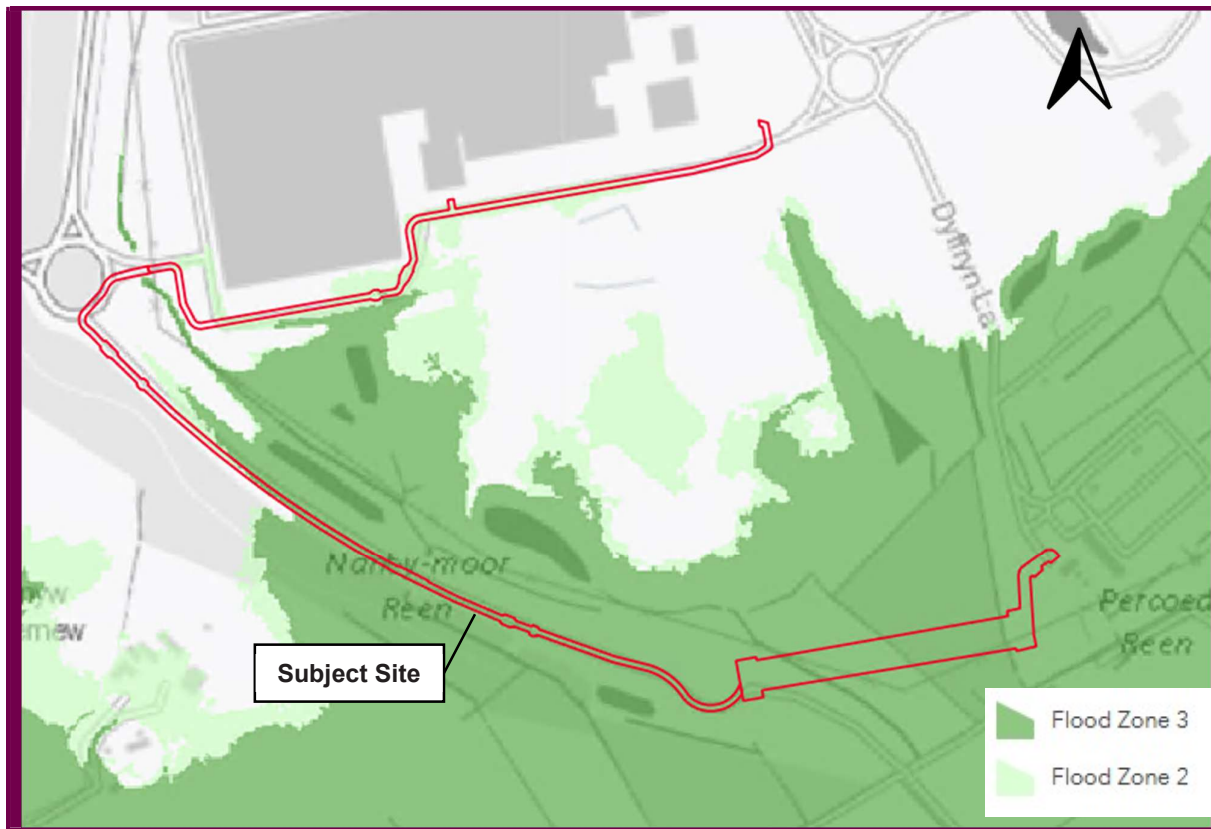


Figure 5. NRW Flood Map for Planning (Tidal / Sea Flooding)

- 6.19 NRW's Flood Risk Assessment Wales Mapping is included in Figure 6 and shows that the majority of the site is at low risk of tidal flooding when flood defences are taken into account.
- 6.20 This corresponds with an annual probability of flooding of between 1 in 1000-year (0.1%) and 1 in 200-year (0.5%).

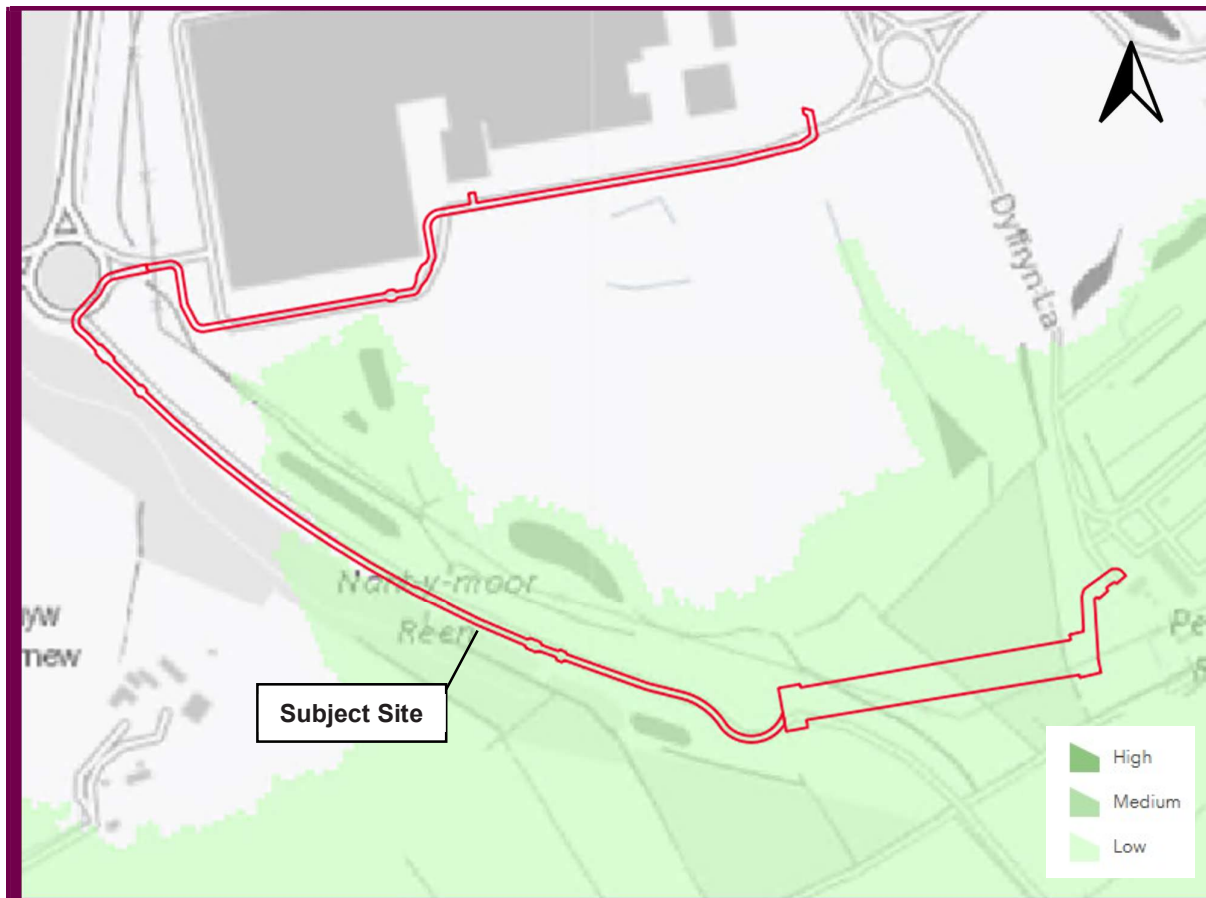


Figure 6. NRW Flood Risk from the Sea Map

- 6.21 The site is shown on NRW mapping to be in a TAN15 defended zone where defences are shown to have a standard of protection of 1000 years (2023) against the sea.

NRW Tidal Flood Modelling

- 6.22 NRW has been consulted for additional information relating to the tidal flood risk to the site. They have provided the Caldicot and Wentlodge (2016) modelling results which RPS has processed and produced flood level mapping. Key information of relevance to this assessment is summarised later in this section, but a formal response regarding modelled flood levels is provided in Appendix A.
- The site is not located within an area where historic flooding has been recorded.
 - The site benefits from protection in the form of an Embankment, assessed in January 2025 to have the condition 'fair'.

Tidal Flooding on Site

- 6.23 Tidal flooding on a site can be seen as the consequence of offshore Extreme Sea Levels (comprising underlying astronomical 'tide' and the passage of a large-scale storm 'surge') being subject to wave action and overtopping then inundating the coastal land.

- 6.24 Extreme Sea Levels are produced from the Coastal Flood Boundary Conditions for the UK Study. The latest study was published in 2018. The Extreme Sea Levels are available as an online dataset³.
- 6.25 Table 3 below shows the 1 in 200-year and 1 in 1,000-year Extreme Sea Levels at the nearest nodes for the site.

Table 3. Extreme Sea levels near the site extracted from the 2018 Coastal Flood Boundary Conditions for the UK Study

396	8.33	8.67
398	8.25	8.59
400	8.18	8.52
402	8.11	8.45



- 6.26 An allowance must be made for the effect of future climate change on tidal flood risk. The way in which climate change should be considered within a FCA is outlined in the Welsh Government Guidance published September 2021⁴.
- 6.27 The guidance states that an appropriate uplift should be applied to the Extreme Sea Levels. The site has a development lifetime of 75 years. The Guidance provides uplift values for the year 2100 therefore this uplift value has been adopted. There are different uplift values for the higher central allowance scenario (70th percentile) and upper end allowance scenario (95th percentile). These uplifts are presented in Table 3 in Section 2.23 above.
- 6.28 Table 4 below shows the 200 year and 1,000 year Extreme Sea Levels with the Upper End allowance scenario (95th percentile) year 2100 uplift of 1.11 m applied.

³ Coastal Design Sea Levels - Coastal Flood Boundary Extreme Sea Levels (2018); Published by the Environment Agency; Last updated: 15 November 2024 ([Coastal Design Sea Levels - Coastal Flood Boundary Extreme Sea Levels \(2018\) - data.gov.uk](https://data.gov.uk/dataset/coastal-design-sea-levels-coastal-flood-boundary-extreme-sea-levels-2018))

**Table 4. Extreme Sea Levels Near the Site with the Upper End Allowance Scenario (95th Percentile)
Year 2100 Uplift of 1.11m Applied**

	396	9.44	9.78
	398	9.36	9.70
	400	9.29	9.63
	402	9.22	9.56
6.29	The next stage of the analysis would be to “translate” these Extreme Sea Levels into on-site flood levels by undertaking wave action and overtopping analysis and inundation assessment. As an alternative to doing this process, the opportunity to use existing hydraulic modelling data results has been investigated as described in the following sections.		
6.30	The NRW has provided the 2016 Caldicot and Wentlooge Coastal Model ⁵ . The hydraulic modelling exercise uses a detailed approach to assess how Extreme Sea Levels manifest into tidal flood levels in-land (i.e. on the site). The modelling considers the way in which offshore waves morph into the nearshore, calculates volumes of wave overtopping, and simulates flood inundation of the land (taking into account the presence or absence of defences). In this way, the modelling can capture how offshore Extreme Sea Levels are modified by the time they reach the site.		
6.31	Due to the age and purpose of the modelling, it does not contain exact equivalent scenarios to those which are required for this 2025 FCA. Since the production of the modelling (in 2016) both the Extreme Sea Levels have changed (these are derived from the Coastal Flood Boundary Conditions for the UK Study which was originally undertaken in 2011 and then updated in 2018) and the climate change uplift magnitudes have been subject to revision. However, there is an opportunity to use the 2016 model results as a proxy for the required 2025 FCA scenarios. A comparison of the events and scenarios in the modelling and the FCA is presented in Table 5, along with the Extreme Water Levels for each.		

Table 5. Extreme Water Levels Comparison Between 2016 NRW Model and 2025 FCA

Version of the Coastal Flood Boundary Conditions for the UK Study dataset from which Extreme Water Levels are taken	2011	2018
	(note: that the modelling approach did undertake a minor revision to the EWL values)	
200-year Extreme Water Level at Newport (node 398)	8.61 m AOD (includes 95% confidence interval of 0.2 m)	8.25 m AOD

1000-year Extreme Water Level at Newport (node 398)	9.13 m AOD (includes 95% confidence interval of 0.4 m)	8.59 m AOD
<i>The above rows show that the 2018 update to the Coastal Flood Boundary Conditions for the UK Study produced lower Extreme Water Levels at Newport compared to the original 2011 version of the Study</i>		
Source of Climate Change Allowance uplift values	Latest guidance available at the time	Welsh Government Guidance published September 2021
Climate Change Horizon considered	Year 2115	Year 2100
Climate Change Confidence Level	95 th percentile	95 th percentile (Upper End)
Climate Change uplift value applied to the Extreme Water Level	1.06 m	1.11 m
<i>The above rows show that the 2016 modelling applies a lower magnitude of uplift than that required for the 2025 FCA.</i>		
200-year Extreme Water Level at Newport (node 398) with Climate Change uplift value applied	9.67 m AOD	9.36 m AOD
1000-year Extreme Water Level at Newport (node 398) with Climate Change uplift value applied	10.19 m AOD	9.70 m AOD
<i>The above rows show that the 2016 modelling uses higher Extreme Water Levels than those required for the 2025 FCA.</i>		

- 6.32 The information in Table 5 above indicates that the 2016 modelling uses higher Extreme Water Levels than those required for the FCA assessment. As such it can be concluded that were the 2025 FCA Extreme Water Levels to be put through the model (i.e. be subjected to wave action and overtopping analysis and inundation modelling) to produce tidal flood risk data at the site, the resulting on-site flood levels would be lower than those provided within the 2016 modelling results. As such, it is appropriate to consider the provided model results in a suitable (conservative) proxy for the required data to inform the 2025 FCA.
- 6.33 Table 6 displays which modelled scenario results have been used as a proxy for the required 2025 FCA scenarios.

Table 6. Modelled Scenario Results Used as Proxy for the required 2025 FCA Scenarios

200-year present day scenario	200-year
200-year Climate Change horizon year 2100 Upper End 95th percentile confidence level scenario	200-year Climate Change horizon year 2115 95th percentile confidence level scenario
1000-year present day scenario	1000-year
1000 year Climate Change horizon year 2100 Upper End 95th percentile confidence level scenario	1000-year Climate Change horizon year 2115 95th percentile confidence level scenario

6.34 As discussed in the section above, the model results are being used as a proxy for this 2025 FCA required scenarios. The model results are presented in Appendix A and the impacts on the cable route are summarised below:

- During the 1 in 200 year present day defended scenario, the cable route remains flood free.
- During the 1 in 200 year CC defended scenario, flooding is seen in the south of the cable route and along the Nant-y-moor reen. Depths in flooded areas sit between 0.25m and 1m, depths within the tributaries of Percoed Reen and the Nant-y-moor reen are shown to be between 1m-1.5m.
- During the 1 in 1000 year present day defended scenario, the cable route remains flood free.
- During the 1 in 1000 year CC defended scenario, flooding is seen in the south of the cable route and extends up the existing access along Percoed Lane. Depths in flooded areas exceed 2.5m in the south of the site and sit between 0.25m and 1m along the south extent of the existing Percoed Lane.
- During the 1 in 200 year present day undefended scenario, flooding is seen in the south of the cable route and extends up the existing access along Percoed Lane. Depths in flooded areas exceed 2.5m in the south of the site and are between 0.25m and 1m along the south extent of the existing Percoed Lane.
- During the 1 in 200 year CC undefended scenario, flooding is seen in the majority of the south of the cable route, with depths over 2.5m present. Depths between 1.5m and 2m are also seen along Percoed Lane. Flooding is seen in the north of the cable route, where the cable ajoin to the existing data centre, depths of between 0.25m and 1m are seen.
- During the 1 in 1000 year present day undefended scenario, flooding is seen in the south of the cable route and extends up the existing access along Percoed Lane. Depths in flooded areas exceed 2.5m in the south of the site and sit between 0.25m and 1m along the south extent of the existing Percoed Lane

- During the 1 in 1000 year CC undefended scenario, flooding is seen in the majority of the cable route is flooded with depths over 2.5m. Depths between 1.5m and 2m are also seen along Percoed Lane. Flooding is seen in the north of the cable route, where the cable joins to the existing data centre, depths are shown to reach between 1 and 1.5m

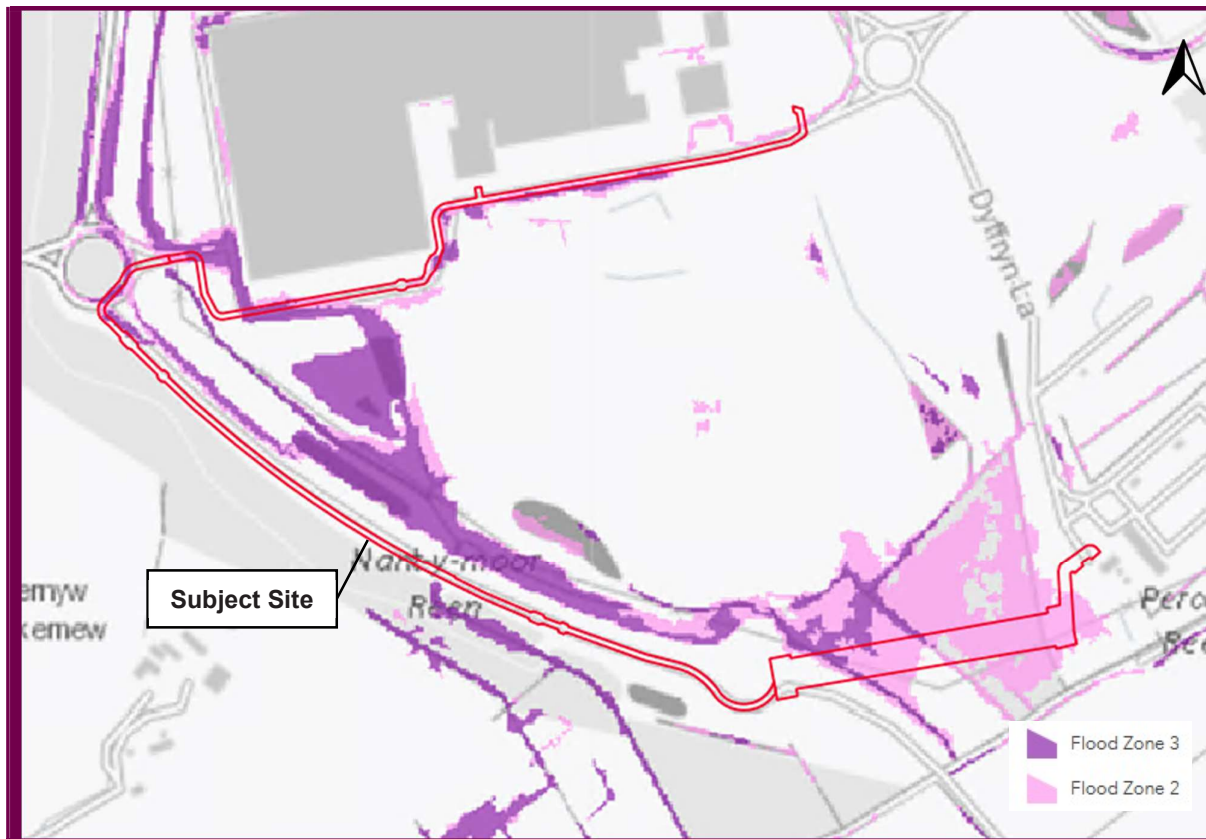
- 6.35 Once constructed, the cable route will be entirely below ground and therefore will not be impacted by the flood event. During construction, site users should sign up to receive text warnings if a flood is expected (see below in paragraph 6.45) and should not access the site if a warning is received.
- 6.36 It is recommended that a Flood Evacuation Plan is produced for construction workers on site.

Tidal Inundation Modelling

- 6.37 The NRW Caldicot and Wentlodge (2016) model included inundation raw data files for defended climate change scenarios only. RPS processed and produced flood inundation mapping using GIS and TUFLOW.
- 6.38 Inundation mapping shows that for the 1 in 200-year Climate Change horizon year 2100 Upper End 95th percentile confidence level event, flood waters from the coast flow through small drains and rivers within the Wentlodge Levels. Water begins to spill out of the Percoed Reen to the southeast of the site 16hours after the start of the event however, water does not encroach the site until the 21hour 30 minutes. Most of the site is inundated with flood waters by 27hours.

Surface Water Flood Risk Classification

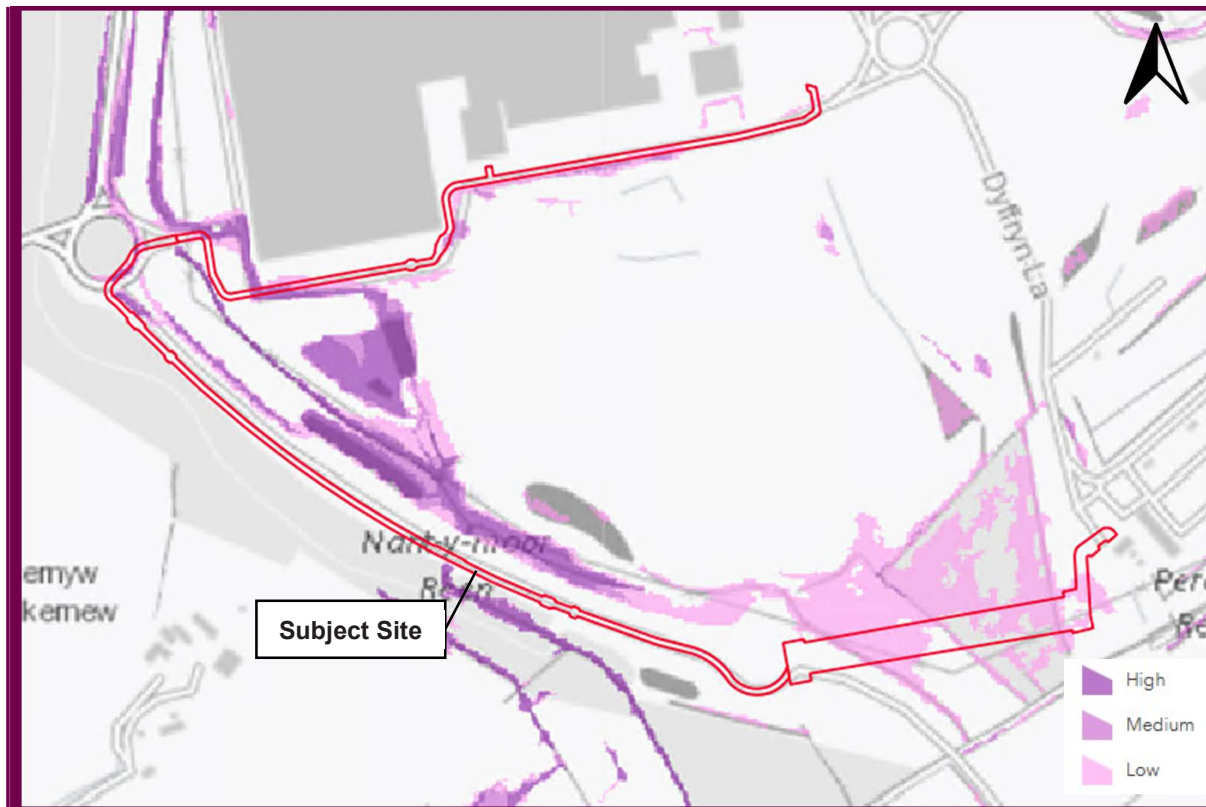
- 6.39 The NRW's Flood Map for Planning includes Flood Zones for surface water and small watercourses with consideration for climate change and how it will affect flood risk extents over the next century and is provided in Figure 7.
- 6.40 The NRW's Flood Map identifies that the majority of the site is classified as Flood Zone 1, whereby the annual probability of flooding is less than 1 in 1,000-year (0.1%). Small areas within the north and southern extents of the site are located within Flood Zone 2 (annual probability of flooding that is between 1 in 1,000-year and 1 in 100-year (1%)) and Flood Zone 3 (annual probability of flooding that is more than 1 in 30-year (3.3%).



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Figure 7. NRW Flood Map for Planning (Pluvial / Surface Water Flooding)

- 6.41 NRW's Flood Risk Assessment Wales Mapping provides surface water flood extents for the 1 in 30, 1 in 100 and 1 in 1,000-year return periods.
- 6.42 The mapping indicates that the majority of the site has a negligible risk of surface water flooding. There are small areas of 'low' risk that exist in the south of the site near existing ditches, corresponding to a chance of flooding between 1 in 1000 (0.1%) and 1 in 100 (1%). Areas of high risk are seen in the north of the site, corresponding to a chance of flooding greater than 1 in 30 (3.3%).
- 6.43 The NRW Flood Risk from Surface Water Map is provided in Figure 8.



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Figure 8. NRW Surface Water Flood Risk Map

Reservoir Flood Risk Classification

- 6.44 NRW's Flood Risk Assessment Wales Mapping also indicates that the site is not located within an area potentially at risk from reservoir flooding.

Flood Warning and Flood Alert Areas

- 6.45 The site is in the Flood Warning Area for Coast at the Wentlooge Levels in the Newport Area, and the Flood Alert Area for Coast from Aberthaw to Severn Bridge.

Local Authority Flood Risk Documents

- 6.46 The Newport City Council PFRA was published in April 2011 with an addendum in 2017 confirming no significant flood events or new information regarding future climate change has occurred since the first publication. It provides an overview of flood risk from various sources within the borough. Information relevant to this assessment is summarised below:

- One Welsh Water sewer flood incident was recorded approximately 500m north of the site.
- On a strategic scale in Newport, groundwater is not considered to be a significant flood risk and is considered to rise and fall relatively slowly. In addition, the local geology is not considered to yield significant volumes of groundwater;
- Newport City Council own and maintains two reservoirs within their authority boundary, however, there are no records of flooding from these water bodies.

7 HYDROGEOLOGICAL SETTING

- 7.1 British Geological Survey (BGS) online mapping (1:50,000 scale) indicates that the site is situated on the following superficial deposits:
- Tidal Flat Deposits comprising clay and silt (south)
 - Alluvium comprising clay, silt and gravel (centre)
 - River Terrace Deposits comprising sand and gravel (north)
- 7.2 The south half of the site is underlain by a bedrock of mudstone belonging to the Mercia Mudstone Group and the north half of the site is situated on a bedrock of argillaceous rocks and sandstone belonging to the St Maughans Formation.
- 7.3 The nearest BGS borehole records to the site are private and could not be accessed. The nearest available borehole (BGS Reference: ST28SE170) is approximately 40m south of the site confirms the presence of clay and silt, and also peat approximately 3.5m below ground level (bgl). The record states no groundwater was encountered.
- 7.4 The soils are described as 'loamy and clayey soils of coastal flats with naturally high groundwater' in the south and 'Freely draining slightly acid loamy soils' in the north by the National Soils Research Institute.
- 7.5 According to the BGS GeoIndex Aquifer Designation Mapping, the Tidal Flat Deposits at the surface in the south are classified as Unproductive Strata. These formations have a low permeability and have negligible significance for water supply or base flow. Superficial deposits in the south are classified as a Secondary A Aquifer, which generally support water supply and base river flow on a local scale.
- 7.6 The bedrock deposits in the south of the site are classified as a Secondary B Aquifer. These formations are generally formed of lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering. The bedrock deposits in the north half of the site are classified as a Secondary A Aquifer, which generally support water supply and base river flow on a local scale.
- 7.7 NRW online groundwater Source Protection Zone (SPZ) mapping indicates that the site is not located within a groundwater SPZ.
- 7.8 NRW online groundwater vulnerability mapping shows that the site can be considered to have 'Low' vulnerability.

8 FLOOD RISK AND MITIGATION

- 8.1 The key sources of flooding that could potentially impact the site are discussed below:

Fluvial Flooding

- 8.2 The NRW Flood Map for Planning, as seen in Figure 2, indicates that the cable route passes through Flood Zones 2 and 3. The annual probability of flooding is classified as being greater than 1 in 100 (1%) in the absence of any defences.
- 8.3 NRW's Flood Risk Assessment Wales Mapping indicates that areas in the south of the site are at low risk (chance of flooding of between 1 in 1000 (0.1%) and 1 in 100 (1%)) of flooding from fluvial sources when flood defences are taken into consideration.
- 8.4 The site is located within the TAN15 defended zone, defended from rivers. The standard of protection is shown on NRW mapping to be 100 years for fluvial flooding. There are culverts along the Percoed Reen to the south of the site, these are classified as fluvial defences.
- 8.5 NRW provided the fluvial River Ebbw (2018) model as part of the assessment, and outputs of the data received are included in Appendix A.
- 8.6 The site is shown to be flood free during the defended 1 in 100 year +25% (2117 central allowance) scenario. When considering the upper end allowance of 70%, During the defended 1 in 100 year +70% (2117 upper end allowance) scenario, flooding is seen in the southeast of the cable route. Depths in the flooded area sit mostly between 0.25m and 1m, within the ditches present depths sit between 1m and 1.5m. Shallower depths of up to 0.25m are seen where the cable reaches Percoed Lane.
- 8.7 No climate change scenarios are available for the undefended scenarios. Extents and depths remain similar during the modelled 1 in 100 undefended present day scenario. During the 1 in 1000 year present day undefended scenario, extents increase slightly but depths increase to mostly 0.25m to 1m for the majority of the impacted area
- 8.8 The site is not located within an area where historic fluvial flooding has been recorded on NRW mapping.

Tidal Flooding

- 8.9 The majority of the cable route is classified as Flood Zone 3, whereby the annual probability of flooding is greater than 1 in 200-year (0.5%). Areas in the north also pass through areas of Flood Zone 2 (0.1% to 0.5% (1 in 1000 to 1 in 200) annual probability of flooding from the sea). However, NRW's Flood Risk Assessment Wales Mapping shows that the majority of the site is at low risk of tidal flooding when flood defences are taken into account.
- 8.10 No historical flood records are held at the site.
- 8.11 As the site is in the presence of defences in 'fair' condition and with a standard of protection of 1000 years for tidal flooding, the defended scenario flood levels and these figures have been used to inform development design and mitigation measures.
- 8.12 As outlined in Section 6, the Caldicot and Wentlooge Coastal Modelling (2016) results are being used as a (conservative) proxy for the required 2022 FCA scenarios. As the site benefits from defences, the defended scenarios have been summarised below.

200-year present day defended scenario

- The site remains flood free.

200-year Climate Change horizon year 2100 Upper End 95th percentile confidence level defended scenario

- Flooding is seen in the south of the cable route and along the Nant-y-moor reen. Depths in flooded areas sit between 0.25m and 1m, depths within the tributaries of Percoed Reen and the Nant-y-moor reen are shown to be between 1m-1.5m..

1000-year present day defended scenario

- The site remains flood free.

1000-year Climate Change horizon year 2100 Upper End 95th percentile confidence level defended scenario

- Flooding is seen in the south of the cable route and extends up the existing access along Percoed Lane. Depths in flooded areas exceed 2.5m in the south of the site and sit between 0.25m and 1m along the south extent of the existing Percoed Lane.

Proposed mitigation

- 8.13 Site users should sign up to receive flood warnings and avoid accessing the site if a flood warning is received.
- 8.14 Once constructed, the cable route will be entirely below ground and therefore will not be impacted by the flood event. During construction, site users should sign up to receive text warnings if a flood is expected and should not access the site if a warning is received.
- 8.15 It is recommended that a Flood Management Plan is prepared for site management and staff during construction, with instructions on appropriate measures to take in case of flooding. This will ensure the safeguarding of personnel in the event of a potential inundation. This will be produced in association with the detailed drainage design.
- 8.16 It is also recommended that during construction, temporary construction compounds are located outside of modelled flood extents.

Flooding from Sewers

- 8.17 Sewer flooding can occur during periods of heavy rainfall when a sewer becomes blocked or is of inadequate capacity.
- 8.18 There are no historic flood incidences from sewers recorded at the site.
- 8.19 The risk from sewer flooding can be considered low.

Surface Water Flooding (Overland Flow)

- 8.20 This can occur during intense rainfall events when water cannot soak into the ground or enter drainage systems.
- 8.21 NRW's Flood Map identifies that the majority of the site is classified as Flood Zone 1, whereby the annual probability of flooding is less than 1 in 1,000-year (0.1%). Small areas within the north and southern extents of the site are located within Flood Zone 2 (annual probability of flooding that is between 1 in 1,000-year and 1 in 100-year (1%)) and Flood Zone 3 (annual probability of flooding that is more than 1 in 30-year (3.3%).
- 8.22 As the development is a cable route, it is considered that all development will be below ground and after construction, the surface will be restored and there will be no changes to the existing surface topography and therefore no impact on surface water flows.

8.23 Due to the nature of the development the use of Sustainable Drainage Systems (SuDS) is not considered to be required.

8.24 Therefore, the risk of surface water flooding can be considered low.

Groundwater Flooding

8.25 This can occur in low-lying areas when groundwater levels rise above surface levels, or within underground structures.

8.26 BGS mapping indicates the site is underlain by superficial Tidal Flat Deposits which are described as comprising Clay and Silt. The site is shown to be further underlain by bedrock deposits from the Mercia Mudstone Group which is described as comprising Mudstone.

8.27 The Newport City Council Preliminary Flood Risk Assessment suggests that groundwater is not considered to be a significant risk and is considered to rise and fall relatively slowly. In addition, the PFRA notes the local geology is not considered to yield significant volumes of groundwater.

8.28 Based on the above the risk associated with groundwater flooding is assessed as low.

Other Sources

8.29 There is a limited risk of flooding occurring as a result of a break in a water main.

8.30 The risk of flooding associated with reservoirs, canals and other artificial structures is considered to be low given the absence of any such structures in the site vicinity.

Event Exceedance

8.31 The mitigation measures proposed as part of the development scheme are considered appropriate to help mitigate against event exceedance scenarios.

9 FLOOD RISK VULNERABILITY CLASSIFICATION

Vulnerability Classification

- 9.1 In accordance with TAN 15 (2025), the proposed development is classified as a ‘Less Vulnerable’ (All other types) development in flood risk terms.
- 9.2 The required design standard for new development is to be flood free during the 1% river flood (i.e. a flood with a 1 in 100 chance of occurring in any year) and the 0.5% flood from the sea (i.e. a flood with a 1 in 200 chance of occurring in any year), plus an allowance for climate change over the lifetime of development.

Table 7. Flood events in which a development must remain flood free

	Rivers	Sea
Highly Vulnerable	Emergency Services	0.1% +CC
	All other types	0.1% +CC
Less Vulnerable Development		
Water Compatible Development that may be occupied by people	1% +CC	0.5% +CC

Key: 0.1% = 1 in 1000, 1%= 1 in 100, 0.5%= 1 in 200

- 9.3 As the site is classed as ‘Less Vulnerable’ and is shown on the Flood Map for Planning to be at risk of tidal flooding, the development will need to remain flood free during the 0.5% +CC event. The site is also shown to be at risk of fluvial flooding, therefore it needs to remain flood free during the 1% +CC event from this source.
- 9.4 The proposed development is for a below ground cable route, there will be no above ground infrastructure as a result of the development therefore it is not considered to be at risk of flooding.
- 9.5 After construction the development will be below ground, therefore it is considered disproportionate to carry out breach modelling.

10 SUMMARY AND CONCLUSIONS

10.1 The aim of the FCA is to outline the potential for the site to be impacted by flooding, the potential impacts of the development on flooding both onsite and in the vicinity, and the proposed measures which can be incorporated into the development to mitigate the identified risks and any consequences. The report has been prepared in accordance with the guidance detailed in the emerging TAN15. Reference has also been made to the CIRIA SuDS manual (C753) and following consultation with NRW.

10.2 The potential flood risks to the site, and the measures proposed to mitigate the identified risks, are summarised in **Error! Reference source not found. 8**.

Table 8. Proposed mitigation

Source of Flooding	Identified Risk			Mitigation Proposed	Residual Risk		
	L	M	H		L	M	H
Fluvial	✓			Not considered to be at significant risk	✓		
Tidal	✓				✓		
Fluvial & Tidal during construction		✓		Construction workers to sign up to receive NRW Flood Warnings and Alerts Flood Management Plan for Construction Site Users	✓		
Sewers	✓			Not considered to be at significant risk	✓		
Surface Water	✓				✓		
Groundwater	✓				✓		
Other Sources (e.g. reservoirs, water mains)	✓				✓		

10.3 The installation of below ground cables will be temporary in nature, with no permanent above ground land structures proposed. Some areas for construction works are not within previously developed land however, there will be no changes to existing land use. The cable route corridor does not increase flood risk to the surrounding area and has negligible of flooding to and from the development. An ordinary watercourse consent will be required for the proposed watercourse crossings.

10.4 It is recommended that a Flood Management Plan is prepared for site management and staff during construction, with instructions on appropriate measures to take in the instance of a flood. This will ensure the safeguarding of personnel in the event of a potential inundation. This will be produced in association with the detailed drainage design.

10.5 It is also recommended that during construction, temporary construction compounds are located outside of modelled flood extents.