

Translink 16E Coastal Defence Flood Risk Assessment

Draft Report

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Prepared for:
Amey Consulting

www.jbaconsulting.com

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Abbreviations

AEP	Annual Exceedance Probability
AFS	Areas for Further Study
APSFR	Areas of Potential Significant Flood Risk
DARD	Department of Agriculture, Environment and Rural Affairs
DfI	Department for Infrastructure
EA	Environment Agency
FRA	Flood Risk Assessment
GIS	Geographical Information Systems
NI	Northern Ireland
OSNI	Ordnance Survey Northern Ireland
OS NGR	Ordnance Survey National Grid Reference
SoP	Standard of Protection
SPPS	Strategic Planning Policy Statement
SuDS	Sustainable Drainage Systems

Executive Summary

Background and site context

JBA Consulting were commissioned by Amey Consulting to undertake a Flood Risk Assessment (FRA) for the proposed coastal protection at the City of Derry Airport. The proposed site is located within the City of Derry Airport. It is situated northwest of Greysteel and the North Sea is just north of it. The site comprises part of the railway line and a small area of the airport. The proposed development includes a coastal protection. This involves new rock armour to tie into the existing grass embankment tie in either side of the new rock armour revetment formed in a double interlocking rock layer.

The site is very low lying and there is a slope from south to north towards the sea. The site itself has a elevation between 0 and 2m.

The site is underlain by Roe Valley Group: sandstone and conglomerate, interbedded. Overlying superficial deposits of Intertidal deposits – clay, silt, sand and gravel are present. There are boreholes present within the airport approximately 1km southwest of the site with a depth of 15m.

An unnamed river, sourced from the sea, culverts underneath the site in the east and there are unnamed watercourses north and south of the site boundaries. The North Sea is north of the site.

Flood risk

- The Department for Infrastructure historic flood map shows that there has been historical flooding in the eastern area of the site. According to satellite imagery, there are also historical flood events north and south of the western area of the site.
- Fluvial flooding is predicted to impact the centre of the site and in patches towards the east, parallel to the nearby airport. This is due to the river which culverts under the railway. The fluvial climate change flooding has a larger extent in the centre of the site.
- The whole site, except a small patch in the east, is impacted by present day and climate change tidal flooding. This is due to the close proximity to the coast.
- During both present day and climate change 1 in 200-year rainfall events, there is surface water flooding and pooling in the centre and west of the site. This is due to surface water following the topographic slope to the north but pooling south of the railway line as there is no clear flow path.
- According to the GSNI, the groundwater vulnerability over most of the site is classed as 2 where 5 is the highest class of vulnerability. Although, groundwater vulnerability of 4e is observed parallel to the site. Class 4 is subdivided into the nature of the pathway, and 4e is where superficial aquifers are present. Given

the sites proximity to the North Sea and the presence of underlying aquifers just south of the site, it is likely that relatively shallow groundwater is present beneath the site. As a result, the risk of groundwater flooding at the site is considered to be medium.

- The site is not located within an urban area and is surrounded by greenfield land. Therefore, the risk of sewer flooding is assessed as low.
- Reservoir flood mapping shows that the site and vicinity around the site is not at risk from reservoir flooding.

Recommendations

- Provision of safe access and egress routes for the period in which the coastal defences are being built so that builders and the machinery being used can egress from the site without damage or loss.
- Provision of an evacuation plan if deemed necessary and utilise the weather, flood risk and flood incidents platforms.

1 Introduction

1.1 Terms of reference

JBA Consulting were commissioned by Amey Consulting to undertake a Flood Risk Assessment (FRA) for the proposed coastal flood defence at the City of Derry Airport.

This FRA provides information on all aspects of flood risk pertaining to the site in accordance with the revised Planning Policy Statement 15 – Planning & Flood Risk development and flood risk. It also considers the flood risk mitigation relevant to the nature of the proposed development and the Flood Zone classification of the site.

The flood risk to and from the site has been determined from publicly available information and a review of the site topography.

1.2 FRA requirements

It is a requirement for development applications to consider the potential risk of flooding from various sources to a proposed development over its lifetime and any possible impacts on flood risk elsewhere as a result of the development.

Where appropriate, the following aspects of flood risk should be addressed and the extent to which the development is designed to deal with flood risk:

- the nature and expected lifetime of the development and the extent to which the development is designed to deal with flood risk;
- the area liable to flooding from various sources;
- the probability of the current and future flood risk;
- the extent and standard of existing flood defences and their effectiveness over time;
- the likely depth of flooding;
- the rates of predicted flows;
- the likelihood to impacts on other areas, properties, and habitats; and
- the effects of climate change.

The level of flood risk to the site has been determined based on open license flood risk datasets provided by the Department for Infrastructure (DfI) of the Northern Ireland Executive.

2 Study Area

2.1 Existing site

The proposed site is located within the City of Derry Airport. It is situated northwest of Greysteel and the North Sea is just north of it. The site comprises part of the railway line and a small area of the airport.

Table 2-1: Summary of site details

Site Name	City of Derry Airport
Site area	3.87 ha
Existing site use	Railway line
OS NGR	NV 71533 84365
Country	Northern Ireland
Local Government District	Derry City and Strabane



Figure 2-1: Site location plan

2.2 Proposed development

The proposed development includes coastal protection, including new rock armour to tie into the existing grass embankment either side of the new rock armour revetment formed in a double interlocking rock layer.

The proposed development layout is shown in Appendix A.

2.3 Topography

The Northern Ireland Topographic map has been used to provide a topographical visualisation of the wider area and is shown in **Error! Not a valid bookmark self-reference..** The site is very low lying and there is a slope from south to north towards the sea. The site itself has an elevation between 0 and 2m.

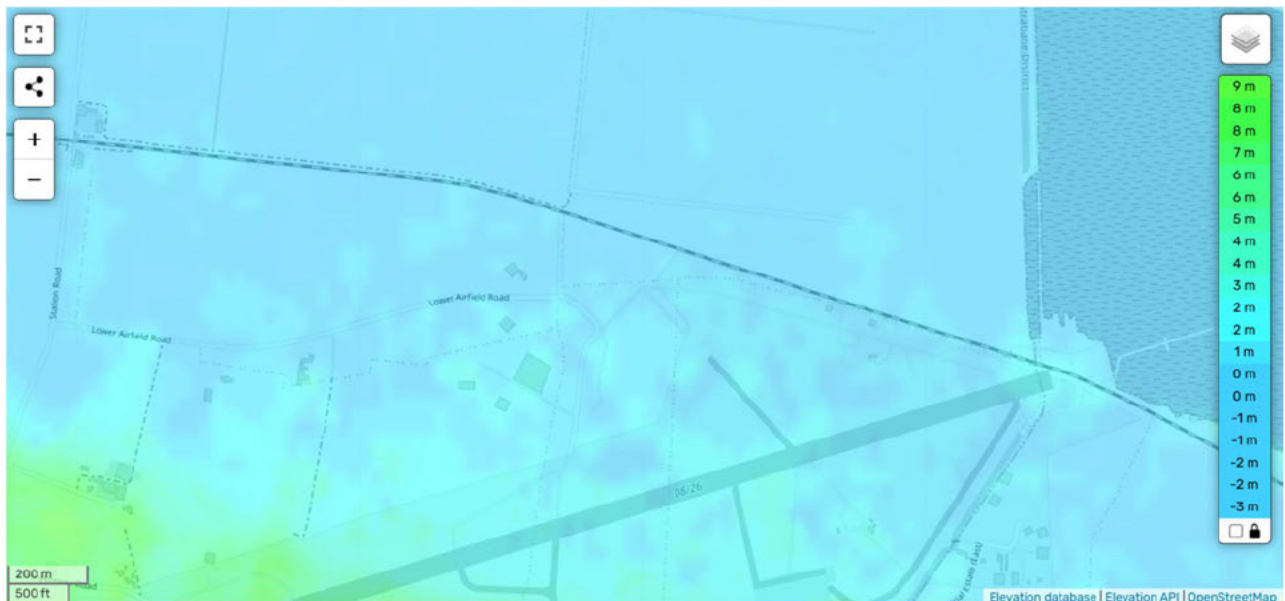


Figure 2-2: Northern Ireland Topographic Map

2.4 Geology

The Geological Survey of Northern Ireland mapping indicates that the site is underlain by Roe Valley Group: sandstone and conglomerate, interbedded. Overlying superficial deposits of Intertidal deposits – clay, silt, sand and gravel are present.

There are boreholes present within the airport approximately 1km southwest of the site with a depth of 15m.

2.5 Watercourses and defences

DfI and Ordnance Survey (OS) mapping have been used to identify the locations of watercourses within and around the development site.

An unnamed river, sourced from the sea, culverts underneath the site in the east and there are unnamed watercourses north and south of the site boundaries. The North Sea is north of the site.

As seen in

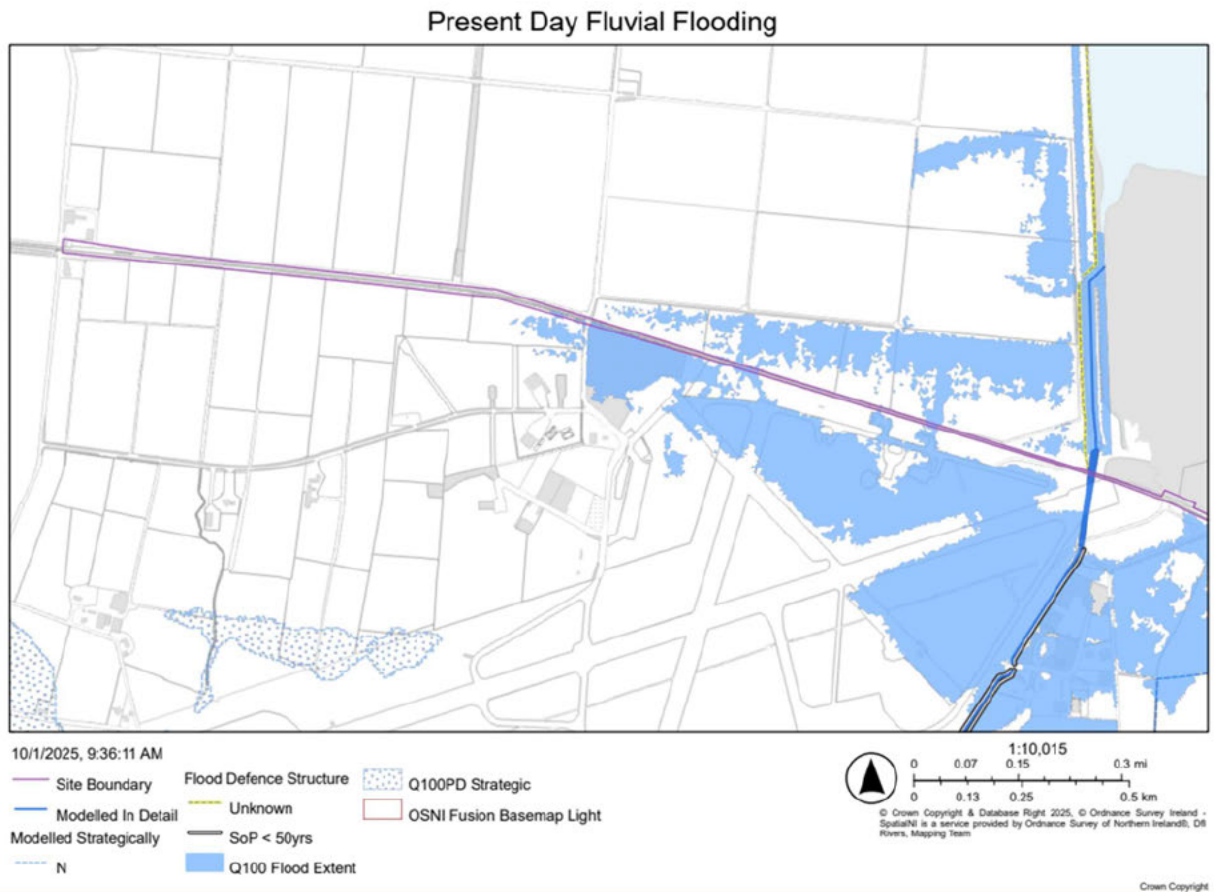


Figure 4-2, there is currently a fluvial defence south of the site which has a standard of protection (SoP) of <50 years. There is also a coastal defence with an unknown SoP north of the site.

Watercourses



Figure 2-3: Surrounding watercourses

3 Planning Policy and Flood Risk

3.1 The Strategic Planning Policy Statement (SPPS)

The Strategic Planning Policy Statement (SPPS) consolidates some twenty separate policy publications into one document and sets out the Department's policy on important planning matters that should be addressed across Northern Ireland. It also provides the core planning principles to underpin delivery of the two-tier planning system with the aim of furthering sustainable development. It sets the strategic direction for councils to bring forward detailed operational policies within their new Local Development Plans.

The SPPS has a statutory basis under Part 1 of the Planning Act (Northern Ireland) 2011 which requires the Department to formulate and co-ordinate policy for securing the orderly and consistent development of land and the planning of that development.

3.2 PPS15 Planning and Flood Risk

Planning Policy Statement 15 sets out the Department of Agriculture, Environment and Rural Affairs (DARD) approach to managing flood risk through the planning system in Northern Ireland:

The primary aim of the revised PPS 15 remains: *“to prevent future development that may be at risk from flooding or that may increase the risk of flooding elsewhere”*.

3.2.1 Policy FLD1

Development will not be permitted within the 1 in 100 year fluvial flood plain (AEP of 1%) or the 1 in 200 year coastal flood plain (AEP of 0.5%) unless the applicant can demonstrate that the proposal constitutes an exception to the policy.

Where the principle of development is accepted by the planning authority through meeting the 'Exceptions Test', as set out below under the Exceptions heading, the applicant is required to submit a Flood Risk Assessment for all proposals. Planning permission will only be granted if the Flood Risk Assessment demonstrates that:

- a) All sources of flood risk to and from the proposed development have been identified; and
- b) There are adequate measures to manage and mitigate any increase in flood risk arising from the development.

Relevant exceptions:

Water compatible development such as for boat mooring, navigation and water based recreational use, which for operational reasons has to be located within the flood plain.

3.3 Climate change allowances

The DfI explain when and how flood risk assessments should be used. This includes demonstrating how flood risk will be managed now and over the development's lifetime, taking climate change into account.

IN February 2019, the DfI released technical flood risk guidance which consolidates and where appropriate, updates existing guidance on allowances for Climate Change and is designed to assist engineers and other professionals in their considerations of flood risk.

Unlike England & Wales for which the EA have based Climate Change allowances on River Basin Districts, it is considered that single allowances (e.g. for additional flow or rainfall intensity) are appropriate, covering all of Northern Ireland because of its relative small size, UKCP09 information does not vary significantly across the Province.

3.3.1 Guidance on allowances for Climate Change in undertaking Hydrological and Hydraulic modelling / design – FLUVIAL

It is generally recommended for the fluvial (river) context throughout NI, that a single Climate Change allowance of +20% additional flow is applied to the estimated 'Present Day' 100-year peak flow. This is the predicted allowance for the 2080s epoch

3.3.2 Guidance on allowances for Climate Change in undertaking Hydrological and Hydraulic modelling / design – COASTAL

The key physical components contributing to coastal flooding are listed as follows:

- Predicted astronomical tide
- Storm surge residual
- Wave / fetch effects
- Local bathymetric and topographic effects

The 'Tidal Hazard' information available on the DfI's GIS provides both 'Present Day' and estimated 'Climate Change' coastal levels for the 2080s epoch (Medium Emissions) for 3 levels of confidence namely 5%, 50% and 95%. It is recommended for normal Flood Risk Assessments that the 50 percentile Relative Sea Level should be used. Where a strategically important development is being designed or assessed for climate impacts or, where risk to life or major economic losses could occur should design levels be overtopped, it may be more precautionary to use allowances based on a higher percentile.

3.3.3 Guidance on allowances for Climate Change in undertaking Hydrological and Hydraulic modelling / Watercourse Storm Drainage design – PLUVIAL

In line with latest technical guidance, it is recommended that Climate Change is considered in modelling and design of Watercourse infrastructure to address pluvial

(surface water) flooding and that a +20% allowance should be applied to 'Present Day' peak flows or peak rainfall intensity.

3.4 Policy review

3.4.1 Derry City and Strabane Local Development Plan 2032

The Council's LDP Strategy for Development and Flooding, in accordance with the above documents, is to have a precautionary approach to development within flood-prone areas. Our policy approach will be to avoid inappropriate development within areas of flood risk and areas that may increase flooding elsewhere, protect our key assets from risk of flooding and to minimise and manage the risk of flooding. This LDP will be in line with regional policy whereby only suitable types of development will be permitted across our District, to align with the Strategic Growth Plan and the Council's emerging Climate Change Adaptation Plan.

3.4.2 Northern Ireland Flood Risk Assessment (NIFRA) 2018

The objectives of this report are:

- To update the existing analysis of locations within Northern Ireland identified during the first cycle of Flood Risk Management Planning to be Areas of Potential Significant Flood Risk (APSFR) or Areas for Further Study (AFS); and
- Utilising current flood hazard and flood risk mapping and available or readily derivable information, to produce a revised flood risk assessment identifying those areas where the potential impact of flooding is most significant, i.e. APSFR.

3.4.3 Northern Ireland Flood Risk Management Plan 2021-2027

The Flood Risk Management Plan Measures give consideration to:

- Prevention of increased flood risk through appropriate land use planning;
 - Keep development outside of flood risk areas.
 - Surface water management.
 - SuDS.
- Protection of communities and the environment by provision of schemes and approaches to reduce the likelihood and severity of flooding;
 - New Flood Alleviation Schemes.
 - Maintenance of the Existing Drainage and Flood Defence Network.
 - Catchment Based Natural Flood Management
- Preparedness arrangements to improve dealing with flooding when it occurs.

- Flood Emergency Planning and Response.
- Flood Warning and Informing.
- Communication of Flood Risk.

4 Assessment of Flood Risk

4.1 Historic flooding

The Department for Infrastructure historic flood map shows that there has been historical flooding in the eastern area of the site. According to satellite imagery, there are also historical flood events north and south of the western area of the site.

The FRMP noted previous flooding within Londonderry in 1987, 2004, 2015 and 2017 due to heavy rainfall overwhelming drainage systems and rivers. Although, there has been no specific mention about the area where the site is situated.

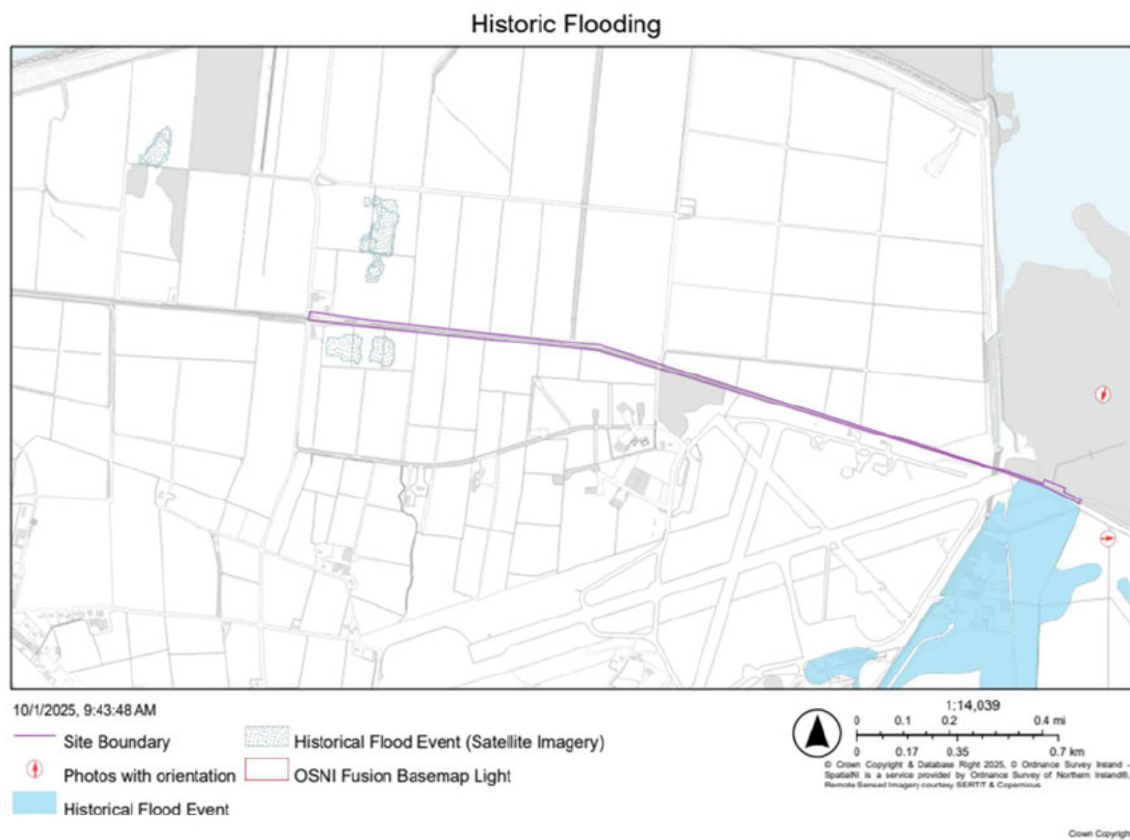


Figure 4-1: DfI Recorded Flood Outlines

4.2 Fluvial flood risk

4.2.1 Present Day

The Northern Ireland (NI) River Floodplain Map has been reviewed to assess risk of flooding from fluvial sources. The outlines of the floodplains highlighted in the map identify the areas that in any year have a 1% AEP (1 in 100) or greater chance of flooding from rivers. As seen in

Present Day Fluvial Flooding

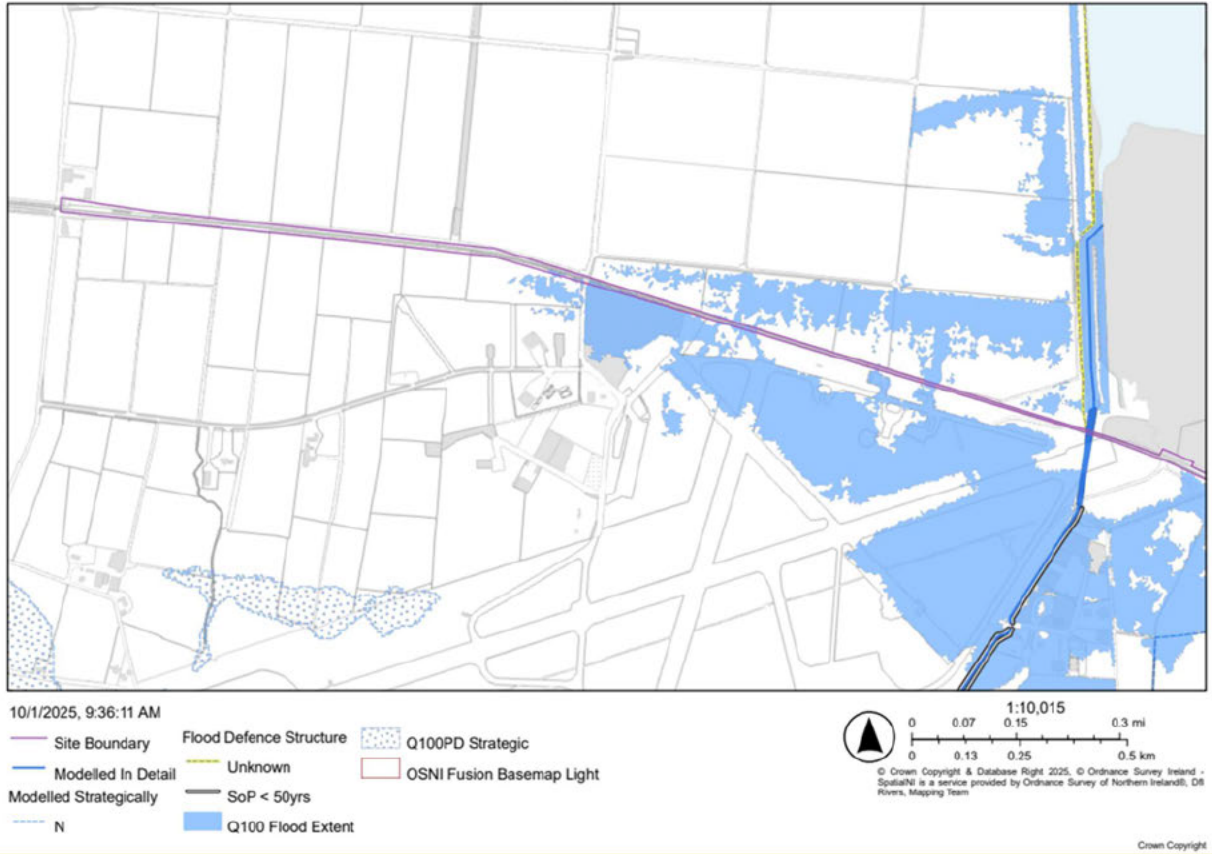


Figure 4-2, fluvial flooding is predicted to impact the centre of the site and in patches towards the east, parallel to the nearby airport. This is due to the river which culverts under the railway.

Present Day Fluvial Flooding

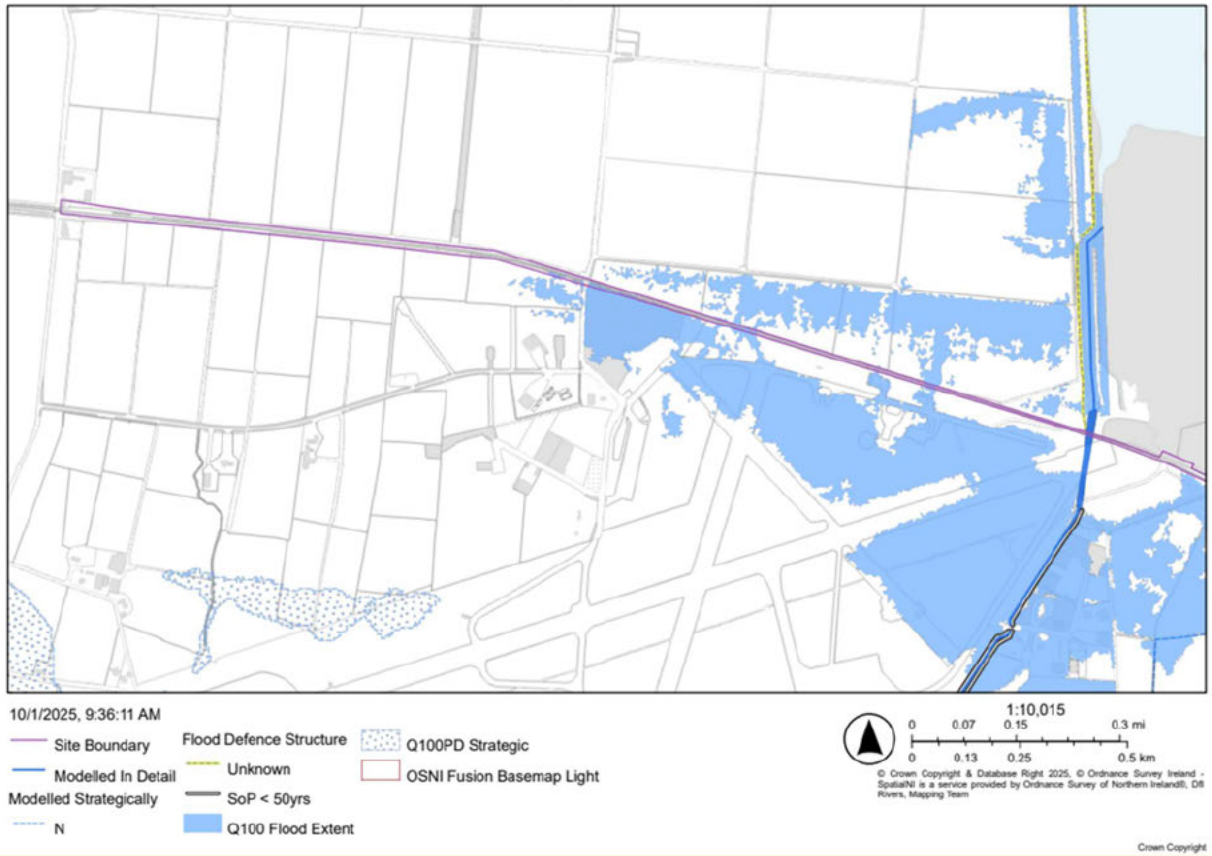


Figure 4-2: Present Day Fluvial Flood Risk

4.2.2 Climate Change (2080-year epoch)

As Figure 4-3 shows, the 100-year plus climate change extent covers a larger extent in the centre of the site but similar towards the east.

Fluvial Flood Risk plus Climate Change

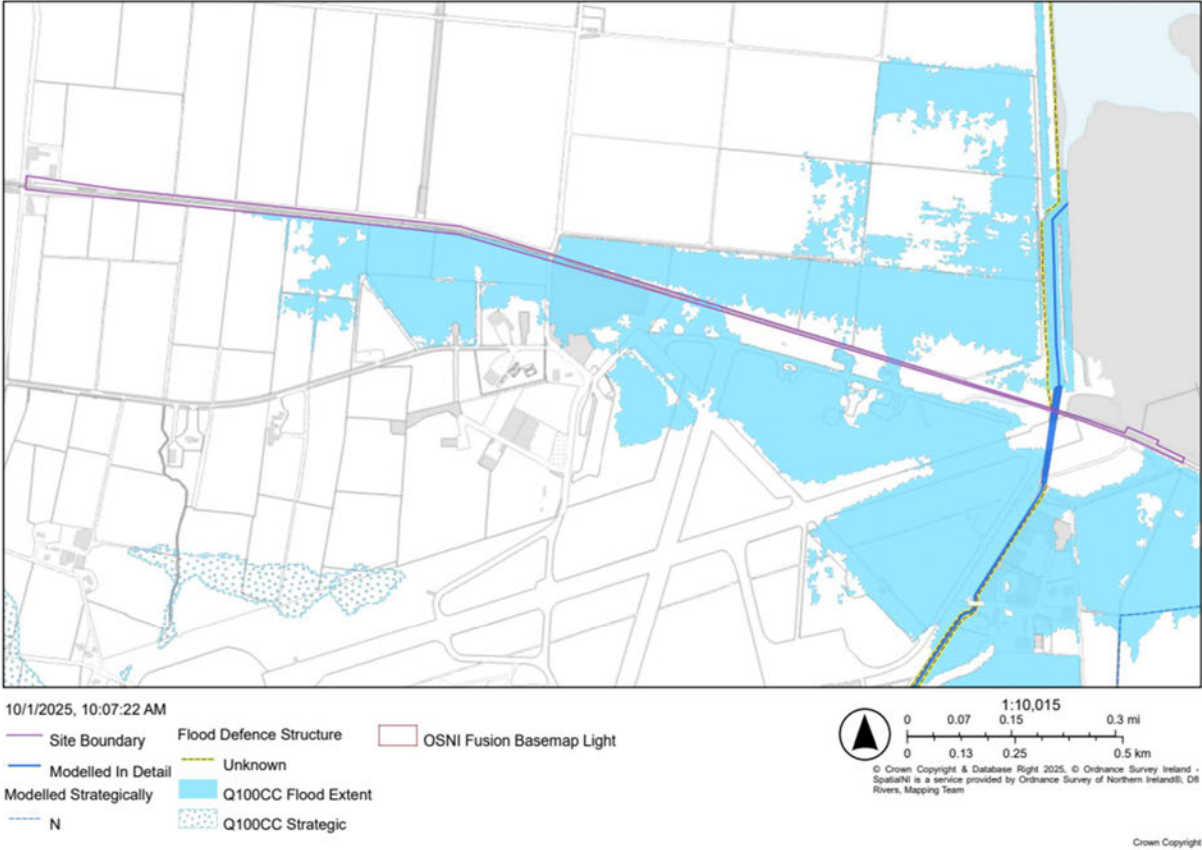


Figure 4-3: Fluvial Flood Risk plus climate change

4.3 Tidal flood risk

The NI Sea (coastal) Floodplain Map has been reviewed to assess risk of flooding from tidal sources. The Sea Floodplain map provides an illustration of the coastal floodplains which are the relatively flat areas of land around the shoreline that are subject to periodic coverage by the sea.

4.3.1 Present Day

The outlines of the floodplains highlighted in the map identify the areas around the coastline that in any year have a 0.5% (1 in 200) or greater chance of flooding from the sea. Figure 4-4 shows that the whole site, except a small patch in the east, is impacted by tidal flooding due to close proximity to the coast.

Present Day Tidal Flooding

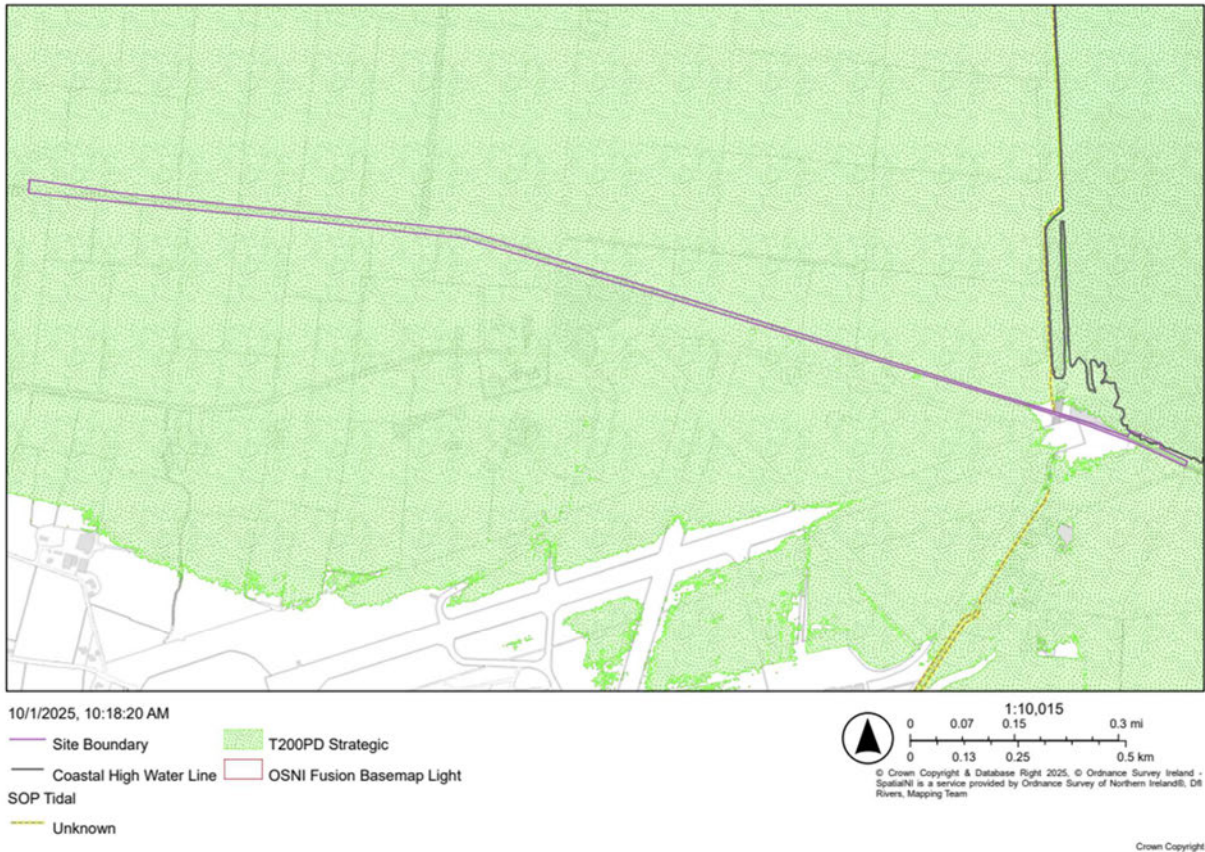


Figure 4-4: Present Day Tidal Flood Risk

4.3.2 Climate Change (2080-year epoch)

The climate change tidal flood map for the 1 in 200 (0.5% AEP) covers the same extent in the site as the present day tidal flooding.

Tidal Flood Risk plus Climate Change

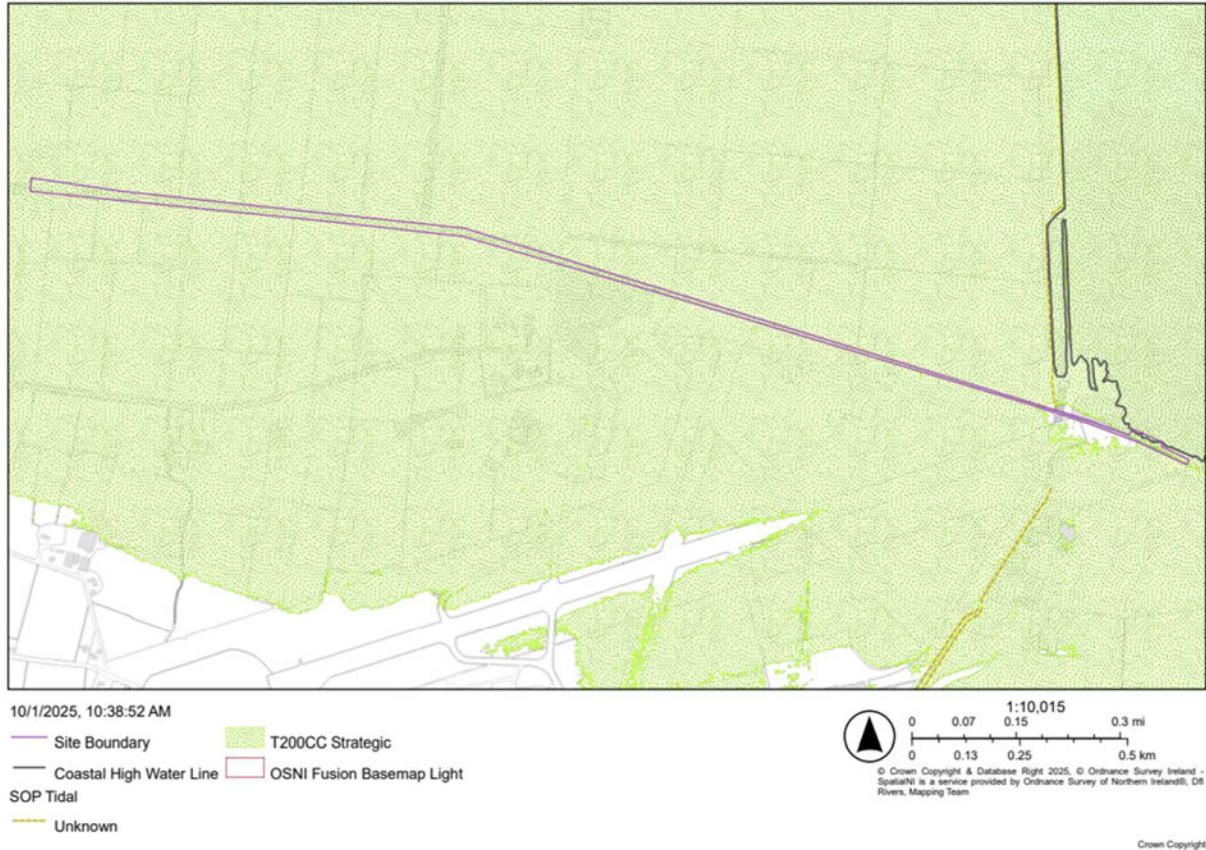


Figure 4-5: Tidal Flood Risk plus climate change

4.4 Surface water flood risk

Surface water flooding arises when rain falling on saturated ground flows overland, following the local topography. Overland flow can pose a risk to both the development site and land surrounding the development site. In the former case, overland flow may originate from the site itself or from adjoining land at a higher elevation from which flow migrates onto the development area. In the latter case, existing developments at a lower elevation may be subject to flooding due to overland flow originating from the site and migrating towards lower areas. The layout of the proposed development needs to reflect and, where necessary, mitigate against the risks.

The NI Surface Water Flood Map has been used to illustrate the low-lying areas and hollows that are estimated to be prone to flooding from an extreme 1 in 200yr rainfall event. The surface water flood map does not specifically illustrate areas that are at risk from flooding due to local deficiencies in sewerage or drainage systems which are at best, designed to cope with a 1 in 30-year rainfall event.

4.4.1 Present Day

Figure 4-6 shows surface water flooding during the 1 in 200 (0.5% AEP) event. This indicates pooling in the centre and west of the site. This is due to surface water following the topographic slope to the north but pooling south of the railway line as there is nowhere for runoff to flow. It should be noted that this is national generalised mapping and is not intended for detailed site design.

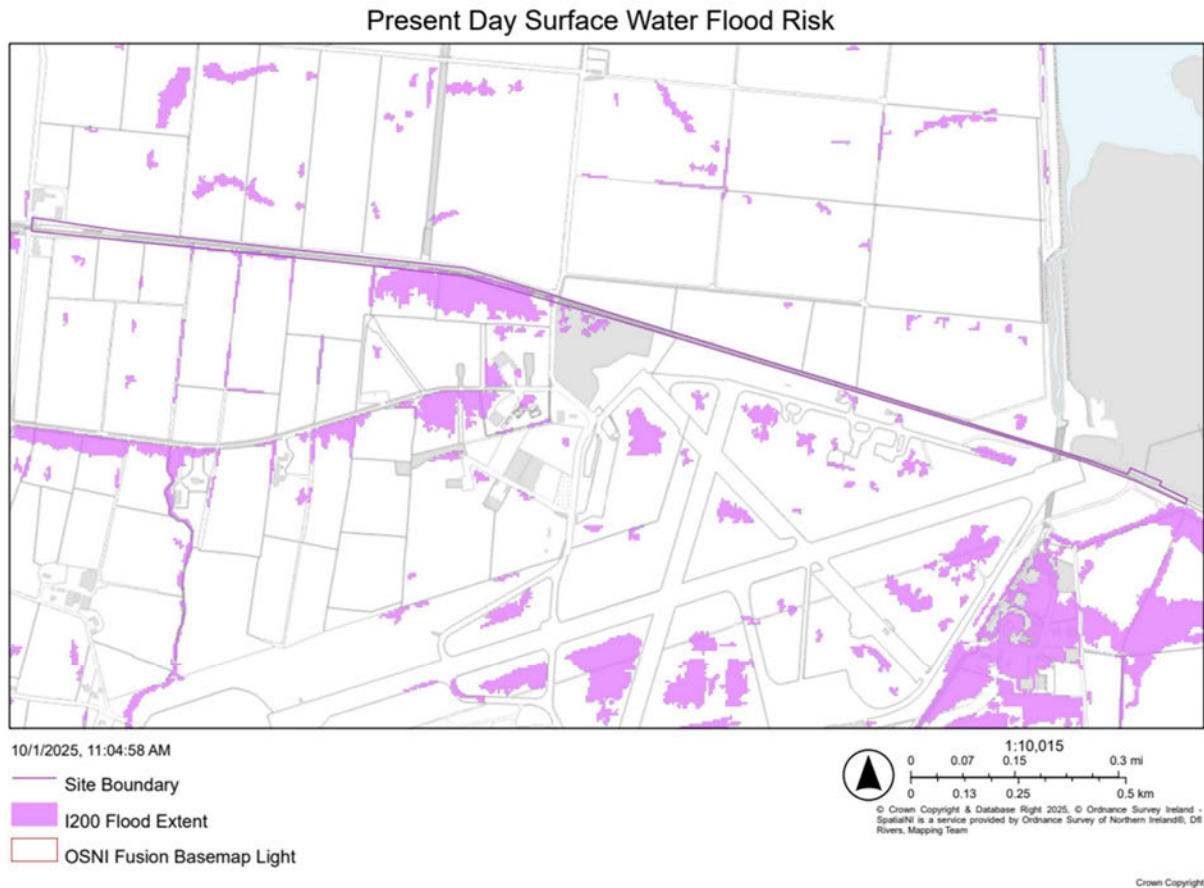


Figure 4-6: Risk of flooding from surface water mapping

4.4.2 Climate Change (2080-year) epoch

The surface water climate change flood risk for the 1 in 200 (0.5% AEP) event has a very similar extent to that of the present day. It is focused in the centre of the site where there is pooling south of the railway line, as well as small patches in the west.

Surface Water Flood Risk plus Climate Change

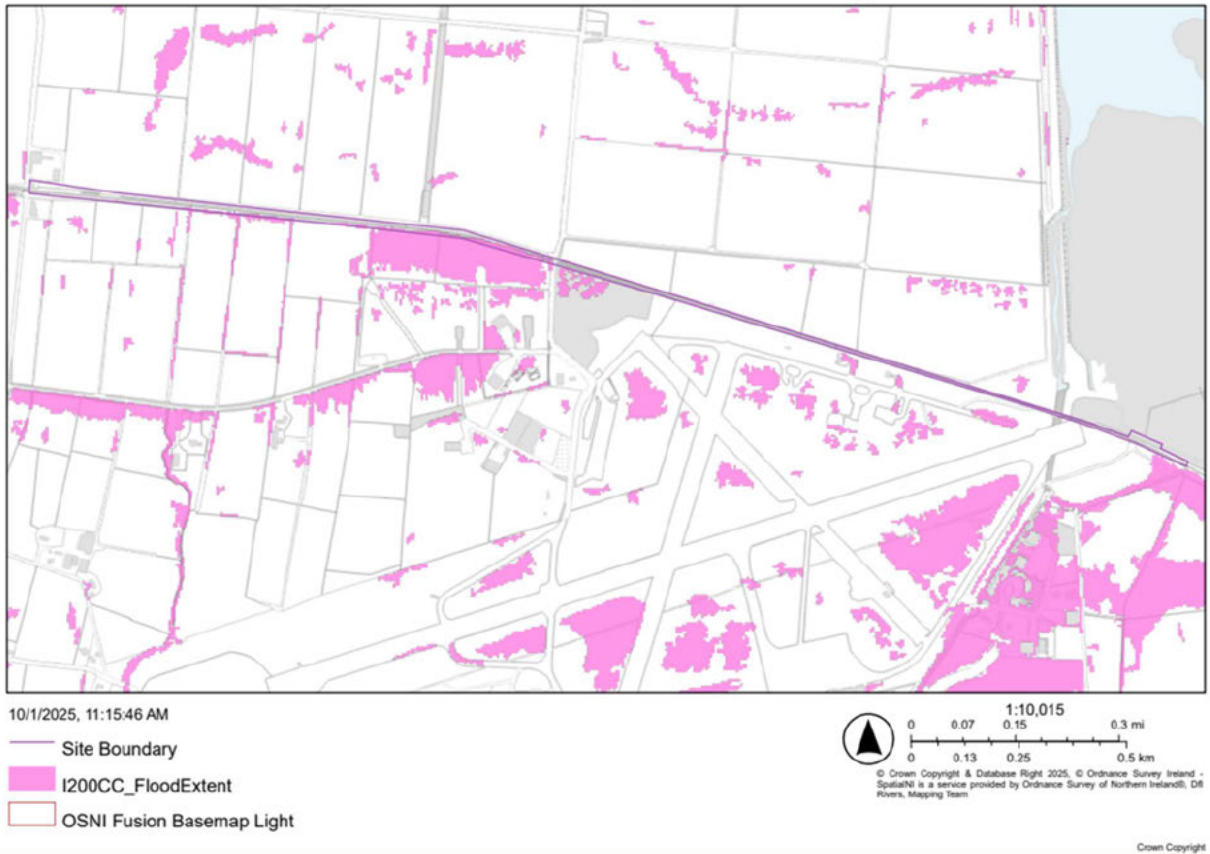


Figure 4-7: Surface Water Flood Risk plus climate change

Overall, the site is considered to be at a low risk of pluvial flooding.

4.5 Groundwater flood risk

Groundwater flooding occurs when the water table rises above ground level, particularly after prolonged rainfall events. This is most likely to occur in low-lying areas that are underlain by permeable bedrock and superficial geologies. Unlike other forms of flooding, groundwater flooding does not pose a significant risk to life but can cause serious damage to property.

According to the GSNI, the groundwater vulnerability over most of the site is classed as 2 where 5 is the highest class of vulnerability. Although, groundwater vulnerability of 4e is observed parallel to the site. Class 4 is subdivided into the nature of the pathway, and 4e is where superficial aquifers are present.

Given the sites proximity to the North Sea and the presence of underlying aquifers just south of the site, it is likely that relatively shallow groundwater is present beneath the site. As a result, the risk of groundwater flooding at the site is considered to be medium.

4.6 Sewer flood risk

Sewer flooding can occur when drainage systems become overwhelmed by heavy rainfall or when pipes become blocked.

The site is not located within an urban area and is surrounded by greenfield land. Therefore, the risk of sewer flooding is assessed as low.

4.7 Reservoir flood risk

NI's [Controlled Reservoir Viewer](#) provides the location of each Controlled Reservoir and the flood extent in the event of an uncontrolled release of water due to dam failure.

Reservoir flood mapping shows that the site and vicinity around the site is not at risk from reservoir flooding.

5 Flood Mitigation Measures

5.1 Safe access and egress

As this is 'water compatible' development, it is not necessary to demonstrate safe access and egress after the sea defences have been built. However, this is still relevant whilst construction work is proceeding. During the climate change flood events, most of the site is at risk of flooding from tidal flooding and some of the site is at risk due to fluvial and surface water flooding.

5.2 Flood warning and evacuation

5.2.1 Flood warning

Northern Ireland does not have a dedicated Flood Alert and Warning Service, but checking for flood risk and severe weather on the [indirect website](#) can be done. To report a flooding incident, the Flood Incident Line 0300 2000 100 should be called.

5.2.2 Flood response plan

A Flood Warning and Evacuation Plan should be developed for the site during the construction phase, which should highlight the extent of the floodplain surrounding the site and the safest route of escape in the event of extreme flooding occurring. If a plan is required by the Local Authority, it should:

- Identify available flood warning systems and local triggers which will be used to activate the flood response plan;
- Prepare procedures for the different levels of flood warning and local triggers available, including procedures for on and off-site evacuation; and
- Consider the depths, velocity and rate of onset of flooding.

6 Conclusions and Recommendations

6.1 Conclusion

- JBA Consulting were commissioned by Amey Consulting to undertake a Flood Risk Assessment (FRA) for the proposed coastal protection at the City of Derry Airport.
- An unnamed river, sourced from the sea, culverts underneath the site in the east and there are unnamed watercourses north and south of the site boundaries. The North Sea is north of the site. There is currently a fluvial defence south of the site which has a standard of protection (SoP) of <50 years. There is also a coastal defence with an unknown SoP north of the site.
- The Department for Infrastructure historic flood map shows that there has been historical flooding in the eastern area of the site. According to satellite imagery, there are also historical flood events north and south of the western area of the site.
- Fluvial flooding is predicted to impact the centre of the site and in patches towards the east, parallel to the nearby airport. This is due to the river which culverts under the railway. The fluvial climate change flooding has a larger extent in the centre of the site.
- The whole site, except a small patch in the east, is impacted by present day and climate change tidal flooding. This is due to the close proximity to the coast.
- During both present day and climate change 1 in 200-year rainfall events, there is surface water flooding and pooling in the centre and west of the site. This is due to surface water following the topographic slope to the north but pooling south of the railway line as there is no clear flow path.
- According to the GSNI, the groundwater vulnerability over most of the site is classed as 2 where 5 is the highest class of vulnerability. Although, groundwater vulnerability of 4e is observed parallel to the site. Class 4 is subdivided into the nature of the pathway, and 4e is where superficial aquifers are present. Given the sites proximity to the North Sea and the presence of underlying aquifers just south of the site, it is likely that relatively shallow groundwater is present beneath the site. As a result, the risk of groundwater flooding at the site is considered to be medium.
- The site is not located within an urban area and is surrounded by greenfield land. Therefore, the risk of sewer flooding is assessed as low.
- Reservoir flood mapping shows that the site and vicinity around the site is not at risk from reservoir flooding.

6.2 Recommendations

- Provision of safe access and egress routes for the period in which the coastal defences are being built so that builders and the machinery being used can egress from the site without damage or loss.
- Provision of an evacuation plan if deemed necessary and utilise the weather, flood risk and flood incidents platforms.

A Proposed development layout

B Topographic Survey

Offices at

Bristol
Coleshill
Doncaster
Dublin
Edinburgh
Exeter
Glasgow
Haywards Heath
Leeds
Limerick
Newcastle upon Tyne
Newport
Peterborough
Portsmouth
Saltaire
Skipton
Tadcaster
Thirsk
Wallingford
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