East Meath - North Dublin Grid Upgrade Environmental Impact Assessment Report (EIAR): Volume 3

Appendix A12.1 – Flood Risk Assessment

EirGrid

March 2024

Contents

Appendix A12.1 – Flood Risk Assessment

1. Introduction

1.1 Development Background

The East Meath – North Dublin Grid Upgrade (hereafter referred to as the Proposed Development) includes approximately 37.5 kilometres (km) of new 400 kilovolt (kV) underground cable circuit (also referred to as the proposed cable route) between the existing Woodland Substation in the townland of Woodland, near Batterstown, County Meath and the existing Belcamp Substation in the townlands of Clonshagh and Belcamp in Fingal, County Dublin (as shown in Image 1.1). The Proposed Development will also involve works in the substations to facilitate the connection of the underground cable circuit to the electrical grid.

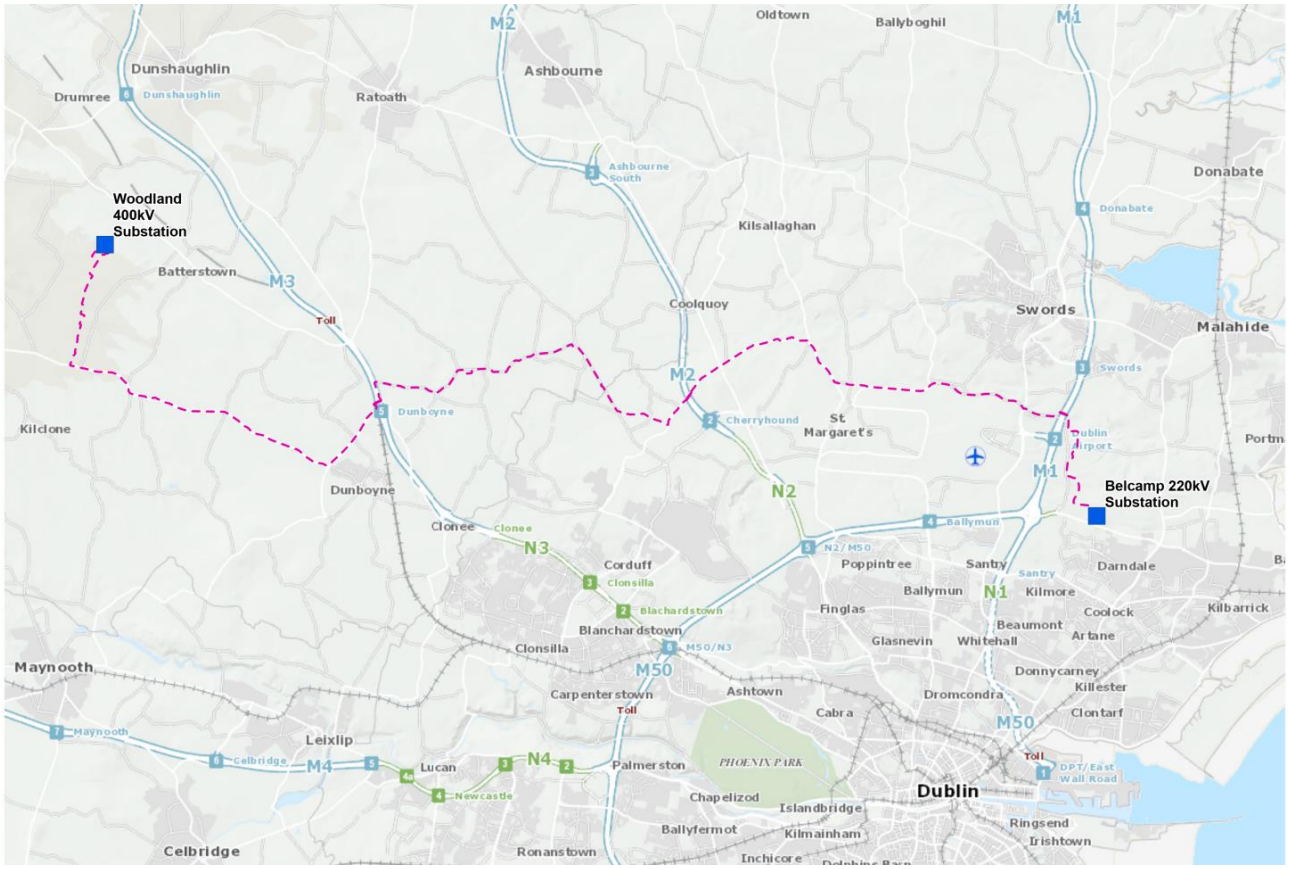

Image 1.1: Location of the Proposed Development

A full description of the Proposed Development is presented in Chapter 4 (Proposed Development Description) in Volume 2 of this Environmental Impact Assessment Report (EIAR).

This Flood Risk Assessment (FRA) Report provides an assessment of the baseline flood risk and the assessment of future flood risk within the Proposed Development infrastructure / sites.

1.2 Structure of this Report

Table 1.1 outlines the structure of this FRA Report.

Table 1.1: FRA Report Structure

Section	Overview
Section 1 (Introduction)	An outline of the Report, a description of the Proposed Development; information on the approach to its development, as well as information on sustainability relevant to the Proposed Development.
Section 2 (Planning Guidelines)	Contains a list of Planning Guidelines that have been considered.
Section 3 (Flood Risk Assessment)	Sets out the Flood Risk Assessment Methodology.
Section 4 (Stage 1 Flood Risk Identification)	Includes the findings of the Stage 1 Flood Risk Assessment.
Section 5 (Stage 2 Initial Flood Risk Assessment)	Presents the findings of the Stage 2 Flood Risk Assessment.
Section 6 (Stage 2: Potential Flood Risk Impacts from Proposed Development)	Details the potential flood risk implications arising from the Proposed Development and the proposed mitigation measures.
Section 7 (Flood Risk Management and Evaluation)	Assesses the Proposed Development in accordance with the Justification Test.
Section 8 (Conclusions and Recommendations)	Presents the conclusions and recommendations.

2. Planning Guidelines

2.1 The Planning System and Flood Risk Management Guidelines for Planning Authorities

The Department of the Environment, Heritage and Local Government (DEHLG) and the Office of Public Works (OPW) Planning System and Flood Risk Management, Guidelines for Planning Authorities (hereafter referred to as the Flood Risk Guidelines) introduce comprehensive mechanisms for the incorporation of flood risk identification, assessment and management into the planning process (DEHLG and OPW 2009).

The Flood Risk Guidelines set out the methodology to be used for the FRA, which require the planning system at national, regional and local levels to:

- Avoid development in areas at risk from flooding, particularly floodplains, unless there are proven wider sustainability grounds that justify development. Where this is the case, development must be appropriate and flood risks must be effectively managed to reduce the level of risk;
- Adopt a sequential approach to flood risk management when assessing the locations for new development based on avoidance, reduction, and mitigation of flood risk; and
- Incorporate FRA into planning application decisions and appeals.

2.2 The European Union Floods Directive, Water Framework Directive and River Basin Management Plans

Implementation of the Flood Risk Guidelines (DEHLG and OPW 2009) will also rely on the ongoing integration with existing European Union (EU) Directives:

- Directive 2007/ 60/ EC of the European Parliament and of the Council of 23 October 2007 on the assessment and management of flood risk (hereafter referred to as the EU Floods Directive) requires Member States to undertake preliminary FRAs on a national scale, to identify possible future areas of flooding. Member states are also required to prepare Flood Risk Management Plans (FRMPs) per catchment, in order to set out local flood risk management goals and measures. The OPW is responsible for undertaking this role in Ireland. Under this Directive, the

EU recognises the importance of land use management as a key tool in managing flood risk as well; and

- Council Directive 2000/ 60/ EC of 23 October 2000 establishing a framework for Community action in the field of water policy (hereafter referred to as the Water Framework Directive (WFD)) introduces the concept of River Basin Management Plans (RBMPs), so that all rivers and coastal waters may achieve good ecological status by 2027. As of today, River Basin Districts have been established, and relevant management plans are available.

2.3 Greater Dublin Strategic Drainage Study

The Greater Dublin Strategic Drainage Study (GDSDS) (Dublin Drainage Consultancy 2005) was commissioned to analyse existing foul and surface water drainage systems in the local authority areas of Dublin City, Fingal, South Dublin and Dun Laoghaire – Rathdown and the adjacent catchments in Counties Meath, Kildare and Wicklow. With respect to the Proposed Development, the applicable objectives of the study can be summarised as follows:

- To develop an environmentally sustainable drainage strategy for the region consistent with the WFD;
- To provide a consistent policy framework and standards which will apply throughout the region;
- To develop tools for the effective management of the drainage systems including Geographical Information Systems (GIS), network models and digital mapping; and
- To develop the optimum drainage solution from a range of alternative scenarios having regard to the whole-life cost and environmental performance, the solution to be broken down into a set of implementation projects which can be prioritised and put in place.

2.4 Strategic Flood Risk Assessment for the Meath County Development Plan

JBA Consulting was commissioned by Meath County Council (MCC) to provide assistance in the preparation of the Strategic Flood Risk Assessment (SFRA) incorporated into the Meath County Development Plan 2021-2027 (hereafter referred to as the MCDP) (MCC 2021).

The Flood Risk Guidelines (DEHLG and OPW 2009) recommend a sequential approach to spatial planning, promoting avoidance rather than justification and subsequent mitigation of risk. The implementation of the Planning Guidelines on a settlement basis is achieved through the application of the policies and objectives contained within the MCDP. The use and application of the policies and guidelines constitutes the formal plan for flood risk management in County Meath. This approach has been captured in the settlements contained within the MCDP and covered in the SFRA. The objectives contained within Chapter 6 of the MCDP are presented in Table 2.1.

Table 2.1: Objectives and Recommendations MCDP 2021-2027

SFRA Objective / Policy Action Code	Objective
INF OBJ 20	To implement the Planning System and Flood Risk Management-Guidelines for Planning Authorities (DoEHLG/OPW 2009) or any updated guidelines. A site-specific Flood Risk Assessment should be submitted where appropriate.
INF OBJ 21	To restrict new development within floodplains other than development which satisfies the Justification Test, as outlined in the Planning System and Flood Risk Management Guidelines 2009 for Planning Authorities (or any updated guidelines).
INF OBJ 23	To protect and enhance the County's floodplains, wetlands and coastal areas subject to flooding as "green infrastructure" which provide space for storage and conveyance of floodwater and ensure that development does not impact on important wetland sites within river/stream catchments.
INF OBJ 24	To identify existing surface water drainage systems vulnerable to flooding and develop proposals to alleviate flooding in the areas served by these systems in conjunction with the Office of Public Works.

2.5 Strategic Flood Risk Assessment for Fingal Development Plan

Fingal County Council's (FCC's) SFRA provides "*an area wide assessment of all types of significant flood risk to inform strategic land use planning decisions.*" The SFRA forms part of the Fingal Development Plan 2023 – 2029 (hereafter referred to as the FDP) (FCC 2023).

The SFRA presents the key flood management policies and objectives that must be followed by all new developments. It identifies sites within Flood Zones A and B and covers acceptable grounds for justification tests for development plans within each site. Where the Proposed Development is within or proximate to these sites, further detail is provided within this report.

Furthermore, the FDP outlines surface water and flood risk management policies which have been strengthened and improved upon since the previous Fingal Development Plan 2016 – 2022 (FCC 2016). These have also been updated based on the information provided in the SFRA process.

The Proposed Development will need to demonstrate compliance with the overarching objectives and recommendations of the SFRA stated in Table 2.2.

Table 2.2: Objectives and Recommendations of the FCC SFRA

SFRA Objective / Policy Action Code	Objective
Policy IUP12 – Flood Risk Management	Ensure the continued incorporation of Flood Risk Management into the spatial planning of the County of Fingal, to meet the requirements of the EU Floods Directive and the EU Water Framework Directive and to promote a climate resilient County.
Policy IUP13 – Protection of Fingal's Floodplains, Wetlands and Coastal Areas	Protect and enhance the County's floodplains, wetlands and coastal areas subject to flooding as vital green infrastructure which provides space for storage and conveyance of floodwater, enabling flood risk to be more effectively managed and reducing the need to provide flood defences in the future.
Policy IUP14 – OPW	Continue to support and assist the OPW in implementing and delivering the relevant Flood Risk Management Plans for rivers, coastlines and estuaries within Fingal.
Objective IUO16 – OPW Flood Risk Management Guidelines	Have regard to the OPW Flood Risk Management Guidelines 2009, as revised by Circular PL 2/2014, when assessing planning applications and in the preparation of statutory and non-statutory plans and to require site specific flood risk assessments are to be considered for all new developments within the County. All development must prepare a Stage 1 Flood Risk Analysis and if the flooding risk is not screened out, they must prepare a Site-Specific Flood Risk Assessment (SSFRA) for the development, where appropriate.
Objective IUO17 –Strategic Flood Risk Assessment	Implement and comply fully with the recommendations of the Strategic Flood Risk Assessment prepared as part of the Fingal Development Plan 2023–2029.
Objective IUO18 – SFRA Recommendations	All Flood Risk Assessments must comply with the recommendations from the SFRA report.
Objective IUO19 – Medium Range Future Scenario Climate Change Predictions	Surface water designs must include 'Medium Range Future Scenario Climate Change Predictions'.
Objective IUO20 – Tolka River Flood Study Maps	Prepare a flood map using data from both the River Tolka Flood Study extents and recently provided National Indicative Fluvial Mapping as well as site specific modelling to ensure the most up-to-date flood maps for Tolka River are available, within 1 year of making this Development Plan.
Objective IUO21 – Precautionary Principle in OPW Guidelines	Require all developments in the County to be designed and constructed in accordance with the 'Precautionary Principle' as detailed in the OPW Guidelines and to minimise the flood risk in Fingal from all potential sources of flooding as far as is practicable, including coastal, pluvial, fluvial, reservoirs and dams, and the piped water system.
Objective IUO22 – Flood Alleviation Measures	Support and facilitate the provision of new or upgrading of existing flood alleviation measures where appropriate.
Objective IUO23 – Protection of Rivers, Streams and Watercourses	Ensure that where flood protection or alleviation works take place that the natural and cultural heritage of rivers, streams and watercourses are protected and enhanced to the greatest extent possible.
Objective IUO24 – Cross-Boundary Flood Management	Work with neighbouring Local Authorities when developing cross-boundary flood management work programmes and when considering cross-boundary development.

3. Flood Risk Assessment

The Flood Risk Guidelines (DEHLG and OPW 2009) outline the key principles that should be used for assessing flood risk to the Proposed Development. Planning authorities (both elected members and officials) must implement these Flood Risk Guidelines in ensuring that, where relevant, flood risk is a key consideration in preparing development plans and local area plans and in the assessment of planning applications. These Flood Risk Guidelines are being issued by the Minister of the Environment, Heritage and Local Government

under Section 28 of Number 30 of 2000 – Planning and Development Act, 2000 (as amended). Planning authorities and An Bord Pleanála are required to have regard to the Flood Risk Guidelines in carrying out their functions under the Planning Acts. These Flood Risk Guidelines supersede previous interim guidance on flooding in Appendix E to the Development Plan Guidelines in 2007.

The core objectives of the Flood Risk Guidelines are to:

- Avoid inappropriate development in areas at risk of flooding;
- Avoid new developments increasing flood risk elsewhere, including that which may arise from surface water runoff;
- Ensure effective management of residual risks for development permitted in floodplains;
- Avoid unnecessary restriction of national, regional or local economic and social growth;
- Improve the understanding of flood risk among relevant stakeholders; and
- Ensure that the requirements of EU and national law in relation to the natural environment and nature conservation are complied with at all stages of flood risk management.

The assessment of flood risk requires an understanding of where the water comes from (i.e. the source), how and where it flows (i.e. the pathways) and the people and assets affected by it (i.e. the receptors). All three elements must be examined as part of the FRA including the vulnerability and exposure of receptors to determine its potential consequences. The planning process is primarily concerned with the location of receptors, taking appropriate account of potential sources and pathways that might put those receptors at risk. The Flood Risk Guidelines recommend that a staged approach should be adopted.

The stages of appraisal and assessment are as follows:

- **Stage 1: Flood risk identification** – This stage identifies any issues (flooding or surface water management) related to the Proposed Development;
- **Stage 2: Initial flood risk assessment** – This stage seeks to confirm the sources of flooding identified in Stage 1. All existing information is reviewed in detail and extent of the flood risk associated with the Proposed Development established; and
- **Stage 3: Detailed flood risk assessment** – Where required, this stage will assess flood risk issues in sufficient detail to provide a quantitative appraisal of potential flood risk to a new or existing development, of its potential impacts on flood risk elsewhere and of the effectiveness of any Proposed mitigation measures. This will typically involve use of an existing or construction of a hydraulic model across a wide enough area to appreciate the catchment wide impacts and hydrological process involved.

Due to the nature, design, and location of the Proposed Development, this FRA will progress up to Stage 2, as there are no specific locations or elements of the design that require a detailed flood risk analysis.

3.1 Flood Zones

Flood zones are geographical areas within which the likelihood of flooding is in a particular range, and they are a key tool in flood risk management within the planning process as well as in flood warning and emergency planning. The Flood Risk Guidelines (DEHLG and OPW 2009) define the following three flood zones:

- **Flood Zone A** – Where the probability of flooding from rivers and the sea is highest (greater than 1% annually or 1 in 100 years for river flooding or 0.5% annually or 1 in 200 years for coastal flooding). Development in this zone should be avoided and/or only considered in exceptional circumstances, such as essential infrastructure that cannot be located elsewhere, and where the Justification Test has been applied;
- **Flood Zone B** - Where the probability of flooding from rivers and the sea is moderate (between 0.1% or 1 in 1000 years and 1% annually or 1 in 100 for river flooding and between 0.1% annually or 1 in 1000 years and 0.5% annually or 1 in 200 for coastal flooding); and

- **Flood Zone C** – Where the probability of flooding from rivers and the sea is low (less than 0.1% annually or 1 in 1000 years for both river and coastal flooding (Flood Zone C covers all areas of the plan that are not in zones A or B). Development in this zone is appropriate from a flood risk perspective (subject to assessment of flood hazard from sources other than rivers and the coast) but would need to meet the normal range of other proper planning and sustainable development considerations.

These flood zones are used to assess the suitability of the location for a Proposed Development with respect to its vulnerability to flooding.

Furthermore, climate change is expected to increase flood risk. It could lead to more frequent flooding and increase the depth and extent of flooding. Due to the uncertainty surrounding the potential effects of climate change a precautionary approach is recommended to:

- Recognise that significant changes in the flood extent may result from an increase in rainfall or tide events and accordingly adopt a cautious approach to zoning land in these potential transitional areas;
- Ensure that the levels of structures designed to protect against flooding, such as flood defences, land raising or raised floor levels are sufficient to cope with the effects of climate change over the lifetime of the development they are designed to protect; and
- Ensure that structures to protect against flooding and the development protected are capable of adaptation to the effects of climate change when there is more certainty about the effects and still time for such adaptation to be effective.

3.2 Vulnerability of the Proposed Development

The vulnerability of a development to flooding depends on the nature of the development, its occupation and the construction methods used. The classification of different land uses and types of development as highly vulnerable, less vulnerable and water-compatible is influenced primarily by the ability to manage the safety of people in flood events and the long-term implications for recovery of the function and structure of buildings. The vulnerability of the Proposed Development is high given it will be located underground and is considered to be critical infrastructure. The Proposed Development would be more likely to be at risk of flooding during the Construction Phase, due to its exposure at the surface.

With reference to Section 3.1 of the Flood Risk Guidelines (DEHLG and OPW 2009), the Proposed Development is assessed as "*essential infrastructure as electricity generating power stations and substations*" and therefore, classed as a "*highly vulnerable development*".

The Flood Risk Guidelines require that a Justification Test be completed for any highly vulnerable developments that are located within Flood Zone A or Flood Zone B, and this would include elements of the Proposed Development, specifically in the crossing with different watercourses.

4. Stage 1: Flood Risk Identification

4.1 Historic Flood Events

The OPW National Flood Hazard Mapping website (OPW 2024) was used to any identify historical flooding in the area of the Proposed Development. Image 4.1 below indicates a number of past and reoccurring floods in the area, at Dunboyne, Black Bull, Piercetown, Kilbridge, Coolquay Ward Road, and Stockhole Lane respectively. The available information and approximate distance from the Proposed Development for each historic flood is presented in Table 4.1.

Table 4.1: Flood Events Identified On or Near the Proposed Development

Location	Approximate Chainage	Type	Date	Description
1. Tolka Dunboyne – approx. 700m south-east of route	11,500	Fluvial – River Tolka	Nov 2000	River Tolka flood event. 
2. Tolka Woodpark, Black Bull Br to Pace – approx. 1km north-west of route	13,500	Fluvial – River Tolka	Recurring	Woodpark, Black Bull Bridge to Pace – Flood plain of River Tolka. Extensive area after heavy rain.
3. Piercetown Black Bull – approx. 1.2km north-west of route	13,500	Fluvial – River Tolka tributary	Recurring annually	Piercetown – Stream overflows its banks and floods road after heavy rain every year. One property is affected.
4. Kilbridge – on Proposed Development route	19,600	Unknown – possibly fluvial	Recurring annually	Blocked drains and floods every year after heavy rain.
5. N2 at Coolquay Ward Road – approx. 1.5km north of route	24,200	Unknown – possibly pluvial	Nov 2000	Road and property flooding.
6. Stockhole Lane (near Airport) – approx. 350m west of route	35,700	Pluvial - Low lying lands	Recurring	Road flooding

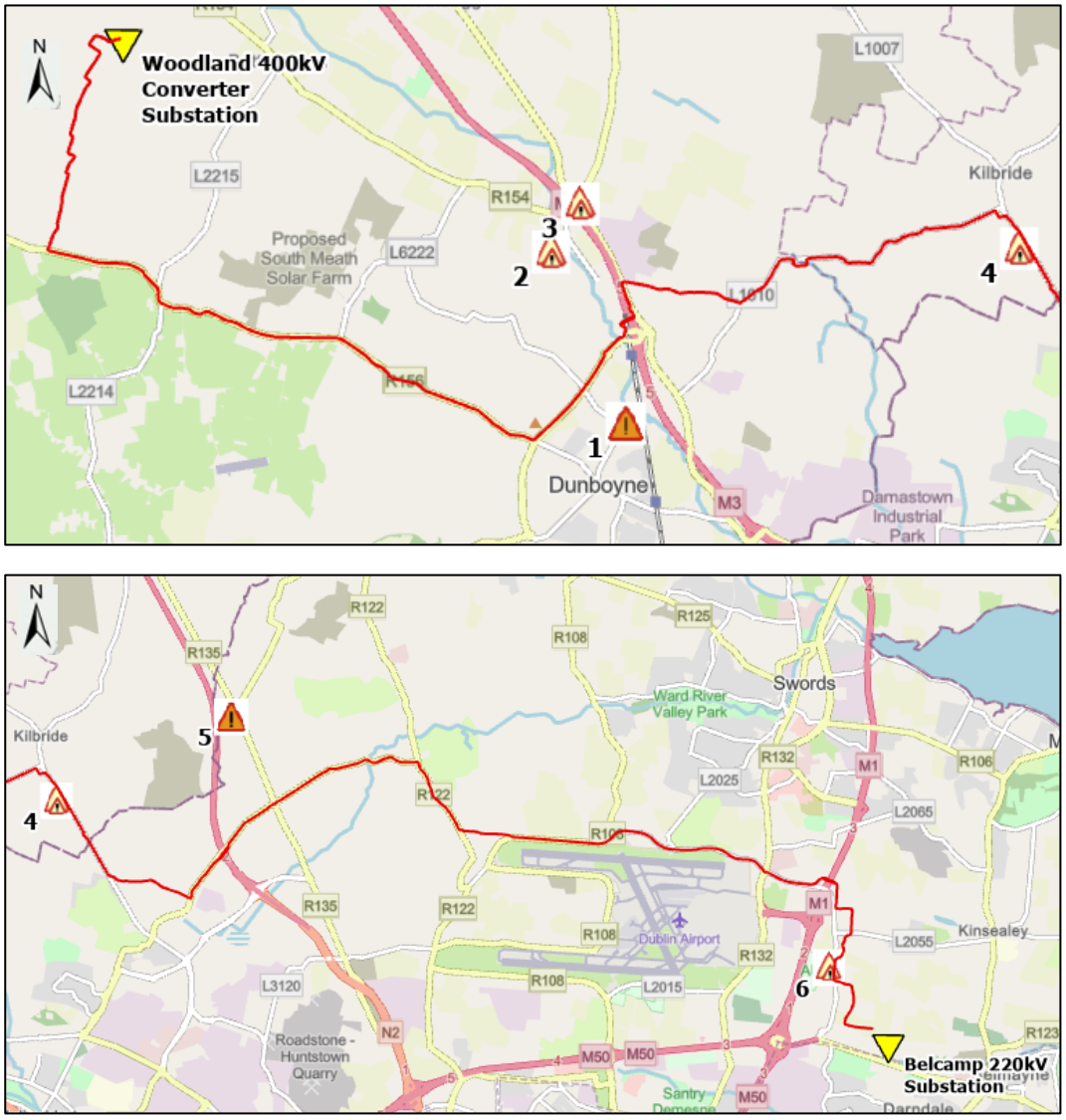

Image 4.1: Extract of Past Flood Events Near the Proposed Development. Source: OPW National Flood Hazard Mapping website (OPW 2024)

4.2 Nearby Watercourses and Notable Crossings

The Environmental Protection Agency (EPA) maintain data of watercourses throughout Ireland. The Proposed Development will cross a number a rivers and streams along its route, a summary of those to be crossed is available below, together with the proposed method of crossing (see Table 4.2).

Table 4.2: Proposed Watercourse Crossings Along the Proposed Development

Code	Waterbody Name (EPA)	Approximate Chainage	Proposed Crossing
WB01	Dunboyne Stream	2,165	Open Cut Trenching
WB02	Dunboyne Stream	10,805	Within Road Structure
WB03	Naulswood	11,640	Within Road Structure
WB04	Tolka	12,540	Open Cut Trenching
WB05	Pinkeen	16,340	Open Cut Trenching
WB06	Ward	14,750	Within Road Structure
WB07	Ballymacoll Little	18,155	Within Road Structure
WB08	Ward	18,200	Open Cut Trenching
WB09	Ward	19,235	Open Cut Trenching
WB10	Priest Town	20,460	Open Cut Trenching
WB11	Court 08	20,640	Open Cut Trenching
WB12	Gallanstown	20,855	Within Road Structure
WB13	Ward	23,635	Open Cut Trenching
WB14	Ward	24,750	Within Road Structure
WB15	Shallon	26,190	Open Cut Trenching
WB16	Huntstown 08	28,350	Open Cut Trenching
WB17	Barberstown 08	29,285	Within Road Structure
WB18	Ward	29,900	Within Road Structure
WB19	Sluice	30,435	Within Road Structure
WB20	Sluice	31,785	Within Road Structure
WB21	N/A	35,150	Open Cut Trenching
WB22	N/A	35,950	Open Cut Trenching
WB23	Cuckoo Stream	36,820	Open Cut Trenching

Of these, the most notable crossings for the Proposed Development are:

- River Tolka (WB04) – open cut trenching; and
- Sluice River (WB19 and WB20) – within road structure.

4.3 OPW PFRA and CFRAM Study Mapping

4.3.1 Fluvial & Coastal Flood Risk

The present-day fluvial and coastal flood risk in the area of the Proposed Development was assessed against the OPW Preliminary Flood Risk Assessment Study (PFRA) Eastern Catchment Flood Risk Assessment and Management (CFRAM) Study. The Eastern CFRAM Study and PFRA Flood Extent and Depth Maps for Coastal Flood Risk are available online (OPW 2024). Image 4.3 shows the Proposed Development is largely not at risk of fluvial flooding from these river crossings, as the Proposed Development will be running underground. The only watercourse crossing which could be subject to fluvial flood risk is located at approximate Chainage 10,805 with Dunboyne Stream, where there is a permanent access track which runs parallel to the proposed cable route (Image 4.2).

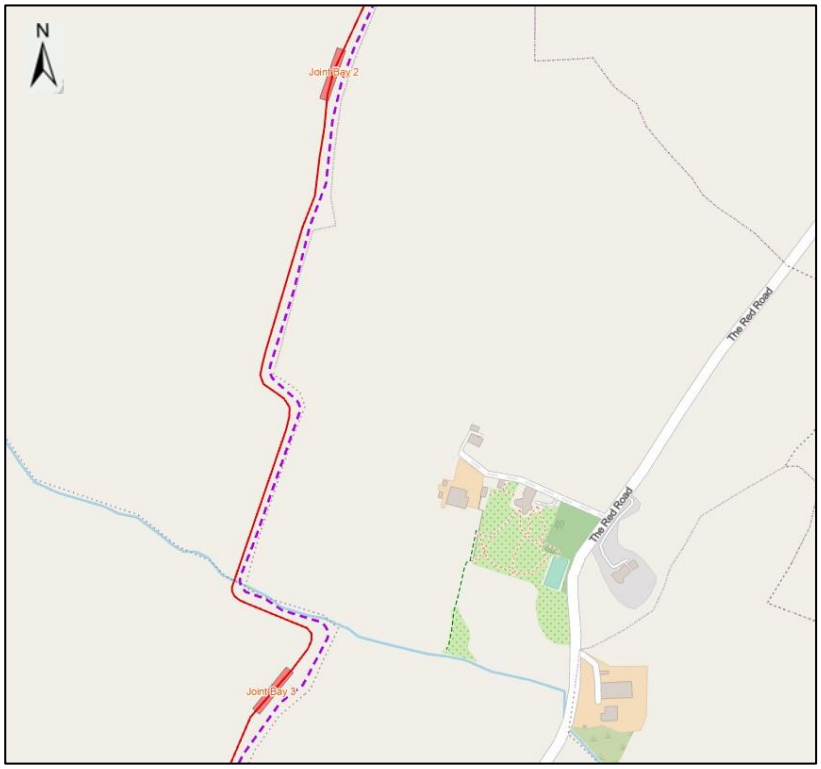

Image 4.2: Permanent Access Track which Intersects Dunboyne Stream

In locations where detailed CFRAM maps are not available, PFRA mapping is used supplementarily (see Image 4.6).

The Proposed Development will be located approximately 6km west of the coast at an elevation of approximately 40-100m AOD (metres above Ordnance Datum). Therefore, the Proposed Development is not at risk of coastal flooding.

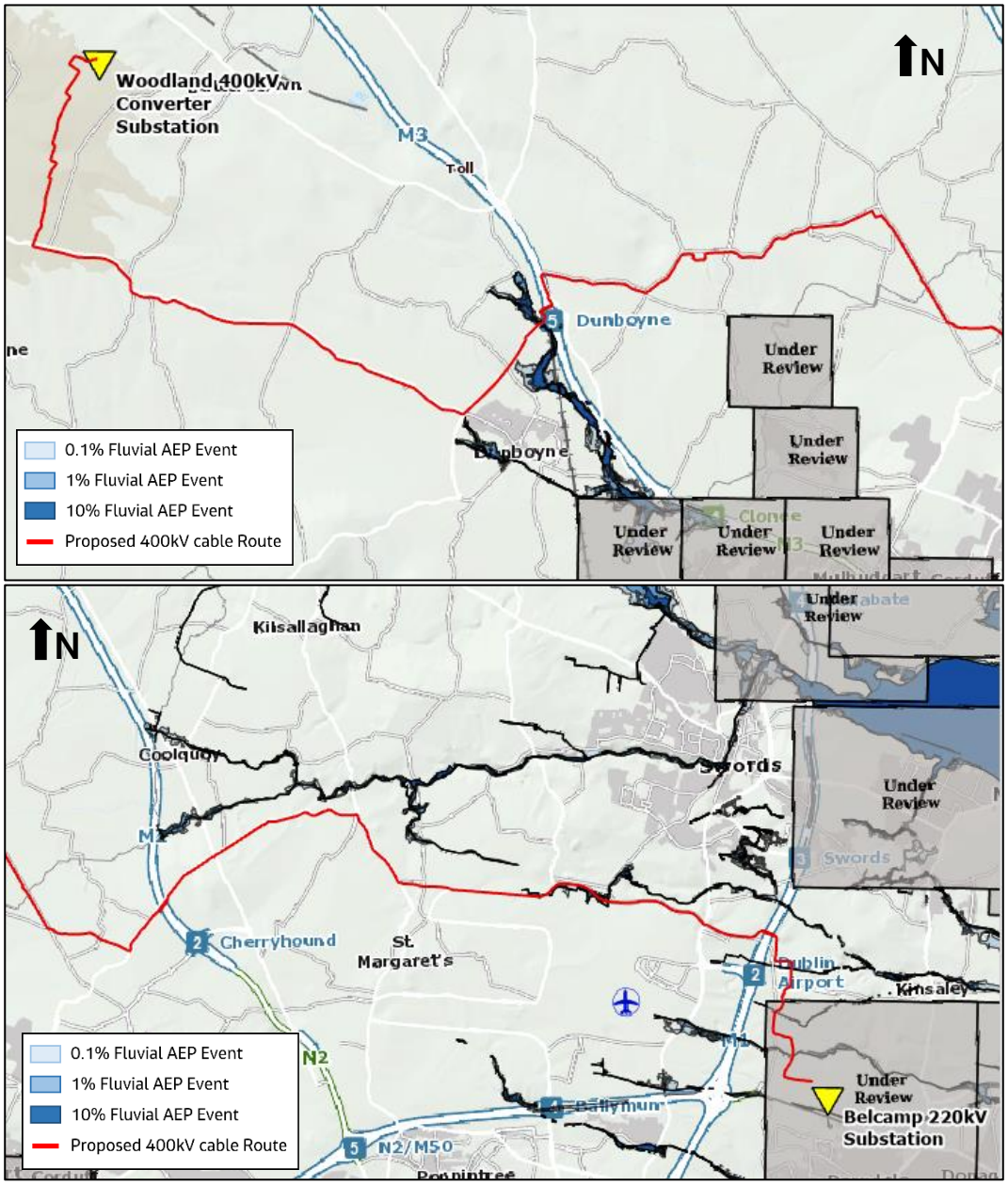

Image 4.3: Extract of Fluvial Flood Mapping from Eastern CFRAM Study for the Proposed Development, from Woodland Substation to Belcamp Substation (OPW 2024)

Of all the watercourse crossings detailed above, some will be located in flood risk areas and are presented in more detail below.

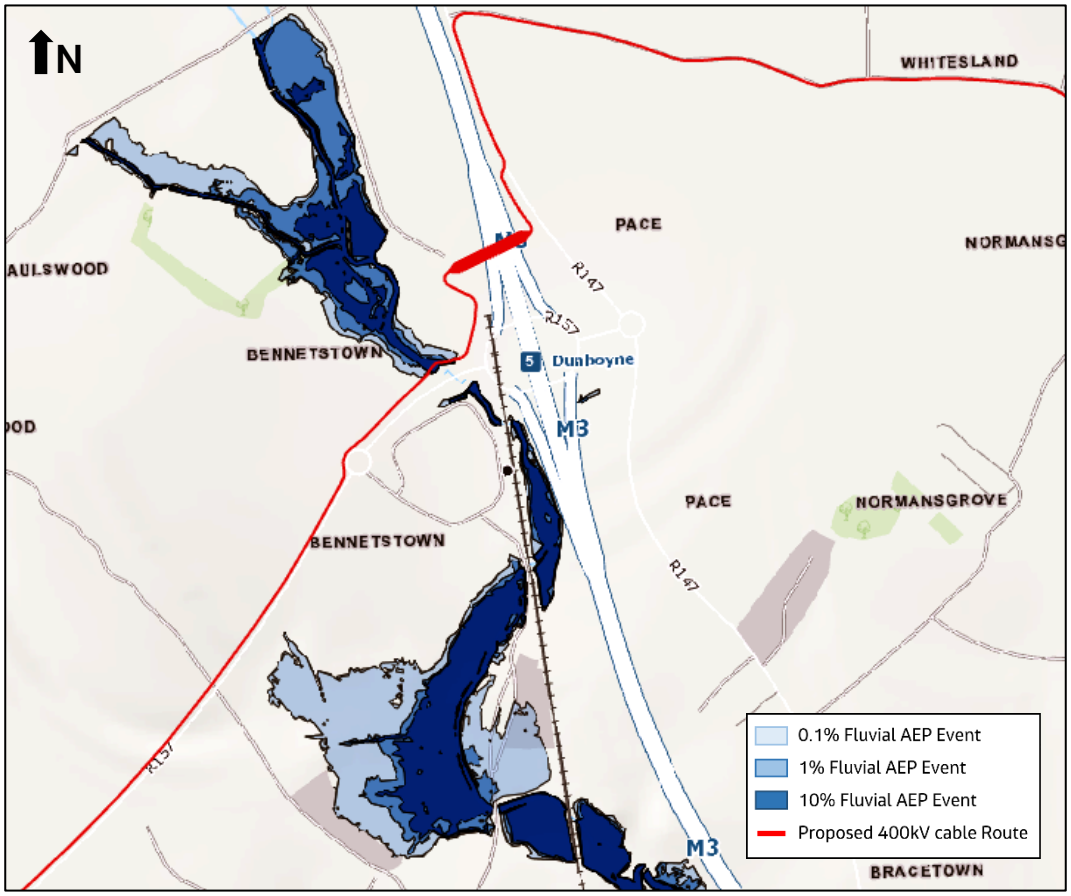

Image 4.4: Extract of CFRAM Fluvial Flood Mapping on Crossing with River Tolka (WB04)

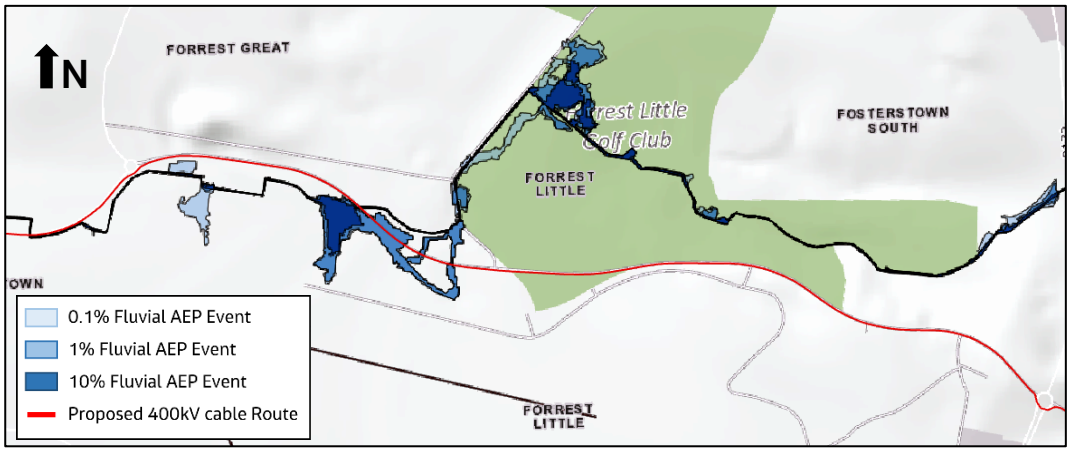

Image 4.5: Extract of CFRAM Fluvial Flood Mapping on Crossing with Sluice River (WB15 and WB16)

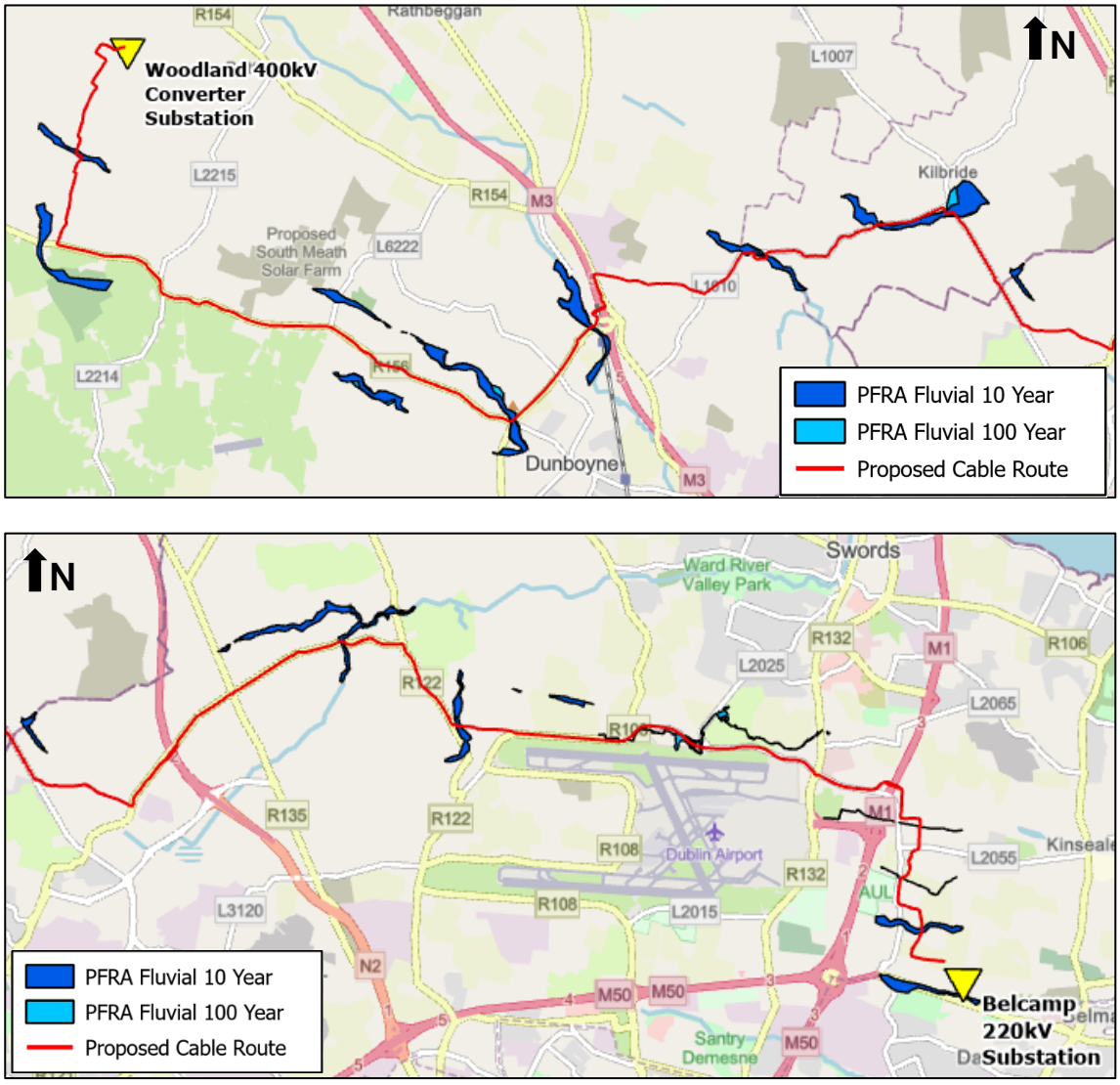

Image 4.6: Extract of Preliminary Flood Risk Assessment PFRA Study for the Proposed Development, from Woodland Substation to Belcamp Substation.

4.3.2 Rainfall / Pluvial Flood Risk

Pluvial flooding occurs during periods of heavy rainfall, when the rainfall rate is greater than the infiltration capacity. It is usually associated with high intensity rainfall events (typically >30mm/h) resulting in overland flow and ponding in depressions in the topography. In urban situations underground sewerage / drainage systems and surface watercourses may be completely overwhelmed.

Pluvial flood extents are available for areas of County Dublin and County Meath and provide an indication of the level of risk. The flood mapping considered flood risk in 10%, 1% and 0.5% Annual Exceedance Probability (AEP) rainfall events. The rainfall flood extents at the area of interest were reviewed using a QGIS shapefile, based on data from the OPW Flood info website (OPW 2024), as well as an extract of PFRA pluvial mapping.

There is a low risk of pluvial flooding to the Proposed Development overall based on the available pluvial mapping. However, there are a few areas where the Proposed Development will cross pluvial flood zones (see Table 4.3 and Image 4.6 to Image 4.11 for details).

Table 4.3: Locations of Possible Pluvial Flood Risk Along the Proposed Cable Route.

Approximate Chainages	Location / Description
350	Close to Woodland Substation
13,250	Along M3 at Dunboyne
14,750 – 15,050	At Portmanna
22,200	At Hollystown
28,700	Close to Kingstown

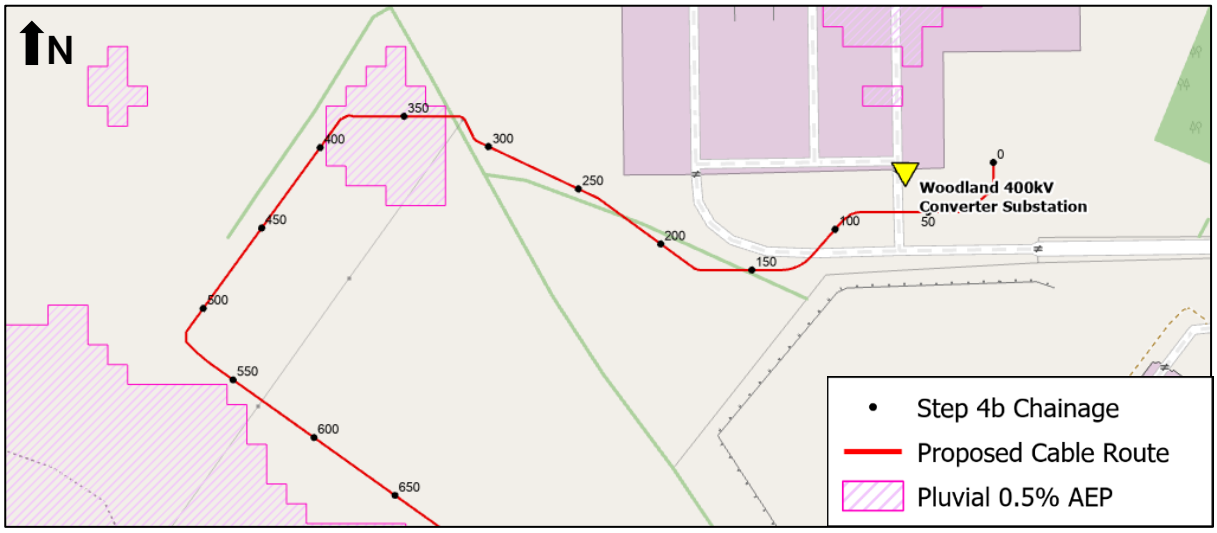

Image 4.7: Extract of Pluvial PFRA Mapping (0.5% AEP) along the Proposed Development (Chainage 350).

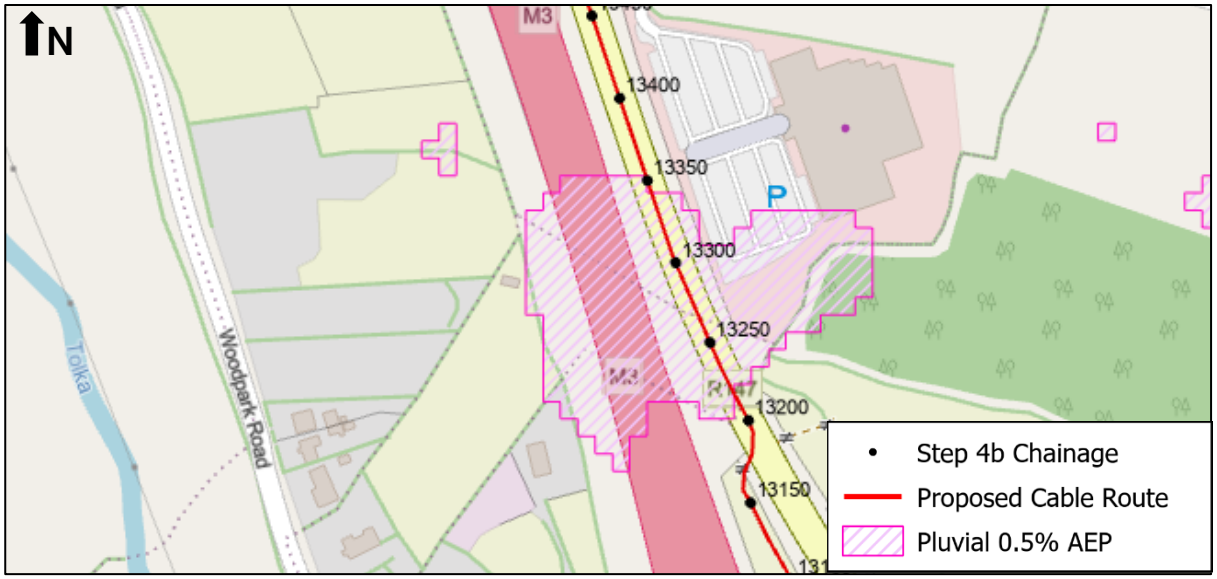

Image 4.8: Extract of Pluvial PFRA Mapping (0.5% AEP) along the Proposed Development (Chainage 13,250).

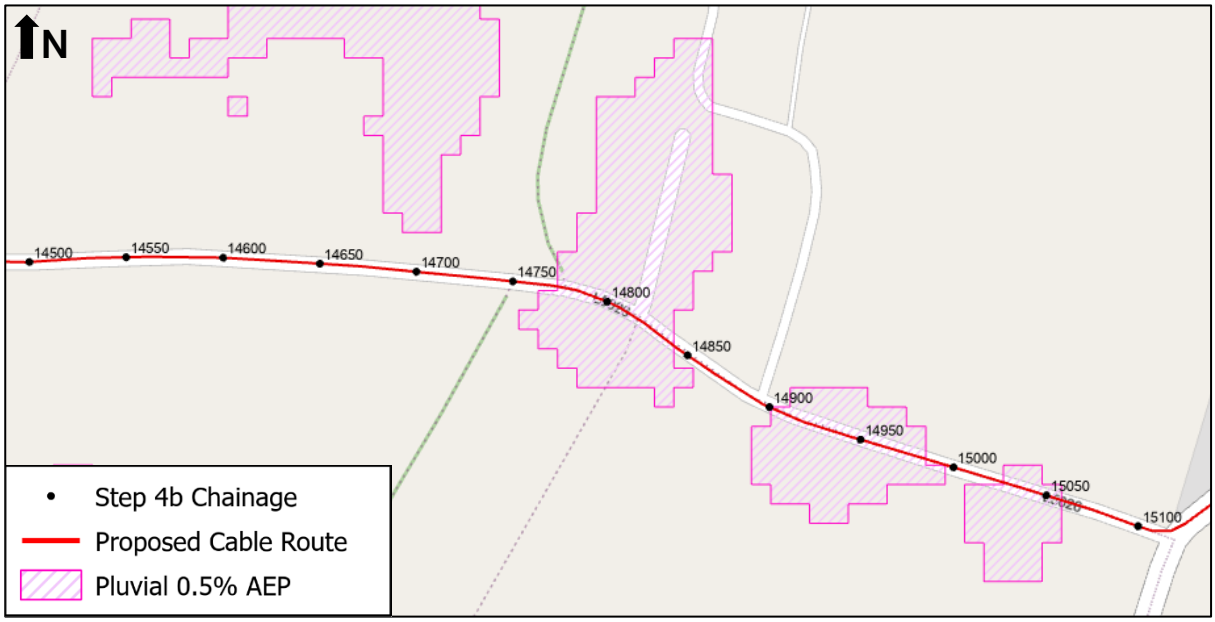

Image 4.9: Extract of Pluvial PFRA Mapping (0.5% AEP) along the Proposed Development (Chainage 14,750 to Chainage 15,050).

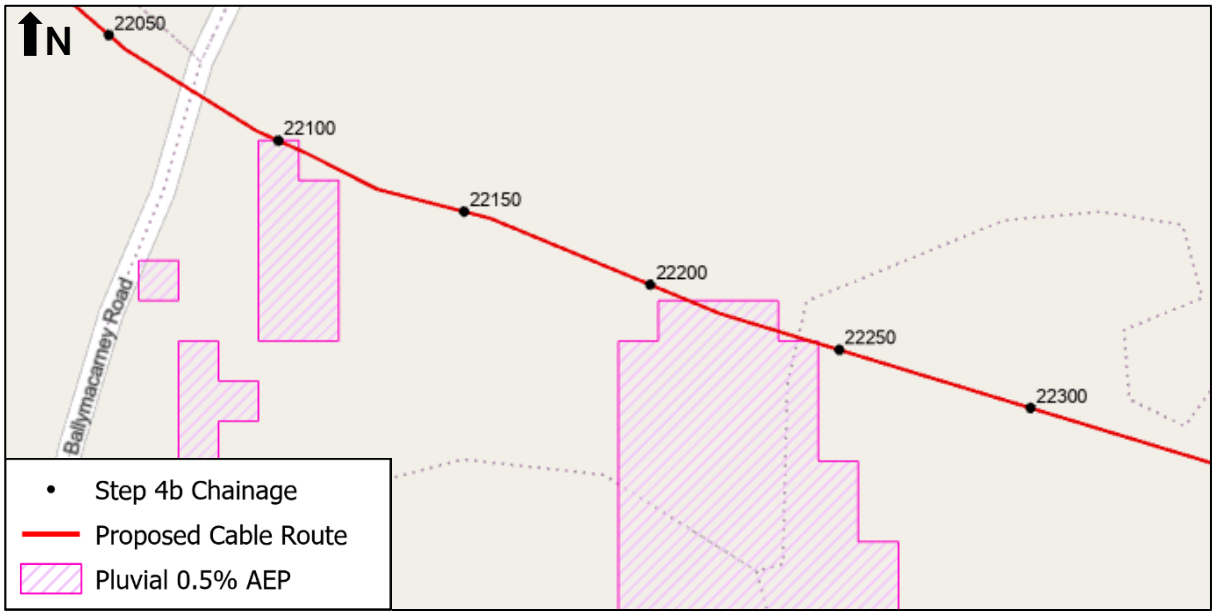

Image 4.10: Extract of Pluvial PFRA Mapping (0.5% AEP) along the Proposed Development (Chainage 22,200).

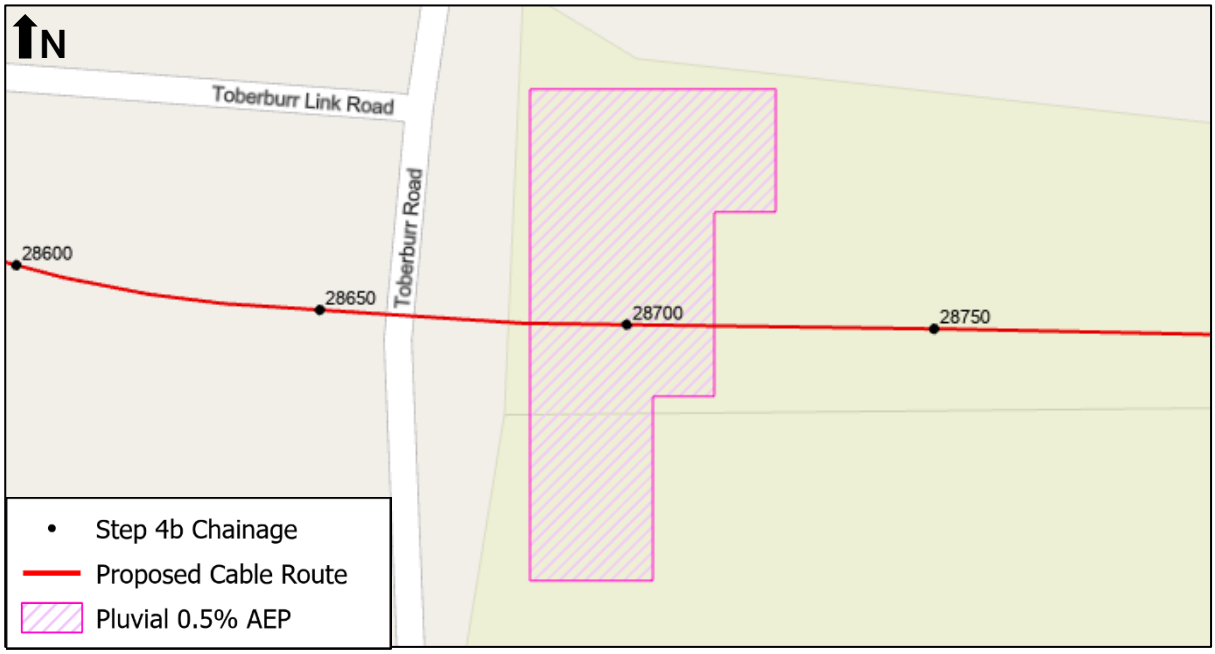

Image 4.11: Extract of Pluvial PFRA Mapping (0.5% AEP) along the Proposed Development (Chainage 28,700).

4.4 National Indicative Fluvial Mapping (NIFM)

The National Indicative Flood Mapping (NIFM) data (OPW 2024) was produced for all catchments greater than 5km^2 (squared kilometres) that were not covered by the National CFRAM Programme. The images presented below are extracted from maps available online (OPW 2024).

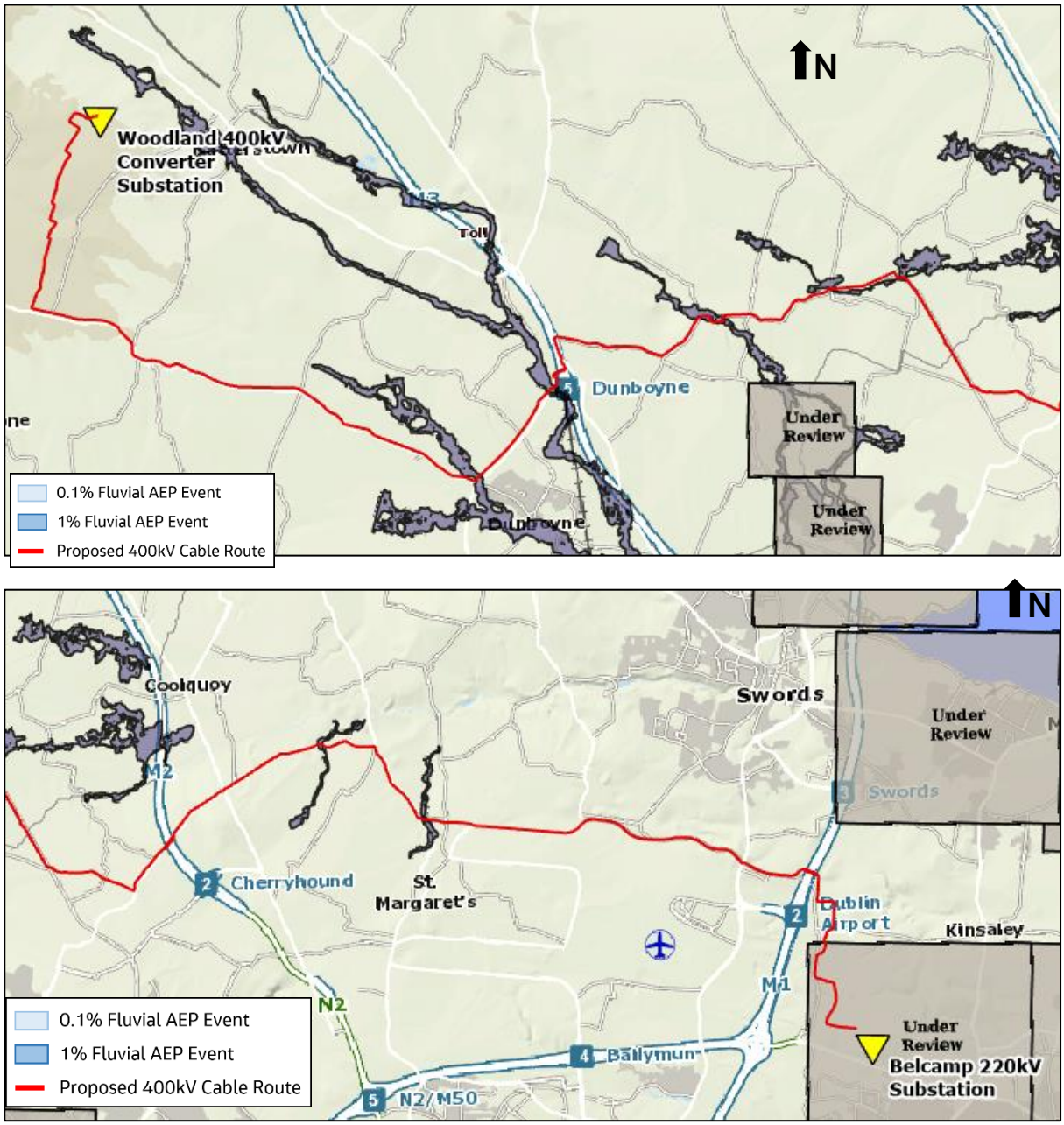

Image 4.12: Extract of Fluvial Flood Mapping from NIFM for the Proposed Development, from Woodland Substation to Belcamp Substation.

As shown in Image 4.12, the risk of fluvial flooding to the Proposed Development is generally low. In some key areas where watercourses identified by the NIFM will be crossed, the Proposed Development will cross within the 0.1% and 1% AEP fluvial flood risk areas. As the Proposed Development will be underground, there is a low risk of flooding at these areas only during construction (refer to Stage 2 of this FRA in Section 6.7 for proposed mitigation measures).

4.5 Groundwater Flood Risk

Groundwater flooding occurs when the level of water stored in the ground rises as a result of prolonged rainfall to meet the ground surface and flows out over it (i.e., when the capacity of this underground reservoir is exceeded). Groundwater flooding tends to be very local and results from interactions of site-specific factors such as tidal variations. While water levels may rise slowly, it may be in place for extended periods of time.

Hence, such flooding may often result in significant damage to property rather than be a potential risk to life. The OPW National Flood Hazard Mapping website (OPW 2024) was used to assess the risk of groundwater flooding. Based on the OPW groundwater maps, there is no risk of groundwater flooding to the Proposed Development.

Regarding potential seepage of groundwater into the proposed open cut trenching during construction, existing groundwater protection scheme report for County Meath (Geological Survey Ireland (GSI) 2018) reveals no significant shallow deposits of groundwater in the area of the Proposed Development. Local borehole testing would reveal the water table level and any potential seepage. Furthermore, GSI maps (GSI 2024) reveal soil permeability along the Proposed Development. As shown in Image 4.13, soil permeability is generally "Low" around all the area of the Proposed Development.

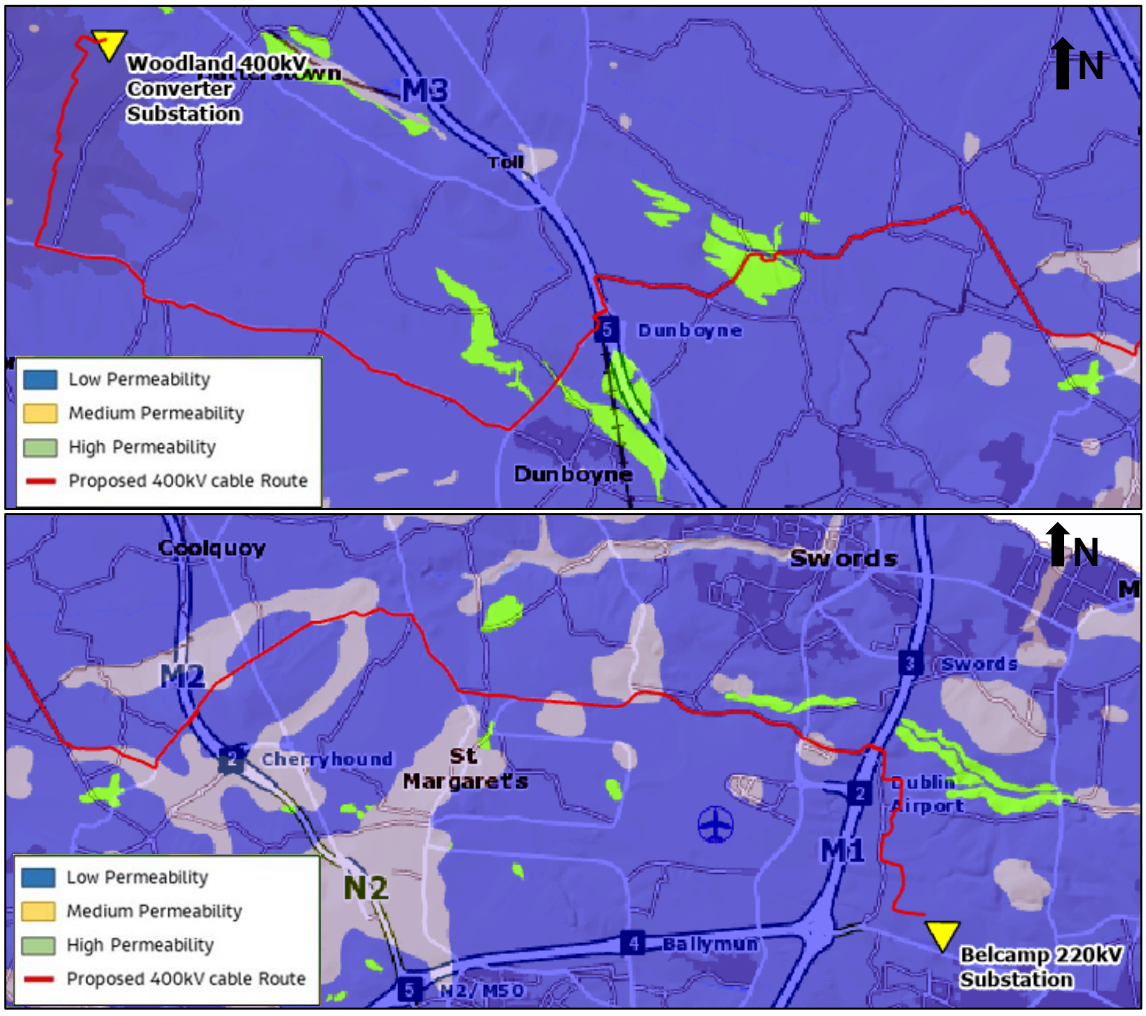

Image 4.13: Extract of Subsoil Permeability Mapping from the GSI Groundwater Data Viewer Mapping at the Proposed Development and Surrounding Area (GSI 2024).

In the event that groundwater seepage into the trenching of the Proposed Development is detected, potential mitigation measures that will be implemented are detailed below:

- Dewatering: This method involves pumping out groundwater from the trench, with the aim of lowering the water table and allow for a dry working area. This will be achieved by creating local well points around the trench and extracting the groundwater using pumps; and
- Trench boxes: Trench boxes are metal or plastic structures placed in the open cut trench to support it and prevent collapse by creating a water tight seal around its perimeter. However,

this method also increases water pressure on the sides of the trench, so dewatering must be carried out first.

4.6 Strategic Flood Risk Assessments (SFRA)

4.6.1 SFRA for Meath County Development Plan

As mentioned in Section 2.4, JBA Consulting was commissioned by Meath County Council in November 2011 to undertake a SFRA. This study informed the MCDP (MCC 2021). As depicted in Image 4.14, the majority of the Proposed Development will be located in Flood Zone C (as defined in Section 3.1), except for local crossings with Flood Zone B and A sites.

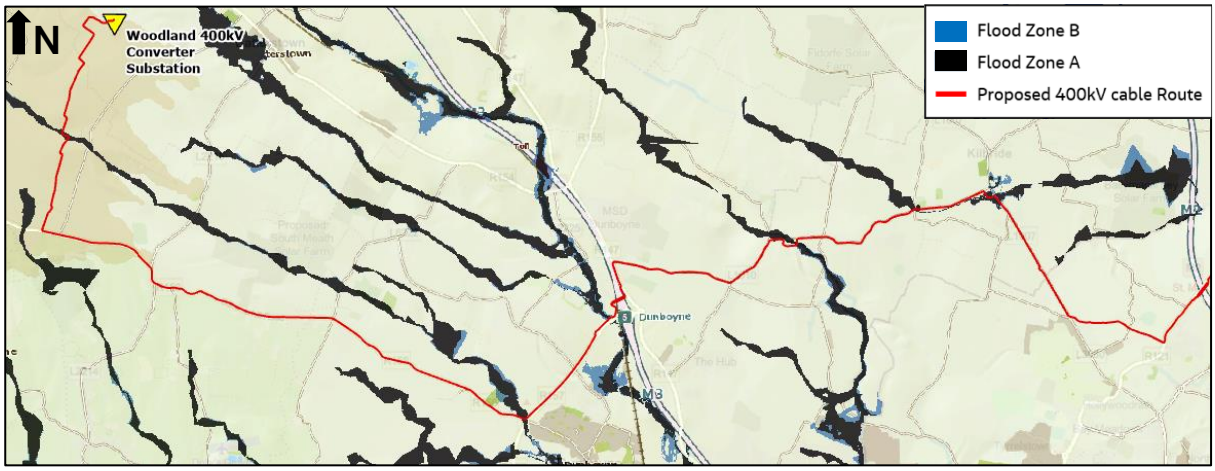

Image 4.14: Extract of Flood Zones A and B from MCDP (MCC 2021)

4.6.2 SFRA for Fingal Development Plan

As outlined in Section 2.5, the SFRA of Fingal has been carried out to support the Strategic Environmental Assessment of the FDP (FCC 2023). The assessment was carried out in accordance with the requirements of the Flood Risk Management Guidelines (DEHLG and OPW 2009) and the WFD. This study informed the FDP for the period of 2023 to 2029.

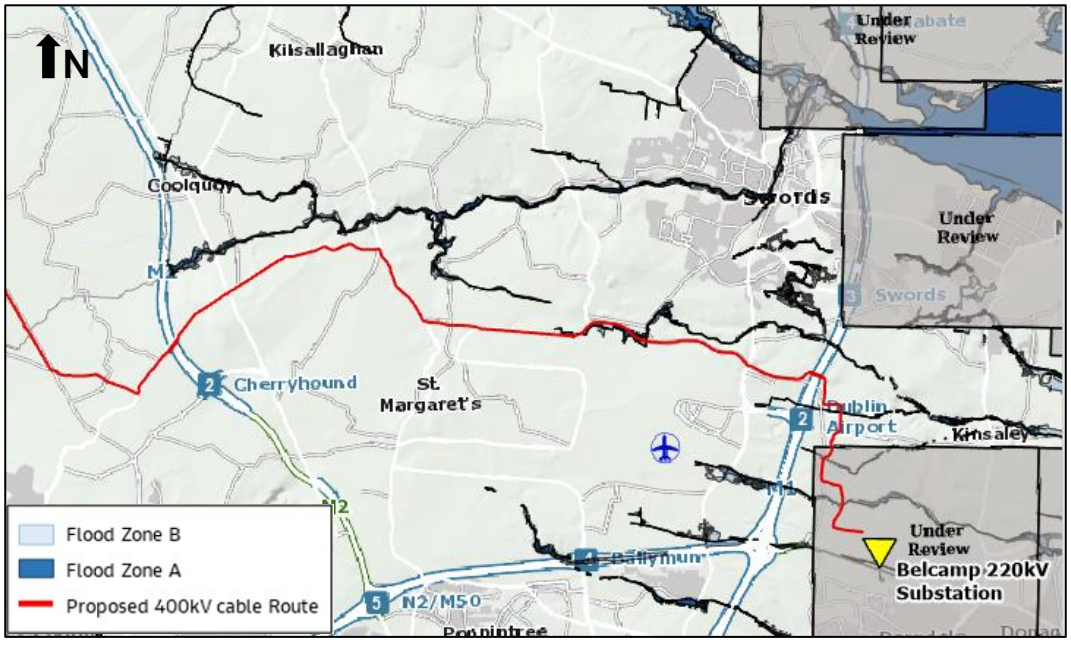

Image 4.15: Extract of Flood Zones A and B for Fingal from OPW (OPW 2024)

As depicted in Image 4.15, the majority of the Proposed Development will be located in Flood Zone C (as defined in Section 3.1), except for local crossings with Flood Zone B and A sites.

5. Stage 2: Initial Flood Risk Assessment

This Section assesses the risk of flooding to the Proposed Development once the works are complete from a range of different sources, which is then used to develop a broader understanding of the risk characteristics to the Proposed Development.

5.1 Potential Sources of Flooding

Based on the online information provided by the OPW (OPW 2024), the Stage 1 assessment identified a low risk for fluvial and pluvial flooding in certain locations. These have been identified from available mapping in Stage 1, and further mitigation measures, where necessary, are proposed. There is no known risk for coastal or groundwater flooding.

5.2 Artificial Drainage Systems

Care must be taken during construction, so that the Proposed Development does not impact surface water or artificial drainage systems following construction. The 400kV proposed cable circuit will be laid at a lower depth (approximately 1.3m (metres) in the public road and 1.8m in private lands) than that expected for drainage systems (0.7m to 1.2m), so chances of crossing with the existing networks are low. However, there is risk of undermining existing drainage infrastructure when trenching for the Proposed Development, therefore care must be taken to maintain appropriate clearance levels.

5.3 Flood Risk due to Climate Change

Future climate change is predicted to give rise to an increased risk of flooding through rising sea levels and an increase in river flows and the frequency and intensity of extreme rainfall. The OPW has identified two potential scenarios for the impacts of climate change that are known as the Mid-Range Future Scenario (MRFS) and High-End Future Scenario (HEFS).

Table 5.1 summarises the predicted impacts of both scenarios on predicted sea levels, river flows and rainfall depths over the next 100-years.

Table 5.1: Climate Change Forecast

Parameter	Mid-range Future Scenario (MRFS)	High-End Future Scenario (HRFS)
Mean Sea Level Rise	+500mm	+1000mm
River Flows	+20%	+30%
Extreme Rainfall Depths	+20%	+30%

The MRFS scenario is intended to represent the 'likely' future scenario based on a range of forecasts. The HEFS represents a more extreme forecast that is at the upper end of accepted projections.

Fluvial flood extent maps for the CFRAM and NIFM future scenarios are available below.

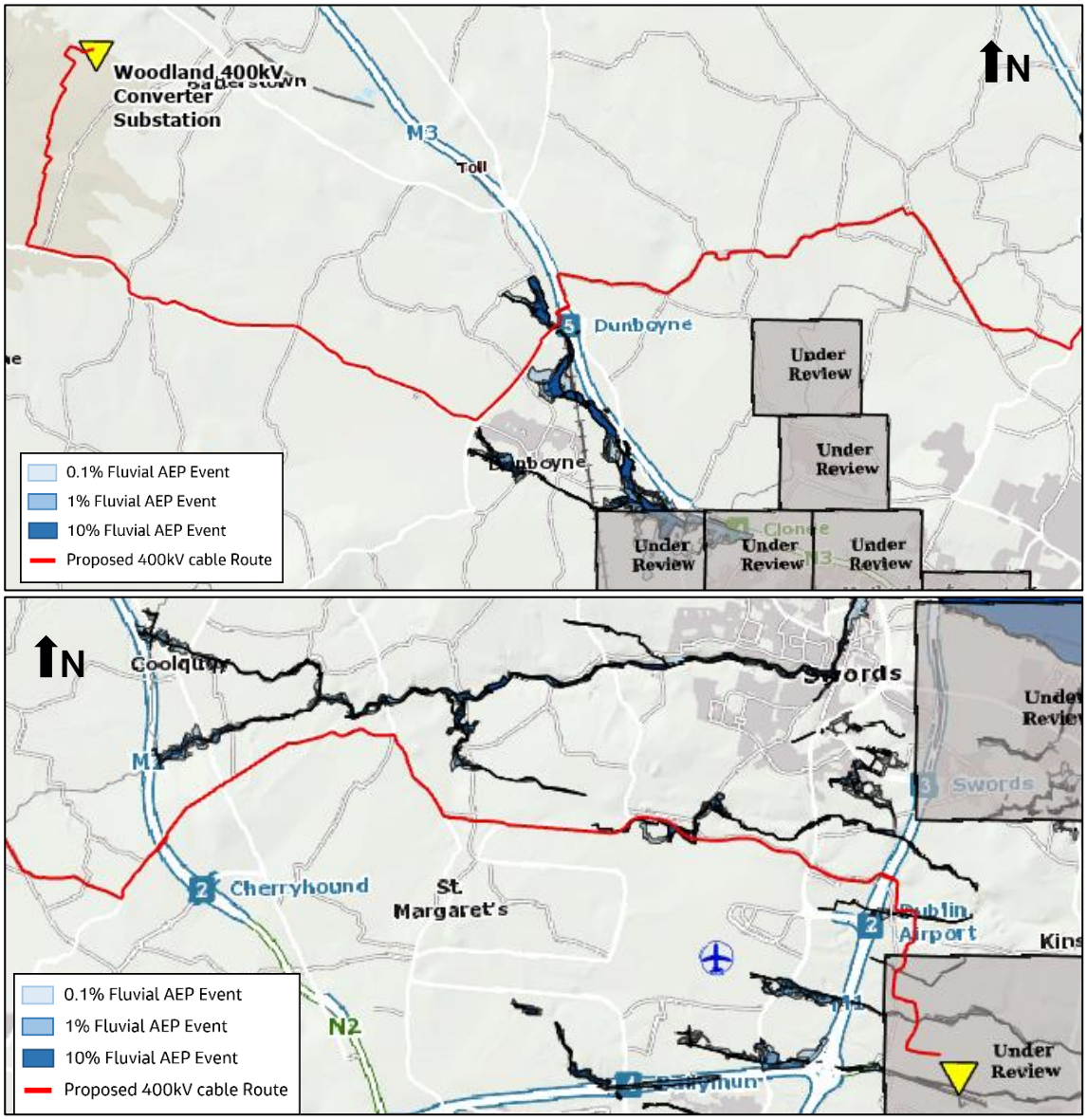

Image 5.1: Extract from CFRAM Study Fluvial Flood Mapping, Mid-Range Future Scenario, Woodland Substation to Belcamp Substation (OPW 2024)

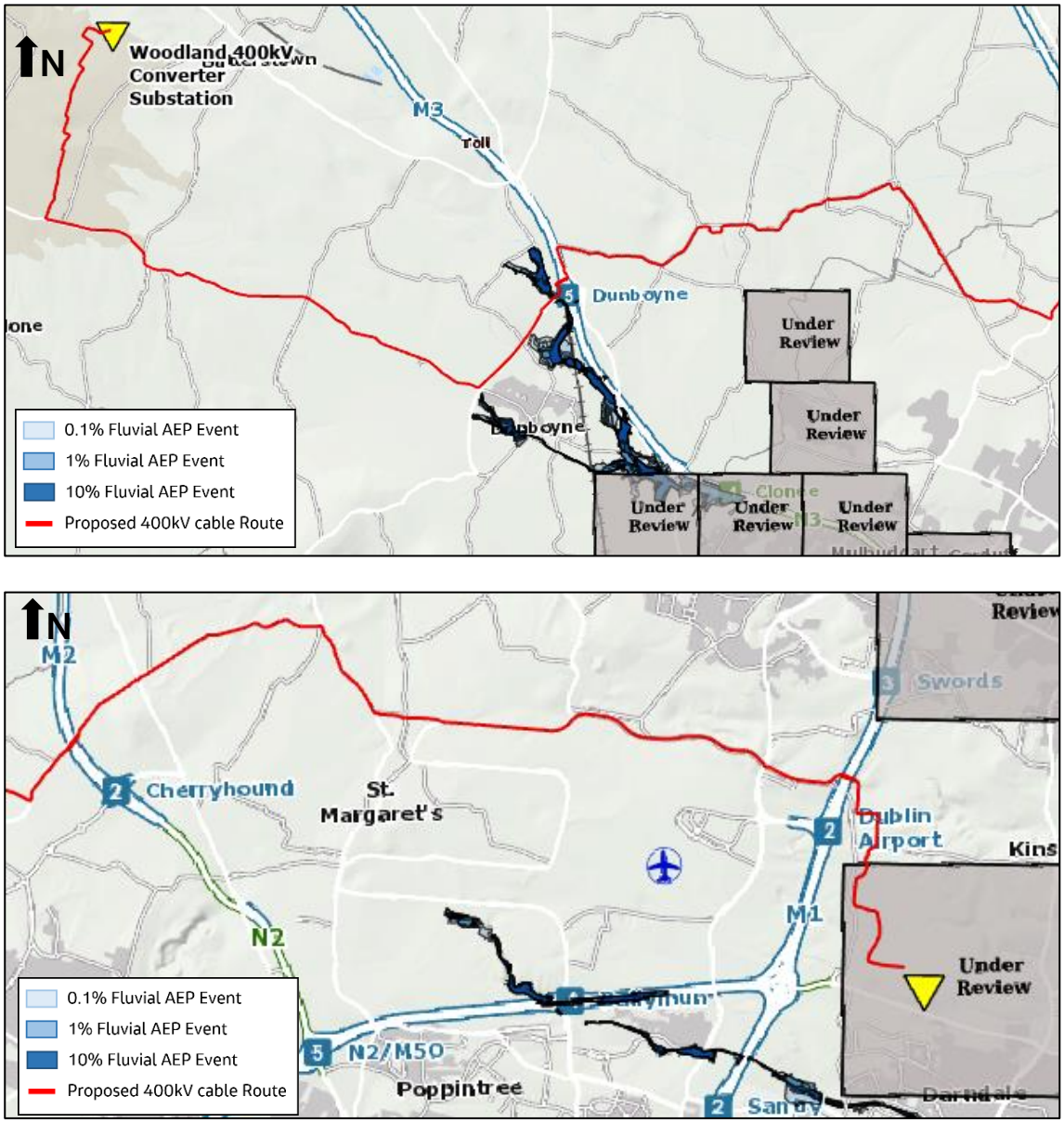

Image 5.2: Extract from CFRAM Study Fluvial Flood Mapping, High-End Future Scenario, Woodland Substation to Belcamp Substation (OPW 2024)

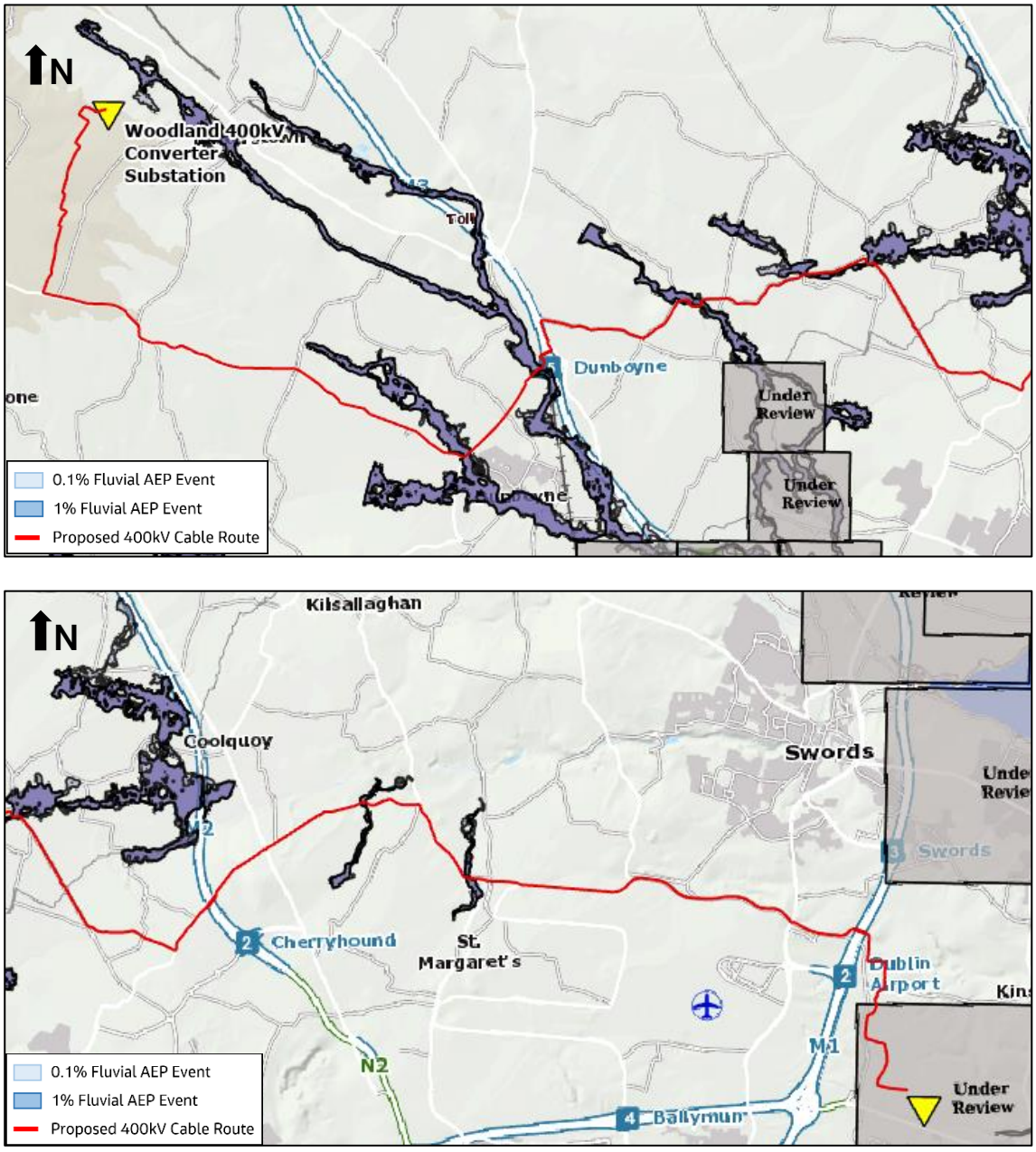

Image 5.3: Extract from NIFM Flood Extents for the Mid-Range Future Scenario (OPW 2024)

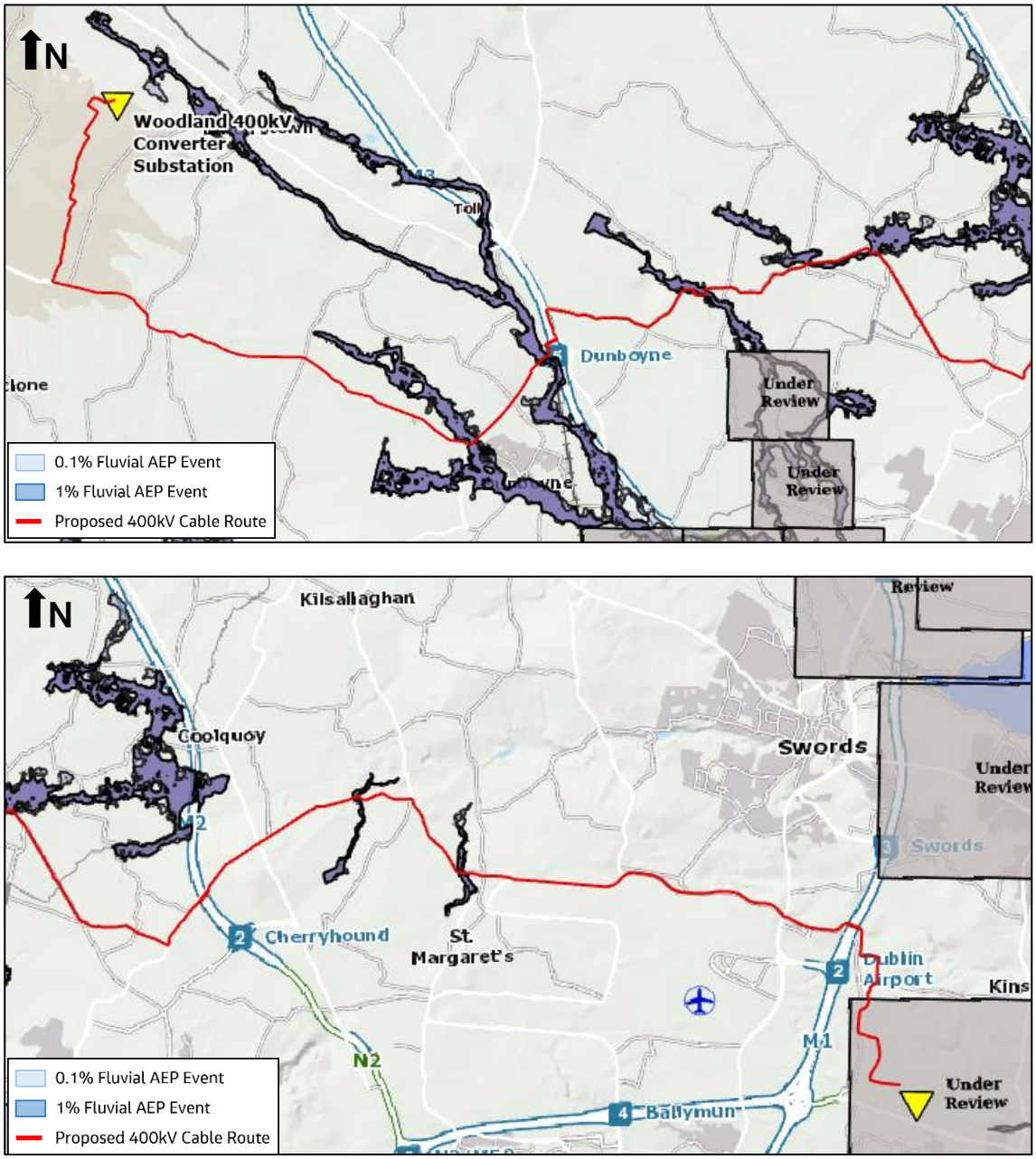

Image 5.4: Extract from NIFM Flood Extents for the High-End Future Scenario (OPW 2024)

For the purposes of this FRA, the potential impact of climate change on flood risk to the Proposed Development has been made relative to the MRFS scenario. Table 5.2 summarises the potential flood risk impacts due to climate change on the Proposed Development.

Table 5.2 Climate Change Impact

Source of Flooding	Likely Impacts of Climate Change	Discussion
Coastal	N/A	There is no known existing risk of Coastal Flooding to the Proposed Development and climate change will not result in potential flooding of the Proposed Development from coastal sources.
Fluvial	No change	There is only a temporary risk of flooding during construction. Future climate change will not affect this conclusion, apart from the access track crossing with Dunboyne stream. For the detailed design of the crossing structure, climate change will be considered.
Estuarine	No change	There is no known risk of estuarine flooding to the Proposed Development. This conclusion is not changed by the impact of climate change.
Pluvial	No change	There is only a temporary risk of flooding during construction. Future climate change will not affect this conclusion.
Artificial Drainage Systems	No change	The Proposed Development will have no identified impact on surface water or artificial drainage systems as it is underground, built at a lower depth. Any new impermeable surfaces associated with the Proposed Development will be catered for in additional stormwater infrastructure ensuring any additional runoff will not compromise the capacity or performance of the existing drainage systems. All additional stormwater drainage required will be designed to cater for the effects of future climate change.
Groundwater	No change	The Proposed Development is not at risk from groundwater flooding, based on online information provided by OPW (OPW 2024). Future climate change will not affect this conclusion.

5.4 Temporary Construction Compounds / HDD Compounds

During the Construction Phase there will be seven Temporary Construction Compounds (TCCs), and six HDD Compounds, which may be at risk of flooding from any of the sources mentioned above. These locations are:

Temporary Construction Compounds:

- TCC0: Chainage 0;
- TCC1: Chainage 3,350;
- TCC2: Chainage 10,600;
- TCC3: Chainage 21,600;
- TCC4: Chainage 26,850;
- TCC5: Chainage 34,700; and
- TCC6: Chainage 37,700.

These locations are shown on Image 5.5.

HDD Compounds:

- HDD 1a: Chainage 12,850;
- HDD 1b: Chainage 13,050;
- HDD 2a: Chainage 23,400;
- HDD 2b: Chainage 23,600;
- HDD 3a: Chainage 34,250; and
- HDD 3b: Chainage 34,450.

These locations are shown on Image 5.6.

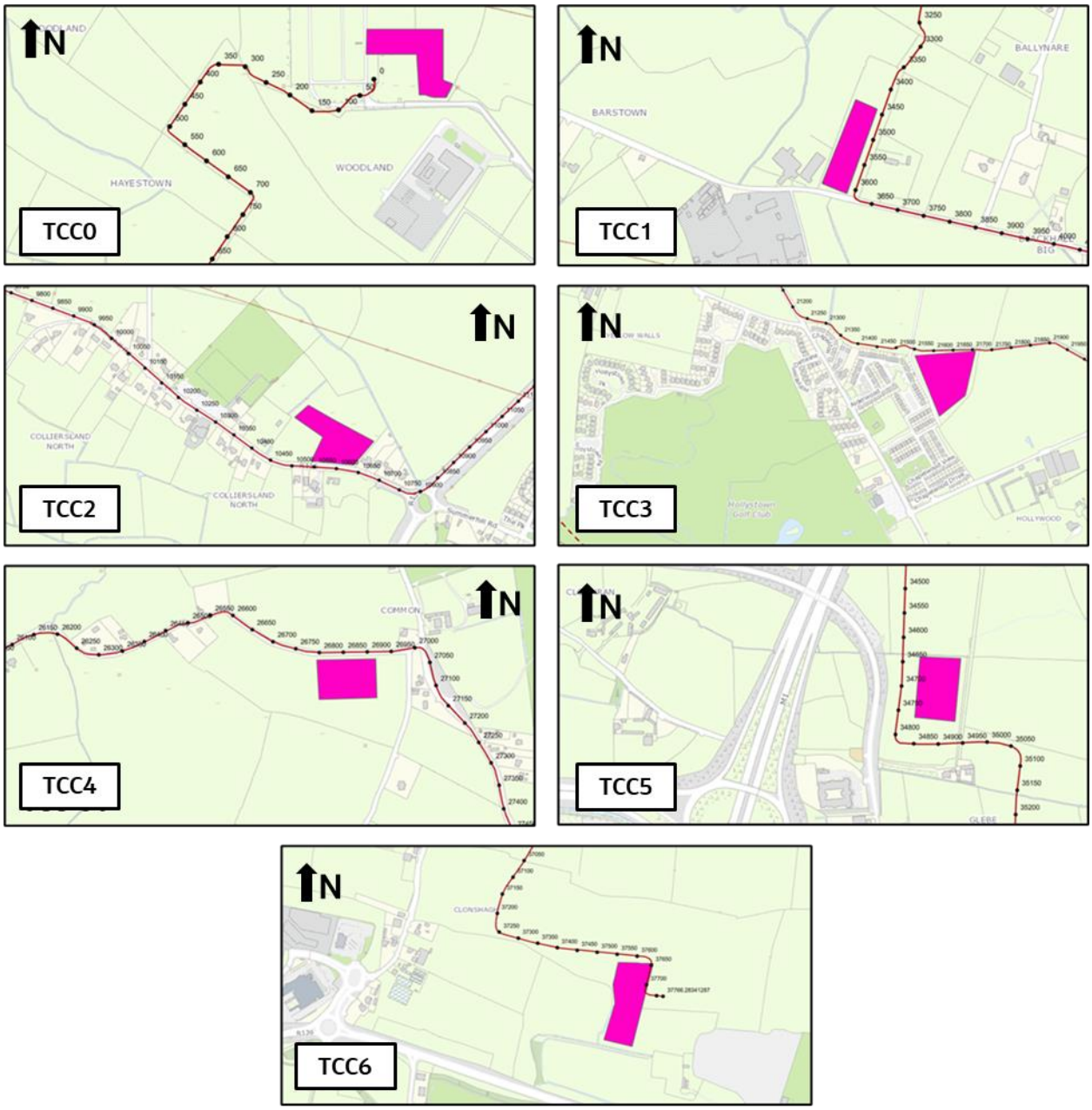

Image 5.5: TCC Locations

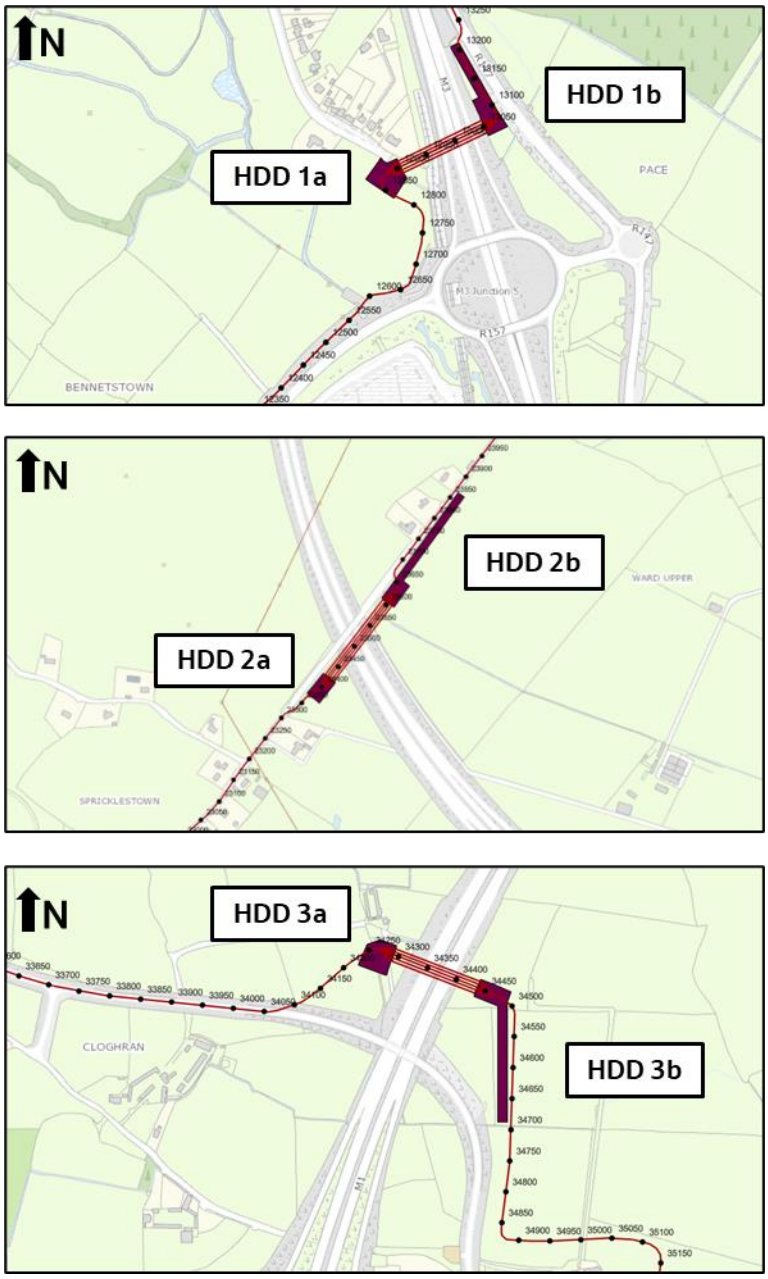

Image 5.6: HDD Compounds Locations

These locations were assessed for any potential risk of flooding from any of the above sources, the findings are detailed below.

Table 5.3: Summary of Flood Risk to TCCs / HDD Compounds

Flood Risk	Summary of Impact	Notes
Coastal	Low	There is no risk of coastal flood risk.
Fluvial	Low	There is low flood risk over the TCCs / HDD Compounds according to the current CFRAM and PFRA fluvial flood risk maps (OPW 2024). However, TCC2, located near the Dunboyne Stream, presents a flood risk based on the NIFM future climate change scenarios maps. The current NIFM scenario maps for this location are under review. While it is considered unlikely for a fluvial flood risk to occur on the site due to its temporary nature, some mitigation measures will be considered for this location. Therefore, it is recommended to be aware of the weather forecast in order to avoid any person working in this location in the case of an extreme storm.
Estuarine	Low	There is no risk of estuarine flooding.
Pluvial	Low	PFRA 0.5%APE maps do not show any pluvial flood risk where the compounds are located. Therefore, the risk of pluvial flooding is low.
Artificial Drainage Systems	Low	The risk of flooding from artificial drainage systems is low.
Groundwater	Low	There is no documented risk of groundwater flooding in the areas close to the TCCs / HDD Compounds.

5.5 Summary of Flood Risk

The flood risk to the Proposed Development is summarised in Table 5.4.

Table 5.4: Summary of Flood Risk to Proposed Development

Flood Risk	Summary of Impact	Notes
Coastal	N/A	Based on the information provided online there is no known risk of coastal flooding to the Proposed Development.
Fluvial	Low	The CFRAM fluvial flood extents (OPW 2024) highlight that there is a low risk of flooding from local watercourses during construction, in key areas where a watercourse will be crossed. Proposed methods of watercourse crossing include HDD, trench crossings and in-road crossings. The watercourse crossing structure in the access track over Dunboyne stream will be designed considering the existing flood risk over it, defining the proper size and height of the structure and the road.
Estuarine	No change	There is no known risk of estuarine flooding to the Proposed Development based on the information provided.
Pluvial	Low	The CFRAM pluvial flood extents highlight that there is a low risk of pluvial flooding during construction at certain areas along the Proposed Development. As the method of cable laying here will be open trenching, there is a low impact of pluvial flooding on the Proposed Development during construction.
Artificial Drainage Systems	No change	There is no known risk of flooding from artificial drainage systems to the Proposed Development based on the information provided.
Groundwater	Low	There is no known risk of flooding from groundwater to the Proposed Development based on the information provided.

6. Stage 2: Potential Flood Risk Impacts from Proposed Development

Section 5 considered the flood risk to the Proposed Development. This Section will consider the potential change in flood risk to the surrounding areas from the Proposed Development for each source of flooding during the Construction and Operational Phase.

6.1 Impacts on Coastal Flooding

The Proposed Development is not at risk from coastal flooding during the Construction or Operational Phases. The Proposed Development will have no known impact on coastal flood risk based on online information provided by the OPW (OPW 2024).

6.2 Impacts on Fluvial Flooding

The Proposed Development is at low risk from fluvial flooding during construction. Any works at watercourses (e.g., open cut trenching for crossings) will be designed to maintain waterflows and allow the discharge of water without affecting flood risk.

Once construction is complete, the Proposed Development is expected to slightly increase existing impermeable areas at the locations where off-road Joint Bays are proposed. This is due to the proposed localised hardstanding areas and permanent access tracks for some of the Joint Bays. The typical design for the permanent access tracks which are largely made up of course materials is discussed in Chapter 4 (Proposed Development Description) in Volume 2 of the EIAR. The only watercourse crossing which could be subject to fluvial flood risk comprises a permanent access track crossing Dunboyne Stream. At this crossing, the structure will be designed to not increase the fluvial flood risk over the adjacent areas. The hardstanding areas around the off-road Joint Bays will be similarly constructed to not increase fluvial flood risk. All Joint Bays and link boxes are designed with watertight connections as standard. Drainage sumps are proposed for the Joint Bays, to provide for additional drainage.

It is considered that the hardstanding areas, Joint Bays, and permanent access tracks will not result in any significant loss of floodplain and will not increase the risk of flooding. Also, for TCC2, the grading of the existing terrain will not be increased, and any physical barriers that could contribute to an increase in flood risk to adjacent properties will not be raised.

The Proposed Development will have no known impact on fluvial flood risk based on online information provided by the OPW (OPW 2024).

6.3 Impacts on Estuarine Flooding

The Proposed Development is not at risk from estuarine flooding. The Proposed Development will have no known impact on estuarine flood risk based on online information (OPW 2024).

6.4 Impacts on Pluvial Flooding

In order to assess the increase in pluvial flood risk, the following points need to be considered:

- Will the Proposed Development increase the rainfall runoff rate; and
- Will the Proposed Development alter existing flow or drainage paths.

The Proposed Development will result in a slight increase in the area of hardstanding surfaces (see Chapter 4 (Proposed Development Description) in Volume 2 of the EIAR for details of the hardstanding areas, Joint Bays, and permanent access tracks). The unbound permanent access tracks materials will be water permeable

to a degree but there will be a change from the current greenfield conditions. However, there will be no significant change in runoff as a result of the hardstanding areas, Joint Bays, and permanent access tracks. On the off-road sections, these areas will runoff to the adjacent greenfield areas. There will be a low impact on surrounding areas from pluvial flooding, due to proposed additional hardstanding areas and access tracks around off-road Joint Bays. Additional drainage sumps will be provided at the Joint Bays to offset this.

6.5 Impacts on Groundwater Flooding

The Proposed Development involves new works below existing ground levels, but it is unlikely that this would contribute to groundwater flooding, based on available online information from the OPW and GSI (OPW 2024).

6.6 Impacts on Artificial Drainage Systems

The Proposed Development is not expected to cross any existing artificial drainage systems, as the intended route will be significantly deeper than the expected level of existing drainage networks. During the Operational Phase, the Proposed Development is also expected to have no impact on artificial drainage systems.

6.7 Summary of Potential Flood Risk Impacts from Proposed Development

The flood risk impacts from the Proposed Development are summarised in Table 6.1.

Table 6.1: Summary of Potential Flood Risk Impacts on Surrounding Areas as a Result of the Proposed Development

Flood Risk	Potential Impact	Discussion and Mitigation (where Required)	Residual Impact (with Mitigation)
Coastal	No Impact	No known impact as the Proposed Development is not at risk of coastal flooding.	No impact
Fluvial	Low	Low impact on surrounding areas from fluvial flooding, due to proposed additional localised hard standing and access tracks around off-road Joint Bays. Additional drainage sumps will be provided at the Joint Bays to offset this. In the crossing with Dunboyne stream, the structure will be designed to not increase the fluvial flood risk over the adjacent areas. The TCC2, located nearby this stream, will not present any barrier or element that could increase the flood risk to the adjacent properties.	No Impact
Estuarine	No impact	No known impact on surrounding areas due to estuarine flooding.	No impact
Pluvial	Low	Low impact on surrounding areas due to pluvial flooding, due to proposed additional localised hard standing and access tracks around off-road Joint Bays and TCCs / HDD Compounds. Additional drainage sumps will be provided at the joint bays to offset this.	No impact
Artificial Drainage Systems	No impact	The Proposed Development is not at known risk of surface flooding / impacting artificial drainage systems.	No impact
Groundwater	No impact	Below-ground elements of the works are localised and are unlikely to impact ground water movements.	No impact

7. Flood Risk Management and Evaluation

7.1 Justification Test for the Proposed Development

As defined in Section 4.3, the Proposed Development will be located in Flood Zone C, apart from minor local areas. For the specific areas where the works are located in Flood Zones A and / or B, these require a Justification Test, as illustrated in Image 7.1.

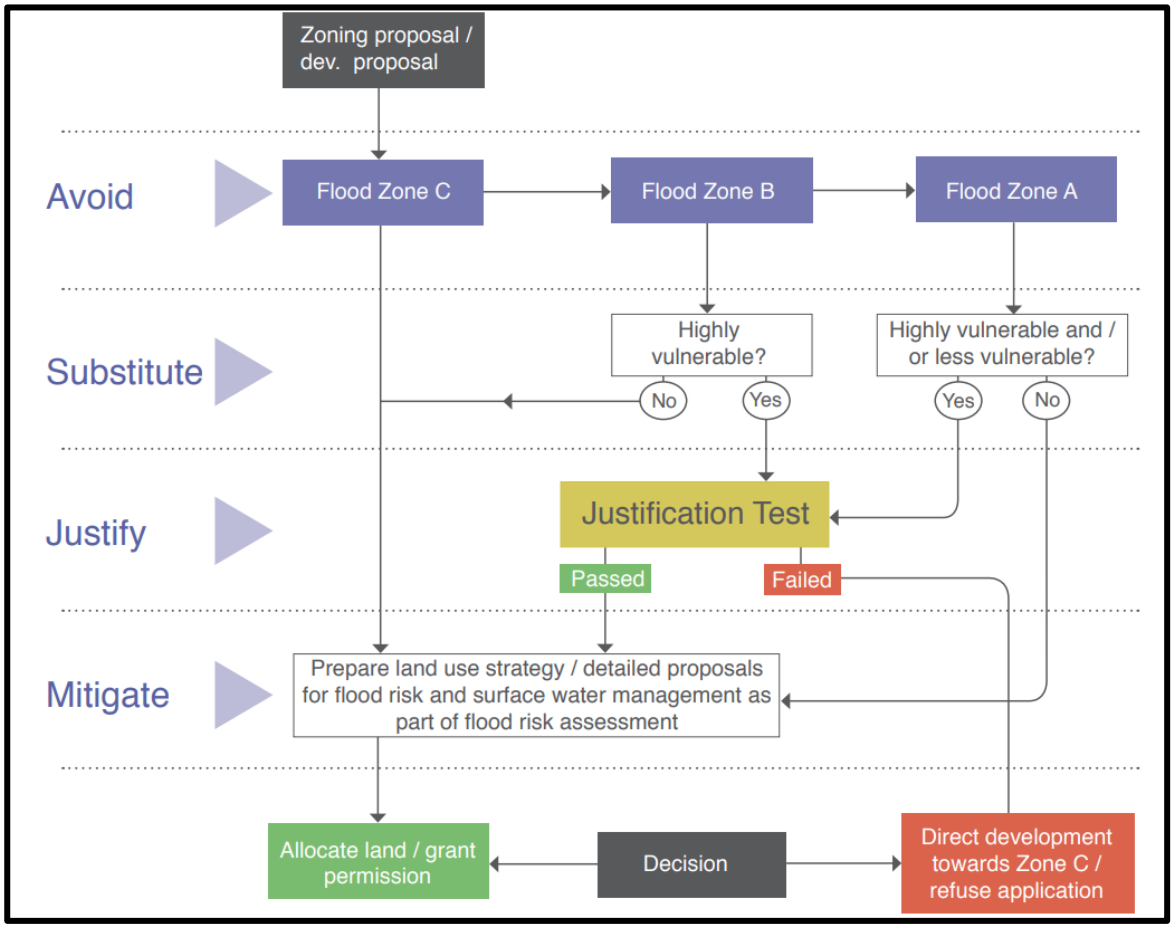

Image 7.1: Justification Test

Section 5.15, Box 5.1 of the Flood Risk Guidelines sets out the criteria for the Justification Test and is replicated in Image 7.2 (DEHLG and OPW 2009). An assessment of the Proposed Development against these criteria is presented in Table 7.1 and Table 7.2.

When considering proposals for development, which may be vulnerable to flooding, and that would generally be inappropriate as set out in Table 3.2, the following criteria must be satisfied:

1. The subject lands have been zoned or otherwise designated for the particular use or form of development in an operative development plan, which has been adopted or varied taking account of these Guidelines.
2. The proposal has been subject to an appropriate flood risk assessment that demonstrates:
   (i) The development proposed will not increase flood risk elsewhere and, if practicable, will reduce overall flood risk.
   (ii) The development proposal includes measures to minimise flood risk to people, property, the economy and the environment as far as reasonably possible.
   (iii) The development proposal includes measures to ensure that residual risks to the area and/or development can be managed to an acceptable level as regards the adequacy of existing flood protection measures or the design, implementation and funding of any future flood risk management measures and provisions for emergency services access; and
   (iv) The development proposed addresses the above in a manner that is also compatible with the achievement of wider planning objectives in relation to development of good urban design and vibrant and active streetscapes.

The acceptability or otherwise of levels of residual risk should be made with consideration of the type and foreseen use of the development and the local development context.

Note: See section 5.27 in relation to major development on zoned lands where sequential approach has not been applied in the operative development plan.

Refer to section 5.28 in relation to minor and infill developments.

Image 7.2: Justification Test for Development Management to be Submitted by the Applicant

Table 7.1 Assessment Against Justification Test criteria - Fluvial Flood Risk

Criteria to be Satisfied	Justification	Criteria Met
The subject lands have been zoned or otherwise designated for the particular use or form of development in an operative development plan, which has been adopted or varied taking account of these Guidelines.	The Proposed Development forms a key part of wider development proposals for the upgrade of the Client's cable network, such as the Grid Implementation Plan 2017-2022 (EirGrid 2017).	Yes
The development will not increase flood risk elsewhere, and, if practicable, will reduce overall flood risk.	As shown in Sections 4, 5, and 6, the Proposed Development will not increase flood risk from any watercourse that is crossed by the Proposed Development.	Yes
The development proposal includes measures to minimise flood risk to people, property, the economy and the environment as far as reasonably practicable.	The Proposed Development is designed to be resilient to the 0.1% AEP fluvial flood.	Yes
The development proposed includes measures to ensure that residual risks to the area and/or development can be managed to an acceptable level as regards the adequacy of existing flood protection measures or the design, implementation and funding of any future flood risk management measures and provisions for emergency services access.	The Proposed Development is designed to be resilient to the 0.1% AEP fluvial flood. The Proposed Development has no impact on the performance of any existing Flood Relief Schemes.	Yes
The development proposed addresses the above in a manner that is also compatible with the achievement of wider planning objectives in relation to development of good urban design and vibrant and active streetscapes.	The Proposed Development meets the objectives set out in the Meath County Development Plan 2021-2027 (MCC 2021) and the Fingal Development Plan 2023 – 2029 (FCC 2023), as a robust electricity network is essential infrastructure for the expecting increase in population.	Yes

Table 7.2: Assessment Against Justification Test Criteria - Pluvial Flood Risk and Surface Water Drainage

Criteria to be Satisfied	Justification	Criteria Met
The subject lands have been zoned or otherwise designated for the particular use or form of development in an operative development plan, which has been adopted or varied taking account of these Guidelines.	The Proposed Development forms a key part of wider development proposals for the upgrade of the Client's cable network, such as the Grid Implementation Plan 2017-2022.	Yes
The development will not increase flood risk elsewhere, and, if practicable, will reduce overall flood risk.	As shown in Sections 4 and 5, the Proposed Development will not increase pluvial flood risk from any receiving watercourse or existing drainage network.	Yes
The development proposal includes measures to minimise flood risk to people, property, the economy and the environment as far as reasonably practicable.	The Proposed Development is designed to be resilient to the 0.1% AEP pluvial flood.	Yes
The development proposed includes measures to ensure that residual risks to the area and/or development can be managed to an acceptable level as regards the adequacy of existing flood protection measures or the design, implementation and funding of any future flood risk management measures and provisions for emergency services access.	The Proposed Development has no impact on the performance of any drainage networks as there is no change in existing runoff rates.	Yes
The development proposed addresses the above in a manner that is also compatible with the achievement of wider planning objectives in relation to development of good urban design and vibrant and active streetscapes.	The Proposed Development meets the objectives set out in the Meath County Development Plan 2021-2027 and in the Fingal Development Plan 2023 – 2029, as it forms a key part of achieving a robust electricity network for the expecting increase in population.	Yes

8. Conclusions and Recommendations

This FRA Report is a FRA of the Proposed Development. The assessment included desk-based investigations into the potential flood risks and an assessment of the potential impacts the Proposed Development will have on flood risk in the surrounding areas.

8.1 Flood Risk to the Proposed Development

The Proposed Development will be located in Flood Zone C, apart from minor local areas in close proximity to watercourses. Given the Proposed Development will be located underground, there is no risk of flooding to it once the works have been completed.

The only element of the design which is subject to fluvial flood risk is the crossing of Dunboyne Stream with a permanent access track. The watercourse crossing structure will be defined during detailed design, taking into account that is should not be vulnerable to fluvial flood risk.

The Proposed Development also includes some additions in Woodland and Belcamp Substations. Specifically, in Belcamp Substation a new GIS Hall is planned. Following the FRA, it is concluded that there is no flood risk at the substations, and therefore, these upgrade works will not be affected by flood risk, and they will not result in a flood risk increase in adjacent areas.

During the Construction Phase, measures have been incorporated into the Construction Environmental Management Plan (included as a standalone document to this planning application pack) to minimise risks during flooding events.

8.2 Flood Risk Impacts from the Proposed Development

The Proposed Development is not at risk of flooding, nor at risk of impacting flooding in the area based on the online information provided (OPW 2024). It is therefore concluded that a Stage 3 Detailed Risk Assessment, including site specific hydraulic modelling, is not required.

In the permanent access track crossing with Dunboyne Stream, the hydraulic structure will be designed so that there is not any increase over the adjacent areas.

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Directive 2007/ 60/ EC of the European Parliament and of the Council of 23 October 2007 on the assessment and management of flood risk: Official Journal L288/ 27-34.

Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment

Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment.

European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296/2018).

Government of Ireland (2020). Project Ireland 2040 – National Planning Framework.

Government of Ireland (2021). Project Ireland 2040 – National Development Plan 2021-2030.

Planning and Development Act 2000 (No. 30 of 2000) (as amended).

Planning and Development Regulations 2001 (S.I. No. 600 of 2001) (as amended).

Appendix A. Information Sources Checklist

No.	Information Source	Status	Reference/Comments
1	OPW Preliminary Flood Risk Assessment indicative fluvial flood maps	✓	Provided by OPW (www.floodinfo.ie)
2	National Coastal Protection Strategy Study flood and coastal erosion risk maps.	X	
3	Predictive and historic flood maps, and Benefiting Lands Map	✓	Flooding History was provided by OPW floodinfo.ie
4	Predictive flood maps produced under the CFRAM studies	✓	CFRAM maps are available and have been used.
5	River Basin Management Plans and reports	✓	River Basin Management Plan for Ireland (2018-2021)
6	Indicative assessment of existing flood risk under Preliminary Flood Risk Assessment	X	
7	Previous Strategic Flood Risk Assessments	✓	Strategic Flood Risk Assessment for Meath County Development Plan 2021-2027 Strategic Flood Risk Assessment for Fingal Development Plan 2023-2029
8	Expert advice from OPW who may be able to provide reports containing the results of detailed modelling and flood-mapping studies including critical damage areas, and information on historic flood events and local studies etc.	X	
9	Topographical maps, in particular digital elevation models produced by aerial survey or ground survey techniques.	X	
10	Information on flood defence condition and performance	N/A	
11	Alluvial deposit maps	N/A	
12	'Liable to Flood' markings on the old 6" Inch Map	X	
13	Local Libraries and newspaper reports	✓	Adequate information on Flooding History was provided by OPW floodmaps.ie
14	Interviews with local people, local history/ natural history societies etc.	X	
15	Walkover survey to assess potential sources of flooding, likely routes for flood water and the site's key features, including flood defences, and their condition	X	