Greenlink Interconnector Limited

Ireland | Onshore

Flood Risk Assessment

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Appendix A
Flood Risk Identification for Cable Route

1 Introduction

1.1 Project Background

Arup has been appointed by Greenlink Interconnector Limited to prepare a Flood Risk Assessment (FRA) report for the proposed electricity interconnector linking the power markets in Ireland and Great Britain. The FRA is to form part of the planning application for the development.

This assessment was carried out in accordance with the "Guidelines for Planning Authorities, The Planning System and Flood Risk Management" published by the then Department of Environment, Heritage and Local Government, (DoEHLG), and the Office of Public Works (OPW), in November 2009.

This report should be read in conjunction with the Environmental Impact Assessment Report (EIAR) for the proposed development.

1.2 Project Scope

The scope of the FRA includes the following:

- Review all relevant existing information,
- An assessment of the risk of flooding to the site and to adjacent sites as a result of construction of the proposed development,
- Identification of potential flood mitigation measures, if necessary,
- Preparation of a Flood Risk Assessment Report.

1.3 Proposed Development

Greenlink will be a High Voltage Direct Current (HVDC) electricity interconnector with a nominal rating of 500MW between Ireland and Wales. The proposed electricity interconnector will allow the transfer of power between the high voltage transmission grids in the Republic of Ireland and Great Britain. The power will be able to flow in either direction at different times, depending on the power supply and demand in each country.

The proposed development comprises the following permanent and temporary elements:

Landfall Compound – a temporary landfall compound at Baginbun, where the high voltage direct current (HVDC) cable will be installed underground, below the beach and cliff at Baginbun Beach, by horizontal directional drilling (HDD);

HVDC Cables – two HVDC electricity cables with a nominal capacity of 500 megawatts (MW), installed underground from the landfall at Baginbun to the converter station, including jointing bays and ground level marker posts at intervals along the route;

Converter Station – a converter station situated close to the existing Great Island substation in Wexford;

Tail Station- A 220kV substation located beside the converter station. The tail station connects the HVAC 220kV cable into the 220kV grid via the existing Great Island substation;

Converter station construction compound: temporary compound for the construction of the converter station and tail station at Great Island;

Cable Contractor compound – three temporary cable contractor compounds will be required (i) at the landfall site close to Baginbun Beach (ii) at the proposed converter station and (iii) one along the onshore route in the townland of Lewistown;

HDD Compounds – temporary HDD contractor compounds are required. One will be located close to the cable contractor compound at Baginbun Beach with another HDD compound located at either side of the Campile River Estuary crossing;

High Voltage Alternating Current (HVAC) Cables – one 220 kV HVAC electricity cable circuit consisting of three cables, installed underground connecting the converter station via the tail station to the EirGrid substation;

Fibre Optic Cables – fibre optic cables for operation and control purposes, laid underground with the HVDC and HVAC cables; and

Community Gain Roadside Car Parking near Baginbun Beach – in consultation with Wexford County Council, circa 54 roadside car parking spaces will be constructed; and

Community Gain in Ramsgrange Village – in consultation with Wexford County Council, extension to existing footpaths, four new street lights and a speed activated sign at Ramsgrange.

For a full description of the development, refer to **Chapter** *3 Proposed Development* in the Environmental Impact Assessment Report.

An overview of the proposed development is presented in Figure 1.

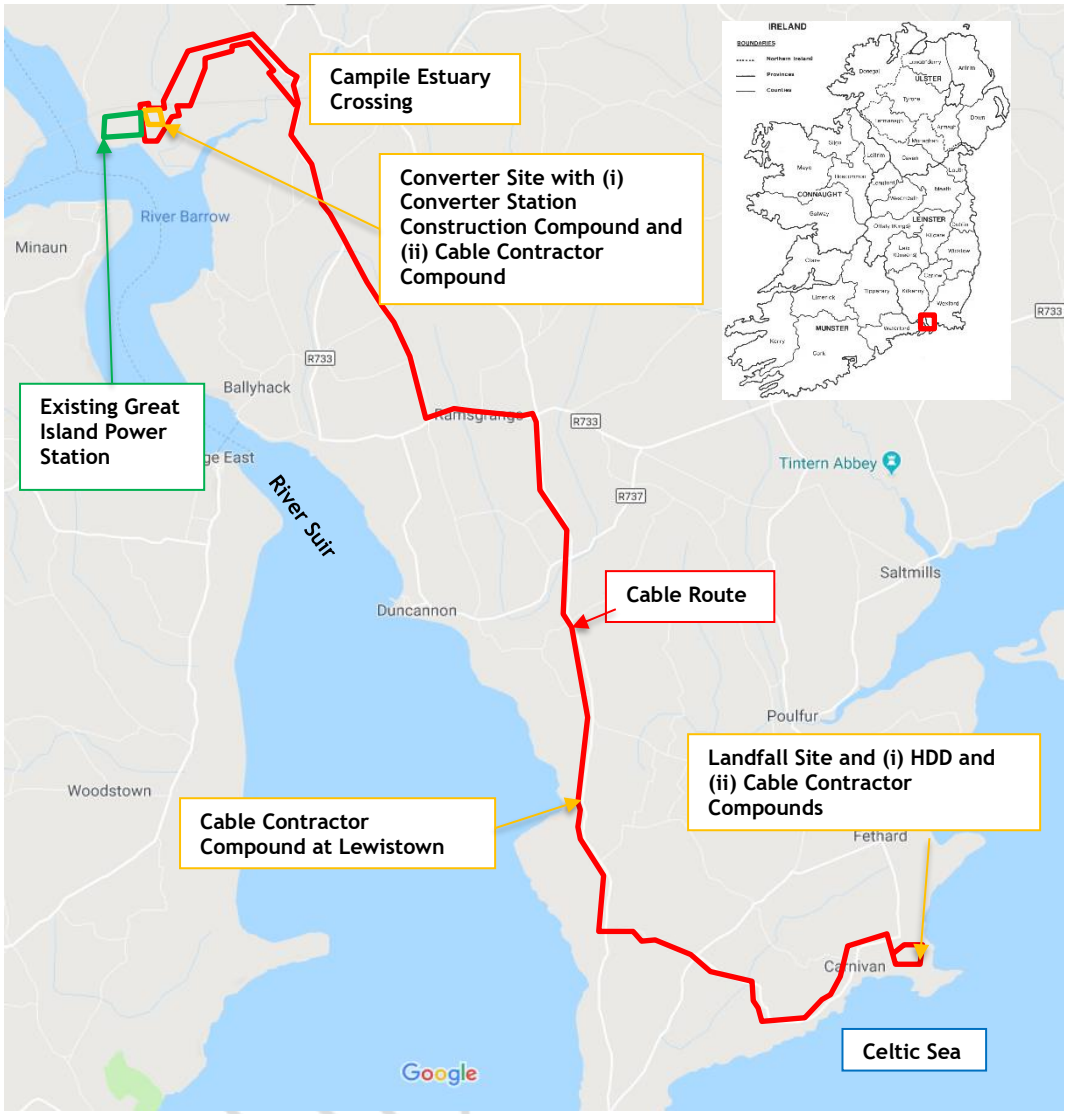


Figure 1: Overview of Proposed Development (Source: Google Maps | not to scale)

1.3.1 Site Topography

Based on topographical surveys undertaken at the Converter Site, existing levels range between 10.0mOD and 32.0mOD. The surrounding area is largely rural.

1.4 Summary of Data Used

Data regarding flood risk relevant to the proposed development and surrounding

area has been obtained from the following sources:

- Wexford County Development Plan 2013 – 2019;
- Wexford County Development Plan 2013 – 2019 Strategic Flood Risk Assessment;
- Ballyteigue - Bannow Catchment Flood Risk Management Plan (FRMP) (https://www.floodinfo.ie/publications);

- OPW National Flood Hazard Mapping Website (www.floodinfo.ie)
- Preliminary Flood Risk Assessment (PFRA) mapping produced by the OPW(www.myplan.ie)
- Irish Coastal Protection Strategy Study maps and reports;
- Geological Survey Ireland Data and Maps (gsi.ie);
- Ordnance Survey Ireland mapping (map.geohive.ie).

2 Planning Context

2.1 Introduction

The following planning policy documents are relevant to the flood risk assessment of the proposed development;

- The Planning System and Flood Risk Management Guidelines for Planning Authorities.
- Wexford County Development Plan 2013 – 2019 including its Strategic Flood Risk Assessment.

2.2 The Planning System and Flood Risk Management

In November 2009, the Department of Environment, Heritage and Local Government and the Office of Public Works jointly published a Guidance Document for Planning Authorities entitled 'The Planning System and Flood Risk Management'.

The guidelines are issued under Section 28 of the Planning and Development Act 2000; and Planning Authorities and An Bord Pleanála are therefore required to implement these Guidelines in carrying out their functions under the Planning Acts.

The aim of the guidelines is to ensure that flood risk is neither created nor increased by inappropriate development.

The guidelines require the planning system to avoid development in areas at risk of flooding, unless they can be justified on wider sustainability grounds, where the risk can be reduced or managed to an acceptable level.

They require the adoption of a Sequential Approach (to Flood Risk Management) of Avoidance, Reduction, Justification and Mitigation and they require the incorporation of Flood Risk Assessment into the process of making decisions on planning applications and planning appeals. Fundamental to the guidelines is the introduction of flood risk zoning and the classification of different types of development having regard to their vulnerability. The management of flood risk is now a key element of any development proposal in an area of potential flood risk and should therefore be addressed as early as possible in the site master planning stage.

2.2.1 Definition of Flood Zones

Flood zones are geographical areas within which the likelihood of flooding is in a particular range.

There are three types of flood zones defined in The Guidelines as follows:

Table 1: Description of Flood Zones

Zone category	Description
Flood Zone A	Probability of flooding from rivers and the sea is highest (greater than 1% or 1 in 100 for river flooding or 0.5% or 1 in 200 for coastal flooding).
Flood Zone B	Probability of flooding from rivers and the sea is moderate (between 0.1% or 1 in 1000 year and 1% or 1 in 100 for river flooding and between 0.1% or 1 in 1000 year and 0.5% or 1 in 200 for coastal flooding).
Flood Zone C	Probability of flooding from rivers and the sea is low (less than 0.1% or 1 in 1000 for both river and coastal flooding). Flood Zone C covers all areas of the plan which are not in zones A or B.

2.2.2 Definition of Vulnerability Classes

The following table summarises the Vulnerability Classes defined in the Guidelines and provides a sample of the most common type of development applicable to each.

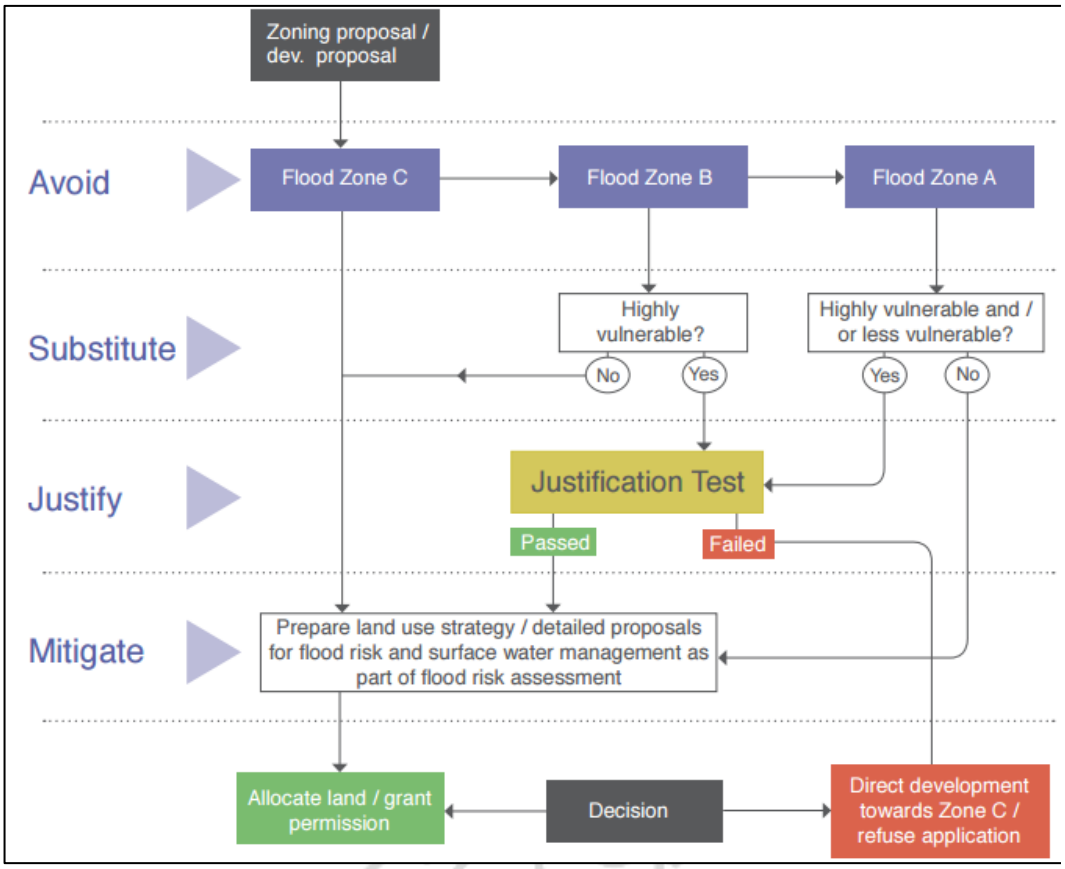
Table 2: Vulnerability classes

Vulnerability Class	Land Uses and Types of Development which include;
Highly Vulnerable Development	Includes Garda, ambulance and fire stations, hospitals, schools, residential dwellings, residential institutions, essential infrastructure, such as primary transport and utilities distribution and SEVESO and IPPC sites, etc.
Less Vulnerable Development	Includes retail, leisure, warehousing, commercial, industrial and non-residential institutions, etc.
Water Compatible Development	Includes Flood Control Infrastructure, docks, marinas, wharves, navigation facilities, water-based recreation facilities, amenity open spaces and outdoor sport and recreation facilities.

2.2.3 Sequential Approach and Justification Test

The Guidelines outline the sequential approach that is to be applied to all levels of the planning process.

Figure 2: Sequential approach (reproduced from The Guidelines)



This approach should also be used in the design and layout of a development and the broad philosophy is shown in

Figure 2. In general, development in areas with a high risk of flooding should be avoided as per the sequential approach.

The Justification Test has been designed to rigorously assess the appropriateness, or otherwise, of developments that are being considered in areas of moderate or high flood risk. The test comprises the following two processes.

- The first is the Plan-making Justification Test and is used at the plan preparation and adoption stage where it is intended to zone or otherwise designate land which is at moderate or high risk of flooding.
- The second is the Development Management Justification Test and is used at the planning application stage where it is intended to develop land at moderate or high risk of flooding for uses or development vulnerable to flooding that would generally be inappropriate for that land.

Table 3 illustrates the different types of Vulnerability Class appropriate to each zone and indicates where the Justification Test is required.

Table 3: Justification Test Matrix (The Planning System and Flood Risk Management - Guidelines for Planning Authorities)

	Flood Zone A	Flood Zone B	Flood Zone C
Highly Vulnerable	Justification Test	Justification Test	Appropriate
Less Vulnerable	Justification Test	Appropriate	Appropriate
Water Compatible	Appropriate	Appropriate	Appropriate

The Guidelines recognise that there is a need to reconcile the desire to avoid development in areas at risk of flooding while also ensuring sequential and compact urban development as several large urban centres are already located in areas that are at risk of flooding:

"Notwithstanding the need for future development to avoid areas at risk of flooding, it is recognised that the existing urban structure of the country contains many well-established cities and urban centres, which will continue to be at risk of flooding. At the same time, such centres may also have been targeted for growth in the National Spatial Strategy, regional planning guidelines and the various city and county development plans taking account of historical patterns of development and their national and strategic value. In addition, development plans have identified various strategically located urban centres and particularly city and town centre areas whose continued growth and development is being encouraged in order to bring about compact and sustainable urban development and more balanced regional development. Furthermore, development plan guidelines, issued by the Minister for the Environment, Heritage and Local Government under Section 28 of the Planning and Development Act 2000, have underlined the importance of compact and sequential development of urban areas with a focus on town and city centre locations for major retailing and higher residential densities."

2.3 Wexford County Development Plan 2013-2019

2.3.1 Flood Risk Management Objectives

The current Wexford County Development Plan includes the following objectives in relation to flood risk management:

Table 4: Wexford CDP Flood Risk Management Objectives

Objective	Description
FRM01	To carry out flood risk assessment for the purpose of regulating, restricting and controlling development in areas at risk of flooding and to minimise the level of flood risk to people, business, infrastructure and the environment through the identification and management of existing and potential future flood risk.
FRM02	To ensure that flood risk management is incorporated into the preparation of all town development plans and local area plans through the preparation of Stage Two Strategic Flood Risk Assessments for the respective plan areas in accordance with the requirements of the Planning System and Flood Risk Management-Guidelines for Planning Authorities (DEHLG and OPW, 2009).
FRM03	To apply the sequential approach which is based on the principles of avoidance, reduction and mitigation of flood risks when preparing town development plans and local area plans and when assessing planning applications for development proposals.
FRM04	To ensure that all development proposals comply with the requirements of the Planning System and Flood Risk Management-Guidelines for Planning Authorities' (DEHLG and OPW 2009) and to ensure that the Justification Test for Development Management is applied to required development proposals and in accordance with methodology set out in the guidelines.
FRM05	To have regard to any future flood hazard maps, flood risk maps and flood risk management plans prepared as part of the South-East Catchment Flood Risk Assessment and Management Study.
FRM06	To require the use of Sustainable Urban Drainage Systems (SuDS) to minimise the extent of hard surfacing and paving and require the use of sustainable drainage for new development or extensions to existing developments.
FRM07	To protect and enhance the county's floodplains, wetlands and coastal areas as '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, subject to normal planning and environmental criteria and the development management standards contained in Chapter 18.
FRM08	To facilitate the provision of necessary suitable flood risk management infrastructure by the Office of Public Works, the Local Authority or private developers, subject to compliance with normal planning and environmental criteria and the development management standards contained in Chapter 18.
FRM09	To ensure that where flood protection or alleviation works take place that the natural and cultural heritage and rivers, streams and watercourses are protected and enhanced.

Objective	Description
FRM10	To preserve appropriately sized riparian strips alongside river channels free of development and of adequate width to permit access for river maintenance.
FRM11	To ensure that development proposals in areas at moderate (Flood Zone B) or high (Flood Zone A) risk of flooding which are considered acceptable in principle demonstrate that appropriate mitigation measures can be put in place and that residual risks can be managed to acceptable levels.
FRM12	To ensure new development does not increase flood risk elsewhere including that which may arise from surface water run-off.
CZM04	To prohibit development within areas liable to coastal flooding, other than in accordance with the Flood Risk Management Guidelines for Planning Authorities (Department of the Environment, Heritage and Local Government and Office of Public Works, 2009).
CZM05	To have regard to the findings and recommendations of the Irish Coastal Protection Strategy Studies in the assessment of planning applications.

2.3.2 Strategic Flood Risk Assessment

A Stage 1 Strategic Flood Risk Assessment (SFRA) was undertaken for the Wexford County Development Plan which;

- Identified the broad nature of flood risk in the county
- Outlined the flood risk management objectives to be included in the Development Plan
- Outlined the development management standards to be included in the Development Plan

The SFRA also produced indicative flood zone maps for the county. Extracts from these maps are reviewed in **Section 4**.

3 Potential Flooding Mechanisms and Historic Flooding adjacent the Site

3.1 Potential Flood Mechanisms

The following potential sources of flood risk have been assessed:

- Fluvial flooding (river, stream or mill race) – There could be a risk of fluvial flooding during high flows in the River Barrow and River Suir or when the flow of the river becomes blocked or restricted.
- Coastal/ Tidal flooding – There could be a risk of tidal/coastal flooding from the River Barrow estuary and River Suir estuaries.
- Pluvial flooding/urban drainage – Pluvial flooding may occur when the capacity of the local surface water drainage network is exceeded during periods of intense rainfall and results in surface water ponding in low spots in the ground surface topography
- Groundwater flooding – groundwater flooding can occur during lengthy periods of heavy rainfall, typically during late winter/early spring when the groundwater table is already high. If the groundwater level rises above ground level, it can pond at local low points and cause periods of flooding.

Refer to Section 4 where each of the above potential mechanisms is assessed separately.

3.2 Historic Flood Data

Records of historic fluvial and tidal floods were obtained from the OPW National Flood Hazard Mapping website, www.floodmaps.ie. 5no past flood events have been recorded within 1.5km of the proposed development, of which 4no. records relate to the same flood event on February 3rd, 2014. Notwithstanding this, none of the recorded flood events directly affected the proposed development site. **Figure 3** presents a record of the history of flood events in close proximity to the site.

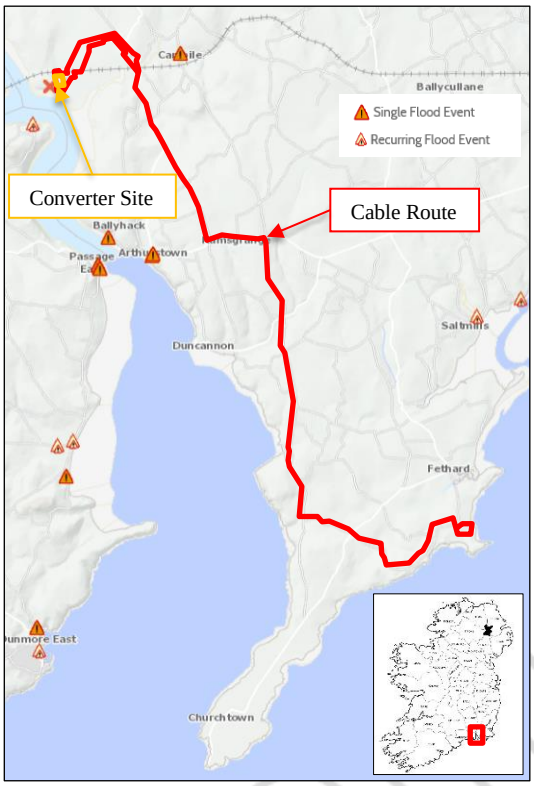


Figure 3: Historical Flood Events (source: www.floodinfo.ie/map/floodmaps | not to scale)

4 Assessment of Existing Flood Risk

4.1 Introduction

The development has been broken into two elements for the purpose of this section:

- The proposed converter station, tail station and associated infrastructure
- The proposed cable route (including landfall site).

Sections 4.2 to 4.5 assess the flood risk in the context of the converter station site. A separate flood risk identification for the cable route is contained in **Appendix A**.

Note that since a significant area of the project is located in a rural area, the available flood mapping is relatively limited. During the preparation of this report, the OPW Preliminary Flood Risk Assessment mapping was deemed to be the best available information in some areas and was sourced from the myplan.ie website. Prior to the issue of this report, this data was withdrawn in advance of the publication of a new "National Indicative Flood Mapping" (NIFM) dataset. At time of writing, the NIFM data had not yet been published, therefore this report continues to reference the PFRA data.

4.2 Fluvial Flood Risk (Converter Station and Tail Station Site)

An extract from the OPW PFRA fluvial flood extent map is presented in , showing the predicted extent for the 1 in 100-year fluvial flood event. An extract from the county development plan SFRA flood zone map is presented in Figure 4: PFRA Fluvial Flood Extent Map (source: OPW mapping, Current Scenario, myplan.ie | not to scale)

, showing the extent of the 1 in 100 year flood event (blue).

It can be seen that the converter site is located outside the modelled flood extents in both cases. The risk of fluvial flooding to the converter station and tail station site is considered to be low.

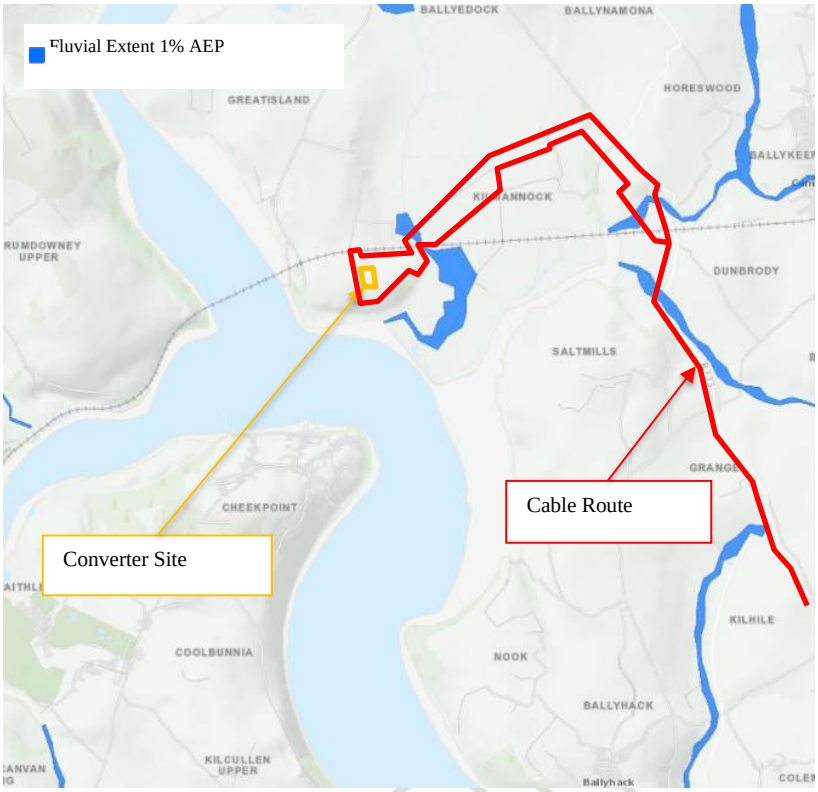


Figure 4: PFRA Fluvial Flood Extent Map (source: OPW mapping, Current Scenario, myplan.ie | not to scale)

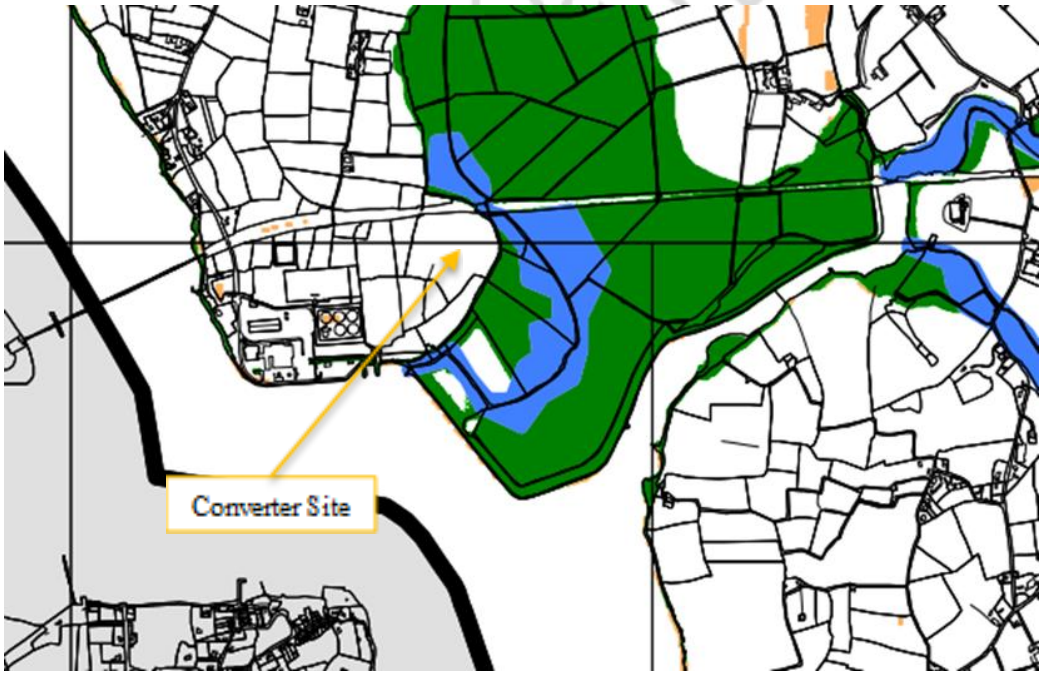


Figure 5: Extract from County Development Plan SFRA mapping | not to scale. *Blue indicates fluvial flooding (1 in 100 year) and Green represents coastal flood events (1 in 200 year)*

4.3 Coastal Flood Risk (Converter Station Site)

To assess the coastal flood risk for the development, the Irish Coastal Protection Strategy Study (ICPSS) mapping was examined. This mapping outlines the 0.5% AEP (1 in 200-year) coastal flooding extent for the Irish coastline.[1] An extract from the relevant ICPSS map is presented in

.

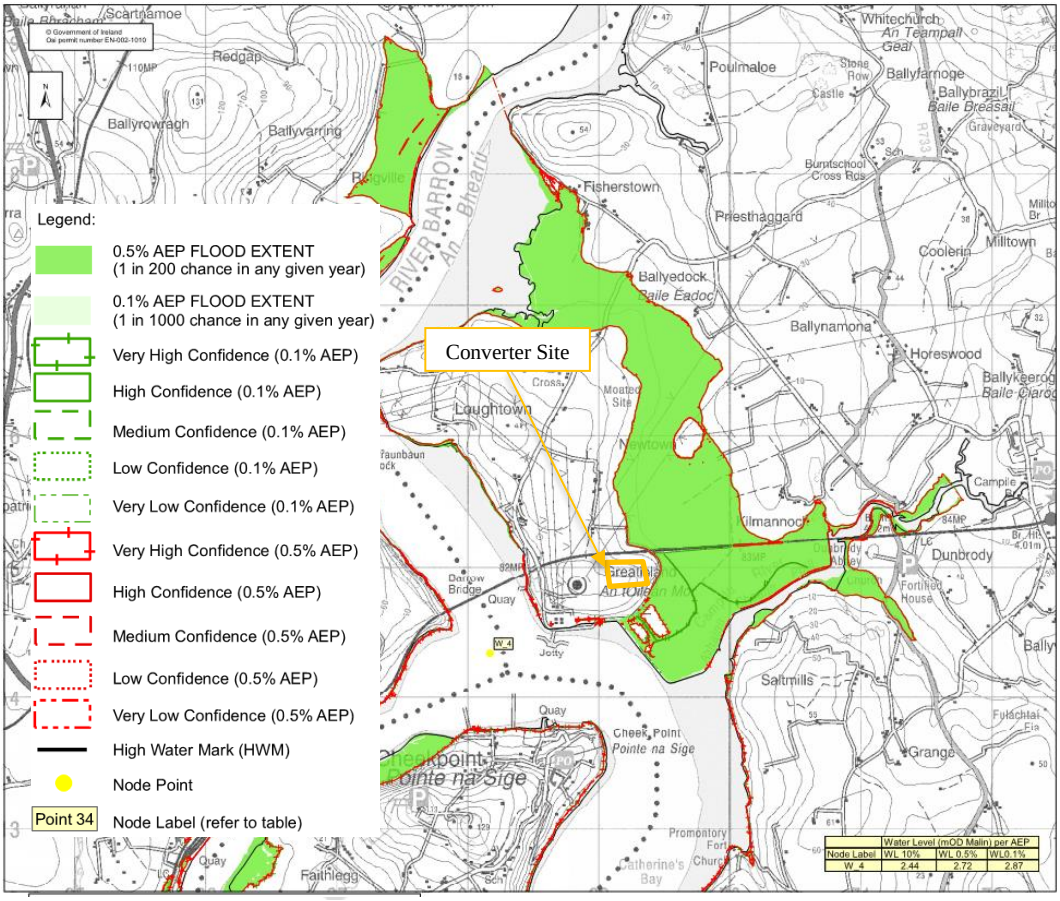


Figure 6: ICPSS Coastal Extent Mapping (not to scale)

The ICPSS also provides values for the predicted tidal flood levels at node W_4, located approximately 0.5km south-west of the Great Island Power Station as set out in **Table 5** below.

[1] Note that the South Eastern CFRAM project did not produce detailed mapping for this area. As such, the ICPSS data represents the most current information from a coastal perspective. It should also be noted that CFRAM data does not provide any tabulated levels adjacent to the proposed development.

Table 5: Summary of ICPSS Coastal Flood Levels

Node Label	Water Level (mOD Malin)		
	1 in 10 year	1 in 200 year	1 in 1000 year
W_4	2.44	2.72	2.87

As the proposed development is to be constructed at a FFL of 23.0mOD, the site is well above the ICPSS predicted Coastal 0.1% AEP level of 2.87mOD. Therefore, it is considered that there will be no risk of coastal flooding to the converter station itself.

It is notable that the ICPSS did not take any existing coastal flood defences into account. In reality, the area of coastal flood risk to the east and north of the site broadly corresponds to the Kilmannock "Drainage District". Drainage Districts were carried out by the Commissioners of Public Works under a number of drainage and navigation acts from 1842 to the 1930s to improve land for agriculture and to mitigate flooding. The local authority is responsible for maintaining drainage districts under the Arterial Drainage Act, 1945.

The Kilmannock drainage district is defended from coastal inundation by two networks of defences:

- Approximately 2.4km long embankment along the bank of the Campile Estuary and the Barrow/Suir Estuary to the south and east of the proposed converter station site,
- Approximately 0.5km long concrete flood defence wall along the L4033 road in the townlands of Great Island and Ballyedock, 2km north of the converter station site.

By comparing the extent of the existing defences with the ICPSS predicted coastal flood extent, it appears that the area is defended to approximately the 0.5%AEP current scenario standard.

Notwithstanding this, there is a residual risk that a breach or failure of the defences could result in temporary inundation of the access road to the site around a high tide. However, given that there is no history of difficulty with access to Great Island Power Station in extreme weather conditions, this residual risk is considered to be acceptable.

4.4 Pluvial Flood Risk (Converter Station Site)

Pluvial flooding occurs when extreme rainfall overwhelms drainage systems or soil infiltration capacity, causing excess rainwater to pond above ground at low points in the topography.

An examination of the PFRA mapping () indicates that the site is not subject to pluvial flooding during the indicative 1% AEP (100-year) event.

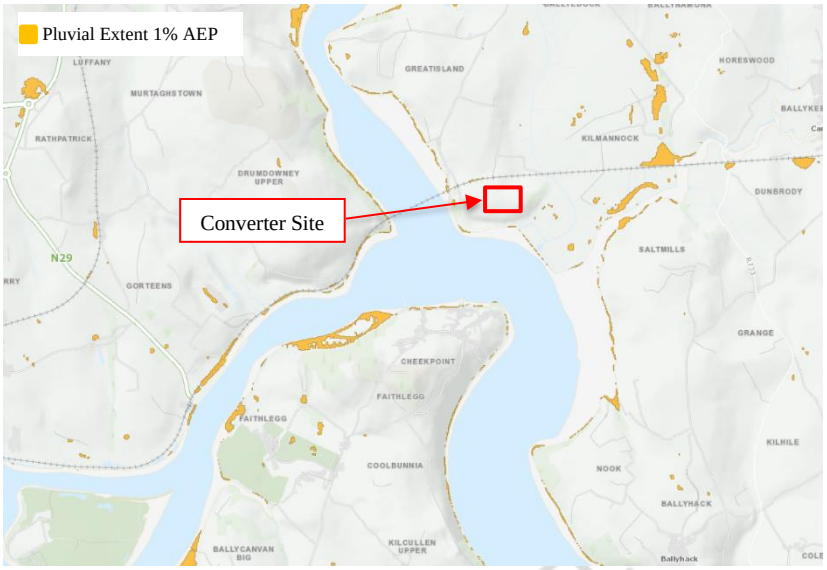


Figure 7: Converter Site PFRA Pluvial Extent Map (www.myplan.ie | not to scale)

4.5 Groundwater Flooding (Converter Station Site)

Groundwater flooding can occur during lengthy periods of heavy rainfall, typically during late winter/early spring when the groundwater table is already high. If the groundwater level rises above ground level, it can pond at local low points and cause extended periods of flooding.

The OPW Preliminary Flood Risk Assessment (PFRA) contains mapped extents of groundwater flood risk from known sources such as turloughs. This flood risk mapping did not indicate any areas at risk from this source in the vicinity of the site.

Groundwater monitoring was undertaken at a number of locations across the scheme area as part of the site investigation works. **Table 6** below summarises the relevant data.

Table 6: Groundwater Monitoring Summary

Location	Relevant Borehole Numbers	Range of Recorded Groundwater Levels (mBGL)
Converter station site	BH01-3	13.5m-15.6m

While it is noted that dip readings taken were mainly recorded during dry weather, the data does not suggest a significant risk of groundwater flooding.

Therefore considering the lack of any evidence of potential groundwater flood risk, and considering the elevated topography of the converter station site, the risk of groundwater flooding to the development is considered to be low.

4.6 Assessment of Flood Risk for the Proposed Cable Route

As outlined in **Appendix B1.1**, there are six locations where the cable route crosses the fluvial 0.1% AEP extent.

However, it is noted that the proposed cable shall be located below ground. There will be no over ground permanent works along the cable route which might affect conveyance or floodplain storage.

Therefore, the proposed works will not alter the existing flood risk in the area and the risk to the completed development itself is considered to be low. Notwithstanding, mitigation measures are considered further in Section 5.

5 Proposed Mitigation Measures

5.1.1 Introduction

The following section outlines mitigation measures as defined in the OPW guidelines, i.e. elements of a development design which may be used to manage flood risk to a development, either by reducing the incidence of flooding both to the development and as a result of it and/or by making the development more resistant/resilient to the effects of flooding. Note that further mitigation measures relating to water and hydrology are contained in **Chapter 13** of the Environmental Impact Assessment Report.

5.1.2 Converter Station Site

The proposed Converter Site is at low risk of both coastal and fluvial flooding. Additionally, given the elevated topographical profile of the site, the risk of pluvial and groundwater flooding is also classed as low.

To reduce the risk of flooding from the proposed development, the surface water drainage system will be designed in accordance with SuDS principles, which will attenuate surface water discharges to the greenfield runoff rate. The surface water network will discharge to the existing ditch to the east of the site.

To manage any potential residual risk during design exceedance events, the design of the proposed converter station will ensure that surface water will continue to be managed across the site through the existing road surface gradients. The proposed structures/infrastructure on site will also be detailed to ensure that any overland flow during a design exceedance event would not threaten any vulnerable assets. The planning drawings and Chapter 4 of the EIAR include further details.

Any construction compound for the converter station will be located outside of the predicted flood risk areas.

5.1.3 Cable Route

Where the proposed works encounter an existing drainage line, arrangements will be made to protect or provide a temporary diversion and reinstate where necessary, the existing drainage system. This will mitigate the risk of excess run-off from the proposed works. All road and drainage system modifications will be designed following relevant best practice guidelines.

Road run-off will be channelled during excavation works for the cable, to avoid potential ponding on roads or flooding of adjacent lands during construction.

The cable and cable ducting will be designed to prevent ingress of water. The joint bays will be as far as practicable located outside of the estimated floodplains, and the link box at each joint bay will be waterproof.

At two locations, the cable route crosses beneath an existing water body.

- Kilmannock Stream: The preferred methodology is to cross this stream using micro-horizontal directional drilling. With this method, there will be no

direct interaction with the watercourse. Alternatively, the cable crossing will be constructed using open trench methods. Adequate temporary works and flow management measures will be implemented during construction to ensure that the risk of flooding is not increased.

- Campile Estuary: The cable crossing will be constructed using horizontal directional drilling beneath the estuary. As the entry and exit pits (and all construction plant) will be located outside of the predicted flood extent, there will be no significant flood risk impact.

All construction compounds along the cable route will be located outside of the predicted flood risk areas.

6 Off Site Impacts

6.1 Storage and Conveyance

The proposed converter station will have no impact on floodplain storage and/or conveyance as the converter station will be outside of the 1 in 1000-year flood plain.

Similarly, the proposed cable will have no permanent impact as it will be below ground.

6.2 Runoff

The proposed converter station will include a surface water drainage system designed in accordance with SuDS principles, which will attenuate surface water discharges to the greenfield runoff rate. Therefore, there will be no significant increase in surface water runoff as a result of the proposed development.

7 Application of the Flood Risk Management Guidelines

7.1 Sequential Approach

7.1.1 Converter Site

It is considered that the proposed development should be classed as "highly vulnerable development including essential infrastructure" as per the vulnerability classification in .

Based on the analysis undertaken in Section 4, the converter site is considered to be within Flood Zone C.

Therefore, as the proposed development is classified as a 'Highly Vulnerable Development' but located in Flood Zone C, a Justification Test is not required.

7.1.2 Cable Route

It is considered that the proposed cable route should be classed as "highly vulnerable development including essential infrastructure" as per the vulnerability classification in .

The cable route is predominately located within Flood Zone C however at some locations it does cross into Flood Zone A & B. Therefore a Justification Test as outlined in Figure 4-1 of "The Planning System and Flood Risk Management Guidelines" is required.

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 Wexford County Development Plan 2013-2019 was subject to a Strategic Flood Risk Assessment, and has therefore taken account of the OPW Guidelines. While the lands along the cable route are unzoned, the proposed underground cable is not excluded by the development plan.

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 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; 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 flood risk to the proposed cable route has been assessed in Section 4.6, and mitigation measures have been identified in Section 5.1.3. The assessment concluded that the proposed development will not increase flood risk elsewhere in the catchment, and is not likely to increase flood risk to people, property, the economy or the environment.

8 Conclusions

This report details the Flood Risk Assessment carried out as part of the planning application for the proposed development. This FRA has been undertaken in accordance with the Guidelines for Planning Authorities on 'The Planning System and Flood Risk Management' published in November 2009, jointly by the Office of Public Works (OPW) and the then Department of Environment, Heritage and Local Government (DEHLG).

Based on the assessment carried out, the following conclusions are made:

- The proposed converter station site is on elevated ground at approximately 23.0mOD. This raised elevation is well above the predicted 0.1% AEP fluvial flood levels and the predicted 0.1% AEP tidal flood levels.
- A residual flood risk has been identified in relation to the access road to the converter station site, which passes through the Kilmannock "Drainage District" (refer to Section 4.3). Considering the presence of existing flood defences, the lack of flood history in modern times, and the low level of planned occupancy of the converter station and tail station, this residual risk is considered to be acceptable.
- The flood risk associated with the proposed cable route is considered to be low (refer to Section 4.6)
- A number of mitigation measures relating to the design and to provide protection during the construction of the development are committed-to in **Chapter 13** of the EIAR *Water and Hydrology*.
- The proposed converter station and cable route are both classified as a "Highly Vulnerable Development".
- As the converter station site is located in Flood Zone C, a Justification Test is not required for that element of the proposed development.
- A Justification Test has been undertaken for the proposed cable route (refer to Section 7.1.2), and the requirements of same are deemed to have been satisfied.

Overall, the risks relating to flooding for this proposed development are considered to be low and at acceptable levels; and therefore, comply with DoEHLG/OPW and Wexford County Council guidelines.

Appendix A

Flood Risk Identification for Cable Route

A1 Introduction

This section identifies areas potentially at risk of flooding along the proposed cable route from the following potential sources:

- Fluvial
- Coastal
- Pluvial
- Groundwater

A1.1 Fluvial Flood Risk Identification

to Figure 10 compare the proposed cable route with the OPW PFRA fluvial flood extent map.

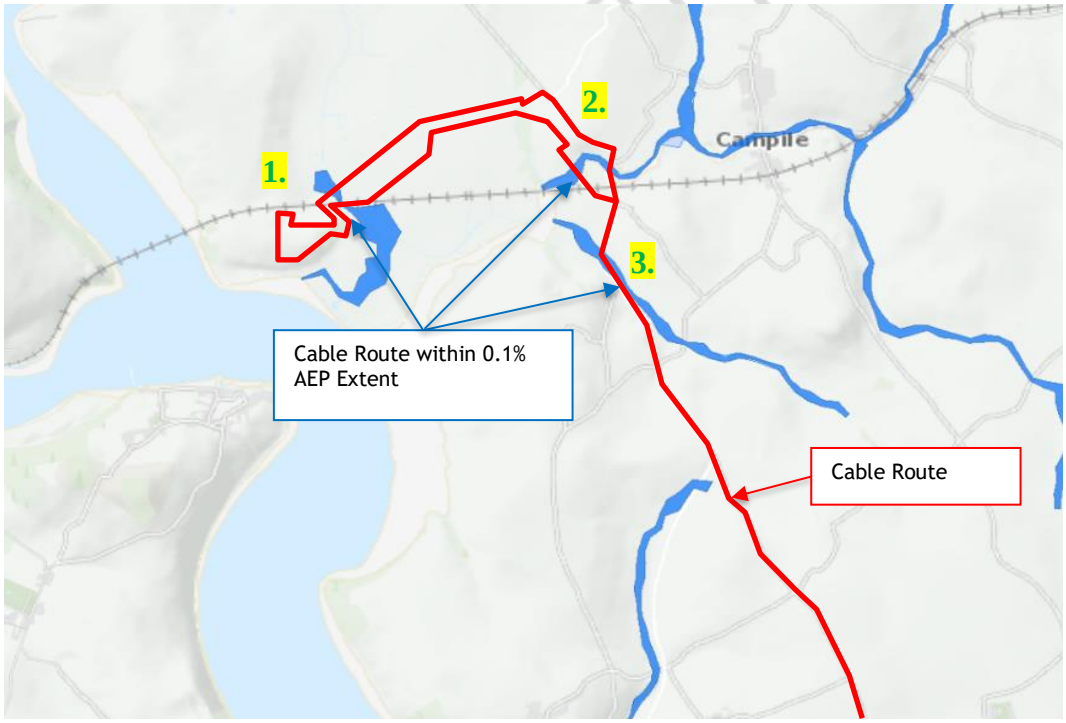


Figure 8: Cable Route vs. Fluvial 0.1% AEP, 1 of 3 (source: OPW mapping, myplan.ie) (not to scale)

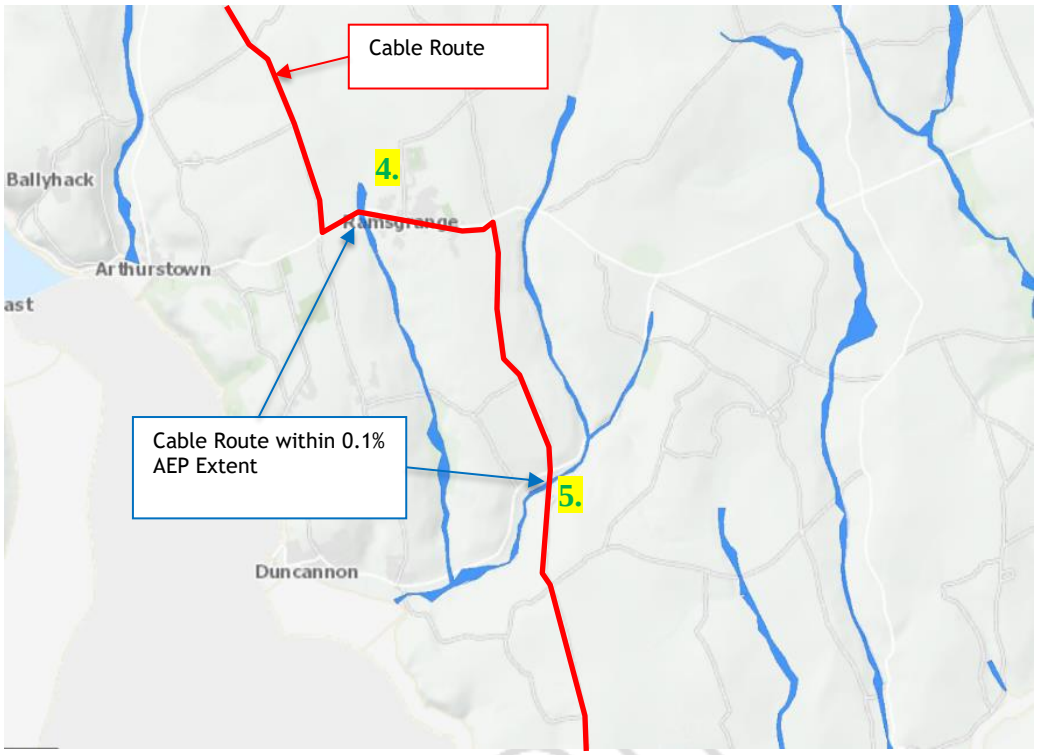


Figure 9: Cable Route vs. Fluvial 0.1% AEP, 2 of 3 (source: OPW mapping, myplan.ie) (not to scale)

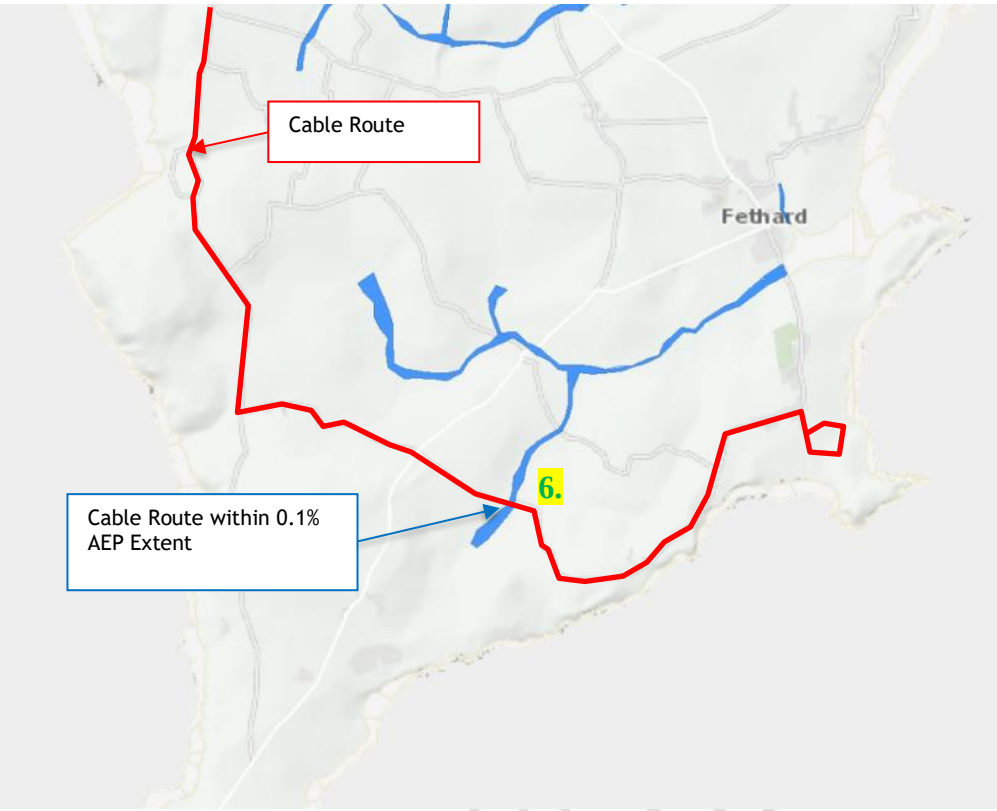


Figure 10: Cable Route vs. Fluvial 0.1% AEP, 3 of 3 (source: OPW mapping, myplan.ie)

Six areas where the cable route lies within the 0.1% AEP boundary were identified. These locations are predominantly comprised of minor streams crossing the L4045 & R733 roads.

The proposed works at each of the identified locations is as follows:

1. The proposed cable will be underground as it leaves the Converter Site. The cable will cross beneath the Kilmannock stream to the south of the discontinued railway line by means of an open cut trench.
2. A horizontal directional drill (HDD) will be utilised to cross beneath the Campile Estuary.
3. The proposed cable will be installed underground within the existing road corridor along this reach.
4. The proposed cable will be installed underground within the existing road corridor along this reach.
5. The proposed cable will be installed within the existing bridge structure at this location.
6. The proposed cable will be installed within the existing bridge structure at this location.

A1.2 Coastal Flood Risk Identification

The proposed cable route was compared with the 0.1% AEP ICPSS coastal flood extent (see **Figure 11** below).

The proposed route only encroaches on the 0.1% AEP extent in the vicinity of the Kilmannock Stream crossing and at the crossing of the Campile estuary.

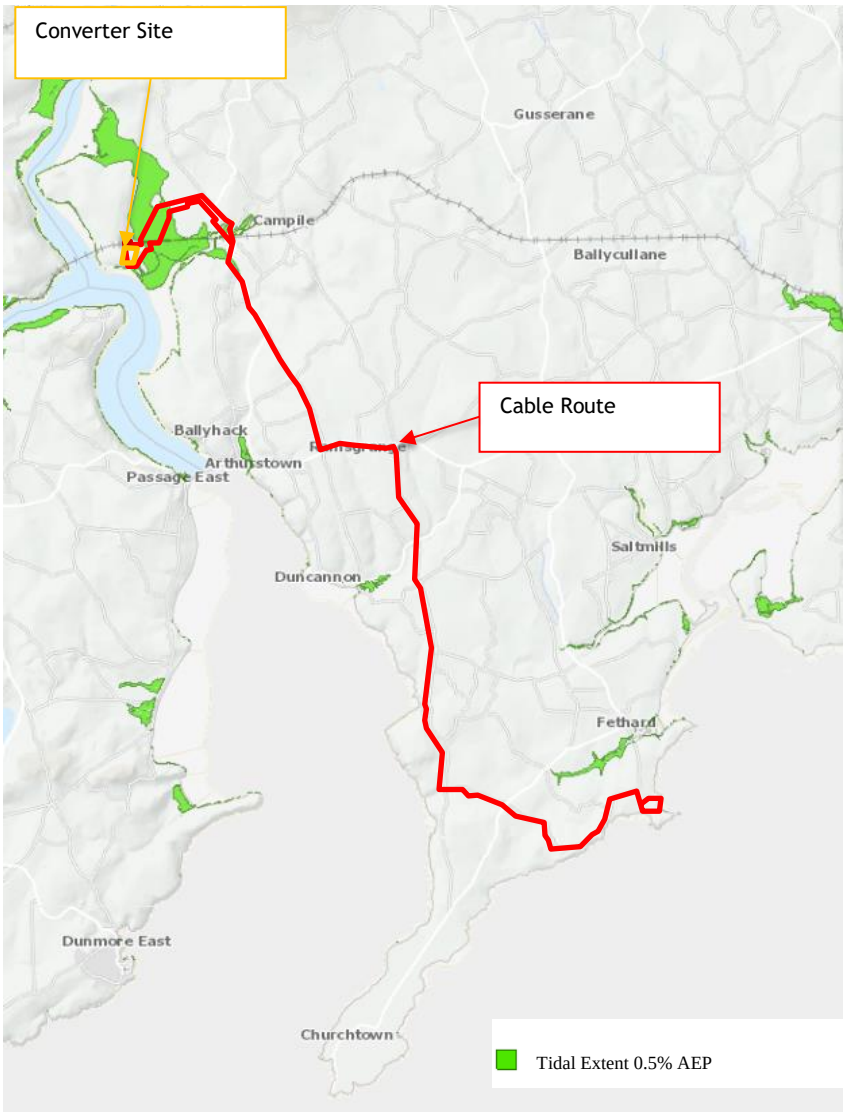


Figure 11: Cable Route Tidal Extent Map, Current Scenario (0.1%AEP | not to scale)

A1.3 Pluvial Flood Risk Identification

The proposed cable route was also examined in relation to the PFRA predicted 1% AEP pluvial flood extent, as shown on .

No significant area of pluvial flood risk was found on the route of the proposed cable.

Figure 12: Cable Route vs PFRA Pluvial Extent Map (www.myplan.ie) (not to scale)

A1.4 Groundwater Flood Risk Identification

No areas of groundwater flooding were identified from the available mapped information.

Groundwater monitoring was undertaken at a number of locations across the scheme area as part of the site investigation works. Table 6 below summarises the relevant data.

Table 7: Groundwater Monitoring Summary (Cable Route)

Location	Relevant Borehole Numbers	Range of Recorded Groundwater Levels (mBGL)
Adjacent to Kilmannock Stream	BH06A-3	0.1m-0.85m
Adjacent to Campile Estuary	BH04-2; BH01-2	8.9m-9.6m
Landfall Site	BH01-1; BH04-1	0.63m-1.25m

While it is noted that dip readings taken were mainly recorded during dry weather, the data does not suggest a significant risk of groundwater flooding. The high dip readings adjacent to Kilmannock stream and at the landfall site can be attributed to the influence of the adjacent surface water bodies, and as such groundwater flooding would not be a dominant flood mechanism at these locations. As noted in **Chapter 12** of the EIAR *Land, Soils Geology and Hydrogeology*, groundwater flows may be affected on a small scale only for the onshore cable route, which will involve excavations to approximately one metre depth only.

A1.5 Conclusion

This section identifies sources of potential flood risk along the proposed cable route. An assessment of this risk is undertaken in **Section 4.6**.