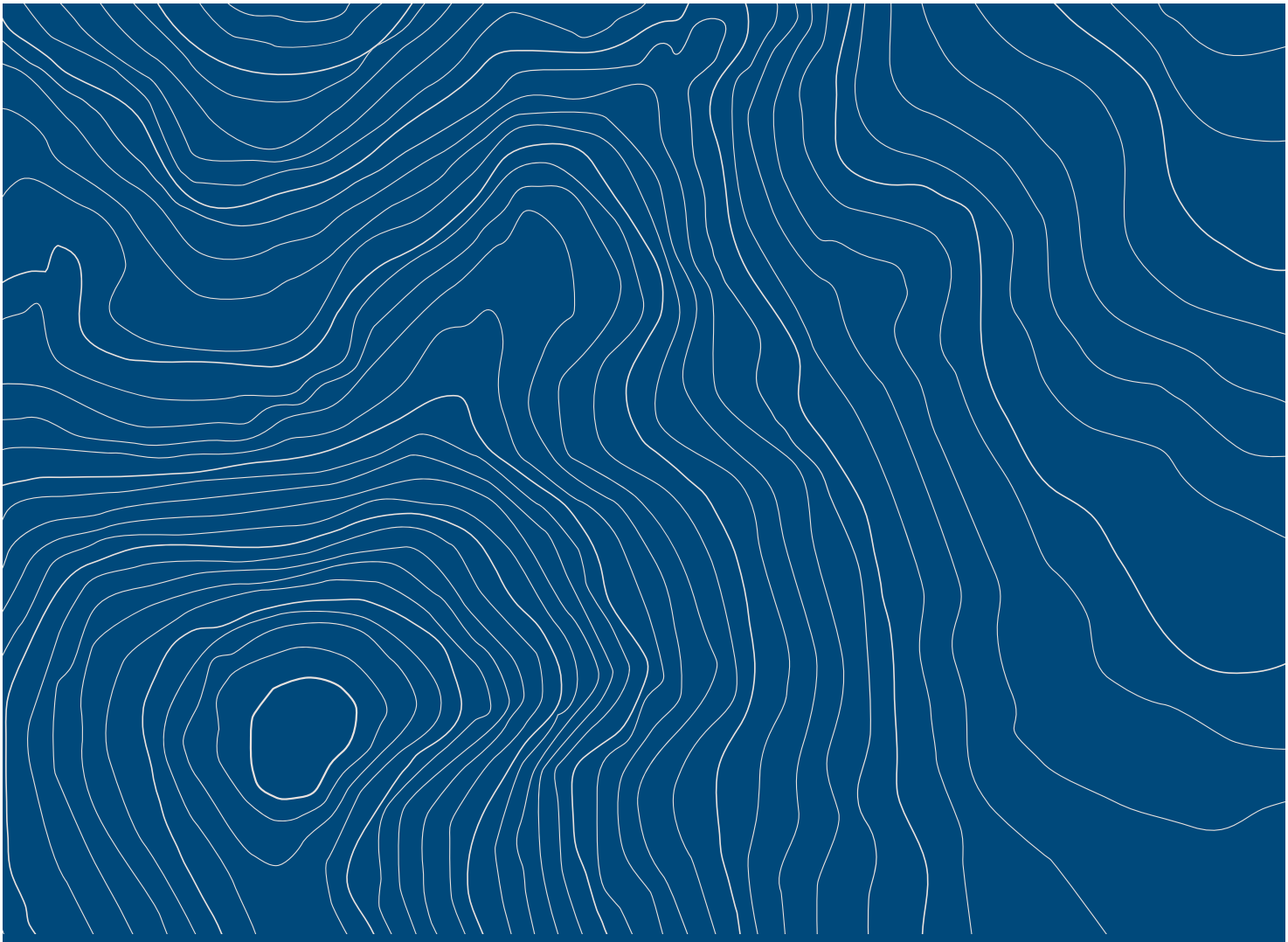

Dublin Array
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EIAR Volume 6: Onshore Infrastructure Technical Appendices Appendix 6.5.4-2: Flood Risk Assessment for the Dublin Array Onshore Electrical System

Kish Offshore Wind Ltd

RWE SLR GoBe APEM Group

www.dublinarray-marineplanning.ie

Flood Risk Assessment for the Dublin Array Onshore Electrical System

Dublin Array

Kish Offshore Wind Limited
Bray Offshore Wind Limited

Prepared by:

SLR Environmental Consulting (Ireland) Ltd

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SLR Project No.: 501.065303.00001

Client Reference No: Dublin Array

1 December 2024

Revision: FINAL

Basis of Report

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Table of Contents

Tables in Text

Figures in Text

Appendices

Acronyms and Abbreviations

1D	One Dimensional (modelling)
2D	Two Dimensional (modelling)
AAR	Average Annual Rainfall
AEP	Annual Exceedance Probability
AFA	Area for Further Assessment
AMAX	Annual Maximum
AOD	Above Ordnance Datum (Ordnance Datum for Ireland is Malin)
CFRAM Study	Catchment Flood Risk and Management Study
DEM	Digital Elevation Model
DEHLG	Department of the Environment, Heritage and Local Government
DTM	Digital Terrain Model
DS	Downstream
ECR	Export Cable Route
FRA	Flood Risk Assessment
FSU	Flood Study Update
GIS	Geographical Information System
GCP	Grid Connection Point
GSI	Geological Survey of Ireland
HDD	Horizontal Directional Drilling
HEFS	High-End Future Scenario
LA	Local Authority
LiDAR	Light detection and ranging
mOD	Meters above Ordnance Datum (Malin)
MRFS	Mid- range future scenario
NIFM	National Indicative Fluvial Mapping
OPW	Office of Public Works
OSS	Onshore substation
OSi	Ordnance Survey Ireland
PFRA	Preliminary Flood Risk Assessment
SFRA	Strategic Flood Risk Assessment
SPR	Source-Pathway-Receptor
SSFRA	Site Specific Flood Risk Assessment
SuDS	Sustainable Drainage Systems
US	Upstream
WWTP	Wastewater treatment plant
XS	Cross Section

1.0 Introduction

This flood risk assessment (FRA) report has been prepared by SLR Environmental Consulting (Ireland) Limited (SLR), on behalf of the Client, Kish Offshore Wind Limited, as part of a planning submission for the proposed Onshore Electrical System (OES) of the proposed Dublin Array Offshore Wind Farm (hereafter referred to as Dublin Array). The OES comprises the transition joint bays (TJBs) at the Landfall Site, onshore export cables route a new Onshore substation (OSS) and a grid connection to the existing Carrickmines 220kV substation, the grid connection point (GCP). These are described in full in Volume 2, Chapter 2.6 Project Description (hereafter referred to as the Project Description Chapter). A separate FRA has been prepared for the Operations and Maintenance Base (O&M Base) which can be found in Volume 6, Chapter 5.4-3 O&M Base Flood Risk Assessment.

This FRA has been carried out in accordance with the Planning Process and Flood Risk Management published in November 2009 by the Office of Public Works (OPW) and Department of Environmental, Heritage and Local Government (DEHLG). This assessment identifies and sets out possible mitigation measures against potential risks of flooding from various sources.

1.1 Scope of the Report

Dublin Array is a combination of offshore infrastructure and onshore infrastructure. The mean high-water springs (MHWS) mark separates the offshore and onshore infrastructure. The onshore infrastructure includes the OES and the proposed Dublin Array Operations and Maintenance (O&M) Base at Dún Laoghaire Harbour. The O&M Base is described in full in the Project Description Chapter.

For the purposes of this FRA, only the proposed OES is assessed. This includes: the Landfall site, the onshore export cable route (ECR) to the OSS and the grid connection route to the Carrickmines GCP.

The Landfall Site is where the offshore export cables from the offshore wind farm come ashore and transition to the onshore export cables at the underground TJB. All of the onshore infrastructure in the OES, with the exception of the OSS, will be located below ground.

In addition to the OSS, on completion of the OES works, inspection manhole covers to access below ground communication chambers and link box chambers at 600 – 850 m intervals along the onshore ECR will be visible above ground as well as and cable marker posts in private agricultural lands and an access track to one set of joint bays. The remainder of the lands will be reinstated to its original condition following completion of the works. The OSS will contain infrastructure which is predominantly above ground and includes buildings, electrical equipment and access roads.

Structure of Report

This FRA report analyses the risk of flooding from fluvial, tidal, pluvial and groundwater sources. It includes considerations of the potential impact of the proposed infrastructure on flood risk mechanisms in the surrounding areas of the Dublin Array OES. The report is divided into the following sections:

i. Introduction;
ii. Planning Context and Flood Guidelines;
iii. Sources of Flooding;
iv. Landfall Site Flood Risk;
v. OSS Flood Risk;

vi. ECR Flood Risk; and

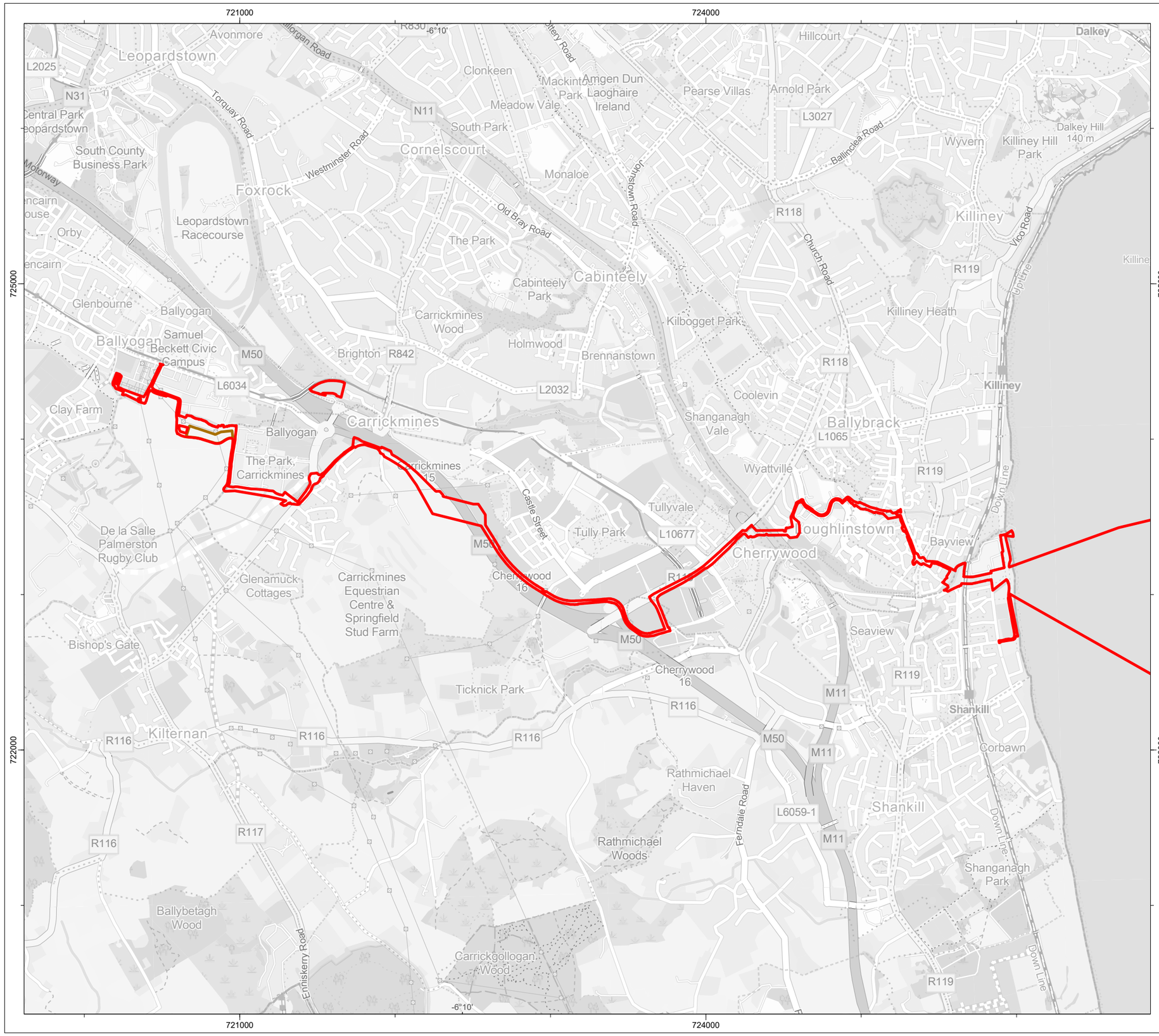
vii. Conclusions.

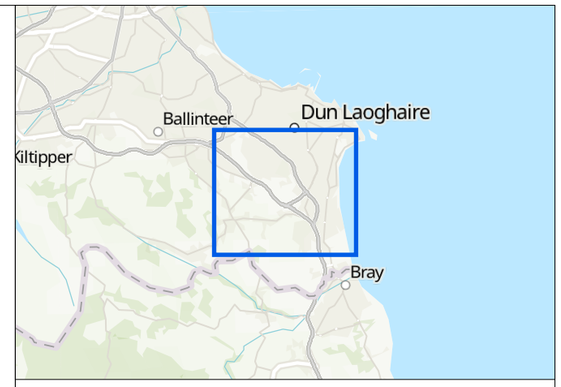
1.2 Site Location

The proposed underground TJBs will be located at the Landfall Site at Shanganagh Cliffs immediately south of the existing Shanganagh-Bray Wastewater Treatment Plant (WWTP), at Shanganagh, Co. Dublin as shown on Figure 1-1.

The onshore ECR is 7.4 km and will traverse the townlands of Shanganagh, Hackettsland, Ballybrack, Loughlinstown, Cherrywood, Glebe, Laughanstown, Carrickmines Great, and Jamestown. It will be comprised of two 220 kV circuits and associated underground infrastructure to be installed in trenches connecting the TJBs to the OSS.

The OSS will be located in the townland of Jamestown adjacent to the former Ballyogan Landfill Facility. A final onshore grid connection route of 800 m will connect the OSS to the Carrickmines GCP.





Application Site Boundary

Onshore Substation (OSS)

DRAWING STATUS

PUBLIC

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PROJECT TITLE

Dublin Array

DRAWING TITLE

Flood Risk Assessment: Study Area

DRAWING NUMBER: **1-1**

PAGE NUMBER: **1 of 1**

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0 0.1 0.2 0.3 0.4 Miles

N GRID NORTH

SCALE	1:25,000	PLOT SIZE	A3
DATUM	IRENET95	VERTICAL REF	ODN/LAT/MLLW
PRJ	IRENET95 Irish Transverse Mercator		

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2.0 Planning Context and Flood Guidelines

In November 2009 the Office of Public Works (OPW) and Department of the Environment, Heritage and Local Government (DEHLG) issued guidelines for planning authorities addressing the management of flood risk in the planning system[1] (herein after referred to as the 'Flood Guidelines').

The Flood Guidelines introduced comprehensive mechanisms for the incorporation of flood risk identification, assessment and management into the planning process. Implementation of the guidelines will be achieved through actions at national, regional, local authority and site-specific levels, depending on the plan or development project being considered.

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 detailed in Table 2-1.

Table 2-1 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 Development Vulnerability

The Flood Guidelines classify potential development in terms of its vulnerability to flooding and assigns each land-use to an appropriate Flood Risk Zone. The Classes are provided in Table 2-2.

Table 2-2 Development Vulnerability Classes

Development Vulnerability Classes	Type of Development
Highly Vulnerable	Garda, ambulance, fire stations, hospitals, schools, dwelling houses, student halls, essential infrastructure, emergency services and strategic infrastructure, power stations.
Medium Vulnerable	Retail, leisure, warehousing, waste management, local transport infrastructure, land and buildings used for agriculture and forestry
Water Compatible	Flood control infrastructure, docks, marinas, water-based recreation and tourism

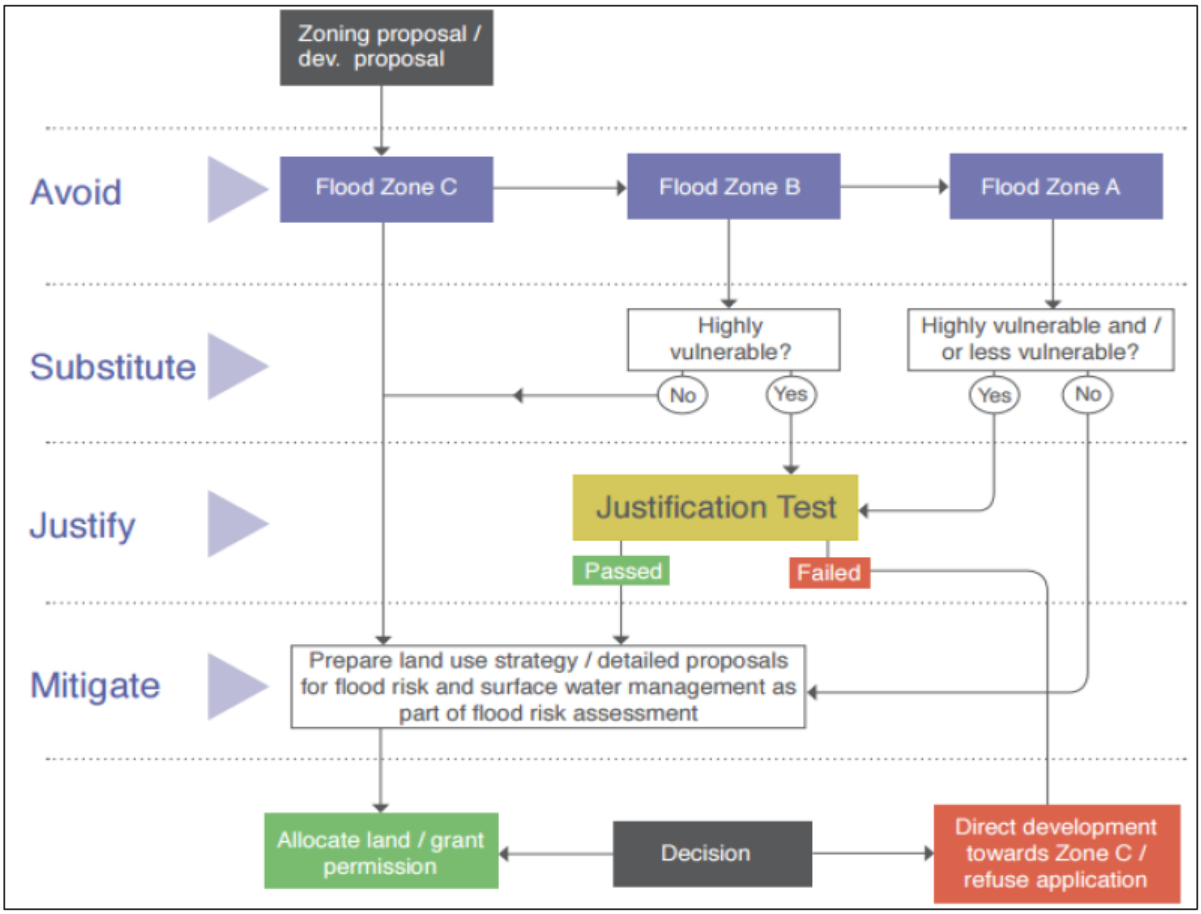
[1] '*The Planning System and Flood Risk Management Guidelines for Planning Authorities*' (2009): Office of Public Works and the Department of the Environment, Heritage and Local Government.

A full list of the types of development and related vulnerability class is provided in Table 3.1 of the Flood Guidelines. Uses which are not listed in the table should be considered on their own merits.

2.3 Definition of Sequential Approach Justification Test

The guidelines outline the sequential approach that is to be applied to all levels of the planning process. This approach should be used in the design and layout of a development and the broad philosophy is shown in Figure 2-1. In general, development in areas with a high risk of flooding should be avoided as per the sequential approach.

Figure 2-1 Sequential Approach (source: Flood Guidelines)



2.4 Justification Test

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; and
- 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 2-3 illustrates the different types of Vulnerability Class appropriate to each zone and indicates where the Justification Test is required.

Table 2-3 Justification Test Matrix (Source: Flood Guidelines)

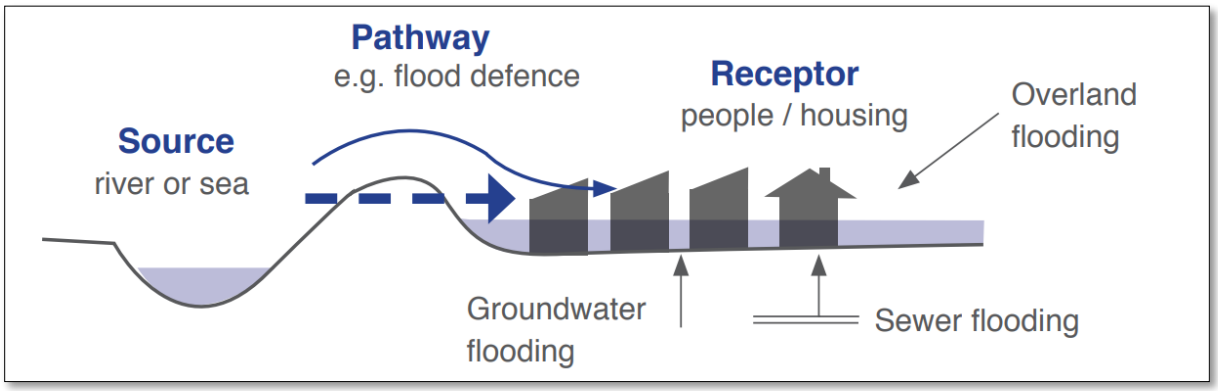
Vulnerability	Flood Zone A	Flood Zone B	Flood Zone C
Highly Vulnerable	Justification Test	Justification Test	Appropriate
Medium Vulnerable	Justification Test	Appropriate	Appropriate
Water Compatible	Appropriate	Appropriate	Appropriate

2.5 Conceptual Model

In order to assess the flood risk for a particular site it is essential to understand what the risk is, and this is undertaken using a conceptual Source-Pathway-Receptor (SPR) model, which is widely used in understanding and managing environmental risks.

In order to develop a conceptual SPR model for the purpose of risk assessment it is necessary to understand the origin and magnitude of potential flooding (the Source), the mechanism or route of flooding (the Pathway) and the nature/scale of the proposed development (the Receptor).

Figure 2-2 Source-Pathway-Receptor Model (source: Flood Guidelines)



2.6 Flood Risk Practice for Wind Farms

As explained in the flood guidelines, "*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 classification of the OES is not explicitly covered by Table 2-2, and has therefore been considered by the authors with respect to its ability to operate or not during a flood event and whether flooding can cause damage to the infrastructure.

3.0 Sources of Flooding

The following potential sources of flood risk have been assessed for the proposed development:

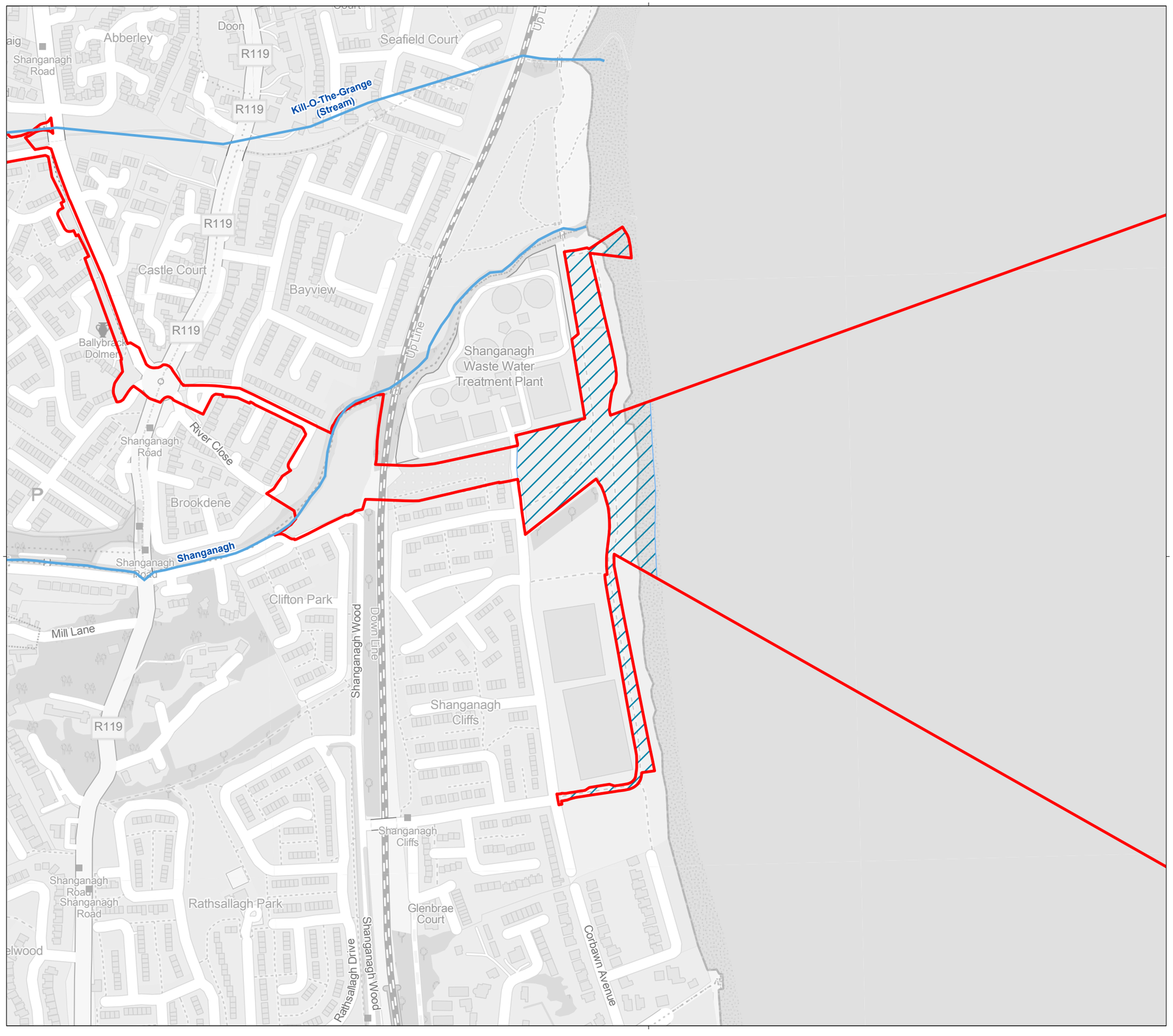
- Fluvial flooding (river or stream) – Fluvial flooding can occur when excessive rainfall creates a situation where the flow capacity of the river is exceeded and bank overtopping occurs, flooding nearby areas.
- Coastal/ Tidal flooding – Coastal/Tidal flooding can occur when tides are high and/or during a storm surge, where an abnormal rise in water generated by high winds and low atmospheric pressure due to a storm which increases sea level above the astronomical tide.
- Pluvial flooding/urban drainage – Pluvial flooding can 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.
- Flooding from manmade impoundments (reservoirs, canals, and other artificial sources).

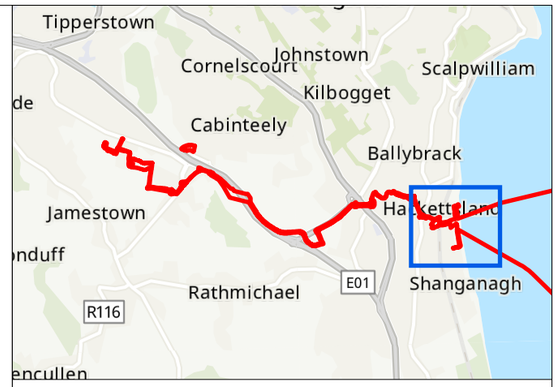
Past flood events, available predictive fluvial and tidal flood risk maps as well as other sources of information relevant to fluvial, tidal, pluvial, and groundwater flooding have been assessed.

4.0 Landfall Site Overview

The location of the Landfall Site is at Shanganagh Cliffs, south County Dublin. The Landfall Site describes where the offshore export cables meet the shoreline and transition to the onshore export cables in underground plinths referred to as transition joint bays (TJBs). The TJBs are the start of the onshore ECR running east – west to the OSS in Jamestown, and onwards to the Carrickmines grid connection point.

The site is shown on Figure 4-1.





Application Site Boundary
Landfall TJB Area
Watercourse

DRAWING STATUS

PUBLIC

DISCLAIMER

MAP NOTES / DATA SOURCES:

PROJECT TITLE

Dublin Array

DRAWING TITLE

Flood Risk Assessment: Landfall Site Location

DRAWING NUMBER: **4-1**

PAGE NUMBER: **1 of 1**

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02	2025-01-30	Public	JK	AM	AM

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0 100 200 300 400 Feet

GRID NORTH

SCALE 1:5,000 PLOT SIZE A3

DATUM IRENET95 VERTICAL REF CDN/LAT/MLLW

PRJ IRENET95 Irish Transverse Mercator

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4.1 Landfall Flood Risk Identification and Assessment

The permanent infrastructure within the Landfall site is not considered vulnerable to flooding. Infrastructure buried underground is designed to withstand water exposure. The Landfall site permanent infrastructure consists of:

- Two transition joint bays, where the two offshore export cables transition to the onshore export cables.
    - Each TJB is comprised of a concrete plinth buried below ground at 2 m depth measuring 18 m x 2 m set on a layer of crushed stone.
    - Each TJB will require an excavated area of 26.5 m x 8.5 m x 2 m.
    - Each TJB will be co-located with an underground link box chamber and communications chamber. The electrical cables pass through the TJBs with smaller communications chambers provided adjacent to the TJBs to accommodate the fibre optic cables. The two chambers will require an additional excavation area of 5.4 m x 2.4 m x 1.75 m.
    - Within each TJB, the three-core offshore export cable is split out and jointed to a single onshore export cable comprising of three single-core cables. After cable installation, the TJB pits will be backfilled with a combination of the excavated material stored on site and suitable material such as Cement Bound Sand (CBS). Topsoil will be reseeded to grass, and the inspection manhole covers over the link box chambers and communications chambers will be the only visible above ground permanent infrastructure at the Landfall Site.
- Temporary construction access track: Upgrades to an existing pedestrian path to the Landfall Site will provide temporary construction access during construction. Diverted pedestrian paths and laybys will also be installed for the duration of construction. Once the OES works are complete, the diverted pedestrian paths and laybys will be reinstated. The upgraded access track will remain in situ for public use and future maintenance access to the TJBs from the public road.; and
- The access track will have appropriate slopes to facilitate water runoff and prevent ponding.

4.2 Landfall Site Flood Risk Identification and Assessment

4.2.1 Fluvial Flooding

No watercourses cross the Landfall Site. The closest waterbody is the Shanganagh River which runs to north of the site, and discharges into the Irish Sea some 30 m north of the Landfall Site.

The Landfall Site is within the Flood Risk Management Plan for the Liffey and Dublin Bay (UOM09)[2]. The available Catchment Flood Risk and Management Study (CFRAM) flood maps[3] show that the site does not flood for the 1% AEP, 0.1% AEP and 1% AEP MRFS events.

[2] Office of Public Works (OPW), 2018. *Flood Risk Management Plan for the Liffey & Dublin Bay River Basin (UOM09)*. Available at: https://s3-eu-west-1.amazonaws.com/docs.floodinfo.opw/floodinfo_docs/Final_FRMPs_For_Publication/FRMP_Final2018_RiverBasin_09.pdf

[3] Flood Maps - Floodinfo.ie

The proposed Landfall Site is located within Flood Zone C (low risk of flooding).

The flood OPW CFRAM fluvial maps for the Landfall Site and the Shanganagh River are provided in Appendix A.

4.2.2 Coastal Flooding

The Shanganagh River is under the tidal effect of the Irish Sea. The flood extent is similar to those related to fluvial flooding. The CFRAM flood maps show that the site is within Flood Zone C.

The OPW CFRAM coastal flood maps for the area at the Landfall Site are provided in Appendix A.

4.2.3 Pluvial Flooding

The existing topography does not show any significant land depression or risk of overland flows at the Landfall Site.

The risk of pluvial flooding for the permanent state of the TJBs can be considered low, as the infrastructure will be buried underground and designed to withstand water exposure.

There is a risk of pluvial flooding during the construction phase of the TJBs as they will be constructed within an excavated pit, approximately 2 m deep, which could be inundated during an intense rainfall event. However, the inundated water can be pumped from the pit following a rainfall event as part of the construction site management.

4.2.4 Groundwater Flooding

The Geological Survey of Ireland (GSI) dataset does not indicate any groundwater flooding within and adjacent to the proposed Landfall Site.

The risk of groundwater flooding is considered to be low.

4.2.5 Historical Flooding

Records of past fluvial, tidal, and pluvial floods were obtained from the OPW National Flood Hazard Mapping website. There are no recorded flood events within or reasonably adjacent to the Landfall Site.

4.2.6 Summary

The risk of flooding to the Landfall Site is summarised in Table 4-1.

Table 4-1 Landfall Site Flooding - Summary

Source of Flooding	Flood Risk	Requirement for FRA Stage 3
Fluvial Flooding	The proposed landfall site is located in Flood Zone C.	No
Coastal Flooding	The proposed landfall site is located in Flood Zone C.	No
Pluvial Flooding	The risk of any significant pluvial flooding is considered low and shall be mitigated during construction with appropriate measures such as de-watering and pumping.	No
Groundwater Flooding	The available GSI data show that the risk of groundwater flooding is low.	No
Manmade impoundments	There are no reservoirs, canals, and other artificial sources within and adjacent to the site.	No

There will be no above ground infrastructure within the Landfall Site apart from four the inspection manhole covers over the link box chambers and communications chambers. The infrastructure will be installed underground and the surface will be reinstated to original form and levels, and as such flooding will not impact the development and the development will have no impact to flooding or surface water runoff.

The vulnerability classification of the OES is not explicitly covered by the Flood Guidelines. The permanent infrastructure at the Landfall Site includes the TJB, onshore export cables, link box chambers and communications chambers which will be installed underground in waterproofed cable ducts.

If flooding was to occur at the Landfall Site, it is considered that these infrastructure elements would not be damaged, and operation would not be impacted. There will be no long-term implications for recovery following a flood event. The infrastructure is therefore considered “water compatible" development.

Based on the available flood maps, the Landfall Site is located within Flood Zone C. Therefore, the proposed development is considered appropriate within this zone and the Justification Test is not required.

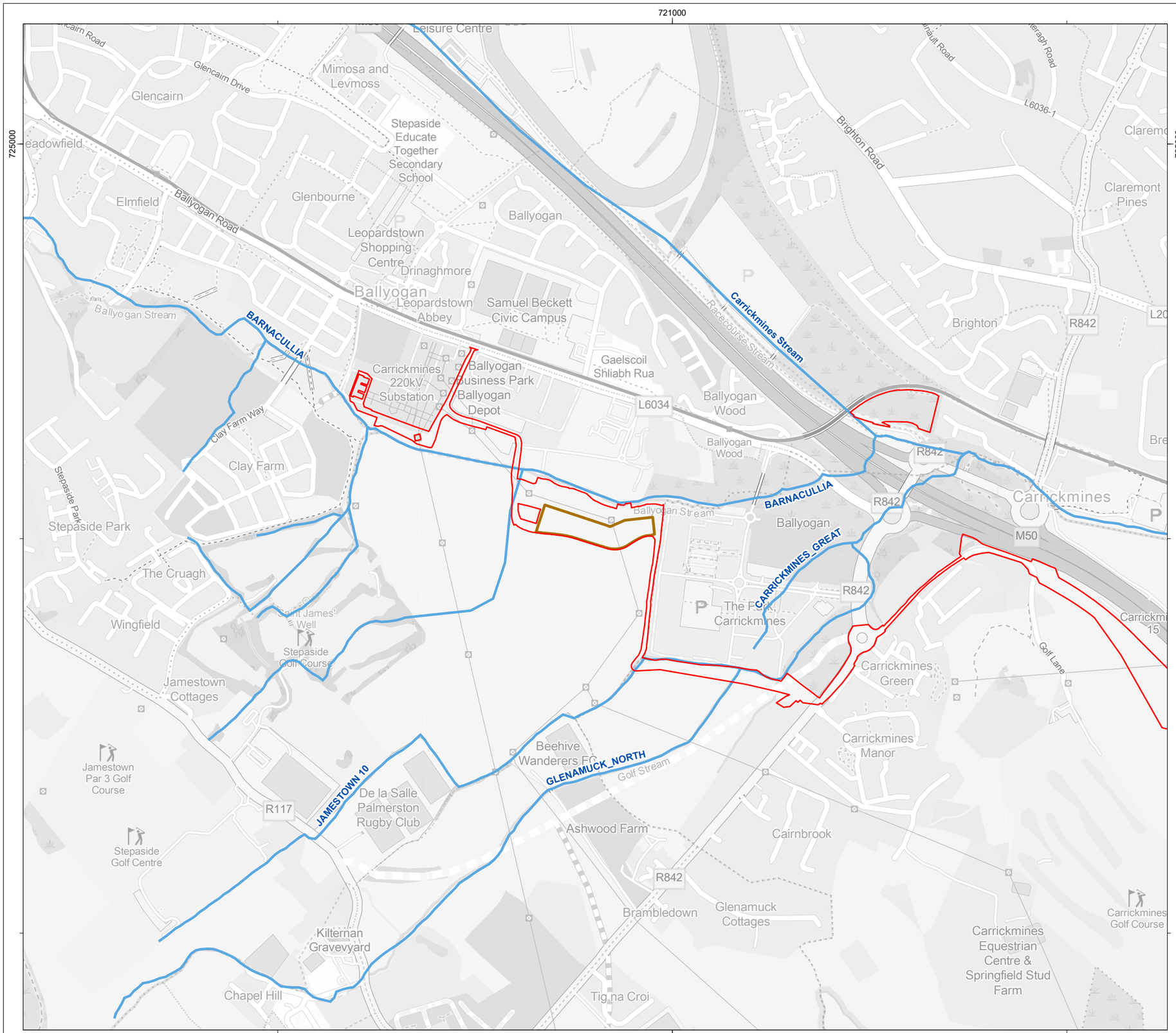
No flood mitigation measures are proposed for the Landfall Site.

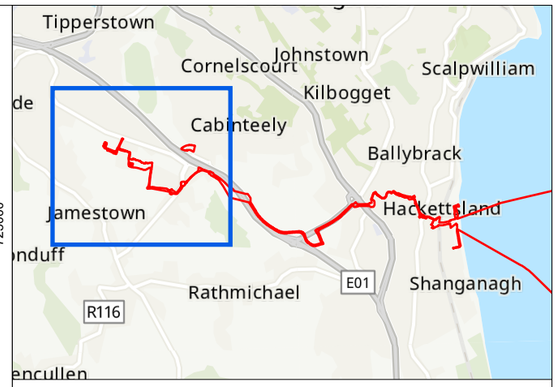
5.0 Onshore Substation Overview

The proposed OSS is located approximately 0.4 km to the southeast of the existing 220 kV Carrickmines substation. The proposed OSS will be accessed from the Ballyogan Road. The location of the OSS is shown on Figure 5-1.

Flood risk needs to be considered in the context of both the construction stage and also the operational stage for the OSS buildings and other critical above ground infrastructure associated with the OSS. The OSS is considered to be a critical piece of infrastructure and is classified as being Highly Vulnerable development in the Flood Guidelines and therefore it is vital that flood risk to the OSS in minimised.

The location of the facility and its layout have been informed by the consideration of flood risk as described below with respect to the various potential sources of flood risk identified.





Application Site Boundary
Onshore Substation (OSS) Boundary
Watercourse

DRAWING STATUS

PUBLIC

DISCLAIMER

MAP NOTES / DATA SOURCES:

PROJECT TITLE

Dublin Array

DRAWING TITLE

Flood Risk Assessment: Proposed OSS at Carrickmines

DRAWING NUMBER: 5-1

PAGE NUMBER: 1 of 1

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GRID NORTH

SCALE 1:10,000 PLOT SIZE A3
DATUM IRENET95 VERTICAL REF ODN/LAT/MLLW
PRJ IRENET95 Irish Transverse Mercator

SLR

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5.1 Substation Flood Risk Identification and Assessment

The principal water feature in the vicinity of the site is the Ballyogan Stream (also known as the Carrickmines Stream), which flows in the easterly direction towards the Irish Sea some 50 m north of the proposed OSS.

5.1.1 Fluvial Flooding

The available OPW CFRAM flood maps[4] show that the OSS site does not flood for the 1% AEP, 0.1% AEP and 1% AEP MRFS events.

The existing ground levels at the OSS site are approximately 10 m higher than the Ballyogan stream level and therefore the site is not considered to be at risk of fluvial flooding from the stream.

The proposed OSS is located within Flood Zone C.

The OPW CFRAM flood maps are provided in Appendix B.

5.1.2 Coastal Flooding

The proposed OSS is located approximately 5.2 km from the Irish Sea. Due to the distance, it is considered that the site is at low risk of coastal flooding.

5.1.3 Pluvial Flooding

The existing topography does not show any significant land depression or risk of overland flows into the substation from outside sources and all surface water runoff generated on site will be managed by a surface water drainage network and attenuation system. The site has a gentle fall towards the Ballyogan Stream/Carrickmines Stream which will help with outflow to the drainage system that will be installed at the OSS.

A site walkover was undertaken in September 2024. No local topographic low points were identified which could flood during a rainfall event.

It is considered that the risk of pluvial flooding to the OSS site is low.

5.1.4 Groundwater Flooding

The GSI groundwater flooding dataset does not indicate any groundwater flooding within and adjacent to the proposed OSS site.

The risk of groundwater flooding is considered to be low.

5.1.5 Historical Flooding

The OPW website indicates that there are no records of flooding at the site and within 0.5 km buffer zone from the OSS site. The closest recorded historical flood incident is a recurring flooding at Glenamuck Road (ID-2069) some 0.8 km southeast of the OSS site.

The desktop study did not provide any specific information indicating that the OSS site was flooded in the past.

5.1.6 Summary

The risk of flooding to the OSS is summarised in Table 5-1

[4] Flood Maps - Floodinfo.ie

Table 5-1 OSS Flooding - Summary

Source of Flooding	Flood Risk	Requirement for FRA Stage 3
Fluvial Flooding	The proposed substation is located in Flood Zone C.	No
Coastal Flooding	The proposed substation is located in Flood Zone C.	No
Pluvial Flooding	Topography data and site walkover findings did not identify any local low points where water could impound and cause flooding. The site has a gentle fall towards the stream.	No
Groundwater Flooding	The available GSI data show that the risk of groundwater flooding is low.	No
Manmade impoundments	There are no reservoirs, canals, and other artificial sources within and adjacent to the site.	No

Based on the flood risk findings, it is concluded that the proposed OSS will be situated within Flood Zone C, as that area is at low risk of flooding. Therefore, a detailed flood risk assessment (Stage 3) is not required.

The proposed OSS is considered essential infrastructure “highly vulnerable” to flooding, as per the vulnerability classification in Table 2-2. The sequential approach has been followed and the site is located in Flood Zone C, area at low risk of flooding from rivers or the sea.

Therefore, the proposed development is considered appropriate within this site and a Justification Test is not required.

5.2 Proposed Mitigation Measures

The proposed OSS site is at low risk of flooding. However, it is necessary to address the potential for flood risk increase due to increase in runoff from the OSS site with hard impermeable surfaces.

Surface water runoff at the site will be managed through a dedicated surface water drainage network, with runoff from impermeable areas collected by swales and filter drains before discharging into buried carrier pipes. Rainwater from buildings and equipment slabs will also be directed into the carrier pipe network.

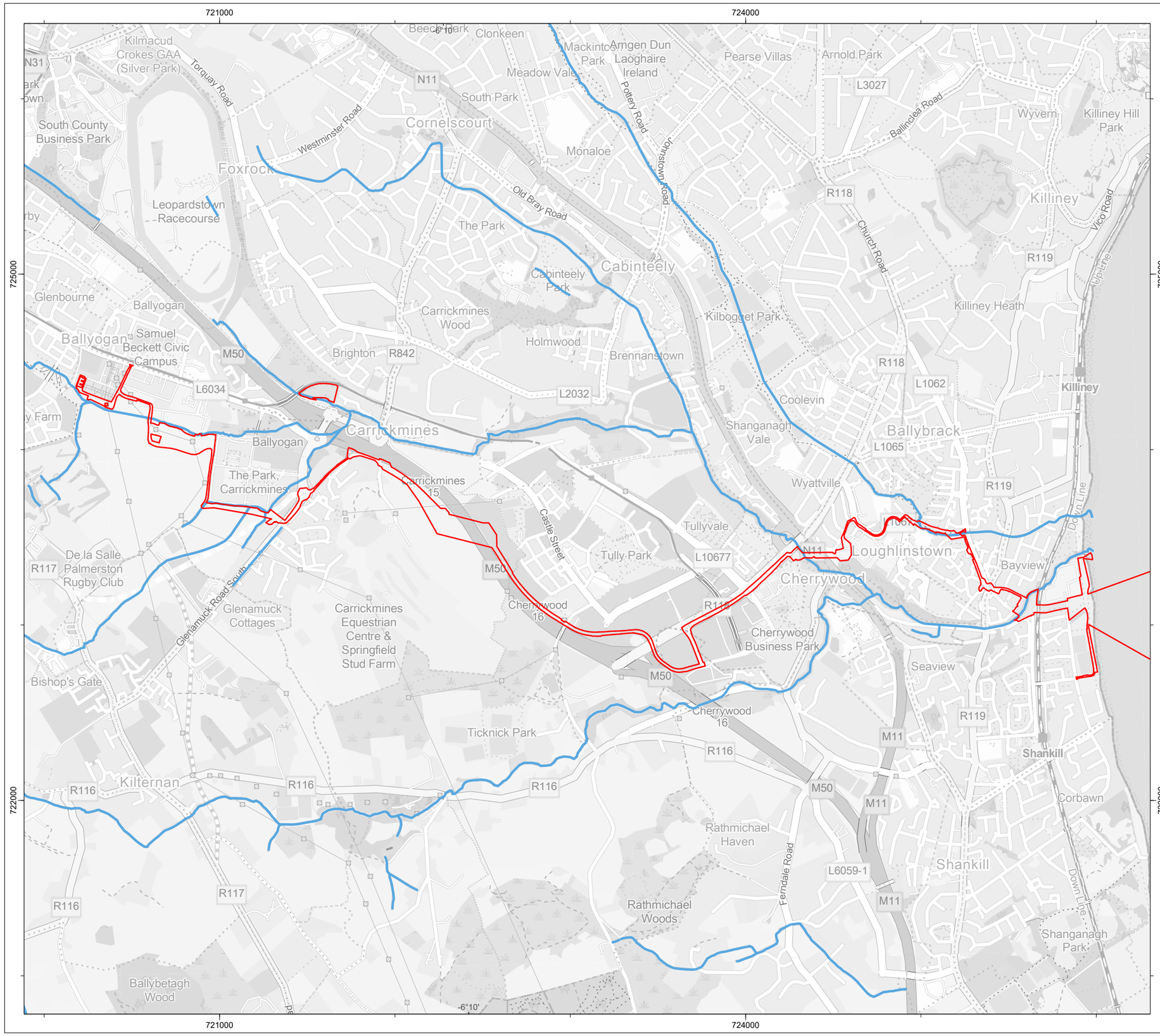
The surface runoff will be controlled to match existing greenfield runoff rates using a flow control device and an attenuation basin will store and attenuate excess runoff. The attenuation basin will be designed to attenuate a 1 in 100-year rainfall event, limiting runoff to existing greenfield rates. The runoff will be ultimately discharged into the Ballyogan Stream.

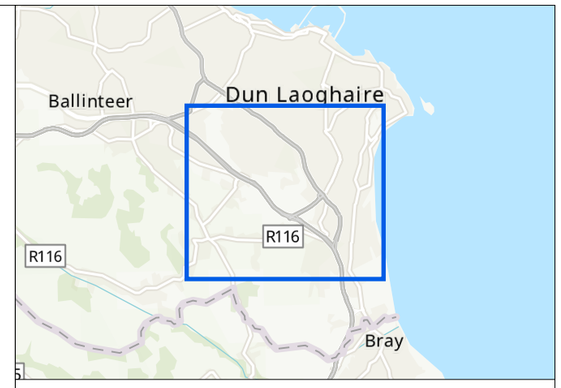
Water quality will be maintained through a treatment train approach, including filter drains, a hydrocarbon interceptor, and concrete bunds for fuel tanks to prevent spillages from entering the water network.

6.0 Onshore Export Cable Route Overview

The proposed onshore ECR is sub-divided into seven Sectors for reference purposes. The sectors run from the Landfall Site at Shanganagh Cliffs to the OSS site in Carrickmines in the west. The proposed OES is shown on Figure 6-1.

While the onshore ECR is mainly proposed within public roads, there are several locations where the route deviates from the road and crosses private lands.





Application Site Boundary

Watercourse

DRAWING STATUS

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PROJECT TITLE

Dublin Array

DRAWING TITLE

Flood Risk Assessment: Proposed OES

DRAWING NUMBER: **6-1**

PAGE NUMBER: **1 of 1**

VER	DATE	REMARKS	DRAW	CHEK	APRD
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02	2025-01-30	Public	JK	AM	AM

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0 0.1 0.2 0.3 0.4 Miles

N GRID NORTH

SCALE 1:22,148 PLOT SIZE A3

DATUM IRENET95 VERTICAL REF ODN/LAT/MLLW

PRJ IRENET95 Irish Transverse Mercator

SLR

Dublin Array Generation for generations

Kish Offshore Wind Limited - Bray Offshore Wind Limited

Once construction is completed, the surfacing and levels of the road/ground along the ECR will be reinstated to their original form and level. The only visible above ground structures along the ECR will be small marker posts to indicate the location of the cables in private lands and inspection manhole covers associated with the link box chambers and communications chambers co-located with the joint bays along the ECR at 600 – 850 m intervals.

Joint bays will be required along the cable route to facilitate cable pulling through pre-installed ducts. Joint bays are underground pre-cast concrete chambers measuring 8 m long by 2.5 m wide. They facilitate the joining of individual lengths of export cable sections. Up to 10 sets of joint bays (20 joint bays in total) will be installed at strategic locations along the onshore ECR to facilitate cable installation and to support the operation and maintenance of the export cable circuits throughout the operational lifetime of the proposed development. Underground communications chambers and link box chambers will be co-located with each joint bay.

There is only one new permanent access track (approx. 200 m) proposed along the ECR. This will be located in Sector 4 east of the M50 to access the joint bays.

6.1 Onshore ECR Flood Risk Identification and Assessment

6.1.1 Fluvial Flooding

Fluvial flooding will have no impact on the onshore ECR as the infrastructure will all be below ground. The majority of the ECR is located outside of the fluvial flood extent areas mapped as part of the OPW CFRAMS process, and thus are in Flood Zone C.

However, a review of the cable route against the CFRAMS flood maps indicates a number of locations along the ECR, where the route crosses a river or stream, that are at risk of flooding from either the 1% AEP or the 0.1% AEP flood events.

The OPW CFRAM Fluvial Flood Maps covering the ECR are provided in Appendix C.

6.1.2 Coastal Flooding

Where the watercourses along the ECR are under a tidal effect, i.e. the lower reaches of the Shanganagh River, the flood extents are similar to those associated with fluvial flooding.

The flood risk and flood mechanisms are considered to be the same for both fluvial and coastal flooding for the lower reach of the Shanganagh River.

The OPW CFRAM Fluvial Flood Maps covering the onshore ECR, including the tidal section of the Shanganagh River, are provided in Appendix C.

6.1.3 Pluvial Flooding

Surface water runoff on the onshore ECR is not considered a significant issue, due to the existing road drainage as well as the nature of development (underground cables in ducts).

Pluvial flood risk to the ECR is considered to be low.

6.1.4 Groundwater Flooding

Available groundwater flooding maps from the Geological Survey of Ireland (GSI) do not indicate any groundwater flood extents along the ECR.

Groundwater flood risk to the ECR is considered to be low.

6.1.6 Historical Flooding

There are a number of recorded historical flooding incidents in the vicinity of the ECC. These were recorded at:

- Shanganagh Carrickmines (November 1982);
- Flooding at N11, Loughlinstown, Co. Dublin (24th October 2011);
- Deansgrange River Achill Road (Recurring); and
- Flood report for Dun Laoghaire/Rathdown (2nd of August 2014).

Due to the fact that the ECR infrastructure will be below the ground, the historical flood incidents are not considered to be relevant to the proposed development.

The locations of the recorded historical flood incidents in the vicinity of the ECR are provided in Appendix C.

6.1.7 Flooding due to Reduction in Flow Conveyance of Hydraulic Structure

The proposed ECR will cross a number of watercourses from the Landfall Site to OSS. When working near water courses, trenchless techniques (HDD or similar) will be adopted at the majority of crossings:

- Sector 1: (TX-02): Shanganagh River;
- Sector 2: (TX-04 and TX-05) Two crossings of Kill-O-The-Grange Stream;
- Sector 3: (TX-06) Carrickmines Stream; and
- Sector 4: (TX-07) Laughanstown Stream.

In Sector 7, there will be two open cut trench crossings under the Glenamuck North and Jamestown 10 (also known as Golf) streams. For these crossings, a dam shall be installed in the watercourse by installing sheet piling or an aqua dam at either side of the crossing location. The watercourse shall be over pumped from one side of the dam to the other to maintain the flow of the watercourse. The ducting will then be installed in the dammed section via open cutting as per EirGrid specification OFD-SSS-529. Once the ducts are installed the watercourse bed will be reinstated and the dam removed.

6.1.8 Summary

The risk of flooding to the ECR is summarised in Table 6-1.

Table 6-1 ECR Flooding - Summary

Source of Flooding	Flood Risk	Requirement for FRA Stage 3
Fluvial Flooding	The majority of the ECR is located within Flood Zone C. A number of discrete locations along the corridor of the ECR are at risk of flooding from either the 1% AEP or the 0.1% AEP flooding. Due to the nature of the ECR, the flood risk is considered to be low.	No
Coastal Flooding	The watercourses associated with the ECR are under a tidal effect. The flood extents are similar to those associated with fluvial flooding. Coastal flooding will have no impact on the onshore cable route and associated	No

Source of Flooding	Flood Risk	Requirement for FRA Stage 3
	infrastructure, as the infrastructure is below ground.	
Pluvial Flooding	The cable and associated infrastructure will be buried with the ground reinstated to its current level and surfacing, and as such will not alter the flood risk to surrounding areas. Flood risk is considered to be low.	No
Groundwater Flooding	The available GSI data show that the risk of groundwater flooding is low.	No
Manmade impoundments	There are no reservoirs, canals, and other artificial sources within and adjacent to the site.	No

The ECR is proposed on land falling within all flood cones, i.e. Flood Zones A, B and C.

The ECR will be installed within underground ducts and once installed, it can operate during flooding conditions. Maintenance is unlikely to take place during a flood event. As such, the ECR infrastructure is considered “water compatible” development. and is therefore considered appropriate within any flood zones and the Justification Test is not required.

The onshore ECR will be underground in its permanent state and is not anticipated to alter the flood mechanism or cause any changes to existing flood risk. Therefore, no flood mitigation measures are required for the operational phase.

7.0 Conclusion

The proposed development is a combination of offshore and onshore infrastructure. This flood risk assessment report addresses flooding associated with the OES which includes the Landfall Site, the onshore substation (OSS) and the onshore export cable route (ECR).

The flood risk screening process demonstrates that the proposed Landfall Site and OSS are located in the area of low risk of flooding (Flood Zone C). Such infrastructure is appropriate in this zone and therefore no Justification Test is required as per the Flood Guidelines.

The proposed ECR is mostly within Flood Zone C. However, sections of the ECR are situated within Flood Zone A and B. Given that the onshore cable will be underground in its permanent state, it is considered that the development is ‘water compatible’ and is therefore compatible development in flood zones A and B.

The proposed OSS site will result in increased runoff from impermeable areas. To mitigate this, the proposed OSS site will have its own drainage system which will limit the runoff to the predevelopment levels. The development of the OSS site will not increase the flood risk elsewhere.

8.0 Closure

This report has been prepared by SLR Environmental Consulting (Ireland) Ltd. with all reasonable skill, care and diligence, and taking account of the manpower and resources devoted to it by agreement with the client. Information reported herein is based on the interpretation of data collected and has been accepted in good faith as being accurate and valid.

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SLR disclaims any responsibility to the client and others in respect of any matters outside the agreed scope of the work.

Appendix A Flood Maps Landfall Site

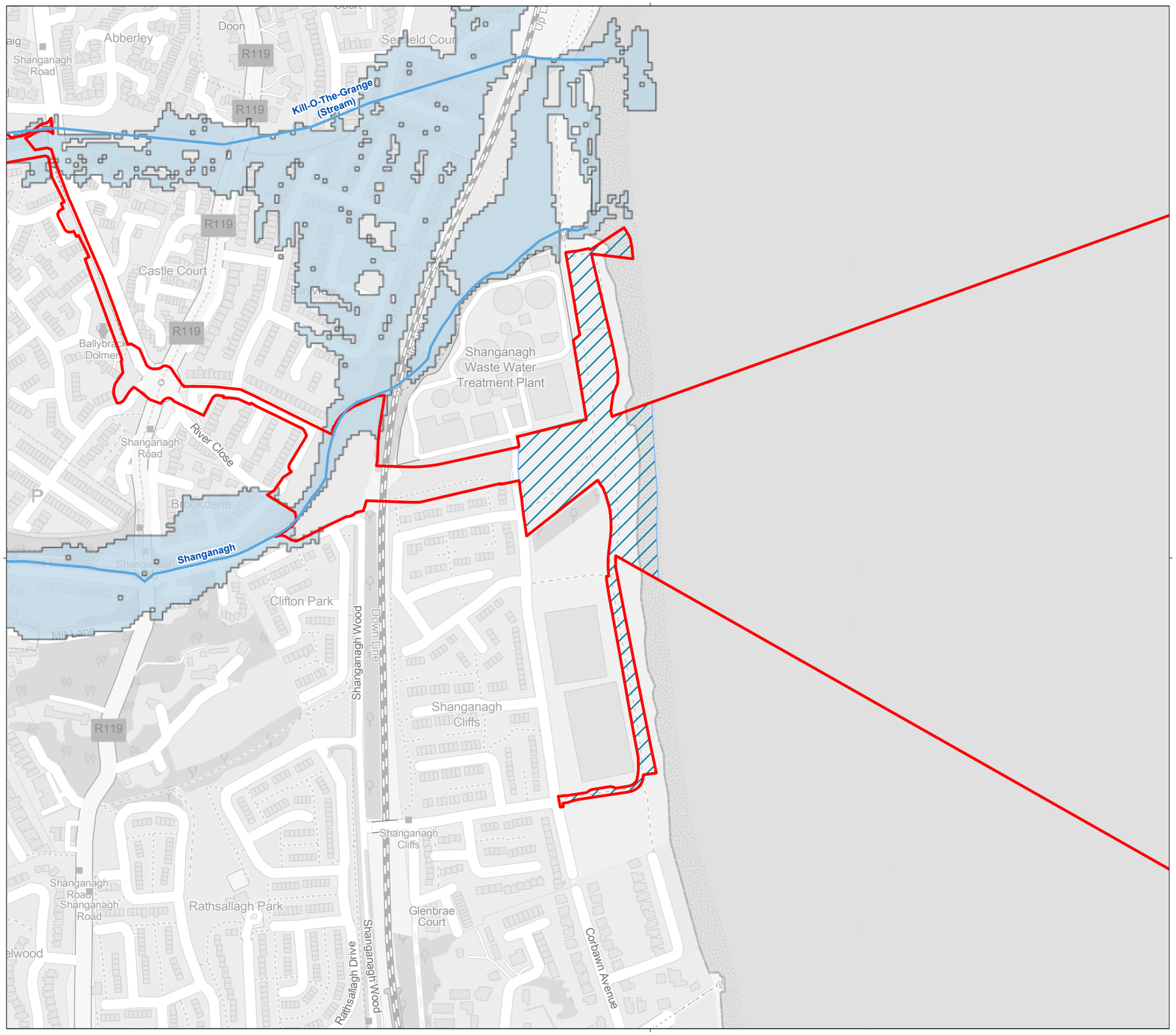
Flood Risk Assessment for the Dublin Array Onshore Electrical System

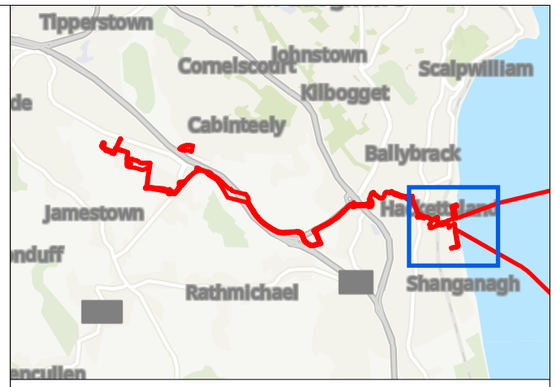
Dublin Array

Bray Offshore Wind Limited

SLR Project No.: 501.065303.00001

1 December 2024





- Application Site Boundary
- Landfall TJB Area
- Watercourse
- Fluvial Flood Extents - Low Probability

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PROJECT TITLE

Dublin Array

DRAWING TITLE

Flood Risk Assessment: Landfall Fluvial Flooding

DRAWING NUMBER: **A1**

PAGE NUMBER: **1 of 1**

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02	2025-01-30	Public	JK	AM	AM

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DATUM IRENET95 VERTICAL REF CDN/LAT/MLLW
PRJ IRENET95 Irish Transverse Mercator

SLR

Dublin Array
Generation for generations
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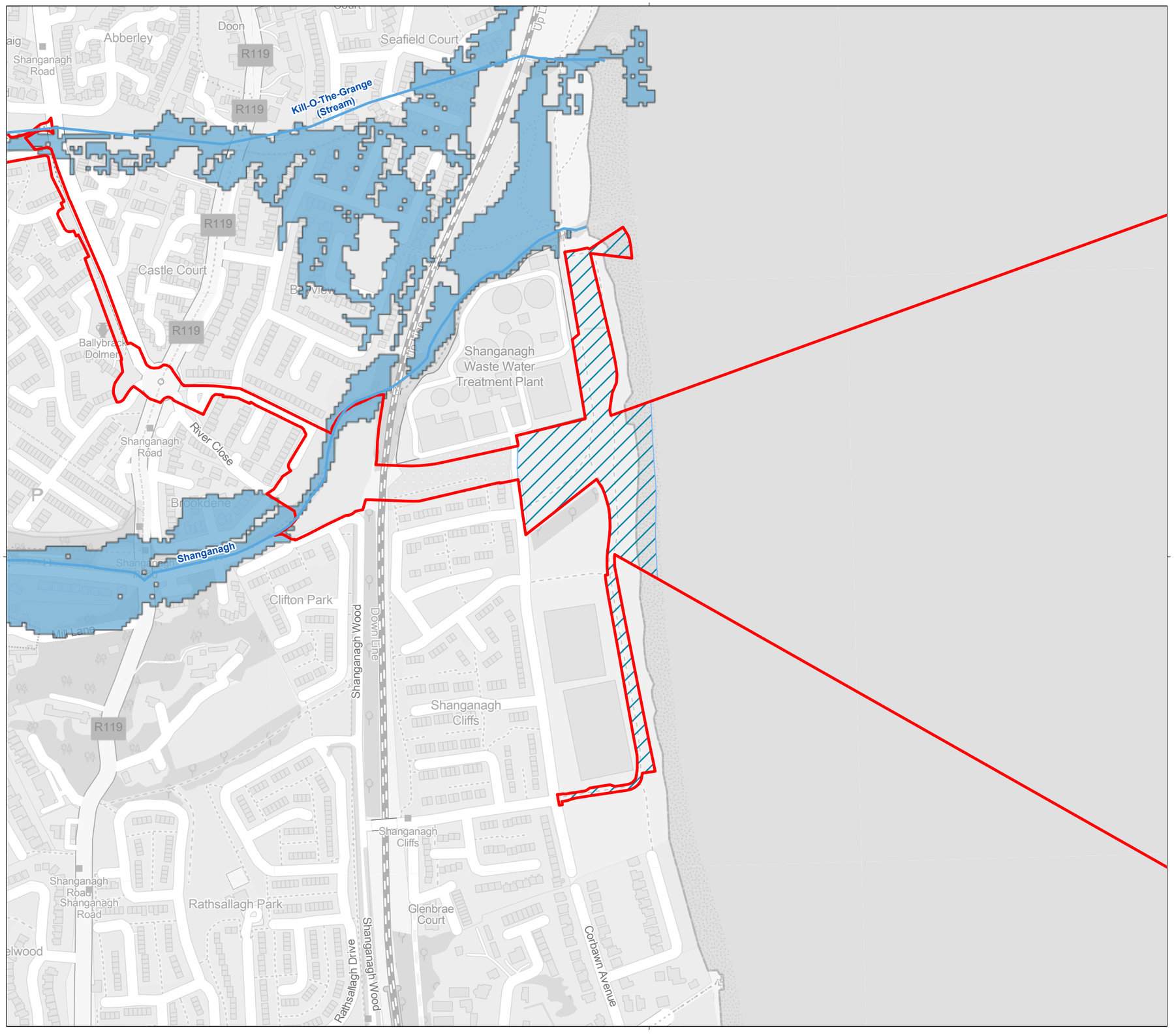

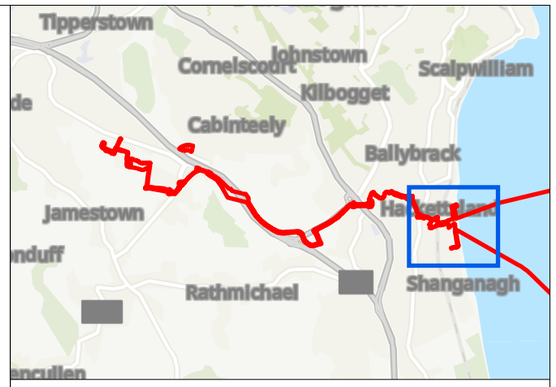

- Application Site Boundary
- Landfall TJB Area
- Watercourse
- Fluvial Flood Extents - Medium Probability

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PROJECT TITLE

Dublin Array

DRAWING TITLE **Flood Risk Assessment: Landfall Fluvial Flooding**

DRAWING NUMBER: **A2**

PAGE NUMBER: **1 of 1**

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Dublin Array
Generation for generations
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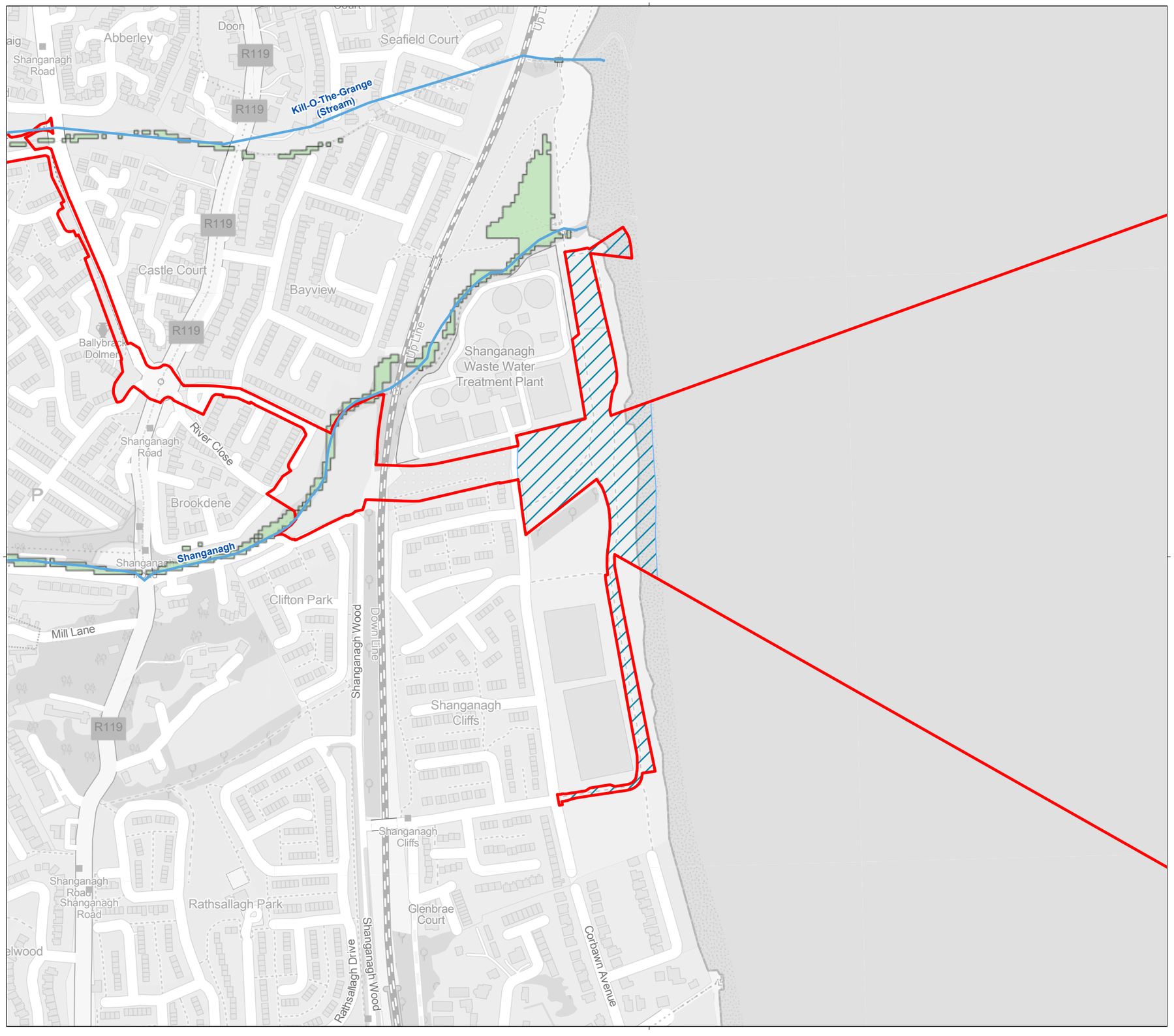

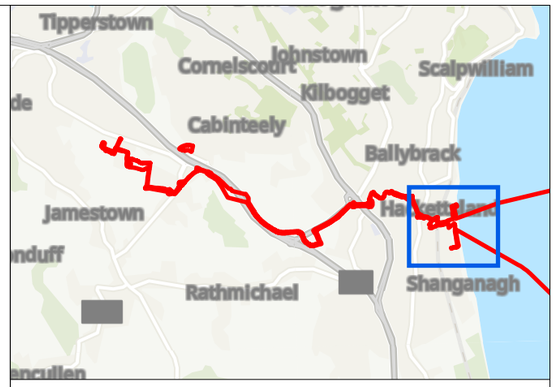

- Application Site Boundary
- Landfall TJB Area
- Watercourse
- Coastal Flood Extents - Low Probability

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Dublin Array

DRAWING TITLE

Flood Risk Assessment: Landfall Coastal Flooding

DRAWING NUMBER: **A3**

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02	2025-01-30	Public	JK	AM	AM

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N GRID NORTH

SCALE 1:5,000 PLOT SIZE A3
DATUM IRENET95 VERTICAL REF ODN/LAT/MLLW
PRJ IRENET95 Irish Transverse Mercator

SLR

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Generation for generations
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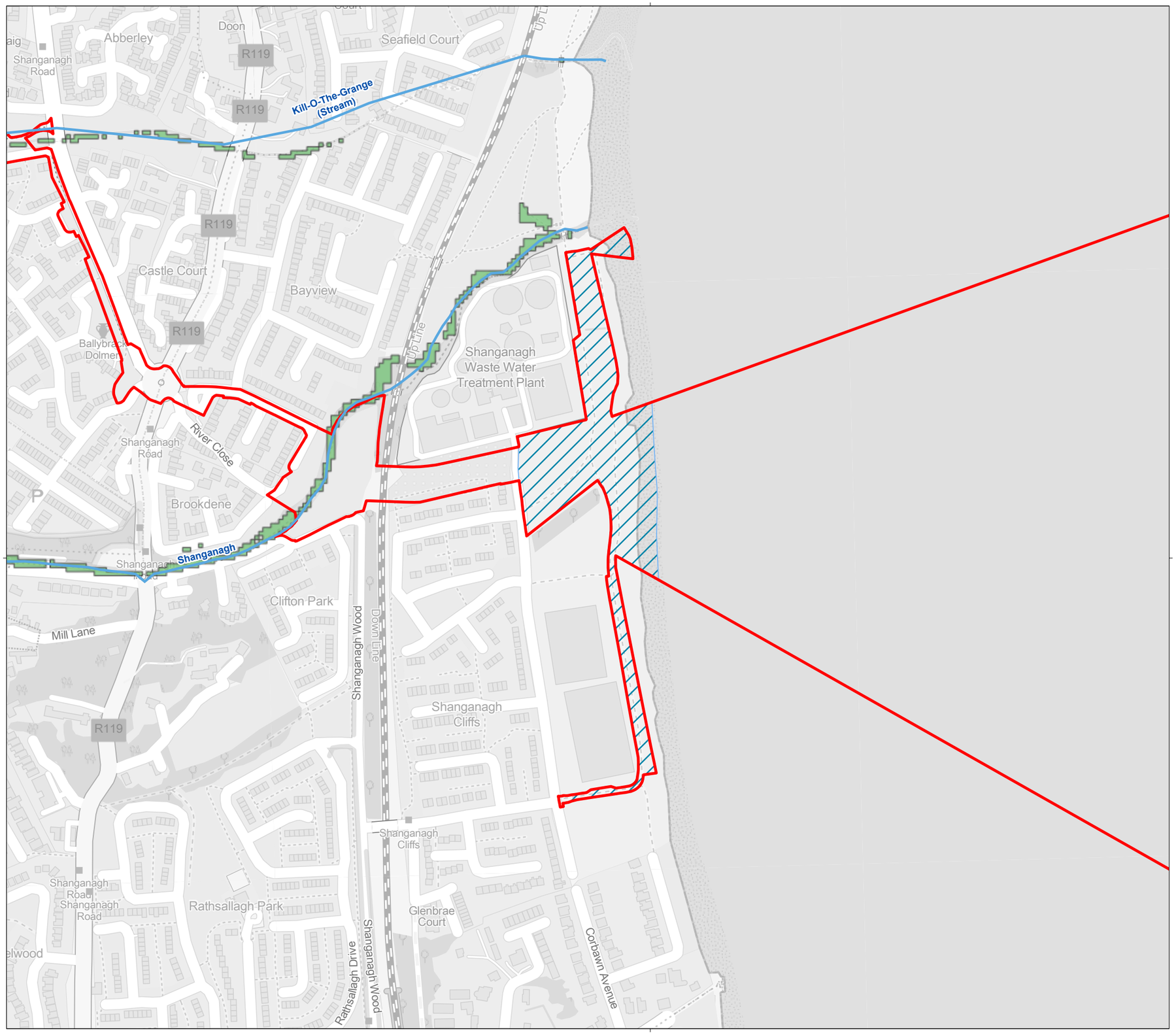

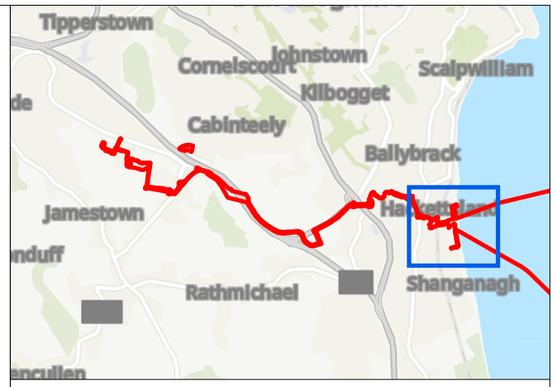

Application Site Boundary
Landfall TJB Area
Watercourse
Coastal Flood Extents - Medium Probability

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Dublin Array

DRAWING TITLE

Flood Risk Assessment: Landfall Coastal Flooding

DRAWING NUMBER: **A4**

PAGE NUMBER: **1 of 1**

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PRJ IRENET95 Irish Transverse Mercator

SLR

Dublin Array
Generation for generations
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Appendix B Flood Maps OSS

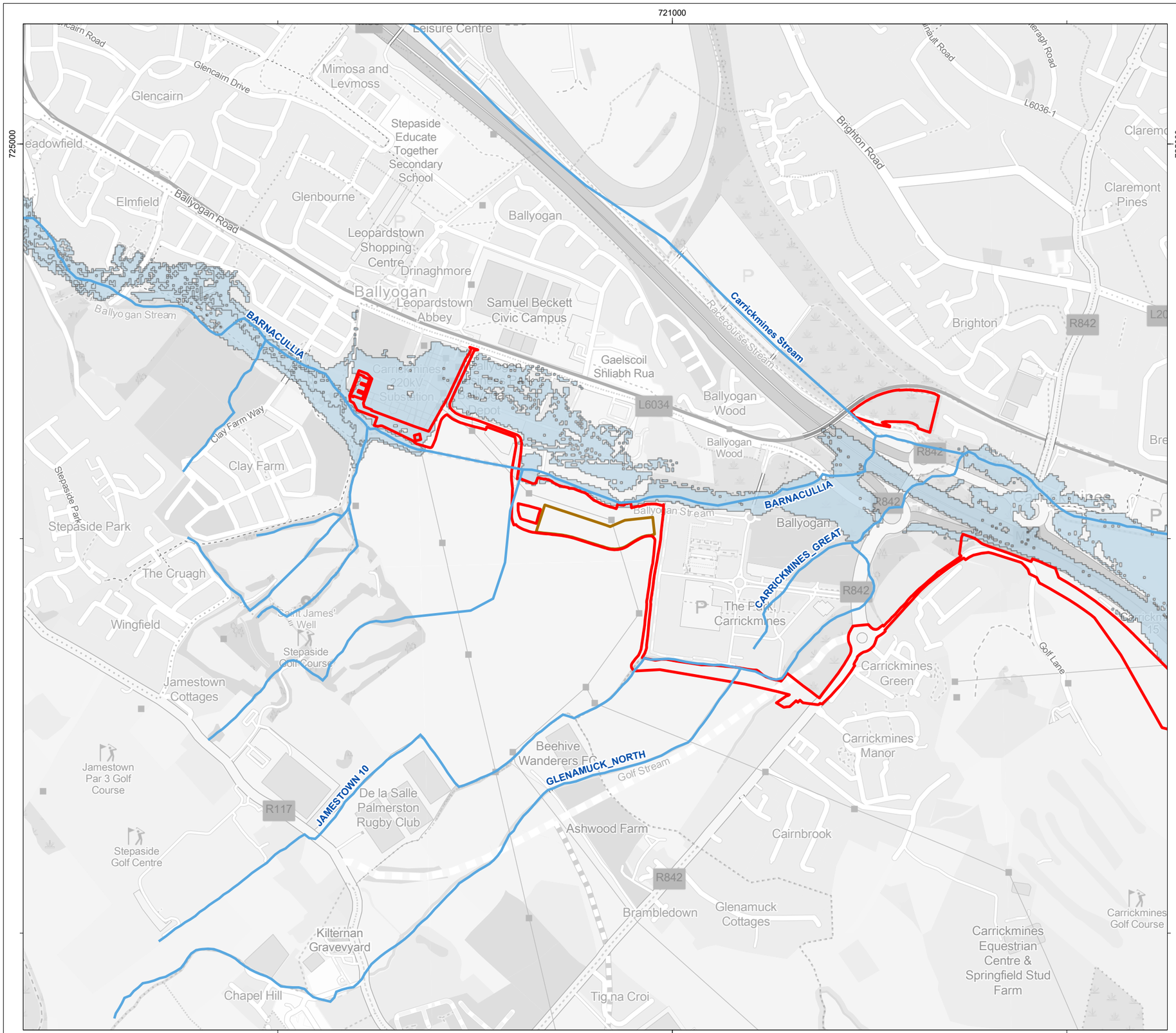
Flood Risk Assessment for the Dublin Array Onshore Electrical System

Dublin Array

Bray Offshore Wind Limited

SLR Project No.: 501.065303.00001

1 December 2024



Application Site Boundary
Onshore Substation Boundary
Watercourse
Fluvial Flood Extents - Low Probability

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Dublin Array

DRAWING TITLE

Flood Risk Assessment: Proposed OSS Fluvial Flooding

DRAWING NUMBER: **B1**

PAGE NUMBER: **1 of 1**

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02	2025-01-30	Public	JK	AM	AM

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DATUM IRENET95 VERTICAL REF ODN/LAT/MLLW
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Dublin Array
Generation for generations
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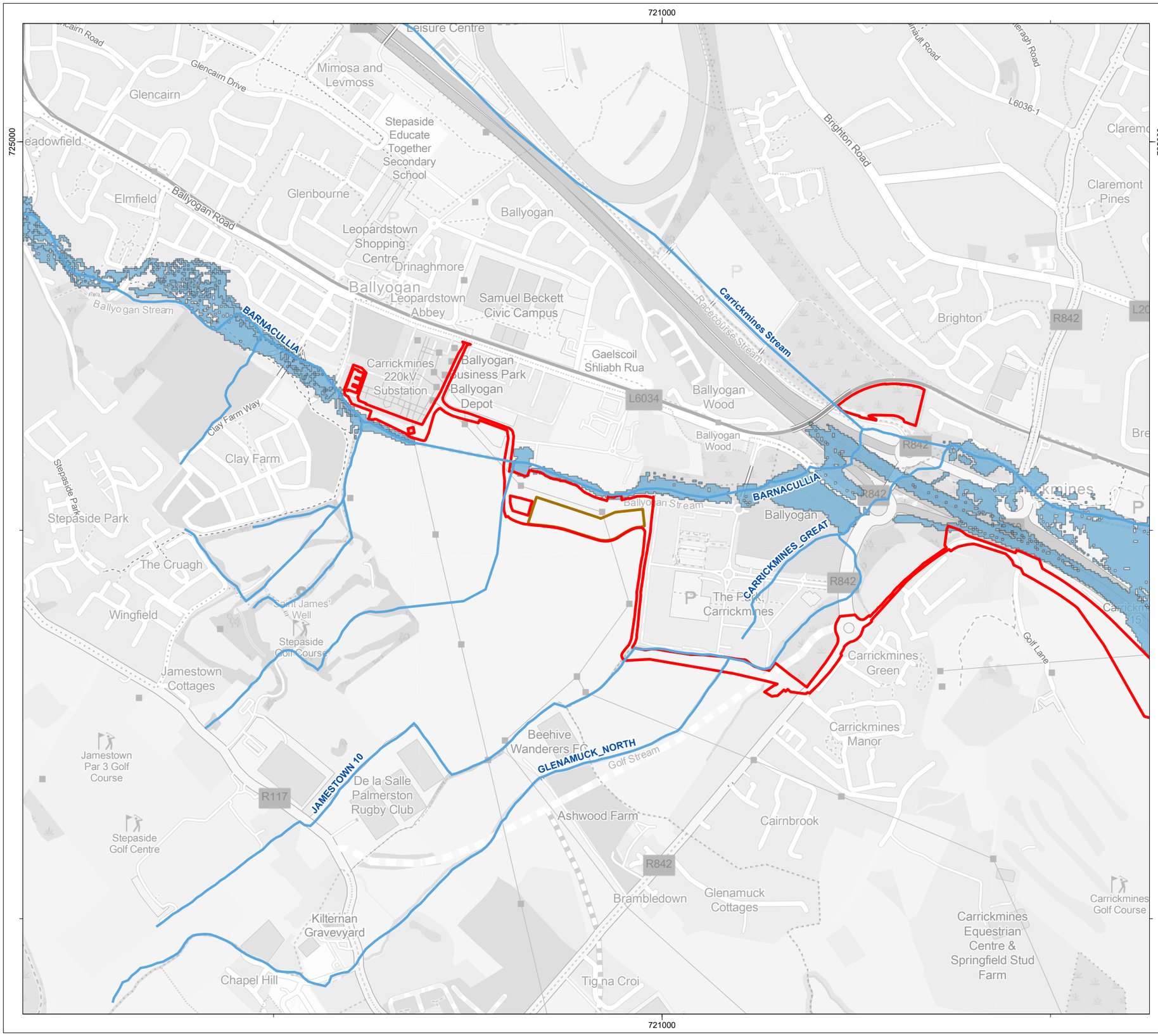

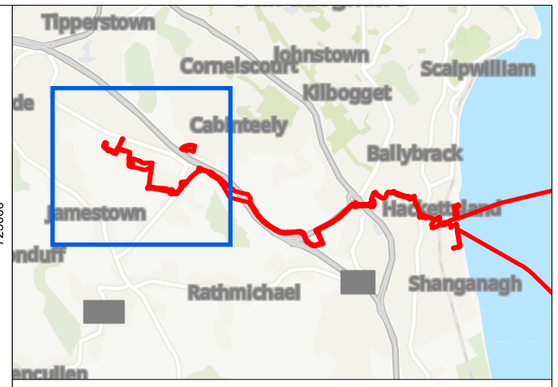

Application Site Boundary
Onshore Substation Boundary
Watercourse
Fluvial Flood Extents - Medium Probability

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PROJECT TITLE

Dublin Array

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Flood Risk Assessment: Proposed OSS Fluvial Flooding

DRAWING NUMBER: **B2**

PAGE NUMBER: **1 of 1**

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PRJ IRENET95 Irish Transverse Mercator

SLR

Dublin Array Generation for generations

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Appendix C Flood Maps OES

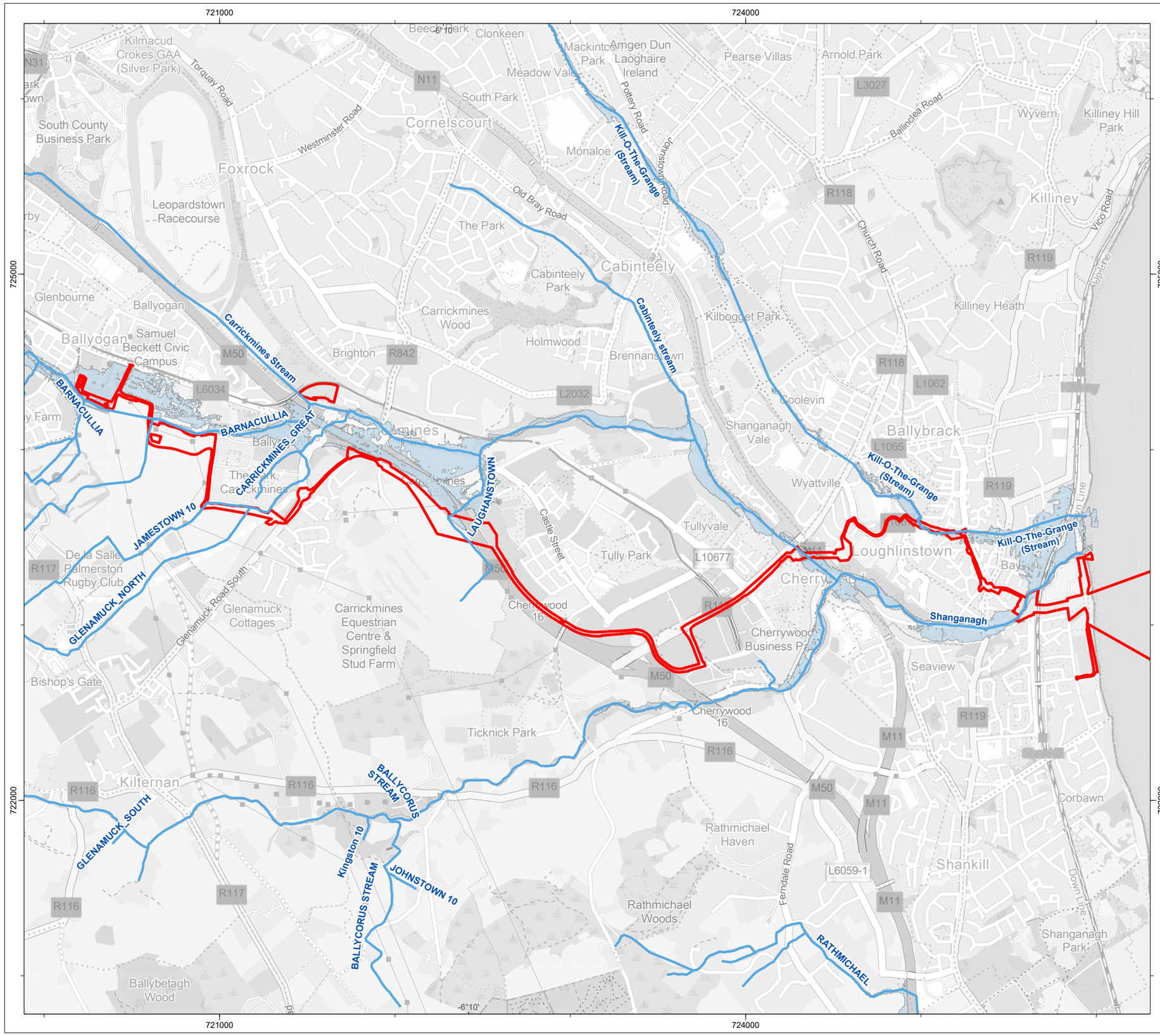
Flood Risk Assessment for the Dublin Array Onshore Electrical System

Dublin Array

Bray Offshore Wind Limited

SLR Project No.: 501.065303.00001

1 December 2024



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PROJECT TITLE

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Flood Risk Assessment: Proposed OES Fluvial Flooding

DRAWING NUMBER: **C1**

PAGE NUMBER: **1 of 1**

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0 0.1 0.2 0.3 0.4 Miles

GRID NORTH

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Dublin Array Generation for generations

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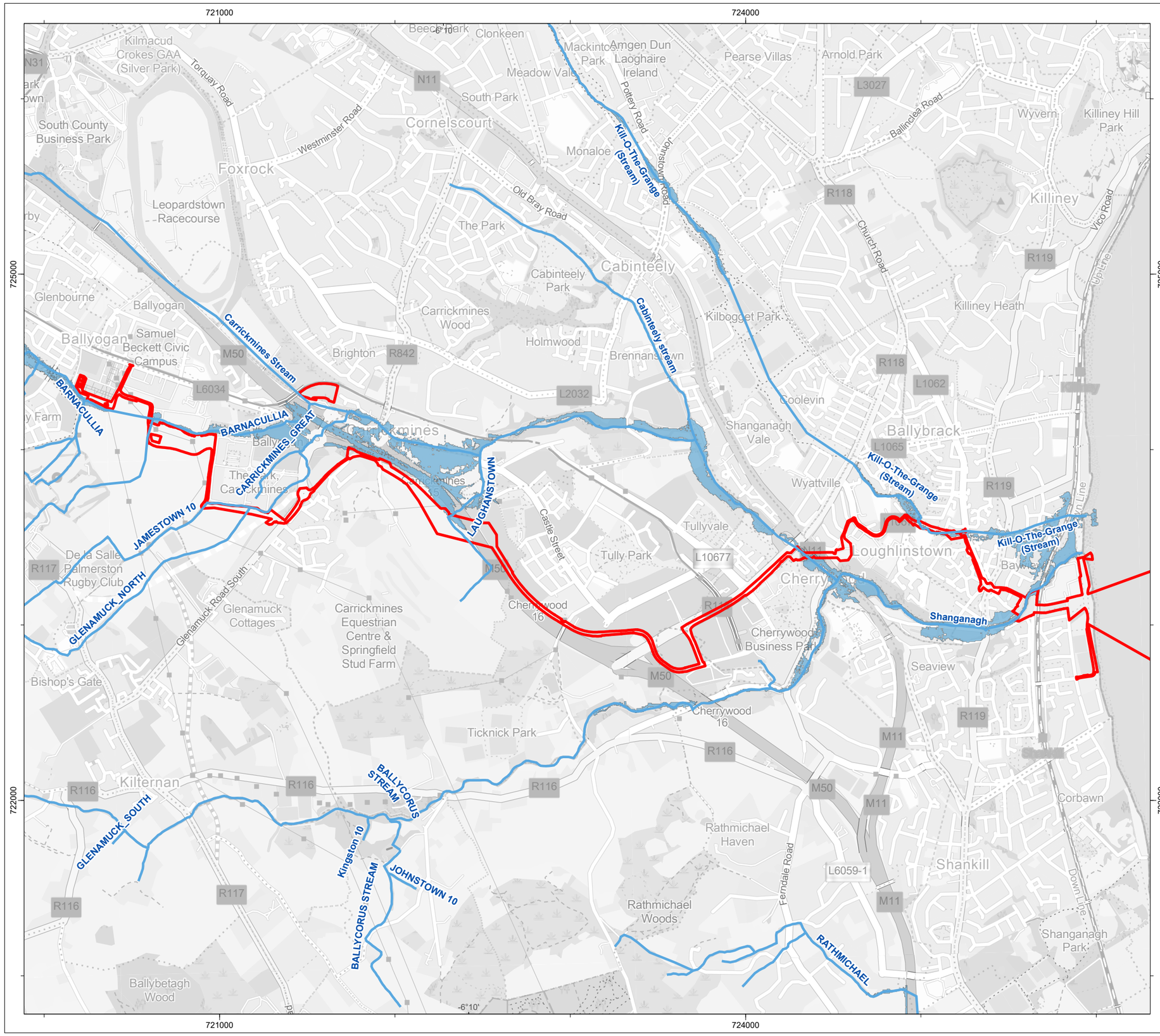

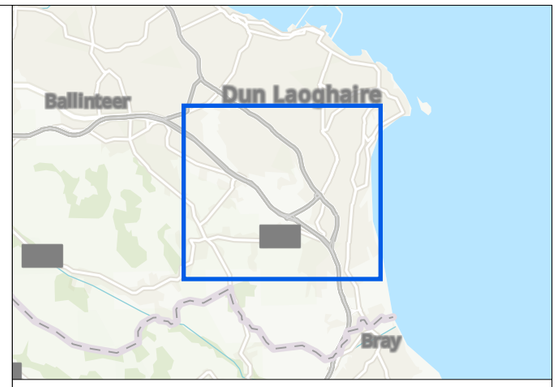

Application Site Boundary

Watercourse

Fluvial Flood Extents - Medium Probability

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MAP NOTES / DATA SOURCES:

PROJECT TITLE

Dublin Array

DRAWING TITLE

Flood Risk Assessment: Proposed OES Fluvial Flooding

DRAWING NUMBER: **C2**

PAGE NUMBER: **1 of 1**

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0 0.1 0.2 0.3 0.4 Miles

GRID NORTH

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PRJ IRENET95 Irish Transverse Mercator

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Dublin Array Generation for generations

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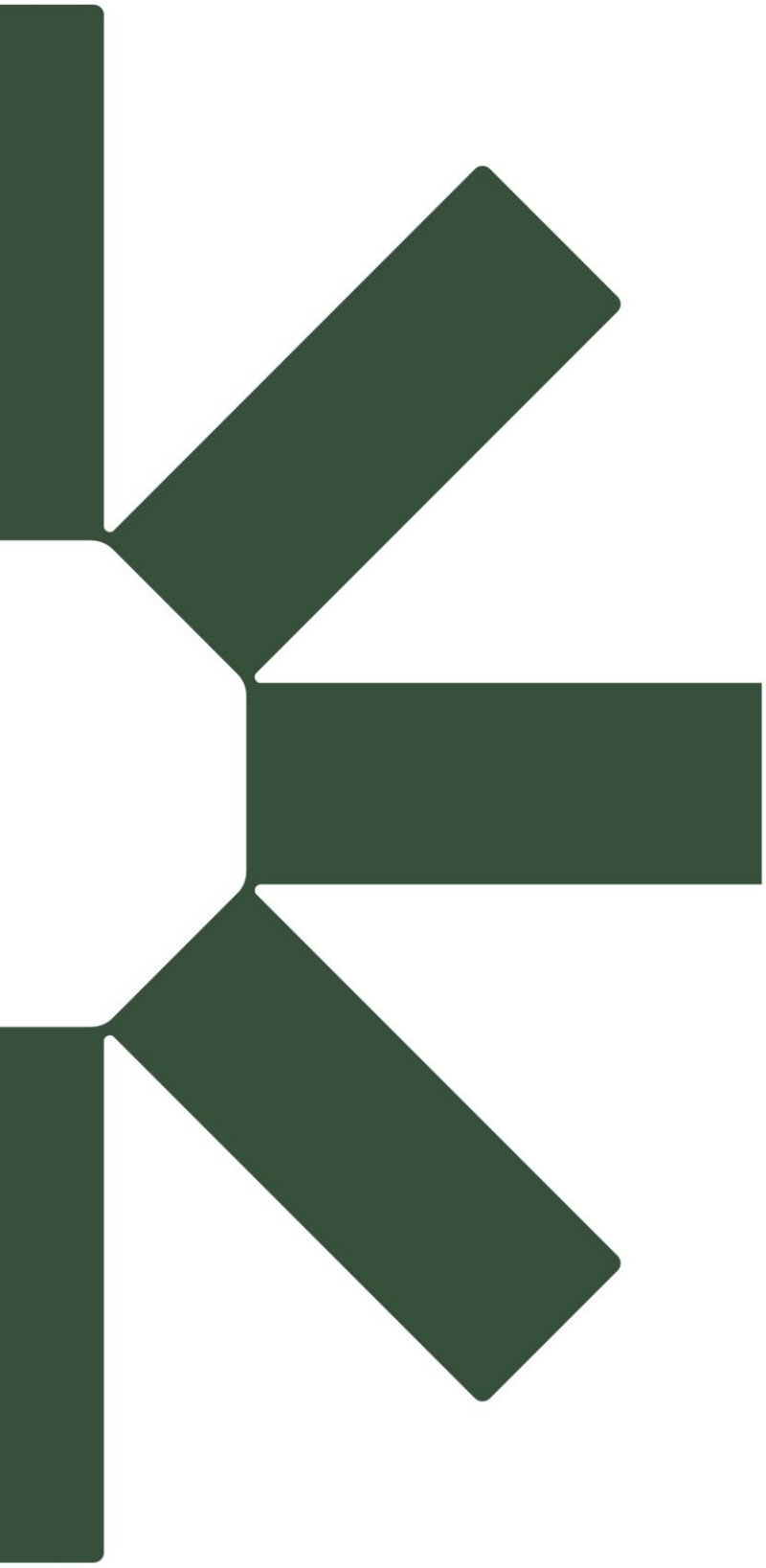

Making Sustainability Happen

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