codling wind park

Environmental Impact Assessment Report

Volume 4

Appendix 20.2 Site Specific Flood Risk Assessment


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Abbreviations

Abbreviation	Term in Full
ABP	An Bord Pleanála
CWPL	Codling Wind Park Limited ('the Applicant')
SSFRA	Site-Specific Flood Risk Assessment
SFRA	Strategic Flood Risk Assessment
FRA	Flood Risk Assessment
CWP	Codling Wind Park
OWF	Offshore Wind Farm
OTI	Onshore Transmission Infrastructure
ESB	Electricity Supply Board
HWM	High- Water Mark
TJB	Transition Joint Bay
HDD	Horizontal Directional Drilling
DPC	Dublin Port Company
PSFRM Guidelines	Planning System and Flood Risk Management Guidelines for Planning Authorities
MRFS	Mid-Range Future Scenario
HEFS	High- End Future Scenario
CDP	Dublin City Development Plan 2022-2028
OPW	The Office of Public Works
PFRA	Preliminary Flood Risk Assessment Study
DTM	Digital Terrain Model
CFRAM	Catchment Flood Risk Assessment and Management Study
ICPSS	Irish Coastal Protection Strategy Study
AEP	Annual Exceedance Probabilities
ICWWS	Irish Coastal Wave and Water Level Modelling Study
NCFHM	National Coastal Flood Hazard Mapping
UoM	Units of Management
HA	Hydrometric Area
GSI	Geological Survey Ireland

Definitions

Glossary	Meaning
the Applicant	The developer, Codling Wind Park Limited (CWPL).
Codling Wind Park (CWP) Project	The proposed development as a whole is referred to as the Codling Wind Park (CWP) Project, comprising of the offshore infrastructure, the onshore infrastructure and any associated temporary works.
Codling Wind Park Limited (CWPL)	A joint venture between Fred. Olsen Seawind (FOS) and Électricité de France (EDF) Renewables, established to develop the CWP Project.
combi-wall	A piling wall that is comprised of high modulus structural components interspaced by lighter sheet piles. The high modulus components - known as king piles - can be tubular, box, bearing or other types of fabricated piles.
Compound A	A temporary construction compound, support area and storage facility for the landfall works, and to support the installation of the onshore export cables. It will operate as a hub for the onshore construction works as well as acting as a staging post and secure storage for equipment and component deliveries.
Compound B	A temporary construction compound / laydown area for general cable route and onshore substation construction activities.
Compound C	A temporary construction compound for the onshore substation site. Contractor welfare facilities will be located in this compound as well as some material storage space.
Compound D	A temporary construction compound and laydown area to facilitate the construction of the bridge over the cooling water channel.
EirGrid	State-owned electric power transmission system operator in Ireland and nominated Offshore Transmission Asset Owner
ESB Networks (ESBN)	Owner of the electricity distribution system in the Republic of Ireland, responsible for carrying out maintenance, repairs and construction on the grid.
ESBN network cables *(previously the ESB grid connection)*	Three onshore export cable circuits connecting the onshore substation to the proposed ESBN Poolbeg substation, which will then transfer the electricity onwards to the national grid.
Environmental Impact Assessment (EIA)	A systematic means of assessing the likely significant effects of a proposed project, undertaken in accordance with the EIA Directive and the relevant Irish legislation.
Environmental Impact Assessment Report (EIAR)	The report prepared by the Applicant to describe the findings of the EIA for the CWP Project.
export cables	The cables, both onshore and offshore, that connect the offshore substations with the onshore substation.
high water mark (HWM)	The line of high water of ordinary or medium tides of the sea or tidal river or estuary.
horizontal directional drilling	HDD is a trenchless drilling method used to install cable ducts beneath

Glossary	Meaning
(HDD)	the ground through which onshore export cables from can be pulled. HDD enables the installation of cables beneath obstacles such as roads, waterways and existing utilities.
landfall	The point at which the offshore export cables are brought onshore and connected to the onshore export cables via the transition joint bays (TJB). For the CWP Project The landfall works include the installation of the offshore export cables within Dublin Bay out to approximately 4 km offshore, where water depths that are too shallow for conventional cable lay vessels to operate.
offshore export cables	The cables which transport electricity generated by the wind turbine generators (WTGs) from the offshore substation structures (OSSs) to the TJBs at the landfall.
onshore export cables	The cables which transport electricity generated by the WTGs from the TJBs at the landfall to the onshore substation.
onshore development area	The entire footprint of the OTI and associated temporary works that will form the onshore boundary for the planning application.
onshore transmission infrastructure (OTI)	The onshore transmission assets comprising the TJBs, onshore export cables and the onshore substation. The EIAR considers both permanent and temporary works associated with the OTI.
onshore substation	Site containing electrical equipment to enable connection to the national grid.
onshore substation site	The area within which permanent and temporary works will be undertaken to construction the onshore substation.
operations and maintenance (O&M) activities	Activities (e.g., monitoring, inspections, reactive repairs, planned maintenance) undertaken during the O&M phase of the CWP Project.
O&M phase	This is the period of time during which the CWP project will be operated and maintained.
parameters	Set of parameters by which the CWP Project is defined and which are used to form the basis of assessments.
planning application boundary	The area subject to the application for development consent, including all permanent and temporary works for the CWP Project.
Poolbeg 220kV substation	This is the ESBN substation that the ESBN network cables connect into, from the onshore substation. This substation will then transfer the electricity onwards to the national grid
subject site	this is the onshore development area, which forms the entire footprint of the OTI and associated temporary works that will form the onshore boundary for the planning application.
revetment	a facing of impact-resistant material applied to a bank or wall in order to absorb the energy of incoming water and protect it from erosion.
temporary cofferdam	a barrier to tidal inundation whilst the existing stone covered foreshore is temporarily removed to install the landfall cable ducts.
transition joint bay (TJB)	this is required as part of the oti and is located at the landfall. it is an

Glossary	Meaning
	underground bay housing a joint which connects the offshore and onshore export cables.
tunnel	the onshore export cables will be installed within a tunnel that extends from within compound a, near the landfall, to the onshore substation site.

APPENDIX 20.2 SITE SEPCIFIC FLOOD RISK ASSESSMENT

1 Introduction

1. Codling Wind Park Limited (hereafter 'the Applicant') is proposing to develop the Codling Wind Park (CWP) Project, a proposed offshore wind farm (OWF) which is located in the Irish Sea approximately 13–22 km off the east coast of Ireland, at County Wicklow.

2. TOBIN Consulting Engineering (TOBIN) were appointed by the Applicant to complete a Site Specific Flood Risk Assessment (SSFRA), which identifies and assesses flood risk for the onshore transmission infrastructure (OTI) of the CWP Project.

3. The OTI is situated on the Poolbeg Peninsula and includes the transition joint bays (TJBs), the onshore export cables, the onshore substation, and the Electricity Supply Board Networks (ESBN) network cables to connect the onshore substation to the Poolbeg 220kV substation. This SSFRA also describes the potential impacts of the works at the landfall (landward of the high water mark (HWM)), where the offshore export cables are brought onshore and connected to the onshore export cables at the transition joint bays (TJBs) (hereafter referred to as the 'OTI').

2 Onshore Transmission Infrastructure

4. The layout of the OTI is detailed in **Figure 1** and the onshore substation layout is in **Figure 2**.

2.1 Landfall

5. The landfall, on the southern edge of Poolbeg Peninsula, describes the point at which the offshore export cables are brought onshore and connected at three TJBs to the onshore export cables.

6. The landfall cable ducts will be installed by open cut trenching, which will require the excavation of a single swathe, with three cable trenches between the TJBs and the intertidal area. In summary, the open cut cable duct installation will require the following activities:

- Site clearance between the TJBs and the HWM;
- Construction of a temporary access ramp onto the intertidal area;
- Excavation of the rear berm;
- Excavation of the front berm and temporary diversion of the adjacent footpath;
- Construction of a temporary cofferdam;
- Removal of the existing coastal revetment;
- Installation of open cut cable duct between the repositioned footpath and the intertidal area;
- Backfill of trenches and reinstatement of the footpath to its original position;
- Reinstatement of the existing coastal revetment;
- Removal of the temporary cofferdam;
- Complete installation of onshore open cut cable duct to TJBs (within the front berm);
- Backfill of trenches and reinstatement of the front berm; and
- Landscaping of disturbed areas between HWM and TJBs.

7. Compound A will be located adjacent to the TJBs. This compound will be used as a support area and storage facility for the landfall works. It will also be used to support the installation of the onshore export cables, providing an area within which a smaller tunnel compound and a tunnel shaft will be located.

8. Compound B will be located, adjacent to the South Bank Road and will provide an additional temporary construction compound/laydown area for general cable route and onshore substation construction activities.

2.2 Onshore export cables

9. The onshore export cables will be routed north in an underground tunnel, approximately 0.7 km across the Poolbeg Peninsula, to the onshore substation site. Two tunnel drives are expected to be required to complete the works. The first tunnel drive will commence from a launch shaft at the onshore substation site for a distance of approximately 330 m to a reception shaft on Shellybanks Road. The second tunnel drive will commence from a launch shaft within the Compound A for a distance of approximately 410 m to the reception shaft on Shellybanks Road, equating to a total tunnel length of 740 m.

2.3 Onshore substation

10. The onshore substation is located on the south bank of the River Liffey, on the Poolbeg Peninsula. The site is currently unused land, reclaimed by Dublin Port Company (in the late 1990's/ early 2000's) and surrounded on three boundaries by water and then by a mixture of industrial uses. Immediately to the south the site is the Ringsend Waste Water Treatment Plant and Pigeon House Road, beyond which lies the Irishtown Nature Park and Dublin Bay. The onshore substation will be a gas insulated (GIS) switchgear design, where the HV equipment is designed to be insulated and cooled by pressurised gas. The substation will include:

- Perimeter structures including upgraded revetements and coastal retaining walls;
- Land reclamation for the ESB building;
- Raised site platform;
- One GIS building;
- One ESB GIS building;
- One ESB MV building;
- Three shunt reactors (incorporated within the GIS building);
- One statcom building;
- Three harmonic filters;
- Upgrades to the existing access road from Pigeon House Road to the site entrance;
- New bridge to provide vehicle access across the cooling water discharge channel;
- New internal access road layout within the site boundary and provision of temporary link access road;
- Car parking;
- Drainage infrastructure; and
- Security and lighting.

11. The boundary of the onshore substation site will require reinforcing so a future combi wall and revetment structure will be installed around the perimeter of the site. In the northeast corner, these perimeter works are required to facilitate a waterside turning circle for Dublin Port Company (DPC)[1].

[1] *The waterside turning circle is an objective of the DPC 3FM Project, which is the third and final Masterplan project for Dublin Port. It is required to provide a safe area for ships to swing around in, on either their entry to or departure from the Dublin Port. Policy SC7 of the Dublin City Development Plan 2022 to 2028 recognises the importance of Dublin Port and the need to facilitate port activities, having regard for the Dublin Port Masterplan 2040.*

12. To the southeast of the DPC waterside turning circle, the CWP Project proposes to reclaim approximately 1,800 m^2 of land to create additional space within the onshore substation site, for the ESB building.

13. Compound C will be located to the south east of the onshore substation, adjacent to the former Pigeon House Hotel. Contractor welfare facilities will be located in this compound as well as some material storage space.

14. Compound D will be located on the western side of the cooling water channel, next to where the new bridge is being installed. Contractor welfare facilities will be located in this compound as well as some material storage space, to facilitate the bridge installation.

2.4 ESBN network cables

15. Three 220kV HVAC onshore export cable circuits will connect from the onshore substation to the Poolbeg 220kV substation., which will then transfer the electricity onwards to the national grid. The onshore export cables from the onshore substation to the Poolbeg 220kV substation will be installed by a combination of open cut trench and HDD.

16. The open cut section will be installed from the onshore substation to Compound C. A temporary HDD compound will be located within Compound C and the HDD will be installed from here to a second temporary HDD compound, located within the Poolbeg 220kV substation site.

2.5 Operation and Maintenance Phase

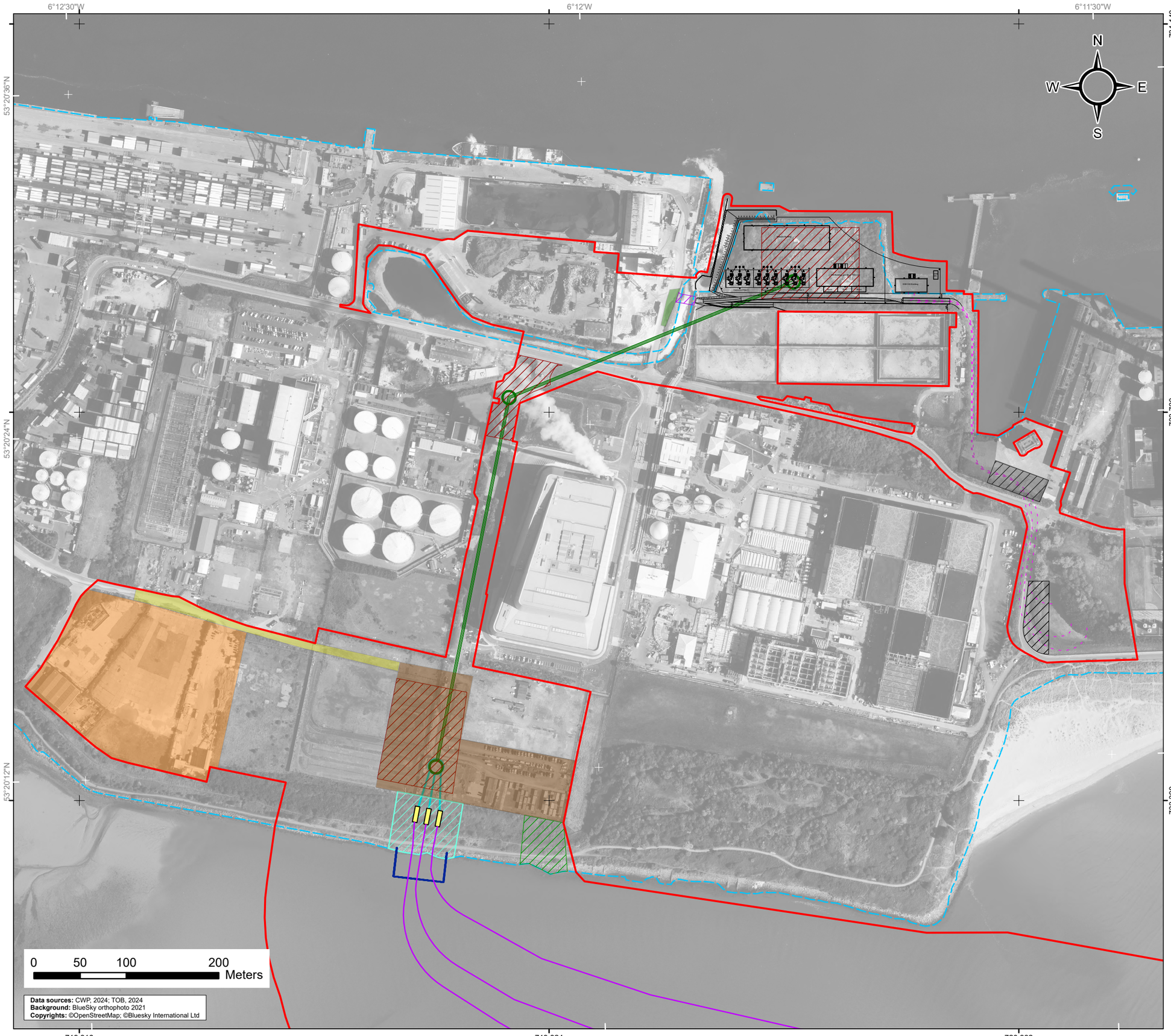
17. Once installed, there will be minimal above ground infrastructure associated with the TJBs, onshore export cables and ESBN networks cables, which are all located underground.

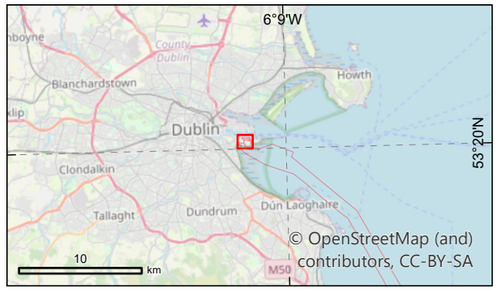
18. Once operational, the onshore substation electrical infrastructure will be monitored remotely and the site is therefore unmanned; however, access would be required periodically for routine maintenance activities, estimated at an average of one visit per week.

3 Purpose of the Report

19. The Dublin City Development Plan (CDP) 2022-2028 flood management policy requires that development proposals undertake an SSFRA. This report has been prepared to address this requirement.

20. The purpose of the SSFRA is to examine the risks from all sources of flooding to and potentially arising from development of the OTI, including an examination of the effectiveness and impacts of any control or mitigation measures, as per the Planning System and Flood Risk Management Guidelines for Planning Authorities (PSFRM Guidelines) (2009).





Legend

Project boundaries
- Planning application boundary

Intertidal temporary structures
- Temporary cofferdam

Offshore infrastructure (preferred locations and alignments)
- Offshore export cable (preferred alignments)

Onshore Infrastructure (Preferred locations and alignments)
- Onshore Substation Infrastructure
- Construction compound A
- Construction compound B
- Construction compound C
- Construction compound D
- Temporary access route for construction compound A and B
- Transition joint bay (TJB)
- Landfall works
- Temporary Access ramp on to the intertidal area
- Temporary tunnel shaft compound
- Temporary HDD compound (ESBN network cables)
- Onshore substation bridge access
- Onshore export cable
- Onshore export cable TJB connection
- ESBN network cables
- High water mark

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Project: Codling Wind Park

Contractor: **TOBIN**
Website: www.tobin.ie

Figure 1
Onshore development area: site layout plan including temporary works

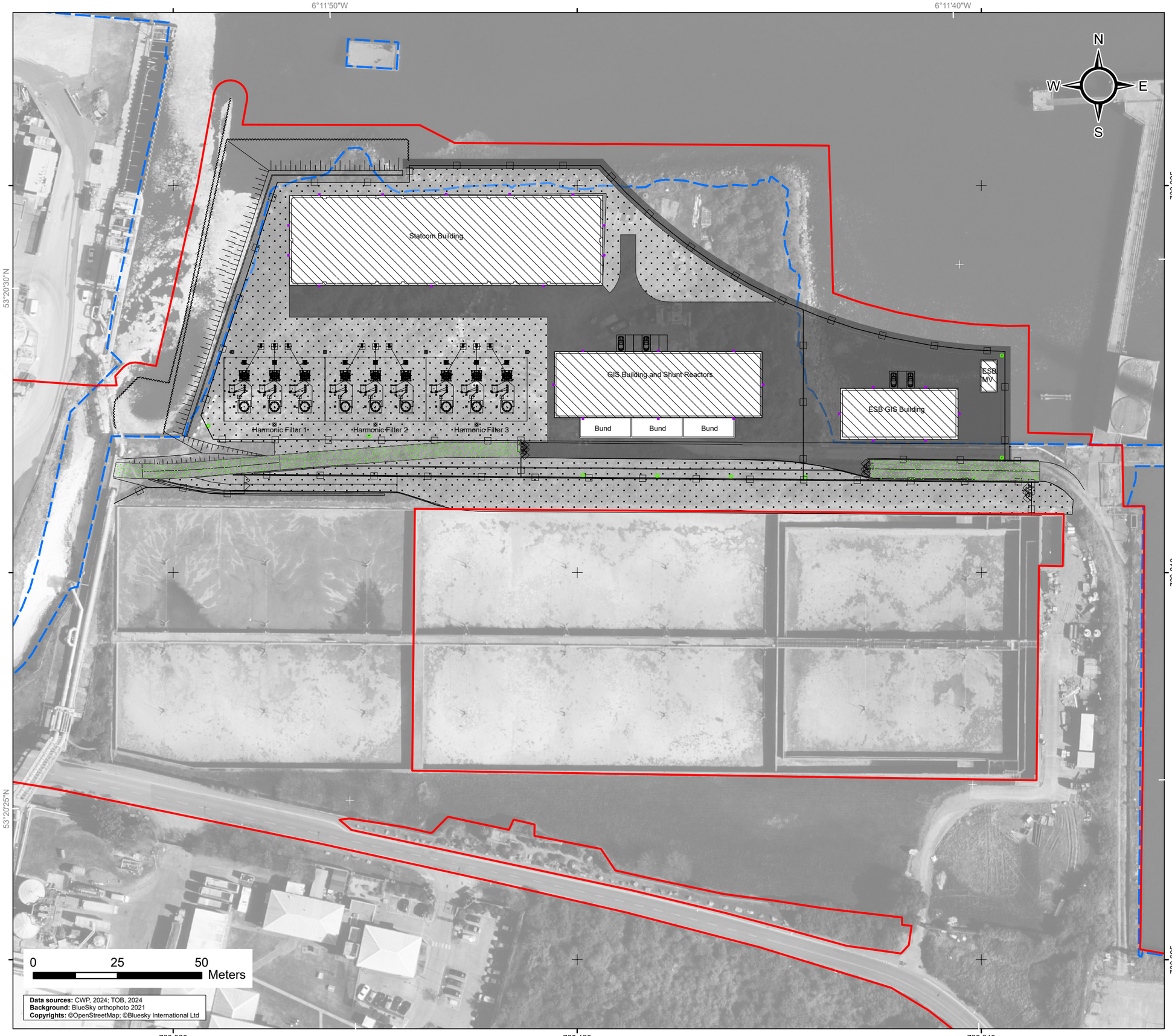
CWP doc. number: CWP-TOB-ENG-08-01-MAP-1796

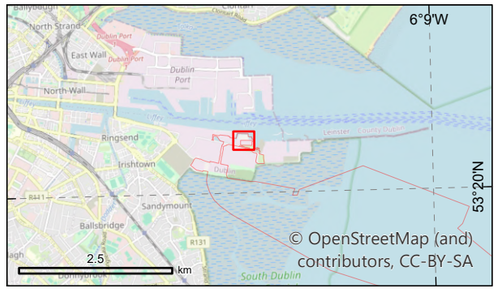
Internal descriptive code:
PB - PAB..OECs.3PB.Cs68..COFF..LF4.TWAsHWM..TJBs6..OnCs.
TJBs6.T.SHAFT..CHC.LF4.to.SS.PIT.1.SS.PP.LO.CH..SS.PP.BRIDGE..ENC..SH.ACC.TWA
..COMPs.CONSTRUCT.FOR.CONSENTS..COMPs.1..COMPs.ENC..RoW.COMPs.AB - HWM -
(ORT-BS-21..EIAR.Vol.04.Ch.20.Ap.02.FIG.01.01)

Size: A3
Scale: 1:4,000

CRS: EPSG 2157

Rev.	Updates	Date	By	Chk'd	App'd
00	Final for issue	2024/08/15	SP	DM/EA	ES





Legend

- Planning application boundary
- High water mark
- Onshore Substation Infrastructure
- Wall mounted lighting
- Lightning column
- Palisade fence
- Concrete
- Stone surface
- Proposed asphalt road

codling wind park

Project: Codling Wind Park

Contractor: TOBIN

Website: www.tobin.ie

Figure 2
Proposed onshore substation layout

CWP doc. number: CWP-TOB-ENG-08-01-MAP-1797

Internal descriptive code: PB.PP - PAB..SS.PP.LO.CIV - HWM - (ORT.BS.21..EIAR.Vol.04.Ch.20.Ap.02.FIG.01.02)

Size: A3

Scale: 1:1,100

CRS: EPSG 2157

Rev.	Updates	Date	By	Chk'd	App'd
00	Final for issue	2024/08/15	SP	DM/EA	ES

4 Structure of the Report

21. This report is structured as follows:

- Section 2 sets out the relevant flood risk management guidance documents and outlines the policy context relative to flood management for the OTI;
- Section 3 is the initial flood risk assessment, which identifies any existing flood risk relative to the OTI;
- Section 4 presents an hydraulics assessment of the OTI, specifically evaluating the potential impact associated with wave action at the onshore substation site;
- Section 5 presents the detailed flood risk assessment, consolidating the flood information from Section 2.0- Section 4.0 and provides an analysis of flood risk and proposed mitigation measures. This section focuses on an assessment of the OTI in accordance with the Justification Test, which is set out in the PSFRM Guidelines. The purpose of the Justification Test is to assess the suitability of the OTI location with respect to flood risk; and
- Section 6 presents the conclusions of the assessment.

5 Flood risk management guidance

22. This SSFRA was carried out in accordance with the following flood risk management guidance documents:

- Office of Public Works (OPW) and Department of the Environment, Heritage and Local Government (DoEHLG), PSFRM Guidelines (November 2009);
- Circular letter PL2/2014 Department of the Environment, Heritage and Local Government (DoEHLG) (August 2014);
- OPW, Flood Risk Management Climate Change Sectoral Adaptation Plan (September 2019);
- Poolbeg West Planning Scheme & Strategic Flood Risk Assessment (2019);
- DCC, Dublin City Development Plan 2022-2028 (November 2022).

5.1 The Planning System and Flood Risk Management Guidelines

23. The PSFRM Guidelines were published in 2009 by the OPW and DoEHLG. Their aim is to ensure that flood risk is considered in development proposals and the assessment of planning applications.

5.1.1 Flood Risk Assessment Classifications

24. A Strategic Flood Risk Assessment (SFRA) is an area-wide examination (up to county scale) of the risks of flooding to support spatial planning decisions such as the zoning of particular areas for development. It is an essential element in the adoption of the sequential approach to the consideration of flood risk in spatial planning. It does not provide suitably detailed site-specific information.

25. An SSFRA is still required to cover, in more detail, all sources of flood risk for individual developments. The level of detail required for an SSFRA depends on the scale and nature of the development and the risks involved. An SSFRA will look at the most recent flooding data available. For example, flood mitigation measures may have been implemented since the SFRA was carried out and are not included in the SFRA. These measures will be identified in the SSFRA and their benefit to the OTI will be assessed.

5.1.2 Flood Zones and Vulnerability Classes

26. The PSFRM Guidelines discuss flood risk in terms of Flood Zones A, B, and C, which correspond to areas of high, medium, or low probability of flooding, respectively. The extents of each flood zone are based on the Annual Exceedance Probability (AEP) of various flood events.

27. The PSFRM Guidelines also categorise different types of development into three vulnerability classes based on their sensitivity to flooding (highly vulnerable, less vulnerable and water compatible).

28. Critical infrastructure such as the onshore substation is considered "highly vulnerable". The TJBs, the onshore export cables and ESBN network cables will be located underground. These have been considered to be water compatible. Once operational, there will be no basement structures accessed by personnel and the underground infrastructure will not be vulnerable to coastal flooding.

29. **Table 1** shows a decision matrix that indicates which types of development are appropriate in each flood zone and when the Justification Test must be satisfied. The annual exceedance probabilities (AEP) used to define each Flood Zone are also provided.

Table 1 Decision Matrix for Determining the Appropriateness of a Development

Flood Zone (Probability)	Annual Exceedance Probability (AEP)	Development Appropriateness		
		Highly Vulnerable	Less Vulnerable	Water Compatible
A (High)	Fluvial & Pluvial Flooding: More frequent than 1% AEP Coastal Flooding: More frequent than 0.5% AEP	Justification Test	Justification Test	Appropriate
B (Medium)	Fluvial & Pluvial Flooding: 0.1% to 1% AEP Coastal Flooding: 0.1% to 0.5% AEP	Justification Test	Appropriate	Appropriate
C (Low)	Fluvial, Pluvial & Coastal Flooding: Less frequent than 0.1% AEP	Appropriate	Appropriate	Appropriate

30. **Planning Guidelines, Circular PL 2/2014** provides further advice and detail to Planning Authorities on older developed areas of towns and cities located in Flood Zone A and B, and also guidance on the development of Flood Zones.

31. Circular letter PL2/2014 from DECLG dated 13 August 2014 states that for existing developed areas at risk of flooding, and proposed regeneration areas, the Planning Authority or Development Plan must *"specify the nature and design of structural or non-structural flood risk management measures prior to future development in such areas to ensure that flood hazard and flood risk to the area and other locations is not increased, or if practicable, will be reduced."*

32. The circular also provided for the Insertion of new foot note 4 to Box 4.1, paragraph 2(v) – page 37 of the Guidelines:

33. *"(v) There are no suitable alternative lands for the particular use or development type, in areas at lower risk of flooding within or adjoining the core of the urban settlement*."

5.1.3 The Justification Test

34. Any proposed development being considered in an inappropriate Flood Zone (as determined by **Table 1** must satisfy the criteria of the Justification Test outlined in **Plate 1** (taken from the PSFRM Guidelines).

Box 5.1 Justification Test for development management (to be submitted by the applicant)

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 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 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.

Plate 1 Criteria of the Justification Test

5.2 The Flood Risk Management Climate Change Adaptation Plan

35. The Flood Risk Management Climate Change Sectoral Adaptation Plan was published in 2019 under the National Adaptation Framework and Climate Action Plan. This plan outlines the OPW's approach to climate change adaptation in terms of flood risk management.

36. This approach is based on a current understanding of the potential impacts of climate change on flooding and flood risk. Research has shown that climate change is likely to worsen flooding through more extreme rainfall patterns, more severe river flows, and rising mean sea levels.

37. To account for these changes, the Adaptation Plan presents two future flood risk scenarios to consider when assessing flood risk:

- Mid-Range Future Scenario (MRFS);
- High-End Future Scenario (HEFS).

38. **Table 2** Climate Change Adaptation Allowances for Future Flood Risk Scenarios indicates the allowances that should be added to estimates of extreme rainfall depths, peak flood flows, and mean sea levels for the future scenarios.

Table 2 Climate Change Adaptation Allowances for Future Flood Risk Scenarios

Parameter	Mid-Range Future Scenario (MRFS)	High-End Future Scenario (HEFS)
Extreme Rainfall Depths	+ 20%	+ 30%
Peak River Flood Flows	+ 20%	+ 30%
Mean Sea Level Rise	+ 0.5 m	+ 1 m

5.3 Dublin City Development Plan 2022-2028

39. Having regard to Criteria 1 of the Justification Test set out in **Plate 1**, it is a requirement of the PSFRM Guidelines to consider whether 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 Dublin City Development Plan 2022-2028 is the relevant *'operative development plan'* for the purpose of this assessment.

40. The DCC Dublin City Development Plan 2022-2028 (hereafter the 'CDP') was adopted at a Special Council meeting on the 2nd of November 2022. The plan came into effect on the 14th of December 2022. The current CDP provides a strategic framework for land use planning for 2022 to 2028.

41. Section 9.5.3 outlines the DCC approach to flooding, incorporating the PSFRM Guidelines.

5.3.1 Zoning

42. Under the CDP, Zoning Map F of Volume 3 identifies the onshore substation site is zoned Z7 'Employment Heavy'. Chapter 14 of the CDP defines Z7 as follows:

> *Land-Use Zoning Objective Z7: To provide for the protection and creation of industrial uses, and facilitate opportunities for employment creation including Port Related Activities.*

43. The CDP notes:

> *The majority of these lands are located in the Port area and at the Diageo/ Guinness complex (see Chapter 4: Shape and Structure of the City, Chapter 6: City Economy and Enterprise, Chapter 9: Sustainable Environmental Infrastructure and Flood Risk, and Chapter 15: Development Standards). The primary uses in these areas are those that can result in a standard of amenity that would not be acceptable in other areas. Such activities include industry (other than light industry), manufacturing, repairs, open storage, waste material treatment, utility operations, and transport operation services. These areas require a measure of protection from other non-compatible uses as this can result in conflict and limit the expansion or adaption of the primary use in the area. In particular, activities that fall within the scope of the SEVESO-III (COMAH) Regulations should only be permitted on lands zoned Z7 and the expansion of such facilities may be impacted by the requirement to protect surrounding land-uses. See Appendix 8 – COMAH (Seveso) Establishments, for further guidance.*

44. Map F of Volume 7 of the CDP, '*Strategic Flood Risk Assessment*', identifies the onshore substation site is included within Flood Zone A and B designations.

45. A small portion of the landfall area, along the HWM is also located in Flood Zone A. See **Table 3** for details of flood zone classification for the OTI.

Table 3 OTI location and associated flood zone classification

OTI	Vulnerability class	Flood Zone classification
Landfall: landfall cable ducts	water compatible	A at the HWM and C
Landfall: TJBs	water compatible	C
Landfall: Compounds A and B	less vulnerable	C
Onshore export cables	water compatible	C
Onshore substation	highly vulnerable	A and B
ESBN network cables	water compatible	A, B and C
Compounds C and D	less vulnerable	C

46. The landfall area is primarily located within Flood Zone C, and also falls within the bounds of the **Poolbeg Planning Scheme 2019**, whereby:

47. *Objective IU1: To require all proposed developments to carry out a site specific Flood Risk Assessment (SSFRA) that shall demonstrate compliance with:*

- *The Planning System and Flood Risk Management, Guidelines for Planning Authorities (Department of the Environment, Heritage and Local Government, November 2009, as may be revised/ updated);*
- *The prevailing Dublin City Development Plan;*
- *Recommendations contained within Section 4 of the Strategic Flood Risk Assessment for the Poolbeg West Planning Scheme.*

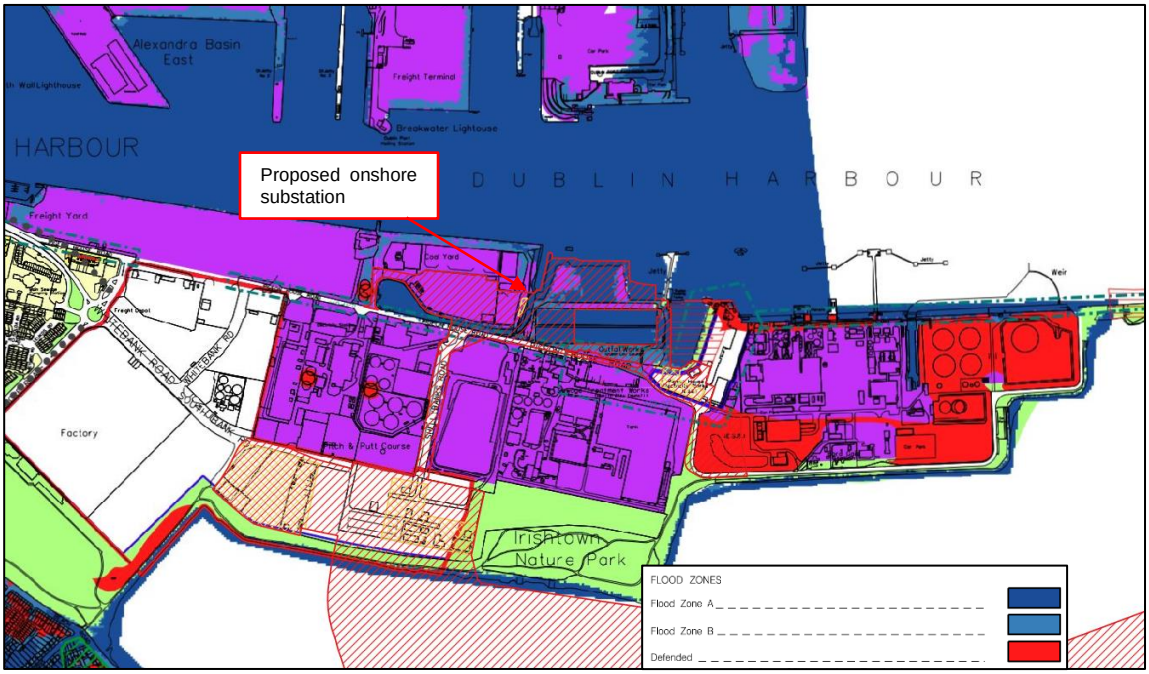


Plate 2 Extract from Map F of Volume 7 of the Dublin City Development Plan 2022-282

5.3.2 Dublin City Council Flood Management Policy

48. Chapter 9 (Section 9.5.3) of the CDP addresses 'Sustainable Environmental Infrastructure and Flood Risk'.

49. The CDP notes that the Strategic Flood Risk Assessment (SFRA) undertaken as part of the Plan *"has been prepared in accordance with the Planning System and Flood Risk Management Guidelines (2009) to provide a broad (wide area) assessment of all types of flood risk to inform strategic land-use planning decisions".*

50. The Development Plan sets out the following relevant objectives:

SI14 **Strategic Flood Risk Assessment**

"To implement and comply fully with the recommendations of the Strategic Flood Risk Assessment prepared as part of the Dublin City Development Plan 2022-2028, including all measures to mitigate identified climate change and flood risks, including those recommended under Part 3 (Specific Flood Risk Assessment) of the Justification Tests, and to have regard to the 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."

[2] https://www.dublincity.ie/sites/default/files/2023-01/MapsetF%20Flood.pdf

SI15 **Site-Specific Flood Risk Assessment**

"All development proposals shall carry out, to an appropriate level of detail, a Site-Specific Flood Risk Assessment (SSFRA) that shall demonstrate compliance with:

- *The Planning System and Flood Risk Management, Guidelines for Planning Authorities, Department of the Environment, Community and Local Government (2009), as revised by Circular PL 2/2014 and any future amendments, and the Strategic Flood Risk Assessment (SFRA) as prepared by this development plan.*
- *The application of the sequential approach, with avoidance of highly and less vulnerable development in areas at risk of flooding as a priority and/ or the provision of water compatible development only. Where the Justification Test for Plan Making and Development Management have been passed, the SSFRA will address all potential sources of flood risk and will consider residual risks including climate change and those associated with existing flood defences. The SSFRA will include site specific mitigation measures, flood-resilient design and construction, and any necessary management measures (the SFRA and Appendix B of the above-mentioned national guidelines refer). Attention shall be given in the site-specific flood risk assessment to building design and creating a successful interface with the public realm through good design that addresses flood concerns but also maintains appealing functional streetscapes. Allowances for climate change shall be included in the SSFRA.*
- *On lands where the Justification Test for Plan Making has been passed and where a small proportion of the land is at significant risk of flooding, the sequential approach to development will be applied, and development will be limited to Minor Development (Section 5.28 of the Planning System and Flood Risk Management Guidelines 2009) on the portion at significant risk of flooding. There will be a presumption against the granting of permission for highly or less vulnerable development which encroaches onto or results in the loss of the flood plain. Water compatible development only will be considered in such areas at risk of flooding which do not have existing development on them."*

SI16 **Site-Specific Flood Risk Assessment**

"Proposals which may be classed as 'minor development', for example small scale infill, extensions to houses and small-scale extensions to existing commercial and industrial enterprises in Flood Zone A or B, should be assessed in accordance with the Guidelines for Planning Authorities on the Planning System and Flood Risk Management and Technical Appendices (2009), as revised by Circular PL 2/2014 and any future amendments, with specific reference to Section 5.28 and in relation to the specific requirements of the Strategic Flood Risk Assessment. This will include an assessment of the impact of climate change and appropriate mitigation. The policy shall be not to increase the risk of flooding to the development or to third party lands, and to ensure risk to the development is managed."

SI19 **Provision and Upgrading of Flood Alleviation Assets**

"To facilitate the provision of new, or the upgrading of existing, flood alleviation assets where necessary and in particular, the implementation of proposed flood alleviation schemes, on the Santry, Camac, Dodder, Wad, Naniken, Mayne, Tolka and Poddle rivers as well as Clontarf Promenade, Sandymount/ Promenade (northwards towards Irishtown Nature Park subject to the outcome of a flood/ environmental study), Liffey estuary and any other significant flood risk areas being progressed through the planning process to completion during the lifetime of the 2022-2028 Dublin City Development Plan, with due

regard to the protection of natural heritage, built heritage and visual amenities, as well as potential climate change impacts."

5.3.3 Strategic Flood Risk Assessment (SFRA)

51. Appendix Volume 7 of the CDP includes the SFRA and provides the basis of zoning objectives and land use policy for the plan. It's stated purpose is *"to provide a broad assessment of flood risk to inform strategic land-use planning decisions, in accordance with The Planning System and Flood Risk Management Guidelines for Planning Authorities and Technical Appendices, 2009"*.

52. The SFRA of the CDP includes a review of the land-use zonings in relation to flood risk and also recommends flood risk management policies and objectives. The Planning Guidelines recommend a sequential approach to the management of flood risk where the preferred option is the avoidance of development in areas of flood risk; where this is not possible development type should be substituted to a less vulnerable or water compatible land-use. Land-use zoning in an area of flood risk has been subject to the Justification Test for Plan Making to demonstrate that development is necessary for strategic growth of the area and that flood risk can be mitigated and managed appropriately.

53. The land-use zoning allocations aim to avoid areas of high flood risk and where this is not achieved, but the proposed zoning has passed parts 1 and 2 of the Justification Test, recommendations have been made in part 3 of the Justification Test, relating to flood risk.

54. The SFRA cites the PSFRM Guidelines (November 2009) which defines three types or levels of Flood Zones: The subject site is partially located within Flood Zone A (see **Plate 2**).

"Zone A: High probability of flooding – *Where the estimated average probability of flooding from rivers and sea is highest (greater than 1% annually or more frequent than 1 in 100 years for river flooding or greater than 0.5% annually or more frequently than 1 in 200 years respectively for coastal flooding). Most forms of development are deemed to be inappropriate here unless the requirements of the Justification Test for Plan Making are met. Only water compatible development would normally be allowed."*

55. Under Table 1-2 of the SFRA 'Classification of Vulnerability of Different Types of Development', the land use, '*electricity generating power stations and sub-stations*' are included within the 'Highly vulnerable development (including essential infrastructure)'.

56. Table 1-3 of the SFRA 'Matrix of Vulnerability Versus Flood Zone to Illustrate Appropriate Development and that Required to Meet the Justification Test' clarifies that within Flood Zone A, a 'Justification Test' is required in respect of land use categories of 'Highly Vulnerable Development.'

57. It is important to highlight that the SFRA distinguishes between the levels of Strategic Flood Risk Assessment and Site-Specific FRA.

Strategic Flood Risk Assessment (SFRA): *The SFRA provides a broad basis (masterplan, area-wide or city/ countywide) assessment of all types of known flood risk to inform strategic land-use planning decisions. The SFRA allows the Planning Authority to undertake the sequential approach (described below) and identify how flood risk can be reduced as part of the Development Plan process. Where development is planned in flood risk areas, a detailed flood risk assessment may have to be carried out within the SFRA so that the potential for development of the lands and their flood risk and wider environmental impact can be assessed. The SFRA will provide more detailed information on the spatial distribution of flood risk to enable adoption of the sequential approach and to identify where it will be necessary to apply the Justification Test. The Flood Risk Assessment undertaken for the Dublin City Development Plan is at the Strategic Flood Risk Assessment scale.*

Site Specific Flood Risk Assessment (site FRA): *A site specific FRA is undertaken to assess all types of flood risk for a new development. This requires identification of the sources of flood risk, the effects of climate change on the flood risk, the impact of the proposed development, the effectiveness of flood mitigation and management measures and the residual risks that then remain.*

Table 4 Land-Use Zoning and Vulnerabilities

Zoning Objective Use	Vulnerability	Justification Test Required
Z7: To provide for the protection and creation of industrial uses and facilitate opportunities for employment creation including Port Related Activities	*Less with water compatible elements (High if a vulnerable use is proposed)*	*For highly vulnerable uses in Flood Zones A and B* *For less vulnerable development in Flood Zone A*

5.3.4 Area Assessment Index

58. The Appendix of the SFRA addresses flood risk issues and Justification Test (for the Development Plan zoning) in respect of specific areas of the city. **Table 5** below sets out the flood risk issues and justification test information outlined for the ***Dublin Port South of the Liffey from Tom Clarke Bridge*** (in which the subject site is located).

Table 5 DCC CDP SFRA Flood Risk Issues and Justification Test

Benefitting from Defences (flood relief scheme works):	*The portion of the sea wall along the western end of Pigeon House Road offers some protection to properties to the south of it. The rest of the area is largely undefended. Much of the residential development is also defended from tidal flooding from the River Dodder Estuary. Dublin Port Master Plan, 2040, incorporates new flood alleviation. Existing flood defences reduce flood risk significantly.*
Residual Risk:	*Any proposed developments in the protected areas on the west side of Pigeon House Road will require a detailed assessment of current defences and will have to consider the impact of a defence breach, particularly where it relates to high vulnerability industrial development.*
Commentary on Flood Risk:	*The flood extents indicate flow paths generally coming directly out of the tidal region. The flood maps are based on the OPW CFRAM Plan and checked against historic flooding in the area.*
Development Options:	*The Dublin Port Company published the Dublin Port Masterplan 2040 in 2012 and this was reviewed in 2018. This identifies the following future uses in this part of the port: container terminal and RO-RO freight terminal, bulk commodities, and a new deep water multi-purpose berth. Major infrastructure proposed in the wider area includes a proposed District Heating Scheme as part of the Covanta Dublin Waste to Energy facility, the extension of Luas to Poolbeg, Bus Connects routes and coastal cycle routes.*

Justification Test for Development Plans 2. The zoning or designation of the lands for the particular use or development type is required to achieve the proper planning and sustainable development of the urban settlement and, in particular: **(i) Is essential to facilitate regeneration and/or expansion of the centre of the urban settlement.**	*The development plan has identified the Poolbeg peninsula as a Strategic Sustainable Infrastructure Hub for the city with a strategic role in accommodating the city's critical hard infrastructure (see Policy SI52 of the Written Statement). This area is also essential for the future expansion and operation of Dublin Port and its related operations. The Port is the largest freight and passenger port in the country and it is a critical part of the national infrastructure in terms of trade and tourism and employment. Its strategic transport and function role is recognised in the NPF[3] and the RSES[4].*
(ii) Comprises significant previously developed and/or under-utilised lands. Answer: Yes:	*Most of the lands would comprise existing and former industrial/ Port/ infrastructural / residential and other mixed-service uses. The 34 ha landbank at Poolbeg West is a brownfield site.*
(iii) Is within or adjoining the core of an established or designated urban settlement. Answer: Yes:	*These lands are located in Dublin Docklands in Dublin City centre. Some of the area forms part of Strategic Development and Regeneration Area No. 6 Docklands. These are important brownfield sites with the potential to deliver a significant quantum of mixed uses. Point Village/Poolbeg is designated as a Key Urban Village in the development plan under the Core Strategy. This area is also essential for the future expansion and operation of Dublin Port and its related operations.*
(iv) Will be essential in achieving compact and sustainable urban growth. Answer: Yes:	*n/a*
3. Specific Flood Risk Assessment	*Some of the lands shown in the above flood cell are directly connected with Dublin Port and its related facilities. The lands are zoned Z7 in the Development Plan which is to provide for the protection and creation of industrial uses and facilitate opportunities for employment creation including Port Related Activities. The types of uses that generally go into this area would be heavy industrial port-related uses/ infrastructural uses. There are a number of existing COMAH (SEVESO) establishments located in the Port area, and fuel storage depots etc.* *Part of the lands above are included in the Docklands Strategic Development and Regeneration Area (SDRA 6) which will provide a significant amount of mixed uses.* ***Use Classes considered as 'Vulnerable Development' shall not be permitted in Flood Zone A or B (this includes essential***

[3] National Planning Framework (NPF)
[4] Regional Spatial and Economic Strategy (RSES)

	infrastructure such as primary transport and utilities distribution including electricity generating power stations and sub stations, water and sewage treatment, and potential significant sources of pollution (SEVESO sites, IPPC sites etc.). ***As the flood risks are tidal, mitigation through land raising (or bunding for smaller developments) will have no impact on neighbouring development, so compensatory storage will not be required. The focus of the FRA will be to ensure the safety and long-term operability of the development and safety of operatives.*** ***Where development will be in the defended area, consideration should be given to the likelihood of the defences failing (either through overtopping or breach) and how the operation will ensure it can retain functionality/ recover following an extreme flood event. Buildings should be of flood resilient construction.***
Conclusion:	***The subject area passes the Justification Test for Development Plans.***

59. **Planning Guidelines, Circular PL 2/2014** provides further advice and detail to Planning Authorities on older developed areas of towns and cities located in Flood Zone A and B, and also guidance on the development of Flood Zones.

60. Circular letter PL2/2014 from DECLG dated 13 August 2014 states that for existing developed areas at risk of flooding, and proposed regeneration areas, the Planning Authority or Development Plan must *"specify the nature and design of structural or non-structural flood risk management measures prior to future development in such areas to ensure that flood hazard and flood risk to the area and other locations is not increased, or if practicable, will be reduced."*

61. The circular also provided for the Insertion of new foot note 4 to Box 4.1, paragraph 2(v) – page 37 of the Guidelines:

"(v) There are no suitable alternative lands for the particular use or development type, in areas at lower risk of flooding within or adjoining the core of the urban settlement."

62. The Executive Summary of the DCC CDP Strategic Flood Risk Assessment, states ' *The Flood Zones are based on an undefended scenario and do not take into account the presence of flood protection structures such as flood walls or embankment'*.

Brownfield lands

63. It is useful to note that the SFRA distinguishes between development on Greenfield lands and Brownfield sites. At section 4.5.2.1 it is noted as 'not appropriate' for new, highly vulnerable development to be located on greenfield land in Flood Zone A or B, whether it is highly or less vulnerable. In the main, such areas are parks and public open space within the wider built environment which provide flood storage and reduce risks to existing development.

64. Regeneration of areas within Flood Zones A and B has, in the main, been justified with the approach for managing risks. i.e., building on brownfield sites does not reduce absorption.

5.3.5 Compliance with Dublin City Development Plan[5]

65. The SFRA of the CDP supports the Z7 designation zoning of the onshore substation site with the qualification that Use Classes considered as 'Vulnerable Development' (sub stations are specifically referred to) shall not be permitted in Flood Zone A or B.

66. The SFRA excludes Vulnerable Uses from Flood Zone A sites (within zoning objective Z7) in order to satisfy and comply with the Justification Test for Development Plans and maintain the Z7 zoning objective (i.e. Strategic level compliance).

67. However, as presented in the CDP the development cannot satisfy Criteria 1 of the Justification Test, as the Development Plan states that vulnerable uses are not permitted in Flood Zone A and Flood Zone B.

68. Table 1.3 of the SFRA 'Matrix of Vulnerability Versus Flood Zone to Illustrate Appropriate Development and that Required to Meet the Justification Test' states that *"within Flood Zone A, a 'Justification Test' is required in respect of land use categories of 'Highly Vulnerable Development"*. Table 3.1 of the SFRA further clarifies that the Justification Test is required for highly vulnerable uses in Flood Zones A and B.

69. The SFRA is also clear that within Flood Zone A, a 'Justification Test' is required in respect of land use categories of 'Highly Vulnerable' Development.

70. Policy Objective SI 15 of Chapter 9 of the CDP SSFRA requires "All development proposals shall carry out, to an appropriate level of detail, a Site-Specific Flood Risk Assessment (SSFRA)".

71. The Governmental Guidelines state that "*Where development is planned in flood risk areas, a detailed flood risk assessment may have to be carried out within the SFRA so that the potential for development of the lands and their flood risk and wider environmental impact can be assessed*".

72. Overall, it is noted that the Dublin City Development Plan 2022-28 includes conflicts and inconsistencies between land use categorisation under the SFRA and procedural planning policy for the assessment of development in Flood Risk Zones. In light of this inconsistency, the Planning Report accompanying this application for permission sets out the basis whereby An Bord Pleanála may grant permission for the proposed Project, based upon its power *inter alia* to *'have regard to' 'the development plan of any coastal planning authority within whose functional area it is proposed to carry out development to which the application relates'*[6].

73. This SSFRA comprehensively addresses Criteria 2 of the Justification Test for the onshore substation site and provides a detailed assessment of design of structural or non-structural flood risk management measures prior to future development in such areas to ensure that flood hazard and flood risk to the area will be reduced (as required by Circular PL2/2014).

5.4 Electricity and Gas Networks, Climate Change Adaptation Plan

74. This Plan is prepared under the National Adaptation Framework and details the approach to adaptation planning for the energy networks (electricity and gas) sector.

75. The approach to adaptation planning followed the six step approach as outlined in the Sectoral Planning Guidelines for Climate Change Adaptation, which was published in May 2018.

[5] This sub-section has been prepared in association with MacCabe Durney Barnes, Planning Consultants
[6] Section 293(3) of the Planning and Development Act, 2000 as amended

76. The Plan notes flooding (change in precipitation / extreme events) as one of the key climate impacts for the energy sector.

77. Section 6, details the Adaptation Implementation Plan (AIP) for the overall sector, with Objective 7 of the Plan detailing the following:

- *'Energy network companies to continue to ensure climate change is taken into account in planning and design standards and engineering management practices'*

78. This SSFRA outlines how flood risk and climate change allowances have been incorporated into the design of the OTI, to ensure that the Project has been designed to minimize flood risk and on this basis is considered to comply with Objective 7 of the AIP.

6 Initial Flood Risk Assessment

6.1 Past Flood Events

79. The OPW's National Flood Information Portal[7] provides past flood event mapping with records of flooding reports, meeting minutes, photos, and/or hydrometric data. Based on the flood map shown in **Plate 3**, there are no recorded incidents of flooding on the Poolbeg Peninsula, however several past flood events have been recorded in the areas of Sandymount, Irishtown, Ringsend and Clontarf.

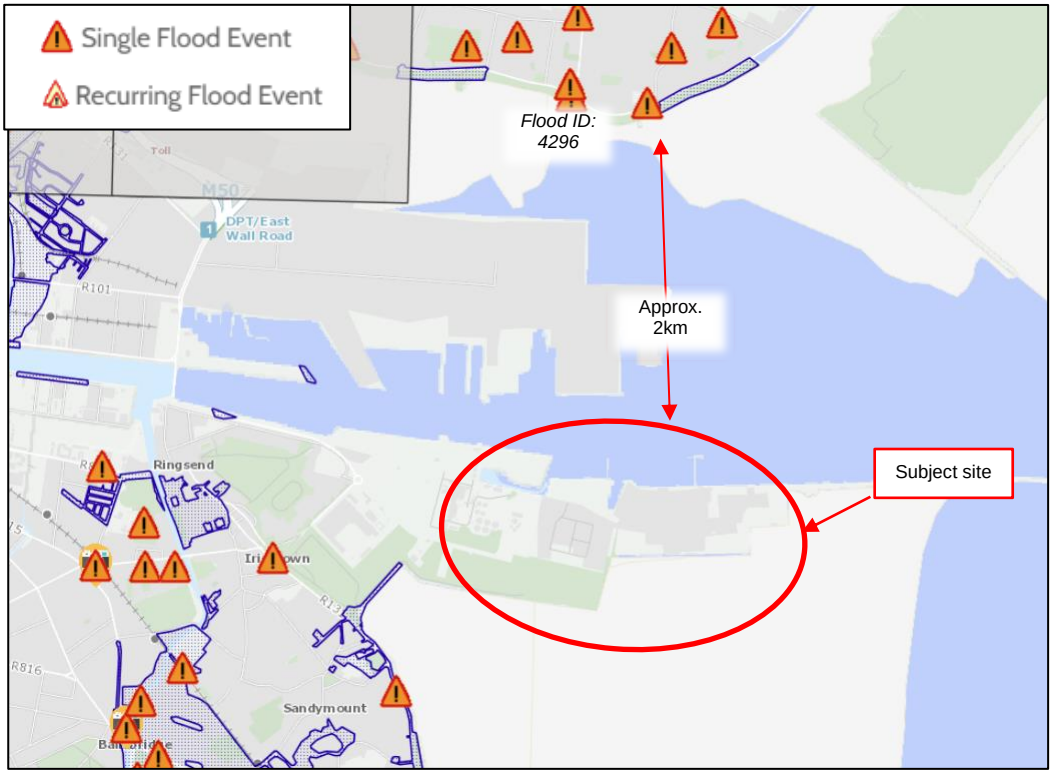


Plate 3 OPW Flood Map of Past Flood Events (Excerpt from Floodinfo.ie 2024)

[7] floodinfo.ie

80. A letter[8] from the Docklands Engineer to ESBI noted tidal flooding on the 27th-28th October 2004 (ID: 4296) caused by the third highest recorded tide since records began at the Dublin Port Station. A tide level of 2.62mOD combined with wave action due to a strong easterly wind. Waves between 1.5-1.8m in amplitude hit the sea wall, at an angle from Bull Island Road to Clontarf Baths. This generated sideways waves along the sea wall flooding the linear park, 1km of the Clontarf Road and several house gardens and garages.

6.2 OPW Preliminary Flood Risk Assessment (PFRA) Study

81. In 2009, the OPW produced a series of maps to assist in the development of a broad-scale FRA throughout Ireland. These maps were produced from several sources.

82. The OPW's National Preliminary Flood Risk Assessment (PFRA) Overview Report from March 2012 noted that "the flood extents shown on these maps are based on broad-scale simple analysis and may not be accurate for a specific location" [9].

83. Limitations on potential sources of error associated with the PFRA maps include:

- Assumed channel capacity (due to absence of channel survey information);
- Absence of flood defences and other drainage improvements and channel structures (bridges, weirs, culverts);
- Local errors in the national Digital Terrain Model (DTM).

84. **Plate 4** provides an overview of the fluvial, coastal, pluvial, and groundwater indicative flood extents in the vicinity of the subject site. Small portions of the onshore substation site and along the southern boundary of the landfall are indicated as liable to coastal flooding in the 1-in-200-year event.

[8] https://s3-eu-west-1.amazonaws.com/floodmaps.floodinfo.ie/Reports/F310%20Data%20Collection/012%20Dublin%20City%20Council/005%20Communication%20from%20Public/dcc_lt_jf_0000002048.pdf
[9] The National Preliminary Flood Risk Assessment (PFRA) Overview Report, OPW (March 2012)

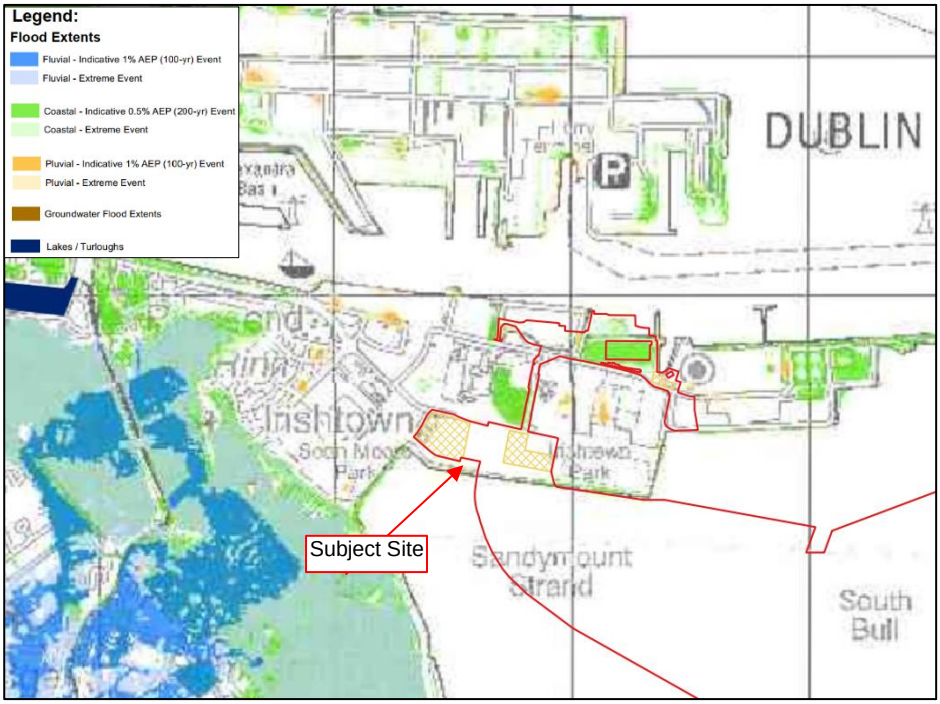


Plate 4 Indicative Flood Mapping [extract from PFRA Map 238]

85. Improved hydraulic modelling was carried out through the Catchment Flood Risk Assessment and Management Study (CFRAM) in 2015 (discussed in Section 6.5) and is considered more accurate than the PFRA study.

6.3 Irish Coastal Protection Strategy Study (ICPSS)

86. As part of the Irish Coastal Protection Strategy Study (ICPSS), RPS performed detailed hydraulic modelling of tidal flooding along the Irish Coast. The study produced 'predictive' flood maps which provide predicted coastal flood extents for a future scenario 'design' flood event.

87. ICPSS flood extent mapping (**Plate 5**) indicates that the subject site is located within the predicted areas of coastal flooding. The ICPSS predicts a coastal flood level of 3.28m OD in the vicinity of the onshore substation site (Point 22, Figure No. NE / RA / EXT / 18) during a 0.1% (1000-yr) coastal flood event. This corresponds to an 0.1% AEP HEFS coastal flood level of 4.28mOD. The HEFS modelled flood event adds 1.0m to the existing sea level.

88. As per the ICPSS:

"The maps have been produced at a strategic level to provide an overview of coastal flood hazard and risk in Ireland, and minor or local features may not have been included in their preparation. A DTM is used to generate the maps, which is a 'bare earth' model of the ground surface with the digital removal of man-made and natural landscape features such as vegetation, buildings, bridges and embankments. The mapping process can show some of these man-made features, such as bridges and embankments, as flooded on the flood maps, when in reality they do not flood".

89. Due to these limitations, the National CFRAM Programme is considered more accurate than the ICPSS study (see Section 6.5).

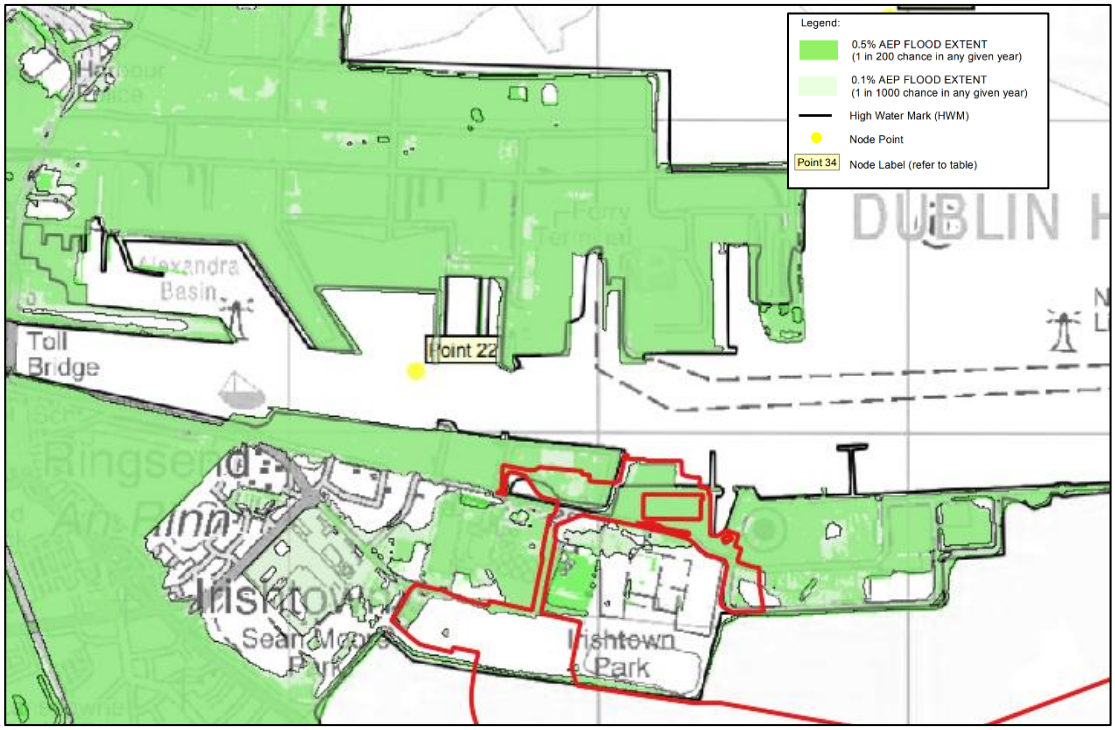


Plate 5 ICPSS HEFS Flood Mapping at Poolbeg

6.4 National Coastal Flood Hazard Mapping (NCFHM)

90. The National Coastal Flood Hazard Mapping (NCFHM) was prepared in 2021. The aim of the project was to produce updated national scale coastal flood extent and depth maps for the 50%, 20%, 10%, 5%, 2%, 1%, 0.5% and 0.1% Annual Exceedance Probabilities (AEPs) for the present day scenario and for the Mid-Range Future Scenario (MRFS), High End Future Scenario (HEFS), High+ End Future Scenario (H+EFS), and High++ End Future Scenario (H++EFS) which represent a 0.5m, 1.0m, 1.5m and 2.0m increase in sea level respectively. The mapping is based on the extreme levels calculated in the Irish Coastal Wave and Water Level Modelling Study (ICWWS).

91. The Irish Coastal Wave and Water Level Modelling Study (ICWWS) was undertaken in 2018. The study provides an update to the water levels presented in the ICPSS undertaken between 2004 and 2013.

92. NCFHM flood extent mapping (**Plate 6**) indicates that the subject site is located within the predicted areas of coastal flooding. The ICWWS (and associated NCFHM) predicts a coastal flood level of 3.30m OD in the vicinity of the onshore substation site (Point NE22) during a 0.1% (1000-yr) coastal flood event. This corresponds to an 0.1% AEP HEFS coastal flood level of 4.30mOD. The HEFS modelled flood event adds 1.0m to the predicted sea level under existing climate conditions.

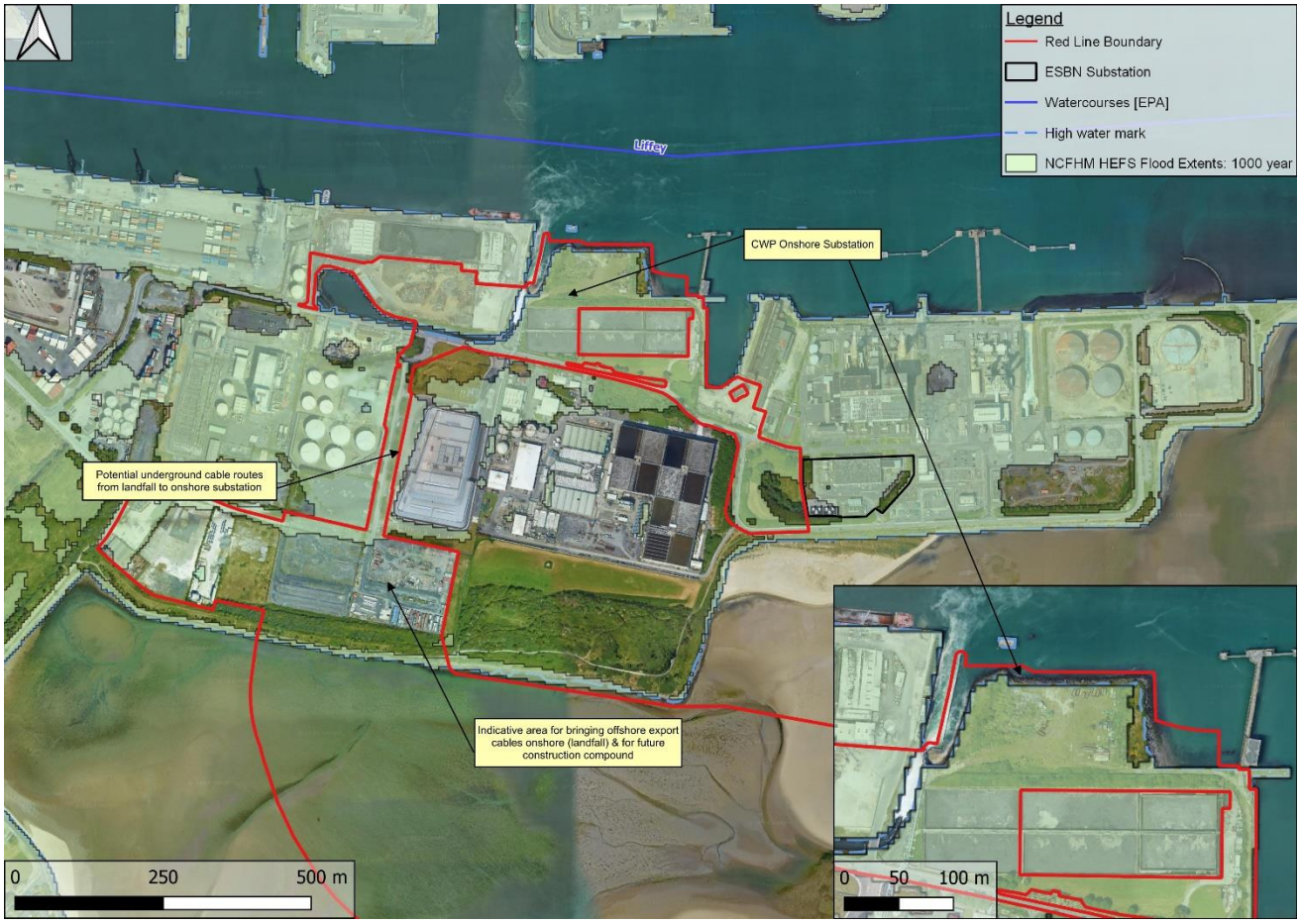


Plate 6 NCFHM HEFS Flood Mapping at Poolbeg

6.5 Catchment Flood Risk Assessment and Management Study (CFRAM)

93. In 2015, the OPW produced flood maps[1] as part of the CFRAM Study. The flood extents in these maps are based on detailed modelling of Areas for Further Assessment identified by the National PFRA.

94. The Eastern CFRAM Study Area covers approximately 6,250 km² and includes four Units of Management (UoM); Hydrometric Area (HA) 07 (Boyne), HA08 (Nanny – Delvin), UoM09 (Liffey-Dublin Bay) and HA10 (Avoca-Vartry). There is historical evidence of a high level of flood risk within certain areas of the Eastern CFRAM Study area, with significant coastal and fluvial flooding events having occurred in the past. The River Liffey, from Blessington to Dublin Bay, has been represented across seven models. The Lower Liffey and Dublin Bay areas were modelled using Infoworks ICM.

6.5.1 Fluvial Flood Risk (CFRAM)

95. The onshore substation is located along the south bank of the River Liffey Estuary. CFRAM mapping of the HEFS 1000-year fluvial flood extents are presented in **Plate 7** below. The OTI are not at risk of fluvial flooding in the 1000-year HEFS event. The nearest CFRAM node (09LIFF00007) to the onshore substation site estimates a 1000-year flood level of 2.44mOD. Flooding at this section of the River

Liffey is primarily tidal and therefore does not indicate fluvial flooding to the OTI, notably with fluvial flooding not extending to the landfall area and onshore export cable route.

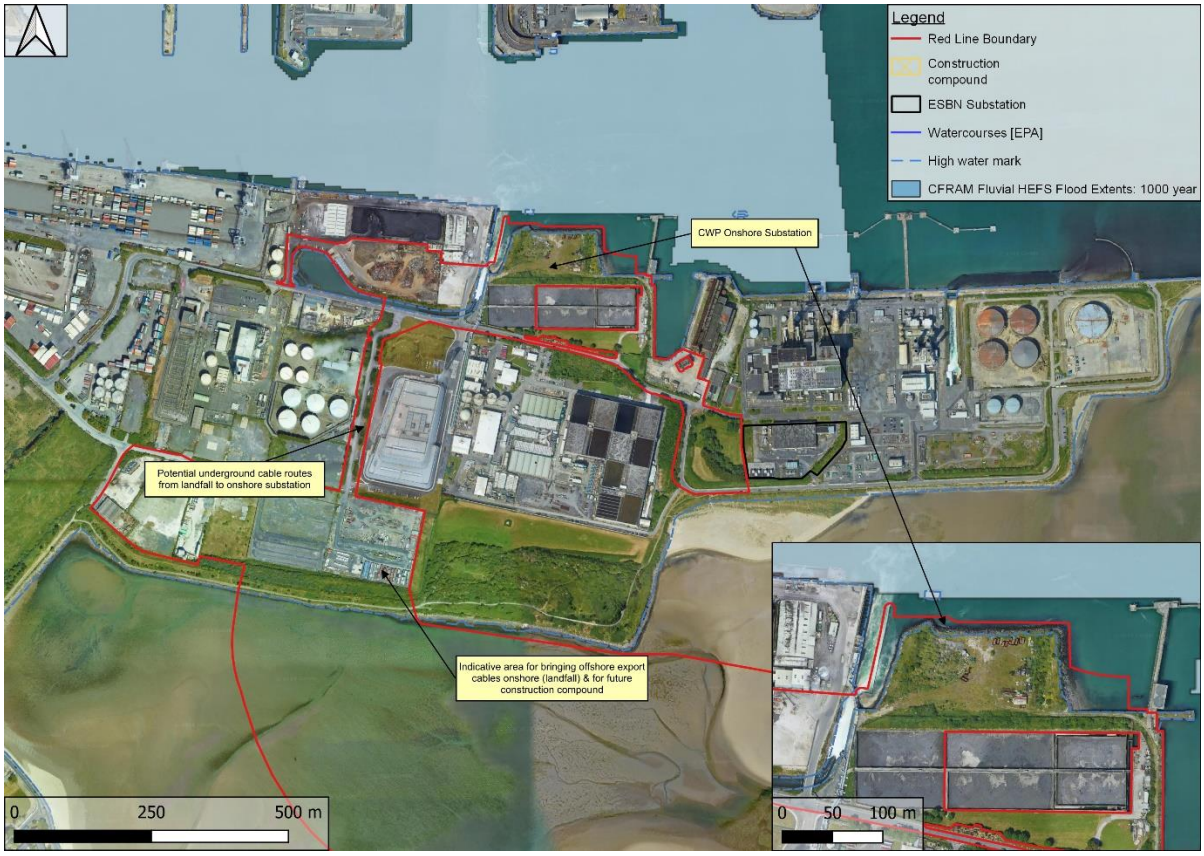


Plate 7 OPW CFRAM Study Fluvial HEFS Flood Extents

6.5.2 Tidal Flood Risk (CFRAM)

96. With reference to the hydraulic modelling and subsequent flood extent mapping developed as part of the Eastern CFRAM study in the vicinity of the onshore substation site at Poolbeg, the predicted coastal flood level during a 0.1% (1000-yr) coastal flood event is 3.34m OD. (Node Label E0924C0012[10]). The Eastern CFRAM also included an assessment of the likely impact of climate change on flood risk in the area. The flood extents for a HEFS are shown in **Plate 8**, including a predicted 1.0m rise in sea levels.

97. The predicted coastal flood level for the 0.1% HEFS event at the onshore substation is 4.34mOD. The coastal flood level at the landfall area (adjacent to the South Dublin Bay SAC) is also 3.34mOD for the current 0.1% AEP event, and **4.34mOD for the HEFS 0.1% AEP event**. Inundation is only predicted along the immediate shoreline of the landfall area and is not predicted to inundate Compound A or Compound B.

98. The land proposed for Compound A is currently protected by a berm, with a minimum crest of 7.50mOD. The landfall cable ducts will be installed via an open cut trench through the existing berm

[10]Eastern CFRAM Study - Liffey Tidal Flood Extents: CFRAM Drawing No. E09LIF_EXCCD_F1_06

and coastal revetment. The elevations behind the berm are currently >4.48mOD, therefore in the event of a breach through the cut berm, coastal flood waters are unlikely to propagate onshore.

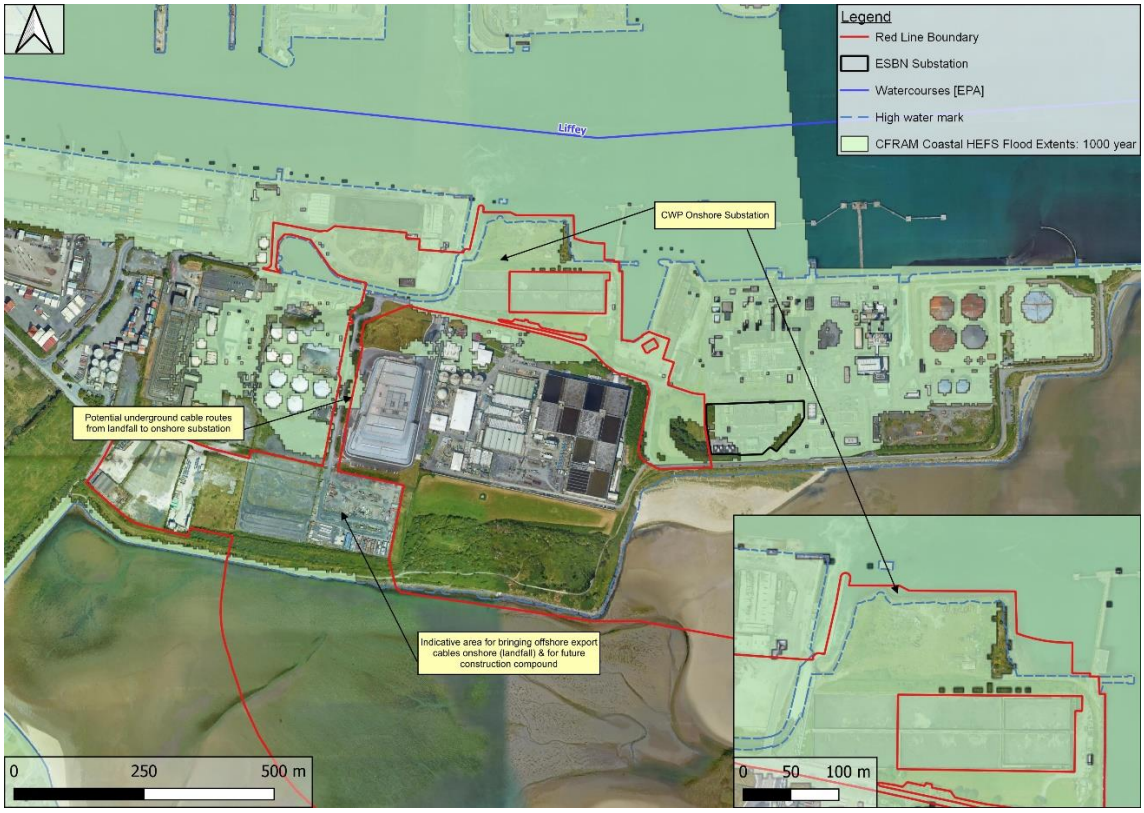


Plate 8 OPW CFRAM Study Tidal HEFS Flood Extents

6.6 Geological Survey Ireland Mapping

99. The Geological Survey Ireland (GSI) provides mapping[11] with data related to Ireland's subsurface. Based on the map shown in **Plate 9**, the nearest karst feature is located at Saint Doolaghs approximately 8.1km north of the subject site.

100. There are no lands identified by GSI near the subject site which may be liable to groundwater flooding.[12]

101. Hydraulic modelling completed by HR Wallingford as part of the PFRA project (see **Plate 4**) did not indicate any areas of predicted groundwater flooding in the vicinity of the subject site.

[11] https://www.gsi.ie/en-ie/data-and-maps/Pages/default.aspx
[12] https://dcenr.maps.arcgis.com/apps/webappviewer/index.html?id=848f83c85799436b808652f9c735b1cc

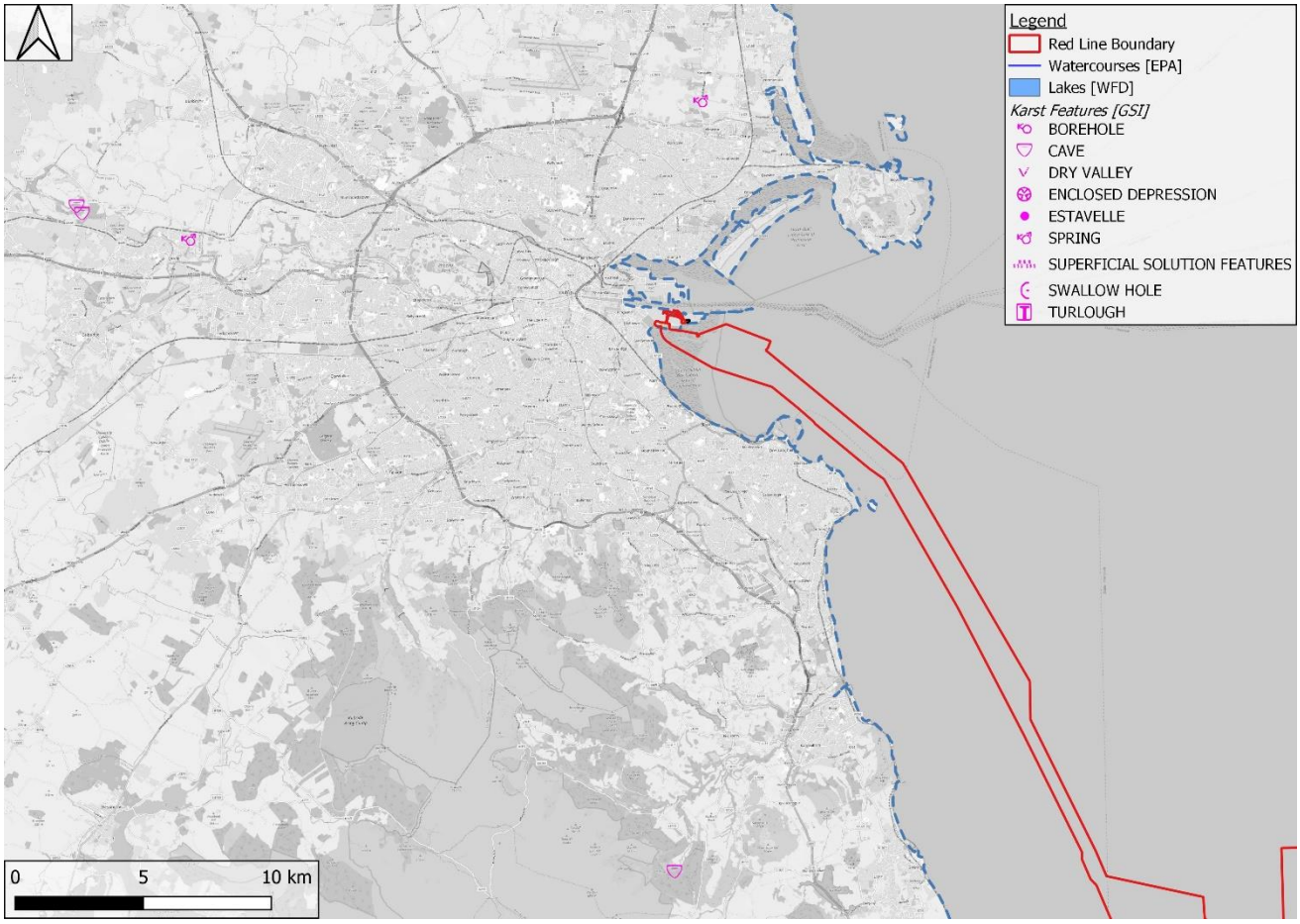


Plate 9 GSI Mapping of Karst Features

7 Hydraulic assessment

7.1 Onshore substation

7.1.1 Wave action

102. During initial consultation with DCC, the Applicant presented a proposed future flood level (design level) for the onshore substation site. Following this consultation, it was concluded that further consideration of wave action at the onshore substation site was required.

103. This section presents the outcome of the final wave action assessment for the onshore substation, with recommendations relevant to the proposed design levels and this site-specific flood risk assessment.

Future Flood (Design Levels)

104. Dublin Port is bounded by the North and South Bull walls which provide "*a significant coastal defence which breaks up waves (from Dublin Bay)"*[13]. The waves in the Dublin Port Area are therefore, primarily fetch- and depth-limited waves.

105. Using the flood mapping from the Eastern CFRAM[14], the future flood level for the onshore substation site is estimated at 4.34mOD[15]. This level represents the HEFS during a 0.1% (1000 year) coastal flood event (using CFRAM Node: E0924C0012).

106. Section 4.10.2 (Ground Levels, Floor Levels and Building Use) of the CDP SFRA sets out recommended minimum finished floor levels for different scenarios (Table 4-2 of the CDP SFRA). In each scenario, 300mm freeboard is recommended.

107. Based on this initial assessment, a finished floor for the onshore substation site was identified at **4.64m OD** (0.1% AEP HEFS + 300mm freeboard). This future flood level complies with the requirements of the CDP SFRA and also the EirGrid Substation Civil and Building Works Specification[16].

108. The Eastern CFRAM tidal data is derived from the earlier ICPSS. The Eastern CFRAM Hydraulics Report stated that: "*The ICPSS water levels are total water levels, comprising tidal and surge components which together yield a joint probability event of a particular AEP*", suggesting that wave action and overtopping was not included in the final water level results.

109. The Eastern CFRAM further mentions that: "Wave overtopping risk was assessed and not found to have significant influence and therefore was not included in this model (for the Dublin Port area)".

Coastal Processes Risk Assessment (RPS)

110. A 2019 report from RPS assessed the potential impact of the 2021-2022 maintenance dredging campaign on the coastal processes within the Dublin Port and Dublin Bay areas. The report included information on the tidal regime and the inshore wave climate to assess the potential impacts of dredging within Dublin Bay.

111. An extensive programme of numerical modelling was used by RPS to aid in their assessment. RPS used the MIKE 21 Spectral Wave module to transform the offshore wave conditions for the north easterly, easterly, and south easterly storm events into the nearshore. This spectral wave module describes the propagation, growth, and decay of waves in near-shore areas and takes account of the effects of refraction, shoaling, local wind generation and energy dissipation due to bottom friction and wave breaking. This is a particularly important factor for areas such as the onshore substation where the wave climate is dominated by wind waves generated over short fetches.

112. Based on the simulations from the report, the largest waves that propagate into Dublin Port occur during easterly storm events at spring high water, see **Plate 10**. The model estimates a significant wave height of <0.4m in the vicinity of both the onshore substation site and proposed landfall compound.

[13] Dublin City Development Plan 2022-2028 Volume 7 SFRA (Appendix A-7), JBA Consulting (2021)
[14] Eastern CFRAM Study HA09 Hydraulics Report. RPS (2017)
[15] Eastern CFRAM E09LIF_EXCCD_F1_06, Node: E0924C0012. RPS (2017)
[16] EirGrid Substation Civil and Building Works Specification (Document Reference: XDS-GFS-13-001-R2)

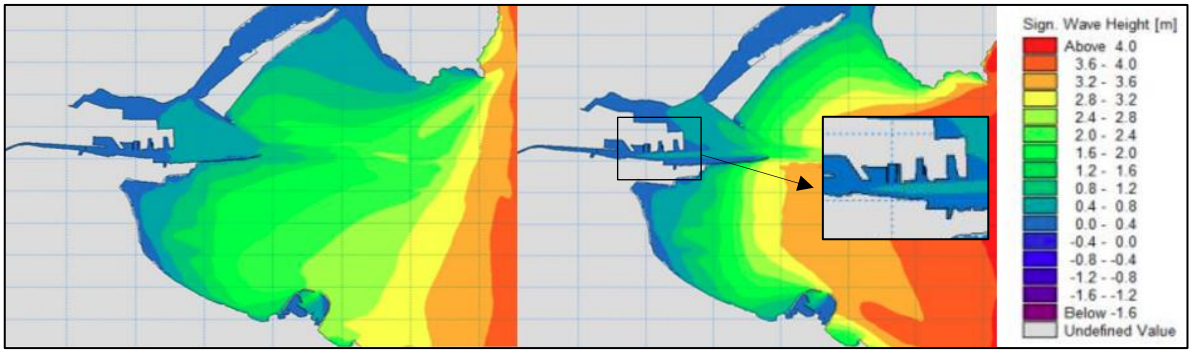


Plate 10 Significant wave height for north-easterly (left) easterly (right) in Dublin Port

Wind Fetch & Wave Generation

113. The CDP SFRA mentions that the North and South Bull Walls protect Dublin Port against the larger waves that are generated within Dublin Bay and the Irish Sea. This suggests that waves in the Dublin Port Area are therefore, primarily fetch- and depth-limited waves.

114. Wind fetch is defined as the unobstructed distance that wind can travel over water in a constant direction. Fetch is an important characteristic of open water because longer fetch can result in larger wind-generated waves. The largest fetch length for the onshore substation site is from a north easterly direction, see **Plate 11**.

115. Wind data from a reliable source is required to predict extreme wind and wave conditions. A wind speed of 35.12 knots was used to calculate the height of the wind-fetch waves as it reflects the upper limit of north easterly hourly wind speeds at Dublin Airport[17]. The MET Éireann windrose for Dublin Airport[18] correspondingly suggests an extremely low probability of occurrence (<<5%) (**Plate 12**).

Plate 11 Fetch lengths from the onshore substation site

[17] Met Éireann Historical Data. Available at: https://www.met.ie/climate/available-data/historical-data
[18] Wind, Met Éireann. Available at: https://www.met.ie/climate/what-we-measure/wind

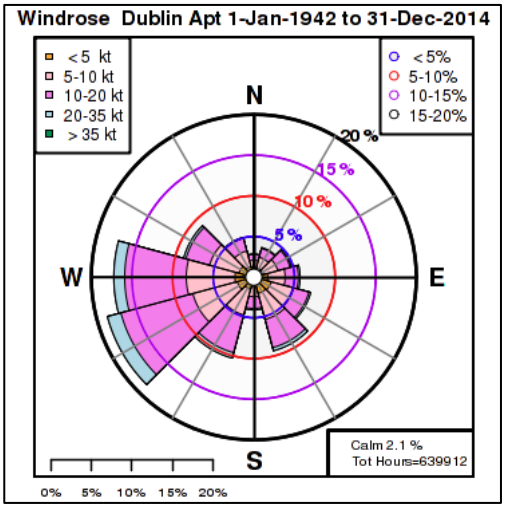


Plate 12 Windrose for Dublin Airport

116. The calculated wind speed also considers the orographic effects between the airport and the subject site, where the elevation of the weather station at Dublin Airport is approximately 71 mOD (design wind speed is calculated at an elevation of 10 mOD) while also considering the surface friction of water in Dublin Harbour (U_{Water} = 1.2 x U_{Land}). The speed was also time corrected to reflect the fetch length and time interval of the recorded data using Figure II-2-1 and Figure II-2-3 from the Coastal Engineering Manual II-2[19].

117. The USGS' *Fetch and Depth Limited Wave Calculator*[20] was used to estimate significant wave height generated by a north easterly wind. The online tool implements Eqns. 3-39 and 3-40 from the *Shore Protection Manual*[21] (**Plate** 13).

$$\frac{gH}{U_A^2} = 0.283 \tanh\left[0.530\left(\frac{gd}{U_A^2}\right)^{3/4}\right] \tanh\left\{\frac{0.00565\left(\frac{gF}{U_A^2}\right)^{1/2}}{\tanh\left[0.530\left(\frac{gd}{U_A^2}\right)^{3/4}\right]}\right\} \qquad (3\text{-}39)$$

$$\frac{gT}{U_A} = 7.54 \tanh\left[0.833\left(\frac{gd}{U_A^2}\right)^{3/8}\right] \tanh\left\{\frac{0.0379\left(\frac{gF}{U_A^2}\right)^{1/3}}{\tanh\left[0.833\left(\frac{gd}{U_A^2}\right)^{3/8}\right]}\right\} \qquad (3\text{-}40)$$

Plate 13 Equations 3-39 and 3-40 from the Shore Protection Manual

[19] Coastal Engineering Manual II-2. U.S. Army Corps of Engineers (2002)
[20] Fetch and Depth Limited Waves, USGS. Available at: csherwood-usgs.github.io
[21] Shore Protection Manual. U.S. Army Corps of Engineers, Waterways Experiment Station, Vicksburg Mississippi. Coastal Engineering Research Center (1984).

118. Using a fetch length of 2,340m, a wind speed of 35.12 knots, resulted in a significant wave height of 0.60m with a wave period of 2.334 seconds.

119. The calculated significant wave height of 0.6m compares well with the simplified wind wave chart in **Plate 14**. However, the significant wave height is slightly higher than the <0.4m height calculated by RPS and is considered conservative[22] (**Plate 10**).

120. These results agree with the findings of the Eastern CFRAM Study where: "*Wave overtopping risk was assessed and not found to have significant influence and therefore was not included in this model (for the Dublin Port area*)".

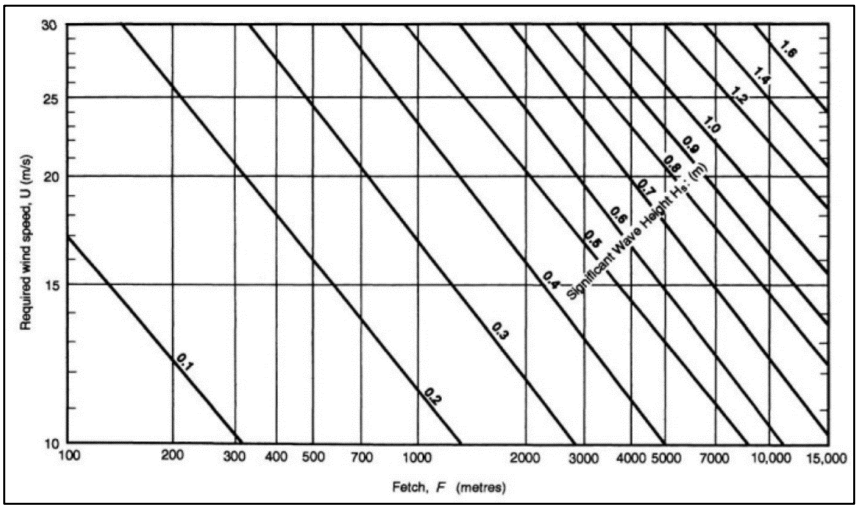


Plate 14 Simplified relationship between fetch length, wind speed and significant wave height[23]

Shipwash

121. Other sources of wave generation including ship wash waves were also considered. The speed limit of 9 knots in Dublin Port[24] may provide low wake wave.

122. A preliminary value of 0.11m was obtained using methodology from World Association for Waterborne Transport Infrastructure (PIANC) and Moffatt and Nichol25.

123. This value of 0.11m is significantly below the calculated wave height and is considered captured within the overall design allowance for wave height (0.6m) at the onshore substation site.

[23] Wave and overtopping predictions on reservoirs and inland waterways, Proc. 3rd Int. Conf. on Protection against Overtopping Pullen T, Allsop W, Silva S, Goff C & Williamson T. (2018)
[24] https://www.dublinport.ie/wp-content/uploads/2022/12/04-2023-Speed-Limits.pdf
[25] VESSEL WAKE STUDY - KM LNG Operating General Partnership. Moffatt and Nichol available at: https://docs2.cer-rec.gc.ca/ll-eng/llisapi.dll/fetch/2000/90466/94153/552726/657379/657474/670503/686250/B11-7-_2011.05.05.RPT.Vessel.Wake.Study_-_A1Z0S9_.pdf?nodeid=686399&vernum=-2

7.1.2 Outcome and Conclusion

124. To address wave action, the construction of the onshore substation is to be provided with a combi-wall capping beam and revetment at the perimeter of the onshore substation site, both at a level of +5.24mOD (**Plate 15** and **Plate 16**).

125. With a level of +5.24mOD, the overall total freeboard to the capping beam above the 0.1% AEP HEFS flood level is 0.9m (4.34mOD + 0.9m= 5.24mOD).

126. The overall total freeboard of 0.9m will incorporate both the wave action allowance (0.6m) and the 300mm (0.3m) freeboard recommended in the Dublin Strategic FRA, in addition to the 1.0m allowance for climate change (HEFS); however, the CDP SFRA defines freeboard as the following:

> *"Freeboard" tends to compensate for the many unknown factors that could contribute to flood heights greater than the height calculated for a selected size flood, such as wave action, bridge openings, and hydrological uncertainty."*

127. It should be noted that the wave action allowance of 0.6m is considered conservative and robust, with wind fetch estimations applying extreme wind speeds with worst case scenario flood depths. The probability of large easterly and north-easterly wind waves are also extremely low. The calculated wave height is also higher than the modelled wave heights of <0.4m found in the RPS model for Dublin Port.

128. The PSFRM guidelines state that "*Freeboard should account for uncertainty in hydrological predictions, **wave action**, modelling accuracy, topographical accuracy and the quality of digital elevation models*", therefore the 0.3 m freeboard between the capping beam / revetment (5.24 mOD) and peak wave level (<4.94 mOD) is adequate.

129. The wave action allowance is circa 0.3m above the finished floor levels, however the capping beam and revetment will mitigate this risk by providing additional freeboard at the perimeter of the site.

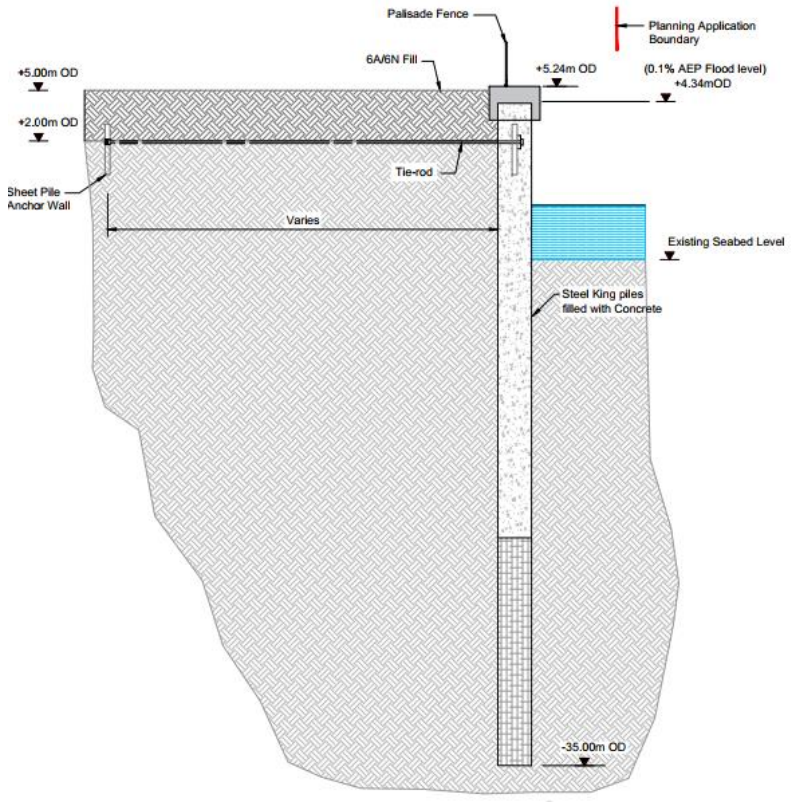


Plate 15 Proposed combi wall detail at the onshore substation site *(ref: planning drawing 0051 Onshore Substation – Site Sections- Sheet 1 of 2)*

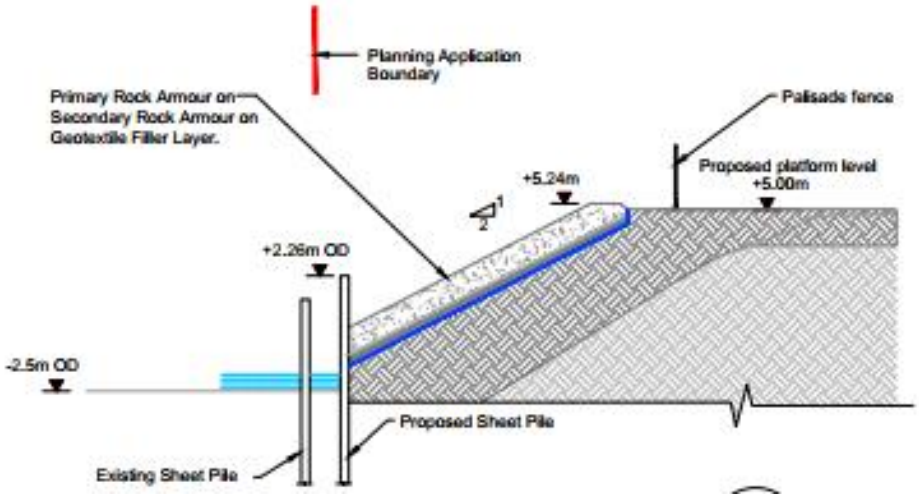


Plate 16 Revetment detail at the onshore substation site (*ref: planning drawing 0051 Onshore Substation – Site Sections- Sheet 1 of 2)*

7.2 Landfall

130. The landfall cable ducts will be installed by open cut trenching, which will require the excavation of a single swathe (40 m in length and 70 m wide) and installing three cable trenches between the TJBs and the intertidal area (See **Section 1.1** and **Plate 17**). This will require the excavation of the existing berm (front and rear berms) and the coastal revetment and a temporary diversion of the footpath.

131. These open cut works are partially located within a Flood zone A at the HWM. Compounds A and B are located in Flood Zone C (behind the berm), where there is a low probability of flooding from tidal sources.

132. Prior to the commencement of open cut cable duct installation, a temporary cofferdam will be installed in the intertidal area, to act as a barrier against tidal inundation while the coastal revetment is temporarily removed and the ducts installed, up to the diverted footpath. It is expected that the total duration for the temporary cofferdam will be 6 weeks, which includes for its installation.

133. The front berm at the landfall, the coastal revetment and the footpath will be reinstated once construction works to install the landfall cable ducts from the intertidal area to the TJB's are complete.

134. For the construction phase of the landfall works, no wave action allowance has been considered in the assessment. The waters at the landfall location are relatively shallow and the wave climate is likely to reduce as it propagates towards the coastline. This is due mainly to wave refraction as the wave fronts interact with the seabed, wave breaking over the Kish and Burford banks, and shoaling as waves traverse the nearshore bathymetry[26].

135. The proposed cofferdam top level of 3.0mOD will protect the construction works to the predicted 10% AEP coastal flood event (2.67mOD). No construction works would be undertaken at the cofferdam area during adverse weather events.

136. The construction works for the landfall cable ducts will not introduce additional flood risk the lands behind the berm (Compound A). The open cut works for the ducts are undertaken in 2 sections i.e. there will not be a full open cut section from the HWM through to Compound A. The first section will be installed from the HWM to the diverted footpath. The coastal revetment and footpath are then reinstated and the second section will be installed along the remaining length into the TJBs.

137. Additionally, the existing ground levels and topography increase, moving inland behind the berm, with levels at approximately >4.48mOD. The temporary construction activities will not introduce additional flood risk to the area.

138. The associated flood risk with the landfall is considered minimal for the construction phase.

139. During the operation and maintenance phase, the infrastructure at the landfall will be located underground and is considered water compatible.

[26] Dublin Coastal Flooding Protection Project (DCFPP) Final Report Volume 1 - Main Report. Dublin City Council and Fingal County Council

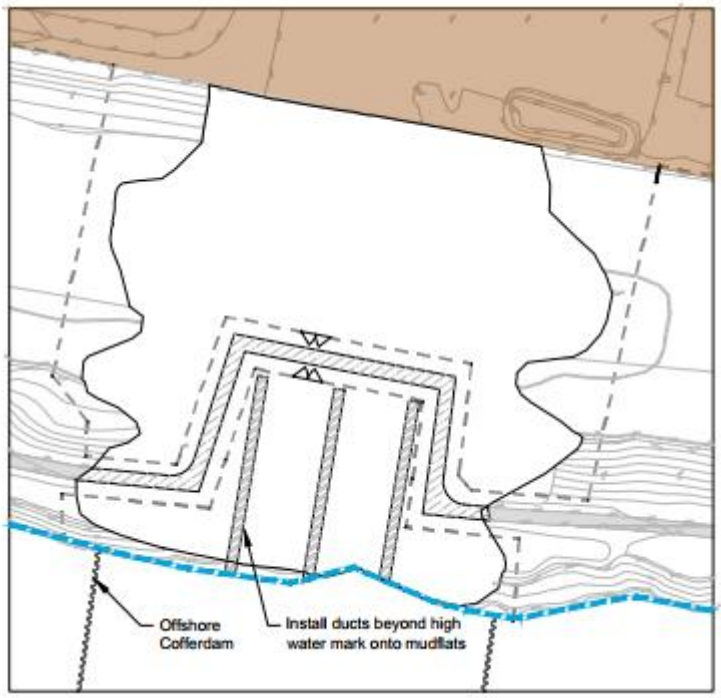


Plate 17 Opencut excavation at landfall with temporary cofferdam and footpath diversion (*Ref: Planning Drawing 0017 Landfall Details Construction Sequence Sheet 1 of 3)*

8 Flood risk assessment

140. With reference to the PSFRM Guidelines, the onshore substation is classified as “highly vulnerable” in terms of sensitivity to flooding. The primary objective of this section is to set out the detailed flood risk assessment and proposed mitigation for the onshore substation. The section addresses the Justification Test, which is set out in the PSFRM Guidelines and assesses the suitability of the onshore substation site with respect to flood risk.

141. Once installed, the remainder of the OTI (TJBs, the onshore export cables and ESBN network cables will be located underground and have been classified as water compatible. On this basis, no further assessment is required and the application of the Justification Test does not apply.

8.1 Fluvial Flooding

142. The onshore substation will be located along the south bank of the River Liffey Estuary. CFRAM mapping of the HEFS 1000-year fluvial flood extents indicates that the onshore substation is not at risk of fluvial flooding, see **Plate 7**. Flooding at this section of the River Liffey is primarily tidal and therefore does not indicate any fluvial flooding.

143. The nearest CFRAM node (09LIFF00007) estimates a 1000-year flood level of 2.44mOD, approximately 1.90mOD below the minimum recommended floor levels of the site. Therefore, it is estimated that risk of fluvial flooding associated with the OTI is minimal.

8.2 Pluvial Flooding

144. Based on the indicative pluvial flood mapping presented in the OPW PFRA, it is estimated that the subject site is not at risk from pluvial flooding during an extreme 0.1% AEP pluvial flood event (see **Plate 4**).

145. The natural landscaping and topography of the subject site will provide safe exceedance flow paths and prevent surface water ponding. Therefore, it is estimated that risk of pluvial flooding associated with the OTI is minimal.

8.3 Groundwater Flooding

146. Based on a review of Geological Survey Ireland (GSI) subsurface mapping of karst features (Plate 9) historic and predicted groundwater flooding in the area, and the PFRA study (**Plate 4**), there is no evidence to suggest liability to groundwater flooding in relation to the OTI.

147. The Poolbeg Peninsula is located in Dublin Bay and as a result, groundwater is affected directly by the coastal water in terms of both water levels (tidal effects) and water quality (high salinity). Site investigations carried out in 2003 and 2005 as part of the Poolbeg Planning Scheme recorded water levels at depths close to mean sea level. The only continuous groundwater level data available for the peninsula comes from site investigations at the Irish Glass Bottle site, approximately 800 m southwest from the onshore substation site and 250 m west of the landfall compound.

148. Analysis of this data suggests that the groundwater on the site had a mean level of approximately 0.60 m OD in August 2007 and fluctuated by approximately 0.5 m corresponding to a tidal cycle of 3.25 m i.e., groundwater is higher than the tide level at low tide but considerably lower than at high tide. The groundwater is not considered to be significant with regard to flood mechanisms in Poolbeg.

8.4 Coastal Flooding

8.4.1 Onshore substation

149. As noted, the CFRAM Programme is considered more accurate, and more conservative, than the ICPSS and NCFHM studies. The predicted coastal flood level during a 0.1% (1000-yr) coastal flood event is 3.34m OD as part of the Eastern CFRAM study in the vicinity of the onshore substation site.

150. Also previously noted, for ‘Critical’ or ‘extremely vulnerable’ development (e.g., hospitals, major sub-stations, blue light services), the tidal climate change allowance (increase in sea level) is 1.0m (HEFS) as per Section 4.9 of the CDP SFRA.

151. The predicted coastal flood level during a 0.1% (1000-yr) HEFS coastal flood event is 4.34m OD, per the Eastern CFRAM Study, and is the most conservative predicted value, where the ICPSS predicts a value of 4.28mOD, while the ICWWS (2018) and associated NCFHM mapping predict a value of 4.30mOD.

152. The SFRA for the CDP sets out recommended minimum finished floor levels for different scenarios (Table 4-2 of the CDP SFRA). In each scenario, 300mm freeboard is recommended.

153. Based on this initial assessment, it is recommended that the proposed finished floor level of the substation site in Poolbeg is a minimum of 4.64m OD (0.1% AEP HEFS + 300mm freeboard) to comply with the latest flood risk management guidance available.

154. As the flood risks are tidal, mitigation through land raising (or bunding for smaller developments) will have no impact on neighbouring development, so compensatory storage will not be required. Further, the proposed design mitigates against defence breach given the proposed ground level has raised the proposed development out of the coastal floodplain, including future considerations for climate change.

155. To address wave action, the combi-wall capping beam and revetment at the perimeter of the onshore substation site will be installed at a level of +5.24mOD (**Plate 15** and **Plate 16**).

156. With a level of +5.24mOD, the overall total freeboard to the capping beam above the 0.1% AEP HEFS flood level is 0.9m (4.34mOD + 0.9m= 5.24mOD).

157. The overall total freeboard of 0.9m would incorporate both the wave action allowance (0.6m) and the 300mm (0.3m) freeboard recommended in the Dublin Strategic FRA. The CDP SFRA defines freeboard as the following:

'"Freeboard" tends to compensate for the many unknown factors that could contribute to flood heights greater than the height calculated for a selected size flood, such as wave action, bridge openings, and hydrological uncertainty'.

158. It should be noted that the wave action allowance of 0.6m is conservative, with wind fetch estimations applying extreme wind speeds with worst case scenario flood depths. T

159. he probability of large easterly and north-easterly wind waves are also extremely low. The calculated wave height is also much higher than the modelled wave heights of<0.4m found in the RPS model.

8.5 Onshore Substation: The Justification Test

160. With reference to the PSFRM Guidelines, the onshore substation is classified as "highly vulnerable" in terms of sensitivity to flooding.

161. Based on the findings of this FRA, the onshore substation is primarily located in Flood Zone A, i.e., the onshore substation site may be liable to flooding in a 1% AEP event.

162. The CDP SFRA 'Matrix of Vulnerability Versus Flood Zone to Illustrate Appropriate Development and that Required to Meet the Justification Test' clarifies that within Flood Zone A, a 'Justification Test' is required in respect of land use categories of 'Highly Vulnerable Development'. Table 3.1 of the SFRA further clarifies that the Justification Test is Required for highly vulnerable uses in Flood Zones A and B.

163. The sections below reference the criteria that must be satisfied when considering the Justification Test as detailed in **Plate 1**

8.5.1 Criteria 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:

164. The site is zoned for industrial uses and facilitate opportunities for employment creation including port related activities (Z7). Among the permissible uses under this zoning are '…general industrial uses, industry (light) and public service installation...', which would be applicable to the development of the onshore substation.

165. The SFRA of the CDP justifies the Z7 designation zoning of the onshore substation site with the qualification that Use Classes considered as 'Vulnerable Development' (sub stations are specifically referred to) shall not be permitted in Flood Zone A or B. This exclusion is in order to satisfy and comply

with the Justification Test for Development Plans and maintain the Z7 zoning objective (i.e. Strategic level compliance).

166. The SFRA considers the site in its current state as 'undefended'.

167. The SFRA does not specify the nature and design of structural or non-structural flood risk management measures prior to future development in such areas to ensure that flood hazard and flood risk to the area will be reduced (as required by Circular PL2/2014).

168. The SFRA also does not consider suitable alternative lands for the particular use or development type, in areas at lower risk of flooding within or adjoining the core of the urban settlement (as required by Circular PL2/2014). As such the proposed development does not comply with Criteria 1 of the Justification Test.

169. The Planning Report sets out the basis on which An Bord Pleanála can grant permission notwithstanding non-compliance with Criteria 1. The Planning Report also notes that under Section 293 (3) the Board shall "have regard to" the Development Plan and Flood Risk Assessment Guidelines, where it states:

(3) Without prejudice to the generality of subsection (1), the Board shall, in the making of a decision in relation to an application under section 291, have regard to —

(c) guidelines issued under section 28,

(e) the development plan of any coastal planning authority

170. The Planning Report highlights that the wording of this section gives the Board the power to grant permission by having 'regard to' the Development Plan and the Guidelines including any inconsistent policies that may be contained therein. The Planning Report sets out a comprehensive justification for granting permission for this development as Chapter 3 – Site Selection and Consideration of Alternatives sets out that there is no other suitable location for the onshore substation. Also, it is highlighted that CWP is the largest renewable energy project in the State and the most important contribution to Ireland's overall offshore wind goals. With a planned output of 1,300 megawatts (MW), it represents 26% of the Ireland's 2030 target 5 gigawatts (GWs) for offshore wind energy and it therefore fundamental to the Climate Action Plan 2024. As a standalone project, it will make the most significant contribution to the achievement of abatements in the electricity sector; responsible for 43.7% of total carbon budget in 2030.

171. In these circumstances, it is considered appropriate to prepare an SSFRA that addresses Criteria 2 of the Justification Test. This SSFRA provides a detailed assessment of design of structural or non-structural flood risk management measures to be implemented prior to future development to ensure that flood hazard and flood risk to the area will be reduced (as required by Circular PL2/2014).

172. In that regard, the following provisions of the CDP and PSFRM are relevant.

173. Table 1.3 of the SFRA 'Matrix of Vulnerability Versus Flood Zone to Illustrate Appropriate Development and that Required to Meet the Justification Test' clarifies that within Flood Zone A, a 'Justification Test' is required in respect of land use categories of 'Highly Vulnerable Development'. Table 3.1 of the SFRA further clarifies that the Justification Test is Required for highly vulnerable uses in Flood Zones A and B.

174. The SFRA is also clear that within Flood Zone A, a 'Justification Test' is required in respect of land use categories of 'Highly Vulnerable Development.

175. Policy Objective SI 15 of Chapter 9 of the CDP SFRA requires "All development proposals shall carry out, to an appropriate level of detail, a Site-Specific Flood Risk Assessment (SSFRA)".

176. The Governmental Guidelines state that “Where development is planned in flood risk areas, a detailed flood risk assessment may have to be carried out within the SFRA so that the potential for development of the lands and their flood risk and wider environmental impact can be assessed”.

8.5.2 Criteria 2: The proposal has been subject to an appropriate flood risk assessment that demonstrates:

177. ***The development proposed will not increase flood risk elsewhere and, if practicable, will reduce overall flood risk.***

- As detailed in Sections 4.0-5.0, the development of the onshore substation will not increase flood risk elsewhere. As the flood risks are tidal, mitigation through land raising at the onshore substation will have no impact on neighbouring development, and compensatory storage will not be required.

178. ***The development proposal includes measures to minimise flood risk to people, property, the economy and then environment as far as reasonably practicable.***

- The design of the onshore substation has incorporated measures to minimise flood risk in the 0.1% AEP HEFS scenario. This is detailed in Sections 4.0-5.0.
- During the operation and maintenance phase, the onshore substation will be monitored remotely and the site is therefore unmanned; however, access would be required periodically for routine maintenance activities, estimated at an average of one visit per week.
- An Emergency Management Plan will be prepared to ensure no risk to operatives during a flood event. As the flood risk is tidal, floods can be forecasted easily (with onsite tidal gauge or gauge within Docklands), and the onshore substation can be evacuated in advance of an extreme event.

179. ***The development proposed includes measures to ensure that residual risk 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 design of the onshore substation has incorporated measures to minimise flood risk in the 0.1% AEP HEFS scenario.
- The proposed ground level of the onshore substation site will be raised as part of the construction activities, to effectively remove the site from the flood risk area (Refer to Section 5.0).
- Residual risks to the area and to the onshore substation during an extreme flood event have been managed to an acceptable level through a dedicated stormwater drainage system which will be installed for the operation and maintenance phase.

180. ***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 development of the onshore substation is compatible with the wider planning objectives of the area, which promote sustainable growth and development.
- The development of the onshore substation satisfies Criteria 2 of the PSFRM criteria of the Justification Test.

9 Conclusions

181. The Applicant is proposing to develop the CWP Project, a proposed OWF located in the Irish sea approximately 13 – 22 km off the east coast of Ireland, at County Wicklow. The OTI is situated on the Poolbeg Peninsula and the purpose of this SSFRA is to examine the risks from all sources of flooding to and potentially arising from development of the OTI.

182. Flooding at this section of the River Liffey is primarily tidal and therefore does not indicate any fluvial flooding. Groundwater and pluvial flooding also pose no identified flood risk to the OTI.

183. Once installed, the TJBs, the onshore export cables and ESBN network cables will be located underground and have been classified as water compatible.

184. The onshore substation is considered critical infrastructure and therefore “highly vulnerable” in terms of sensitivity to coastal flooding. The CDP designates the site for development, classifying it as Z7 zoning, subject to other policies and objectives of the CDP including SFRA. While the SFRA generally permits 'general industrial uses, industry (light) and public service installations', it explicitly excludes substations from Flood Zones A and B. As the substation falls under the category of 'Vulnerable Development', it conflicts with the SFRA's restrictions. Consequently, Criterion 1 for development approval is not met on this specific basis.

185. The onshore substation is located within Flood Zone A, however mitigation measures have been proposed to protect the site into the future.

186. The Planning Report sets out the basis on which An Bord Pleanála can grant permission notwithstanding non-compliance with Criteria 1. Under these circumstances, this SSFRA considers compliance with Criterion 2 to be relevant to ABP’s decision-making process.

187. The mitigation measures are conservative and will incorporate both the wave action allowance and the freeboard recommended in the CDP SFRA.

188. The SSFRA confirms that Criterion 2 has been adhered to. It is emphasized that the mitigation design is conservative, and that the specific nature of the flood risk does not result in an elevated risk elsewhere. Based on the site-specific flood risk assessment outlined herein, the proposed onshore elements of the Codling Wind Park have been designed to minimize flood risk and are compliant with Criteria 2 of the PSFRM Justification Test where necessary.