codling wind park

Environmental Impact Assessment Report

Volume 2

Chapter 3 Site Selection and Consideration of Alternatives


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Abbreviations

Abbreviation	Term in Full
AA	Appropriate Assessment
ABP	An Bord Pleanála
AC	Alternating current
AEZ	Archaeological Exclusion Zones
AIS	Automatic Identification System
CAP	Climate Action Plan
CDP	County Development Plan
CEMP	Construction Environmental Management Plan
CGS	County Geological Site
CO_2	Carbon dioxide
CRU	Commission for Regulation of Utilities
CWP	Codling Wind Park
CWPE	Codling Wind Park Extension
CWPL	Codling Wind Park Limited
DCC	Dublin City Council
DECC	Department of the Environment, Climate and Communications
DLH	Dún Laoghaire Harbour
DPC	Dublin Port Company
DCIHR	Dublin City Industrial Heritage Record
Draft ORDEP II	Draft Offshore Renewable Energy Development Plan II
EC	European Commission
EDF R	Électricité De France Renewables
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EMP	Environmental Monitoring Plan
EMRA	Eastern and Midlands Region
EPA	Environmental Protection Agency
ES	Environmental Statement
ESB	Electricity Supply Board
ESBN	ESB Networks
EU	European Union

FOS	Fred. Olsen Seawind
FRA	Flood Risk Assessment
GBS	Gravity based structures
GCA	Grid Connection Assessment
GSI	Geological Survey of Ireland
GHG	Greenhouse gas
GIS (switchgear)	Gas Insulated Switchgear
GPR	Ground Penetration Radar
GW	Gigawatts
HAT	Highest astronomical tide
HDD	Horizontal directional drilling
HGV	Heavy Goods Vehicle
HV	High voltage
HWM	High water mark
MHWS	Mean high water spring
IRCG	Irish Coastguard
km	Kilometre
kV	Kilovolt
LAT	Lowest astronomical tide
MAC	Maritime Area Consent
MAP	Maritime Area Planning
MGN	Marine Guidance Note
MSO	Marine Survey Office
MV	Medium voltage
MW	Megawatts
NIS	Natura Impact Statement
NMPF	National Marine Planning Framework
NORA	National Oil Reserves Agency
NPF	National Planning Framework
NPWS	National Parks and Wildlife Service
OREDP	Offshore Renewable Energy Development Plan
OECC	Offshore export cable corridor
OEM	Original Equipment Manufacturers
OfTI	Offshore transmission infrastructure

O&M	Operations and maintenance
OMPP	Overarching Marine Planning Policies
OS	Ordnance Survey
ORE	Offshore Renewable Energy
OREI	Offshore Renewable Energy Installations
ORESS	Offshore Renewable Electricity Support Scheme
OSS	Offshore substation structure
OTI	Onshore
OWF	Offshore wind farm
RPS	Record of Protected Structures
RPO	Regional Policy Objectives
RSES	Regional Spatial and Economic Strategy
RYA	Royal Yachting Association
SAC	Special Area of Conservation
SAR	Search and rescue
SDZ	Strategic Development Zone
SEA	Strategic Environmental Assessment
SEAI	Sustainable Energy Authority of Ireland
SI	Site investigation
SMPP	Sectoral Marine Planning Policies
SPA	Special Protection Area
SSFRA	Site Specific Flood Risk Assessment
TJB	Transition joint bay
UAU	Underwater Archaeological Unit
UK	United Kingdom
UXO	Unexploded ordnance
WFD	Water Framework Directive
WEI	Wind Energy Ireland
WTG	Wind turbine generator

Definitions

Glossary	Meaning
alternating current (AC)	A flow of electrical current which reaches maximum in one direction, decreases to zero, then reverses itself and reaches maximum in the opposite direction. The cycle is repeated continuously and the number of cycles per second is equal to the frequency. The Irish electrical system is an AC network that uses a frequency of 50 Hz.
the Applicant	The developer, Codling Wind Park Limited (CWPL).
array site	The red line boundary area within which the wind turbine generators (WTGs), inter-array cables (IACs) and the Offshore Substation Structures (OSSs) are proposed.
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.
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	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.
generating station	Comprising the wind turbine generators (WTGs), inter array cables (IACs) and the interconnector cables.
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)	HDD is a trenchless drilling method used to install cable ducts beneath 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.
inter-array cables (IACs)	The subsea electricity cables between each WTG and between the OSSs.
interconnector cables	The subsea electricity cables between OSSs.

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.
limit of Deviation (LoD)	Locational flexibility of permanent and temporary infrastructure is described as a LoD from a specific point or alignment.
Maritime Area Consent (MAC)	A Maritime Area Consent (MAC) provides State authorisation for a prospective developer to undertake a maritime usage and occupy a specified part of the maritime area. A MAC is required to be in place before planning consent can be sought.
Maritime Area Planning (MAP) Act 2021	The MAP Act 2021 regulates the maritime area, by means of a National Marine Planning Framework, maritime area consents for the occupation of the maritime area for the purposes of maritime usages that will be undertaken for undefined or relatively long periods of time (including any such usages which also require development permission under the Planning and Development Act 2000) and licences for the occupation of the maritime area for maritime usages that are minor or that will be undertaken for relatively short periods of time. The MAP Act also creates a new regulatory authority and a regime for designating protected marine areas.
metocean	Meteorological and oceanographic data (for example metocean data or metocean conditions).
offshore development area	The total footprint of the offshore infrastructure and associated temporary works including the array site and the OECC.
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.
offshore export cable corridor (OECC)	The area between the array site and the landfall, within which the offshore export cables cable will be installed along with cable protection and other temporary works for construction.
offshore infrastructure	The permanent offshore infrastructure, comprising of the WTGs, IACs, OSSs, interconnector cables, offshore export cables and other associated infrastructure such as cable and scour protection.
offshore substation structure (OSS)	A fixed structure located within the array site, containing electrical equipment to aggregate the power from the wind turbine generators and convert it into a more suitable form for export to shore.
offshore transmission infrastructure (OfTI)	The offshore transmission assets comprising the OSSs and offshore export cables. The EIAR considers both permanent and temporary works associated with the OfTI.
onshore development area	The entire footprint of the OTI and associated temporary works that will form the onshore boundary for the development consent application.
onshore transmission infrastructure (OTI)	The offshore transmission assets comprising the OSSs and offshore export cables. The EIAR considers both permanent and temporary works associated with the OfTI.

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.
Phase 1 Project	Under the special transition provisions in the Maritime Area Planning Act 2021, as amended (the MAP Act), the Minister for the Department of Environment, Climate and Communications (DECC) has responsibility for assessing and granting a Maritime Area Consent (MAC) for a first phase of offshore wind projects in Ireland. The Phase 1 Projects include Oriel Wind Park, Arklow Bank II, Dublin Array, North Irish Sea Array, Codling Wind Park and Skerd Rocks. A MAC has since been granted by DECC for each of the Phase 1 Projects.
planning application boundary	The area subject to the application for development consent, including all permanent and temporary works for the CWP Project.
Poolbeg 220 kV 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.
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.
sheet piles	Sections of sheet materials with interlocking edges that are driven into the ground to provide earth retention and excavation support. Sheet piling is used in construction to provide both temporary and permanent walls.
transition joint bay (TJB)	This is required as part of the OTI and is located at the landfall. It is an underground bay housing a joint which connects the offshore and onshore export cables.
wind turbine generator	All the components of a wind turbine, including the tower, nacelle and rotor.

3 SITE SELECTION AND CONSIDERATION OF ALTERNATIVES

3.1 Introduction

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

2. This chapter forms part of the Environmental Impact Assessment Report (EIAR) for the CWP Project, detailing the site selection process and consideration of alternatives carried out by the Applicant to determine the most appropriate location and design for the CWP Project, as described in EIAR **Chapter 4 Project Description**.

3. Consideration has been given to reasonable alternatives at every stage of the process. This includes consideration of alternative locations for the array site, cable route alignments, site layouts, designs, processes and mitigation measures for both the offshore and onshore infrastructure. This has formed the basis for decision making throughout the pre-application stage, and is a process that has been underpinned by the following overarching project objectives:

    - Contribute effectively to enhancing the security of Ireland's energy supply, by providing domestically produced renewable energy; in support of the Climate Action Plan (2024) and the actions set out in Energy Security in Ireland to 2030 (Government of Ireland, 2023).
    - Provide low cost energy to the Irish consumer; in support of the Second Renewable Energy Directive (Directive 2018/2001) Recital 19.
    - Deliver a significant contribution (>25%) to the Irish Government's goal of achieving 5 GW installed electricity generation capacity in offshore wind by 2030; in support of the Climate Action Plan 2024 and draft Climate Action Plan 2024.
    - To identify and implement measures at each stage of the development process to avoid, prevent, reduce or, if possible, offset any identified significant adverse effects on the environment; in accordance with the suggested project level mitigation measures in the Offshore Renewable Energy Development Plan (OREDP) and the National Marine Planning Framework (NMPF). Where it is impossible to avoid a constraint, these constraints are reported and appropriate mitigation measures will be put in place.
    - To minimise impacts to local communities; in support of National Policy Objective 52 in the National Planning Framework (NPF).
    - Make use of existing brownfield sites for the onshore transmission infrastructure (OTI) where possible; in support of the NPFs objective to secure compact and sustainable growth.
    - Develop a wind turbine generator (WTG) array which makes efficient use of available seabed; in support of NMPF ORE Policy 1 and NMPF policies to protect sea-floor and water column Integrity.
    - Make efficient use of available grid connection capacity; as required by the terms and conditions of the CWP Project Offshore Renewable Electricity Support Scheme (ORESS).
    - To utilise the shortest and straightest feasible export cable routes from the offshore array site to the grid connection location; in accordance with the suggested project level mitigation measures in the Offshore Renewable Energy Development Plan (OREDP) and the National Marine Planning Framework (NMPF).
    - To deliver the CWP Project in a safe and efficient manner; in support of NMPF Safety at Sea Policy 1–5.

4. In developing the CWP Project, the Applicant has ensured alignment with Irish Government's policy objectives in all areas related to the establishment of Offshore Renewable Energy (ORE), including polices relevant to ORE site selection and consideration of alternatives. A summary of site selection and consideration of alternatives related policies that have been considered is provided throughout

this chapter, supported by the **Planning Report** which provides an assessment of the CWP Project against all relevant planning policy.

5. From a policy perspective, the need for OWF development within Irish waters to replace more environmentally damaging energy options such as traditional (fossil fuel) power stations is also set out in the **Planning Report**.

3.2 Background

6. The historical background of the CWP Project provides important context for this chapter of the EIAR. A summary of this is provided below, with a focus on the key events that shaped the early stages of the CWP Project development.

7. Site selection and consideration of alternatives for the CWP Project was first initiated by Fred Olsen Renewables Ltd (FORL) in 1999 with the initial aim to identify a suitable location for the array site.

8. This initial process, described in **Section 3.8** of this chapter, led to the identification of the current CWP Project array site. However, at the time this site was initially identified, the size of the area made it unrealistic for development in a single phase. As a result, a decision was taken by FORL to make a foreshore lease application for the northern part of the site, now referred to as the original CWP array site, with an opportunity to apply for permission to develop of the southern part of the site at a later stage.

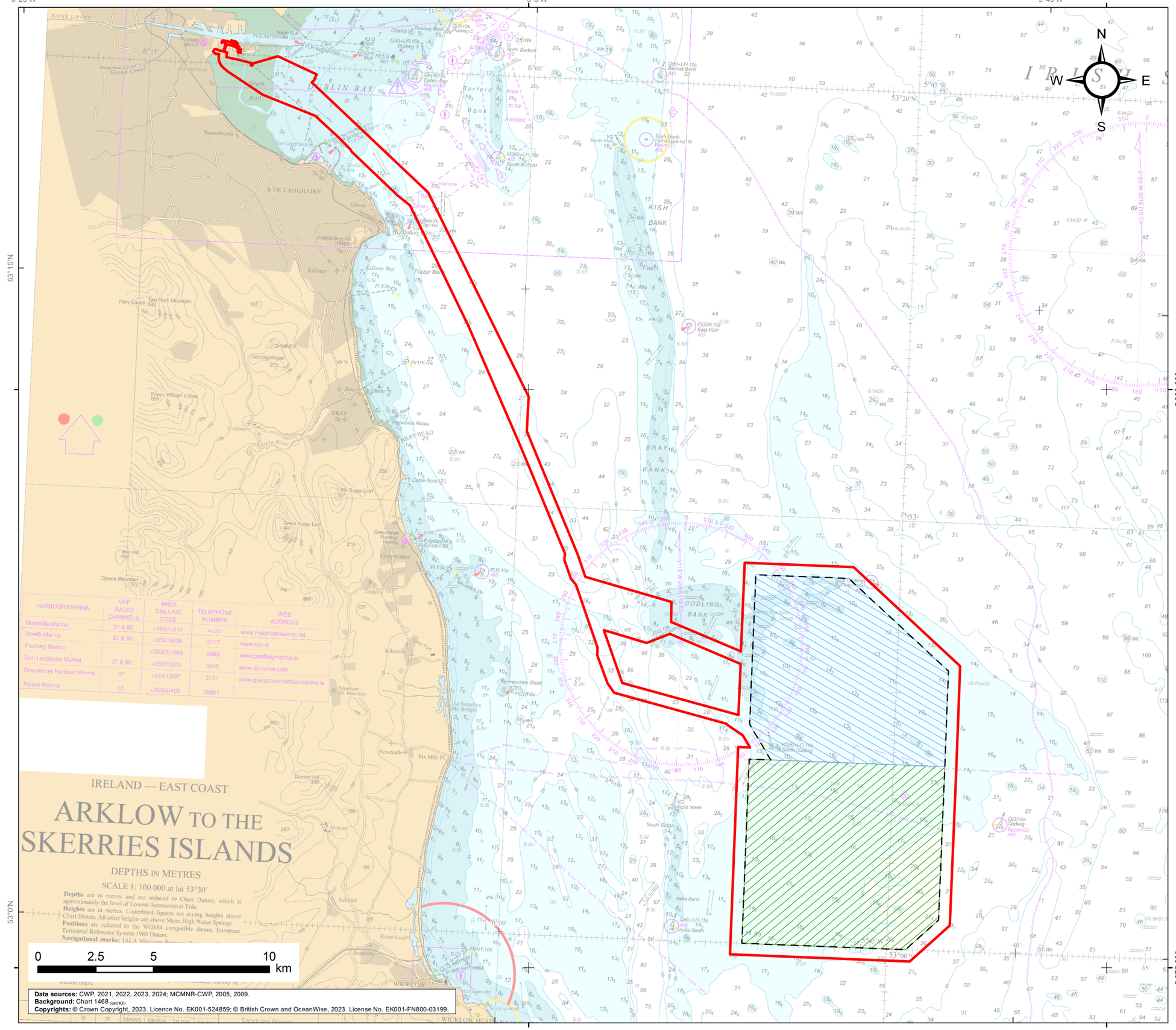
9. In November 2005 FORL was awarded a Foreshore Lease under the Foreshore Act 1933 for the installation of up to 220 WTGs within the original CWP array site with a generating capacity of up to 1,100 MW and associated infrastructure.

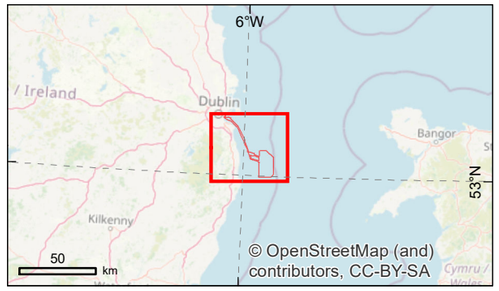
10. In March 2009, following the completion of further site selection analysis, FORL applied for a Foreshore Lease for the Codling Wind Park Extension (CWPE), a similar sized array site containing up to 200 additional WTGs with up to 1,000 MW generating capacity. The proposed CWPE array adjoined the original CWP array site and extended to the south (see **Figure 3-1**). However, issues in Ireland at the time concerning a viable route to market for OWF projects and grid connection delays meant that the application for the CWPE was not taken forward.

11. In 2019, the Irish Government published its Climate Action Plan (CAP) 2019[1], setting out the ambition of delivering 70% of Ireland's electricity from renewable sources by 2030 including at least 3.5 gigawatt (GW) of offshore wind capacity by 2030. Plans were also set out for a new consenting system for the maritime area, in the form of the now established MAP Act 2021. This provided a platform to reinitiate the project, including the special transition provisions which provided the Minister for the Department of Environment, Climate and Communications (DECC) with responsibility for assessing and granting a Maritime Area Consent (MAC) for a first phase of offshore wind projects in Ireland, including the CWP Project. This new legislative regime, and the subsequent awarding of a MAC for the CWP Project superseded the Foreshore Lease for the original CWP array site, which had been maintained by FORL.

12. Although initially proposed as two projects, significant advances in WTG technology, combined with considerable reductions in the cost of energy from offshore wind, mean that the original CWP project and CWPE can now be developed as one project, the 'CWP Project', with a greatly reduced number of WTGs while optimising the renewable electricity production from the site.

[1] These targets have since been updated, with CAP 2023 setting out the Irish Government's intention to meet up to 80% of electricity consumption from renewable power by 2030, including 5 gigawatts (GW) of installed, fixed bottom offshore wind capacity. This plan is the first to be prepared under the Climate Action and Low Carbon Development (Amendment) Act 2021.





Legend

- Planning application boundary
- Array site
- Original CWP array site
- Codling wind park extension

codling wind park	*Project:* Codling Wind Park	*Contractor:* *Website:*

Figure 3.1
CWP array site planning history

CWP doc. number: CWP-CWP-ENG-08-01-MAP-1089

Internal descriptive code:	*Size:* A3	*CRS:*
WE - PAB..WF.FL..WF.FL.N..WF.FL.S - - (EIAR.Vol.03.Ch.03.FIG.01)	*Scale:* 1:160,000	EPSG 25830

Rev.	Updates	Date	By	Chk'd	App'd
00	Final for issue	2024/08/15	MC	CD	ES

3.3 Legislation, policy and guidance

3.3.1 Legislation

13. The key legislation that is applicable to the site selection process and consideration of alternatives is summarised below. Further detail where relevant is provided in **Chapter 2 Policy and Legislative Context**.

Environmental Impact Assessment

14. The Environmental Impact Assessment (EIA) Directive 2011/52/EU (as amended) requires an EIAR to contain:

> *'a description of the reasonable alternatives (for example in terms of project design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects.'*

15. This requirement is reflected in Schedule 6 of the Planning and Development Regulations 2001 (as amended), which details the following requirements for an EIAR in relation to reasonable alternatives:

> *'1(d): A description of the reasonable alternatives studied by the person or persons who prepared the EIAR, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the proposed development on the environment '*
>
> *And*
>
> *'2(b) a description of the reasonable alternatives (for example in terms of project design, technology, location, size and scale) studied by the person or persons who prepared the EIAR, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects;'*

3.3.2 Policy

16. In developing the CWP Project, the Applicant has ensured alignment with Irish Government's policy objectives in all areas related to the establishment of Offshore Renewable Energy (ORE), including polices relevant to the site selection and assessment of alternatives process. In particular, the process has taken account of the following key national policy documents as well as other relevant local policies:

- Offshore Renewable Energy Development Plan (OREDP);
- Draft Offshore Renewable Energy Development Plan II (Draft ORDEP II);
- National Marine Planning Framework (NMPF); and
- Ireland 2040 Our Plan – National Planning Framework.

17. The relevant aspects of each of the above-mentioned policy documents are summarised in more detail below. Reference is also provided throughout this chapter to specific polices that the Applicant has had regard to in undertaking the site selection and assessment of alternatives process.

18. From a policy perspective, the need for OWF development is set out in the **Planning Report** which accompanies the EIAR.

Offshore Renewable Energy Development Plan

19. The Offshore Renewable Energy Development Plan (OREDP) states that *'in order to ensure that significant adverse effects in the marine environment as a result of the development of offshore renewable energy projects are managed appropriately, measures to avoid, reduce or offset any potential significant adverse effects have been developed through the Strategic Environmental Assessment (SEA) and Natura Impact Statement (NIS) processes'*.

20. The suggested OREDP project level mitigation measures of relevance to the site selection process for the CWP Project are referred to throughout this chapter.

21. Reference is also made in this document (see **Section 3.8**) to the analysis undertaken for potential OWF development areas as part of the OREDP Strategic Environmental Assessment (SEA) of the potential effects that the proposals contained in the OREDP would have on the marine and coastal environment of Ireland.

Draft Offshore Renewable Energy Development Plan II

22. This draft document focuses on the spatial strategy, proposing how the State will identify the areas which are best suited for ORE. It is noted that in ORDEP II that initially Ireland's offshore wind targets for 2030 will be primarily met through fixed offshore wind in Ireland's eastern and southern coastal region (including the Phase 1 Projects) and the draft OREDP II is largely focused on the plan-led enduring regime, which is envisaged to be deployed post 2030. As such, the draft OREDP II does not contain any substantive policy that applies to the CWP Project and is therefore not considered further within this chapter.

National Marine Planning Framework (NMPF)

23. Launched in 2021 and put on a statutory footing by the MAP Act 2021, the NMPF is Ireland's first national framework for managing marine activities. It sets out the overarching approach to managing Ireland's maritime activities to ensure the sustainable use of resources up to 2040.

24. ABP can only grant permission that would materially contravene the NMPF if ABP if it is satisfied that (i) the proposed development is of strategic, economic or social importance to the State, and (ii) the NMPF or the maritime spatial plan, as the case may be, contains objectives that conflict with one another or that are ambiguous with regard to their application to the proposed development.

25. The NMPF is articulated around Overarching Marine Planning Policies (OMPP) supplemented by Sectoral Marine Planning Policies (SMPP).

26. A wide range of SMPP are of relevance to the CWP Project. These are discussed in more detail in the **Planning Report**. This includes an assessment of how the grant of permission for the CWP project would be consistent with those policies.

27. SMPP that are relevant to the site selection and assessment of alternatives process are referred to throughout this chapter.

Ireland 2040 Our Plan – National Planning Framework

28. The NPF is only relevant to that part of the CWP Project that lies above the high water of ordinary or medium tides (i.e., the onshore components of the CWP Project).

29. The NPF sets out Ireland's planning framework up to 2040 as part of Project Ireland 2040. It is articulated around a series of National Strategic Outcomes (NSOs) and National Policy Outcomes (NPOs). The NPF states that:

> *'…much of the potential for impact to the environment can be avoided by the careful siting of development and infrastructure. In other cases a robust site selection process will be important to avoid impacts on European Sites in particular, and on the wider receiving environment. For example, a number of locations, in particular former dockland and port areas, have been identified as having potential for infill and brownfield development in order to prevent urban sprawl and the loss of greenfield lands.'*

30. Avoidance of unnecessary impacts is the preferred mitigation strategy for the NPF, which aligns closely with the approach that has been taken by the Applicant at all stages of the onshore site selection and development process.

31. As an example, this is evident from the confined nature of the CWP Project OTI which is located entirely within the heavily industrialised Poolbeg Peninsula.

32. More specific examples of compliance with the NPF in relation to site selection and good design are provided throughout this chapter.

Guidance

33. Guidelines on the Information to be contained in Environmental Impact Assessment Reports (hereafter referred to as the EIAR Guidelines), prepared by the Environmental Protection Agency (EPA) (May 2022), details the requirement for an Applicant to describe the reasonable alternatives examined during the design process with an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects.

34. The guidance also details the requirement, if relevant to the project, to consider different forms of alternatives, including:

- Do nothing;
- Alternative locations;
- Alternative layouts;
- Alternative designs;
- Alternative processes; and
- Alternative mitigation measures.

35. The guidance set out above has informed the structure and scope of this chapter.

3.4 Site selection process and consideration of alternatives methodology

36. The siting, design and ongoing refinement of the CWP Project has taken account of physical constraints, and environmental, technical, social and commercial considerations. This is with the aim of identifying sites that will be both environmentally acceptable and technically deliverable, whilst seeking to deliver the lowest cost of energy for the consumer.

37. A multi-disciplinary design team was formed to undertake the site selection process, which included a team of specialists comprising engineers, planners, legal advisors and EIA consultants, whose expertise was drawn upon throughout.

38. The identification of preferred sites and routes (as described in **Section 3.8**, **3.10**, **3.11**, **3.13**, **3.15** and **3.17** of this chapter) was progressed through six distinct phases, each relating to separate but integrally linked components of the CWP Project.

39. Each phase involved the identification of site and route option locations for the main components of the CWP Project and included desktop studies, site visits, identification and mapping of constraints, and public and stakeholder consultation. The starting point for this phased approach was site selection of the array site, followed by consideration of suitable grid connection points. An outline of the phases is provided in **Plate 3-1** below.

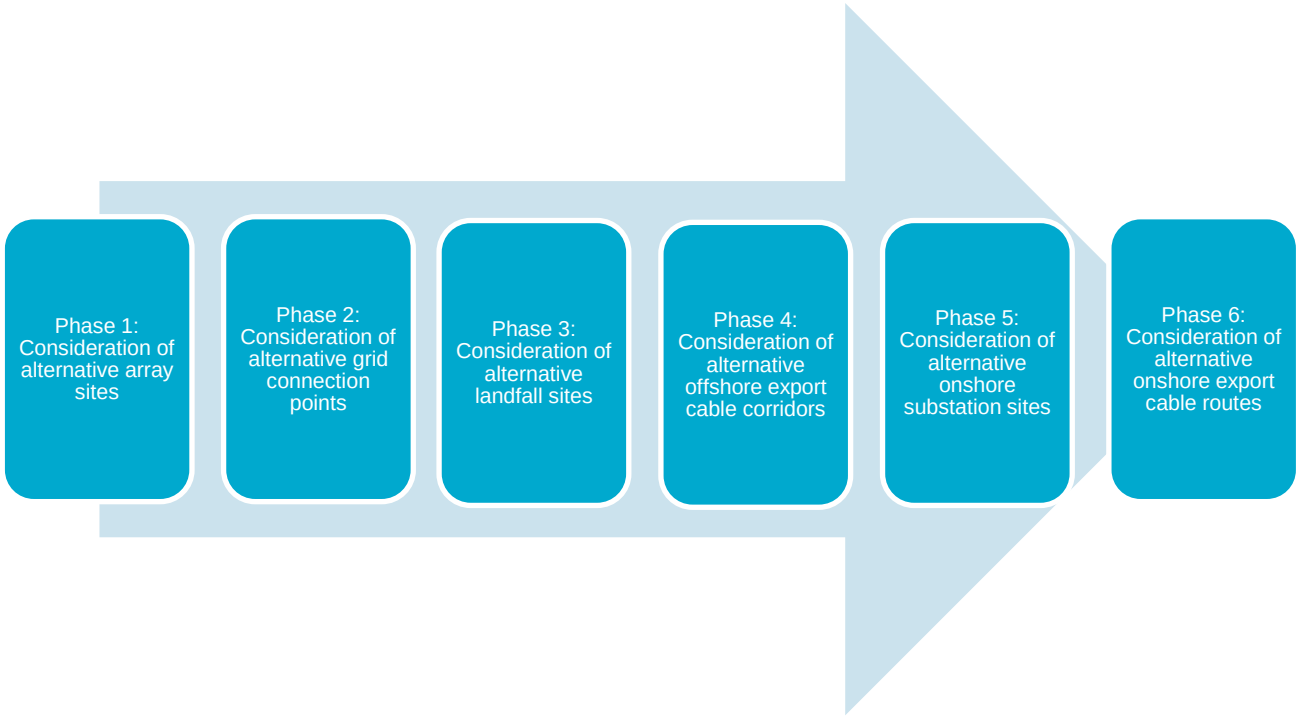


Plate 3-1 Site selection and assessment of alternatives process

40. During each phase reasonable alternatives were identified and assessed against a range of criteria including technical, economic, environmental and socio-economic. Where multiple reasonable alternatives were identified a comparison of environmental effects was undertaken, which has been summarised within this chapter. This led to the identification of a preferred site / route option for each of the main components.

41. The emerging preferred options when combined, presented the overall emerging preferred location for the CWP Project. This facilitated a change in focus from alternative sites and routes to the development of individual project components including the consideration of:

- Alternative layouts / locations / alignments:
    - Alternative WTG layouts (including OSS positions) (**Section 3.9.2**);
    - Alternative IAC and interconnector cable layouts (**Section 3.9.5**);
    - Alternative TJB layouts (**Section 3.12.1**);
    - Alternative offshore export cable alignments (**Section 3.14.1**);
    - Alternative onshore substation layouts (**Section 3.16.1**);

- Alternative locations for the [onshore substation] ESB Networks (ESBN) building (**Section 3.16.2**); and
- Alternative ESBN network cable alignments (**Section 3.16.3**).

- Alternative designs and technologies:
  - Alternative WTG models (and number of WTGs) (**Section 3.9.1**);
  - Alternative WTG heights as a function of minimum blade tip clearance (**Section 3.9.3**); and
  - Alternative WTG foundation designs (including OSS foundations) (**Section 3.9.4**).
- Alternative installation methods:
  - Alternative landfall cable duct installation methods (**Section 3.12.2**);
  - Alternative ESBN network cable installation methods (**Section 3.16.3**); and
  - Alternative onshore export cable installation methods (**Section 3.17**).

42. In summary, this chapter provides a description of the reasonable alternatives (including in terms of project design, technology, location, size and scale) studied by the Applicant, which are relevant to the CWP Project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects.

3.5 Consultation

43. Consultation on refinements to the CWP Project component site selection, layouts and configurations have been undertaken throughout the lifetime of the project. The consultation has given interested stakeholders the opportunity to provide feedback to help shape emerging plans and influence key design decisions.

44. Public feedback received during each phase of public consultation is summarised in the **Public and Stakeholder Consultation Report** submitted as part of the application for development permission. This report includes details of how the project has had regard to feedback received as part of consultation process.

45. A summary of the main phases of public consultation that have influenced the CWP Project development is provided below.

- The first round of pre-application public consultation took place during March 2021 during COVID restrictions and consisted of three elements: a virtual public exhibition, a webinar with members of the Applicant's team and a series of information clinics.
- The second round of pre-application public consultation took place from the 11th January to 8th February 2023. The consultation included a number of face-to-face exhibitions in Wicklow, Kilcoole, Greystones and Ringsend, together with an online virtual exhibition and a series of dedicated information clinics.
- A final round of pre-application public information events took place in April and May 2024 which provided an update on the final design of the CWP Project in advance of the planning application.

46. In addition to the above, consultation on the design for the CWP Project has been undertaken through the EIA Scoping process. Initially, an EIA Scoping Report for the CWP Project offshore infrastructure was published in December 2020. The Applicant then prepared an EIA Scoping Report for the onshore infrastructure, which was published in April 2021.Further feedback has been received throughout the EIA process via topic specific meeting and through wider engagement with relevant landowners and government bodies.

47. For the purposes of this chapter, **Table 3-1** provides a summary of the key issues raised during the consultation process relevant to site selection and consideration of alternatives and details how the Applicant has taken this feedback into consideration.

48. It should be noted that early consultation regarding the location of CWP Project was undertaken as part of the application for the original CWP array site (consented in 2005), and then as part of the foreshore licence application for the CWP array site extension (submitted in 2009). Recorded aspects of this early consultation are included in **Table 3-1** below.

Table 3-1 Consultation responses relevant to site selection and consideration of alternatives

Consultee	Comment	How issues have been addressed
Array site		
Local fisherman	Engagement between FORL and local fisherman was undertaken prior to the foreshore lease application for the original CWP array site and the CWPE. It is recorded that Codling Bank is heavily fished for whelks, which congregate in and around shallow water depths (between 2 and 8 metres to mean sea level). Similarly, an area to the north east of the Codling Bank study area was identified by the Howth Fishermen's Association as an area frequently trawled for ray and skate. More recent consultation with local fishermen has informed regular scouting surveys to determine hotspots of fishing activity within the array site.	Areas with an increased potential for commercial fishing have been avoided where possible (see **Section 3.8**)
Underwater Archaeological Unit (UAU)	It is essential that the archaeological assessment is carried out at an early stage as it may result in further archaeological mitigation.	In response to both historic and more recent engagement with the UAU the Applicant has carried out a geophysical survey campaign across the full extent of the array site and along the OECC. This data has informed the siting of infrastructure to avoid identified constraints, including features of known or potential archaeological importance (see **Section 3.9** and **3.14**)
Shipping and Navigation stakeholders (including Irish Coastguard (IRCG), Irish Lights and Marine Survey Office (MSO)).	Confirmed content with the use of Maritime and Coastguard Agency's (MCA) Marine Guidance Note (MGN) 654 in the absence of Irish guidance. Specifically, the IRCG confirmed that in advance of the Irish MGN being published reliance should be placed on MGN 654.	MGN 654 has informed the WTG layout (see **Section 3.9.2**)
BirdWatch Ireland	Engagement between BirdWatch Ireland and FORL was undertaken to identify locations within the Codling Bank study area with an increased potential for breeding and foraging birds. The shallow banks associated with	Areas with an increased potential for breeding and foraging birds have been avoided where possible (see **Section 3.8**)

Consultee	Comment	How issues have been addressed
	Codling Bank and India bank were identified as areas that should, where possible, be avoided.	
WTG Original Equipment Manufacturers (OEMs)	Over the course of the project development the Applicant has undertaken extensive engagement with OEMs to identify potential WTG model options for the CWP Project.	The outcomes of this engagement are described in **Section 3.9**.
CWP Project second phase of public consultation	During the second phase of public consultation the Applicant requested feedback on an indicative WTG array consisting of 100 WTGs. Limited feedback was received; however, a request was made to increase the distance between the CWP Project WTGs and the Dublin Array OWF array site.	The request mentioned has been considered by the Applicant. Further information is provided in EIAR **Chapter 15 Seascape, Landscape and Visual Impact Assessment**.
Landfall		
Dublin Port Company (DPC)	Detailed discussions between DPC and the Applicant have informed a feasibility study to consider the potential to install and operate the CWP Project offshore export cables within the River Liffey.	The outcomes of these discussions is described in **Section 3.11**.
	Detailed discussions between DPC and the Applicant have informed the siting of the TJBs at the landfall.	The outcomes of these discussions is described in **Section 3.12.1**
National Parks and Wildlife Service (NPWS) February 2022	The potential routeing of the offshore export cables through the South Dublin Bay Special Area of Conservation (SAC) and South Dublin Bay and River Tolka Estuary Special Protection Area (SPA) was discussed with NPWS at an early stage. It was noted by NPWS that 'the nature of the habitats present at this location would suggest that if a trench had to be cut these habitats would recover quickly, noting that trenching operations can be done in suitable locations very quickly so there is a potential for minimal displacement of species. Recovery for infaunal biodiversity might occur as quickly as six months. Consideration should be given to the seasonal dimension – particularly around feeding birds – if the trenching method is pursued'.	This feedback from NPWS on the potential routeing of the offshore export cables through the South Dublin Bay SAC and South Dublin Bay and River Tolka Estuary SPA has informed the site selection process for the landfall site (see **Section 3.11**).
CWP Project second phase of public consultation	During the second phase of public consultation the Applicant presented the preferred landfall location on the southern shoreline of the Poolbeg Peninsula. No specific feedback on this was received.	n/a
Offshore export cables		

Consultee	Comment	How issues have been addressed
Irish Lights July 2021	Routeing and navigational features assessments should consider the Dublin Bay, Skerries, Tuskar and Smalls Traffic Separation Schemes (TSSs).	As described in **Section 3.14**, the Applicant has sought to maximise the distance between the individual offshore export cables and key navigational features.
MSO March 2021	The MSO had no specific concerns about inshore routeing and would expect the majority of vessels to route outside of the proposed projects (the MSO would not want to encourage inshore routeing).	N/A
UAU	It is essential that the archaeological assessment is carried out at an early stage as it may result in further archaeological mitigation.	In response to both historic and more recent engagement with the UAU the Applicant has carried out a geophysical survey campaign across the full extent of the array site and along the OECC. This data has informed the siting of infrastructure to avoid identified constraints, including features of known or potential archaeological importance (see **Section 3.9** and **3.14**)
Dún Laoghaire Harbour (DLH)	The Applicant has engaged with DLH on the potential interaction between the CWP Project offshore export cables and a future proposal by DLH to increase the area and depth of dredging to accommodate larger vessels, notably cruise ships. A request was made by DLH for the CWP Project offshore export cables to routed outside of the the proposed dredging area, or to otherwise burial increase the burial depth of the cables within the proposed dredging area to avoid impeding future plans.	As described in **Section 3.13**, the Applicant has sought to maximise the distance between the OECC and DLH whilst also maximising the distance between the OECC and the Dublin Bay Anchorage, which is a busy anchorage used by large vessels associated with Dublin Port. This is to avoid disruption to anchoring activity during the installation process, and an anchor interaction hazard once the offshore export cables are laid. Likewise, as described in **Section 3.14**, the Applicant has sought to maximise the distance between the individual offshore export cables and DLH whilst also avoiding potential archaeological constraints. At the point of overlap between the OECC and the DLH proposed dredging area, an area of potential deeper burial has also been identified, with an increased minimum depth of cover, as

Consultee	Comment	How issues have been addressed
		described in EIAR **Chapter 4 Project Description**.
CWP Project second phase of public consultation	During the second phase of public consultation the Applicant requested feedback on what may need to be considered as the offshore export cable alignments continue to be refined. No specific feedback on this was received.	N/A
Onshore substation		
Landowners and third-party asset owners / operators on Poolbeg Peninsula	Extensive engagement with landowners including Dublin City Council (DCC) and DPC has informed the identification of the preferred onshore substation site, as well has informing the layout of the onshore substation.	The outcomes of this engagement are described in **Section 3.15** and **3.16**.
CWP Project second phase of public consultation	During the second phase of public consultation the Applicant requested feedback on what may need to be considered as the onshore substation design continues to be refined. No specific feedback on this was received.	N/A
Dublin City Council	The Applicant has engaged with DCCs heritage team on the design and look of the onshore substation façade.	The outcomes of this engagement are described in the **Onshore Substation Architectural Design Statement**.
Onshore export cables		
Landowners and third-party asset owners / operators on Poolbeg Peninsula	Extensive engagement with landowners including Dublin City Council (DCC), DPC, Uisce Éireann and ESBN has informed the identification of the preferred onshore export cable route and installation method.	The outcomes of this engagement are described in **Section 3.17**.
Dublin City Council heritage team February 2023	DCC referenced the importance of the area from a heritage perspective and requested detailed heritage constraints mapping, showing the project infrastructure (above and below ground) and flagged the importance of the Great South Wall.	Detailed heritage constraints mapping has informed the selection of the preferred onshore export cable route and installation method (see **Section 3.17**).
CWP Project second phase of public consultation	During the second phase of public consultation the Applicant requested feedback on three indicative cable corridors. No specific feedback on the route options was received.	N/A

3.7 Do nothing scenario

49. The do nothing scenario is a description of the environment, where a proposed development did not proceed. The Revised Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA, May 2022) state that the 'do nothing alternative should describe consequences that are reasonably likely to occur.'

50. In the context of the CWP Project, the 'do nothing' scenario would comprise not proceeding with the development at all. This would remove any possibility of significant environmental effects (in the context of EIA), which for the CWP Project have been predicted in relation to seascape and landscape impacts only (see **Chapter 15 Seascape, Landscape and Visual Impact Assessment** for more detail).

51. However, the requirement for the project and its core objectives would not be met and to do nothing would be incompatible with core government policies to meet Ireland's legal obligations to reduce greenhouse gas emissions and transition to renewable energy.

52. In particular, the Climate Action Plan 2024 (DECC, 2024) demonstrates the urgent need for Ireland to limit GHG emissions, targeting a reduction of 51% in GHG emissions by 2030, compared to 2018 levels. The targets have been set under the Climate Action and Low Carbon Development (Amendment) Act 2011.

53. To achieve this the Climate Action Plan 2024 recognises the connection of 5 GW of offshore wind capacity by 2030 as a key action, and one that is central to the government's target to provide 80% of electricity from renewables by 2030.

54. With a generating capacity of 1.3 GW, the CWP Project will make a significant contribution of 26% towards this target (see **Plate 3-2**). Ireland's carbon budget for electricity between 2026 and 2030 is 20 Mt CO2eq total and that budget cannot be achieved unless there is early delivery of a significant volume of the installed capacity targets required by the Climate Action Plan. More detail on the need for the CWP Project and the expected contribution of the project to Ireland's carbon budget is provided in the **Planning Report** and in EIAR **Chapter 28 Climate - Carbon Balance Assessment**.

55. On Friday 10th March 2023 the Irish government published the 'Phase Two Policy Statement' which set out the expectation that Phase 2 OWF projects in Ireland will bridge the gap between whatever is delivered in Phase 1 and the 5 GW target in the Climate Action Plan. Is not suggested that other Phase 2 OWF projects will make up for the loss of Phase 1 OWF projects unless these projects fail to secure a route to market or development consent. The 'Phase Two Policy Statement' does not acknowledge or consider a 'do nothing' scenario for Phase 1 Projects, which would be inappropriate given the scale of the task in hand and the long lead-time for offshore wind development.

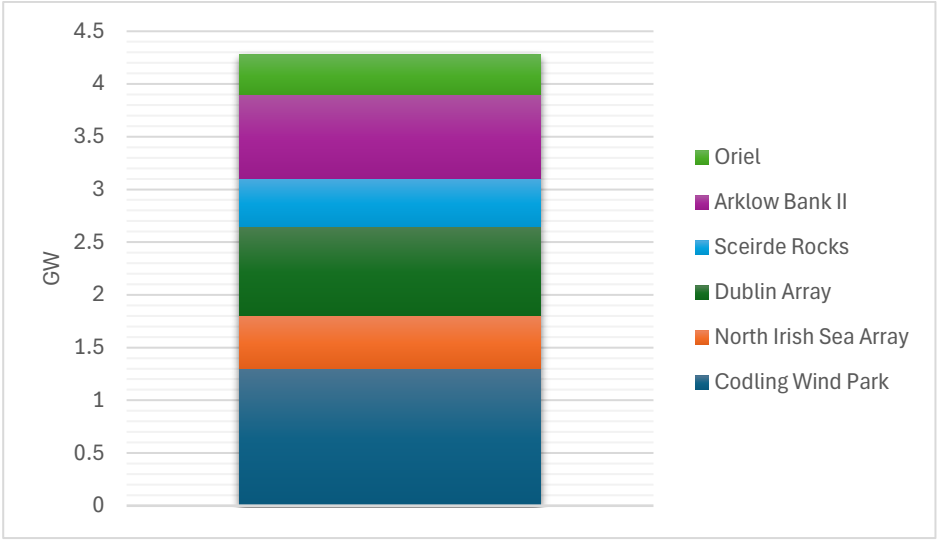


Plate 3-2 Contribution of the CWP Project and other Phase 1 OWF projects to the Irish Government's 2030 5 GW target for installed offshore wind capacity

56. In summary, the 'do nothing' scenario would significantly hinder efforts to respond to the clear and urgent need for offshore wind deployment at scale, before 2030, to help Ireland meet its legally binding net zero by 2050 commitment to mitigate the effects of climate change.

57. The 'do nothing' scenario is considered individually within each of the specialist chapters in the EIAR.

3.8 Phase 1: Consideration of alternative array sites (and associated infrastructure)

58. The site selection and consideration of alternatives for the CWP Project array site has been a staged process, underpinned throughout by three main success factors: environmental acceptability; practicability of construction; and commercial viability.

59. **Sections 3.8.1**, **3.8.3** and **3.8.5** of this document summarise the original assessment undertaken by FORL to identify a preferred site for the original CWP array site. The information presented in these sections is drawn from the Environmental Statements (ES) prepared for the original CWP array site (FORL, 2002) and the CWPE (FORL, 2009). This includes the presentation of original site selection considerations and analysis only.

60. The above sections in this chapter are supplemented by **Sections 3.8.2**, **3.8.4** and **3.8.6**, which are provided to support the original assessment by addressing relevant updates in policy, legislation and environmental and technical constraints to OWF development. This includes some retrospective analysis to demonstrate that the overall conclusions of the original site selection assessment remain valid whilst applying the requirements of the EIA Directive in its current form, and the requirements of the EPAs Revised Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA, May 2022).

61. **Section 3.8.7** provides a summary of the original conclusions by FORL at each stage of the array site selection process, and the additional analysis undertaken to support and validate these conclusions. In summary, for each stage of the array site selection process, the consideration of current legislation, policy and environmental and technical constraints has demonstrated that the conclusions of the

original assessment by FORL remain valid and that the preferred array site remains an appropriate site for the rapid deployment of an OWF.

62. Notwithstanding this additional analysis, it is the Irish Government's recognition of the advanced status of the CWP Project, including the original site selection and alternatives assessment, that led to the status of the CWP Project as a Phase 1 Project, enabling the Applicant to successfully apply to the Minister for the DECC for a MAC to more quickly advance Phase 1 Project commissioning and decarbonisation. This included a decision by the Irish Government to confine the invitation for MAC applications to the original foreshore lease area, incorporating the original CWP array site and the CWPE.

63. The process of designing and optimising the layout of the infrastructure within the array site is set out in detail within **Section 3.9** of this document.

3.8.1 Alternative array sites – whole of Ireland (summary of the original assessment (1999 – 2002))

Background

64. As described in **Section 3.2** of this chapter, the site selection and consideration of alternatives process for the CWP Project was first initiated by FORL in 1999 with the initial aim to identify a suitable location for the array site.

65. This section summarises the original assessment undertaken by FORL to identify a preferred search area for the array site within the whole o*f Ireland, within which potential array site locations could be identified and assessed. The analysis presented below has been drawn from the Environmental Statement (ES) that was submitted by FORL as part of the original CWP array site and includes:

- Relevant policy considerations;
- Study area and constraints analysis;
- Identification of reasonable alternatives; and
- The main reasons for selecting the preferred option.

Policy considerations

66. The key policy documents that informed the initial identification of a preferred search area for the CWP Project array site are summarised below.

Table 3-2 Summary of historic planning policy relevant to the consideration of alternative array sites (whole of Ireland)

Policy	Relevant considerations
Offshore Electricity Generating Stations – Note for Intending Developers (Department of the Marine and Natural Resources, 2001)	In 2001 the then Minister for the Marine and Natural Resources published a policy document on the regulation of offshore wind and wave electricity generating stations. The policy document 'Offshore Electricity Generating Stations – Note for Intending Developers' (Department of the Marine and Natural Resources, 2001) set out a two-phase approach to development, including an initial phase of site suitability investigation followed by the construction and operation phase, including a full environmental impact assessment in order to gain planning permission. In relation to latter, the policy document provided a list of information to be provided in Environmental Impact Statements (EISs) for Offshore Electricity Generating

Policy	Relevant considerations
	Stations, including the requirement to provide reasons for the non-selection of alternative locations [i.e., the array site]. The document also stated that: *'Offshore generating stations will not, as a general rule, be allowed within 5 km. of shore but applicants may make a case for such if they consider that the proposed construction will not interfere unduly with the visual amenity of the area in question (both landscape and seascape). Such applications will be subject to special consultation procedures in the light of potential for excessive visual impact.'*
Assessment of Offshore Wind Energy in the Republic of Ireland and Northern Ireland (Kirk McClure Morton, 2000)	The inception of the CWP Project also coincided with the timing of a joint study by the governments of the Republic of Ireland and Northern Ireland to assess Ireland's offshore wind resource, resulting in the published report 'Assessment of Offshore Wind Energy in the Republic of Ireland and Northern Ireland' (Kirk McClure Morton, 2000). From an environmental perspective the study identified a number of potential environmental issues to OWF development in Ireland including: seabed ecology; fisheries and spawning grounds; recreational use; migratory seabirds; visual impacts; underwater archaeology; noise; and the effects of transmission cables in coastal regions. However, with respect to site selection, the study concluded that *'although environmental issues have been identified, detailed site specific environmental assessments will be required at each offshore wind farm site. At this stage of the investigation therefore, areas [for offshore wind resource exploitation] have not been excluded on the basis of their environmental sensitivity'.* It's assessment of practical resource did, however, exclude all areas within 5 km of the coastline, citing the likely visual impact of developments within this area. The study also highlighted that the economic viability of offshore wind farms would be dependent on achieving a balance between: i. seeking the maximum available resource; and ii. choosing sites where structures can in practice be located. In this regard the study referenced water depth as a major factor that would influence project viability, alongside the aggressiveness of the offshore site and the location of the grid connection. Therefore, although not a policy document, the above-mentioned study provided an important, government-led data source for emerging OWF developments in Ireland. The following key conclusions were used to inform the site selection and consideration of alternatives process for CWP Project array site: • There is the potential for exploitation of wind energy resource along the east, south and west coasts of Ireland. • The effects of each development will be site specific and the detailed environmental impacts will become clear following the completion of the EIA. • Areas within 5 km of the coastline should be avoided due to the potential for visual impact on the character of the coast. • It is preferable from an engineering point of view to locate OWFs for power input to the Irish national gird in the east and south east coasts of the Republic of Ireland.

Study area and constraints analysis

67. The study area for original assessment by FORL included the whole of the Irish coastline. This began with an analysis of the key constraints to OWF development that were applicable at that point in time.

Environmental

68. The initial identification of broad search areas for the CWP array site was informed by the following environmental constraint:

- **Visual impact**: in line with relevant policy, to reduce the impacts of OWFs on onshore landscapes and visual receptors, a minimum distance of 5 km from the high water mark was set by FORL for potential sites. This hard constraint was adopted in accordance with the policy document 'Offshore Electricity Generating Stations – Note for Intending Developers' (Department of the Marine and Natural Resources, 2001). A much broader environmental constraints analysis was undertaken to identify and compare array site options within the preferred search area (see **Section 3.8.3** and **Section 3.8.5**).

Other

69. Technical and physical constraints linked to the practicability of construction and commercial viability also informed the initial identification of broad search areas for the CWP Project array site. More specifically, the constraints analysis undertaken by FORL for the consideration of whole of Ireland alternatives included:

- **Wind speed**: the European wind energy atlas was used to give indicative average annual wind speeds at various heights around the coastline of Ireland. A minimum indicative wind speed of 8.5 m/s at 50 m above sea level was selected as the cut off for a potentially viable OWF.
- **Water depth**: a maximum water depth of 20 m below MHWS was considered as being the limit for a potentially viable OWF, with favourable cost factors in other areas.
- **Continuous shallow water**: for the purposes of broad site selection FORL looked at the largest areas of continuous or adjacent shallow water of a depth no greater than 20 m.
- **Grid connection**: a distance of 30 km was defined as the maximum distance of a potential site from the nearest 110 or 220 kV distribution / transmission network. A reduction in the length of the offshore transmission cables reduces the environmental impact and costs of construction. It also reduces electrical losses.

Identification of reasonable alternatives

70. The following broad search areas, covering the whole of the Irish coastline were identified in the initial stages of the search for a suitable array site:

- West coast of Ireland;
- South coast of Ireland; or
- East coast of Ireland.

71. When considered against the environmental and technical search criteria described in the sections above, the east coast of Ireland was determined by FORL to be the only practicable location for the development of an OWF. The ES prepared for the original CWP array site sets out the principal reasons for this conclusion (see **Table 3-3** below).

Table 3-3 Identification of reasonable alternatives for the array site (whole of Ireland)

Option	Considerations (FORL, 2002)	Option taken forwards for further consideration? (Y/N)
West coast of Ireland	• Suitable sites for offshore wind farm development on the west coast of Ireland were typically located in close proximity to the shore in bays or estuaries such as Donegal Bay, Galway Bay, the Shannon Estuary, Dingle Bay etc. These sites were generally open to the west and exposed to Atlantic storms. • Visual impact was greatly increased at these sites because of their close distance to the shore and seabed conditions within the bays and estuaries on the west coast were generally comprised of soft muds, sands and gravels often underlain by rock at shallow depths. • Locations further offshore were unsuitable as water depths increased rapidly. Also, the limited number of suitable connections to the grid poses a disadvantage in this area.	N
South coast of Ireland	• The south coast is exemplified by deep water close to shore, with the seabed generally consisting of rock. This reduces the attractiveness of potential sites for wind farm development. • There are a limited number of suitable connections to the grid in this area, although there are 110 kV and 220 kV transmission lines running between Wexford, Waterford and Cork, they are generally located a considerable distance inshore.	N
East coast of Ireland	• East coast sites are subjected to a much less severe wave climate to that of the west coast and water depths are much more favourable to wind farm development with several banks located beyond 5–10 km from the coastline. • The east coast includes a number of stable sand banks where water depths are shallow. • The east coast sites are also located near a number of potential grid connection locations to both the 110 and 220 kV transmission systems. Wind farms would, therefore, have access to either service the main load centres such as Dublin or connect to the larger main national transmission system. • The east coast is not subject to as severe a wave climate as the west coast, however, storm wave conditions still pose significant structural design loads.	Y

The main reasons for selecting the preferred option

72. The initial site selection process undertaken by FORL found sites on the east coast of Ireland to be the only feasible option for OWF development when considered against the environmental and technical search criteria described in the sections above. A lack of suitable onshore grid connections in proximity to the west and south coast search areas, alongside increased water depths in these areas were key factors that contributed to this finding.

73. This conclusion aligned with the findings of the assessment undertaken by Kirk McClure Morton (2000); concluding that it is preferable from an engineering point of view to locate OWFs for power input to the Irish national gird in the east and south east coasts of the Republic of Ireland.

3.8.2 Alternative array sites – whole of Ireland (Information to support the original assessment)

74. The section above summarises FORLs original assessment to identify a preferred search area for the array site within Ireland, within which array site locations could be identified and assessed.

75. In order to validate the original conclusions, additional analysis is provided below that includes:

- Current policy considerations relevant to whole of Ireland alternatives for the CWP array site;
- A contemporary review of the environmental and technical constraints analysis relevant to whole of Ireland alternatives for the CWP array site;
- Identification of reasonable alternatives, considering the points above; and
- The main reasons for selecting the preferred option, considering the points above.

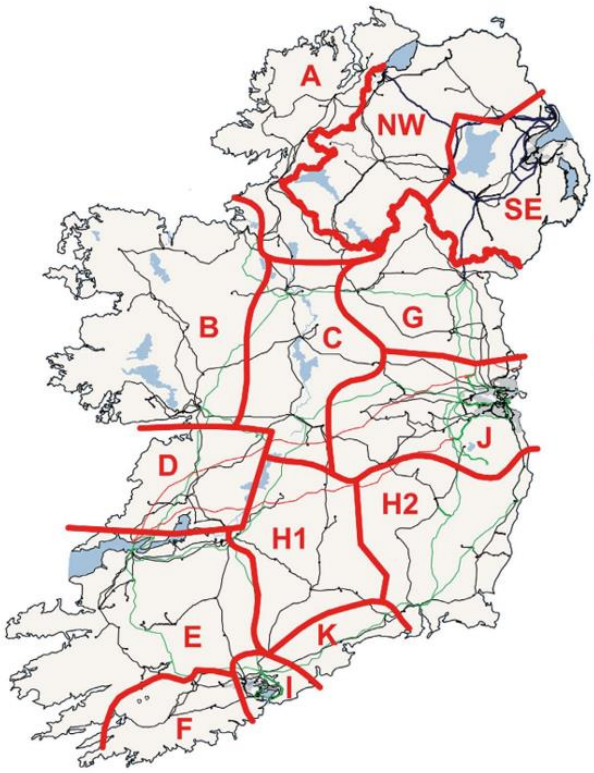
Policy considerations

76. **Table 3-4** summarises current planning policy and legislation in Ireland that considers or is relevant to the consideration of alternative locations for OWF development for the whole of Ireland.

Table 3-4 Summary of current planning policy relevant to the consideration of alternative array sites (whole of Ireland)

Policy	Relevant considerations
Maritime Area Planning Act 2021, as amended	Under the special transition provisions in the Maritime Area Planning Act 2021, as amended (the MAP Act), the Minister for DECC had responsibility for assessing and granting a Maritime Area Consent (MAC) for a first phase of offshore wind projects in Ireland. The Phase 1 Projects include Oriel Wind Park, Arklow Bank II, Dublin Array, North Irish Sea Array, Codling Wind Park and Skerd Rocks. A MAC has since been granted by DECC for each of the Phase 1 Projects. The special transition provisions in the MAP Act confirm the Irish Government's recognition of the extent of work, including the original site selection process for the Phase 1 Projects (including the CWP Project), and the need to commission the Phase 1 Projects quickly in order to advance decarbonisation. All the above-mentioned projects, with the exception of Sceirde Rocks, are located on the east coast of Ireland.
Offshore Renewable Energy Development Plan (DECC, 2014)	As part of the ORDEP (2014), the Irish Sea and its approaches were assessed for its potential to support offshore wind development in terms of GW that could be deployed. The associated SEA and Appropriate Assessment (AA) identified the east coast (south) assessment area (within which the CWP Project sits) as having the potential to accommodate between 3000 and 3300 MW without causing any likely significant adverse effects on the environment and other marine activities / users. This assessment took into account of the OWF developments in the Irish Sea that had already been approved by means of the foreshore consenting process including the original CWP array site (1,100 MW), Arklow Bank II (520 MW) and Dublin Array (214 MW). This assessment provided an early evidence base to support the development of offshore wind along the east coast of Ireland, and one which was based on a 'precautionary view' in relation to the technology available at the time of the

	assessment. Whilst the CWP Project, Arklow Bank II and the Dublin Array project locations haven't changed, and larger WTGs are proposed, the total number of WTGs proposed has decreased significantly. Therefore, although not a recent assessment, the conclusion of the ORDEP with respect to the east coast (south) assessment area is still considered to be valid.
Draft South Coast Designated Maritime Area Plan for Offshore Renewable Energy (draft SC-DMAP) (DECC, 2024)	As part of the Government's Phase 2 policy, the development of offshore wind projects beyond Phase 1 will be plan led through the development of several Designated Maritime Area Plans (DMAPs). The draft SC-DMAP represents the first sub-national, forward maritime spatial plan for ORE in Ireland. It identifies four Maritime Areas within the wider geographical area, which is the subject of the draft Plan. This will include an initial development of approximately 900 megawatt (MW) offshore wind capacity in Maritime Area A that will aim to contribute to achieving the Government objective of 5 gigawatts (GW) of grid connected offshore wind by 2030. The primary driver for selecting the location of the first DMAP, the South Coast DMAP published in May 2024, was '…. *the requirement to ensure that future offshore wind development is situated in proximity to available onshore grid capacity that will connect offshore wind generation to the onshore transmission system. The decision further reflects analysis by Ireland's transmission system operator (TSO), EirGrid, that there is sufficient current available onshore grid capacity to connect 700 MW to 900 MW of offshore wind capacity to the onshore transmission system along the South Coast*.' This is considered relevant in regard to the feasibility of the south coast area to accommodate the CWP Project's proposed export capacity of 1,300 MW. Relevant environmental considerations from the draft SC-DMAP for the siting of OWFs are also considered in the sections below, including the adoption of a 5 km minimum distance from shore to identify suitable maritime areas for OWF development.
EirGrid's Shaping Our Electricity Future Roadmap (EirGrid, 2023)	EirGrid's Shaping Our Electricity Future Roadmap (EirGrid, 2023) states that *'Offshore wind is expected to emerge as a key contributor to delivering the Renewable Ambition. Strong progress is being made to set the required regulatory frameworks and connection principles and methods in place. The initial focus leading up to 2030 is on developments on the east coast which places the generation close to the largest centre of demand, again reducing network constraints and the scale and quantity of network reinforcements required.'* **Plate 3-3**, taken from the roadmap, shows that grid constraints exist in the west, south west and south or Ireland.



Area	Offshore wind (MW)
IE AREA A	0
IE AREA B	0
IE AREA C	0
IE AREA D	0
IE AREA E	390
IE AREA F	0
IE AREA G	370
IE AREA H1	0
IE AREA H2	1,170
IE AREA I	350
IE AREA J	2,720
IE AREA K	0
NI SE	500
NI NW	0

Plate 3-3 Summary of assumed 2030 renewable generation capacities by area in Ireland and Northern Ireland (Source: Shaping Our Electricity Future Roadmap (EirGrid, 2023))

Study area and constraints analysis

77. **Table 3-5** repeats the environmental and technical the constraints originally considered by FORL for alternative search areas within the whole of Ireland (see **Section 3.7.1**). Relevant updates in response to current planning policy and publicly available constraints data are provided in the adjacent column.

Table 3-5 Updated constraints analysis for whole of Ireland alternatives

Constraint	Original considerations (FORL, 2002)	Relevant updates
Environmental		
Visual impact	In line with relevant policy, to reduce the impacts of OWFs on onshore landscapes and visual receptors, a minimum distance of 5 km from the high water mark was set by FORL for potential sites.	Visual impact remains a key consideration for OWF development. This is reflected in the ORDEP which states that '*consideration should be given to locating devices at a maximum distance from the shore / coast (within technological constraints*)'. In addition, the most recent OWF policy in Ireland, the draft SC-DMAP (DECC, 2024), adopted a 5 km

		minimum distance from shore to identify suitable maritime areas for OWF development.
Other		
Wind speed	The European wind energy atlas was used to give indicative average annual wind speeds at various heights around the coastline of Ireland. A minimum indicative wind speed of 8.5 m/s at 50 m above sea level was selected as the cut off for a potentially viable OWF.	SEAI Wind Maps (2013) as shown on Ireland's Marine Atlas demonstrate sufficient wind speeds for OWF development around the whole coastline of Ireland, with mean wind speeds generally in excess of 8.5 m/s at all locations. Furthermore, sites with mean wind speeds less than 8.5 m/s are also now technically feasible due to more advanced WTG technology. Overall, the SEAI Wind Map data demonstrates the potential for OWF development in Ireland around the full coastline of Ireland. Wind speed is therefore considered non material with respect to the consideration of whole of Ireland alternatives.
Water depth / continuous shallow water	A maximum water depth of 20 m below MHWS was considered as being the limit for a potentially viable OWF, with favourable cost factors in other areas. For the purposes of broad site selection FORL looked at the largest areas of continuous or adjacent shallow water of a depth no greater than 20 m.	It is noted that recent advances in WTG technology and associated installation methods have increased the limit of fixed bottom WTG foundation installation. The implications of this are discussed further below and also in regard to East Coast of Ireland and Codling Bank alternatives (**Section 3.8.4** and **Section 3.8.6**, respectively).
Grid connection	A distance of 30 km was defined as the maximum distance of a potential site from the nearest 110 or 220 kV distribution / transmission network. A reduction in the length of the offshore transmission cables reduces the environmental impact and costs of construction. It also reduces electrical losses.	To deliver electricity from the CWP Project it is necessary to connect the array site to the existing onshore transmission grid. This requires an onshore transmission grid location with 220 kV electrical connectivity, which is the electrical voltage of the incoming export cables. A 110 kV connection would no longer be suitable. When considering this constraint in the context of whole of Ireland alternatives, it can be seen from **Plate 3-4** that the existing 220 kV network extends around the full coast of Ireland, however, **Plate 3-3** (see **Table** 3-4) demonstrates that grid constraints in terms of grid capacity still exist west, south west and south.

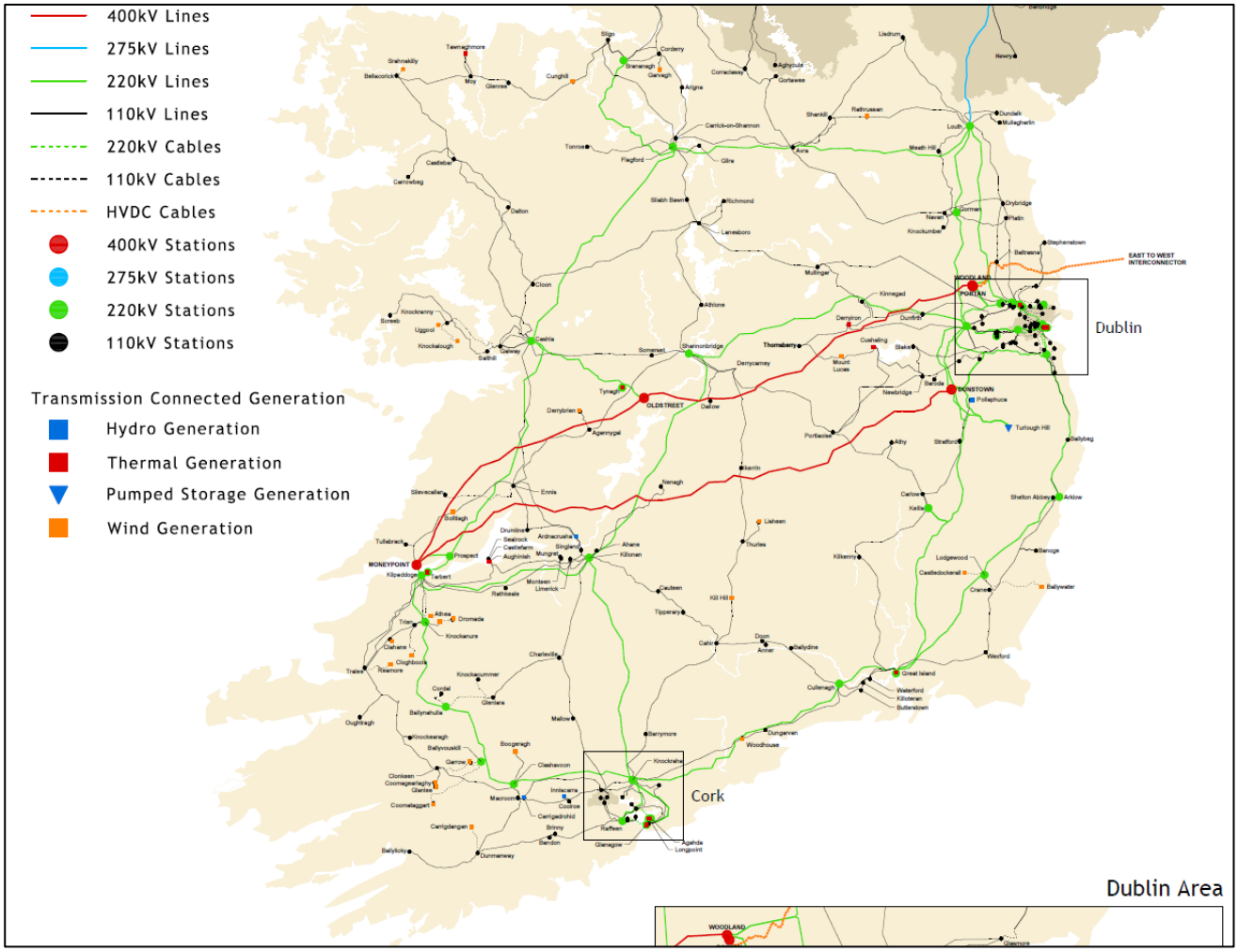


Plate 3-4 EirGrid transmission system map

Identification of reasonable alternatives

78. The original assessment by FORL, described in **Section 3.8.1**, found sites on the east coast of Ireland to be the only feasible option for OWF development when considered against the environmental and technical constraints described in the sections above. A lack of suitable onshore grid connections in proximity to the west and south coast search areas, alongside increased water depths in these areas were key factors that contributed to this finding.

79. Current policy including the draft SC-DMAP (see Table 3-4) and the relevant updates in **Table 3-5** demonstrate that grid constraints remain a primary driver for selecting suitable locations for the development of OWFs. **Plate 3-3** from EirGrid's 'Shaping Our Electricity Future Roadmap' (EirGrid, 2023) shows that grid constraints still exist west, south west and south. There is currently insufficient grid capacity in these areas (current or planned) to accommodate the CWP Project's proposed export capacity of 1300 MW.

80. It is noted that recent advances in WTG technology and associated installation methods have increased the limit of fixed bottom WTG foundation installation at commercial scale to water depths up to approximately 59 m. However, even with the ability to install fixed bottom WTGs to such depths,

there are large extents of the west and south west coasts of Ireland where water depths are beyond the limits of current technology within 5 km of the shore.

81. Considering the above, it remains the case that alternative sites on the south and west coast of Ireland are not deemed to be reasonable alternatives when considering the overarching project objective to deliver a significant contribution (>25%) to the Irish Government's goal of achieving 5 GW installed electricity generation capacity in offshore wind by 2030. This is reflected in the Irish Governments decision to designate five OWF projects on the east coast of Ireland as Phase 1 Projects; namely the CWP Project, Oriel Wind Park, Arklow Bank II, Dublin Array and North Irish Sea Array. This enabled the Applicant to apply to the Minister for the DECC for a Maritime Area Consent (MAC) and demonstrates the Irish Government's recognition of the work already completed, including the original site selection process, for the projects and the need to commission the Phase 1 Projects quickly in order to advance decarbonisation.

The main reasons for selecting the preferred option

82. The initial site selection process undertaken by FORL found sites on the east coast of Ireland to be the only feasible option for OWF development. Contemporary analysis presented in the sections above has shown that the main reasons for FORL reaching this conclusion remain valid:

- The east coast provides the most available and viable grid connection points for large scale offshore wind development;
- The water depths on the east coast of Ireland support suitable locations further offshore; and
- In the context of wider effects on the environment, ORDEP identified the east coast (south) assessment area (within which the CWP Project sits) as having the second highest potential for fixed offshore wind development in terms of total MW capacity, without causing any likely significant adverse effects.

3.8.3 **Alternative array sites – east coast of Ireland** (summary of the original assessment (1999–2002))

Background

83. Following the initial identification of a preferred search area, a more in-depth analysis of potential array sites on the east coast of Ireland was undertaken. This section summarises the original assessment undertaken by FORL, drawing on the analysis presented in the ES prepared by FORL for the original CWP array site.

Policy considerations

84. Key policy documents and associated policies relevant at the time of the original assessment of east coast of Ireland alternatives for the CWP Project array site are as presented in **Table 3-2** for the whole of Ireland alternatives.

Study area and constraints analysis

85. Following the initial identification of a preferred search area (the east coast of Ireland), a more in-depth review of potential sites on the east coast of Ireland was undertaken. No specific study area was defined, however four areas associated with shallow offshore banks along were identified for further analysis:

- Kish and Bray Banks;
- Codling Bank (including India Bank to the south);
- Arklow Bank; and
- Blackwater Bank.

86. Firstly, the site conditions of the four areas, including the banks and the immediate areas surrounding each bank, were reviewed to better understand the physical characteristics of each area and the suitability of the area to accommodate OWF development. The outputs of this analysis were presented in the ES for the original CWP array site and are re-presented for the purposes of this chapter in **Table 3-6** below.

Table 3-6 Site condition review of existing banks along the east coast of Ireland (FORL, 2002)

Site	Site condition summary
Kish and Bray Banks	• The Kish and Bray Banks join to form a long narrow sandbank extending north-south from the mouth of Dublin Bay for 17 km to approximately 1 km north of the Codling Bank. The bank is approximately 2.5 km in width. Water depths on the bank range between 1 and 18 m rapidly increasing in depth to up to 40 m to the east and west of the sandbanks. • The Codling Bank provides some shelter to the south end of the Kish Bank from southerly storms; however, the whole bank is subjected to storms waves from the north to south east direction. Wave heights along the bank will typically be 5 m during storm conditions. • The nature of the seabed material indicates the bank would provide suitable stability for a range of different foundation types. • The shape of the Kish and adjoining Bray banks would constrain a wind farm placed on it to a long strip of WTGs running parallel to the Irish shoreline.
Codling Bank	• The Codling Bank is located between approximately 9 km and 25 km off the east coast of Ireland between Greystones and Wicklow Head. The shallow bank ranging between 2 m and 9 m in depth is located to the north approximately 9 km off the coast from Greystones and runs east west for approximately 5.5 km. The area of shallow water less than 20 m in depth is considerably larger, extending over 26 km in the north-south direction and 20 km east-west. • The average wave height at the Codling bank is approximately 1.3 m. Waves in gale conditions are predicted to be in the order of 5.0 – 5.5 m significant wave height. • Investigation of the geological forms of the bank together with historic morphological analysis shows that unlike most of the other banks on the east coast of Ireland, the Codling Bank has a stable structure and has remained in its current location for more than 100 years. • The nature of the seabed material and the known stability of the bank would indicate that the bank is suitable for a range of different foundation types.
Arklow Bank	• The Arklow Bank is located approximately 8 to 10 km offshore to the east of Arklow in County Wicklow. The long, narrow sandbank runs north-south for approximately 27 kilometres. The bank is approximately 2 km in width with rapidly increasing water depths to in excess of 30 metres to the east and west of the bank. • Wave heights will vary across the bank from about 3 m to 7 m during a 1 in 50 return period storm. The nature of the seabed material would indicate that the bank would be suitable for a range of different foundation types.

Site	Site condition summary
	• Similar to the Kish and Bray Banks the shape of the Arklow bank would constrain a wind farm placed on it to a long strip of WTGs running parallel to the Irish shoreline.
Blackwater Bank	• The Blackwater Bank is located between approximately 5 and 8 km from the coastline to the north east of Wexford. The long narrow sand bank runs north south for approximately 17 kilometres. The bank is approximately 3 kilometres in width, with shallow waters ranging from 10 to 15 metres depth to the west of the bank and deeper water in excess of 35 metres to the east of the bank. The coastline in the area of the Blackwater Bank is a high amenity area. • Shipping in the area is restricted due to the shallow water depth of the bank, however, there are shipping routes and high-speed craft operating in the vicinity due to the proximity to Rosslare Europort. • Wave heights to the seaward side of the bank are typically 5 m and reduce to 3 m or less on the inside of the bank. • Similar to the Arklow Bank, the shape of the bank would confine a wind farm placed on it to a long strip of WTGs running parallel to the Irish shoreline increasing the degree of visual impact. This would have less impact on the energy yield on this bank due to its position on the south east coast. • Preliminary desktop studies have indicated a high concentration of seabirds on this bank.

87. In addition to the above, FORL provided further analysis of the constraints to OWF development on the east coast of Ireland, against which potential options could be assessed. The sections below describe the key constraints that were identified at the time of the original assessment.

Environmental

- **Visual impact**: in line with relevant policy at the time of the assessment, to reduce the impacts of OWFs on onshore landscapes and visual receptors, a minimum distance of 5 km from the high water mark was set by FORL for potential sites.
- **Underwater pipelines and cables**: FORL identified two underwater cables located to the north of Dublin Bay, indicated on the Admiralty Chart, which cross the south end of the Bennet Bank and a further submarine cable crossing the north end of the Bennet Bank. There was also a gas interconnector pipeline identified, in excess of 20 km north of Dublin Bay. However, it was noted that this pipeline is located in waters that are generally in excess of 25 m in depth and therefore unsuitable for wind farm development. The Admiralty Chart 1468 at time of the assessment indicated three cables fanning out from the coastline at Newcastle in County Wicklow, however, only the near shore elements of the cable were illustrated.
- **Navigation channels and commercial craft**: A number of navigation corridors were noted to exist within the Irish Sea including a number of daily ferry crossings between Ireland and Europe, these operate out of Dun Laoghaire Ferryport, Dublin Port, Rosslare Ferryport and Cork Harbour. Dún Laoghaire Ferryport is situated approximately 11 km South of Dublin City, Rosslare Ferryport is situated in Co. Wexford on the south east coast and Cork Harbour is located on the south coast. These are, however, all following channels that in any case have depths greater than the maximum considered by the study for an offshore wind farm.
  FORL described a number of small to medium size commercial and leisure craft entering in and out of the ports and harbours along the coastline, namely Arklow Port, Wicklow Harbour, Dun Laoghaire Harbour etc. However, no navigation channels were identified for these vessels.

- **Designated areas**: At the time of the original assessment no offshore Special Protection Areas (SPAs) had been designated or proposed for marine birds listed on Annex I of the EU Birds Directive (79/409). Similarly, there were no proposed Natural Heritage Areas for marine birds on the informal listings. However, on the coastline, The Murrough, extending between Wicklow and Greystones, contained two designated SPAs for birds under the EU Birds Directive – Broadlough and Kilcoole Marshes. At the time of the original assessment, The Murrough was also a proposed Special Area of Conservation (SAC) under the EU Habitats Directive. It was also a proposed Natural Heritage Area (pNHA).
  The Wicklow County Development Plan (1999) lists the coastal area as an Area of Outstanding Natural Beauty.
  The Wicklow Reef was proposed as a marine Special Area for Conservation (SAC) on the basis of its biogenic reef (*Sabellaria*) structures in 2000. The reef is located off Wicklow Head and is in the vicinity of the Codling and Arklow Banks.

Other

- **Water depth**: a maximum water depth of 20 m below MHWS was considered as being the limit for a potentially viable offshore wind farm, with favourable cost factors in other areas.
- **Continuous shallow water**: for the purposes of array site selection FORL looked at the largest areas of continuous or adjacent shallow water of a depth no greater than 20 m.
- **Seabed stability**: the nature of the seabed material and the stability of the bank has an impact on the suitability of different foundation types.
- **Grid connection**: a distance of 30 km was defined as the maximum distance of a potential site from the nearest 110 or 220 kV distribution / transmission network. A reduction in the length of the offshore transmission cables reduces the environmental impact and costs of construction. It also reduces electrical losses.

Identification of reasonable alternatives

88. As described in the section above, four areas along the east coast of Ireland were identified by FORL as reasonable alternatives for the location of the CWP Project array site:

- Kish and Bray Banks;
- Codling Bank (including India Bank to the south);
- Arklow Bank; and
- Blackwater Bank.

Comparison of environmental effects

89. It is noted in the ES for the original CWP array site that each of the abovementioned alternatives were assessed against a range of technical and environmental criteria, leading FORL to identify a preferred location on the east coast of Ireland for the CWP Project array site. The conclusions of this assessment were summarised in the ES for the original CWP array site and have been restated below.

The main reasons for selecting the preferred option

90. The desktop studies completed by FORL for the CWP array site highlighted multiple banks on the east coast of Ireland as being potentially viable OWF sites, however, it was considered that the Codling Bank (including India Bank to the south) demonstrated considerable advantages over the other areas

identified. The key advantages were set out in the ES for the original CWP array site and have been listed below:

- Firstly, the size, shape and known stability of the bank would present a wide-ranging scope for site design and would permit positioning of the wind farm layout away from any features of environmental importance, for example, archaeological finds, should they be encountered during site investigation (SI) works or consultation.
- Secondly, as the Codling Bank is significantly larger than the other banks in the area, it allows the design of a wind farm to be in a layout extending away from the coastline, rather than confined to a long strip of WTGs running parallel to the coastline, as would be the case for other sites considered on the east coast. This would both increase the energy yield of the site as the WTGs would be located perpendicular to the prevailing wind direction providing maximum wind capture and would also significantly reduce the horizontal extent of the wind farm when viewed from the coastline, thus markedly reducing the degree of visual impact from the coastline.
- Thirdly, the Codling Bank has a stable structure and has remained in its current location for more than 100 years. This stability provides scope for a range of suitable foundations for the site.

91. The distance of the site from the coastline also presents the advantage of reducing the magnitude of visual impact when viewed from the shoreline when compared to other potential areas. Since the shoreline along the east coast has areas designated at national level for their landscape value it was thought advantageous to increase the distance to the shore within the physical constraints set out at the start of this section.

92. The main disadvantage of the Codling Bank compared to other potential areas was noted by FORL as the greater distance from the closest potential transmission connection and therefore increased grid connection costs. Despite this, it was considered that the site had good economic potential for a viable offshore wind farm.

3.8.4 **Alternative array sites – east coast of Ireland** (information to support the original assessment)

93. The section above summarises FORLs original assessment to identify a preferred area on the east coast of Ireland for the CWP array site, within which array site locations could be identified and assessed.

94. In support of the original conclusions, additional analysis is provided below that includes:

- Current policy considerations relevant to east coast of Ireland alternatives for the CWP array site;
- A contemporary review of the environmental and technical constraints analysis relevant to east coast of Ireland alternatives for the CWP array site;
- Identification of reasonable alternatives, considering the points above; and
- The main reasons for selecting the preferred option, considering the points above.

Policy considerations

95. **Table 3-7** summarises current planning policy in Ireland that considers or is relevant to the consideration of alternative locations for OWF development along the east coast of Ireland. A more detailed consideration of compliance with ORDEP and NMPF policies is provided in the **Planning Report**.

Table 3-7 Summary of current planning policy relevant to the consideration of alternative array sites (east coast of Ireland)

Policy	Relevant considerations
Offshore Renewable Energy Development Plan (2014)	The ORDEP states that *'in order to ensure that significant adverse effects in the marine environment as a result of the development of offshore renewable energy projects are managed appropriately, measures to avoid, reduce or offset any potential significant adverse effects have been developed through the Strategic Environmental Assessment (SEA) and Natura Impact Statement (NIS) processes'.* The OREDP project level mitigation measures of relevance to the consideration of alternative array sites along the east coast of Ireland include: • Geology, geomorphology and hydrography: o Avoidance of placement of devices in areas where sediment transport pathways are modelled as highly sensitive to change. • Protected sites and species: o Careful site selection avoiding sensitive sites for devices and export cables (i.e., existing and proposed protected sites). • Fish and Shellfish: o Avoid sensitive sites / areas where possible; and o Avoid locating developments on key migration routes or in key breeding areas. • Marine birds: o Avoid sensitive sites / areas where possible (i.e., SPAs); o Avoid large installations in migratory corridors; and o Avoid siting offshore windfarms in key offshore resting, roosting and foraging areas or near coastal breeding / roosting areas. • Marine mammals: o Avoid sensitive sites / areas where possible; and o Avoid large installations in migratory corridors. • Marine Reptiles: o Do not site devices in particularly sensitive areas – e.g., migration routes, feeding, breeding areas; and o Avoid placement of devices within constrained areas where array could completely block or cause a significant perceptual barrier to marine reptiles. • Commercial fisheries: o Avoid device placement in sensitive areas. • Aquaculture: o Avoid device placement in or near to existing fish farms. • Ports, Shipping and Navigation: o Avoid constrained areas or areas of high shipping densities and regularly used shipping routes.

	• Military Exercise Areas:
	  ○ Avoidance of byelawed and danger sites.
	• Dredging and Disposal Areas:
	  ○ Avoid development within 500 m of dredging and / or disposal sites.
	• Oil and Gas Activity:
	  ○ Careful site selection avoiding areas of existing and proposed oil and gas activity.
	• Seascape:
	  ○ Consideration should be given to locating devices at a maximum distance from the shore / coast (within technological constraints); and
	  ○ Consider spacing of turbines at wide enough intervals to permit use of mobile fishing gear.
	Although not in place at the time of site selection process for the CWP array site, the analysis presented below demonstrates an approach that is unpinned by the principle of impact avoidance, and is therefore consistent with the requirements of this more recent policy document.

National Marine Planning Framework (2021)	The NMPF promotes impact avoidance across a wide range of receptor groups, articulated around Overarching Marine Planning Policies (OMPP) supplemented by Sectoral Marine Planning Policies (SMPP). SMPP that are of relevance to the consideration of alternative array sites along the east coast of Ireland include: • Biodiversity Policy 1; • Biodiversity Policy 4; • Protected Marine Sites Policy 4; • Seascape and Landscape Policy 1; • Aquaculture Policy 2; • Petroleum Policy 1; • Fisheries Policy 1; and • Ports, Harbours and Shipping Policy 2. Although not in place at the time of site selection process for the CWP array site, the analysis presented below demonstrates an approach that is unpinned by the principle of impact avoidance, and is therefore consistent with the requirements of the abovementioned polices.

Study area and constraints analysis

96. As described in **Section 3.8.3**, the original assessment indicated a study area consisting of four areas associated with shallow offshore banks along the east coast of Ireland:

- Kish and Bray Banks;
- Codling Bank (including India Bank to the south);
- Arklow Bank; and
- Blackwater Bank.

97. The focus of the original assessment on these particular areas can be explained by reference to regional scale bathymetry for the east coast of Ireland which shows that the nearshore is characterised by the presence of a series of coast-parallel, north-south trending, offshore banks.

98. These banks are generally about 10 km offshore, typically stand in 20 to 40 m of water and rise to within a few metres of the water surface. The banks form a punctuated line along the east coast, and from north to south include Bennet, Kish and Bray, Frazer, Codling, India, Arklow, Glassgorman, Rusk and Blackwater banks.

99. OWFs around the UK and Ireland are generally sited on shallow banks, which offer advantages in easier installation methods, scaled reductions in foundation mass requirements, and in the tendency of shallow banks to be located in areas away from shipping channels (Coughlan, Long and Doherty, 2020). This includes the one existing OWF in Ireland, located on Arklow Bank.

100. It is therefore logical from both an environmental and technical perspective to define a study on the east coast of Ireland that focuses on the existing shallow banks that are a feature of Ireland's eastern coastline.

101. For the purposes of an updated constraints analysis, presented below, the original study area (including Kish and Bray Banks, Codling Bank (including India Bank to the south), Arklow Bank and Blackwater Bank) has been broadened to take account of the full north to south extent of the east coast banks, including Bennet, Kish and Bray, Frazer, Codling, India, Arklow, Glassgorman, Rusk and Blackwater banks.

102. **Table 3-8** presents the environmental and technical the constraints originally identified by FORL for alternative array sites on the east coast of Ireland (see **Section 3.8.3**). Relevant updates in response to current planning policy and publicly available constraints data are provided in the adjacent column.

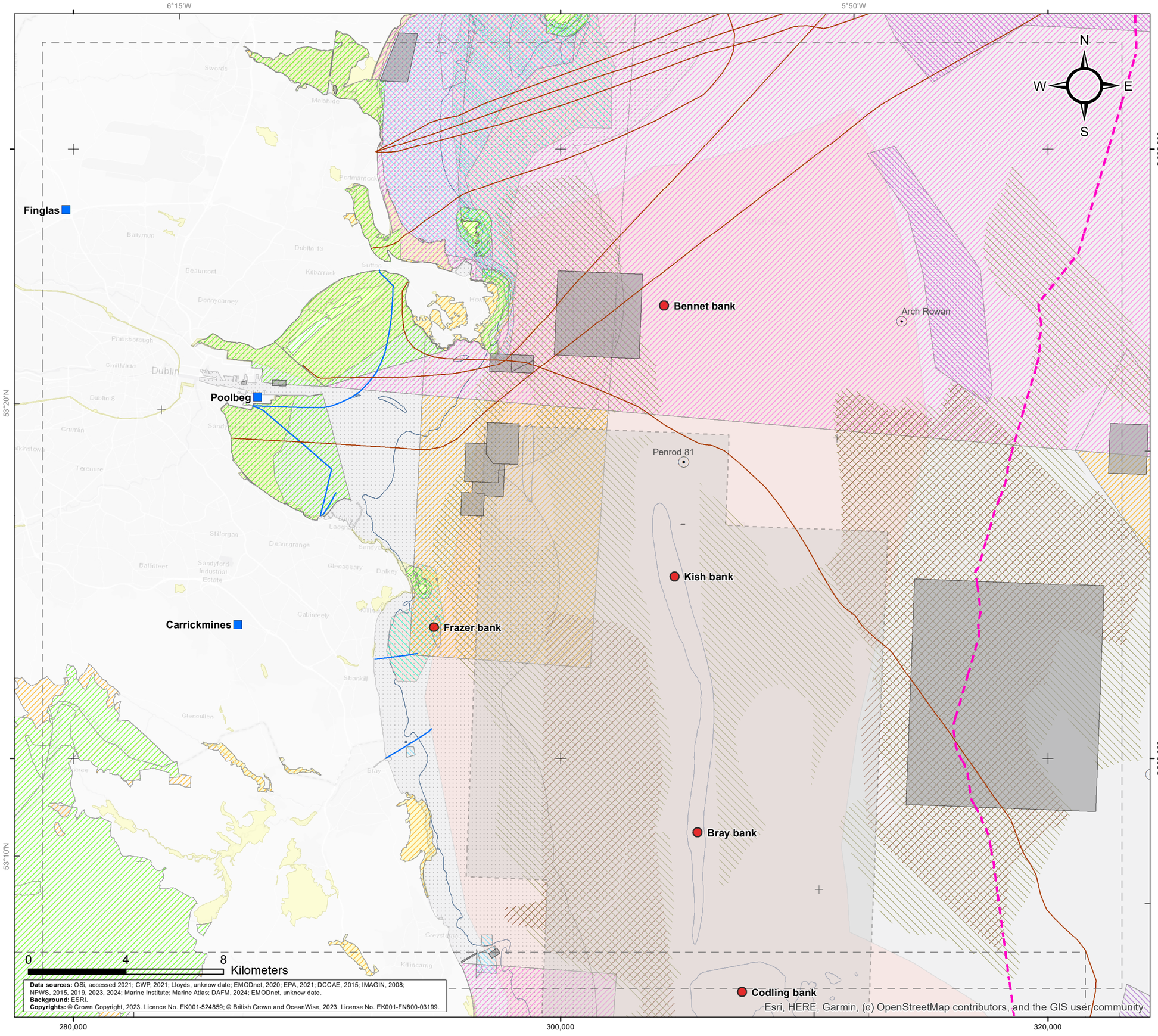
103. To inform this section an updated environmental constraints map has been produced (see **Figure 3-2**).

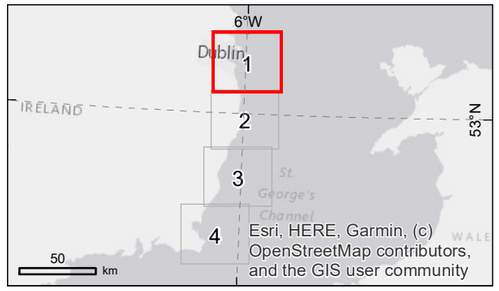
Table 3-8 Updated constraints analysis for east coast of Ireland alternatives

	Original considerations (FORL, 2002)	Relevant updates
Environmental		
Visual impact	In line with relevant policy at the time of the assessment, to reduce the impacts of OWFs on onshore landscapes and visual receptors, a minimum distance of 5 km from the high water mark was set by FORL for potential sites.	Visual impact remains a key consideration for OWF development. This is reflected in the ORDEP which states that '*consideration should be given to locating devices at a maximum distance from the shore / coast (within technological constraints*)'. In addition, the most recent OWF policy in Ireland, the draft SC-DMAP (DECC, 2024), adopted a 5 km minimum distance from shore to identify suitable maritime areas for OWF development.
Underwater pipelines and cables	There are two underwater cables located to the north of Dublin Bay, indicated on the Admiralty Chart, which cross the south end of the Bennet Bank and a further submarine cable crossing the north end of the Bennet Bank. There is also a gas interconnector pipeline, which is located in excess of 20 km north of Dublin Bay, however, this pipeline is located in waters that are generally in excess of 25 m in depth and are therefore unsuitable for wind farm development. The Admiralty Chart 1468 indicates three cables fanning out	In line with current policy, developers should demonstrate consideration of existing cables passing through or adjacent to areas for development, making sure ability to repair and carry out cable-related remedial work is not significantly compromised. Existing subsea infrastructure (i.e., cables and pipelines) are shown on **Figure 3-2**.

	from the coastline at Newcastle in County Wicklow, however, only the near shore elements of the cable are illustrated.	Overall, the location of existing subsea infrastructure is relatively unchanged since the original assessment by FORL.
Navigation channels and commercial craft	A number of navigation corridors exist within the Irish Sea including a number of daily ferry crossings between Ireland and Europe, these operate out of Dun Laoghaire Ferryport, Dublin Port, Rosslare Ferryport and Cork Harbour. Dún Laoghaire Ferryport is situated approximately 11km South of Dublin City, Rosslare Ferryport is situated in Co. Wexford on the south east coast and Cork Harbour is located on the south coast. These are, however, all following channels that in any case have depths greater than the maximum considered by the study for an offshore wind farm. There are a number of small to medium size commercial and leisure craft entering in and out of the ports and harbours along the coastline, namely Arklow Port, Wicklow Harbour, Dun Laoghaire Harbour etc., however, there are no navigation channels identified for these vessels.	In line with current policy, areas of high shipping densities and regularly used shipping routes should be avoided, although this is likely to be the case given the shallow nature of the banks. Overall, the main navigation corridors and areas of increased vessel densities are as described in the original assessment by FORL.
Designated areas	No offshore Special Protection Areas (SPAs) have been designated or proposed for marine birds listed on Annex I of the EU Birds Directive (79/409). Similarly, there are no proposed Natural Heritage Areas for marine birds on the informal listings proposed to date. However, on the coastline, the Murrough, extending between Wicklow and Greystones, contains two designated SPAs for birds under the EU Birds Directive – Broadlough and Kilcoole Marshes. The Murrough is also a proposed Special Area of Conservation (SAC) under the EU Habitats Directive. It is also a proposed Natural Heritage Area (pNHA). The Wicklow County Development Plan (1999) lists the coastal area as an Area of Outstanding Natural Beauty. The Wicklow Reef was proposed as a marine Special Area for Conservation (SAC) on the basis of its biogenic reef (*Sabellaria*) structures in 2000. The reef is located off Wicklow Head and is in the vicinity of the Codling and Arklow Banks.	In line with current policy, sites within or in close proximity to marine protected sites will be avoided where possible. The current boundaries of designated sites for nature conservation are shown on **Figure 3-2** (Ireland's Marine Atlas, 2024).
Commercial fisheries	Not specifically considered in original assessment with respect to east coast of Ireland alternatives.	In line with current policy, sensitive areas for commercial fishing should be avoided where possible. Data indicating the location of different fishing activities in Irish waters is shown

		on **Figure 3-2** (Ireland's Marine Atlas, 2024).
Aquaculture	Not specifically considered in original assessment with respect to east coast of Ireland alternatives.	In line with relevant policy, sites close to existing fish farms should be avoided where possible. Existing aquaculture sites within the study area are shown on **Figure 3-2** (Ireland's Marine Atlas, 2024).
Oil and gas infrastructure licensed exploration areas	Not specifically considered in original assessment with respect to east coast of Ireland alternatives.	In line with current policy, areas of existing and proposed oil and gas activity should be avoided where possible. Oil and gas infrastructure licensed exploration areas within the study area are shown on **Figure 3-2** (Ireland's Marine Atlas, 2024).
Marine aggregates and disposal sites	Not specifically considered in original assessment with respect to east coast of Ireland alternatives.	In line with current policy, development within 500 m of dredging and / or disposal sites should be avoided where possible. Licenced dredging and disposal sites within the study area are shown on **Figure 3-2** (Ireland's Marine Atlas, 2024).
Other		
Water depth / continuous shallow water	A maximum water depth of 20 m below MHWS was considered as being the limit for a potentially viable OWF, with favourable cost factors in other areas. FORL also looked at the largest areas of continuous or adjacent shallow water of a depth no greater than 20 m.	It is noted that recent advances in WTG technology and associated installation methods have increased the limit of fixed bottom WTG foundation installation. The implications of this are discussed further in regard to Codling Bank alternatives (see **Section 3.8.6**).
Grid connection	A distance of 30 km was defined as the maximum distance of a potential site from the nearest 110 or 220 kV distribution / transmission network. A reduction in the length of the offshore transmission cables reduces the environmental impact and costs of construction. It also reduces electrical losses. A more detailed description of the grid constraints identified at the time of the original assessment are described in **Section 3.8.3**.	To deliver electricity from the CWP Project it is necessary to connect the array site to the existing onshore transmission grid. This requires an onshore transmission grid location with 220 kV electrical connectivity, which is the electrical voltage of the incoming export cables. A 110 kV connection would no longer be suitable. When considering this constraint in the context of east coast of Ireland alternatives, it can be seen from **Plate 3-4** that 220 kV infrastructure extends along the east coast of Ireland, with a number of existing 220 kV stations located in close proximity to the coastline. Furthermore, **Plate 3-3** (see **Table 3-4**) indicates suitable grid capacity along the east coast of Ireland.





Legend

- 5km buffer from high water mark
- 12 nautical mile limit

Potential grid connection points
- Carrickmines
- Poolbeg
- Finglas

- East coast of Ireland banks

Subsea utilities
- Submarine cable (telephone/power)
- Pipeline

Oil and gas infrastructure licensed exploration areas
- Exploration well
- Authorised oil and gas exploration area

Marine aggregates and disposal sites
- Aggregate resource area
- Aggregate study area
- Disposal at sea

Designated sites for nature conservation
- Special Protection Area (current)
- Special Protection Area (original)
- Special Conservation Area
- Proposed National Heritage Areas (pNHAs)

Commercial fishing
- Dredge fishing areas
- Fishing grounds
- Nets fishing
- Pot fishing

- Bathymetric contours 2m (10m below m VORF LAT)
- Map viewframes

Background: Charts 1468,1787-0 (UKHO)

codling wind park	*Project:* Codling Wind Park	*Contractor:*

Figure 3.2
Array site – east coast of Ireland constraints map

Page 1 of 4

CWP doc. number: CWP-CWP-CON-09-MAB-1081

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Rev.	Description	Date	By	Chk'd	App'd
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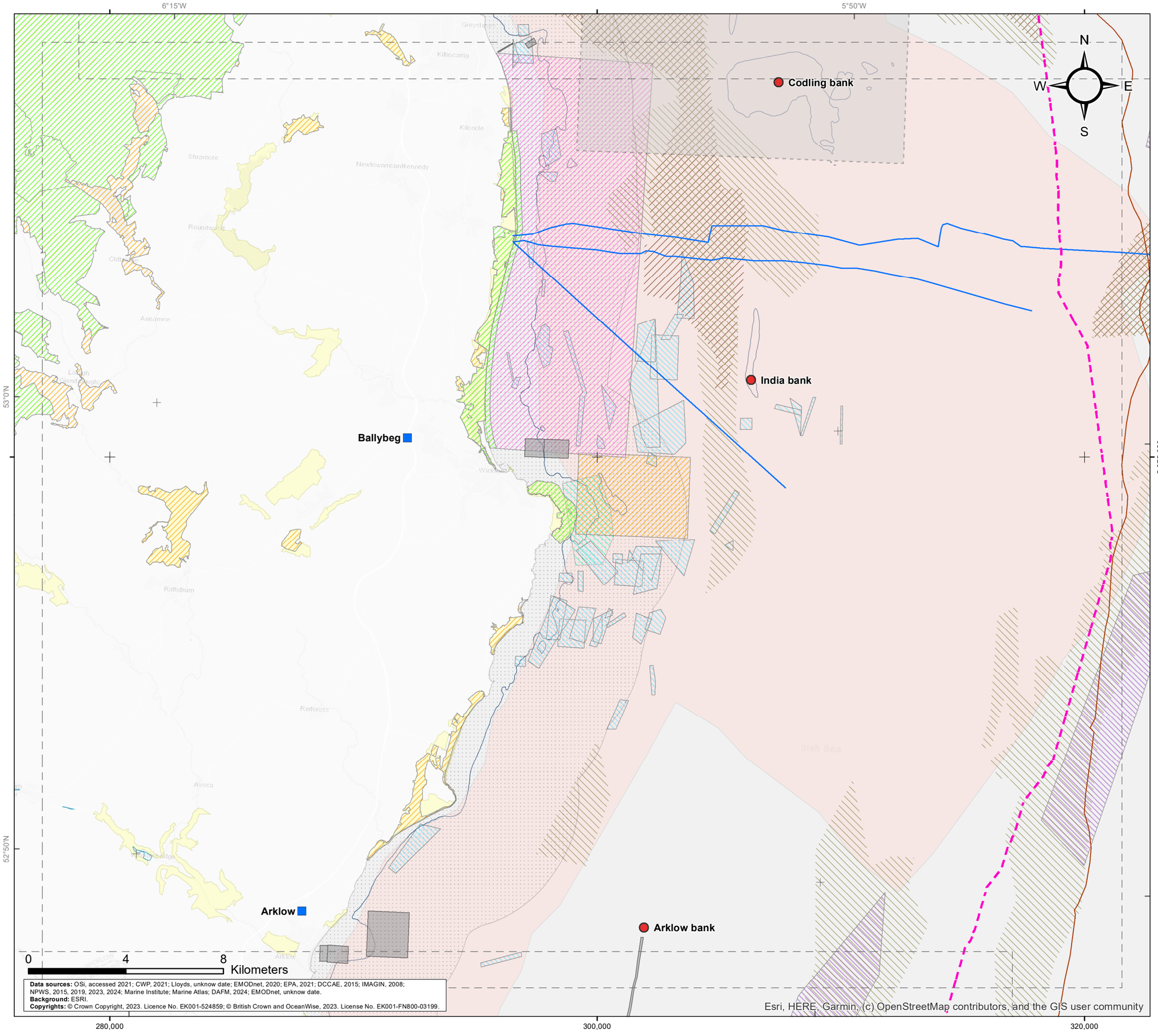

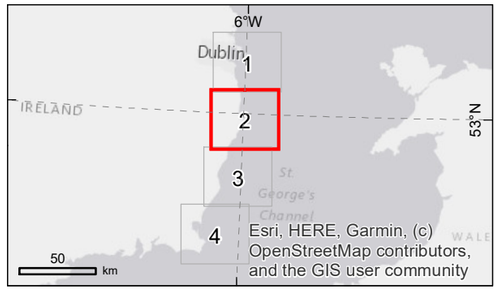

Legend

- 5km buffer from high water mark
- 12 nautical mile limit

Potential grid connection points
- Arklow
- Ballybeg
- East coast of Ireland banks

Subsea utilities
- Submarine cable (telephone/power)
- Pipeline
- Authorised oil and gas exploration area

Marine aggregates and disposal sites
- Aggregate resource area
- Aggregate study area
- Disposal at sea

Designated sites for nature conservation
- Special Protection Area (current)
- Special Protection Area (original)
- Special Conservation Area
- Proposed National Heritage Areas (pNHAs)

Commercial fishing
- Dredge fishing areas
- Fishing grounds
- Nets fishing
- Pot fishing
- Aquaculture sites

- Bathymetric contours 2m (10m below m VORF LAT)
- Map viewframes

Background: Charts 1468,1787-0 (UKHO)

codling wind park	*Project:* Codling Wind Park	*Contractor:*

Figure 3.2
Array site – east coast of Ireland constraints map

Page 2 of 4

CWP doc. number: CWP-CWP-CON-09-MAB-1081

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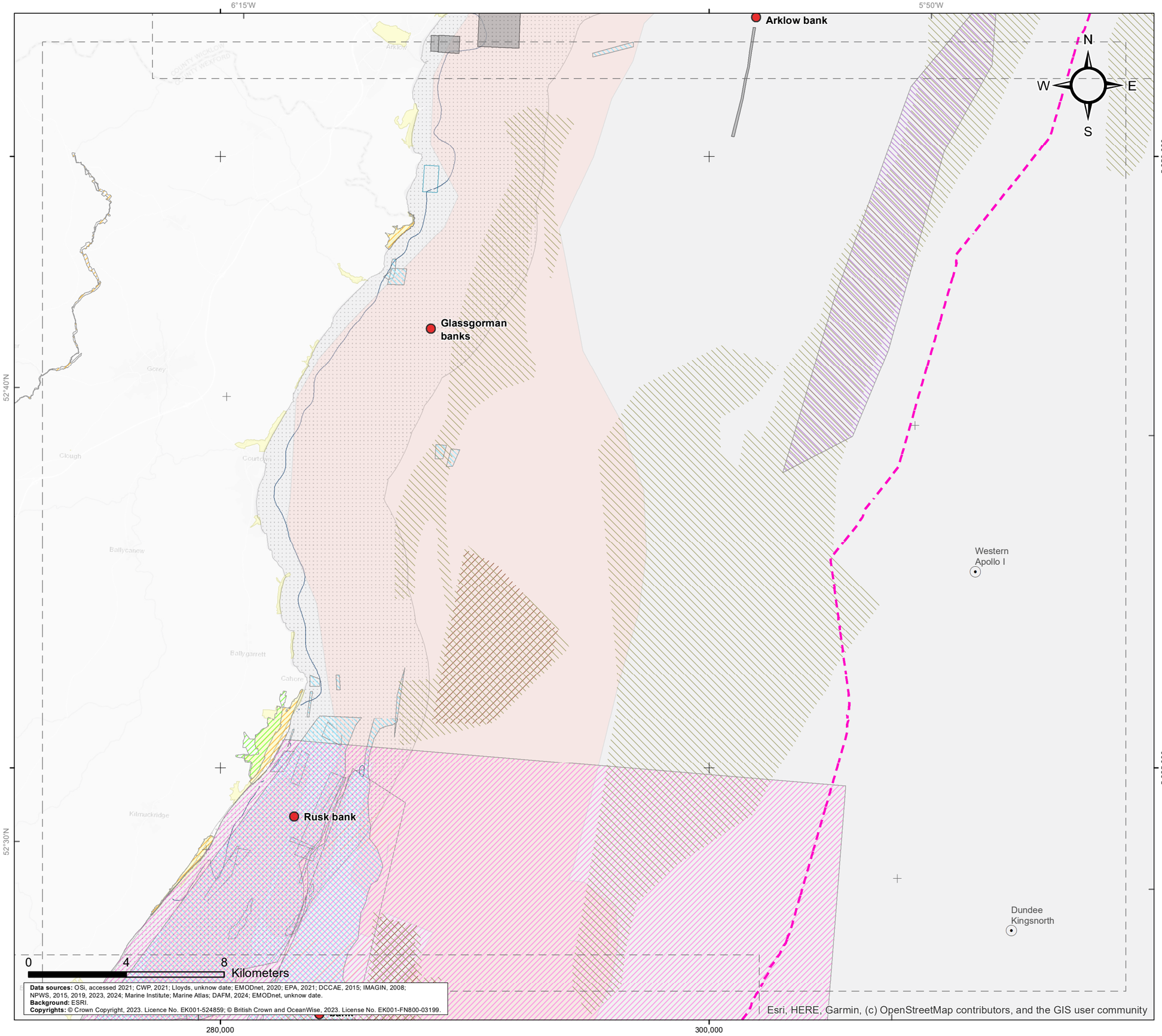
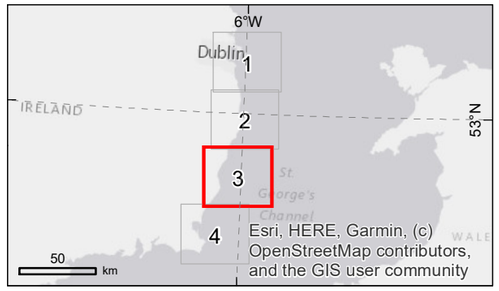




Legend

- 5km buffer from high water mark
- 12 nautical mile limit
- East coast of Ireland banks

Oil and gas infrastructure licensed exploration areas
- Exploration well

Marine aggregates and disposal sites
- Aggregate resource area
- Aggregate study area
- Disposal at sea

Designated sites for nature conservation
- Special Protection Area (current)
- Special Protection Area (original)
- Special Conservation Area
- Proposed National Heritage Areas (pNHAs)

Commercial fishing
- Dredge fishing areas
- Fishing grounds
- Pot fishing
- Aquaculture sites

- Bathymetric contours 2m (10m below m VORF LAT)
- Map viewframes

Background: Charts 1468,1787-0 (UKHO)

codling wind park

Project: Codling Wind Park

Contractor:

Figure 3.2
Array site – east coast of Ireland constraints map

Page 3 of 4

CWP doc. number: CWP-CWP-CON-09-MAB-1081

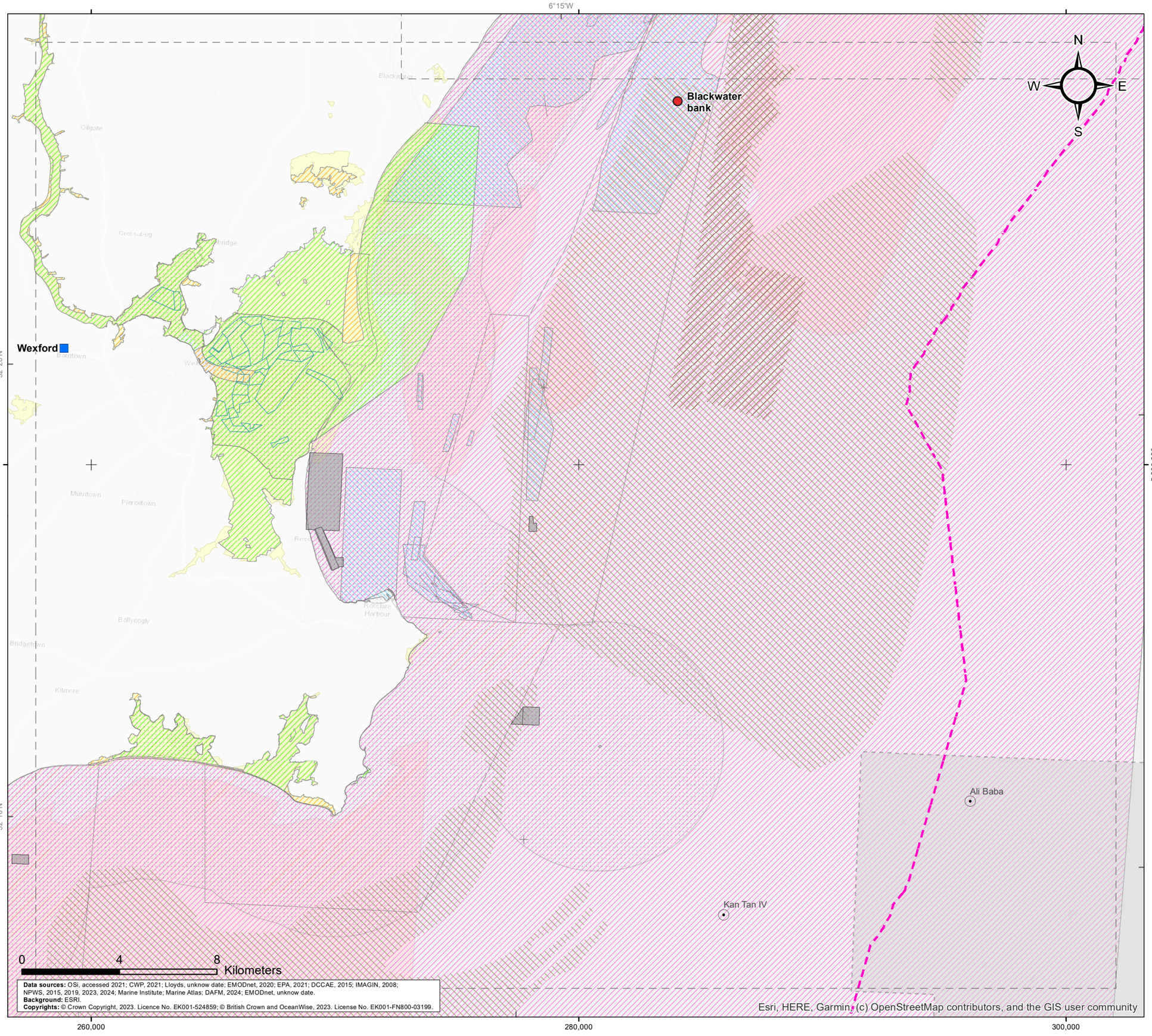
Internal descriptive code: IS - - SS.EXIST..BANKS..HWM.BUFF.5km.OFFSH.. CONSTR.E.H..EMOD.CONT.2m - ()

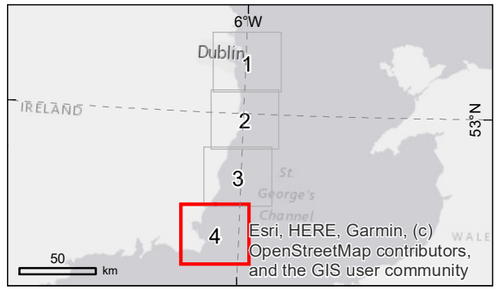
Size: A3

Scale: 1:150,000

CRS: EPSG 25830

Rev.	Description	Date	By	Chk'd	App'd
00	Final for issue	2024/08/15	MC	CD	ES





Legend

- 5km buffer from high water mark
- 12 nautical mile limit

Potential grid connection points
- Wexford
- East coast of Ireland banks

Oil and gas infrastructure licensed exploration areas
- Exploration well
- Authorised oil and gas exploration area

Marine aggregates and disposal sites
- Aggregate resource area
- Aggregate study area
- Disposal at sea

Designated sites for nature conservation
- Special Protection Area (current)
- Special Protection Area (original)
- Special Conservation Area
- Proposed National Heritage Areas (pNHAs)

Commercial fishing
- Dredge fishing areas
- Pot fishing
- Aquaculture sites

- Map viewframes

Background: Charts 1468,1787-0 (UKHO)

codling wind park

Project: Codling Wind Park

Contractor:

Figure 3.2
Array site – east coast of Ireland constraints map

CWP doc. number: CWP-CWP-CON-09-MAB-1081

Internal descriptive code: IS - - SS.EXIST..BANKS..HWM.BUFF.5km.OFFSH.. CONSTR.E.H..EMOD.CONT.2m - ()

Size: A3
Scale: 1:150,000

CRS: EPSG 25830

Rev.	Description	Date	By	Chk'd	App'd
00	Final for issue	2024/08/15	MC	CD	ES

Identification of reasonable alternatives

104. Due to the advantages outlined in the section above, the original assessment by FORL identified a number of east coast banks as potential options for OWF development. However, a review of regional scale bathymetry for the east coast of Ireland has identified additional areas which may have been considered at the time of the original assessment:

- Bennet Bank;
- Frazer Bank;
- Glassgorman Bank; and
- Rusk Bank.

105. A shortlist of reasonable alternatives can be established through a screening exercise, taking into account the constraints described in the section above. This exercise, presented in **Table 3-9** below, results in a number of the east coast banks being excluded from further consideration and validates the focus of the original assessment by FORL on the following areas:

- Kish and Bray Banks;
- Codling Bank (including India Bank to the south);
- Arklow Bank; and
- Blackwater Bank.

Table 3-9 Identification of reasonable alternatives for the array site (east coast of Ireland) (excluding other Phase 1 Projects)

Bank	Screened in / out	Rationale
Bennet	Out	Extends outside the 5 km 'minimum distance to coastline' but remains within close proximity to the coastline, including Howth Head proposed Natural Heritage Areas (pNHA) and Howth Head Coast Special Protection Area.
Kish and Bray	In	Includes Kish Bank and Bray Bank, which together form a long narrow sandbank extending north-south.
Frazer	Out	Located within the 5 km 'minimum distance to coastline'.
Codling (including India Bank to the south)	In	Includes the shallow Codling Bank and the areas to the east and south of the Codling Bank, incorporating the India Bank.
Arklow	In	Includes the long, narrow sandbank that runs north-south, east of Arklow.
Glassgorman	Out	Located within the 5 km 'minimum distance to coastline'.
Rusk	Out	Located within the 5 km 'minimum distance to coastline'.
Blackwater	In	Includes the Blackwater Bank and the areas to the north and south of the Blackwater Bank, incorporating Money-weights Banks and Lucifer Bank.

106. Finally, and notwithstanding the above, it is important to also now consider the feasibility of the remaining alternatives in the context of current policy and legislation; particularly with respect to seabed availability.

107. Although not relevant at the time of the original assessment, the MAP Act has afforded a first phase of offshore wind projects in Ireland (Oriel Wind Park, Arklow Bank II, Dublin Array, North Irish Sea Array, Codling Wind Park and Skerd Rocks) with access to a MAC, awarding the relevant developers with seabed exclusivity for the construction and operation of an OWF.

108. Therefore, in short, areas of seabed now subject to a MAC for alternative OWFs are no longer feasible alternatives for the CWP Project array site. On this basis, the screening exercise (**Table 3-9**) can be updated further to reflect current seabed availability in the context of MACs awarded along the east coast of Ireland (see **Table 3-10**).

Table 3-10 Identification of reasonable alternatives for the array site (east coast of Ireland) (including other Phase 1 Projects)

Bank	Screened in / out	Rationale
Bennet	Out	Extends outside the 5 km 'minimum distance to coastline' but remains within close proximity to the coastline, including Howth Head proposed Natural Heritage Areas (pNHA) and Howth Head Coast Special Protection Area.
Kish and Bray	Out	Includes Kish Bank and Bray Bank, which together form a long narrow sandbank extending north-south. In December 2022 a MAC was granted for the Dublin Array OWF Project. The MAC provides for an array site that extends along the full extent of Kish and Bray Banks.
Frazer	Out	Located within the 5 km 'minimum distance to coastline'.
Codling (including India Bank to the south)	In	Includes the shallow Codling Bank and the areas to the east and south of the Codling Bank, incorporating the India Bank.
Arklow	Out	Includes the long, narrow sandbank that runs north-south, east of Arklow. In December 2022 a MAC was granted for the Dublin Arklow Bank II OWF Project. The MAC provides for an array site that extends along the full extent of Arklow Bank.
Glassgorman	Out	Located within the 5 km 'minimum distance to coastline'.
Rusk	Out	Located within the 5 km 'minimum distance to coastline'.
Blackwater	In	Includes the Blackwater Bank and the areas to the north and south of the Blackwater Bank, incorporating Money-weights Banks and Lucifer Bank.

Comparison of environmental effects

109. The original assessment by FORL identified four areas on the east coast of Ireland as reasonable alternatives for the location of the CWP Project array site. However, based on the screening assessment described above two of these areas (Kish and Bray Banks and Arklow Bank) are no longer considered to be reasonable alternatives for the CWP Project array site.

110. Therefore, in light of current policy, legislation and environmental and technical constraints, further consideration of reasonable alternatives for the location of the CWP Project array site on the east coast of Ireland can be limited to Codling Bank (including India Bank) and Blackwater Bank.

111. A comparison of the short listed east coast of Ireland alternatives against each of the environmental constraints identified in the section above is presented in **Table 3-11** below. This forms a retrospective exercise in support of the conclusions presented in the original assessment by FORL. It is also takes into account the constraints presented in **Table 3-8** that were not considered in the original assessment.

Table 3-11 Comparison of environmental effects for alternative array sites (east coast of Ireland)

Constraint / Criteria	Relevant considerations
Designated sites for nature conservation	**Codling Bank** • Designated sites located in close proximity (<5km) to Codling Bank include: ○ Northwest Irish Sea Special Protection Area (SPA); designated for a number of breeding seabird species. It should be noted that this SPA was not designated at the time of the original array site selection process. At time of identifying the array site, there were no designated sites located within close proximity (<5 km) to Codling Bank. **Blackwater Bank** • There are no designated sites located within close proximity (<5 km) to Blackwater Bank.
Visual impact (i.e., proximity to the coastline)	**Codling Bank** • The range in distance to the coastline provides an advantage in terms of the potential reduced visual impact of the WTGs. **Blackwater Bank** • The shape of Blackwater Bank would constrain a wind farm placed on it to a long strip of WTGs running parallel to the Irish shoreline. This would both reduce energy yield, since the bank also lies parallel to the prevailing wind direction, and also significantly increase the horizontal extent of the wind farm when viewed from the majority of viewpoints on coast, significantly increasing the degree of visual impact.
Shipping and navigation	**Codling Bank** • Commercial shipping in the area is restricted due to the shallow water depths. • AIS data (see EIAR **Chapter 16 Shipping and Navigation**) has confirmed the majority of fishing and recreational vessels operate inshore of the bank. **Blackwater Bank** • Commercial shipping in the area is restricted due to the shallow water depths, however, there are shipping routes and high-speed craft operating in the vicinity due to the proximity to Rosslare Europort.

Constraint / Criteria	Relevant considerations
Commercial fisheries	**Codling Bank** • Codling Bank is located within an area identified by the Marine Institute for inshore pot fishing activity. This area extends from north of Dublin Bay to Wexford in the south. **Blackwater Bank** • Blackwater Bank is located within an area identified by the Marine Institute for inshore pot fishing and inshore dredge fishing activity. This area extends from north of Dublin Bay to Wexford in the south.
Aquaculture	**Codling Bank** • There are no aquaculture sites located within close proximity (<5 km) to Codling Bank. **Blackwater Bank** • There are no aquaculture sites located within close proximity (<5 km) to Blackwater Bank.
Marine aggregates and disposal sites	**Codling Bank** • No overlap with identified marine aggregate resource areas, or existing disposal sites. **Blackwater Bank** • No overlap with identified marine aggregate resource areas, or existing disposal sites.
Existing subsea infrastructure (i.e., cables and pipelines)	**Codling Bank** • Two submarine cables intersect the Codling Bank; however, these are now confirmed to be out of service cables (see EIAR **Chapter 18 Material Assets – Marine Infrastructure**). • No significant interaction with other existing subsea infrastructure. **Blackwater Bank** • No significant interaction with existing subsea infrastructure.
Oil and gas infrastructure licensed exploration areas	**Codling Bank** • Codling Bank located within an area approved for oil and gas exploration. The licence for this exploration area expired in August 2020 (DECC, 2020) and therefore is no longer an 'authorised' active exploration licence. In February 2021, DECC confirmed it would no longer be accepting new applications for exploration licences for natural gas or oil. **Blackwater Bank** • No overlap with existing oil and gas infrastructure or licensed exploration areas.
Proximity to potential grid connection locations	**Codling Bank** • The site is well located in relation to a number of potential 220 kV grid connection locations including Poolbeg, Carrickmines, Ballybeg and

Constraint / Criteria	Relevant considerations
	Arklow, however Codling Bank is less favourable compared to other potential sites due to its greater distance offshore. **Blackwater Bank** • The site is favourably located in relation to a potential 220 kV grid connection at Wexford.

The main reasons for selecting the preferred option

112. The original assessment undertaken by FORL found Codling Bank (including India Bank to the south) to demonstrate considerable advantages over the other sites identified (including Kish and Bray Banks, Arklow Bank and Blackwater Bank). These advantages are described in **Section 3.8.3** and provide a clear justification for selecting Codling Bank as the preferred area for the CWP Project array site.

113. The additional analysis presented in this section has, in summary, identified no new reasonable alternatives to those identified in the original assessment. Furthermore, due to MACs granted for the Dublin Array and Arklow Bank II OWF projects, the number of reasonable alternatives on the east coast of Ireland for the CWP Project array site is now reduced.

114. An updated comparison of environmental effects for the remaining alternatives (Codling Bank and Blackwater Bank) has been provided, however the main reasons for selecting Codling Bank as the preferred area for the CWP Project array site remain as described in the original assessment.

3.8.5 Alternative array sites – Codling Bank (summary of the original assessment (1999–2002))

Background

115. At the time of determining the Codling Bank as the preferred location for the array site, the bank was subject to two separate Foreshore Licences, granted to Harland and Wolff Licences Ltd. (a subsidiary company of FORL) which permitted the exploration of the site to determine its suitability for OWF development. The licence area, referred to in this section as the Codling Bank study area, covered the shallow Codling Bank and the areas to the east and south of the Codling Bank, incorporating the India Bank (see **Plate 3-5**).

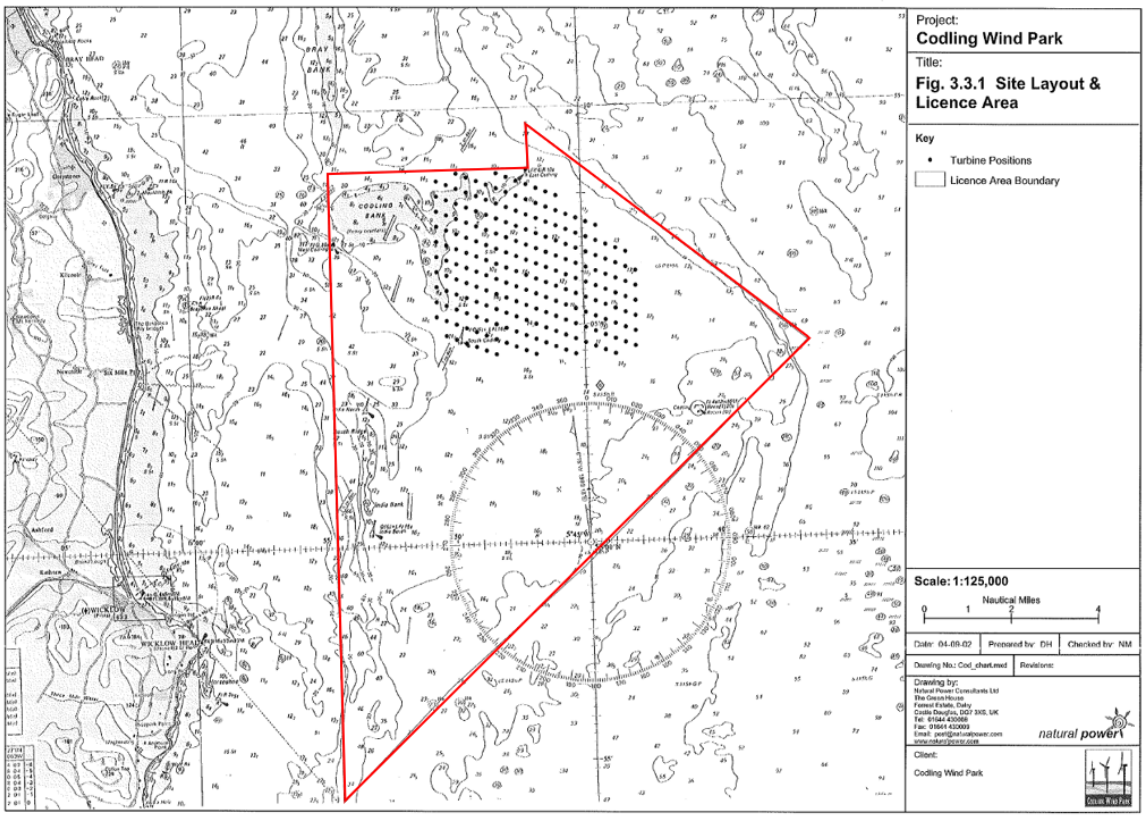


Plate 3-5 The original Codling Bank licence area and study area for the array site, as presented in the original assessment (FORL, 2002)

116. Desktop studies and consultations were undertaken by FORL to determine a location within this study area that would be suitable for the array site.

117. This process, described below, led FORL to identify a suitable array site that included the original CWP array site and the CWPE (i.e., the full extent of the currently proposed CWP Project array site). However, at the time this site was initially identified, the size of the area made it unrealistic for development in a single phase. As a result, a decision was taken by FORL to make a foreshore lease application for the original CWP array site and associated infrastructure, with an opportunity to apply for the CWPE at a later stage.

118. An application for the CWPE was submitted by FORL in March 2009, including additional analysis of the Codling Bank study area, presented alongside the original analysis submitted in support of the foreshore lease application for the original CWP array site.

119. The following section therefore describes the site selection analysis of the Codling Bank study area that informed both of the previous foreshore lease applications and which ultimately confirmed the located of the proposed CWP Project array site (see **Figure 3-1**).

Policy considerations

120. Key policy documents and associated policies relevant at the time of the original assessment of Codling Bank alternatives are as presented in **Table 3-2** for the whole of Ireland alternatives.

Study area and constraints analysis

121. The licence area, described in the background section above formed the Codling Bank study area for the identification of a preferred array site. The following sections describe the constraints and environmental considerations that informed FORLs identification of a preferred array site within the study area.

Environmental

122. In summary, the following environmental constraints were considered, which formed the basis of the study area refinement presented in the sections below.

- **Visual impact**: in line with relevant policy at the time of the assessment, the refinement of the study area sought to increase the distance from the development to the shore and reduce the horizontal extent of the site when viewed from the nearest shore, where possible.
- **Designated areas**: designated sites for nature conservation in proximity to the study area were mapped by FORL. It was noted that Codling Bank is not a designated SAC, pNHA or SAC. Wicklow Reef candidate SAC was identified as the closest SAC to the study area, with The Murrough identified as the closest SPA.
- **Ornithology**: Engagement between BirdWatch Ireland and FORL was undertaken to identify locations within the study area with an increased potential for breeding and foraging birds. The shallow banks associated with Codling Bank and India bank were identified as areas that should, where possible, be avoided.
- **Commercial fishing**: in line with relevant policy, engagement between relevant commercial fishing groups and FORL was undertaken to identify areas with a high density of commercial fishing activity. The shallow banks associated with Codling Bank and India bank were identified as areas with an increased density of whelk fishing activity and should therefore be avoided where possible. Similarly, an area to the north east of the study area was identified by the Howth Fishermen's Association as an area frequently trawled for ray and skate.
- **Shipping and navigation**: in line with relevant policy, constrained areas or areas of high shipping densities and regularly used shipping routes were identified by FORL. A number of navigation buoys were identified within the study area.
- **Existing subsea infrastructure (i.e., cables and pipelines)**: the locations of existing cables within the Codling Bank study area were mapped by FORL. Three out of service cables were identified.
- **Archaeology**: There are several known shipwrecks with the Codling Bank study area. The shallow banks associated with Codling Bank were noted as having an increased density of shipwrecks.

Other

123. Technical and physical constraints linked to the practicability of construction and commercial viability also informed the site selection process for the original CWP array site. More specifically, the original constraints analysis for the identification of a preferred site within the Codling Bank study area included:

- **Water depth**: a maximum water depth of 20 m below MHWS was considered as being the limit for a potentially viable offshore wind farm, with favourable cost factors in other areas.
- **Continuous shallow water**: for the purposes of array site selection FORL looked at the largest areas of continuous or adjacent shallow water of a depth no greater than 20 m.
- **Seabed stability**: the nature of the seabed material and the stability of the bank has an impact on the suitability of different foundation types. Areas within the study area with increased stability are preferred.

- **Territorial limit**: Areas within the study area that extend beyond the 12 nautical mile (nm) limit were not considered. This reflected the limit of the 'foreshore' as defined in the Foreshore Act 1933.

Identification of reasonable alternatives

124. The original constraints analysis that focused on the Codling Bank study area identified a number of areas for avoidance that would be technically unsuitable for OWF development, or would have an increased potential for significant environmental effects. These areas are summarised below:

- Shallow banks with increased potential for archaeology and / or foraging birds. Utilising these areas would also bring the WTGs closer to the shore, increasing proximity to the designated areas and also increasing the visibility of the array.
- Areas with increased density of whelk fishing.
- Area trawled for ray and skate. The Howth Fishermen's Association have previously requested that turbines are not placed in this area.
- Areas beyond the 12 nautical mile (nm) limit.
- Areas with a water depth of 20 m or more.

125. This process, originally undertaken by FORL, identified a preferred area of seabed within the Codling Bank study area for OWF development, taking into account both environmental acceptability and technical feasibility. This area, presented on **Figure 3-1,** included the original CWP array site and the CWPE, and now represents the current CWP Project array site.

126. No alternative areas within the Codling Bank study area were considered to be reasonable alternatives when taking into account the constraints detailed above.

The main reasons for selecting the preferred option

127. The constraints analysis described in the section above led FORL to identify a preferred location for both the original CWP array site and the CWPE; together forming the preferred location for the current CWP Project array site.

128. In summary, the site was found to be the most appropriate site within Codling Bank study area for the following reasons:

- The area to the east of the study area quickly moves beyond the 12 mile nautical limit. This reflected the limit of the 'foreshore' as defined in the Foreshore Act 1933 which placed a geographical restriction on the development of OWFs at this point in time;
- To the west of the original CWP array site lies the shallow bank areas of both the Codling and India banks. Early studies identified the shallow banks to be an important area for birds, archaeology and whelk fishing, and hence these areas were considered less desirable for OWF development. Utilising these areas would also bring the WTGs closer to the shore, increasing the visibility of the array and increasing its proximity to the closest designated sites; and
- Water depths within the site do not typically exceed 20 m providing clear economic advantages in terms of reduced foundation cost. Cost reductions in the construction and operation of the wind farm ultimately reduce the cost of energy to the consumer.

3.8.6 **Alternative array sites – Codling Bank** (information to support the original assessment)

129. The section above summarises FORLs original assessment to identify a preferred area within the Codling Bank study area for the CWP array site, within which the WTGs would be installed.

130. In support of the original conclusions, additional analysis is provided below that includes:

- Current policy considerations relevant to Codling Bank alternatives for the CWP array site;
- A contemporary review of the environmental and technical constraints analysis relevant to Codling Bank alternatives for the CWP array site;
- Identification of reasonable alternatives, considering the points above; and
- The main reasons for selecting the preferred option, considering the points above.

Policy considerations

131. The current planning policy in Ireland that considers or is relevant to the assessment of alternative locations for OWF development within the Codling Bank study area are as presented in **Table 3-7** for the east coast of Ireland alternatives. A more detailed consideration of compliance with ORDEP and NMPF policies is provided in the **Planning Report**.

132. It is also important to note that in replacing the Foreshore Act 1933, the Maritime Area Planning Act 2021, as amended, has provided a legal framework in Ireland for OWF development beyond the 12 nm limit. This represented a key constraint for the original assessment by FORL which has changed. Further consideration of this legislative change is provided in the sections below.

Study area and constraints analysis

133. As described in **Section 3.8.5**, the original assessment identified a study area that covered the shallow Codling Bank and the areas to the east and south of the Codling Bank, incorporating the India Bank (see **Plate 3-5**). This study area reflected the original Foreshore Licence area granted to Harland and Wolff Licences Ltd. (a subsidiary company of FORL) which permitted the exploration of the area to determine its suitability for OWF development.

134. This provided a suitably broad area, extending far beyond the shallow, charted areas of the Codling and India Banks. It also extended beyond the 12 nm limit, albeit the installation of WTGs beyond this limit would not have been feasible at the time of original assessment.

135. In the absence of this legislative constraint the study area for the identification of a preferred array site has the potential to be extended further to the east, incorporating a greater area of seabed beyond the 12 nm limit. However, as presented in **Table 3-12**, current environmental and technical constraints to OWF development would prevent the installation of WTGs beyond the eastern extent of the original study area. This is explained further in the sections below.

136. To inform this section updated environmental constraints maps have been produced (see **Figure 3-3** and **Figure 3-4**) which presents the original constraints identified by FORL but also incorporates more recent data to support the original analysis.

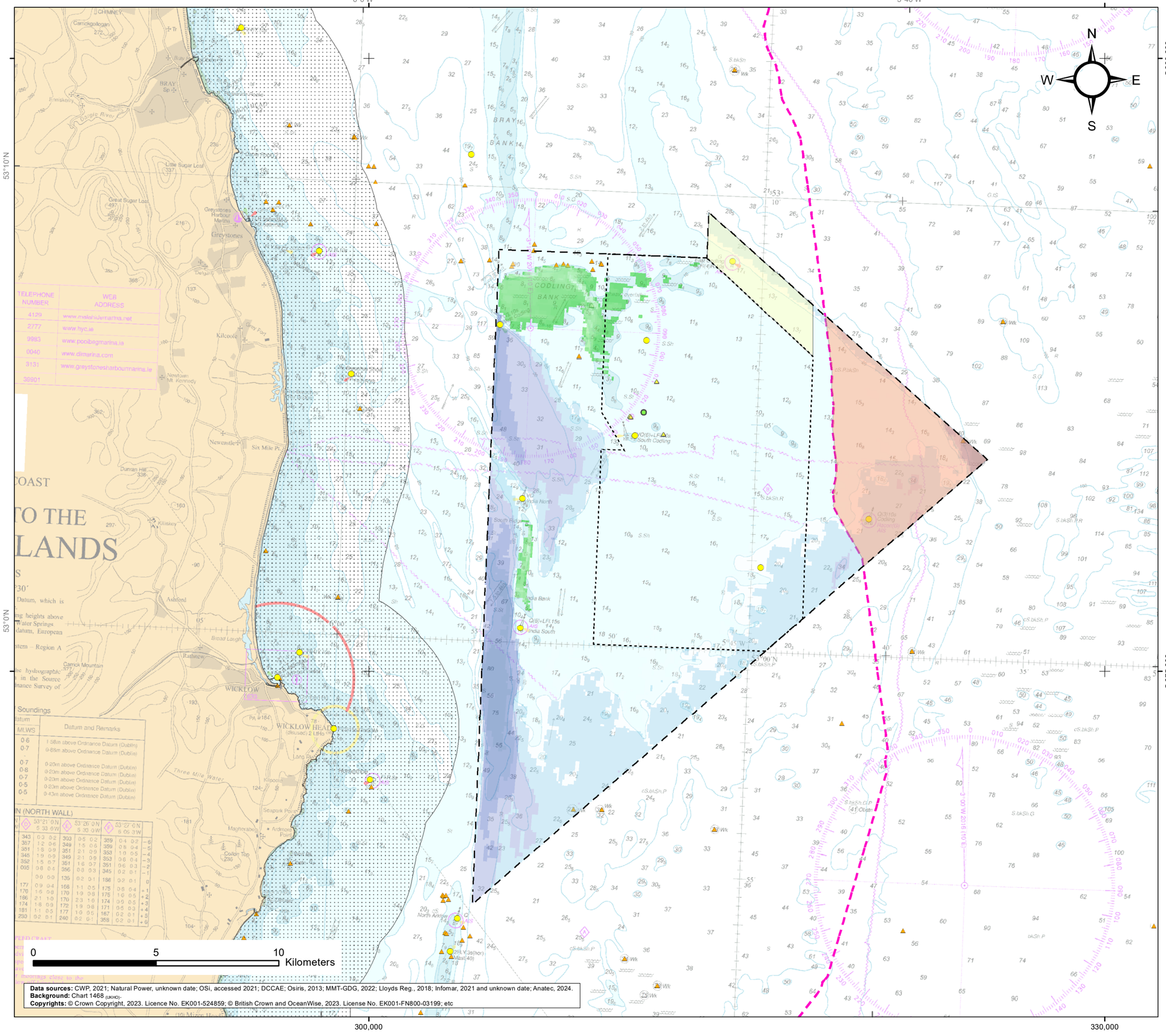
Table 3-12 Updated constraints analysis for Codling Bank alternatives

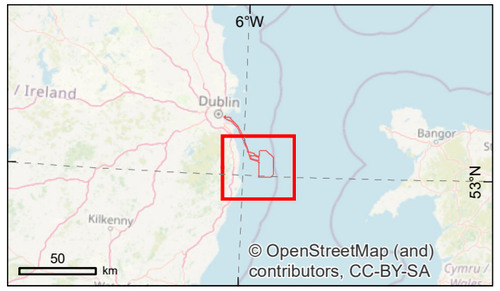
	Original considerations (FORL, 2002)	Relevant updates
Environmental		
Visual impact	In line with relevant policy at the time of the assessment, the refinement of the study area sought to increase the distance from the development to the shore and reduce the horizontal extent	Visual impact remains a key consideration for OWF development. This is reflected in the ORDEP which states that '*consideration should be given to locating devices at a maximum distance from the shore / coast (within technological constraints*)'.

	of the site when viewed from the nearest shore, where possible.	Therefore, in line with past and current policy, it remains preferable to increase the distance from the array site to the shore, and reduce the horizontal extent of the site, however this must be balanced against other environmental and technical constraints.
Designated areas	Designated sites for nature conservation in proximity to the study area were mapped by FORL. It was noted that Codling Bank is not a designated SAC, pNHA or SAC. Wicklow Reef candidate SAC was identified as the closest SAC to the study area, with The Murrough identified as the closest SPA.	As shown on **Figure 3-3**, there are no designated sites for nature conservation within the study area. The Murrough SPA has been extended and is now closer to the eastern edge of the study area relative to when the original assessment was undertaken, however there is no direct overlap with the SPA. The Wicklow Reef SAC remains the closest SAC to the study area. It remains preferable to locate the array site towards the eastern extent of the study area, maximising the distance between the array site and the nearest designated sites for nature conservation.
Ornithology	Engagement between BirdWatch Ireland and FORL was undertaken to identify locations within the study area with an increased potential for breeding and foraging birds. The shallow banks associated with Codling Bank and India bank were identified as areas that should, where possible, be avoided.	As shown on **Figure 3-3**, there are no SPAs within the study area, however marine birds associated with nearby SPAs are known to migrate through this area and to utilise the study area for foraging. A detailed description of the baseline environment for offshore ornithology for the preferred CWP array site is presented in EIAR **Chapter 10 Ornithology**. The baseline data provided in the chapter provides a comprehensive overview of marine bird species identified within the preferred array site during boat-based and digital aerial surveys, undertaken to support the CWP Project EIA. Although comprehensive baseline data is available for the preferred array site, publicly available data for outside of this area is insufficient to accurately determine how bird densities vary within the Codling Bank study area. However, as indicated in the original assessment by FORL, the shallow banks associated with the Codling and India banks are likely to attract higher densities of foraging seabirds. They provide important nursery areas for fish and a greater abundance of molluscs, and consequently provide feeding grounds for seabirds. Therefore, it remains the case that the shallow banks associated with Codling Bank and India bank should be avoided, where possible.

Commercial fishing	Engagement between relevant commercial fishing groups and FORL was undertaken to identify areas with a high density of commercial fishing activity. The shallow banks associated with Codling Bank and India bank were identified as areas with an increased density of whelk fishing activity and should therefore be avoided where possible. Similarly, an area to the north east of the study area was identified by the Howth Fishermen's Association as an area frequently trawled for ray and skate.	Data from fishing vessel plotters on whelk fishing activity within the preferred array site is presented in EIAR **Chapter 12 Commercial Fisheries**. This data is not representative of the full study area, however mapping of potting activity presented in this chapter shows high fishing activity across the west and southern portions of the array site. This data therefore indicates an increased density of whelk fishing towards the shallow banks associated with Codling Bank and India bank, albeit there is evidence of a whelk fishing throughout the CWP Project array site. It is also noted in **Chapter 12 Commercial Fisheries** that when targeting whelk in the area, fleets of pots are shot in an east to the west direction due to the tidal flow direction in the region. Consequently, locating the array site towards the east of the array site, away from the shallow banks is preferable.
Shipping and navigation	Constrained areas or areas of high shipping densities and regularly used shipping routes were identified by FORL. A number of navigation buoys were identified within the study area.	The baseline study to inform **Chapter 16 Shipping and Navigation** the EIAR utilises Automatic Identification System (AIS) data and vessel traffic surveys to assess vessel movements within proximity to the preferred array site for the CWP Project. In summary, commercial vessels were observed to avoid the shallow banks in the area (Kish, Bray, Codling, Arklow), noting that vessels tend to pass either inshore or offshore of the banks. Furthermore, the majority of fishing vessels were recorded inshore of the array site, with a large proportion in north / south transit. A proportion of fishing vessels was recorded exhibiting active fishing behaviour, including limited activity within the array site itself. The majority of recreational traffic was observed to remain on coastal transits, with only limited transits further offshore. The baseline study presented in **Chapter 16 Shipping and Navigation** including the data presented in **Figure 3-4** highlights the areas within the study area that are preferable for the avoidance of high shipping densities.
Existing subsea infrastructure (i.e., cables and pipelines)	The locations of existing cables within the Codling Bank study area were mapped by FORL. Three out of service cables were identified.	Existing subsea infrastructure (i.e., cables and pipelines) are shown on **Figure 3-3**. Overall, the location of existing subsea infrastructure is relatively unchanged since the original assessment by FORL.
Archaeology	FORL mapped several known shipwrecks within the Codling Bank study area. The shallow banks	Known shipwrecks are presented on **Figure 3-3**. The current data supports the original assessment by FORL, with the shallow banks

	associated with Codling Bank were noted as having an increased density of shipwrecks.	associated with Codling Bank displaying an increased density of shipwrecks.
Other		
Water depth / continuous shallow water	A maximum water depth of 20 m below MHWS was considered as being the limit for a potentially viable OWF, with favourable cost factors in other areas. FORL also looked at the largest areas of continuous or adjacent shallow water of a depth no greater than 20 m.	It is noted that recent advances in WTG technology and associated installation methods have increased the limit of fixed bottom WTG foundation installation. The implications of this with respect to the identification of reasonable alternatives for the array site within the Codling Bank study area are discussed further below.
Seabed stability	The nature of the seabed material and the stability of the bank has an impact on the suitability of different foundation types. Areas within the study area with increased stability are preferred.	Despite advances in WTG and foundation technology since the original assessment, it remains the case that areas with increased seabed stability are preferred for OWF developments. Poor seabed stability can render areas entirely unsuitable for all types of WTG foundations, or may it limit the number of feasible options.
Territorial limit	Areas within the study area that extend beyond the 12 nautical mile (nm) limit were not considered. This reflected the limit of the 'foreshore' as defined in the Foreshore Act 1933.	In replacing the Foreshore Act 1933, the Maritime Area Planning Act 2021, as amended, has provided a legal framework in Ireland for OWF development beyond the 12 nm limit. The implications of this with respect to the identification of reasonable alternatives for the array site within the Codling Bank study area are discussed further below.





Legend

- Array site
- Codling Bank study area
- 5km buffer from high water mark
- 12 nautical mile limit
- Beyond the 12 nautical mile limit
- Area trawled for ray and skate

Archaeology

- Wreck object M31
- Possible wrecks
- Wrecks
- Wrecks

Navigational features

- Aid to navigation

Bathymetry

Shallow bank with increased potential for archaeology, foraging birds and increased density of whelk fishing (less than 10 m VORF LAT)

- High : -4
- Low : -10

Bathymetry (more than 20 m VORF LAT) within the study area

- -80.8 - -60.1
- -60 - -50.1
- -50 - -40.1
- -40 - -30.1
- -30 - -22.1
- -22 - -20

Data sources: CWP, 2021; Natural Power, unknown date; OSi, accessed 2021; DCCAE; Osiris, 2013; MMT-GDG, 2022; Lloyds Reg., 2018; Infomar, 2021 and unknown date; Anatec, 2024.
Background: Chart 1468 (UKHO).

codling wind park

Project: Codling Wind Park

Contractor:

Figure 3.3
Array site – Codling Bank constraints map

CWP doc. number: CWP-CWP-ENG-08-01-MAP-1103

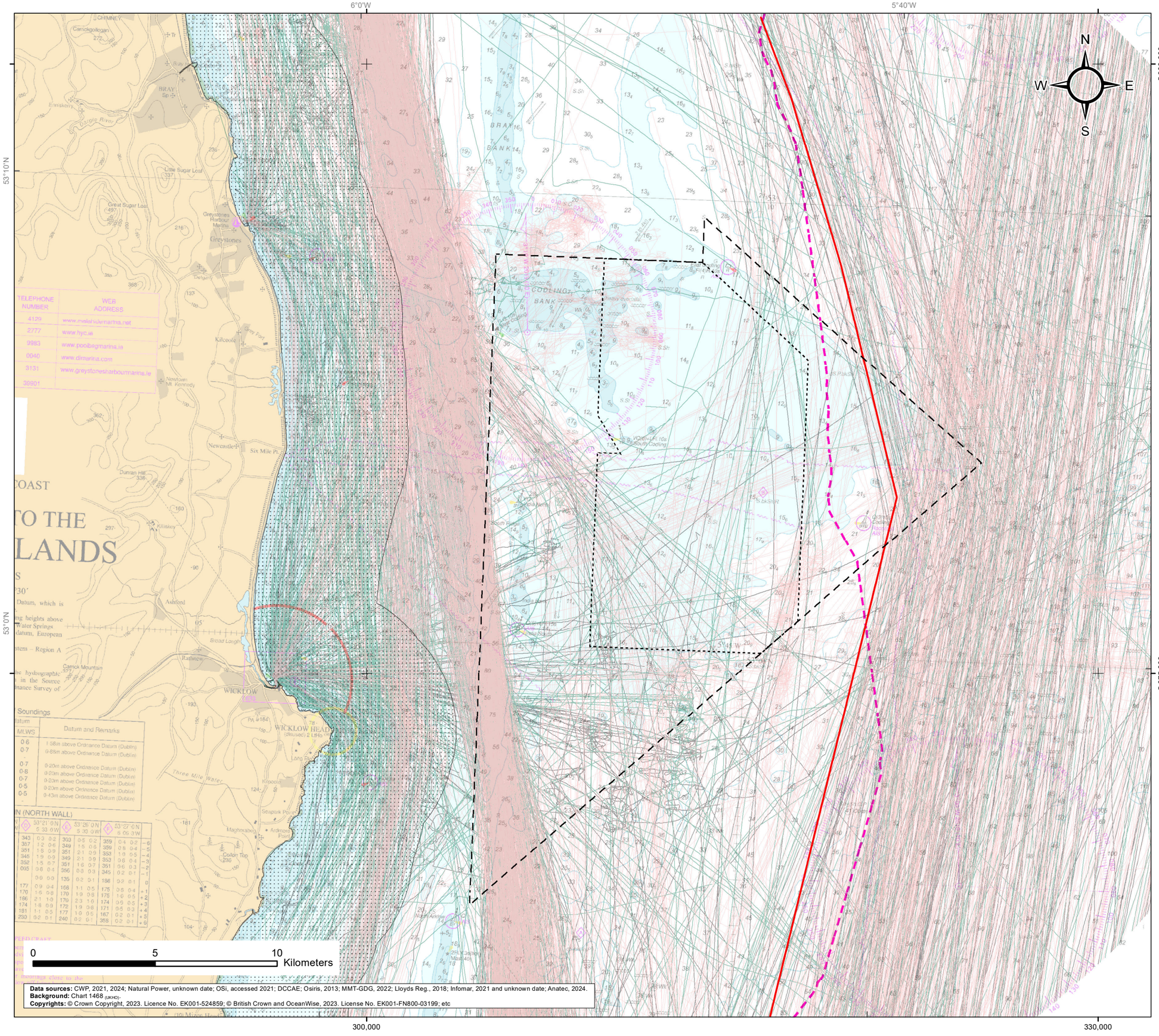
Internal descriptive code: WF - WF.NP..WF.FILA.NP - SEA.LIMs..CONSTR.E.H.. WD<10..WD>20 - (EIAR.Vol.03.Ch.03.FIG.03)

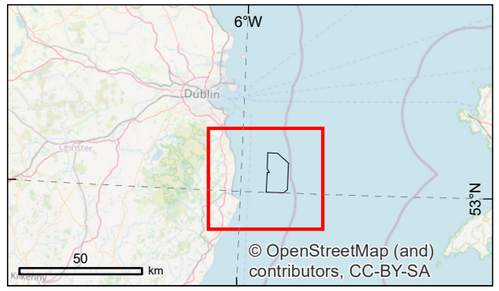
Size: A3

Scale: 1:150,000

CRS: EPSG 25830

Rev.	Description	Date	By	Chk'd	App'd
00	Final for issue	2024/08/15	MC	CD	ES





Legend

- Array site
- Codling Bank study area
- 5km buffer from high water mark
- 12 nautical mile limit
- Indicative western extent of shipping and navigation channel

Vessel traffic

- Summer 2021
- Summer 2022
- Winter 2023

Data sources: CWP, 2021, 2024; Natural Power, unknown date; OSi, accessed 2021; DCCAE; Osiris, 2013; MMT-GDG, 2022; Lloyds Reg., 2018; Infomar, 2021 and unknown date; Anatec, 2024.
Background: Chart 1468 (UKHO).

codling wind park

Project: Codling Wind Park

Contractor:

Figure 3.4
Array site - Codling Bank constraints map (vessel data)

CWP doc. number: CWP-CWP-ENG-08-01-MAP-1758

Internal descriptive code: WF - WF.NP..WF.FILA.NP.VTIBEWF - SEA.LIM's..VT.ALL.21.22.23.. HWM.BUFF.5km.OFFSH - (EIAR.Vol.03.Ch.03.FIG.04)

Size: A3

Scale: 1:150,000

CRS: EPSG 25830

Rev.	Description	Date	By	Chk'd	App'd
00	Final for issue	2024/08/15	MC	CD	ES

Identification of reasonable alternatives

137. The environmental and technical constraints identified in the original assessment led FORL to identify a preferred area of seabed within the Codling Bank study area for OWF development, and the area that is now the proposed CWP Project array site. No alternative areas within the Codling Bank study area were considered to be reasonable alternatives when taking into account the constraints identified.

138. Updates to the constraints identified in the original assessment are presented in **Table 3-12**. Of these, there are two key updates which have the potential to alter the original conclusions by FORL and which therefore require further consideration. These are:

- Recent advances in WTG technology and associated installation methods which have increased the limit of fixed bottom WTG foundations; and
- The Maritime Area Planning Act 2021, as amended, which has provided a legal framework in Ireland for OWF development beyond the 12 nm limit.

139. The CWP Project and the other Phase 1 Projects will use fixed bottom foundation technology to install the WTGs. These foundations are installed in the seabed and have been used to install over 25 GW of OWFs in Europe alone.

140. The main fixed bottom foundation types are described in **Section 3.9.4** of this chapter, which sets out the reasons for selecting a monopile foundation as the preferred WTG foundation type for the CWP Project over other fixed-bottom foundation types including jacket and tripod structures.

141. While newer floating wind technology allows for the development of WTGs further from the coast in deeper water, those technologies are more expensive and less established than the fixed bottom technology that can be installed within the Codling Bank study area. In summary, floating technology is not currently available at the commercial scale required to meet the Government's policy targets, which are reflected in the main objectives of the CWP Project (see **Section 3.1**). By prioritising sites appropriate for fixed bottom technology, Government policy has ensured lower energy costs for consumers and higher certainty that developers can rely on tried and tested construction methods and mitigation to deliver the projects quickly and without significant environmental impacts (WEI, 2021).

142. Despite the above, it is acknowledged that recent advances in WTG technology and associated installation methods have increased the limit of fixed-bottom WTG foundation installation (to approximately 59 m), and it is therefore acknowledged that the water depth limit for fixed-bottom WTG foundation installation is now greater than the 20 m limit originally considered by FORL. In addition, the MAP Act 2021, as amended, has provided a legal framework in Ireland for OWF development beyond the 12 nm limit.

143. Therefore, in summary, when considering these updated constraints in isolation, areas further to the east of the CWP array site, in waters deeper than 20 m and beyond the 12 nm limit may be reasonable alternatives to the current CWP array site.

144. To consider this further, admiralty chart data within and surrounding the preferred array site has been reviewed. This shows that most seabed areas with water depths of ≤59 m LAT that are technically suitable for fixed bottom foundations are within the 12 nm limit. There is some potential to locate the array site further east within water depths ≤59 m LAT, however this would move the WTGs within close proximity to a principal shipping and navigation channel that runs north – south alongside the shallower waters associated with Codling Bank (see **Figure 3-4**).

145. The Department for Transport's draft 'Marine Navigational Safety & Emergency Response Risk of Offshore Renewable Energy Installations (OREI)' (Department for Transport, 2024) notes that '…There should be a minimum of 2nm [3.7 km] between wind farms and shipping routes...'.

146. The distance from the CWP Project array site to the abovementioned shipping route is approximately 2.2 to 3.9 km, and it is therefore not recommended to locate the array site further to the east.

147. Furthermore, with increasing water depth, there is also an associated increase in the size and weight of the WTG structures including the monopile foundation. This has potential negative implications for above and below water noise associated with WTG foundation installation. The avoidance of deeper water also has the benefit of reduced underwater noise propagation during WTG foundation installation, thus reducing potential impacts on marine mammals, fish and invertebrates.

148. Underwater noise modelling for the CWP Project has confirmed the requirement for additional mitigation to reduce effects on marine mammal species (see **Chapter 11 Marine Mammals**). This assessment highlights the importance of adopting measures to reduce below water noise associated with WTG foundation installation, including minimising the size and weight of the WTG monopile foundations, as well as the avoidance of deeper water where possible.

149. It is important to note that although maritime development is no longer restricted by the 12 nm limit by the Maritime Area Planning Act 2021, there is no policy support for OWF development outside those limits. All Phase 1 Projects and the South Coast DMAP are within the 12nm limit.

150. Finally, locating OWFs within the territorial waters limit is not unique to Ireland. The research paper 'Foundations in Offshore Wind Farms: Evolution, Characteristics and Range of Use. Analysis of Main Dimensional Parameters in Monopile Foundations' (Journal of Marine Science and Engineering, 2019) presents **Plate 3-6**, showing OWFs in operation classified by depth and distance from the coast at the end of 2018. This shows that the majority of operational OWFs are located within 12 nm of the coastline.

151. More recently, the Wind Energy Ireland (WEI) paper 'Briefing paper on proposals to block fixed-bottom wind turbines' (WEI, 2021) notes that '*as of the end of 2020, there were 7.8 GW of offshore wind capacity installed in Europe from 65 offshore wind farms located closer than 22 km [12 nm] from the coastline. Another 16 GW of projects within that distance either have planning permission or have applied for it.*' In 2023 the Awel y Mor OWF project was consented off the Welsh coast, and is comparable to the CWP Project in many ways. It is located 10.5 km off the coast in the Irish Sea, with a maximum total area of 78 km^2 and a maximum of 50 WTGs with a tip height of up to 332 m.

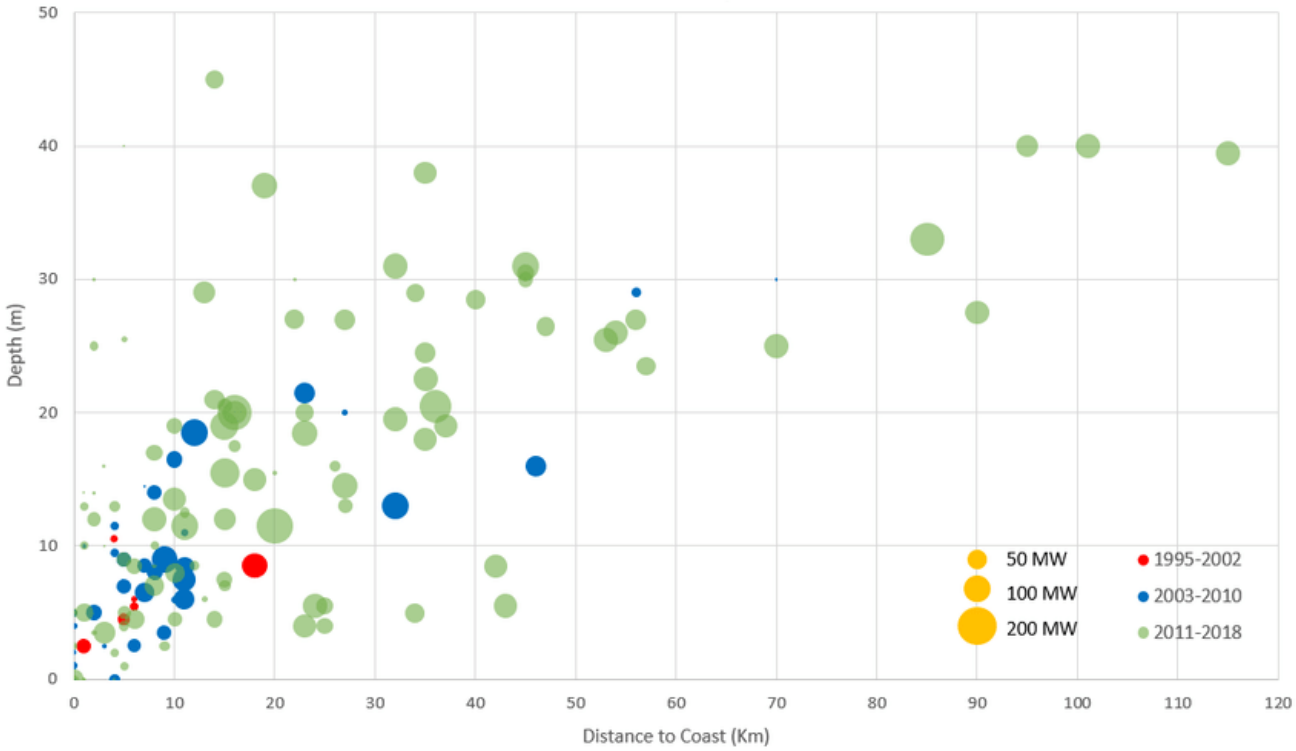


Plate 3-6 OWFs in operation classified by depth and distance from the coast (Source: https://www.mdpi.com/2077-1312/7/12/441)

152. Locating the CWP Project array site further offshore also has the potential to bring in new environmental constraints and greater environmental effects across certain EIA topics, particularly with respect to shipping and navigation, and is not considered a feasible alternative if the Applicant is to successfully achieve its key project objective; to deliver a significant contribution (>25%) to the Irish Government's goal of achieving 5 GW installed electricity generation capacity in offshore wind by 2030.

The main reasons for selecting the preferred option

153. The original assessment undertaken by FORL (see **Section 3.8.5**) found the proposed CWP array site to be the preferred location for the CWP Project WTGs. The site was found to be the most appropriate site within Codling Bank study area for a number of reasons that remain valid today, including:

- the avoidance of areas that are likely to attract higher densities of foraging seabirds;
- distance to shore;
- the avoidance of areas with an increased density of shipwrecks; and
- the avoidance of areas with an increased potential for commercial fishing.

154. Further analysis has also shown that despite recent changes in legal and technical constraints that could facilitate the installation of WTGs further offshore, the preferred array site remains an appropriate site for the deployment of an OWF.

3.8.7 Alternative array sites – summary and validation of findings

155. The site selection and consideration of alternatives for the CWP Project array site has been a staged process, underpinned throughout by three main success factors: environmental acceptability; practicability of construction; and commercial viability.

156. The early stages of this process, undertaken by FORL between 1999 and 2009, was informed by limited government policy on the development of OWF projects in Ireland. More recent policies have since come forwards as part of OREDP and the NMPF (published in 2014 and 2021, respectively) which offer more site selection specific policy requirements for OWF developers. Although not in place at the time of site selection process for the CWP array site, the original assessments presented in **Sections 3.8.1**, **3.8.3** and **3.8.5** of this chapter demonstrate an approach that was unpinned by the principle of impact avoidance, and is consistent with the requirements of these more recent policy documents. Furthermore, supporting information provided in **Sections 3.8.2**, **3.8.4** and **3.8.6** of this chapter has ensured that the array site selection process has had regard to all relevant NMPF and OREDP policies. A more detailed consideration of compliance with NMPF and OREDP policies is provided in the **Planning Report**.

157. When considering visual impact, practicability of construction and commercial viability, the initial process found sites on the east coast of Ireland to be the only feasible area for large scale OWF development. This is a finding supported by the conclusions of the ORDEP SEA which took account of the original CWP Project array site and other OWF developments in the Irish Sea that had already been approved by means of the foreshore consenting process. The lack of onshore grid capacity within the south and west of Ireland also remains a key factor and one that supports the original conclusions.

158. The above conclusion initiated a broader environmental and technical constraints analysis by FORL of alternative sites on the east coast of Ireland. A summary of the original assessment is presented in **Section 3.8.3**. This process led FORL to identify Codling Bank (including India Bank to the south) as the most environmentally advantageous of the feasible areas on the east coast of Ireland and therefore the preferred area to identify a specific location for the array site. Supporting information and additional analysis presented in **Section 3.8.4** highlighted a reduced number of feasible alternatives due to other OWF developments which are now planned along the east coast of Ireland, but did not identify any new policies or constraints that would fundamentally alter the original conclusions.

159. Further assessment, summarised in **Section 3.8.5** led FORL to the location of the preferred array site, informed by more detailed analysis of the Codling Bank study area. Supporting information and additional analysis presented in **Section 3.8.6** demonstrates that despite recent changes in legal and technical constraints the preferred array site remains an appropriate site for the deployment of an OWF based on an appropriate balance of environmental effects. This is essential to achieve the project's key objective; to deliver a significant contribution (>25%) to the Irish Government's goal of achieving 5 GW installed electricity generation capacity in offshore wind by 2030.

160. In summary, it is acknowledged that the CWP Project array site was selected as an ideal location for OWF development in 1999 and later 2000s based on the WTG and foundation technology available at that time. This required installation of many WTGs to generate sufficient power to develop financially viable projects, in shallower water than is required today, and within Irish territorial waters as there was no legislation to support development beyond 12 nm.

161. The assessment of alternative locations for the array site has not identified any new policies or technical and environmental constraints that would fundamentally alter the original site selection conclusions. The preferred array site near Codling Bank therefore remains an appropriate site for the development of an OWF. It is one of a small number of areas in the Irish Sea whose shape, geology and elevation allows for the quick installation of the WTGs using tried and tested technology that benefits from well-established environmental mitigation such as underwater noise reduction measures (see EIAR **Chapter 11 Marine Mammals**).

162. It is the Irish Government's recognition of the advanced stage of the work already done, including the original site selection and alternatives assessment, that led to the status of the CWP Project as a Phase 1 Project, enabling the Applicant to successfully apply to the Minister for the DECC for a MAC to more quickly advance Phase 1 Project commissioning and decarbonisation. This included a decision by the Irish Government to confine the invitation for MAC applications to the original foreshore lease area, incorporating the original CWP array site and the CWPE.

3.9 Array site infrastructure: consideration of alternative designs

3.9.1 Alternative WTG models and number of WTGs

Background

163. Over the course of the project development the Applicant has considered a wide range of WTG models, each with a differing rotor size and MW generating capacity.

164. At this stage in the development process the Applicant is in discussion with WTG suppliers who can provide a 250 m or 276 m rotor diameter WTG. The models under discussion are not yet in production. Therefore, the Applicant will apply for permission without confirming the rotor diameter of the WTGs. Instead, it is seeking a permission that provides for two options in relation to the rotor diameter.

165. The following section describes the process that was undertaken to arrive at this conclusion, including the consideration of alternative WTG models and the main reasons for discounting these.

166. This section also considers alternative numbers of WTGs, as this is a direct function of the WTG rotor diameter and corresponding power output.

167. WTGs with larger rotor diameters typically have a higher generating capacity, and therefore fewer larger WTGs would need to be installed to meet the target generating capacity. To achieve the same generating capacity from smaller rotors would require a greater number of WTGs.

Policy considerations

168. The key planning policies that have informed the identification of a preferred WTG model and number of WTGs are summarised in **Table 3-13** below.

Table 3-13 Summary of planning policy relevant to the consideration of alternative WTG models (and number of WTGs)

Policy	Relevant considerations
National Marine Planning Framework (2021)	The NMPF promotes impact avoidance across a wide range of receptor groups, articulated around Overarching Marine Planning Policies (OMPP) supplemented by Sectoral Marine Planning Policies (SMPP). SMPP that are of relevance to the consideration of alternative WTG models are listed below: • Biodiversity Policy 1; • Biodiversity Policy 4; • Protected Marine Sites Policy 4; and • Seascape and Landscape Policy 1.

Policy	Relevant considerations
	The analysis presented below demonstrates an approach that is unpinned by the principle of impact avoidance, and is therefore consistent with the requirements of the abovementioned polices.

Study area and constraints analysis

WTG model

169. Regarding the selection of the WTG models, the 'study area' is dictated by the offshore wind turbine market, which is dominated by a relatively small number of WTG suppliers, also known as Original Equipment Manufacturers (OEMs). As a result, there is significant competition between OWF developers to secure contracts with OEMs for projects.

170. Additionally, offshore WTG designs are continuing to evolve, and this means that certain WTG models initially considered are no longer available in the market or are expected to be taken out of production at the point of construction.

171. Market availability therefore represents the most significant constraint to the selection of WTG models, alongside the need to meet the projects target generating capacity, as dictated by the terms of the CWP Project's ORESS contract.

172. From an environmental perspective, the key considerations relevant to WTG model selection include:

- **Visual impact**: the potential visual impact of WTGs on onshore receptors depends on a number of factors including WTG size.
- **Ornithology**: WTG rotor diameter size is one parameter that influences the predicted levels of collision mortality for marine birds. A reduction in the size of the WTG rotor diameter has a positive impact on modelled collision mortality estimates.

Number of WTGs

173. As previously noted, the number of WTGs is a direct function of the WTG rotor diameter. Therefore, to meet the projects target generating capacity, the number of WTGs is required to increase as the WTG size (i.e., rotor diameter) decreases. Therefore, the WTG model and the target generating capacity, as dictated by the terms of the CWP Project's ORESS contract, significantly influences the number of WTGs.

174. From an environmental perspective, the key considerations relevant to consideration of alternative numbers of WTGs include:

- **Visual impact**: the potential visual impact of WTGs on onshore receptors depends on a number of factors including number of WTGs.
- **Ornithology**: Number of WTGs is one parameter that influences the predicted levels of collision mortality for marine birds. A reduction in the number of WTGs has a positive impact on modelled collision mortality estimates.

175. A number of additional environmental considerations are relevant to the WTG layout. These are described and considered in **Section 3.9.2** of this chapter.

Identification of reasonable alternatives

WTG model

176. Over the course of the project development the Applicant has undertaken extensive engagement with OEMs to identify potential WTG model options for the CWP Project. This process is entirely dictated by the OEMs and reflects the expected availability of WTG models at the time of construction. Therefore, although a wide range of WTG models have been considered, only a limited number of feasible options were identified. This includes:

- Option A: 250 m rotor diameter WTG.
- Option B: 276 m rotor diameter WTG.
- Option C: 236 m rotor diameter WTG.

177. Significantly smaller WTG models with a maximum rotor diameter of 120 m were proposed for the original project consented in 2005 under the Foreshore Act 1933 (see **Section 3.2**), however these models are no longer available on the market, having been replaced by larger scale, more advanced and efficient WTG technology. This means that the CWP Project can now be developed with a greatly reduced number of WTGs, while optimising the renewable electricity production from the site. Smaller WTG models originally considered by FORL are therefore not considered further in this assessment.

Number of WTGs

178. At the point of EIA scoping (December 2020), prior to any significant engagement with the OEMs, a range of WTG models were under consideration. This resulted in the proposal at EIA scoping for up to 140 WTGs, which reflected the anticipated maximum number of WTGs with the smallest rotor diameter. This maximum number of WTGs was also presented for stakeholder and public engagement during the first round of pre-application public consultation (see **Section 3.5**)

179. By January 2023, at the time of the projects second phase of public consultation, the upper limit of WTG numbers had been reduced from 140 to up to 100. The reduction in the maximum number of WTGs at this stage reflected the Applicant's greater certainty regarding the projects target generating capacity and input from OEMs on WTG model availability in the lead up to the ORESS auction.

180. It was also confirmed at this point in time that the Applicant would seek consent for two WTG models, with different rotor diameters and therefore a different number of WTGs across two different WTG layouts. This reflected the Applicant's ambition to reduce the amount of flexibility being sought in the planning application whilst maintaining the ability to adapt to a changing supply chain.

181. This led the Applicant to consider a number of factors that would inform a final decision on two preferred WTG models, including a total number of WTGs for each option.

182. A comparison of each option against each of the key environmental constraints identified in the section above is presented below. This included numerous WTG model / number configurations, however for simplicity the comparison of effects presented below focuses on the preferred number of WTGs for each WTG model option:

- Option A: 75 x 250 m rotor diameter WTG.
- Option B: 60 x 276 m rotor diameter WTG.
- Option C: 84 x 236 m rotor diameter WTG.

183. It should be noted that the reduction in the maximum number of WTGs from the point of EIA Scoping reflects the outcome of a significant process of project refinement, focused on achieving the correct

balance between maximising the projects total installed generating capacity and at the same time minimising the potential for significant adverse effects on the environment.

184. Key to this process has been the analysis of ornithological data, allowing the Applicant to develop a greater understanding of the likely environmental capacity at the site; with ornithology identified as a key environmental constraint due to the relative proximity of the east coast SPAs.

185. Detailed analysis, including collision risk modelling for key ornithological species was undertaken to assess the maximum number of WTGs that could be installed for each of the three WTG models. This also took into consideration a commitment by the Applicant to raise the height of the WTG blades above the sea surface to a minimum of 36 m above MSL (37.72 m LAT) (see **Section 3.9.3** for more detail), resulting in a significant reduction in collision mortality estimates for each WTG model / number configuration.

Comparison of environmental effects

186. As described above the following WTG model / number configurations were taken forward for a more detailed comparison of environmental effects:

- Option A: 75 x 250 m rotor diameter WTG.
- Option B: 60 x 276 m rotor diameter WTG.
- Option C: 84 x 236 m rotor diameter WTG.

187. A comparison of each option against each of the environmental constraints identified in the section above is presented in **Table 3-14** below.

Table 3-14 Comparison of environmental effects for alternative WTG models (and number of WTGs)

Constraint / Criteria	Relevant considerations
Ornithology	• For all options no significant effects (in EIA terms) to ornithological species are predicted. • For all options no adverse effects on site integrity are predicted in the context of Appropriate Assessment for relevant European designated sites. • When the WTG model / number configurations are compared against each other, Option C results in the highest collision mortality estimates.
Visual impact	• Initial assessment identified the potential for significant effects at certain visual receptor locations resulting from all options. • When the WTG model / number configurations are compared against each other, there is no significance difference in the visual impact at onshore receptor locations.

The main reasons for selecting the preferred option

188. The selection of a preferred WTG model for the CWP Project has been informed by extensive engagement with the WTG OEMs.

189. During this process it was confirmed that the Applicant would seek consent for two WTG models, with different rotor diameters and therefore a different number of WTGs across two different WTG layouts. This approach minimises the amount of flexibility being sought in the planning application whilst maintaining the ability of the project to adapt to a changing supply chain.

190. Therefore, as described in **Chapter 4 Project Description**, it was determined that the Applicant would seek consent for:

- Option A: 75 x 250 m rotor diameter WTG; and
- Option B: 60 x 276 m rotor diameter WTG.

191. The principal reasons for discounting Option C are the increased collision mortality estimates for key ornithological species, as determined by collision risk modelling, and supply chain constraints. This is due to the increased number of WTGs that are required to meet the target generating capacity, and the resultant increase in rotor swept area.

192. Ornithological data analysis and collision risk modelling has also strongly influenced the reduction of WTG numbers for the preferred WTG models, so as to mitigate potential effects on birds.

193. In addition to ornithological considerations, feedback from the projects second phase of public consultation in January 2023 regarding the visual impact of the WTGs also influenced the Applicant's decision to reduce the number of WTGs for each option as far as possible while maintaining the project need and objectives. This includes contributing towards the Government's CAP targets.

194. Overall, it is considered that the final number of WTGs for each preferred WTG model strikes the correct balance between environmental acceptability and commercial viability.

3.9.2 Alternative WTG layouts (including OSS positions)

Background

195. The following sections describe the approach taken by the Applicant to designing and optimising the layout of the WTGs for each of the preferred WTG models.

196. As described above, the WTG layout is dependent on the number of WTGs, which is a direct function of the WTG rotor diameter. As such there have been multiple layouts identified for different WTG size and number configurations. However, the general approach taken by the Applicant has remained consistent throughout the process.

197. In addition to the WTGs, three OSSs are proposed. The positions of OSSs, which are the same for both WTG layout options, have been informed by the same datasets and design principles used to determine the WTG locations. Therefore, for the purposes of this chapter, the consideration of alternative OSS positions is considered as part of the WTG layout.

Policy considerations

198. The key planning policies that have informed the identification of a preferred layout for each WTG model are summarised in **Table 3-15** below.

Table 3-15 Summary of planning policy relevant to the consideration of alternative WTG layouts

Policy	Relevant considerations
Offshore Renewable Energy Development Plan (2014)	The suggested OREDP project level mitigation measures of relevance to the consideration of alternative WTG layouts are listed below: • Marine birds (collision risk): ○ Alignment of turbines in rows parallel to the main migratory direction.

Policy	Relevant considerations

	• Marine mammals (collision risk (bats)):
	  ○ Alignment of turbines in rows parallel to the main migratory direction.
	• Marine and Coastal Archaeology and Wrecks:
	  ○ Avoid sites of interest and exclusion zones for marine archaeology.
	• Commercial fisheries:
	  ○ Consider spacing of turbines at wide enough intervals to permit use of mobile fishing gear.

National Marine Planning Framework (2021)	The NMPF promotes impact avoidance across a wide range of receptor groups, articulated around Overarching Marine Planning Policies (OMPP) supplemented by Sectoral Marine Planning Policies (SMPP). SMPP that are of relevance to the consideration of alternative WTG models are listed below: • Biodiversity Policy 1; • Biodiversity Policy 4; • Protected Marine Sites Policy 4; • Co-existence Policy 1; • Heritage Assets Policy 1; • Seascape and Landscape Policy 1; and • Safety at Sea Policy 5. The analysis presented below demonstrates an approach that is unpinned by the principle of impact avoidance, and is therefore consistent with the requirements of the abovementioned polices.

Study area and constraints analysis

199. The study area for the purposes of defining the WTG layout is the array site, as defined in **Section 3.8.3**. The following sections describe the study area constraints identified and considered in the Applicant's refinement of the preferred layout for both WTG models (Option A and Option B), including the OSS positions.

200. First and foremost, it is helpful to summarise the wind resource and energy yield assessment that underpins WTG layout design, particularly with regards to WTG spacing. For the CWP Project, site specific wind data has been collected from a LiDAR installed on the shore and from two floating LiDARs installed at the CWP site. Several reference long-term datasets have also been analysed to adjust the wind observations over a longer period (10 to 20 years).

201. The above-mentioned wind measurement data has been used throughout the development process to calculate predicted energy yield associated with each WTG layout. This process models wake effects of WTGs, which are losses of energy capture of a turbine lying in the wind shadow of an upwind turbine. Greater advantages in overall yield of a group of WTGs are gained from increasing separation distances between WTGs at sea than onshore. Increasing separation distances between adjacent WTGs running parallel to the prevailing wind direction increases wind yield more than increasing separation distances perpendicular to the prevailing wind direction.

202. Operational experience from large OWFs has demonstrated that energy losses in dense arrays can be higher than anticipated due to turbine wake interaction and the presence of the wind farm influencing the fundamental behaviour of the wind in the vicinity of the WTGs. In order to address this phenomenon, the Applicant has sought to optimise inter-turbine spacing within the constraints of the array site.

203. In addition to the above, the Applicant's overall approach to designing the WTG layout has been underpinned by the requirement for Search and Rescue (SAR) access lanes in at least one line of orientation to minimise risks to surface vessels and / or SAR resource transiting through the array site. This requirement has been implemented by the Applicant to adhere to the guidance provided in the Maritime and Coastguard Agency's (MCA) Marine Guidance Note (MGN) 654 which states '*Developers should plan for at least two lines of orientation unless they can clearly demonstrate that fewer is acceptable*'. Furthermore, the minimum width of SAR lanes is 500 m. This UK guidance has been adopted in the absence of Irish specific guidance

204. It is understood that guidance specific to shipping and navigation will be published by the Marine Survey Office (MSO) in the near future[2], and that this guidance is likely to closely resemble MGN 654 which is the primary guidance used for equivalent assessment for United Kingdom (UK) Offshore Renewable Energy Installations (OREIs). Input to date by both the MSO and Irish Lights was that until guidance was in place, developers should apply the principles of MGN 654. Therefore, in the absence of Irish specific guidance, MGN 654 has been used as the primary guidance document to inform the WTG layout design.

205. Aside from the overarching drivers described above, individual positions of WTGs have been informed by a wide range of site specific data, including geophysical and geotechnical survey data (e.g., bathymetry), environmental data (e.g., benthic surveys and archaeological assessment) and stakeholder consultation.

206. Refining the layout of the WTGs has considered multiple constraints identified from analysis of the above datasets, alongside the consideration of layout principles taken from relevant guidance on the design of OWFs. A summary of the key constraints and principles that have informed the layouts for both WTG Options A and B are provided in **Table 3-16** below. The mapped constraints are also presented on **Figure 3-5** which demonstrates how the constraints have informed the proposed WTG locations for each layout option.

Table 3-16 WTG layout design principles and constraints

Principle / Constraint	WTG Layout Option A	WTG Layout Option B
The WTG layout(s) including OSS positions will be developed to ensure the impacts on known features of archaeological interest are minimised.	Archaeological exclusion zones (AEZs) around known features of archaeological interest (A1 anomalies) have been avoided. No works that impact the seabed will be undertaken within the extent of an AEZ during the construction, operational, or decommissioning phases. For features assigned A2 archaeological discrimination rating (potential seabed features of archaeological interest), no AEZs are recommended. However, these features have been avoided, where possible. Where this has not been possible, further appraisal is proposed prior to construction as detailed in EIAR **Chapter 14 Marine Archaeology & Cultural Heritage**.	

[2] The draft version of the planned guidance was released for targeted consultation in January 2023 by the Department of Transport (DoT), however it not yet finalised at the time of writing (June 2024). The contents closely resemble MGN 654.

Principle / Constraint	WTG Layout Option A	WTG Layout Option B
The WTG layout(s) including OSS positions will be developed to ensure the impacts on sensitive ecological receptors are minimised.	The WTG layout options have been developed to avoid or minimise interaction with known sensitive ecological habitats, including areas with suitable conditions for *Sabellaria spinulosa*, which can form reefs under some circumstances. Whilst reefs were not identified during the characterisation surveys, as an ephemeral feature it will be necessary to validate the results in advance of construction. A pre-construction geophysical survey will therefore be undertaken to facilitate the micro-siting around sensitive habitats such as *Sabellaria spinulosa*.	
The WTG layout(s) including OSS positions will be developed to ensure the impacts on commercial fisheries are minimised.	The WTG layout options have been developed to avoid or minimise interaction with known areas of high fishing density, where possible (see **Figure 3-5**). As avoidance is not always possible, the layouts have also been developed to increase the potential for coexistence. For example, data from fishing vessel plotters has been used to determine the direction in which the fishermen shoot their gear; in an east to west direction. It was therefore preferable to align the rows of WTGs in this same direction.	
The WTG layout(s) will be developed to minimise the seascape, landscape and visual impact of the array site on onshore receptors.	The Applicant has sought to produce a visually balanced and coherent layout of WTGs when seen from key viewpoints, demonstrating a consistent rhythm and spacing. Overarching navigation and safety issues seek consistent lines where possible and to avoid outlying WTGs, away from the main array. For both WTG Layouts, Option A and Option B, a grid layout is proposed with SAR lanes in two lines of orientation. Furthermore, for both options, whilst outliers are present, there are no outlying WTGs that appear significantly detached from the rest of the array. Variation in WTG spacing arising from optimising output and foundation requirements have introduced a degree of irregularity, creating a more organic appearance that helps to reduce the clustering and stacking of WTGs, albeit from some locations the array will appear less coherent. It is inevitable, given the effect of perspective, the balance and coherence of the WTGs in views will vary from one viewpoint to another, these differences are considered in the **Chapter 15 Seascape and Landscape Visual Impacts**.	
Avoidance of unsuitable water depths.	Three main blocks in the north west of the array site have been excluded where water depths are below 10 m LAT, reflecting restricted installation vessel capabilities in shallower waters.	
Avoidance of unsuitable ground conditions.	A paleochannel (the remnants of a river or stream channel that flowed in the past) in the centre west of the array site has been avoided due to unsuitable ground conditions for WTG foundation installation. Other areas of the array site have been excluded for WTG and OSS monopile installation due to unsuitable ground conditions identified during the geophysical and geotechnical campaigns. Specific reasons for exclusion include, adverse seabed slopes, soft infill ground and subsurface faulting.	

Principle / Constraint	WTG Layout Option A	WTG Layout Option B
No blade overhang is permitted outside of the planning application boundary.	All WTGs are within at least 125 m of the array site boundary for WTG Layout Option A and within at least 138 m of the array site boundary for WTG Layout Option A. Any movement of WTGs within the LoD will take this requirement into consideration.	

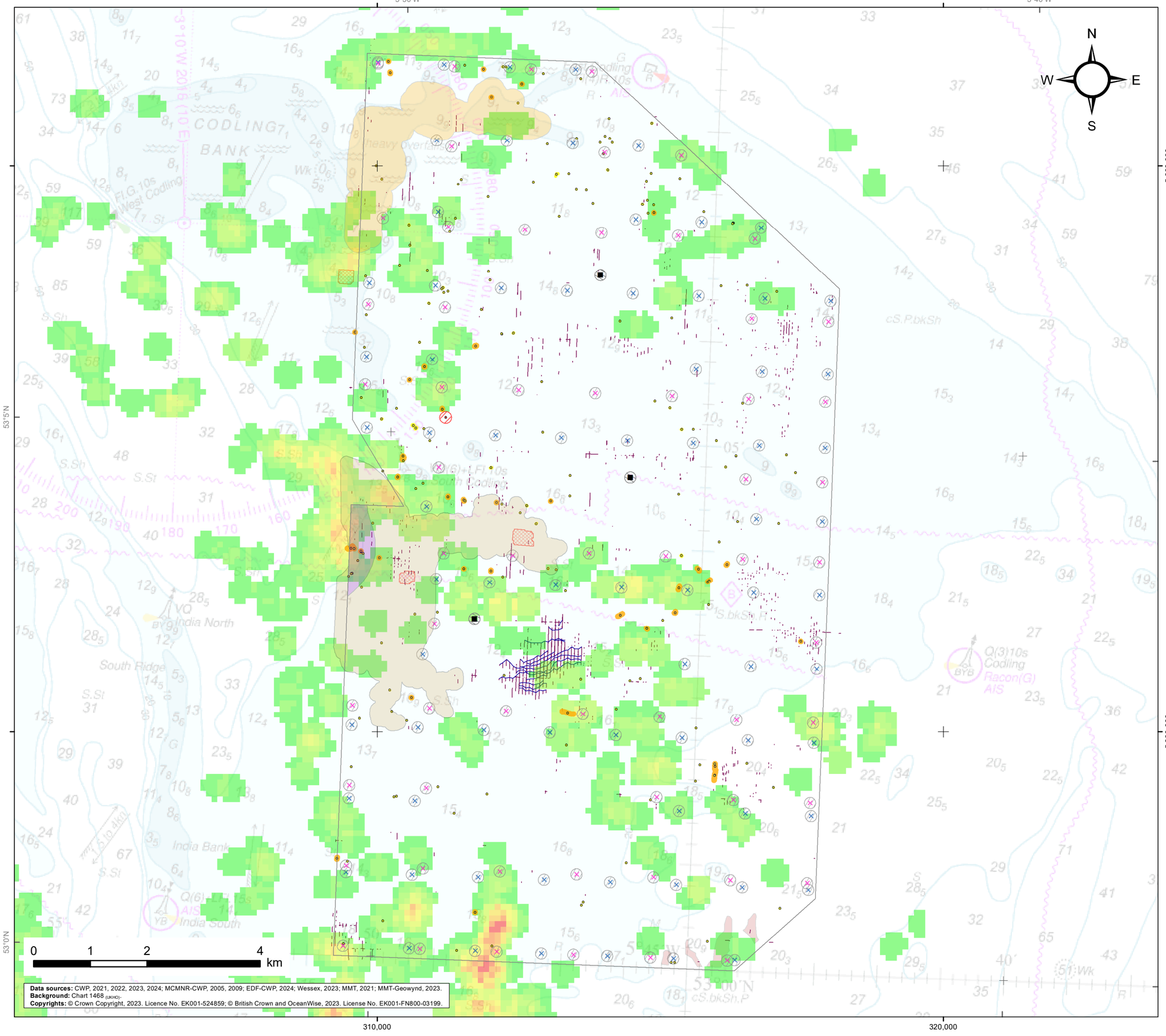
207. In addition to the environmental constraints described in **Table 3-16**, OREDP also identifies the following project level mitigation measures of relevance to the consideration of alternative WTG layouts:

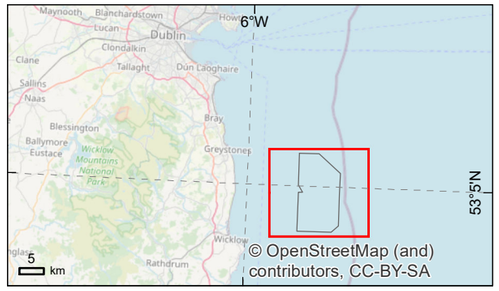
- Marine birds (collision risk):
  - Alignment of turbines in rows parallel to the main migratory direction.
- Marine mammals (collision risk (bats)):
  - Alignment of turbines in rows parallel to the main migratory direction.

208. Firstly, as highlighted by the detailed assessment provided in **Chapter 10 Ornithology**, marine birds have formed a key consideration in the EIA process and have informed several elements of the site selection and consideration of alternatives process, including alternative numbers of WTGs (see **Section 3.9.1**), alternative WTG heights (see **Section 3.9.3**) and in relation to the landfall selection (see **Section 3.12**)

209. With respect to WTG layout, the alignment of WTGs in north-south and east-west rows may be preferable for numerous migratory species, however, is not considered a necessary mitigation in order to avoid significant environmental effects. As described in **Chapter 10 Ornithology**, migratory movements occur across broad geographic fronts, of which the CWP Project WTG array occupies a very small proportion. As such, the large majority of migratory birds will avoid impacts entirely, while those individuals which would otherwise pass through the array site may generally avoid doing so (should they choose to do so), through subtle alterations to flight trajectories or altitudes. Such changes (if any) to migratory flight paths may, at most, increase migratory energetic costs only negligibly and in such a way as to have no noticeable effect upon survival rates or future reproductive outputs (Masden et al, 2009).

210. Similarly, with respect to migratory bats, the alignment of WTGs in east-west rows is likely to be preferable for bats migrating between Ireland and Wales, however as described in **Chapter 13 Offshore Bats**, there are no known defined migration routes in the Irish Sea and as such this has not directly informed the WTG layout design.





Legend

- Array site
- WTG Layout Option A
- WTG Layout Option B
- OSS locations

Offshore infrastructure limits of deviation

- WTGs LoD
- OSSs LoD

Archaeology

Seabed features of archaeological potential

- A1 - Anthropogenic origin of archaeological interest
- A2_h - Uncertain origin of possible archeological interest (high priority)
- A2_l - Uncertain origin of possible archeological interest (low priority)
- A1 - Archaeological exclusion zone (100 m)
- A2_h - Recommended micro-siting constraint (50 m)
- A2_l - Recommended micro-siting constraint (25 m)

Commercial fishing

Fishing gear density (points / km^2) – 250 m radius

High : 152.789

Low : 0

Bathymetric, geophysical and geotechnical constraints

- Shallow water (depth less than 10 m VORF LAT) - 200m buffer
- Depression
- Palaeochannels - 100m buffer
- Palaeochannels - U6 exclusion
- Possible gas accumulation located less than 10 m below seabed
- Faults
- Shalow faults

codling wind park

Project: Codling Wind Park

Contractor:

Figure 3.5
Array site - WTG and OSS layout constraints map

CWP doc. number: CWP-CWP-ENG-08-01-MAP-1045

Internal descriptive code: WF - WTG.LOs.60.L214.GRID_.75.L219.GRID_.OSSs_.LoDs - FISH.GEAR.DENSITY.R250..FOUND.CONSTR.HARD_.FAULTS_.GAS - (EIAR.Vol.03.Ch.03.FIG.05)"

Size: A3

Scale: 1:65,000

CRS: EPSG 25830

Rev.	Description	Date	By	Chk'd	App'd
00	Final for issue	2024/08/15	MC	CD	ES

Identification of reasonable alternatives

211. Over the course of the project's most recent phase (2021 onwards) 42 different WTG layout configurations have been identified and interrogated by the Applicant's project team in order to optimise and refine each layout. In summary, the key activities that have influenced this process include:

- Energy yield assessments at all stages of the layout development.
- The refinement of WTG model and number configurations, as described in **Section 3.9.1**.
- Numerous project workshops to analyse and take account of emerging constraints data, as detailed in the section above.
- Meetings with key offshore stakeholders, including:
    - Coastal planning authorities (i.e., Wicklow County Council) with respect to potential visual impacts;
    - Irish Aviation Authority; and
    - Shipping and navigation stakeholders (i.e., Irish lights, Irish Coast Guard and the Marine Survey Office).
- Engagement with the local fishing community.
- Public consultation events.

212. These activities have led the Applicant to establish a preferred WTG layout for both WTG Option A and WTG Option B, as presented in the relevant **Planning Drawings** that accompany the CWP Project planning application. Overall, it is considered that there are no alternative layouts that would achieve a better outcome in terms of delivering the correct balance between environmental acceptability, technical feasibility and commercial viability. The position of the OSSs are the same for both WTG layout options.

213. Notwithstanding the above, the Applicant acknowledges the need for some limited flexibility in the proposed layouts in the form of a LoD around the centre point of each WTG, as described in **Chapter 4 Project Description**. This is necessary because the Applicant will not be able to exclude the risk that the specific locations described will be unsuitable for WTGs due to hitherto undiscovered seabed conditions (such as undiscovered or unexpected bedrock strata that are unsuitable for WTG foundation installation) or changes in seabed conditions that, due to their ephemeral nature or dynamic seabed conditions, will only be possible to confirm presence / absence during pre-construction environmental and technical surveys after the application date (e.g., generation of biogenic reef or intrusion of mobile unexploded ordnance (UXO)).

The main reasons for selecting the preferred option

214. As set out above the Applicant will seek consent for two WTG layout options, including a LoD around the centre point of each WTG. The main reasons for selecting the preferred layout options are described above.

3.9.3 Alternative WTG heights as a function of minimum blade tip clearance

Background

215. WTG hub height and blade tip height are a direct function of the rotor diameter and the minimum blade tip clearance (clearance between the blade tip and the sea surface).

216. The following sections describe the consideration of alternatives WTG heights, taking into account relevant environmental and technical constraints.

Policy considerations

217. The key planning policies that have informed the identification of a preferred WTG height for each WTG model (Option A and Option B) are summarised in **Table 3-17** below.

Table 3-17 Summary of planning policy relevant to the consideration of alternative WTG heights as a function of minimum blade tip clearance

Policy	Relevant considerations
National Marine Planning Framework (2021)	The NMPF promotes impact avoidance across a wide range of receptor groups, articulated around Overarching Marine Planning Policies (OMPP) supplemented by Sectoral Marine Planning Policies (SMPP). SMPP that are of relevance to the consideration of alternative WTG heights are listed below: • Biodiversity Policy 1; • Biodiversity Policy 4; • Protected Marine Sites Policy 4; • Seascape and Landscape Policy 1; and • Safety at Sea Policy 1. The analysis presented below demonstrates an approach that is unpinned by the principle of impact avoidance, and is therefore consistent with the requirements of the abovementioned polices.

Study area and constraints analysis

218. As already noted, WTG hub height and blade tip height are a direct function of the rotor diameter and the minimum blade tip clearance.

219. However, as the rotor diameter associated with each of the preferred WTG models is a fixed parameter, the Applicant's ability to refine WTG hub height and blade tip height relates solely to the minimum blade tip clearance, which is variable within the constraints identified below. Therefore, alternative minimum blade tip clearance forms the study area for this design element.

220. To determine a preferred minimum blade tip clearance for the Applicant has undertaken a significant environmental and engineering refinement process to balance competing constraints.

- **Ornithology**: the minimum blade tip clearance will be the same for both WTG options. This is necessary to minimise impacts on birds, whereby raising the blade tip clearance to a minimum height above the sea surface moves the rotor swept area to altitudes where bird densities are lower due to the skewed nature of bird flight height distribution. Collision risk modelling indicates that this is an effective way of reducing the collision risk.
- **Visual impact**: increasing the minimum blade tip clearance increases the overall height of the WTGs, which leads to increased visibility of the WTGs from the coastline.
- **Marine mammals**: increasing in the overall height of the WTGs, increases the size and weight of the WTG structures including the monopile foundation. This has potential negative implications for above and below water noise associated with WTG foundation installation.
- **Shipping and navigation**: A minimum blade tip clearance of at least 22 m above highest astronomical tide (HAT) is required which is aligned with the minimum clearance the Royal

Yachting Association (RYA) recommends for minimising allision risk and considered in the absence of Irish specific guidance.

221. In addition to the environmental constraints described above, increasing in the overall height of the WTGs and therefore the size and weight of the WTG structures increases the cost of materials and creates limitations for vessel availability and crane suitability to install the larger WTGs.

Identification of reasonable alternatives

222. During the consideration of alternatives process, a minimum blade tip clearance ranging from 22 m above mean sea level (MSL) to 42 m above MSL was considered. As noted above, the minimum blade tip clearance will be the same for both WTG options.

223. Early collision risk modelling identified minimum blade tip clearance heights of less than 30 m above MSL to be unacceptable with regards to collision risk estimates for a number of key ornithological species. Therefore, alternative minimum blade tip clearance heights ranging from 30 m above mean sea level (MSL) to 42 m above MSL were taken forwards for more detailed analysis.

Comparison of environmental effects

224. As described above, the Applicant has considered in detail the competing environmental effects associated with minimum blade tip clearance heights ranging from 30 m above MSL to 42 m.

225. The range in heights has been considered against each of the environmental constraints identified in the section above, with the key considerations presented in **Table 3-18** below.

Table 3-18 Comparison of environmental effects for alternative WTG heights as a function of minimum blade tip clearance

Constraint / Criteria	Relevant considerations
Ornithology	• Raising the blade tip clearance to a minimum height above the sea surface moves the rotor swept area to altitudes where bird densities are lower due to the skewed nature of bird flight height distribution. • Collision risk modelling has determined that a minimum blade tip clearance of 36 m above MSL in combination with a reduction in WTG numbers (see **Section 3.9.1**) avoids likely significant effects (in EIA terms) to all relevant ornithological species and prevents adverse effects on site integrity in the context of Appropriate Assessment for relevant European designated sites (see **Chapter 10 Ornithology** and **Natura Impact Statement**). • Increasing the minimum blade tip clearance would reduce predicted collision estimates further, however this has been balanced against other negative implications as described below.
Visual impact	• Reducing the overall height of the WTGs leads to reduced visibility of the WTGs from the coastline. However, analysis of WTG visualisations has confirmed that there would be no significant difference in the visual impact of the WTGs when considering a difference in minimum blade tip clearance height from 30 m above MSL to 42 m above MSL. Therefore, although preferable to minimise the overall height of the WTGs, it is not considered appropriate to lower the minimum blade tip height beyond 36 m above MSL, as required to mitigate impacts on ornithology.

Constraint / Criteria	Relevant considerations
Marine Mammals	• Increasing in the overall height of the WTGs, increases the size and weight of the WTG structures including the monopile foundation. This has potential negative implications for above and below water noise associated with WTG foundation installation. Underwater noise modelling for the CWP Project has confirmed the requirement for additional mitigation to avoid significant effects on marine mammal species (see **Chapter 11 Marine Mammals**). This assessment highlights the importance of adopting measures to reduce below water noise associated with WTG foundation installation, including minimising the size and weight of the WTG monopile foundations. Therefore, the Applicant considers it appropriate to adopt a minimum blade tip clearance that provides the necessary level of mitigation for ornithological species, whilst avoiding unnecessary increase in below water noise and the negative implications associated with this.
Shipping and Navigation	• All alternatives (i.e., a range in heights from 30 m above MSL to 42 m above MSL) exceed the height of 22 m above HAT, as required by the RYA.

The main reasons for selecting the preferred option

226. The principal reason for selecting the preferred height for the WTG minimum blade tip clearance is the reduced collision mortality estimates for key ornithological species, as determined by collision risk modelling. A minimum blade tip clearance of 36 m above MSL in combination with a reduction in WTG numbers provides the necessary mitigation to avoid likely significant effects (in EIA terms) to all relevant ornithological species and prevents adverse effects on site integrity in the context of Appropriate Assessment for relevant European designated sites (see **Chapter 10 Ornithology** and **Natura Impact Statement**).

227. The Applicant has undertaken a significant engineering refinement process to balance competing constraints, however increasing the minimum blade tip clearance further (and therefore the overall height of the WTGs) is not considered appropriate due to:

- A resulting increase in the visibility of the WTGs from the coastline;
- An increase in above and below water noise associated with monopile installation;
- An increase in the cost of materials; and
- Limitations with respect to vessel availability and crane suitability to install the larger WTGs.

3.9.4 Alternative WTG foundation designs (including OSS foundations)

Background

228. The following section describes the process that was undertaken to identify the most suitable WTG and OSS foundation for the CWP Project, including the consideration of alternative foundation types and the main reasons for discounting these.

Policy considerations

229. The key planning policies that have informed the identification of a preferred WTG foundation type for both WTG models (Option A and Option B) are summarised in **Table 3-19** below.

Table 3-19 Summary Lof planning policy relevant to the consideration of alternative WTG foundation designs (including OSS foundations)

Policy	Relevant considerations

Offshore Renewable Energy Development Plan (2014)	The suggested OREDP project level mitigation measures of relevance to the consideration of alternative WTG foundation types are listed below:
	• Fish and shellfish, marine birds and marine mammals (noise):
	  ○ Minimise use of high noise emission activities such as impact piling and blasting; and
	  ○ Consider using alternatives (i.e., clump weights, gravity bases, routeing cables through soft sandy sediment or use cable protection rather than burial).
	• Commercial fisheries (direct disturbance):
	  ○ Minimise effects by using procedures and structures that reduce the area of seabed disturbed for turbine foundations.

National Marine Planning Framework (2021)	The NMPF promotes impact avoidance across a wide range of receptor groups, articulated around Overarching Marine Planning Policies (OMPP) supplemented by Sectoral Marine Planning Policies (SMPP). SMPP that are of relevance to the consideration of alternative WTG foundation types are listed below: • Biodiversity Policy 1; • Biodiversity Policy 4; and • Protected Marine Sites Policy 4. The analysis presented below demonstrates an approach that is unpinned by the principle of impact avoidance, and is therefore consistent with the requirements of the abovementioned polices.

Study area and constraints analysis

230. The choice of WTG and OSS foundation type, of which there are several options, forms the study area for this design element.

231. The choice of foundation type is governed by a number of factors. These factors, listed below, are primarily the selected WTG specification and loading conditions, water depth, soil conditions and possible fabrication and installation constraints, including environmental considerations.

Environmental

232. The identification of suitable WTG and OSS foundation types for the CWP Project has been informed by the following environmental considerations:

- **Changes in benthic habitats**: Introducing an WTG or OSS foundation into the marine environment creates new hard-bottom habitat within the array site, a resultant loss of soft-bottom

habitat, which can affect species that are not mobile, or species that use soft-bottom habitats for feeding areas.

- **Seabed disturbance and associated suspended sediments**: the extent of seabed preparation required prior to foundation installation varies across foundation types. For example, gravity-based foundations may temporarily disturb an area several times larger than the foundation footprint itself.
- **Wake effects and scour**: The magnitude of wake effects is proportional to the size of the offshore wind foundation. Scour and erosion of seafloor substrate that develops in response to wake effects over the life of the foundation is potentially a concern in areas with shallow water, where the effect of prevailing currents can have a strong influence on the sea floor.
- **Underwater noise**: underwater noise caused by foundation installation has the potential to cause permanent or temporary effects to marine ecology; notably marine mammals, fish and invertebrates. Foundation types that require impact pile driving generate the highest underwater sound levels and therefore have the greatest impact on marine ecology. The spatial extent of impact pile driving noise will vary among projects based on water depth and temperature, seafloor sediment type, and pile and hammer characteristics, among other factors.

Other

233. Technical and physical constraints linked to the practicability of construction and commercial viability also informed the initial identification of suitable WTG and OSS foundation types for the CWP Project. More specifically, the constraints analysis for the consideration of alternative WTG and OSS foundation types included:

- **WTG specification**: For the selection of a suitable WTG foundation, the maximum potential WTG rotor diameter size was assumed.
- **Water depth**: The majority of the array site has water depths between 10 m and 20 m LAT, with approximately 10% of the site between 20 m and 25 m LAT.
- **Soil conditions**: The CWP Project array site can be broadly split into two zones based on the preliminary geotechnical information that is currently available. The north zone has a 16 m layer of sand overlying clay down to 60 m. In the south zone there is 20 m of sand on top of 40 m of clay. The presence of boulders at the site will influence the selection of foundation type for the project.
- **Fabrication and installation constraints**: Access to suitable fabricators who can deliver to project timelines is key for selection of foundation types for the site. The level of risk is relative to the maturity of technology and availability of suitable fabricators.

Identification of reasonable alternatives

234. At the point of EIA Scoping (December 2020) consideration was being given to four main conventional options for WTG foundations (see **Plate 3-7**):

- **Monopiles**: The most commonly used foundation solution for offshore wind WTGs consisting of a steel cylindrical pile typically installed using impact driving, vibropiling or drilling.
- **Tripod with pin piles**: Three-legged steel sub-surface structure fixed to the seabed using mid-sized pin piles.
- **Jacket foundations with pin piles**: The jackets comprising of tubular steel sections may be configured to include 3 or 4 legs with the footing for each leg secured to the sea bed with a single pin pile.
- **Gravity based structures (GBS)** – Large concrete structures that sit on the seabed and rely on their weight to provide stability for the WTG.

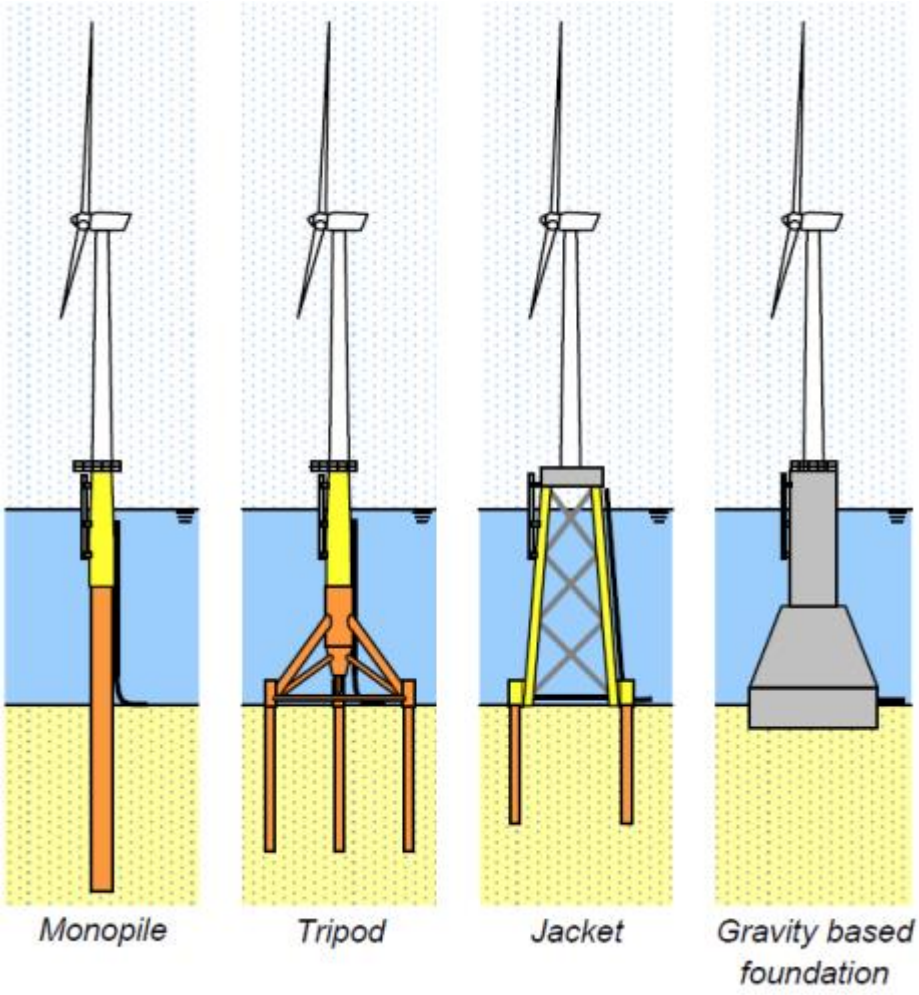


Plate 3-7 WTG foundation types

235. An initial screening study evaluated the suitability of each foundation type against the key technical and physical constraints described above. The tripod option was discounted at this stage due to potential fabrication implications, with limited fabricators globally with experience in fabricating tripod structures. Therefore, the monopile, jacket and GBS foundation types were taken forwards for further consideration.

Comparison of environmental effects

236. As described above the following WTG model / number configurations were taken forward for a more detailed comparison of environmental effects: monopiles, jackets and GBS.

237. A comparison of each option against each of the environmental constraints identified in the section above is presented in **Table 3-20** below.

Table 3-20 Comparison of environmental effects for alternative for alternative WTG foundation designs (including OSS foundations)

Constraint / Criteria	Relevant considerations
Changes in benthic habitats	• Effects of habitat loss due to foundation installation and operation is expected to be greatest for foundations with the largest footprint; likely GBS followed by monopiles and then jackets with pin piles. This takes into consideration the likely scour protection required for each option. However, due to the relatively small amount of habitat loss relative to similar habitat still existing within the array site and in the area surrounding it, any direct and indirect effects would be minimal.
Seabed disturbance and associated suspended sediments	• During the foundation installation process, seabed preparation (e.g., pre-sweeping and sandwave levelling) can cause sediments to become suspended in the water column, increasing the suspended sediment concentration. Foundations that require major seabed preparation, such as by dredging, are expected to have the largest installation-related suspended sediment level and sedimentation effects on benthic communities. • GBS foundation installation is expected to require more extensive seafloor preparation than other foundation types if dredging is needed to level the seafloor before building up the area with gravel or stone for foundation support. For monopile foundations, the extent of seabed disturbance increases with pile diameter, however these typically require less seabed preparation relative to GBS foundations. Jacket foundations with pin piles are typically driven through sleeves or legs that would minimise sediment release.
Wake effects and scour	• The magnitude of wake effects is proportional to the size of the foundation. GBS foundations have a wider diameter at the sea floor and would likely result in a larger wake effect at depth, but they typically taper toward the surface, where currents are often stronger, so the cumulative wake effect may be similar to monopiles. Jacket foundations have a more open structure and may displace a smaller volume of the water column compared to monopiles. Overall wake effects of jacket foundation types are expected to be weaker than monopile foundations.
Underwater noise	• With respect to underwater noise impacts, monopiles are considered to carry the highest risk due to the requirement for large impact hammers required to install the foundations. However, the number of piling events would be significantly greater for jackets due to the number of pin piles required per jacket, and therefore impact duration will be longer. On average foundations using pin piles would require between 3 and 4 times the number of piling events. The Applicant is seeking consent for up to 78 foundations (WTG Option A +OSSs). Using pin piles would take the number of piling events from 78 to 234 for a jacket with three pin piles and from 78 to 312 for a jacket with four pin piles. If we assume the same piling duration (3.5 hrs) it would take the total number of piling hours from 273 to 819 for a jacket with three pin piles and 1092 piling hours for a jacket with four pin piles. This would result in a greater risk of population level effects on cetaceans such as harbour porpoise. Whilst underwater noise is a complex science it is also worth noting that piling of pin piles is considered to result in a greater degree of high frequency noise propagation which can compound the impact on very high / high frequency cetaceans such as

Constraint / Criteria	Relevant considerations
	harbour porpoise. Given the proximity of international designated sites for harbour porpoise the use of monopiles is considered to be a better environmental option when compared with jackets with pin piles with respect to underwater noise. • GBS is considered to carry the least risk for receptors impacted by underwater noise.

The main reasons for selecting the preferred WTG foundation type

238. Based on internal and external analysis of WTG foundation types, the Applicant has concluded that monopile foundations are the most suitable option for installation at the CWP Project array site. Monopiles are recommended over jackets and GBS foundations for the following primary reasons:

- Presence of boulders – It is considerably more feasible to avoid boulders with monopiles whereas this is more difficult with jackets and GBS foundations.
- Well established supply chain – the majority of wind farms globally are founded on monopiles with a large number of fabricators and installers to choose from.
- Simple fabrication – fabrication can easily be scaled up production for large sites.
- Environmental – although monopiles carry a notable risk for underwater noise receptors, there are established measures and procedures for mitigating these impacts. This has been considered within the EIAR (see **Chapter 9 Fish, Shellfish and Turtle Ecology** and **Chapter 11 Marine Mammals**).

3.9.5 Alternative IAC and interconnector cable layouts

Background

239. The following sections describe the approach taken by the Applicant to designing and optimising the layout of the IAC and interconnector cables for each of the preferred WTG layouts.

Policy considerations

240. The key planning policies that have informed the identification of a preferred IAC and interconnector cable layout for each WTG layout are summarised in **Table 3-21** below.

Table 3-21 Summary of planning policy relevant to the consideration of alternative IAC and interconnector cable layouts

Policy	Relevant considerations
Offshore Renewable Energy Development Plan (2014)	The suggested OREDP project level mitigation measures of relevance to the consideration of alternative IAC and interconnector cable alignments are listed below: • Marine and Coastal Archaeology and Wrecks: ○ Avoid sites of interest and exclusion zones for marine archaeology.

Policy	Relevant considerations
National Marine Planning Framework (2021)	The NMPF promotes impact avoidance across a wide range of receptor groups, articulated around Overarching Marine Planning Policies (OMPP) supplemented by Sectoral Marine Planning Policies (SMPP). SMPP that are of relevance to the consideration of alternative IAC and interconnector cable layouts are listed below: • Co-existence Policy 1; • Fisheries Policy; • Ports, Harbours and Shipping Policy 1; • Heritage Assets Policy 1; and • Safety at Sea Policy 5.

Study area and constraints analysis

241. The study area for the purposes of defining the IAC and interconnector cable layouts is the array site, as defined in **Section 3.8.3**. The following sections describe the study area constraints identified and considered in the Applicant's refinement of the preferred IAC and interconnector cable layouts for each of the preferred WTG layouts. The mapped constraints are also presented on **Figure 3-6** which demonstrates how the constraints have informed the proposed IAC and interconnector cable alignments for each WTG layout option.

Environmental

242. Designing and optimising the layout of the IACs and interconnector cables has considered a number of the same environmental datasets and design principles used to determine the WTG locations, as described in **Table 3-14** above. In summary, the constraints taken into consideration include:

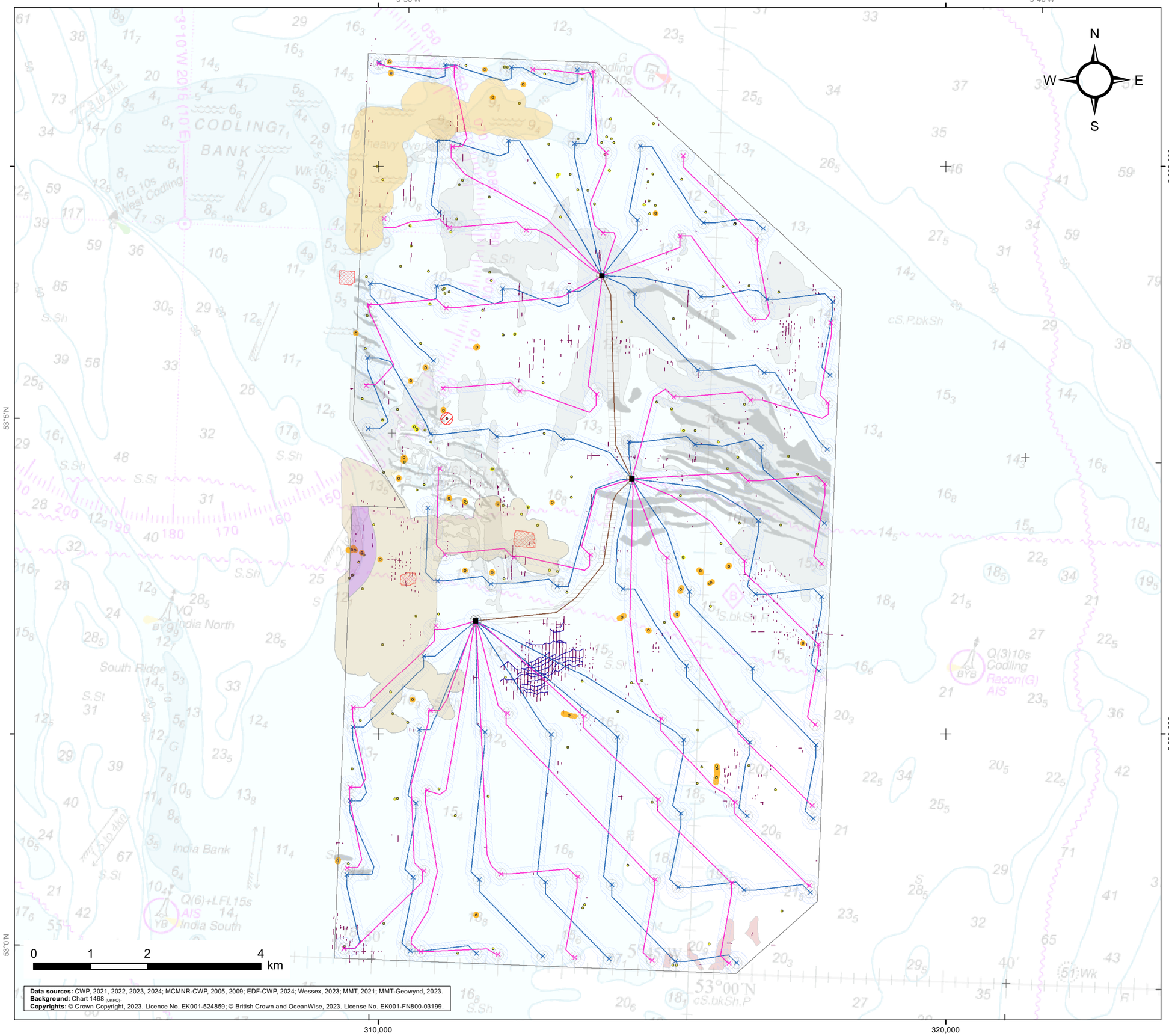
- **Archaeology**: Archaeological exclusion zones (AEZs) around known features of archaeological interest (A1 anomalies) have been avoided. No works that impact the seabed will be undertaken within the extent of an AEZ during the construction, operational, or decommissioning phases. For features assigned A2 archaeological discrimination rating (potential seabed features of archaeological interest) no AEZs are recommended. However, these features have been avoided, where possible. Where this has not been possible, further appraisal is proposed prior to construction as detailed in EIAR **Chapter 14 Marine Archaeology & Cultural Heritage**.
- **Benthic ecology**: The cables have been routed to minimise interactions with sandwaves, thereby reducing the overall requirement for sandwave levelling and the associated effects from increased suspended sediment concentrations.
- **Commercial fisheries / shipping and navigation**: Known areas of hard substrate has been avoided where possible to ensure that as far as practically possible the cables can be buried.

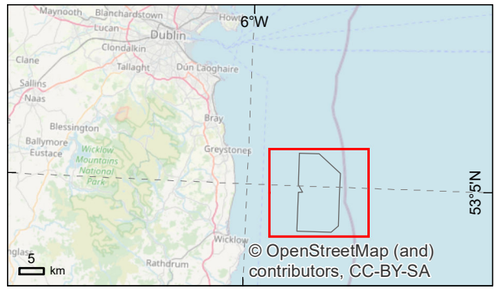
Other

243. Technical (engineering and electrical performance) challenges associated with IAC and interconnector cable layout design have also been considered by the Applicant's engineering team with support from third-party consultants. These considerations include:

- Avoiding thermal overloading in cables;

- Bypassing geotechnical exclusion zones (such as the paleochannel in the centre west of the array site);
- Avoiding IAC crossings within the array site;
- Minimising interactions with identified out of service cables;
- Minimising the overall length of cables and associated electrical power losses;
- Controlling logistic and procurement cost by using a limited number of cable types; and
- Considering the maximum number of cable strings and the installed capacity which the OSSs can accommodate.





Legend

- Array site
- WTG Layout Option A
- WTG Layout Option B
- Inter-array cable (IAC) Option A
- Inter-array cable (IAC) Option B
- Interconnector cable
- OSS locations

Offshore infrastructure limits of deviation

- WTGs LoD
- OSSs LoD
- IAC cables (including cable protection) LoD
- Interconnector cables (including cable protection) LoD

Archaeology

Seabed features of archaeological potential

- A1 - Anthropogenic origin of archaeological interest
- A2_h - Uncertain origin of possible archeological interest (high priority)
- A2_l - Uncertain origin of possible archeological interest (low priority)
- A1 - Archaeological exclusion zone (100 m)
- A2_h - Recommended micro-siting constraint (50 m)
- A2_l - Recommended micro-siting constraint (25 m)

Bathymetric, geophysical and geotechnical constraints

- Shallow water (depth less than 10 m VORF LAT) - 200m buffer
- Depression
- Palaeochannels - 100m buffer
- Palaeochannels - U6 exclusion
- Possible gas accumulation located less than 10 m below seabed
- Faults
- Shalow faults

Bedforms features

- Mega ripples
- Sand waves

codling wind park

Project: Codling Wind Park

Contractor:

Figure 3.6
Array site – IAC and interconnector cable layout constraints map

CWP doc. number: CWP-CWP-ENG-08-01-MAP-1120

Internal descriptive code: WF - WF.RLB..WTG.LOs.60.L214.GRID..75.L219.GRID..IACs..OSSs..INTCs..LoDs - FOUND.CONSTR.HARD..FAULTS..GAS..SANDW - (EIAR.Vol.03.Ch.03.FIG.06)

Size: A3

Scale: 1:65,000

CRS: EPSG 25830

Rev.	Description	Date	By	Chk'd	App'd
00	Final for issue	2024/08/15	MC	CD	ES

Identification of reasonable alternatives

244. Over the course of the project's most recent phase (2021 onwards) numerous IAC and interconnector cable layout configurations have been identified and interrogated by the Applicant's project team to optimise and refine each layout. In summary, the key activities that have influenced this process include:

- Cable thermal rating studies;
- The refinement of WTG model and number configurations, as described in **Section 3.9.1**;
- Numerous project workshops to analyse and take account of emerging constraints data, as detailed in the section above; and
- Engagement with the local fishing community.

245. These activities have led the Applicant to establish a preferred IAC and interconnector cable layout for each of the preferred WTG layouts, as presented in **Figure 3-6**. Overall, it is considered that there are no alternative layouts that would achieve a better outcome in terms of delivering the correct balance between environmental acceptability and electrical performance.

246. Notwithstanding the above, the Applicant acknowledges the need for some limited flexibility in the proposed layouts in the form of a LoD either side of each cable, as described in **Chapter 4 Project Description**. This is necessary because the Applicant will not be able to exclude the risk that the preferred alignments will be unsuitable for cable installation due to hitherto undiscovered seabed conditions (e.g., large boulders) or changes in seabed conditions (e.g., generation of biogenic reef or intrusion of mobile UXO).

The main reasons for selecting the preferred option

247. As set out above the Applicant will seek consent for two WTG layout options and therefore two IAC and interconnector cable layouts, including a LoD either side of each cable. The main reasons for selecting the preferred layout options are described above.

3.10 Phase 2: Consideration of alternative grid connection points

3.10.1 Alternative grid connection points

Background

248. To deliver electricity from the CWP Project it is necessary to connect the array site to the existing onshore transmission grid. This requires an onshore transmission grid location with 220 kV electrical connectivity, which is the electrical voltage of the incoming export cables.

249. On this basis, the location of suitable, existing or proposed 220 kV connections to the onshore transmission grid network forms the primary driver in identifying a suitable grid connection location for the OWF and the associated OTI to facilitate this connection.

Grid connection assessment process

250. In Ireland, the Commission for Regulation of Utilities (CRU) is the independent energy regulator, and EirGrid is the transmission systems operator, responsible for the supply of electricity and planning the future of the onshore electricity grid.

251. On 11 October 2021, CRU published its decision paper (CRU/21/112) which confirmed how Grid Connection Assessment (GCA) applications for Phase 1 Projects would be carried out. This required an application by eligible Phase 1 Project applicants confirming 1) a single Maximum Export Capacity (MEC) and 2) the applicant's stated preference for onshore grid connection point location(s).

252. This information would then be used by EirGrid to issue a GCA to each Phase 1 Project confirming the onshore connection location, the connection method and the cost of connecting the project to the transmission system. A GCA is required for each Phase 1 Project to subsequently receive a full grid connection offer from EirGrid, which has yet to occur.

Policy considerations

253. The GCA process described above is a regulator-led process, undertaken in collaboration with EirGrid as the transmission systems operator. Therefore, in providing a GCA, both the CRU and EirGrid will be required to align decision making with all relevant policy concerning ORE grid connection.

254. This includes DECC's 'Policy Statement on the Framework for Ireland's Offshore Electricity System' (DECC, 2021) which requires EirGrid to pro-actively plan and co-ordinate associated onshore grid infrastructure, including reinforcements, to deliver the grid capacity that is required for the Phase 1 Projects.

Study area and constraints analysis

255. Prior to publication of the CRU/21/112 decision paper, EirGrid published the results of its assessment undertaken to identify a range of locations with strong 220 kV electrical connectivity to the Dublin Region for the purposes of connecting the Phase 1 Projects to the grid, (Offshore Phase 1 Projects – Grid Connections Assessment' (EirGrid, 2021)) in order to assist the Phase 1 Projects in their route selection and design. That assessment identified a number of nodes with potential capacity available which may be suitable for connection of the CWP Project. These are shown on **Plate 3-8** and included:

- Arklow, Ballybeg and Carrickmines in the South Dublin / Wicklow area;
- Louth and Woodland in the Meath / Louth area; and
- Poolbeg and Finglas in the Dublin City area.

256. Each connection point was tested by EirGrid to identify potential capacity for new offshore wind energy generation. Details on physical spacing available at the existing substations and on potential reinforcements that could be undertaken to improve further capacity were also provided.

257. Overall, the assessment undertaken by EirGrid concluded 'all areas were shown to have considerable capacity available for offshore wind generation', with locations close to Dublin load centre and / or with multiple 220 kV connections into the Dublin area having the best opportunities for new generation capacity.

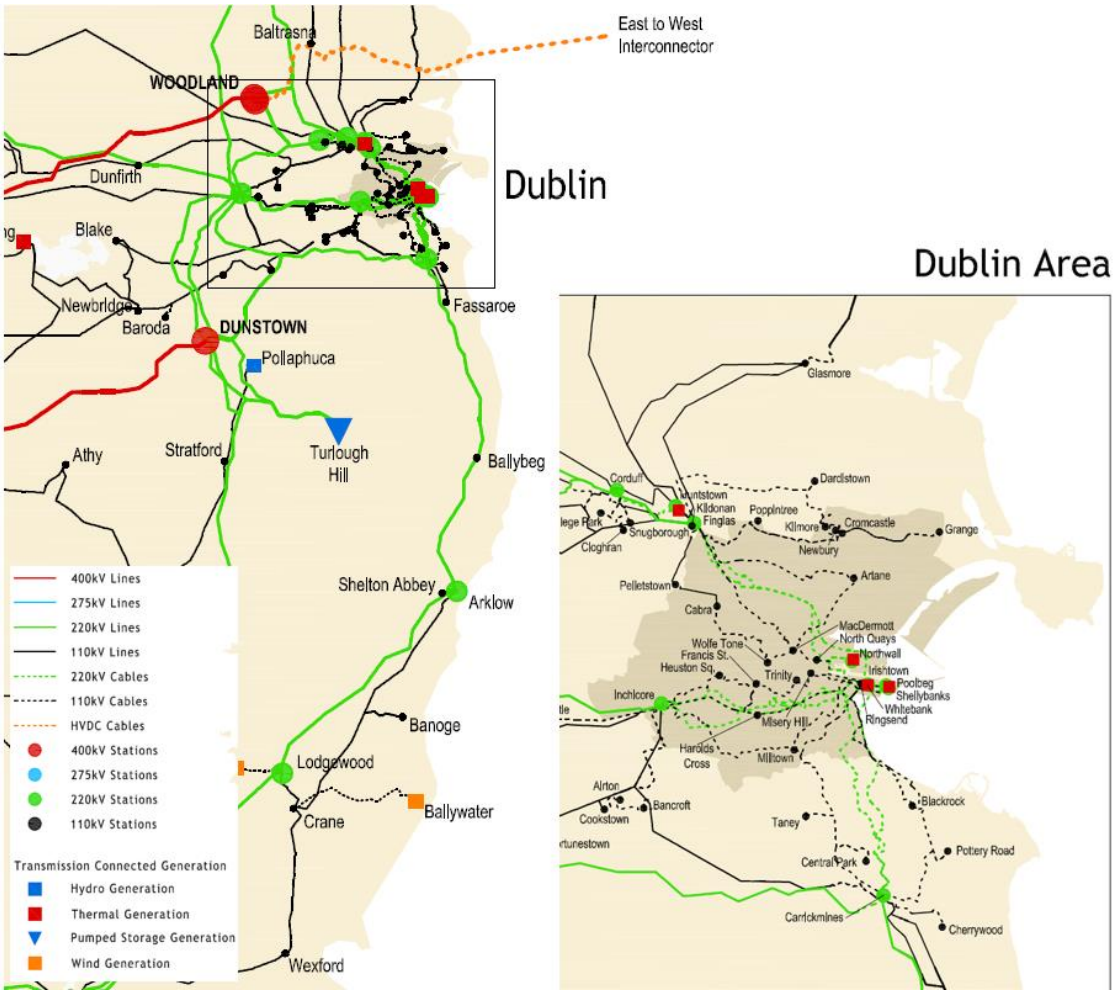


Plate 3-8 EirGrid transmission system map including potential onshore grid connection locations for the CWP Project

Identification of reasonable alternatives

258. EirGrids Offshore Phase 1 Projects – Grid Connections Assessment led the Applicant to initially consider all potential options for the CWP Project grid connection, however a number of potential options were quickly discounted:

- **Finglas / Louth and Woodland in the Meath / Louth area**: Taking account of the location and expected capacity of the CWP array site, the Applicant immediately discounted Louth and Woodland in the Meath / Louth area and at Finglas in the Dublin City area as potential grid connection locations. These options would require a significantly extended offshore export cable route and multiple conflicts with third parties including: Dublin Array, Oriel and NISA OWFs, the approach to Dublin Port and multiple crossings of existing seabed infrastructure.
- **Arklow**: A connection at Arklow was also discounted due to the Arklow Bank Phase II OWF, which had already submitted consent for a connection to the existing Arklow 220 kV substation.
- **Ballybeg**: In Q1 2022 EirGrid confirmed that Ballybeg was not available for consideration as a point of connection.

259. In addition to the above, Poolbeg was identified by EirGrid as the only location which could accept more than 700 MW of electricity. Therefore, a connection at Carrickmines only would not be feasible for the CWP Project. Consequently, on the 7th November 2022 EirGrid issued a GCA to the Applicant confirming Poolbeg as the grid connection location for CWP Project, with capacity for up to 1,450 MW.

3.11 Phase 3: Consideration of alternative landfall sites

Background

260. This section summarises the site selection and consideration of alternatives process undertaken by Applicant to identify a preferred location for the landfall. The landfall can be defined as the point at which the offshore export cables are brought onshore and connected to the onshore export cables within the transition joint bays (TJBs), which are permanent below ground structures.

261. At the time of undertaking this process, the Poolbeg 220 kV substation had been confirmed the most likely grid connection point for the CWP Project. Therefore, the aim of this process was to identify the best performing option for the CWP Project landfall location, with an onward connection to an onshore substation located on the Poolbeg Peninsula.

262. For the purposes of the landfall site selection assessment, four main technical considerations were identified:

- The offshore cable approach, consisting of up to three 220 kV offshore export cable circuits;
- The construction of up to three TJBs;
- The onward connection, consisting of up to three 220 kV onshore export cables; and
- The location of a temporary construction compound to facilitate construction of the TJBs and the landfall works.

263. Further information concerning the evolution of the landfall design at the preferred location is presented in **Section 3.12.1** of this document.

Policy considerations

264. The key planning policies that have informed the identification of a preferred landfall site are summarised in **Table 3-22** below.

Table 3-22 Summary of planning policy relevant to the consideration of alternative landfall sites

Policy	Relevant considerations

Offshore Renewable Energy Development Plan (2014)	The suggested OREDP project level mitigation measures of relevance to the consideration of alternative landfall sites are listed below:
	• Geology, geomorphology and hydrography:
	  ○ Avoidance of placement of devices in areas where sediment transport pathways are modelled as highly sensitive to change.
	• Protected sites and species:
	  ○ Careful site selection avoiding sensitive sites for devices and export cables (i.e., existing and proposed protected sites).

Policy	Relevant considerations

	• Benthic ecology:
	  ○ Careful site selection avoiding sensitive sites for devices and export cables (i.e., areas with known sensitive intertidal and subtidal benthic habitats); and
	  ○ Avoid device / infrastructure placement within 500 m of areas of known sediment contamination.
	• Marine birds:
	  ○ Avoid sensitive sites / areas where possible (i.e., SPAs).
	• Recreation and Tourism:
	  ○ Identify and avoid popular routes for sailing or other water sports such as kayaking;
	  ○ Identify and avoid popular recreational areas where possible;
	  ○ Avoid popular cruising routes, diving areas and key water sport locations; and
	  ○ Avoid areas that are popular with tourists and wildlife tour operators.

National Marine Planning Framework (2021)	The NMPF promotes impact avoidance across a wide range of receptor groups, articulated around Overarching Marine Planning Policies (OMPP) supplemented by Sectoral Marine Planning Policies (SMPP). SMPP that are of relevance to the consideration of alternative WTG models are listed below: • Biodiversity Policy 1; • Biodiversity Policy 2; • Biodiversity Policy 4; • Protected Marine Sites Policy 4; • Access Policy 1; and • Ports, Harbours and Shipping Policy 2. The analysis presented below demonstrates an approach that is unpinned by the principle of impact avoidance, and is therefore consistent with the requirements of the abovementioned polices.
Ireland 2040 Our Plan – National Planning Framework (2018)	Avoidance of unnecessary impacts is the preferred mitigation strategy for the NPF, which aligns closely with the approach that has been taken by the Applicant at all stages of the onshore site selection and development process. With regards to the siting of the landfall, the following NPOs have been considered: • National Policy Objective 59 – to enhance the conservation status and improve the management of protected areas and protected species.
Regional Spatial and Economic Strategy (RSES) for the Eastern and Midlands Region (EMRA) 2019–2031.	The Regional Spatial and Economic Strategy (RSES) for the Eastern and Midland Region 2019–2031 is a strategic plan which identifies policy in response to regional strategic assets, opportunities and challenges. These are referred to as Regional Policy Objectives (RPO). With regards to the siting of the landfall, the following NPOs have been considered: • RPO 7.4 – Statutory land use plans will take account of the risk of coastal erosion, whereby new development should be avoided in areas at risk of coastal erosion to the greatest extent practicable.

Policy	Relevant considerations
	• RPO 7.16 – Support the implementation of the Habitat Directives in achieving an improvement in the conservation status of protected species and habitats in the Region and to ensure alignment between the core objectives of the EU Birds and Habitats Directives and local authority development plans.

Study area and constraints analysis

265. A landfall study area was defined considering a grid connection location on the Poolbeg Peninsula. This study area extended from the River Liffey along the northern edge of the Poolbeg Peninsula, following the coastline of Dublin Bay southwards to Sorrento Point at Dalkey (see **Figure 3-7**).

266. The following sections describe the study area constraints identified and considered in the Applicant's assessment of alternative landfall sites. To inform this section an updated environmental constraints map has been produced (see **Figure 3-7**).

Environmental

267. The identification of a suitable landfall site for the CWP Project has been informed by the following environmental considerations:

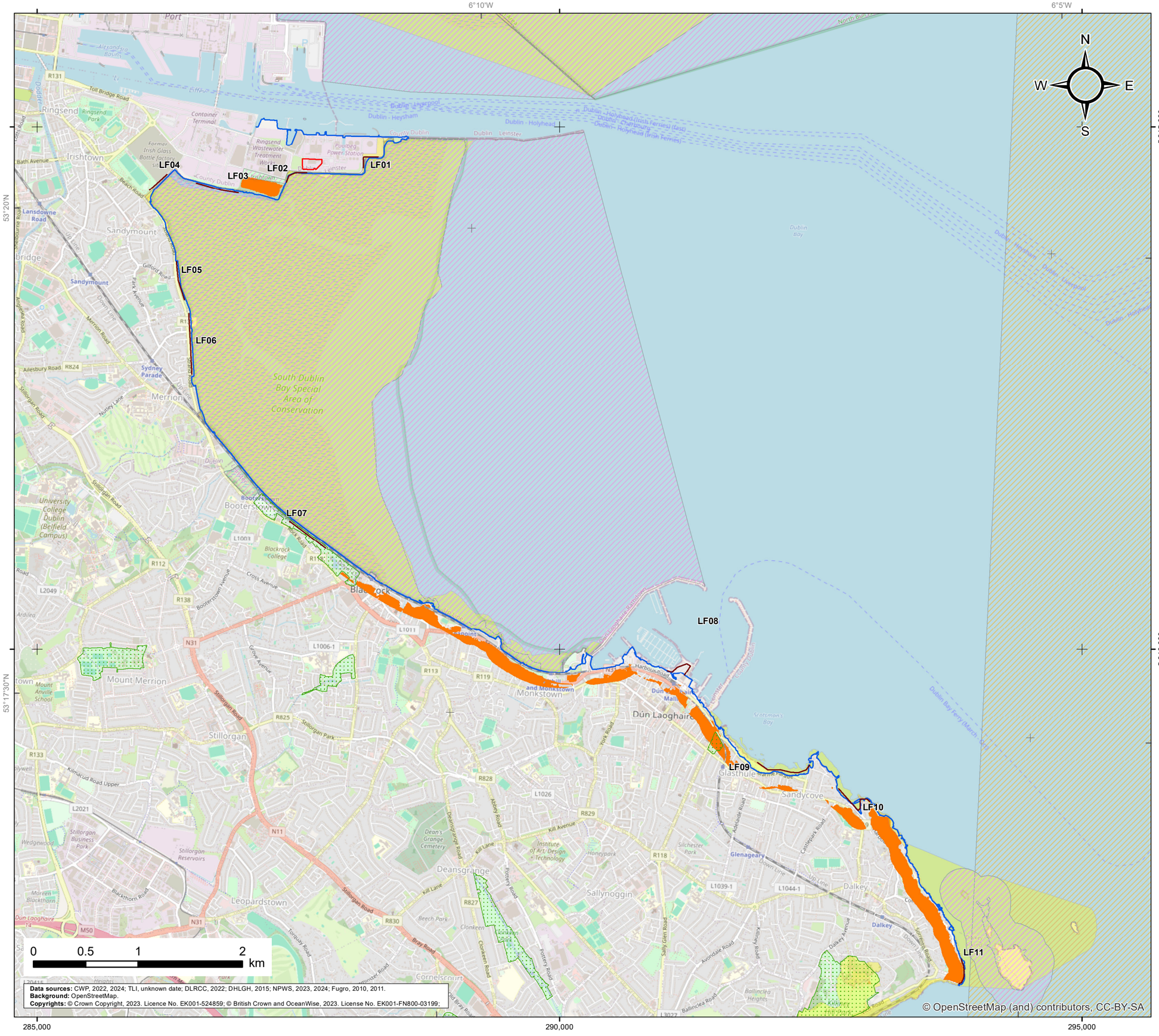
- **Geology, geomorphology and hydrography**: in line with relevant policy, the Applicant has sought to avoid areas with high levels of coastal erosion where possible.
- **Designated sites for nature conservation**: in line with relevant policy, the Applicant has sought to avoid sites within or in close proximity to marine protected sites. Where it is not possible to avoid a designated site, the potential effects have been reported and it is assumed that appropriate mitigation measures will be put in place (as described in relevant chapters of the EIAR and NIS).
- **Shipping and navigation**: in line with relevant policy, areas of high shipping densities and regularly used shipping routes have been avoided where possible.
- **Recreation and tourism**: in line with relevant policy, popular recreational areas have been avoided where possible as well as key water sport locations.
- **Noise and visual disturbance**: sections of the coastline that are fronted by residential or commercial properties are considered to be unsuitable to land the offshore export cables at the shoreline.

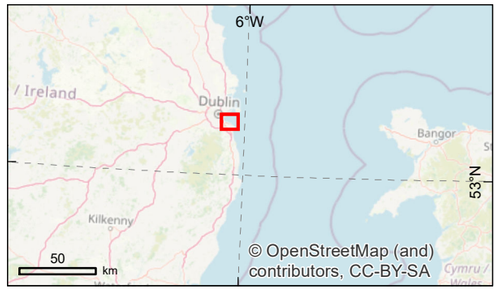
Other

268. Technical (engineering) challenges associated with the proposed landfall works have also been considered by the Applicant's engineering team with support from third-party consultants. These considerations include:

- **Site topography**: areas with significant changes in elevation and / or challenging geology will be excluded. Level sites, as flat as possible are preferred to avoid the need for gradient correction techniques.
- **Temporary works**: areas that are too small to accommodate the typical requirements of a temporary construction compound will be excluded.
- **Traffic and transport**: areas with established onshore access roads are preferred, considering both the requirements during construction of the TJBs and for the installation of the onshore export cables.

- **Beach access**: Areas with no feasible beach access for plant and equipment will be excluded.
- **Offshore cable approach and onshore connection**: It is preferable from both a technical and environmental perspective to utilise the shortest and straightest feasible export cable routes from the offshore array site to the grid connection location. This will reduce the duration of construction programme with associated reduction in temporal effects on environmental receptors, and cost reductions that ultimately reduce the cost of energy to the consumer.





Legend

- Landfall site study area
- Poolbeg 220kV substation
- Potential landfall site locations

Designated sites for nature conservation

- Special Protections Area (SPA)
- Special Conservation Area (SCA)
- Proposed National Heritage Area (pNHA)
- Parks and recreational areas

Cliffs

- Lower than 10 m
- Higher than 10 m

codling wind park

Project: Codling Wind Park

Contractor:

Figure 3.7
Landfall site – Study area, constraints map and identification of potential site options

CWP doc. number: CWP-CWP-ENG-08-01-MAP-1122

Internal descriptive code: PB..DLH - LFs..LF.SEARCH.ZONE - SS.ESBN..PARKS..pNHAs..SACs..SPAs..COAST.DTM>10m - (EIAR.Vol.03.Ch.03.FIG.07)

Size: A3
Scale: 1:35,000

CRS: EPSG 25830

Rev.	Updates	Date	By	Chk'd	App'd
00	Final for issue	2024/08/15	MC	CD	ES

Identification of reasonable alternatives

269. Landfall site options within the River Liffey channel were excluded at an early stage due to the required cable route interaction with the main shipping channel in and out of Dublin Port. This decision was informed by a feasibility study to consider the potential to install and operate the CWP Project offshore export cables within the River Liffey. The study determined that this would not be feasible on the basis that:

1. The main channel of the River Liffey is dredged by DPC to maintain its depth. All cable routes would therefore need to avoid the main channel.
2. Installing the cables in the shallow areas close to the Great South Wall would likely interfere with DPCs future plans that are being brought forwards as part of the 3FM Project.
3. Routing subsea cables close to the Great South Wall would also be challenging due to its significant heritage value and the potential to undermine its foundations.
4. To the north of the main channel there is insufficient space to install the required number of export cables.
5. Vessel / shipping density in the main channel is significant at all times of the year with an increase in recreational vessel activity during summer months. Blocking port activities for any length of time and any impact to shipping would not be compatible with DPC's operational requirements.
6. The water depths outside of the main channel are shallow and not sufficient to support the operations of a traditional cable vessel.

270. Considering the results of the above-mentioned feasibility study and the constraints analysis described in the section above, the Applicant identified eleven potential landfall site locations as shown on **Figure 3-7**.

271. A series of site visits were undertaken by the CWP project team and engineers from a specialised third-party contractor (TLI group) to inspect each of the eleven potential landfall site locations. These inspections were undertaken to better understand the physical characteristics of each site and to assess the feasibility of each option against the four main technical considerations described at the beginning of this section.

272. As a result of this exercise, eight of the eleven landfall site locations were determined by TLI group and the Applicant's project team to be unsuitable for a grid connection at Poolbeg and were therefore screened out from any further assessment. The main reasons for including and excluding these options for further assessment is provided in **Table 3-23** below.

Table 3-23 Identification of reasonable alternatives for the landfall site

Landfall location	Screened in / out	Rationale
LF01 – Shellybanks Car Park	In	A feasible but challenging option due to limited space being available at the shoreline.
LF02 – Shellybanks Beach	In	A feasible but challenging option due to limited space being available at the shoreline.
LF03 – Poolbeg South	In	A favourable option due to the ample available space and proximity to the shoreline.
LF04 – Dublin Bay	Out	Site unavailable due to development plans for the former glass bottle site.
LF05 – Sandymount Strand Car Park 1	Out	Insufficient space inland from the shoreline to accommodate any TJBs. The site is also located on a very narrow and busy commuter road already occupied

Landfall location	Screened in / out	Rationale
		with many services which would make any underground cable routes back to Poolbeg extremely challenging.
LF06 – Sandymount Strand Car Park 3	Out	As described for LF05.
LF07 – Merrion Strand	Out	An existing rail line inhibits the potential for this site and would require a significant horizontal directional drill (HDD). Onward connections to Poolbeg would involve cabling along over 5 km of heavily trafficked, service-laden roads in densely populated south Dublin suburbs.
LF08 – Dún Laoighaire Harbour	Out	There is a high potential for significant impacts to other marine users associated with Dún Laoighaire Harbour. The space required for a TJB compound is potentially available in the old ferry terminal's car park, however any development here could severely limit future plans to develop the site. Onward connections to Poolbeg involving heavily trafficked, service-laden roads would be extremely challenging.
LF09 – Sandycove Beach	Out	As described for LF05.
LF10 – Bullock Harbour	Out	As described for LF05.
LF11 – Dillon's Park	Out	As described for LF05.

273. On the basis of the initial screening assessment, three potential landfall site locations were carried forward for a more detailed comparison of environmental effects:

- LF01 – Shellybanks Car Park;
- LF02 – Shellybanks Beach; and
- LF03 – Poolbeg South.

274. Firstly, the site conditions of the three feasible options were reviewed to better understand the physical characteristics of each area and the suitability of the area to accommodate the landfall works. The outputs of this desktop study have been summarised in **Table 3-24** below.

Table 3-24 Site condition summary for LF01, LF02 and LF03

Site	Site condition summary
LF01 – Shellybanks Car Park	
Site Description	This site consists of a gently sloping, sandy beach and adjacent car park. The shoreline has a recreational walking trail to the west of Shellybanks beach. This site is situated within a heavily industrialised area with a gas network transmission pump station, NORA facility and Poolbeg 220 kV substation all in close proximity.
Offshore Connection	Cable installation could be possible due to the very low gradient beach which extends for approximately 1 km into South Dublin Bay from this point. No rock

Site	Site condition summary
	outcrops are visible and the approach is indicated as sand and unclassified sediments from INFOMAR data.
Onshore Connection	The continuation of Pigeon House Road forms the western and northern perimeter of this landfall location. This narrow, two-lane carriageway is the only access route to several industrial facilities and to the Great South Wall amenity. Several services are indicated in the road south of Poolbeg 220 kV substation including 3 no. high gas network pipes; 1 no. medium pressure gas network pipe; 2 no. 220 kV cables and 2 no. 110 kV cables. Available space for the CWP onshore export cables will be extremely limited within the road curtilage and routeing off the road network may be required to bring the CWP onshore connection to Poolbeg 220 kV substation. There are no available diversion routes.
TJB Suitability	This location would only accommodate a compound suitable for two TJBs. The brownfield site immediately west of the beach would accommodate three TJBs however planning permission is already in place for another development in this alternative location.
Temporary Compound Suitability	There is insufficient space available to accommodate a full-sized temporary compound because the existing cark park measures only 70 m x 18 m, approximately.
Environmental Constraints	The beach is zoned within the sensitive environmental areas of the South Dublin Bay and River Tolka Estuary SPA, South Dublin Bay SAC and South Dublin Bay pNHA. The site is also in close proximity to the Great South Wall, which has value in terms of both heritage and recreation.
LF02 – Shellybanks Beach	
Site Description	This site is a small sandy beach located approximately 1.5 km from the low tide mark at the edge of the South Dublin Bay mud flats. The shoreline has a recreational trail to the west of Shellybanks beach. The site is situated in a heavily industrialised area with Ringsend Wastewater treatment plant, Gas Network Transmission pump station and Poolbeg 220 kV substation all in close proximity.
Offshore Connection	Cable installation could be possible due to the very low gradient beach which extends for approximately 1.9 km into South Dublin Bay from this point. No rock outcrops are visible and the approach is indicated as sand and unclassified sediments from INFOMAR data. Presence of a high-pressure gas connection from Poolbeg to Merrion Strand, subsea sewer connections from Poolbeg to Sutton and Poolbeg to Sandymount.
Onshore Connection	The continuation of Pigeon House Road forms the northern perimeter of this landfall location. This narrow, two-lane carriageway is the only access route to several industrial facilities and to the Great South Wall amenity. Several services are indicated in the road along the northern perimeter of this landfall site including 2 no. high gas network pipes; 1 no. medium pressure gas network pipe; 2 no. 220 kV cables and 2 no. 110 kV cables.
Transition Joint Bay (TJB) Suitability	Insufficient space is available to accommodate three TJBs at the immediate landfall location as this space falls within designated environmental areas (see environmental constraints below).
Temporary Compound Suitability	There is insufficient space available to accommodate a full-sized temporary compound because the existing grassed areas are of insufficient size to

Site	Site condition summary
	accommodate the temporary infrastructure. This space falls within designated environmental areas (see environmental constraints below).
Environmental Constraints	The beach and grassed areas to the road are zoned within the designated environmental areas of the South Dublin Bay and River Tolka Estuary SPA, South Dublin Bay SAC and South Dublin Bay pNHA.
LF03 – Poolbeg South	
Site Description	This site consists of a made-ground plateau with laid rock and earthen berm coastal defences. The shoreline has a recreational trail between Dublin Bay and Shellybanks beach. The area consists of a large industrial yard with a narrow strip of vacant ground to the south.
Offshore Connection	Cable installation could be possible due to the very low gradient mudflats which extend for approximately 0.9 km into South Dublin Bay from this point. No rock outcrops are visible and the approach is indicated as sand and unclassified sediments from INFOMAR data. Presence of a 220 kV HV cable connection from Poolbeg to Sandymount. High-pressure gas connection from Poolbeg to Merrion Strand. Subsea sewer connections from Poolbeg to Sutton and Poolbeg to Sandymount.
Onshore Connection	Good access to this location is possible by means of Shellybanks Road and South Bank Road, both of which are capable of handling Heavy Goods Vehicle (HGV) traffic. Access for large vehicles and proximity to the southern Dublin quays.
Transition Joint Bay (TJB) Suitability	Space is available at this location for 3 no. TJBs.
Temporary Compound Suitability	Ample space is available at this location for a full-size temporary compound.
Environmental Constraints	The intertidal mudflats immediately to the south of this location are zoned within the sensitive environmental areas of the South Dublin Bay and River Tolka Estuary SPA, South Dublin Bay SAC and South Dublin Bay pNHA.

Comparison of environmental effects

275. As described above the following landfall site locations were taken forward for a more detailed comparison of environmental effects:

- LF01 – Shellybanks Car Park;
- LF02 – Shellybanks Beach; and
- LF03 – Poolbeg South.

276. A comparison of each option against each of the environmental constraints identified in the section above is presented in **Table 3-25** below.

Table 3-25 Comparison of environmental effects for alternative landfall sites

Constraint / Criteria	Relevant considerations
Geology, geomorphology and hydrography	• For each option (LF01, LF02 and LF03) the offshore connection would require cable installation within the intertidal area of South Dublin Bay. No rock outcrops are visible and the approach is indicated as sand and unclassified sediments from INFOMAR data. • For all options there is the potential to encounter made ground when installing the landfall infrastructure, particularly above the high water mark within the Poolbeg Peninsula. The risk level of encountering made ground and for the works to act as pathway for the migration of contaminants is considered to be the same for each option. All sites would require further contaminated land risk assessment and consultation with appropriate stakeholders.
Designated sites for nature conservation	• For each option the offshore connection would require cable installation over a very similar distance within the South Dublin Bay and River Tolka Estuary SPA and the South Dublin Bay SAC. • The South Dublin Bay and River Tolka Estuary SPA is designated for wintering birds and breeding / post breeding terns and comprises a substantial part of Dublin Bay, including the intertidal mudflats and shallow marine waters. Offshore export cable installation within the SPA has the potential to result in disturbance and displacement to these species if not managed carefully. Given the location of the landfall site options, the risk level in respect to the SPA and its conservation objectives is considered the same for each option and will therefore need to be considered as part of the project design in the form of appropriate mitigation measures to avoid or otherwise reduce potential effects to acceptable levels (see EIAR **Chapter 10 Ornithology** and the **Natura Impact Statement**). • The South Dublin Bay SAC is designated for its extensive areas of mudflats and sandflats. There would be a direct impact on these habitats and associated faunal communicates during offshore export cable installation with the SAC. Given the location of the landfall site options, the risk level in respect to the SAC and its conservation objectives is considered the same for each option and will therefore need to be considered as part of the project design and the **Natura Impact Statement**. It is likely that any such effects on the SAC will be temporary and short term taking into consideration the short term nature of the works and the recoverability of the habitats and associated species. The potential routeing of the offshore export cables through the South Dublin Bay SAC was discussed with NPWS at an early stage. It was noted by NPWS that '*the nature of the habitats present at this location would suggest that if a trench had to be cut these habitats would recover quickly, and that trenching operations can be done in suitable locations very quickly so there is a potential for minimal displacement of species. Recovery for infaunal biodiversity might occur as quickly as six months. Consideration should be given to the seasonal dimension – particularly around feeding birds – if the trenching method is pursued*'.
Shipping and navigation	• The landfall works associated with each option will take place within the intertidal and shallow water areas of Dublin Bay. There are no ports, harbours or key navigational channels within this area, and therefore very limited potential for effects such as vessel collision, restricted port access

	or vessel to structure allision. The risk level is considered to the same for each option.
Recreational access and amenity	• For each option the onshore connection would require cable installation through the existing footpath that runs adjacent to Dublin Bay between Sandymount and the Great South Wall. Recreational users of this route, may experience some temporary disruption during the works. Nearshore activities such as swimming or yacht clubs may also experience some temporary disruption during the works. • Given the beach location at LF02 and the location of the car park at LF01, it is considered that these two options would have increased effect on recreational access and amenity in comparison to LF03. There is sufficient space adjacent to LF03 to ensure continued access along the adjacent footpath.
Noise and visual disturbance	• For each option the landfall works would result in short term, temporary noise and visual effects to local residents and / or recreational users of the areas mentioned above. However, given the location of the sites, away from residential properties, the risk of significant effects occurring as a result of the landfall works is considered low, and is the same for each option.

The main reasons for selecting the preferred landfall site

277. The process for identifying a preferred landfall site location for the CWP Project has taken into account a range of factors that considers both environmental acceptability and technical feasibility.

278. Of the eleven potential landfall location options identified in this report, three options (LF01, LF02 and LF03) were considered technically feasible options for facilitating an onshore grid connection point within the Poolbeg Peninsula.

279. These three options share a number of benefits compared to the discounted options further to the south:

- Firstly, they are in close proximity (<1 km) to the preferred onshore grid connection point and therefore require reduced onshore cabling, minimising the socio-economic impact compared of an extended onshore connection along heavily trafficked, service-laden roads in densely populated south Dublin suburbs.
- They are also located within an existing, long-established industrial area, and consequently present a low risk of disturbance to the local community and residential areas during construction phase.
- Thirdly, each option has a flat overall profile facing on to the mudflats of South Dublin Bay which would allow for open cut cable installation and will simplify the construction requirements of the TJBs. Furthermore, there are no rock outcrops visible in the vicinity from either aerial imagery or site visits.

280. Whilst sharing a number of advantages, LF03 has the following additional benefits:

- There is ample space in the surrounding industrial yards for a temporary compound setup, contingent on landowner / leaseholder / relevant authority agreement;
- There is also sufficient space to ensure continued access along the adjacent footpath; and
- The site offers particularly good HGV access to the national road network and the South Dublin port facilities, as well as feasible access for vehicles and plant to the intertidal area.

281. In comparison, LF01 and LF02 are considered more challenging options due to the lack of available space at the landfall location for both the TJBs and the necessary temporary compound to facilitate the works. High densities of buried services in the roads around these landfalls would also make installation of the onshore export cables more challenging. LF03 was therefore identified as the singular best option for the landfall location.

282. Alternative options further south, outside the extents of the South Dublin Bay and River Tolka Estuary SPA and South Dublin Bay SAC, were not considered feasible due to lack of available space and the significant disruption that the onshore connection would have on the busy, service laden road network. Alternative options to the north of the SPA and SAC within the River Liffey were also discounted due to the required cable route interaction with the main shipping channel in and out of Dublin Port.

283. Therefore, whilst the avoidance of designated sites is a key policy objective that has underpinned all stages of the CWP Project site selection process, a degree of interaction with the abovementioned sites cannot be avoided in respect to the landfall works. The potential effects of this interaction have been discussed with NPWS and are described in detail within the EIAR and **Natura Impact Statement**, which include appropriate mitigation measures to avoid or otherwise reduce effects on the species and habitats associated with these sites. No significant effects (EIA) or adverse effects om site integrity (AA) are predicted.

284. A more detailed consideration of compliance with OREDP and NMPF policies is provided in the **Planning Report**.

3.12 Landfall infrastructure: consideration of alternative designs

3.12.1 Alternative TJB layouts

Background

285. As described in **Section 3.11**, the location of the landfall for the offshore export cables was subject to an extensive site selection process accounting for various technical and environmental constraints.

286. The site selection process identified LF03 (see **Figure 3-7**) as the singular best option for the landfall location which is the point at which the offshore export cables are brought onshore and connected to the onshore export cables within the TJBs. This decision took account of available space for permanent and temporary works within the confines of ‘Area O’, which is an area identified in the DPC Dublin Port Masterplan 2040 (see **Plate 3-9**).

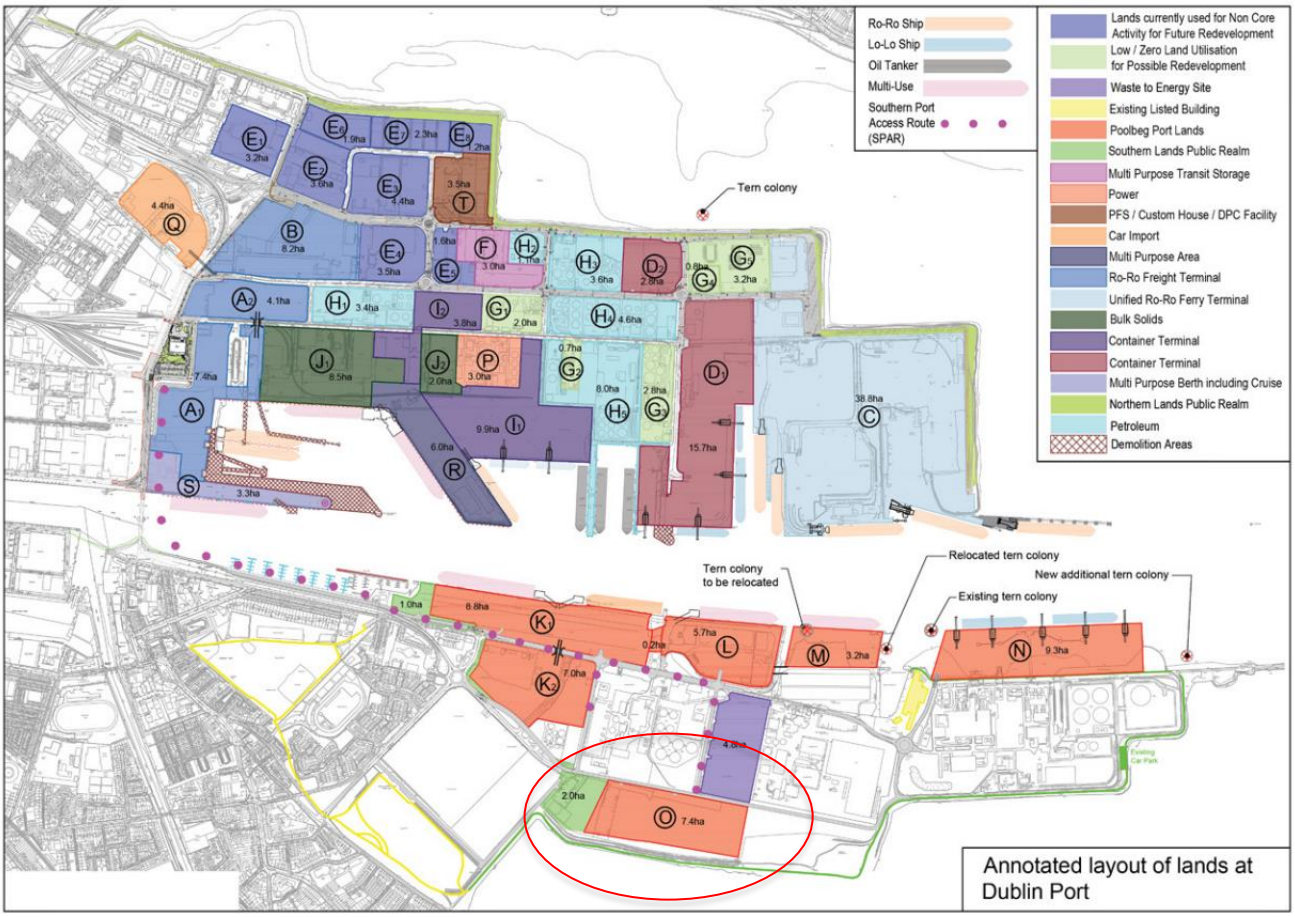


Plate 3-9 Location of 'Area O' in the DPC Dublin Port Masterplan

287. Completion of the abovementioned study initiated a search for the location of three TJB locations (one for each export cable circuit). This initially focused on land available within Area O, whilst taking into consideration the emerging onshore export cable route options (see **Section 3.17**).

288. The following sections describe the approach taken by the Applicant to identifying a preferred location for the TJBs, including the consideration of alternative locations.

Policy considerations

289. The key planning policies that have informed the identification of a preferred location for the TJBs are summarised in **Table 3-26**.

Table 3-26 Summary of planning policy relevant to the consideration of alternative TJB layouts

Policy	Relevant considerations
Offshore Renewable Energy Development Plan (2014)	The suggested OREDP project level mitigation measures of relevance to the consideration of alternative TJB locations are listed below: • Protected sites and species: ○ Careful site selection avoiding sensitive sites for devices and export cables (i.e., existing and proposed protected sites).
National Marine Planning Framework (2021)	The NMPF promotes impact avoidance across a wide range of receptor groups, articulated around Overarching Marine Planning Policies (OMPP) supplemented by Sectoral Marine Planning Policies (SMPP). SMPP that are of relevance to the consideration of alternative WTG models are listed below: • Biodiversity Policy 1; • Biodiversity Policy 2; • Biodiversity Policy 4; and • Protected Marine Sites Policy 4. The analysis presented below demonstrates an approach that is unpinned by the principle of impact avoidance, and is therefore consistent with the requirements of the abovementioned polices.
Ireland 2040 Our Plan – National Planning Framework (2018)	Avoidance of unnecessary impacts is the preferred mitigation strategy for the NPF, which aligns closely with the approach that has been taken by the Applicant at all stages of the site selection and development process. With regards to the siting of the landfall, the following NPOs have been considered: • National Policy Objective 59 – to enhance the conservation status and improve the management of protected areas and protected species.
Regional Spatial and Economic Strategy (RSES) for the Eastern and Midlands Region (EMRA) 2019–2031	The Regional Spatial and Economic Strategy (RSES) for the Eastern and Midland Region 2019–2031 is a strategic plan which identifies policy in response to regional strategic assets, opportunities and challenges. These are referred to as Regional Policy Objectives (RPO). With regards to the siting of the landfall, the following NPOs have been considered: • RPO 7.16 – Support the implementation of the Habitat Directives in achieving an improvement in the conservation status of protected species and habitats in the Region and to ensure alignment between the core objectives of the EU Birds and Habitats Directives and local authority development plans.
DPC Dublin Port Masterplan 2040.	The Masterplan 2012–2040 was adopted by the Board of DPC on 26th January 2012 and published in February 2012. As detailed above and below, the identification a preferred location for the TJBs has had regard to the areas identified within the DPC Dublin Port Masterplan 2040, including the proposed use of these areas.
Poolbeg West Strategic Development Zone (SDZ) Planning Scheme.	Part IX of the Planning and Development Act 2000–2011 provides for the designation of a Strategic Development Zone (SDZ) to facilitate development which in the opinion of the Government is of economic or social importance to the State.

	On 17th May 2016, the Government designated Poolbeg West as a SDZ. These lands are deemed to be of economic and social importance to the State. The designated area in the Order is for a mixed use development which principally includes residential development, commercial and employment activities, including office, hotel, leisure and retail facilities, port-related activities and the provision of educational facilities, transport infrastructure, emergency services and community facilities, as referred to in Part III of the First Schedule to the Act, (including health and childcare services), as appropriate. Area O is located within the extents of the Poolbeg West Strategic Development Zone (SDZ) and is designated for '*Mixed Use – Commercial, Creative Industries, Industrial (including Port Related) Activities*'.

Study area and constraints analysis

290. An initial study area for the TJBs focused on land available within Area O, as identified in the DPC Dublin Port Masterplan 2040.

291. The following sections describe the study area constraints identified and considered in the Applicant's assessment of alternative TJB locations.

Environmental

292. The identification of suitable TJB locations for the CWP Project has been informed by the following environmental considerations:

- **Designated sites for nature conservation**: Area O is located within close proximity to the South Dublin Bay SPA and the Irish Town Nature Reserve. In line with relevant policy, the Applicant has sought to minimise impacts to these sites and associated species.
- **Recreational access and amenity**: A popular recreational route runs along the edge of the coastal revetment, immediately south of Area O. In line with relevant policy, access restrictions along this route should be avoided where possible.

Other

293. Technical (engineering) challenges associated with the proposed TJB works have also been considered by the Applicant's engineering team with support from third-party consultants. These considerations include:

- **Interaction with third parties**: Area O forms part of the DPC Dublin Port Masterplan 2040 and therefore the positioning of the TJBs would need to consider DPCs future plans for the area.
- **Feasibility for trenchless cable duct installation**: At this stage of the site selection process the Applicant was assessing both open cut and trenchless methods for landfall cable duct installation between the TJBs and the intertidal area. Therefore, it was considered that a preferred location for the TJBs would be one that facilitates both installation methods within acceptable engineering limits (i.e., acceptable drill lengths for a trenchless method and cable bend radius).
- **Onshore export cable route**: At this stage of the site selection process the Applicant had begun to consider onshore export cable route options both east and west of the Dublin Waste to Energy (DWtE) facility, with a western route likely to be preferable (see **Section 3.17**). Therefore, it was

considered that a preferred location for the TJBs would be one that facilitates an onshore export cable route to the west of the Dublin Waste to Energy (DWtE) facility.

Identification of reasonable alternatives

294. Four initial options were identified (TJB01, TJB02, TJB03 and TJB04 on **Figure 3-8)** and presented to DPC for feedback. This confirmed that due to emerging plans associated with DPCs 3FM Project it was recommended that no TJBs are placed within 'Area O'. Additionally, any other options which may result in cables crossing the site would need to be considerate of the 3FM plans.

295. As a result of the above TJB03 and TJB04 were discounted. TJB02 was also later discounted as this would only be suitable for a onshore cable route exiting to the west of the site (i.e., the least preferred onshore cable route options presented in **Section 3.17** of this chapter).

296. It was noted by DPC that TJB01 would be acceptable in principle with suitably aligned onshore cables. The additional requirement being that the option should not permanently remove the front berm that forms part of the land between Area O and the intertidal area, with the TJBs needing to be located within the rear berm.

297. Feedback received from DPC led the Applicant to identify two additional options (TJB05 and TJB06 on **Figure 3-8**). These two options, alongside TJB01, were considered in more detail to identify the best performing option. This included a comparison of environmental effects, presented in the section below.

6°12'20"W

6°12'W

53°20'20"N

53°20'10"N

5,914,800

5,914,400

286,800

287,200

Covanta site

Irishtown Nature Park

TJB01

TJB02

TJB03

TJB04

TJB05

TJB06

N

W

E

S

0 25 50 100 Meters

Data sources: CWP, 2022, 2023; Bluesky, 2021; DHLGH, 2015; NPWS, 2023, 2024; DPC, 2022
Background: Bluesky orthophoto
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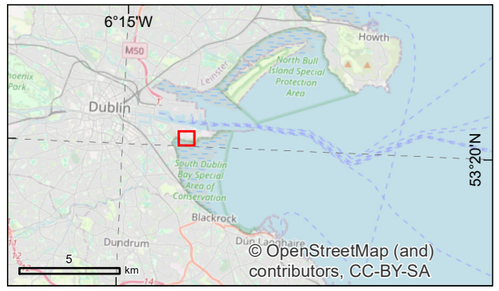


Legend

- Area O
- TJB
- Offshore export cables
- Onshore export cables

Designated sites for nature conservation

- Special Protections Area (SPA)
- Special Conservation Area (SAC)
- Proposed National Heritage Area (pNHA)

codling wind park

Project: Codling Wind Park

Contractor:

Website:

Figure 3.8
Transition joint bays – potential locations

CWP doc. number: CWP-CWP-ENG-08-01-MAP-1104

Internal descriptive code: PB.LF4 - TJBs.OPTIONS - pNHAs..SACs..SPAs - (EIAR.Vol.03.Ch.03.FIG.08)

Size: A3

Scale: 1:2,500

CRS: EPSG 25830

Rev.	Updates	Date	By	Chk'd	App'd
00	Final for issue	2024/08/15	MC	CD	ES

Comparison of environmental effects

298. As described above the following TJB location options were taken forward for a more detailed comparison of environmental effects:

- TJB01;
- TJB05; and
- TJB06.

299. A comparison of each option against each of the environmental constraints identified in the section above is presented in **Table 3-27** below.

Table 3-27 Comparison of environmental effects for alternative TJB locations

Constraint / Criteria	Relevant considerations
Designated sites for nature conservation	• With regards to South Dublin Bay SPA, all options are located in close proximity to the site, albeit screened to some extent by the existing coastal revetment and associated vegetation. No construction works associated with TJBs would occur within the SPA but there is potential for indirect impacts on the qualifying interests of the SPA given their location. It is considered that the likelihood of disturbance impacts may be slightly greater for TJB01 and TJB06, however each option would require consideration in the EIAR and **Natura Impact Statement** with appropriate mitigation provided. • The proximity of TJB05 to the Irishtown Nature Reserve was identified as an immediate concern with this option with an increased potential for disturbance impacts to ecological receptors (notably breeding birds, bats and badger) associated with the reserve. It was also determined that cable installation at TJB01 could encroach on the Irishtown Nature Reserve. TJB06 is therefore expected to carry the lowest potential for impacts to the Irishtown Nature Reserve.
Recreational access and amenity	• Assuming an open cut installation for the landfall cable ducts, all options would require trenching through the existing footpath that runs adjacent to Dublin Bay between Sandymount and the Great South Wall. Recreational users of this route may experience some short term temporary disruption during the works, however the likelihood of effects occurring and the magnitude of the impact would be the same for each option. For all options there is sufficient space available to ensure a temporary footpath diversion.

The main reasons for selecting the preferred option

300. In summary, TJB01, TJB05 and TJB06 present very similar risks from an environmental perspective. These primarily relate to construction phase impacts that will require careful management through the implementation of a **CEMP** and also by means of reinstatement proposals to support longer term landscape and ecological considerations.

301. However, from a technical perspective the analysis of the three options found TJB01 and TJB05 to be present a number of challenges Furthermore TJB01 and TJB05 were deemed incompatible with the emerging, preferred onshore cable route (Routes 1) as described in **Section 3.17** of this document. The analysis therefore identified TJB06 as the preferred location for the TJBs.

3.12.2 Alternative landfall cable duct installation methods

302. Cable ducts will be installed at landfall (marine to terrestrial transition) to protect the offshore export cables as they pass from the marine environment to the TJBs (see **Section 3.12.1** above). The 'landfall cable ducts' concern the section of ducting for each offshore export cable installed between the TJBs, across the HWM and into the intertidal area.

303. Landfall cable ducts can be installed using open cut trenching or trenchless techniques with open cut trenching as a back-up option should the selected trenchless technique fail in situ.

304. The principal reason for this concerns the infestation of Japanese Knotweed along the southern embankment of the Poolbeg Peninsula at the landfall location. Japanese Knotweed was identified on site during investigations to identify suitable locations for intrusive SI. The regulations around invasive species are such that no works can be carried out which would disturb or risk the spread of the species. A first round of treatment was carried out on the Japanese Knotweed in October 2023, with a second round of treatment scheduled for Q3 2024, followed by a third round of treatment during excavation at the point of construction. The project is advised by a specialist invasive species consultancy in this regard. This restriction is a key barrier to the progress of any further SI work in this area.

305. Given the above, the Applicant has selected open cut as the preferred installation method. The Applicant has sufficient data to be assured that the project is deliverable by means of open cut cable duct installation. Furthermore, as mentioned above, installation by means of a trenchless technique would only be adopted alongside open cut trenching as a backup option should the selected trenchless technique fail in situ. Therefore, to protect the feasibility of the CWP Project the Applicant is seeking consent for the landfall cable ducts to be installed using open cut only.

3.13 Phase 4: Consideration of alternative offshore export cable corridors

Background

306. The purpose of the OECC is to provide a LoD (i.e., locational flexibility) for the offshore export cable alignments. This is required because although the Applicant has a high degree of confidence as to the final alignments of the offshore export cables (described below in **Section 3.14.1**), it cannot exclude the risk that the preferred alignment may require some realignment in certain areas. This is due to the potential to uncover undiscovered hazards (i.e., large boulders or features of archaeological importance) or changes in seabed conditions (i.e., generation of biogenic reef or intrusion of mobile UXO) after the planning application date, during pre-construction environmental and technical surveys. The Applicant therefore requires an LoD in the form of a OECC to make reasonable adjustments to the offshore export cable alignments during the pre-construction phase.

307. Therefore, in parallel with the GCA process with EirGrid (see **Section 3.10** above), the Applicant progressed an assessment to identify an OECC route, within which the offshore export cables could be installed between the array site and the landfall location.

308. The assessment was completed in stages, commencing whilst the following potential grid connection locations were being considered:

- Poolbeg, Dublin City;
- Carrickmines, Dún Laoghaire-Rathdown;
- Ballybeg, Co. Wicklow; and
- Arklow, Co. Wicklow.

309. Consequently, the initial OECC assessment considered four broad landfall study areas for the offshore export cables, corresponding to each of the above grid connection locations.

310. Route options to Carrickmines, Ballybeg and Arklow were considered in detail by the Applicant but were subsequently discounted following the confirmation of Poolbeg as the preferred grid connection location for the CWP Project. As such, they are not reasonable alternatives relevant to the CWP Project and its specific characteristics. This section therefore describes the route selection process for the OECC in relation to a grid connection and landfall at Poolbeg only.

Policy considerations

311. The key planning policies that have informed the identification of a preferred landfall site are summarised in **Table 3-28** below.

Table 3-28 Summary of planning policy relevant to the consideration of alternative OECC alignments

Policy	Relevant considerations

Offshore Renewable Energy Development Plan (2014)	The suggested OREDP project level mitigation measures of relevance to the consideration of a preferred OECC are listed below:
	• Protected sites and species:
	  ○ Careful site selection avoiding sensitive sites for devices and export cables (i.e., existing and proposed protected sites).
	• Benthic Ecology:
	  ○ Careful site selection avoiding sensitive sites for devices and export cables (i.e., areas with known sensitive intertidal and subtidal benthic habitats).
	• Fish and Shellfish:
	  ○ Avoid sensitive sites / areas where possible.
	• Marine birds:
	  ○ Avoid sensitive sites / areas where possible (i.e., SPAs).
	• Marine Mammals:
	  ○ Avoid sensitive sites / areas where possible.
	• Marine and Coastal Archaeology and Wrecks:
	  ○ Avoid sites of interest and exclusion zones for marine archaeology.
	• Commercial Fisheries:
	  ○ Avoid device placement in sensitive areas.
	• Ports, Shipping and Navigation:
	  ○ Avoid constrained areas or areas of high shipping densities and regularly used shipping routes; and
	  ○ Avoiding areas of high vessel densities and areas constrained by land e.g., adjacent to the entrances of ports and Lochs.

Policy	Relevant considerations
National Marine Planning Framework (2021)	The NMPF promotes impact avoidance across a wide range of receptor groups, articulated around Overarching Marine Planning Policies (OMPP) supplemented by Sectoral Marine Planning Policies (SMPP). SMPP that are of relevance to the consideration of a preferred OECC are listed below: • Biodiversity Policy 1; • Biodiversity Policy 4; • Protected Marine Sites Policy 4; • Co-existence Policy 1; • Heritage Assets Policy 1; • Ports, Harbours and Shipping Policy 1; and • Heritage Assets Policy 1. The analysis presented below demonstrates an approach that is underpinned by the principle of impact avoidance, and is therefore consistent with the requirements of the abovementioned polices.

Study area and constraints analysis

312. Route selection is a dynamic process, which begins with a broad study area between the array site and the landfall area. This is then refined based on known technical and environmental constraints until the lowest risk and most desirable route is established.

313. In practice, no specific boundary for the study area was defined, however an indicative area is shown on **Figure 3-9** to highlight the extent of the OECC search area. This area included a range of potential cable exit points from the array site and the full extent of the landfall study area, as defined in **Section 3.11**.

314. The following sections describe the study area constraints identified and considered in the Applicant's refinement of the OECC. To inform this section an environmental constraints map has been produced (see **Figure 3-9**).

Environmental

315. The refinement of the OECC has been informed by the following environmental considerations:

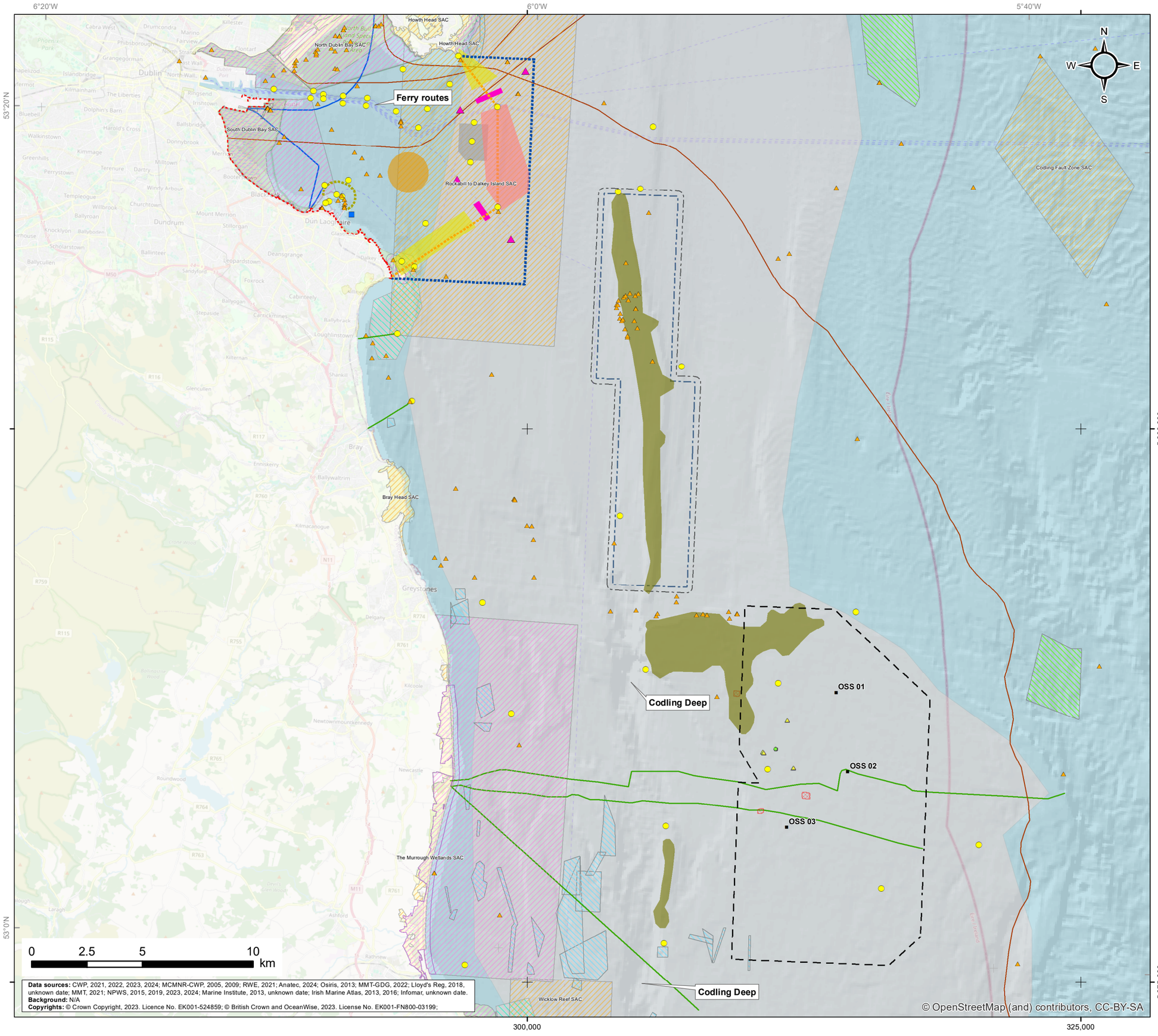
- **Benthic ecology and fish and shellfish ecology**: in line with relevant policy the Applicant has sought to minimise effects on benthic ecology and shellfish ecology by:
    - Minimising the overall length of the OECC by prioritising, where possible, the baseline shortest route between the exit points from the array site and the landfall study area.
    - Minimising the overall extent of the OECC by reducing the width of the OECC to the minimum that is required to install three offshore export cables, taking into account the necessary spacing between multiple offshore export cables, the requirement for temporary works (i.e., sandwave levelling) and the flexibility needed to refine the alignments of the individual offshore export cable alignments (see **Section 13.3.1**).
- **Designated sites for nature conservation**: in line with relevant policy, the Applicant has sought to maximise the distance between the OECC and designated sites for nature conservation. Where it is impossible to avoid a designated site, for example at the approach to the landfall, the potential effects are reported and appropriate mitigation measures will be put in place (as described in relevant chapters of the EIAR and the **Natura Impact Statement**).

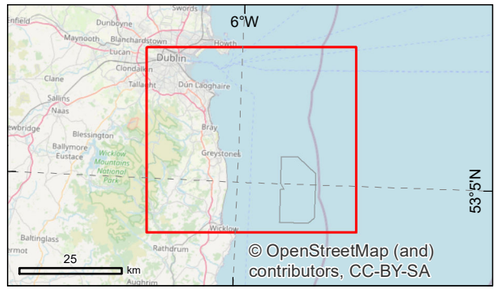
- **Archaeology**: in line with relevant policy, the Applicant has sought to avoid charted shipwrecks, where possible. The avoidance of shipwrecks and other features of potential archaeological importance has informed the specific offshore export cable alignments (see **Section 13.3.1**)
- **Shipping and navigation**: in line with relevant policy, the Applicant has sought to maximise the distance between the OECC and Dún Laoghaire Harbour whilst also maximising the distance between the OECC and the Dublin Bay Anchorage, which is a busy anchorage used by large vessels associated with Dublin Port. This is to avoid disruption to anchoring activity during the installation process, and an anchor interaction hazard once the offshore export cables are laid.
- **Commercial fisheries**: in line with relevant policy the Applicant has sought to avoid areas identified for commercial fishing where possible. Where it is impossible to avoid an area identified for commercial fishing, such as the widespread areas for pot fishing along the east coast of Ireland (see **Figure 3-9**), the potential effects are reported and appropriate mitigation measures will be put in place (as described in EIAR **Chapter 12 Commercial Fisheries**).

Other

316. Technical (engineering) challenges associated with offshore export cable installation have also been considered by the Applicant's engineering team with support from third-party consultants. These considerations include:

- **Seabed conditions**: localised areas with high seabed gradients have been avoided, including where water depths drop from approximately 10 m at Codling Bank to over 100 m within the adjacent trough known as Codling Deep. This is due to slope stability risks associated with the depression and technical challenges to cable installation.
- **Water depth**: reduced water depths in Muglins Sound between Dalkey Island and the lighthouse have been avoided, as these may result in strong tidal currents with associated risks for cable installation and protection post construction.
- **Number and location of the OSSs**: the OECC exit points from the array site have been identified to facilitate the shortest possible offshore export cable lengths within the array site, considering the preferred locations of the OSSs.
- **Other infrastructure**: a minimum distance of 250 m from the Dublin Array OWF array site has been implemented.
- **Existing subsea utilities**: known subsea obstructions including cables and pipelines have been taken into account by minimising cable / utility crossings and where this is unavoidable, enabling perpendicular crossings where possible.





Legend

- Array site
- Landfall site study area
- OSSs
- ESB land to be avoided
- Dublin Array OWF array site
- Dublin Array OWF array site - 250m buffer

Navigational features
- Aid to navigation
- Arklow Bank wind farm turbine
- Preferred anchorage
- Pilot station
- Charted anchorage
- Traffic separation scheme
- Inshore traffic zone
- Shallow bank (10m contours)
- Spoil ground
- Area to be avoided

Authority limit
- Dublin pilotage district
- Dublin port company
- Dun Laoghaire harbour company

Archaeology
- Wreck object M31
- Possible wrecks
- Wrecks

- Possible gas accumulation located less than 10 m below seabed

Subsea utilities
- Submarine cable (telephone/power)
- Cables (out of service)
- Pipelines

Designated sites for nature conservation
- Special Protection Area (SPA) (original)
- Special Protection Area (SPA) (current)
- Special Conservation Area (SCA)
- Proposed National Heritage Area (pNHA)

Commercial fishing
- Dredge fishing areas
- Fishing grounds
- Nets fishing
- Pot fishing

codling wind park

Project: Codling Wind Park

Contractor:

Figure 3.9
Offshore export cable corridor - Study area and constraints map

CWP doc. number: CWP-CWP-ENG-08-01-MAP-1128

Internal descriptive code: OECC.PB - WF.RLB_OSSs_LF.SEARCH.ZONE - DA.WF.DA.WF.BUFF.250m..CONSTR.E.H.SIMPLE - (EIAR.Vol.03.Ch.03.FIG.09)

Size: A3

Scale: 1:165,000

CRS: EPSG 25830

Rev.	Updates	Date	By	Chk'd	App'd
00	Final for issue	2024/08/15	MC	CD	ES

Identification of reasonable alternatives

317. The constraints analysis described in the section above led the Applicant to gradually refine the OECC study area. In summary, the key activities and decisions that influenced this process included:

- The completion of the landfall site selection study (see **Section 3.11**). This process identified LF03, on the south side of the Poolbeg Peninsula, as the best performing landfall location. This enabled the Applicant to refine the OECC within Dublin Bay and minimise its extent within the South Dublin Bay and River Tolka Estuary SPA and South Dublin Bay SAC;
- The identification of the preferred OSS locations (see **Section 3.9.2).** This enabled the Applicant to identify the most suitable cable exit points from the array site;
- Numerous project workshops to analyse and take account of emerging constraints detailed in the sections above; and
- The completion of a geophysical survey to understand and quantify the hazards and ground conditions sufficiently to confirm the alignment and extent of the OECC.

318. These activities led the Applicant to establish a preferred OECC, as presented on the relevant **Planning Drawings** that accompany the CWP Project planning application. Within this area three 220 kV offshore export cables will be installed.

319. The width of the OECC varies between 500 m to 2000 m which is a consequence of the required minimum spacing between the offshore export cables and the presence of constraints and hazards (i.e., archaeological features) identified along the route. The OECC has also been defined to encompass both cables and the adjacent area of seabed that may be subject to temporary works such boulder clearance, sandwave reduction and trenching. The width of the OECC is therefore greater in areas with an increased risk of encountering such features.

320. Overall, it is considered that there are no alternative OECCs that would achieve a better outcome in terms of delivering the necessary locational flexibility to install the offshore export cables, whilst providing the greatest opportunity to avoid a number of key environmental and technical constraints detailed in the sections above.

The main reasons for selecting the preferred option

321. The main reasons for selecting the preferred route of the OECC are described above.

3.14 Offshore export cables: consideration of alternative designs

3.14.1 Alternative offshore export cable alignments

Background

322. A total of three 220 kV offshore export cables will be installed between the OSSs within the array site and the landfall, on the south side of the Poolbeg Peninsula. Each cable will be installed within the array site and OECC, the extent of which is described in **Section 3.13** above. The following sections describe the approach taken by the Applicant to designing and optimising the alignment of the individual offshore export cables.

Policy considerations

323. The key planning policies that have informed the identification of a preferred OECC are summarised in the section above (see **Table 3-28**). The route refinement process for the OECC, including the identification and avoidance of numerous environmental constraints, demonstrates the Applicant's close regard to these policies.

324. Within the OECC the individual alignment of the offshore export cables has been informed by a more specific set of relevant planning policies. These are detailed below in **Table 3-29**.

Table 3-29 Summary of planning policy relevant to the consideration of alternative offshore export cable alignments

Policy	Relevant considerations

Offshore Renewable Energy Development Plan (2014)	The suggested OREDP project level mitigation measures of relevance to the consideration of preferred alignments for the offshore export cables are listed below:
	• Marine and Coastal Archaeology and Wrecks:
	  ○ Avoid sites of interest and exclusion zones for marine archaeology.
	• Benthic Ecology:
	  ○ Careful site selection avoiding sensitive sites for devices and export cables (i.e., areas with known sensitive intertidal and subtidal benthic habitats).
	• Fish and Shellfish:
	  ○ Avoid sensitive sites / areas where possible.
	• Commercial Fisheries:
	  ○ Avoid device placement in sensitive areas.
	• Ports, Shipping and Navigation:
	  ○ Avoid constrained areas or areas of high shipping densities and regularly used shipping routes; and
	  ○ Avoiding areas of high vessel densities and areas constrained by land e.g., adjacent to the entrances of ports and Lochs.

National Marine Planning Framework (2021)	The NMPF promotes impact avoidance across a wide range of receptor groups, articulated around Overarching Marine Planning Policies (OMPP) supplemented by Sectoral Marine Planning Policies (SMPP). SMPP that are of relevance to the consideration of preferred alignments for the offshore export cables are listed below: • Biodiversity Policy 1; • Biodiversity Policy 4; • Protected Marine Sites Policy 4; • Co-existence Policy 1; • Heritage Assets Policy 1; • Ports, Harbours and Shipping Policy 1; and • Heritage Assets Policy 1.

Policy	Relevant considerations
	The analysis presented below demonstrates an approach that is underpinned by the principle of impact avoidance, and is therefore consistent with the requirements of the abovementioned polices.

Study area and constraints analysis

325. The study area for the purposes of defining the offshore export cable alignments is the OSS locations within the array site and the OECC. The following sections describe the OECC constraints identified and considered in the Applicant's refinement of the preferred offshore export cable alignments.

326. As mentioned in **Section 3.13**, the constraints analysis for the offshore export cables was informed by the completion of a geophysical survey campaign in 2021 along the full extent of the emerging OECC, including: multibeam bathymetry, side scan sonar, sub-bottom profiler, magnetometry and grab sampling.

327. The objective of this survey was to understand and quantify the hazards and ground conditions sufficiently to inform the route selection of the individual offshore export cables, the design of the cable itself and to determine the different types of cable installation methods.

328. The geophysical survey confirmed the presence and location of numerous constraints within the OECC, most notably:

- Features of known or otherwise potential archaeological importance;
- The location of cable installation hazards such as large boulders, sandwaves and megaripples;
- The location of existing services (i.e., cables and pipelines); and
- The location of hard substrate that may pose a challenge for cable burial.

329. A short section of each offshore export cable will also be installed within the array site, where each cable connects to one of the three OSSs. The alignment of the offshore export cables within the array site has been informed by the constraints described in **Section 3.9.5** of this document.

Environmental

330. Designing and optimising the alignment of the offshore export cables has considered a number of the same environmental datasets and design principles used to determine the OECC and IAC and interconnector cable alignments. In summary, the constraints taken into consideration include:

- **Archaeology**: in line with relevant policy, archaeological exclusion zones (AEZs) around known features of archaeological interest (A1 anomalies) have been avoided. No works that impact the seabed will be undertaken within the extent of an AEZ during the construction, operational, or decommissioning phases. For features assigned A2 archaeological discrimination rating (potential seabed features), no AEZs are recommended. However, these features have been avoided, where possible. Where this has not been possible, further appraisal is proposed prior to construction as detailed in EIAR **Chapter 14 Marine Archaeology & Cultural Heritage**.
- **Benthic ecology** and **fish and shellfish ecology**: The cables have been routed to minimise interactions with sandwaves, thereby reducing the overall requirement for sandwave levelling and the associated effects from increased suspended sediment concentrations.
- **Commercial fisheries / shipping and navigation**: Known areas of hard substrate has been avoided where possible to ensure that as far as practically possible the cables can be buried.
- **Shipping and navigation**: in line with relevant policy, the Applicant has sought to maximise the distance between the individual offshore export cables and Dún Laoghaire Harbour.

Other

331. Technical (engineering and electrical performance) challenges associated with offshore export cable design have also been considered by the Applicant's engineering team with support from third-party consultants. These considerations include:

- Avoiding thermal overloading in cables;
- Avoiding cable crossings with third-party cables / pipelines or otherwise ensuring crossings can be made at an angle close to 90 degrees;
- Minimising interactions with identified out of service cables;
- Minimising cables in areas of sandwaves;
- Avoiding, as far as possible, hard substrate to ensure that as far as practically possible the cables can be buried;
- Minimising the overall length of cables; and
- Minimising operational costs due to electric power loss.

Identification of reasonable alternatives

332. The constraints analysis described in the section above led the Applicant to gradually refine and optimise the offshore export cable alignments. The key activities and decisions that influenced this process included:

- The completion of the TJB site selection study (see **Section 3.12.1**). This process identified TJB06 as the best performing location for the TJBs. This enabled the Applicant to refine the offshore export cable alignments within Dublin Bay;
- The identification of the preferred OSS locations (see **Section 3.9.2**). This enabled the Applicant to identify the most suitable offshore export cable alignments within the array site;
- Numerous project workshops to analyse and take account of emerging constraints detailed in the section above, including constraints and hazards identified by the geophysical survey campaign; and
- Consultation with relevant stakeholders, i.e., Dún Laoghaire Harbour.

333. These activities led the Applicant to establish a preferred alignment for each of the three offshore export cables, as presented in the relevant **Planning Drawings** that accompany the CWP Project planning application. Overall, it is considered that there are no alternative alignments that would achieve a better outcome in terms of delivering the correct balance between environmental acceptability and electrical performance.

334. Notwithstanding the above, the Applicant acknowledges the need for some limited flexibility in the proposed alignments in the form of the OECC. The reasons for this are described in **Section 3.13** above.

The main reasons for selecting the preferred option

335. The main reasons for selecting the preferred offshore export cable alignments are described above.

3.15 Phase 5: Consideration of alternative onshore substation sites

Background

336. Phase 2 of the site selection process (**Section 3.8.2** of this chapter) describes the GCA process that confirmed Poolbeg as the grid connection location for the CWP Project.

337. Once Poolbeg had been identified by EirGrid as a node with potential capacity available (up to 1450 MW), the Applicant and the Dublin Array OWF project team initiated a collaborative site selection study for an onshore substation site at Poolbeg that would enable either project, or both, to construct a new substation with an onward connection to the existing Poolbeg 220 kV substation. Following conclusion of the GCA process which confirmed that the Dublin Array project would be connecting elsewhere, CWP continued the site selection process at Poolbeg.

338. This section describes the study completed to identify potential site locations for the onshore substation and details the results of an assessment to identify and compare the reasonable alternatives in line with the requirements of the EIA Directive.

Policy considerations

339. The key planning policies that have informed the identification of a preferred onshore substation site are summarised in **Table 3-30** below.

Table 3-30 Summary of planning policy relevant to the consideration of alternative onshore substation sites

Policy	Relevant considerations

Ireland 2040 Our Plan – National Planning Framework (2018)	Avoidance of unnecessary impacts is the preferred mitigation strategy for the NPF, which aligns closely with the approach that has been taken by the Applicant at all stages of the onshore site selection and development process. With regards to the siting of the onshore substation, the following NPOs have been considered:
	• National Policy Objective 55 – promote renewable energy use and generation at appropriate locations within the built and natural environment to meet national objectives towards achieving a low carbon economy by 2050.
	• National Policy Objective 57 – enhance water quality and resource management by:
	  ○ Ensuring flood risk management informs place-making by avoiding inappropriate development in areas at risk of flooding in accordance with The Planning System and Flood Risk Management Guidelines for Planning Authorities.
	  ○ Ensuring that River Basin Management Plan objectives are fully considered throughout the physical planning process.
	  ○ Integrating sustainable water management solutions, such as Sustainable Urban Drainage (SUDS), non-porous surfacing and green roofs, to create safe places.
	• National Policy Objective 59 – to enhance the conservation status and improve the management of protected areas and protected species.

Policy	Relevant considerations
	• National Policy Objective 60 – Conserve and enhance the rich qualities of natural and cultural heritage of Ireland in a manner appropriate to their significance. • National Policy Objective 64 – Improve air quality and help prevent people being exposed to unacceptable levels of pollution in our urban and rural areas through integrated land use and spatial planning that supports public transport, walking and cycling as more favourable modes of transport to the private car, the promotion of energy efficient buildings and homes, heating systems with zero local emissions, green infrastructure planning and innovative design solutions. • National Policy Objective 65 – Promote the pro-active management of noise where it is likely to have significant adverse impacts on health and quality of life and support the aims of the Environmental Noise Regulations through national planning guidance and Noise Action Plans.
Regional Spatial and Economic Strategy (RSES) for the Eastern and Midlands Region (EMRA) 2019–2031	The Regional Spatial and Economic Strategy (RSES) for the Eastern and Midland Region 2019–2031 is a strategic plan which identifies Regional Policy Objectives (RPO) in response to regional strategic assets, opportunities and challenges. The RSES includes a Dublin Metropolitan Area Strategic Plan (MASP) which identifies a number of Guiding Principles for the sustainable development of the Dublin Metropolitan Areas. Of particular relevance to the onshore grid infrastructure required to support offshore renewables, the MASP notes the need to promote quality infrastructure provision and capacity improvement, in tandem with new development and aligned with national projects and improvements in sustainable energy and resource efficiency. With regards to the siting of the onshore substation, the following RPOs have been considered: • RPO 3.5 – Identification of suitable employment and residential lands and suitable sites for infrastructure should be supported by a quality site selection process that addresses environmental concerns such as landscape, cultural heritage, ensuring the protection of water quality, flood risks and biodiversity as a minimum. • RPO 7.4 – Statutory land use plans will take account of the risk of coastal erosion, whereby new development should be avoided in areas at risk of coastal erosion to the greatest extent practicable. • RPO 7.10 – Support the implementation of the Water Framework Directive in achieving and maintaining at least good environmental status for all water bodies in the Region and to ensure alignment between the core objectives of the Water Framework Directive and other relevant Directives, River Basin Management plans and local authority land use Plans. • RPO 7.12 – Future statutory land use plans will include Strategic Flood Risk Assessment (SFRA) and seek to avoid inappropriate land use zonings and development in areas at risk of flooding and to integrate sustainable water management solutions (such as SUDS, non-porous surfacing and green roofs) to create safe places in accordance with the Planning System and Flood Risk Assessment Guidelines for Local authorities.

Policy	Relevant considerations
	• RPO 7.16 – Support the implementation of the Habitat Directives in achieving an improvement in the conservation status of protected species and habitats in the Region and to ensure alignment between the core objectives of the EU Birds and Habitats Directives and local authority development plans.
Dublin City Development Plan (DCC CDP) 2022–2028	The DCC CDP 2022–2028 came into effect in November 2022. The plan sets out an integrated and coherent framework for Dublin City with a view to improve the quality of life of citizens and to ensure it is an attractive place to live, work and visit. With regards to the siting of the onshore substation, the following DCC COP polices have been considered: • SI7 Water Quality Status – To promote and maintain the achievement of at least good status in all water bodies in the City. • SI8 Physical Condition of Waterbodies – To promote the protection and improvement of the aquatic environment and water-dependent ecosystems through proactive discharge and emissions management and through the enhancement of the physical condition of waterbodies. • SI10 Managing Development Within and Adjacent to River Corridors – To require development proposals that are within or adjacent to river corridors in the City (excluding the Camac River) to provide for a minimum set-back distance of 10–15 m from the top of the river bank in order to create an appropriate riparian zone. The Council will support riparian zones greater than 10 metres depending on site-specific characteristics and where such zones can integrate with public / communal open space. • SI14 / SI15 / SI16 – All development proposals will carry out, to an appropriate level of detail, a Site-Specific Flood Risk Assessment. The policy will 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. • SI34 Management of Air Quality – To monitor, pro-actively manage and improve air quality in the City through integrated land use and spatial planning measures to avoid, mitigate and minimise unacceptable levels of air pollution in accordance with national and EU policy directives on air quality and, where appropriate, drive compliance with established targets. • SI37 Noise Sensitive Development – To give careful consideration to the location, design and construction of noise-sensitive developments, including the horizontal and vertical layout of apartment schemes, so as to ensure they are protected from major noise sources, where practical, and to minimise the potential for noise disturbance. • GI9 European Union Natura 2000 Sites – To conserve, manage, protect and restore the favourable conservation condition of all qualifying interest / special conservation interests of all European sites designated, or proposed to be designated, under the EU Birds and Habitats Directives, as Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) (European / Natura 2000 sites). • GI10 Flora and Fauna Protected under National and European Legislation Located Outside Designated Areas – To adequately

Policy	Relevant considerations
	protect flora and fauna (under the EU Habitats and Birds Directives), the Wildlife Acts 1976 (as amended), the Fisheries Acts 1959 (as amended) and the Flora (Protection) Order 2022 S.I No. 235 of 2022, wherever they occur within Dublin City, or have been identified as supporting the favourable conservation condition of any European sites. • GI15 – Inland and Sea Fisheries – To protect inland and sea fisheries and take full account of Inland Fisheries Ireland Guidelines 'Planning for Watercourses in the Urban Environment' 2020, when undertaking, approving or authorising development or works which may impact on rivers, streams, watercourses, estuaries, shorelines and their associated habitats. To protect sea angling sites designated by Inland Fisheries Ireland at the North and South Bull Walls and at Dollymount and Sandymount Strands. • GI19 Protect and Enhance Landscapes – To continue to protect and enhance the city's landscape and seascape, the amenities of places and features of natural beauty and interest, through sustainable planning and design for both the existing community and for future generations in accordance with the National Landscape Strategy 2015 – 2025 and any updated strategy. • GI20 – Views and Prospects To protect and enhance views and prospects which contribute to the appreciation of landscape and natural heritage. • GI34 – To ensure that new development, in terms of siting and design, responds to the character, importance and setting of the city's rivers where the context allows, and to require public open space which is to be provided as part of new development, to supplement riparian buffer zones so as to support the attainment of 'good ecological status' or higher for water bodies, flood management, the conservation of biodiversity and ecosystem functions. • BHA2 Development of Protected Structures That development will conserve and enhance protected structures and their curtilage and will ... (d) Ensure that any development, modification, alteration, or extension affecting a protected structure and / or its setting is sensitively sited and designed, and is appropriate in terms of the proposed scale, mass, height, density, layout and materials. • BHA26 Archaeological Heritage – To protect and preserve Monuments and Places listed on the statutory Record of Monuments and Places (RMP). As well as the abovementioned policies, the Applicant has had regard to the DCC CDP land use zoning objectives. As shown on **Plate 3-10**, there are three main zoning designations that apply to the lands forming part of the Poolbeg Peninsula: • Z7 Employment (Heavy); • Z9 Amenity / Open Space Lands / Green Network; and • Z14 Strategic Development and Regeneration Areas.

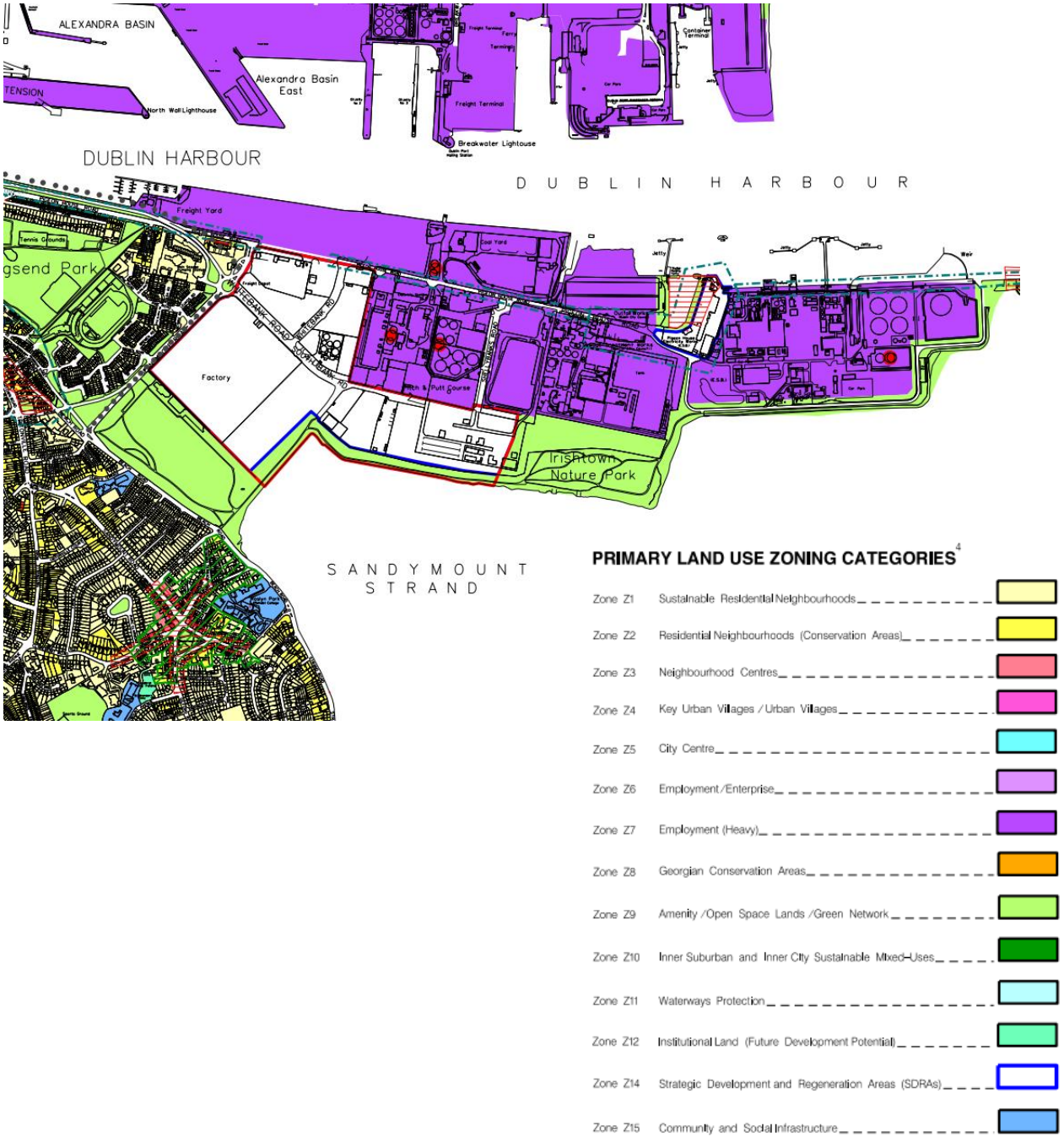


Plate 3-10 Dublin City Development Plan Poolbeg land zones

Study area and constraints analysis

340. The study area for the identification of a new onshore substation encompassed the majority of the Poolbeg Peninsula, within the general environs of the existing Poolbeg 220 kV substation. The study area was defined by the Applicant having due regard to the requirement for the proposed onshore

substation to be connected to the existing Poolbeg 220 kV substation by means of underground cables.

341. As outlined in relation to the landall site selection (see **Section 3.10**), Poolbeg Peninsula is located adjacent to a densely populated urban environment with access limited to busy commuter routes with extensive underground services. Therefore, to allow the cable works to avoid these constraints, and the associated impacts, an onshore substation site on Poolbeg Peninsula in close proximity to the grid connection location would be required. The level of consistency, reliability and stability of electrical power is also improved with a shorter connection between the onshore substation site and the grid connection point.

342. In considering the study area for the onshore substation the Applicant also consulted with the major landholder, DPC, as to the availability of land on the north side of the River Liffey. DPC confirmed that due to capacity issues, its recent implementation of their masterplan and the requirement for additional customs space post Brexit, that there was no land available for a substation on their lands north of the River Liffey. The Applicant also considered green park spaces at Seán Moore and Ringsend Parks, but ruled these locations out due to their amenity value, proximity to residential areas, zoning and distance from the existing Poolbeg 220 kV substation.

343. Given the above, and the fact that the Poolbeg Peninsula is located adjacent to a densely populated urban environment with no available land banks, the Applicant defined the study area as being confined to the Poolbeg Peninsula as shown in **Figure 3-10**.

344. The following sections describe the study area constraints identified and considered in the Applicant's assessment of alternative onshore substation sites. To inform this section key environmental constraints were considered (see **Figure 3-10** and **3-11**).

Environmental

- **Population** and **Communities**: the study area has a limited number of residents and community facilities other than those relating to open space and recreation. Nearby Ringsend, Irishtown and Sandymount are established residential communities with connections to the Poolbeg peninsula and the city centre (see **Figure 3-10**). These communities contain a range of educational, religious and healthcare facilities. The closest residential properties are located to the west of the study area off the Seán Moore Road and at the Coastguard Cottages on the Pigeon House Road.
- **Land Use**: Landcover types based on the Corine land cover dataset across the study area have been identified. The study area comprises artificial surfaces: industrial, commercial and transport units (see **Figure 3-11**), with the surrounding areas generally comprising the same classification.
- **Traffic and Transport**: The study area would be accessed from the roundabout off the R131 with the South Bank Road and into Poolbeg. No height restrictions are observed on the South Bank Road and the road width is suitable to accommodate two-way passing HGVs.
- **Tourism, recreation and amenities**: Recreational facilities within the study area are shown on **Figure 3-10.**
- **Biodiversity Flora and Fauna**:
    - Protected sites within close proximity to the study area are shown on **Figure 3-10**.
    - Habitat surveys have been conducted within the study area where public and / or land access was available.
    - Ecological surveys of accessible areas have confirmed some badger, breeding bird and bat presence within the study area.
- **Archaeology, Architecture and Cultural Heritage**: Cultural heritage sites within the study area are shown on **Figure 3-10**. Identified sites include Architectural Heritage Building / Recorded Protected Structure; Recorded Monuments; SMR Zone of Notification (surrounding some National

Monuments within an area of 'records of Monuments and Place'); and Records from the Dublin City Industrial Heritage Record.

- **Water and Flood Risk**: The southern extent of the Poolbeg Peninsula is bounded by the Dublin Bay coastal water body (IE_EA_090_0000). Dublin Bay is 'Not at risk' with 'Good' ecological status. Along the northern extent of the peninsula is the Liffey Estuary Lower transitional water body (IE_EA_090_0300). This is an 'At Risk' water body with a 'Good' ecological status. With regards to flooding, the 0.1% AEP Mid-Range Future Scenario (MRFS) flood modelling suggests that areas of the peninsula are at risk of the effects of coastal flooding as shown on **Figure 3-10**. The potential flooding is mainly concentrated along the northern boundary of the peninsula.
- **Soils and Geology**:
    - The Poolbeg peninsula is located in an industrial area on reclaimed tidal flats. Geological Survey of Ireland (GSI) mapping shows the area is underlain by limestone and calcareous mudstone of the Lucan Formation.
    - The peninsula has been developed through raising the level of the land which was originally inter-tidal through placement of granular waste materials from the 1960s onwards.
    - The Teagasc and GSI maps record both the soils and subsoils as being Made Ground. Previous ground investigations across the area have indicated that the subsoils are comprised of inter-tidal sands, overlain by made ground in areas.
    - Made ground in the area consists of a mixture of sand and / or gravel and soft to firm clay / silt with occasional concrete, metal, cloth, brick, plastic, ceramics, shells and wood.
    - Based on a review of publicly available ground investigation information from the Poolbeg Peninsula, contaminating materials in the soils have been identified that could cause migration of contaminants into the surface water and groundwater environments.
- **Noise and Air**:
    - The study area is characterised primarily by commercial and industrial development associated with DPC quaysides, jetties and other industries from a range of sectors including power generation, wastewater treatment, aggregate manufacturing, oil storage and metal recycling.
    - The main existing noise levels within the study area are likely to be related to industrial noise from industry in the immediate vicinity and road noise.
    - Air quality is variable and subject to significant spatial variation, with concentrations generally falling significantly with distance from major road sources. The study area experiences a mixture of urban background concentrations of pollutants in Ringsend and industrial concentrations in Poolbeg. The closest major source of air pollution within the study area is road traffic from Dublin city centre to the west and industrial facilities within the study area.

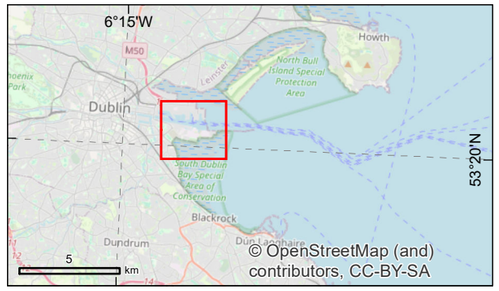
Other

345. Technical (engineering) challenges associated with the construction and operation of the proposed onshore substation have also been considered by the Applicant's engineering team with support from third-party consultants. These considerations include:

- **Available space**: Based on EirGrid's conclusion that the Poolbeg 220 kV substation was a suitable connection point for up to 1,450 MW of offshore wind, the Applicant's team, drawing on its delivery experience of similar infrastructure internationally, considered the essential requirements for the onshore substation site. As a starting point, it was estimated that a land take of approximately 3.2 ha to 4.8 ha would be required for a conventional GIS substation to accommodate up to 1,450 MW of power.

- **Proximity to the Poolbeg 220 kV substation**: A connection between the onshore substation and the Poolbeg 220 kV substation will be required. Sites in close proximity to the Poolbeg 220 kV substation are therefore preferable with regards to an onward grid connection.
- **Suitable access**: The access into the substation for construction, operation and maintenance of the substation is required to be designed to satisfy all the requirements of the owner / operator during the intended life of the substation and will safely support all traffic loading without damage or distress to the asset.
- **Enabling works requirement**: Each site will require enabling works to a lesser or greater extent to facilitate delivery of the optimum substation design. A site with the requirement for significant enabling works is likely to have a negative impact on the overall programme for delivering the project.
- **Land, Permits and Wayleaves**: The assessment of potential options will consider existing land ownership, future development plans and the likelihood of the Applicant securing landowner consent to develop the onshore substation.
- **Programme and deliverability**: Site specific risks to implementation timelines have been considered.

6°12'45"W
6°12'W
6°11'15"W
6°10'30"W
53°20'50"N
53°20'25"N
53°20'N
5,916,000
5,915,000
5,914,000
286,000
287,000
288,000
N
W
E
S
Coastguard cottages
Ringsend residential area
Planned residential development of the former Irish Glass Bottle site
Preferred landfall site
Poolbeg 220 kV substation
Former St. Catherine's Hospital
Lifeboat House
Outfall Works (Dublin Corporation)
Landing Slip
Sea wall
Electricity Works (Dublin Corporation)
Pigeon House power station
Remnants of Pigeon House Fort
Former Pigeon House Hotel
Blockhouse
Sluice House
Causeway
Life Boat House
0 100 200 400 Meters
Data sources: CWP, 2024; Bluesky, 2021; DHLGH, 2015; NPWS, 2023, 2024; IAC-Tobin, 2022; Tobin, 2021
Background: ESRI basemap
Copyrights: © Crown Copyright, 2023. Licence No. EK001-524859; © British Crown and OceanWise, 2023. License No. EK001-FN800-03199
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community, Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community



Legend

Onshore substation site study area

Designated sites for nature conservation
- Special Protections Area (SPA)
- Special Conservation Area (SAC)
- Proposed National Heritage Area (pNHA)

Archaeology and built heritage
- Archaeological heritage sites
- Built heritage sites
- DCIHR sites
- DCC Specific Objectives: Conservation Area
- Zones of notification

Flood risk
- Fluvial flood extents - HEFS - High probability
- Coastal flood extents - HEFS - High probability

codling wind park

Project: Codling Wind Park

Contractor:

Website:

Figure 3.10
Onshore substation – Study area and constraints map

CWP doc. number: CWP-CWP-ENG-08-01-MAP-1106

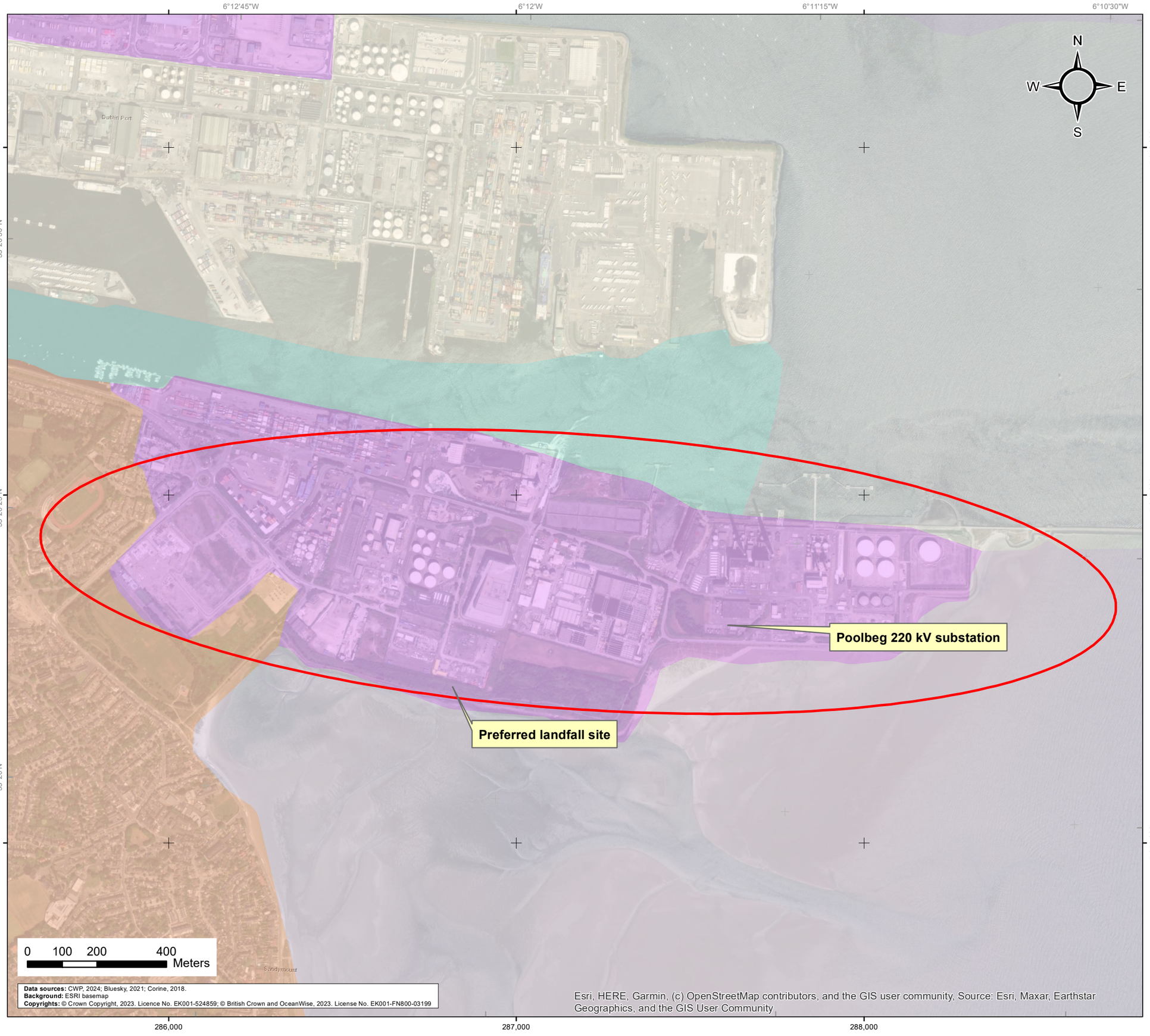
Internal descriptive code: PB - PB.IB - ARCHA..ARCHI..FLOOD.CFRAM..pNHAs.. SACs..SPAs - (EIAR.Vol.03.Ch.03.FIG.10)

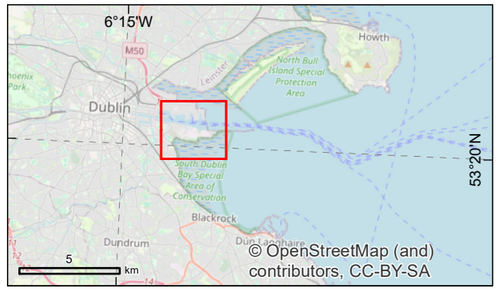
Size: A3

Scale: 1:10,500

CRS: EPSG 25830

Rev.	Updates	Date	By	Chk'd	App'd
00	Final for issue	2024/08/15	MC	CD	ES





Legend

- Onshore substation site study area

Corine land cover

- Industrial or commercial units
- Sea ports
- Estuaries
- Intertidal flats
- Discontinuous urban fabric

codling wind park

Project: Codling Wind Park

Contractor:

Website:

Figure 3.11
Onshore substation – Study area
and constraints map (CORINE land cover)

CWP doc. number: CWP-CWP-ENG-08-01-MAP-1123

Internal descriptive code: PB - PB.IB - CORINE - (EIAR.Vol.03.Ch.03.FIG.11)

Size: A3

Scale: 1:10,500

CRS: EPSG 25830

Rev.	Updates	Date	By	Chk'd	App'd
00	Final for issue	2024/08/15	MC	CD	ES

Identification of reasonable alternatives

346. Based on EirGrid's conclusion that the Poolbeg 220 kV substation was a suitable connection point for up to 1,450 MW of offshore wind, the Applicant's team, drawing on its delivery experience of similar infrastructure internationally, considered the essential requirements for the onshore substation site. As a starting point, it was estimated that a land take of approximately 3.2 ha to 4.8 ha would be required for a conventional GIS substation to accommodate up to 1,450 MW of power.

347. With the identification of the study area and the definition of the minimum site size requirement of approximately 3.2 ha, a desk-based and targeted field inspection was undertaken to identify potentially suitable onshore substation sites.

348. General target areas of opportunity were identified in lands contained within the study area, however, given the constraints identified and lack of available land within the Poolbeg Peninsula, there were no options identified that were of the minimum size requirement for a conventional GIS substation standard solution. Therefore, it was considered that a novel solution would be required such as a multi-storey substation.

349. The Applicant, in consultation with landowners including DPC and DCC subsequently identified a long list of 11 potential sites for a novel onshore substation solution as shown in **Figure 3-13** below. A series of site visits were undertaken by the Applicant's team to inspect each of the eleven potential onshore substation site locations. These inspections were undertaken to better understand the physical characteristics of each site and to assess the feasibility of each option against the main technical considerations described in the section above.

350. As a result of this exercise, eight of the eleven site locations were determined to be unsuitable for the CWP Project onshore substation and were therefore screened out from any further assessment. The main reasons for excluding these options is provided in **Table 3-31** below.

Table 3-31 Identification of reasonable alternatives for the onshore substation site

Onshore substation site location	Screened in / out	Rationale
SS1	Out	No land available for potential onshore substation development within this area due to the consented Flexgen development.
SS2	Out	The site being developed by EirGrid for expansion to existing Poolbeg 220 kV substation and is therefore unavailable for the CWP Project onshore substation.
SS3	Out	The site is partially located within Irish Town Nature Park and the South Dublin Bay and River Tolka Estuary SPA.
SS4	Out	Dublin Port advised that the site is not available for development as it is currently reserved as part of the 3FM Project. The onshore substation would also be inconsistent with DCC CDP land use zoning objectives (see **Plate 3-10**).
SS5	Out	No land available for potential onshore substation development within this area due to presence of National Oil Reserve Agency storage tanks.
SS6	In	The site is constrained by presence of the derelict power station which is a protected structure, however the site

Onshore substation site location	Screened in / out	Rationale
		has development opportunity subject to detailed design and heritage considerations.
SS7	Out	The site is reserved for public amenity as part of Dublin Port's 3FM Project which would require a below ground substation option which would not be considered an acceptable solution.
SS8	In	The site has development opportunity subject to detailed design and environmental considerations.
SS9	Out	No land available for potential onshore substation development within this area due to the redevelopment of the former Irish Glass Bottle site (under construction).
SS10	In	The site has development opportunity subject to detailed design and environmental considerations.
SS11	In	The site has development opportunity subject to detailed design and environmental considerations.

6°12'45"W
6°12'W
6°11'15"W
6°10'30"W
53°20'50"N
53°20'25"N
53°20'N
5,916,000
5,915,000
5,914,000
286,000
287,000
288,000

N
W
E
S

Dublin Port

Ringsend residential area

Coastguard cottages

SS10
SS11
SS8
SS6
SS5
SS9
SS7
SS2
SS1
SS4
SS3

Poolbeg 220 kV substation

Planned residential development of the former Irish Glass Bottle site

Preferred landfall site

Sandymount

0 100 200 400 Meters

Data sources: CWP, 2022; Bluesky, 2021; Tobin, 2021
Background: ESRI basemap
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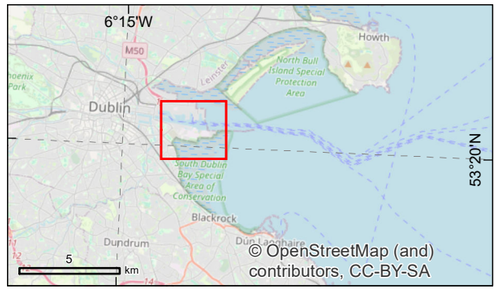


Legend

- Onshore substation site study area
- Potential onshore substation site options

codling wind park

Project: Codling Wind Park

Contractor:

Website:

Figure 3.12
Onshore substation – Identification of potential site options

CWP doc. number: CWP-CWP-ENG-08-01-MAP-1121

Internal descriptive code: PB - PB.IB..SSs.PROP - - (EIAR.Vol.03.Ch.03.FIG.12)

Size: A3

Scale: 1:10,500

CRS: EPSG 25830

Rev.	Updates	Date	By	Chk'd	App'd
00	Final for issue	2024/08/15	MC	CD	ES

Comparison of environmental effects

351. On the basis of the initial screening assessment, four potential onshore substation site locations were carried forward for a more detailed comparison of environmental effects:

- SS6;
- SS8;
- SS10; and
- SS11.

352. A comparison of each option against each of the environmental constraints identified in the section above is presented in **Table 3-32** below.

Table 3-32 Comparison of environmental effects for alternative onshore substation sites

Constraint / Criteria	Relevant considerations
Population, Land Use and Communities	**SS6** • The CDP 2016–2022 identifies the site as within lands zoned as Zone Z7: Employment (Heavy) The aim of Z7 is '*To provide for the protection and creation of industrial uses, and facilitate opportunities for employment creation including Port Related Activities'*. The CDP identifies 'General industrial uses', 'Industry (Light)' and 'Public Service Installation' as permissible uses in this zoning. • Part of the site and its adjacent lands within a Conservation Area. The CDP 2016–2022 states that these areas do not have a statutory basis in the same manner as Protected Structures or Architectural Conservation Areas (ACAs), they are recognised as areas that have conservation merit and importance and warrant protection through zoning and policy application. • The site is also located within a Zone of Archaeological Interest and contains a Protected Structure which is the Pigeon House Power Plant. It is directly adjacent to another Protected Structure which is the Pigeon House Hotel. In the Draft CDP 2022–2028 the zoning is relatively unchanged. • The closest residential dwellings are located over 1 km to the west of SS6. Any impacts to residential receptors associated with the construction and operation of the substation are therefore likely to be low. • The overall risk level is considered to be moderate (i.e., mid level). **SS8** • There are no explicit land use planning zoning policies for this location. The site is located in the nearshore / foreshore directly adjacent to Employment / Industry (Z7) zoned lands within the Poolbeg peninsula in the CDP 2016–2022. • The closest residential dwellings are located over 1 km to the west of SS8. Any impacts to residential receptors associated with the construction and operation of the substation are therefore likely to be low. • The overall risk level is considered to be low-moderate. **SS10** • SS10 is located within Area K of the Poolbeg West Strategic Development Zone (SDZ). • There is no clear indication in the Poolbeg West SDZ Planning Scheme (2019) that the proposed substation is a compatible land use. • There are residential receptors within 70 m of this site location. • The overall risk level is considered to be high. **SS11** • The CDP 2016–2022 identifies the site as within lands zoned as Zone Z7: Employment (Heavy). The aim of Z7 is '*To provide for the protection and creation of industrial uses,*

Constraint / Criteria	Relevant considerations
	and facilitate opportunities for employment creation including Port Related Activities'. The CDP identifies 'General industrial uses', 'Industry (Light)' and 'Public Service Installation' as permissible uses in this zoning. In the Draft CDP 2022–2028 the zoning is relatively unchanged. • The closest residential dwellings are located *c*. 900 m west of SS11. Any impacts associated with the construction and operation of the substation are therefore likely to be low. • The overall risk level is considered to be low-moderate.
Tourism, Recreation and Amenities	**SS6** • There are a limited number of residents and community facilities in direct proximity to the site. However, there are facilities, relating to open space and recreation in proximity, namely the Great South Wall and Poolbeg Lighthouse, Shellybanks Beach, Irishtown Nature Park and Sandymount Strand. There are a range of archaeological and architectural designations associated with this site. In the event that the site was brought forward for redevelopment, there is potential for positive impacts to be experienced in this area, once the construction phase is completed. • The overall risk level is considered to be low-moderate. **SS8** • There are a limited number of residents and community facilities in direct proximity to the site. However, there are facilities, relating to open space and recreation in proximity, namely the Great South Wall and Poolbeg Lighthouse, Shellybanks Beach, Irishtown Nature Park and Sandymount Strand. • The overall risk level is considered to be low-moderate. **SS10** • The considerations for SS10 in relation to recreation and tourism are as described for SS8. • The overall risk level is considered to be low-moderate. **SS11** • The considerations for SS11 in relation to recreation and tourism are as described for SS8. • The overall risk level is considered to be low-moderate.
Biodiversity Flora and Fauna	**SS6** • The proposed location of SS6 is within the extents of the ESBN Poolbeg Power Station, off the Pigeon House Road. It is located *c*. 200 m north of South Dublin Bay and River Tolka Estuary SPA and South Dublin Bay SAC. The habitats within the substation location are likely to be of low ecological value due to the presence of built and artificial surfaces. • No construction works would occur within European or nationally designated sites but there is potential for indirect impacts given the site location, in close proximity to the SPA. Impacts may include disturbance on the qualifying interests of the SPA. In particular, there is potential for disturbance of the Common Tern and Arctic Tern which are a qualifying interest of South Dublin Bay and River Tolka Estuary SPA. These species have breeding grounds located *c*. 100 m north of Substation SS6 at a protected man-made mooring structure known as the E.S.B. dolphin. This dolphin forms part of the South Dublin Bay and River Tolka Estuary SPA and also the Dublin Docks proposed Natural Heritage Area (pNHA). • Records indicate that Kestrel and Peregrine Falcon are known to breed within and / or adjacent to this substation site.

Constraint / Criteria	Relevant considerations
	• Preliminary results indicate bat activity along the boundary of this substation. Bat species are likely to forage along the coastline and roost in the buildings at this site and in surrounding buildings. • The River Liffey is an important salmonid system with resident populations of Brown trout and migratory populations of Atlantic salmon and Sea trout. Previous records have also shown Otter residing within the Poolbeg area. This species may be using the lands and water in proximity to the substation site. There is potential for runoff of contaminated surface water and sedimentation to result in a degradation of water quality and an impact to these aquatic species. Additionally, works associated with this substation site may result in disturbance to the otters. • A **CEMP** would be implemented during the construction phase to avoid or otherwise manage potential impacts on these protected sites and species. • Overall, the risk level associated this site is considered moderate-high due to the sites close proximity to the European Sites and the potential for impact on protected species. In the event that this site was brought forward, it would require further ecological assessment and consultation with appropriate stakeholders. **SS8** • SS8 is located on the River Liffey, to the north of the Great South Wall, adjacent to the National Oil Reserves Agency (NORA) Poolbeg Oil Storage site. The site is directly north of South Dublin Bay and River Tolka Estuary SPA and South Dublin Bay SAC. The site location would require an infill of up to 3 ha within the River Liffey. • No construction works would occur within European or nationally designated sites but there is potential for indirect impacts given their location, in close proximity to this site. Impacts may include disturbance on the qualifying interests of the SPA and / or degradation of qualifying interests of the SAC. • Potential risks relating to fish, otter and bats are as described for SS6. • A **CEMP** would be implemented during the construction phase to manage potential risks and potentially avoid impacts on these protected sites and species. • The overall risk level associated with this site is as described for SS6. **SS10** • The proposed location of SS10 is on land located off the Seán Moore Road, directly north of the former Irish Glass Bottle site. It is located *c*. 300 m north west of South Dublin Bay and River Tolka Estuary SPA and South Dublin Bay SAC. No construction works for this substation would occur within European or nationally designated sites. • Potential risks relating to bats are as described for SS6. A **CEMP** would be implemented during the construction phase to avoid or otherwise manage impacts on protected sites and species. • Overall, the risk level associated this site is considered moderate (i.e., mid level). **SS11** • The proposed location of SS11 is on land located directly north of the existing storm water tanks for the Ringsend Wastewater Treatment Plant, off the Pigeon House Road. It is located *c*. 450 m north of South Dublin Bay and River Tolka Estuary SPA and South Dublin Bay SAC. • The CDL Dolphin, which forms part of the Dublin Docks pNHA is located *c*. 20 m north of the site. The ESB Dolphin is located *c*. 230 m east of the site. This dolphin forms part of the South Dublin Bay and River Tolka Estuary SPA. • No construction works would occur within European or nationally designated sites but there is potential for indirect impacts given the site location, in close proximity to the SPA. Impacts may include disturbance on the qualifying interests of the SPA. In particular, there is potential for disturbance of the Common Tern and Arctic Tern which are a qualifying interest of South Dublin Bay and River Tolka Estuary SPA. These

Constraint / Criteria	Relevant considerations
	species have breeding grounds located on the ESB Dolphin which forms part of the SPA and on the CDL Dolphin, which forms part of the pNHA. • The habitats within the substation location are considered to be bare ground, scrub and artificial surfaces. • Records indicate that Kestrel and Peregrine Falcon are known to breed within and / or adjacent to this substation site. • Potential risks relating to fish, otter and bats are as described for SS6. A **CEMP** would be implemented during the construction phase to manage potential risks and potentially avoid impacts on these protected sites and species. • The overall risk level associated with this site is as described for SS6. • In the event that this site was brought forward, it would require further ecological assessment and consultation with appropriate stakeholders.
Landscape and visual	**SS6** • SS6 is located on the north of the Poolbeg Peninsula, bordering the Dublin Port shipping channel. The seascape is characterised by offshore sandbanks and shipping channels which support high levels of activity associated with commercial shipping entering and leaving Dublin Port. • There are no residential receptors within 1 km of this site and views to residential receptors outside of this are likely to be restricted due to intervening buildings and overall distance. • SS6 is located within an industrial area and the redevelopment of this site is not anticipated to lead to significant landscape and visual effects due to the context in which they would be experienced in (i.e., modified industrial land). • There are a range of archaeological and architectural designations associated with this site. In the event that the site was brought forward for redevelopment, there is potential for positive landscape and visual impacts to be experienced in this area, once the construction phase is completed. • The overall risk level is considered to be low-moderate. **SS8** • SS8 is located on the seaward side of the Great South Wall and the Poolbeg Lighthouse. The seascape is characterised by offshore banks and shipping channels which support high levels of activity associated with commercial shipping entering and leaving Dublin Port. However, despite its overriding industrial character, the Poolbeg area is popular for recreation and amenity. • There are no residential receptors within 1 km of this site and views to residential receptors outside of this, are likely to be restricted due to intervening buildings and overall distance. However, this site could potentially affect the setting of the Great South Wall and the Poolbeg Lighthouse and have a visual impact on recreational users of this asset and other amenity areas in the vicinity. • The overall risk level is considered to be moderate-high. **SS10** • SS10 is located in a largely industrial area to the west of the Poolbeg Peninsula, accessing onto the Seán Moore Road. The landscape is characterised by the surrounding industries and road network. • The closest residential receptors are within 70 m of this site (the Coastguard Cottages on the Pigeon House). Furthermore, there are residential receptors at Irishtown located *c*. 100 m away. These residential receptors may experience some views towards this site location. • The overall risk level is considered to be moderate (i.e., mid level).

Constraint / Criteria	Relevant considerations
	SS11 • SS11 is located on the north of the Poolbeg Peninsula, bordering the Dublin Port shipping channel. The seascape is characterised by offshore banks and shipping channels which support high levels of activity associated with commercial shipping entering and leaving Dublin Port. • There are no residential receptors within *c*. 900 m of this site and views to residential receptors outside of this are likely to be restricted due to intervening buildings and overall distance. • SS11 is located within an industrial area and the redevelopment of this site is not anticipated to lead to significant landscape and visual effects due to the context in which they would be experienced in (i.e., modified industrial land). • The overall risk level is considered to be low-moderate.
Archaeology, Architecture and Cultural Heritage	**SS6** • SS6 is located within the zone of notification for a recorded monument (Blockhouse DU019-027). It is also located within a Conservation Area, as identified in the Dublin City CDP 2016–2022 and Draft CDP 2022–2028. There are two built heritage sites within the proposed substation site. These are former Pigeon House Power Station (RPS No. 6796) and the former Pigeon House Hotel (RPS No. 6796). In addition, the upstanding remains of the Pigeon House Fort (RPS No. 6794) are recorded 207 m west-southwest. It is likely that subsurface remains of the Pigeon House Fort complex extend within the proposed SS6 site, as the Blockhouse (DU019-027) which is a recorded monument, formed just a part of the overall complex. • The Pigeon House Power Station, within the proposed substation site is also listed in the Dublin City Industrial Heritage Record (DCIHR6). In addition, a landing slip (DCIHR5) is located to the immediate north. Two further sites are also listed in the DCIHR, to the west of the site; a Life Boat House (DCIHR7) and the outfall works (DCIHR8). • The site for SS6 is occupied by an upstanding protected structure and within the zone of notification for a recorded monument which may be negatively impacted by the proposed substation construction. • In the event that this site is brought forward, it would require careful consideration of the architectural design of the substation to maintain the character of the power station, and further assessment and consultation with appropriate stakeholders. • The overall risk level is considered to be high. **SS8** • SS8 is located within the water adjacent to the recorded monument (DU019-029002) and protected structure (RPS No. 6798) the Great South Wall. The site is adjacent to an upstanding protected structure / recorded monument which may be negatively impacted by the proposed substation construction. Additionally, the zone of notification for Blockhouse (DU019-027), which once formed part of a larger military fort in the area extends into or directly adjacent to this site location. • The site location would require an infill of up to 3 ha within the River Liffey and there is potential for previously unrecorded underwater archaeology to be encountered. • The site is also located either partially within or immediately adjacent to a Zone of Archaeological Interest (ZoAI) which includes the Great South Wall (also a protected structure). It is critical that impacts on the Great South Wall are minimised and the relevant conservation objectives for this ZoAI and protected structure are met. • In the event that this site is brought forward, it would require further assessment and consultation with appropriate stakeholders. • The overall risk level is considered to be high.

Constraint / Criteria	Relevant considerations
	SS10 • There are no known archaeological, architectural or cultural heritage assets located within the boundaries of SS10. The historic mapping confirms that this site was reclaimed from the estuary. The first edition OS map of 1843 shows the site as forming part of the estuarine environment, with little change by the time of the later map of 1935–8. • There are a number of records from the Dublin City Industrial Heritage Record and the Record of Protected Structures located to the north east of the site. The closest record is that of the Former St. Catherine's Hospital (RPS No. 6793), which is *c*. 400 m to the north east, on Pigeon House Road. The zone of notification for a recorded monument (Blockhouse DU019-027) is located *c*. 170 m north of the site. • There is some potential that archaeological features may survive below the reclamation layers and within the estuarine silts. An assessment will be required in this regard. • The overall risk level is considered to be low-moderate. **SS11** • There are no known archaeological, architectural or cultural heritage assets located within the boundaries of SS11. Aerial photography indicates that this substation site occupies an area that has been reclaimed from the estuary since the early 2000s. • Records from the Dublin City Industrial Heritage Record are located directly south of the site, a Life Boat House (DCIHR7) and the outfall works (DCIHR8). The zone of notification for a recorded monument (Blockhouse DU019-027) is located *c*. 90 m south of the site. The former Pigeon House Power Station (RPS No. 6796), the former Pigeon House Hotel (RPS No. 6796) and the upstanding remains of the Pigeon House Fort (RPS No. 6794) are recorded in the vicinity of the site also. There would be no direct impacts on these heritage assets. • There is some potential that archaeological features may survive below the reclamation layers and within the estuarine silts. An assessment will be required in this regard. • The overall risk level is considered to be low-moderate.
Water and Flood Risk	**SS6** • SS6 borders the River Liffey. The shift from the River Liffey to Dublin Bay where the site is located is considered as a transitional water body area, referred to as the Liffey Estuary Lower (IE_EA_090_0300). • Contaminated surface water runoff and sedimentation could potentially impact on the water quality of this transitional water body area and this may compromise the objectives of the Water Framework Directive (WFD). A **CEMP** would be implemented during the construction phase to manage potential risks and avoid impacts on water quality. • Flood modelling has indicated that the area of the substation site is at risk of the effects of coastal flooding. These flooding events are mainly concentrated along the northern boundary of the Poolbeg Peninsula. A Site Specific Flood Risk Assessment (SSFRA) would need to be progressed should this site be taken forwards. • The overall risk level is considered to be moderate. **SS8** • SS8 is located on the River Liffey, to the north of the Great South Wall. This substation site would require an infill of *c*. 3 ha within the transitional water body. • Water quality risks are as described for SS6. • Due to the proposed location of this substation, careful considered would be given to current and future flood levels and also potential risk of inundation from wave over-topping, however this can be factored into the design process. A SSFRA would need to be progressed should this site be taken forwards.

Constraint / Criteria	Relevant considerations
	• The overall risk level is considered to be moderate. **SS10** • SS10 is located *c*. 250 m to the south of the River Liffey. • Water quality risks are as described for SS6. • Flooding is not considered to be a significant risk for this site. • The overall risk level is considered to be low-moderate. **SS11** • SS11 borders the River Liffey. • Water quality risks are as described for SS6. • Flood modelling has indicated that the area of the substation site is at risk of the effects of coastal flooding. These flooding events are mainly concentrated along the northern boundary of the Poolbeg Peninsula. A SSFRA would need to be progressed should this site be taken forwards. • The overall risk level is considered to be moderate.
Soils and Geology	**SS6** • SS6 borders the River Liffey. Much of the Poolbeg peninsula has been developed through raising the level of the land which was originally inter-tidal through placement of granular waste materials from the 1960s onwards. The soil types in the surrounding area generally comprises man-made fill placed over estuarine deposits. There is potential for contamination to occur due to the historical industrial development at this site. • The bedrock underlying the Poolbeg peninsula is not mapped as an aquifer. Groundwater beneath the site is not considered to be a sensitive receptor, however it is considered as a potential pathway for contaminant migration to Dublin Bay. • There are no known geological features, designations or hazards at or in proximity to the site. There is 1 no. County Geological Site (CGS) located approximately 1.8 km to the northeast of the site and within Dublin Bay. This is the North Bull Island CGS (DC007). • Contaminated land assessments and the implementation of the **CEMP** during the construction phase would manage potential risks and avoid impacts on soils and groundwater. • The overall the risk level associated this site is considered moderate due to the potential to encounter made ground and contaminated land at the site and the potential for groundwater to act as a pathway for contaminated migration. In the event that this site was brought forward, it would require further assessment and consultation with appropriate stakeholders. **SS8** • The considerations for SS8 in relation to soils and geology are as described for SS6, however due to the location of the site there is a reduced potential to encounter made ground and contaminated land. The overall risk level is therefore considered to be low-moderate. • In the event that this site was brought forward, it would require further assessment and consultation with appropriate stakeholders. **SS10** • The considerations for SS10 in relation to soils and geology are as described for SS6, however due to the location of the site there is a reduced potential to encounter made ground and contaminated land. The overall risk level is therefore considered to be low-moderate. • In the event that this site was brought forward, it would require further assessment and consultation with appropriate stakeholders.

Constraint / Criteria	Relevant considerations
	SS11 • The considerations for SS11 in relation to soils and geology are as described for SS6, however due to the location of the site there is a reduced potential to encounter made ground and contaminated land. The overall risk level is therefore considered to be low-moderate. • In the event that this site was brought forward, it would require further assessment and consultation with appropriate stakeholders.
Noise and Air	**SS6** • There are no residential receptors within 1 km of the site. The closest noise and air related sensitive receptors are those associated with workplaces on the Poolbeg Peninsula and the public recreation / amenity areas. • Works associated with the construction of the proposed substation at this site would result in a temporary increase in noise and air quality impacts, however the scale and temporary nature of the works are unlikely to result in significant adverse effects. All construction related nuisance relating to noise and air quality will be managed by the **CEMP**. • During the operational phase, the noise contribution at any residential or amenity based receptor is expected to be below the existing background levels during daytime and night-time periods. • The overall risk level is considered to be low-moderate. **SS8** • The considerations for SS8 in relation to noise and air are as described for SS6. • The overall risk level is considered to be low-moderate. **SS10** • There are residential receptors within 70 m of this site location. • Due to the distance of the residential receptors to potential proposed construction works at this site, noise may be audible over the existing dominant road traffic noise when works are taking place at the closest site boundary. • Works associated with the construction of the proposed substation at this site would result in a temporary increase in noise and air quality impacts. All construction related nuisance relating to noise and air quality will be managed by the **CEMP**. • Potential operational phase impacts are as described for SS6. • The overall risk level is considered to be moderate. **SS11** • The considerations for SS11 in relation to noise and air are as described for SS6. • The overall risk level is considered to be low-moderate.

The main reasons for selecting the preferred onshore substation site

353. In summary, the Poolbeg Peninsula is a heavily industrialised area of reclaimed land to the east of Dublin City centre.

354. General target areas of opportunity were identified in lands contained within the study area, however, given the constraints identified and lack of available land within the Poolbeg Peninsula, there were no options identified that were of the minimum size requirement for a conventional GIS substation standard solution. Therefore, it was considered that a novel solution would be required such as a multi-storey substation.

355. The site selection assessment identified SS11 as the preferred onshore substation site. Similar environmental and socio-economic risk levels were applied to the other sites, which reflects the close proximity of the sites to each other and the nature of the receiving environment with the Poolbeg Peninsula. However, SS11 was considered the least constrained of the shortlisted options.

356. Additional studies have enabled the Applicant to better understand the risks identified in relation to SS11 for the onshore substation. The Applicant now has greater certainty regarding SS11 across multiple performance criteria, with the site considered to have improved overall in terms of technical, environmental, socio-economic and deliverability performance. This supports the conclusion that SS11 is the best performing site option for the onshore substation.

3.16 Onshore substation infrastructure: consideration of alternative designs

3.16.1 Alternative onshore substation layouts

Background

357. As described in **Section 3.15**, the location of the onshore substation was subject to an extensive site selection process accounting for various technical and environmental constraints. The site selection process identified SS11 as the preferred onshore substation site (see **Figure 3-12**). The site is currently unused land on the southern bank of the River Liffey, reclaimed by DPC in the late 1990s / early 2000s and surrounded on three boundaries by water and then by a mixture of industrial uses.

Policy considerations

358. The key planning policies that are of relevance to the layout of the onshore substation are as described in **Table 3-30** for the onshore substation site selection.

Study area and constraints analysis

359. The study area for the purposes of defining the onshore substation layout is the site SS11, as defined in **Section 3.15**. The following sections describe the study area constraints identified and considered in the Applicant's assessment of alternative onshore substation layouts.

Environmental

360. Due to the physically constrained nature of the onshore substation site, the layout of the onshore substation, including the consideration of alternative layouts has been driven primarily by technical constraints as described in the sections below.

361. However, as detailed in **Section 3.15**, the location of the onshore substation was subject to an extensive site selection process accounting for various environmental constraints. These constraints are relevant to the construction and operation of the onshore substation and have been considered in detail in the relevant topic chapters of the EIAR and in the **Natura Impact Statement**.

362. With respect to the onshore substation layout, the sites proximity to the CDL Dolphin was taken into consideration. The CDL Dolphin forms part of the Dublin Docks pNHA and is located *c*. 20 m north of

the site. It also provides a breeding site for Common Tern and Arctic Tern associated with the South Dublin Bay and River Tolka Estuary SPA.

Other

363. Of note and of relevance to all layouts is the interface between the CWP Project onshore substation site and DPCs 3FM Project. The Applicant has been engaging closely with DPC throughout the design process and is committed to developing the onshore substation in such a way that does not conflict with the planned 3FM Project. This includes a proposal to construct a 325 m diameter ship turning circle within the River Liffey, immediately in front of the onshore substation site (see **Plate 3-11**). The proposed turning circle will require the removal of part of the reclaimed land, upon which onshore substation will be built. Therefore, the turning circle further limits the size of the site which is the key constraint that has impacted the feasibility of the alternative onshore substation layouts.

Plate 3-11 DPC ship turning circle interaction with onshore substation site

364. Alongside the engagement with DPC, the Applicant has worked closely with EirGrid to identify a number of design considerations to support an onshore substation development on the site. This included:

- Two level statcom Buildings;
- Three level GIS Building; and
- Shunt Reactors located at ground level within the GIS building.

365. The following vehicle access constraints and assumptions were also considered in developing proposed access arrangements:

- Due to its width the existing eastern access was deemed unsuitable for large vehicles during construction. A new access to the west of the site would therefore be required. It was also assumed that onshore export cables from the landfall would enter the onshore substation site from the west.
- Separate access from the east of the site should be maintained.
- Access to the Uisce Éireann site must be maintained.

366. The above-mentioned constraints amongst others such as EirGrid building specifications, drainage and security and lighting were considered in identifying a number of potential layouts for the onshore substation with a view to finding the optimum arrangement.

367. The following section provides a summary of alternative layouts that were identified and notes the key risks associated with each layout.

Identification of reasonable alternatives

Layout A

368. Layout A, shown by **Plate 3-12**, considered the GIS building at the north of the site with the statcom buildings located to the south and the harmonic filters to the east.

369. The following key risks with this option were identified:

- This GIS building is likely to be the tallest building, and it is therefore preferable to locate the building on the south of the site, further away from the breeding tern colony associated with the CDL Dolphin.
- Onshore export cable routing to the GIS building would be very challenging.
- There is minimal space available for statcom buildings.
- Access would be challenging for operation and maintenance of the statcom transformer.
- Design interface between the GIS building basement and the proposed anchor piles for the perimeter combi-wall structure would require a more technical solution.

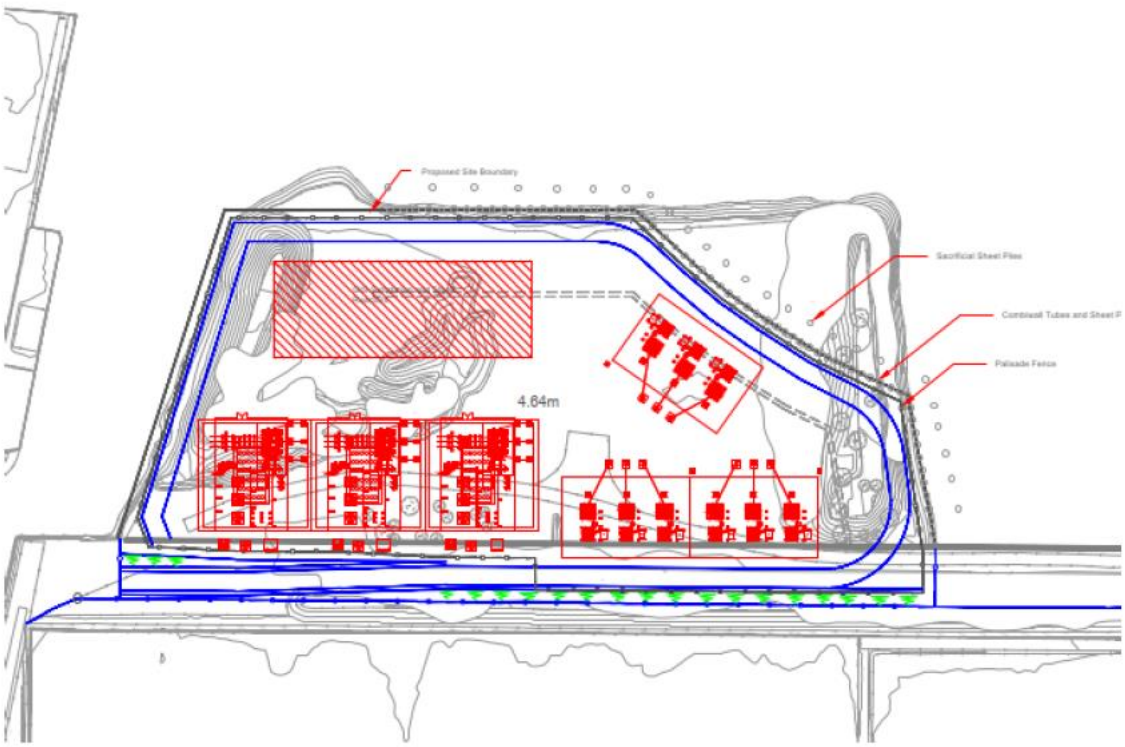


Plate 3-12 Onshore substation Layout A

Layout B

370. Layout B, as shown by **Plate 3-13**, considered the GIS building and the statcom buildings located at the south of the site with the harmonic filters to the north.

371. The following key risks with this option were identified:

- Onshore export cable routing to the GIS building would be challenging.
- Minimal space is available for statcom buildings.
- Vehicle turning area to the east of the statcom buildings is tight presenting challenges for operation and maintenance of the statcom transformer.
- The harmonic filters would be very exposed to sea spray from the River Liffey resulting in salt pollution.

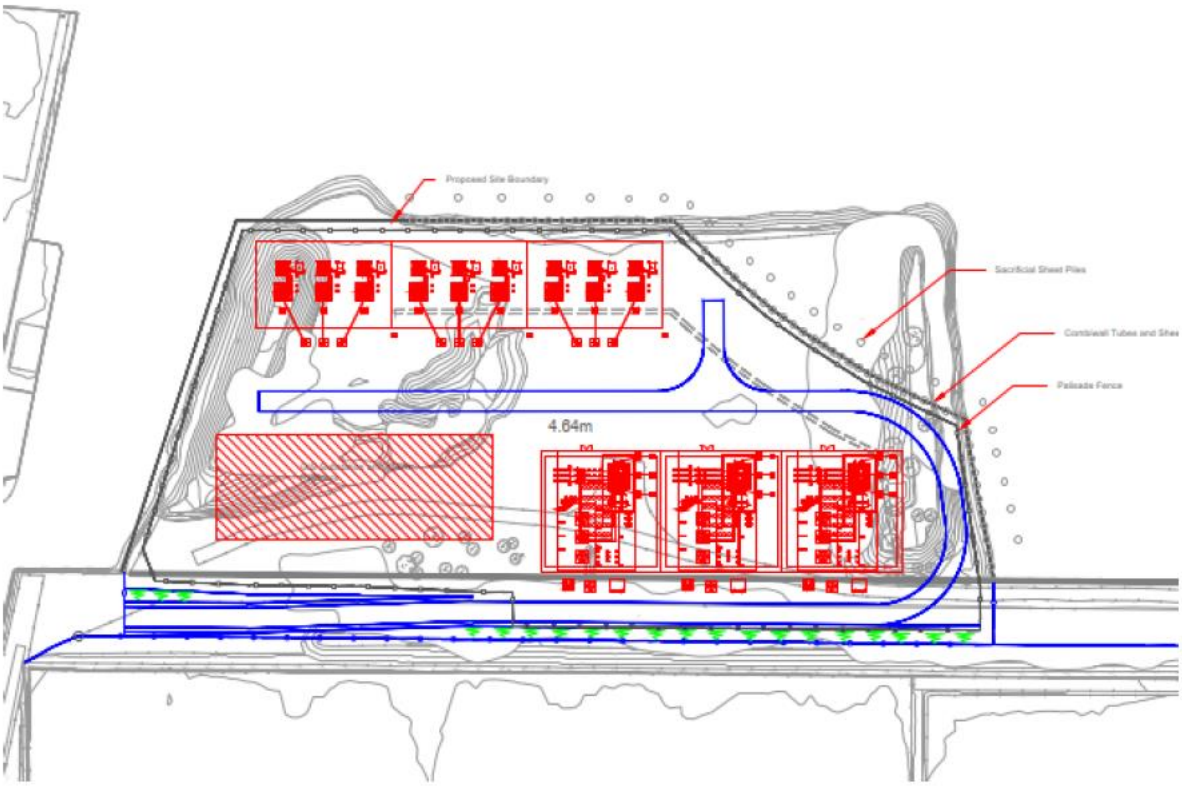


Plate 3-13 Onshore substation Layout B

Layout C

372. Layout C, as shown by **Plate 3-14**, considered the GIS building at the south of the site with the statcom buildings located at the north and the harmonic filters to the east.

373. The following key risks with this option were identified:

- Onshore export cable routing to the GIS building would be challenging.

- Access would be challenging for operation and maintenance of the statcom transformers and shunt reactors.
- Design interface between the statcom building foundations and the proposed anchor piles for the perimeter combi-wall structure would require a more technical solution.
- Necessary electrical clearances may be difficult to achieve between the statcom transformers and harmonic filter.

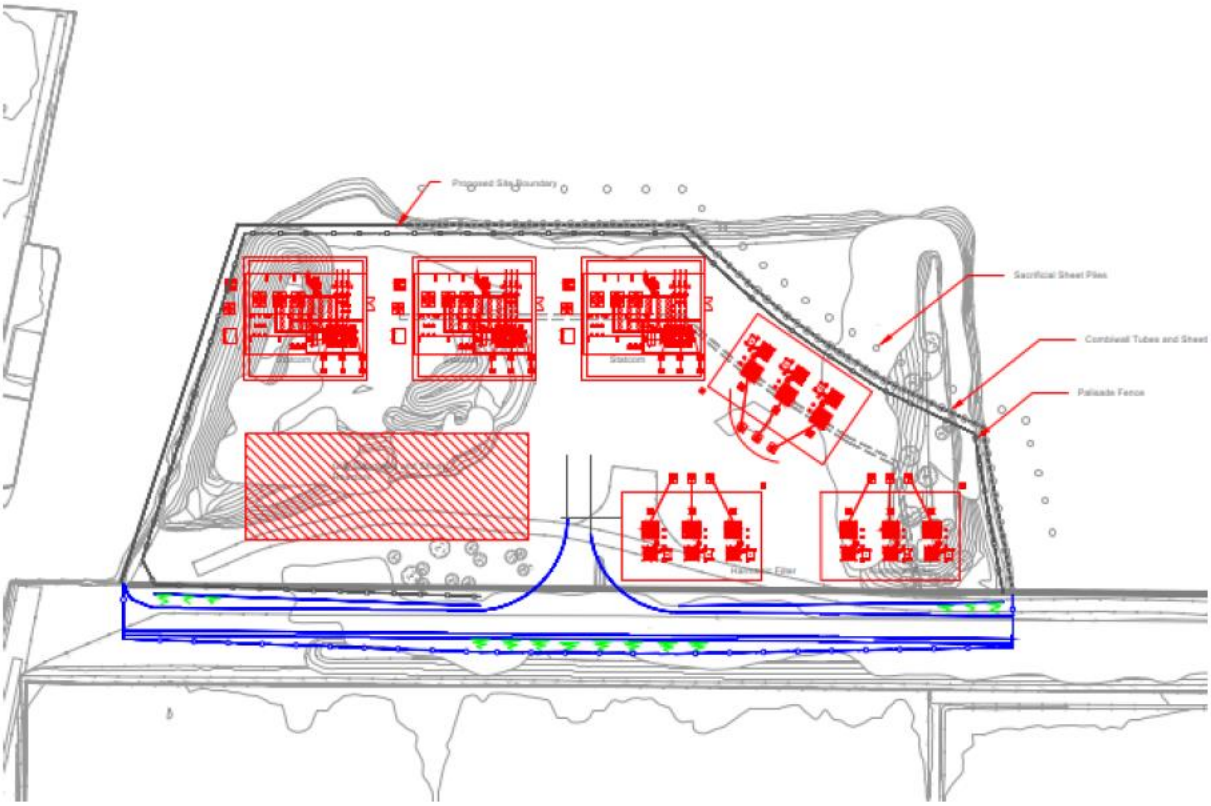


Plate 3-14 Onshore substation Layout C

Layout D

374. Layout D, as shown by **Plate 3-15**, considered the GIS building to the south east of the site with the statcom buildings located at the north and the harmonic filters to the south west.

375. The following key risks with this option were identified:

- The vehicle turning area to the east of the GIS building is tight; and
- Design interface between the statcom building foundations and the proposed anchor piles for the perimeter combi-wall structure would require a more technical solution.

376. Notwithstanding the risks identified above, Layout D was also considered to present a number of opportunities that would be challenging to realise with each of the other layout options:

- Good access to for operation and maintenance of the shunt reactors and statcom transformers;
- Adequate space for the statcom buildings;
- Harmonic filters located in a relatively sheltered area and less exposed to sea spray from the River Liffey; and

- Preferable equipment locations to facilitate good cable routes both into the site and onwards to the Poolbeg 220 kV substation.

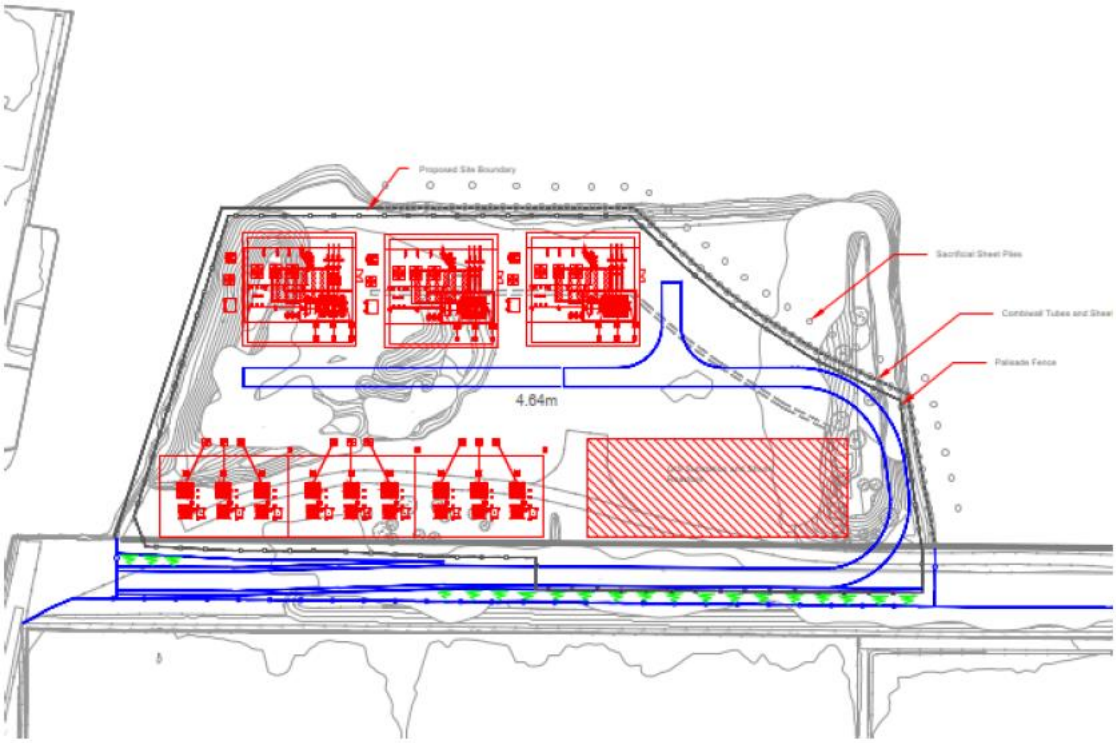


Plate 3-15 Onshore substation Layout D

Comparison of environmental effects

377. From an environmental perspective each option presents very similar risks. Layout A positions the tallest building closest to the breeding tern colony associated with the CDL Dolphin and is therefore considered to be the least preferred option from an environmental perspective.

378. Each option was also reviewed from a landscape and visual impact perspective, which concluded a negligible difference between the layout options proposed, taking into account the screening effect of the surrounding industrialised landscape. (This is evidenced in EIAR **Chapter 23 Landscape and Visual Impact Assessment** which assess the visual impact of the final onshore substation layout and design).

379. There are several potential environmental impacts that are applicable to all options. These primarily relate to construction phase impacts that have been considered in the EIAR and will be carefully managed through the implementation of a **CEMP**.

The main reasons for selecting the preferred option

380. Following a review of the layout options it was decided that Layout D would be brought forward as the preferred option for the onshore substation layout. It provided better opportunities for HV cable routing and the plant and equipment layout provided relatively good access compared to the other options.

3.16.2 Alternative locations for the ESB Networks building

Background

381. Following the completion of the onshore substation layout alternatives assessment, EirGrid advised the Applicant that an ESBN building would be required between the onshore substation and the grid connection point at the Poolbeg 220 kV substation. This would be required to provide an interface between the onshore transmission grid and the offshore transmission grid. This building would be owned by ESBN and would form part of the onshore transmission grid.

382. The following sections describes the Applicant's consideration of alternative locations for the ESBN building.

Policy considerations

383. The key planning policies that are of relevance to the location of the onshore substation are as described in **Table 3-30** for the onshore substation site selection.

Study area and constraints analysis

384. The study area for the purposes of identifying a suitable location for the ESBN building is the onshore substation site (SS11), as defined in **Section 3.15**. Environmental and other constraints associated with this site are as described in **Section 3.15**.

385. Design considerations for the ESBN building included the requirement for three 220 kV GIS circuit breakers with overall building approximate dimensions of 33 m x 15 m. Furthermore, it would be necessary to accommodate the building in a segregated compound with a separate access.

386. Taking the above design considerations into account, combined with the significant spatial constraints on site, it was quickly established that the only feasible options would require an extent of land reclamation adjacent to the onshore substation site.

387. This led the Applicant to identify three options for an area of land reclamation, upon which to locate the ESBN building. The following sections provide a summary of the options that were identified and notes the primary reasons for discounting two of the three options identified.

Identification of reasonable alternatives

Option 1 (West)

388. Option 1 (West), shown by **Plate 3-16**, considered the ESBN building on an area of reclaimed land to the west of the onshore substation site. The area is bounded by sheet piles that control the flow of a

cooling water discharge channel associated with the nearby Dublin Waste to Energy plant and the ESBN Dublin Bay Power Plant.

389. This location was deemed unfavourable for the following reasons:

- The area is too small to accommodate a segregated ESBN compound; and
- High voltage cable routing for the ESBN network cables would be very challenging and would require several crossings with cables located in the main onshore substation site.

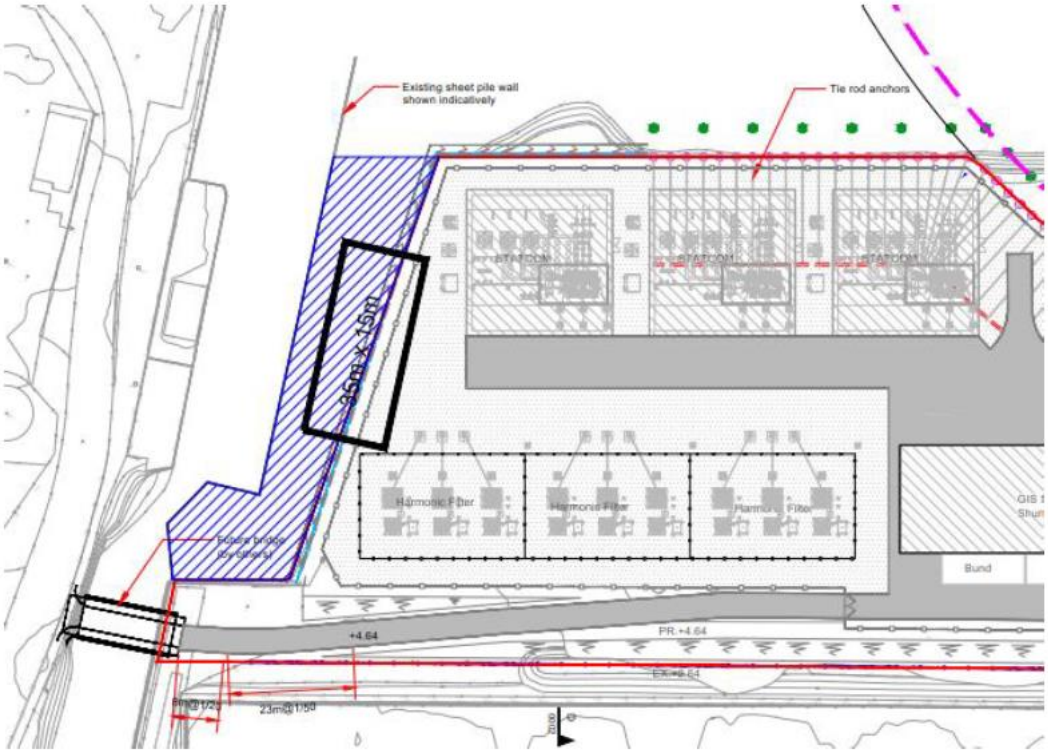


Plate 3-16 ESB building location Option 1 (West)

Option 2 (North)

390. Option 1 (North), shown by **Plate 3-17**, considered the ESBN building on an area of reclaimed land to the north of the onshore substation site. The area is bounded by the extent of DPCs planned turning circle to the east and the breeding tern colony associated with the CDL Dolphin to the north.

391. This location was deemed unfavourable for the following reasons:

- The proximity to the CDL Dolphin tern colony;
- High voltage cable routing for the ESBN network cables would be very challenging and would require several crossings with cables located in the main onshore substation site; and
- Segregated access requirements would require more space within the onshore substation site.

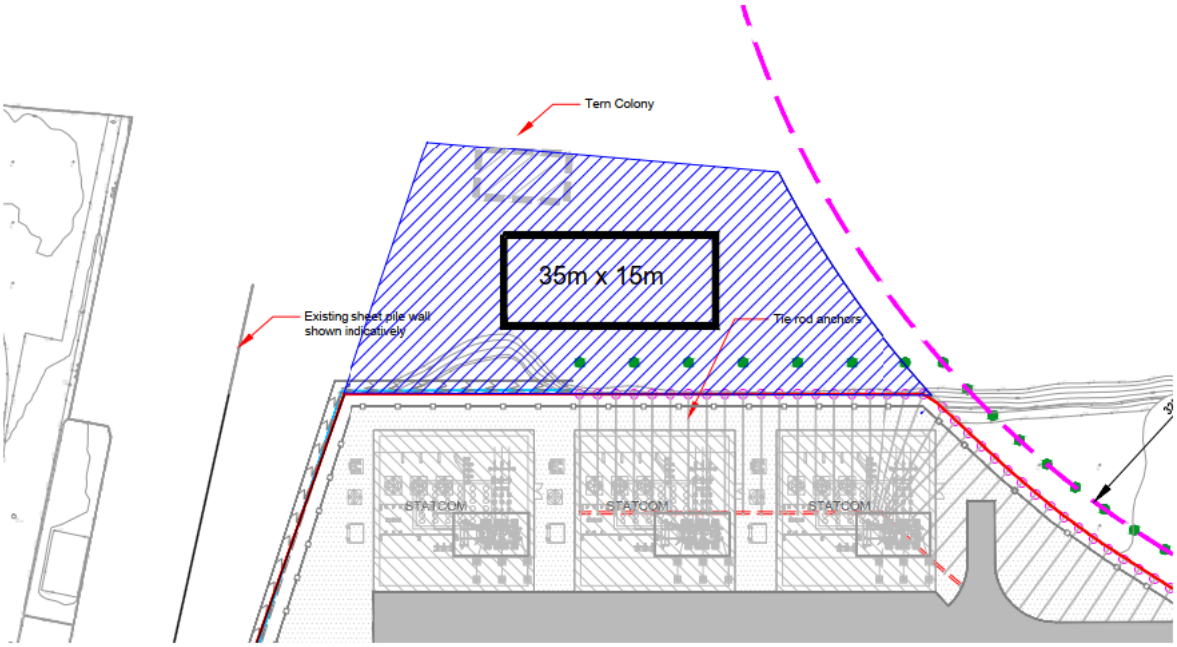


Plate 3-17 ESBN building location Option 2 (North)

Option 3 (East)

392. Option 3 (East), shown by **Plate 3-18**, considered the ESBN building on an area of reclaimed land to the east of the onshore substation site. The area is bounded by the extent of DPCs planned dredged turning circle to the north by an outfall from the Uisce Éireann tanks to the east.

393. Although smaller in size than what would be preferable for construction purposes, this location was found to offer a number of clear advantages over the other options identified:

- The reclaimed land would not encroach on the CDL Dolphin tern colony, with construction works at this location unlikely to be visible from the CDL Dolphin assuming installation of visual screening;
- This location would be optimal for routing the ESBN network cables from the ESBN building to the Poolbeg 220 kV substation; and
- A segregated compound is achievable without impacting space within the main site. This can be serviced by a separated access road utilising the existing track to the east of the site.

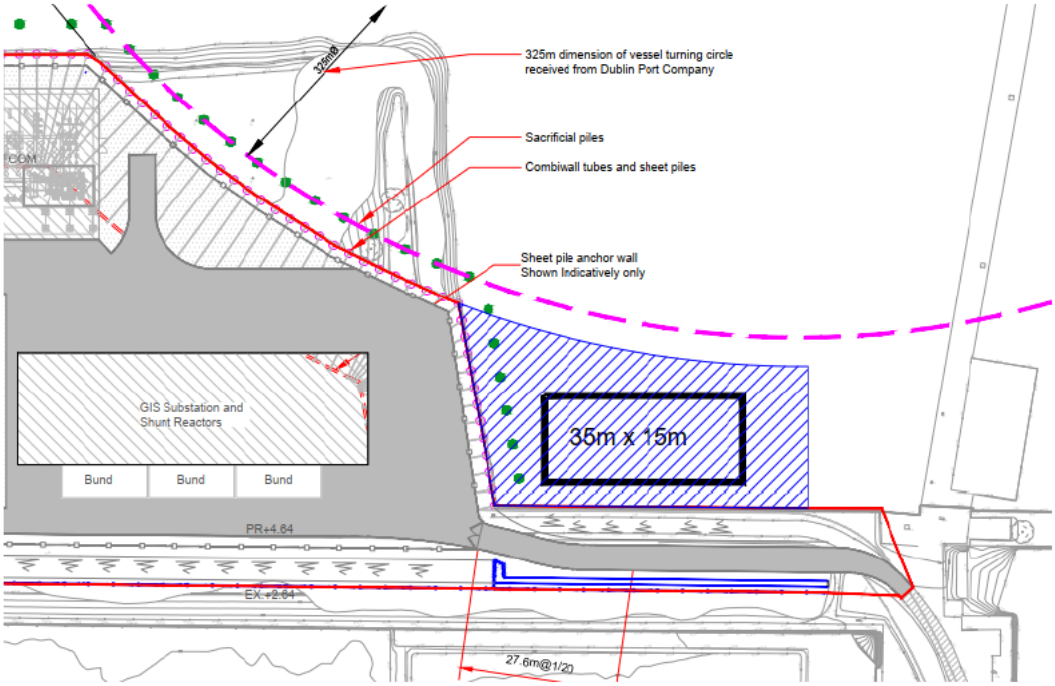


Plate 3-18 ESBN building location Option 3 (East)

Comparison of environmental effects

394. From an environmental perspective each option presents very similar risks. Option 3 (East) is located the greatest distance from the breeding tern colony associated with the CDL Dolphin and is therefore considered to be the preferred option from an environmental perspective.

395. Each option was also reviewed from a landscape and visual impact perspective, which concluded a negligible difference between the potential locations, taking into account the screening effect of the surrounding industrialised landscape. This is evidenced in EIAR **Chapter 23 Landscape and Visual Impact Assessment** which assess the visual impact of the final onshore substation layout and design.

396. There are several potential environmental impacts that are applicable to all options. These primarily relate to construction phase impacts that have been considered in the EIAR and will be carefully managed through the implementation of a **CEMP**.

The main reasons for selecting the preferred option

397. Following a review of the location options it was decided that, for the reasons set out above, Option 3 (East) would be brought forward as the preferred option for the area of reclaimed land required to accommodate the ESBN building.

3.16.3 Alternative ESBN network cable alignments and installation methods

Background

398. Three 220 kV onshore export cable circuits will connect from the onshore substation to the Poolbeg 220 kV substation, which will then transfer the electricity onwards to the Irish Electricity Grid. For the purposes of the planning application these cables are referred to as the ESBN network cables.

399. The route and installation methodology for the ESBN network cables has been established in consultation with EirGrid.

Policy

400. The key planning policies that are of relevance to the routing and installation of the ESBN network cables are as described in **Table 3-30** for the onshore substation site selection.

Study area and constraints analysis

401. The study area for the purposes of identifying a suitable route and installation methodology for the ESBN network cables is the area of Poolbeg Peninsula between the onshore substation site (SS11) and the site of the Poolbeg 220 kV substation.

402. The environmental constraints associated with this area of land are as described for the onshore substation site selection in **Section 3.15**. Other key constraints include:

- **Onshore substation layout / ESBN building location**: The ESBN network cables will exit the onshore substation site from the ESBN building. Therefore, the cables are required to exit to the east of the site, utilising the existing track to the east of the site.
- **Constructability in relation to impacts on the local road network and other utilities**: The results of SI works undertaken by the Applicant have highlighted the extensive nature of existing underground services along Pigeon House Road.
- **Land, Permits and Wayleaves**: The assessment of potential options will consider existing land ownership and future development plans.

Identification of reasonable alternatives

403. Based on the location of the ESBN building within the onshore substation site and location of the Poolbeg 220 kV substation, a single feasible route was identified for the ESBN network cables.

404. This route, presented on the relevant **Planning Drawings**, follows the existing track to the east of the onshore substation site before crossing an area of vacant land owned by DCC. From here the route heads south, across Pidgeon House Road and into the area of land identified by EirGrid for the Pigeon House 220 kV substation.

405. Along this route the Applicant identified two possible installation options:

- Option 1: Open cut trenching; and
- Option 2: Open cut trenching in combination with HDD across Pidgeon House Road.

406. Both options were initially considered as feasible options, however, it was later determined that the Option 1 would not be acceptable to EirGrid due to the extensive nature of existing underground

services along Pigeon House Road and the associated high risk of existing utility conflicts to other critical energy infrastructure.

407. The Applicant therefore concluded that an open cut trenching solution combined with HDD across Pidgeon House Road into the site of the Pigeon House 220 kV substation was the only feasible solution for the ESBN network cables.

The main reasons for selecting the preferred option

408. The main reasons for selecting the preferred route and installation methodology for the ESBN network cables described in the section above.

3.17 Phase 6: Consideration of alternative onshore export cable routes

Background

409. The onshore export cables extend from the TJBs at landfall to the onshore substation. TLI Group was engaged by the Applicant to undertake an onshore export cable route selection assessment for the CWP Project.

410. At the time of completing the assessment, SS11 had been identified as the preferred onshore substation site for the CWP Project and LF03 was identified as the preferred landfall location. Therefore, the aim of the assessment was to identify the best performing route option and installation method for the onshore export cables between the landfall (LF03) and the onshore substation site (SS11).

411. This section describes the approach taken by TLI group to identify alternative routes and installation methods for the onshore export cables and details the results of SI works undertaken by the Applicant which have significantly influenced the consideration of alternatives for this component of the CWP Project.

Policy

412. The key planning policies that are of relevance to the routing and installation of the onshore export cables are as described in **Table 3-30** for the onshore substation site selection.

Study area and constraints analysis

413. The study area for the purposes of identifying a suitable route and installation methodology for the onshore export cables is the area of the Poolbeg Peninsula between the landfall (LFO3) and the onshore substation site (SS11).

414. The environmental constraints associated with this area of land are as described for the onshore substation site selection in **Section 3.14**. Other relevant constraints include:

- **Constructability in relation to impacts on existing utilities**: Ground Penetration Radar (GPR) surveys were commissioned by the Applicant to assess particular 'pinch point' sections within Poolbeg Peninsula. The GPR survey coverage was carried out on locations identified from desktop analysis with considerable High Voltage (HV) / Medium Voltage (MV) apparatus, gas network utilities and water services. The concentrated areas focused on sections of Pigeon House Road,

Shellybanks Road, South Bank Road and major junctions at which each of these road networks converge. Overall, the results of SI works undertaken by the Applicant have highlighted the extensive nature of existing underground services across the Poolbeg Peninsula.

- **Land, Permits and Wayleaves**: The assessment of potential options will consider existing land ownership and future development plans.
- **Effects of made ground**: In addition to the abovementioned SI, COWI UK Ltd also provided the Applicant with further technical advice on HDD feasibility on the Poolbeg Peninsula, setting recommended dimensions for drill bores, separations between parallel HDD runs, entry / exit angles and working space requirements. It was determined that HDDs on the Poolbeg Peninsula will be challenging because of existing ground conditions, the likely scale of HDD drives, the presence of existing historical structures with unknown founding depths, limited working space in several locations and the presence of many existing underground services.
- **Other technical constraints**: surface obstacles; cable pulling procedures and limits on cable tension; and considerations in relation to cable ratings.

Identification of reasonable alternatives

415. It is the preference of EirGrid to install the export cables within the existing public road network, using a standard trench configuration with fully ducted cables. However, based on a detailed review of existing underground service information, the results of GPR surveys, site visits and engagement with adjoining utility stakeholders on Poolbeg Peninsula, it was determined that sufficient space is not available within the existing road network to accommodate this type of conventional underground cable system.

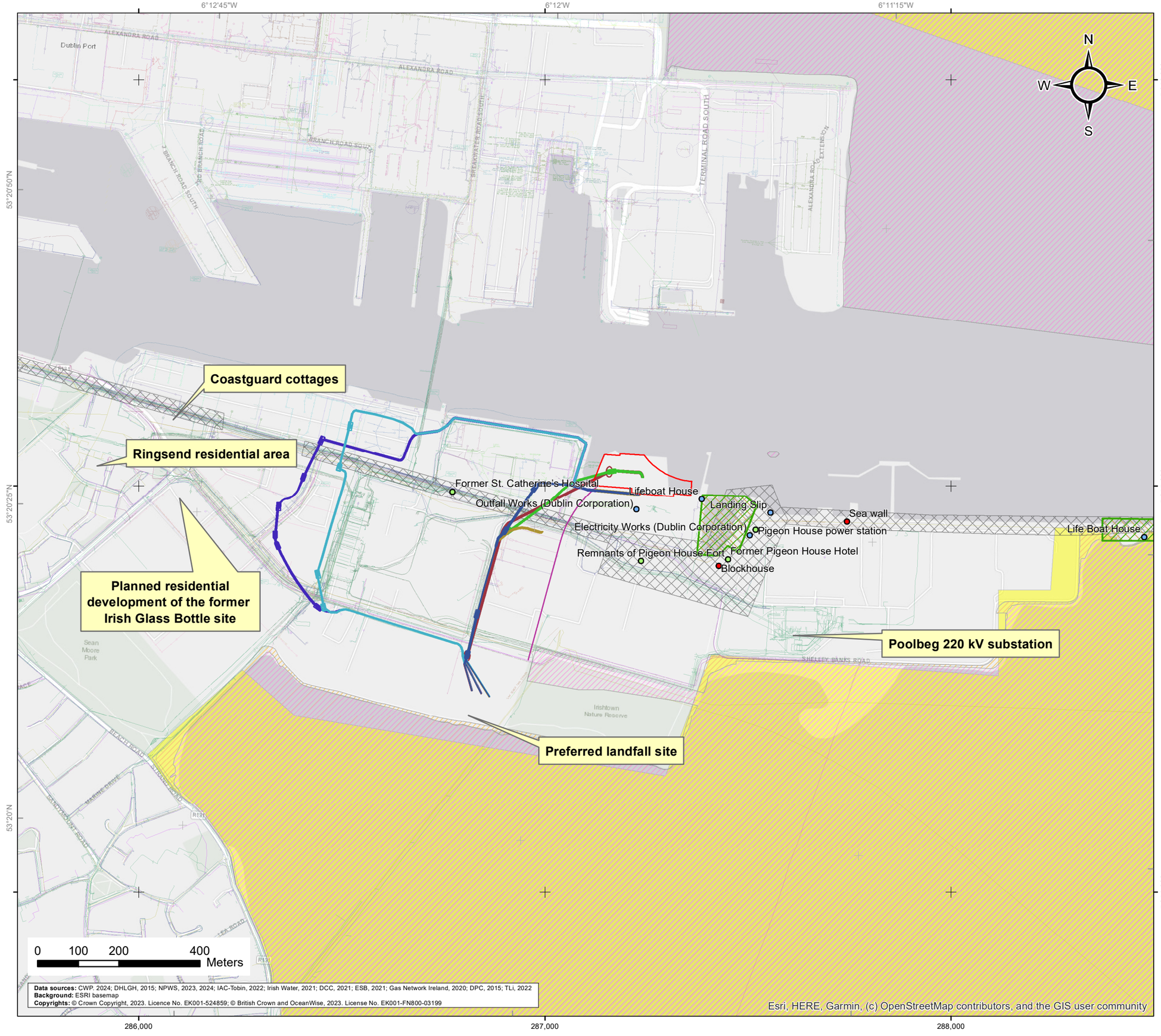
416. Therefore, alternative options were identified and assessed that comprise of a variety of off-road and novel design solutions. In total seven route / installation options were identified. Each option is summarised below and shown on **Figure 3-14**.

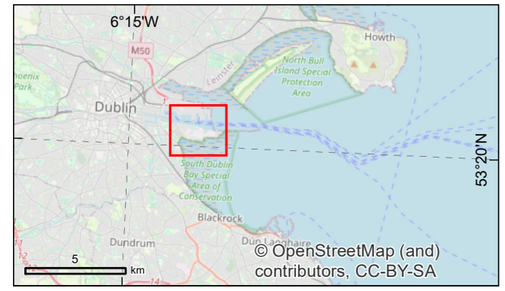
- **Route 1** – Installation of three cable circuits in a single deep tunnel from the main compound to onshore substation site, following the alignment of Shellybanks Road and then beneath Pigeon House Road to the onshore substation site;
- **Route 2** – Installation of three cable circuits using a combination of trenching, a bespoke buried cable trough and two horizontal direction drills (HDDs). This option follows the alignment of Shellybanks Road with a HDD from the northern end of Shellybanks Road to the onshore substation site;
- **Route 3** – Trenching and HDD via South Bank Road, Pigeon House Road and then along the quayside of the Irish Cement, Hammond Lane and EcoCem premises. The concluding section will involve carrying the cable circuits through a new bridge into the onshore substation site;
- **Route 4** – Trenching and HDD via South Bank Road and then along the western perimeter of Ringsend 110 kV Substation. The last section will follow the route outlined from Route Option 3, navigating the quayside of the Irish Cement, Hammond Lane and EcoCem premises and then through a new bridge into the onshore substation site;
- **Route 5** – a variation of Route Option 2, following the same initial route for approximately 500 m, before the circuits transition from the cable trough arrangement to an overhead guided wire arrangement;
- **Route 6** – a variation of Route Option 2, following the same initial route for approximately 500 m, before the use of HDD from Shellybanks Road into a vacant area within the Hammond Lane premises. The route then heads eastwards, traversing EcoCem leased held property before converging into the new bridge into the onshore substation site; and
- **Route 7** – Installation of three cable circuits in a single deep tunnel from the main compound to onshore substation site. Like the installation method for Route 1, but to the east of the Dublin Waste to Energy (DWtE) facility.

417. It should be noted that at the point of the CWP Project second phase of public consultation, only six route options had been identified. Three indicative cable corridor options, indicative of the emerging route options, were presented for public and stakeholder feedback:

- Indicative cable corridor option 1 (indicative of Route 3);
- Indicative cable corridor option 2 (indicative of Route 1, 2, 5 and 6); and
- Indicative cable corridor option 2 (indicative of Route 7).

418. During this online and in person consultation feedback on the three indicative cable corridors was requested, however no specific feedback was received or any preference shown for a particular option.





Legend

- Onshore substation site
- Route option 1
- Route option 2
- Route option 3
- Route option 4
- Route option 5
- Route option 6
- Route option 7

Designated sites for nature conservation

- Special Protections Area (SPA)
- Special Conservation Area (SAC)
- Proposed National Heritage Area (pNHA)

Archaeology and built heritage

- Archaeological heritage sites
- Built heritage sites
- DCIHR sites
- DCC Specific Objectives: Conservation Area
- Zones of notification

Existing utilities

- Sewer system line
- Water system line
- Surface mains
- ESB mapping
- Gas data 2020

codling wind park

Project: Codling Wind Park

Contractor:

Website:

Figure 3.13
Onshore export cables – Identification of potential route options

CWP doc. number: CWP-CWP-ENG-08-01-MAP-1127

Internal descriptive code: PB - INFRAS.PROP..SS.PP.PL - ARCHA..ARCHI..UTIL.. pNHAs..SACs..SPAs - (EIAR.Vol.03.Ch.03.FIG.13)

Size: A3
Scale: 1:9,000

CRS: EPSG 25830

Rev.	Updates	Date	By	Chk'd	App'd
00	Final for issue	2024/08/15	MC	CD	ES

Comparison of environmental effects

419. On the basis of the initial constraints analysis, each of the above route options were carried forward for a more detailed comparison of environmental effects. A comparison of each option against relevant environmental constraints is provided in **Table 3-33** below.

Table 3-33 Comparison of environmental effects for alternative onshore export cable routes

Constraint / Criteria	Relevant considerations
Environmental (including population and communities, traffic and transport, biodiversity and waste)	**Route 1** • There are no residential receptors within approximately 1 km of this route and views of construction works from residential receptors are likely to be restricted due to intervening buildings and overall distance. • There are a reduced likelihood of construction phase traffic impacts due to the routing of the cables beneath Pigeon House Road within a deep tunnel. Conversely, construction of a tunnel may require an increased volume of excavated material and associated construction vehicle movements, although there is unlikely to be a significant difference in vehicle movements between each option. • Construction of a tunnel may require an increased volume of excavated material and spoil to be disposed off-site to a licenced waste facility. • A deep tunnel would, in comparison to other options, result in a reduced potential for impacts on archaeological features or deposits, as well as helping to avoid existing historical structures with unknown founding depths. **Route 2** • As with Route 1 there are no residential receptors within approximately 1 km of this route and views of construction works from residential receptors are likely to be restricted due to intervening buildings and overall distance. • There are a reduced likelihood of construction phase traffic impacts due to the installation of the cables beneath Pigeon House Road by means of HDD. • Environmental control measures for drilling beneath the cooling water channel will be necessary. This risk applies to Routes 2 and 6 only. • There are existing trees along the proposed route which will need to be removed due to the negative impact root systems can have on utility services in addition to the impact on the thermal resistivity properties of the existing ground. • A combination of trenching and HDD would have increased potential for impacts on archaeological features or deposits relative to an underground tunnel (Routes 1 and 7), however there is a lower potential for impacts relative to Routes 3 and 4. **Routes 3 and 4** • Routes 3 and 4 are within approximately 350 m of the closest residential receptors and therefore have a greater potential for construction population impacts relative to other routes, however views of construction works are likely to be restricted due to intervening buildings and overall distance. • An increased volume of excavation for both routes, due to their length, contributes to a higher risk from a traffic and transport perspective and an increased volume of excavated material and spoil to be disposed off-site to a licenced waste facility. • There are an increased likelihood of cumulative traffic impacts due to the proximity of these routes with other planned development in the area. • Considering the overall length of Routes 3 and 4 there is an increased potential for impacts on archaeological features or deposits. **Route 5**

Constraint / Criteria	Relevant considerations
	• Route 5 scores poorly from a visual impact perspective due to the visually intrusive nature of the design. Route 5 being the only option proposed with permanent above ground infrastructure and is therefore the only option with the potential for a long term impact on relevant visual receptors. • There are an increased likelihood of construction phase traffic impacts due to temporary restrictions whilst the overhead circuits are installed. • One advantage of this option is the reduced volume of excavated material and spoil to be disposed off-site to a licenced waste facility. • With regards potential impacts to archaeology Route 5 is similar to Routes 2 and 6, however there is an increased potential for an indirect effect on the setting of nearby built heritage assets due the above ground infrastructure. This impact is unique to Route 5. **Route 6** • As with Routes 1 and 2 there are no residential receptors within approximately 1 km of this route and views of construction works from residential receptors are likely to be restricted due to intervening buildings and overall distance. • There is a reduced likelihood of construction phase traffic impacts due to the installation of the cables beneath Pigeon House Road by means of HDD. • Environmental control measures for drilling beneath the cooling water channel will be necessary. This risk applies to Routes 2 and 6 only. • There are existing trees along the proposed route which will need to be removed due to the negative impact root systems can have on utility services in addition to the impact on the thermal resistivity properties of the existing ground. • A combination of trenching and HDD would have increased potential for impacts on archaeological features or deposits relative to an underground tunnel (Routes 1 and 7), however there is a lower potential for impacts relative to Routes 3 and 4. **Route 7** • As with Routes 1, 2 and 6 there are no residential receptors within approximately 1 km of this route and views of construction works from residential receptors are likely to be restricted due to intervening buildings and overall distance. • There is a reduced likelihood of construction phase traffic impacts due to the routing of the cables beneath Pigeon House Road within an underground tunnel. • Construction of a tunnel may require an increased volume of excavated material and spoil to be disposed off-site to a licenced waste facility. • A deep tunnel would, in comparison to other options, result in a lower level of potential for impacts on archaeological features or deposits, as well as helping to avoid existing historical structures with unknown founding depths.

The main reasons for selecting the preferred option

420. In summary, the route selection process for the onshore export cables identified Route 1 as the best performing option as the installation method would reduce the risk of impacting on existing underground services and would enable a deeper crossing of other known structures such as the Old Harbour Wall, which runs along the southern boundary of the onshore substation site. This was supported by an environmental constraints analysis which determined a low risk for significant environmental effects during construction and operation of the underground tunnel.

421. Route 7 provides similar benefits to Route 1 however this route option is considered less favourable due to the narrow route corridor between the Dublin Waste to Energy (DWtE) facility and the Ringsend Wastewater Treatment Works, passing close to the foundations of buildings and tanks.

422. Routes 2 and 6 scored favourably due to their relatively short route lengths and use of more commonly used installation methods. This includes a combination of trenching, a buried cable trough and a series of drills to installation the cables beneath Pigeon House Road. Ultimately, however, both routes carry an increased risk to existing utilities relative to Route 1 and carry little to no environmental benefit relative to this option.

423. Route Options 3, 4 were also determined to be a less preferred options due to the increased length and complexity of the routes, and the risk of increased utility and third-party conflicts.

424. Route Option 5 was determined to be the least preferred route given the technical complexities, inadequate space and the visually intrusive nature of the required work. Furthermore, a derogation would be required for the bespoke engineering solution which is not currently used in transmission systems.

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