Dublin Array
Generation for generations

Dublin Array Offshore Wind Farm

Planning Application

Part 3 - Environmental Impact Assessment Report
Volume 1 - Non-Technical Summary

Kish Offshore Wind Ltd

RWE SLR GoBe APEM Group

www.dublinarray-marineplanning.ie

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Environmental Impact Assessment Report

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1.1 Introduction

The proposed Dublin Array Offshore Wind Farm (Dublin Array) is located on the Kish and Bray Banks, approximately 10 km off the east coast of Ireland. The Kish and Bray Banks are located off the coast of counties Dublin and Wicklow.

The project will include between 39 and 50 wind turbines, which will generate electricity from the wind. These turbines will be connected by subsea cables (called inter-array cables) to an offshore substation on a platform at sea. The electricity from the offshore substation platform is brought to shore in two subsea electricity cables. Where the two subsea electricity cables come ashore is called the Landfall. The Landfall will be located at Shanganagh Cliffs, County Dublin. From the Landfall two underground electricity cable installations will bring the electricity to a new proposed substation at Carrickmines, Dublin 18. The electricity from this substation will be connected into the existing national electricity grid. The onshore transmission infrastructure works include a Landfall site at Shanganagh and an underground cable route leading to an Onshore Substation at Carrickmines. Additionally, there will be a centre for operations and maintenance at Dún Laoghaire Harbour, supporting both construction and long-term maintenance. The location of the proposed wind farm and its connection to the existing national electricity transmission grid at Carrickmines is shown in Figure 1 with a project overview shown in Figure 2. Further details on the project description are included in section 5.

Dublin Array requires an Environmental Impact Assessment (EIA) as it meets the size criteria set down in planning law in Ireland by the Planning and Development Regulations. This means an Environmental Impact Assessment Report (EIAR) must be submitted with the planning application to An Bord Pleanála.

The EIAR assesses the potential significant effects of constructing, operating, maintaining, and decommissioning Dublin Array. It assesses how these activities might impact the environment and proposes measures to reduce any negative effects. The report also details the site selection process, design considerations, and alternative options.

The EIAR has been prepared according to the Guidelines on the Information to be Contained in Environmental Impact Assessment Reports[1] as prepared by the Environmental Protection Agency (EPA), which require a thorough analysis of the project's environment impacts.

This Non-Technical Summary provides an accessible overview of the EIAR. It presents the detailed information from the EIAR in straightforward language, summarising key findings such as the potential environmental impacts, the main receptors, and the mitigation and monitoring measures proposed.

1 EPA (2022) Guidelines on the Information to be Contained in Environmental Impact Assessment Reports. Environmental Protection Agency, Ireland.

1.2 The Applicant

The planning application has been submitted Kish Offshore Wind (on behalf of Kish Offshore Limited and Bray Offshore Wind Limited) These companies are owned by RWE and Saorgus Energy.

The Applicant is a joint holder of a maritime area consent[2] (MAC) for three parts of the maritime area (which allows the developer to occupy the maritime space):

- MAC Ref 2022-MAC-003 and 004 (held jointly by Kish Offshore Wind Limited and Bray Offshore Wind Limited);
- MAC Ref MAC20230012 (held jointly by Kish Offshore Wind Limited and Bray Offshore Wind Limited); and
- MAC Ref MAC240020 (held jointly by Kish Offshore Wind Limited, Bray Offshore Wind Limited, and Dún Laoghaire Rathdown County Council).

RWE Renewables is wholly owned by RWE AG. It is one of four subsidiary companies which also include RWE Generation, RWE Power and RWE Supply and Trading. RWE Renewables is a leading global renewable energy company, with more than 20,000 employees and activities in 15 countries globally. RWE Renewables has considerable experience in developing, constructing and operating renewables assets both independently, and together with project partners and investors. It invests in a broad range of technologies and has experience with onshore and offshore wind, hydro power, solar, battery storage and research and development phase technologies.

Saorgus Energy Ltd, a privately-owned Irish company specialising in the development of wind projects in Ireland.

1.3 Background and need for the project

Governments worldwide are tackling climate change by reducing greenhouse gas emissions and promoting renewable energy. This shift aims to move away from fossil fuels like coal, oil, and natural gas towards renewable energy sources such as wind, solar, and hydroelectric power with lower carbon emissions.

Renewable energy, especially offshore wind, is crucial in the energy transition. Wind energy generates electricity without emitting greenhouse gases, making it essential for reducing our carbon footprint. Projects like Dublin Array are vital for meeting climate goals. In Ireland, the government aims to achieve 80% renewable electricity by 2030, with at least 5 GW of offshore wind energy. This shift not only benefits the environment but also enhances energy security by reducing reliance on imported fossil fuels.

2 A Maritime Area Consent (MAC) is permission from the Irish government to use a specific part of the sea or coast for projects like wind farms or infrastructure, before getting full planning approval.

The journey to a low carbon economy began with the Kyoto Protocol in 1997 and has been reinforced by agreements like the Paris Agreement of 2015 and national policies pushing for more renewable energy and lower emissions. The 2015 Paris Agreement aims to keep global temperature rise below 2°C. More recently, the COP28 summit called for a 43% reduction in emissions by 2030 compared to 2019 levels. These agreements drive countries to act and shape policies like Ireland's Climate Action Plans.

Ireland, as part of its contribution to the EU's climate and energy ambitions, has committed to generating at least 5 GW of offshore wind capacity by 2030, a goal that is central to the government's Climate Action Plan and other key policy documents such as the Programme for Government: Our Shared Future. The Dublin Array Offshore Wind Farm, which is one of four projects which succeeded in securing contracted capacity in Ireland's first offshore renewable energy support scheme (ORESS 1) is integral to Ireland achieving this target, supporting a capacity of between 2,957 and 3,305 GWh of additional low carbon energy which is enough to offset between 1,100,000 and 1,230,000 tonnes of carbon emissions annually.

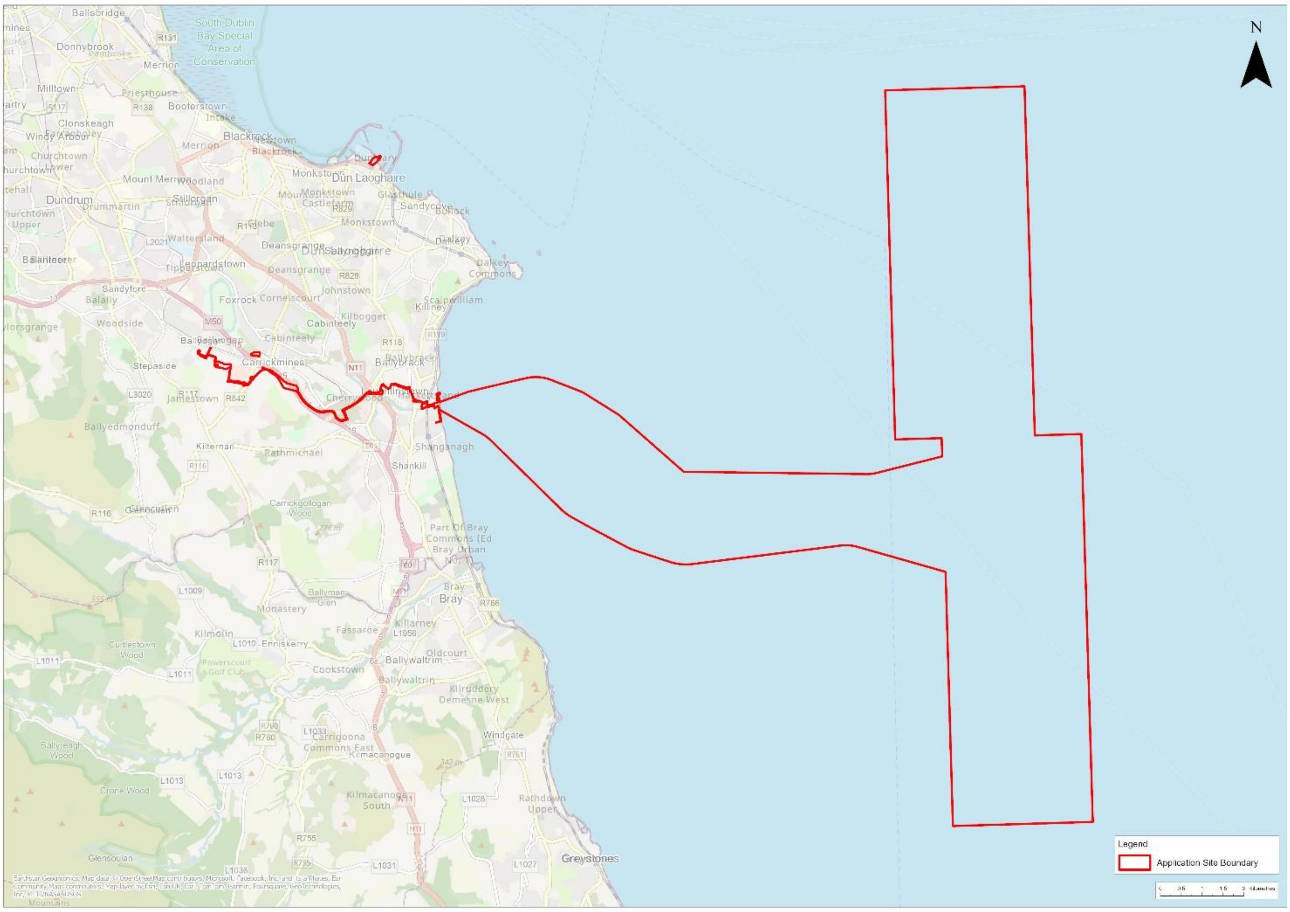


Figure 1 Location of Dublin Array

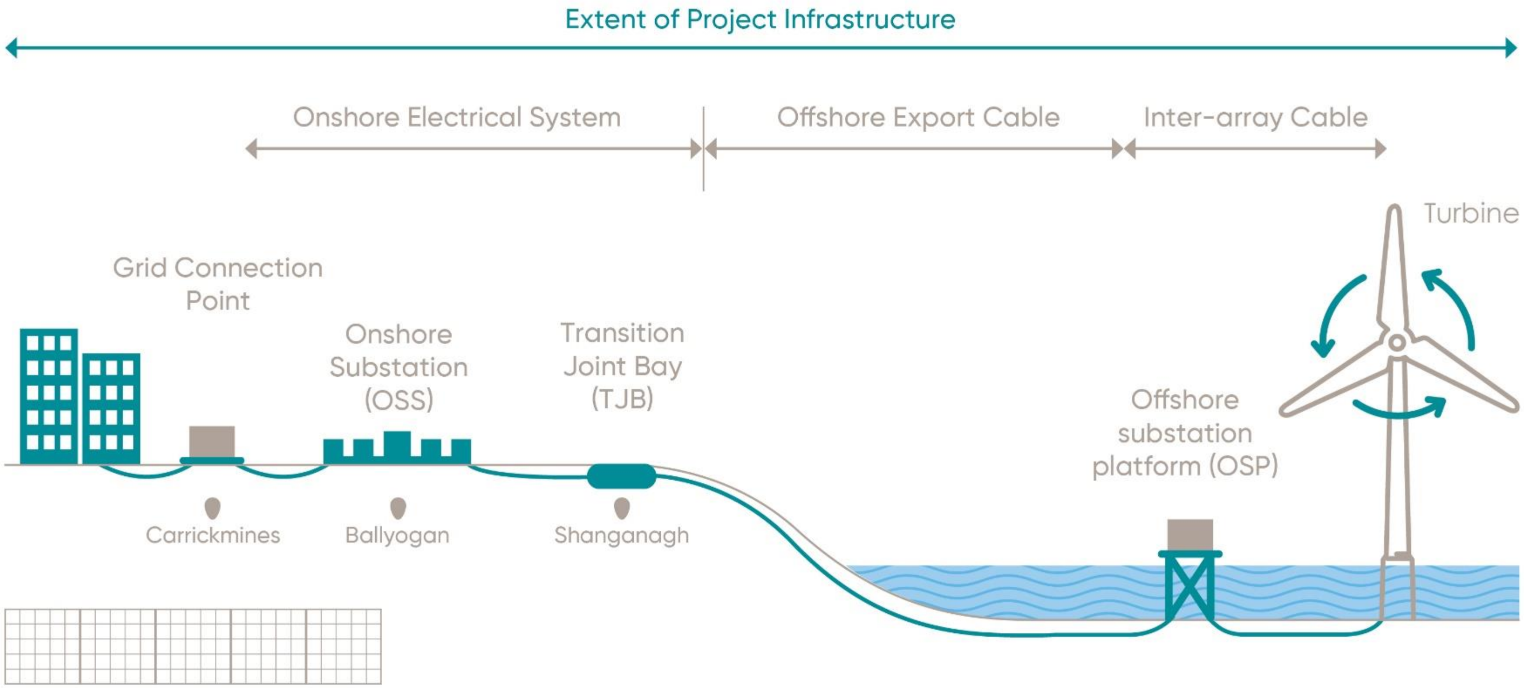


Figure 2 Dublin Array project overview

2 Consents, legislation, policy and guidance

The need for Dublin Array is underscored by international, European, national and local imperatives to transition to a low-carbon economy, driven by international agreements, climate obligations, legislation and policy frameworks. The origins of this project are rooted in the Kyoto Protocol of 1997, which sought to limit greenhouse gas emissions and marked the beginning of Ireland's journey away from fossil fuels. At the time, Ireland's energy system was heavily reliant on fossil fuels, with renewable energy contributing only 4.9% to gross electricity consumption in 1990. Since then, the need to decarbonise has been continuously reiterated through international agreements, most notably the Paris Agreement of 2015, and reinforced through European and national legislative frameworks aimed at meeting ambitious essential renewable energy and emissions reduction targets.

This Non-Technical Summary outlines the key aspects from Volume 2, Chapter 2 of the EIAR 'Consents, Legislation and Policy'.

2.1 International conventions

Under the Kyoto Protocol in 1997, each Party agreed to a set of binding emission reduction targets for developed countries. The Kyoto Protocol was the catalyst for Ireland's emerging climate policies and legislation. 2.3.29

At the twenty-first Conference of the Parties (COP21) to the United Nations Framework Convention on Climate Change (UNFCCC) in Paris, in 2015, the Paris Agreement was created and came into force in 2016. Key components of the Paris Agreement of relevance to offshore wind include:

(a) A commitment to limit global temperature increases to well below 1.5°C above pre-industrial levels.

(b) Agreement to pursue efforts to limit the increase to 1.5°C.

(c) Aim to reach global peak greenhouse gas emissions as soon as possible.

(d) Achieve net-zero greenhouse gas emissions by 2050.

(e) Each Party to submit a National Climate Plan, to demonstrate increased ambition over time.

(f) Plans should detail the Party's Nationally Determined Contributions[3] towards the emissions reduction targets, and Nationally Determined Contributions are to be updated every five years.

(g) Parties to continue to report regularly on greenhouse gas emissions and national implementation efforts.

(h) UNFCCC to undertake a global stocktake of greenhouse gas emissions reductions every five years.

3 NDCs (Nationally Determined Contributions) are climate action plans that countries submit under the Paris Agreement, outlining their commitments to reducing greenhouse gas emissions and adapting to climate change.

At the twenty-ninth Conference of the Parties to the UNFCCC (COP 29) in November 2024 in Baku, Azerbaijan, the agenda highlights that the world is not on track to meet the long-term goal of limiting global temperature increases to 1.5°C. The UNFCCC has called for greater ambition in the next set of Nationally Determined Contributions due to be submitted by 2025.

2.2 European Legislation

EU Governance Regulation and Climate Law

The *EU Regulation (EU) 2018/1999 on the Governance of the Energy Union and Climate Action* is a core piece of EU Climate and Energy legislation that assists the EU's compliance with its commitments under the Paris Agreement particularly with respect to the reporting of Nationally Determined Contributions on behalf of European Member States.

The *EU Climate Law (Regulation (EU) 2021/1119)* modifies the EU Governance Regulation by mandating reductions in net domestic greenhouse gas emissions by at least 55% by 2030, compared to 1990 levels. It also sets a legally binding target of net zero greenhouse gas emissions by 2050. The EU Governance Regulation is crucial for guiding Ireland's transition to a low-carbon energy system.

Revised Renewable Energy Directive

The *revised Renewable Energy Directive (EU) 2023/2413 (RED III)* establishes a binding renewable energy target of at least 42.5% of overall energy consumption by 2030, with an aim of reaching 45% as soon as possible. This represents a minimum 10.5% increase over the previous RED II targets, advancing the ambitions of the European Green Deal and the legally binding climate neutrality objective by 2050. Given the step-up in scale of renewable energy generating capacity that can be achieved by offshore wind, these revised renewable energy targets underscore the essential role that offshore wind energy plays in Ireland and other EU coastal states with suitable offshore wind resources, to meet the EU's climate neutrality objective and ratchet-up the emissions reductions to be achieved through the NDCs under the Paris Agreement. According to figures from the Sustainable Energy Authority of Ireland (SEAI), in 2022, renewable energy represented 23.0 % of energy consumed in the EU, up from 21.9% in 2021. Meeting the new target of 42.5% by 2030 will require doubling this share. RED III includes additional measures to try to accelerate the EU's clean energy transition. Key amendments include additional sectoral targets for renewable energy use and coordinated mapping by Member States to identify potential and suitable locations for renewable energy plants and related infrastructure, such as grids and storage facilities. RED III further presumes renewable energy projects as being of overriding public interest, in the context of the EU Habitats, Birds and Water Framework Directives.

Regulation on Accelerating Deployment of Renewable Energy

Regulation (EU) 2022/2577 on Accelerating Deployment of Renewable Energy, amended by *Council Regulation (EU) 2024/223,* aims to facilitate the rapid deployment of renewable energy projects across EU member states in response to the climate emergency and the need for energy independence (also referred to as security of supply). As an island nation, Ireland is particularly vulnerable to gas supply interruptions and shocks, and to interruptions to operation of electricity interconnectors. These Regulations establish a streamlined framework to expedite permitting processes, enhance grid connections, and promote investments in indigenous renewable technologies on the Island. Regulation (EU) 2022/2577 also established a presumption that renewable energy infrastructure, in prescribed circumstances, is in the overriding public interest in the context of the Habitats Directive, the Birds Directive and the Water Framework Directive. The presumption applied on a temporary basis, for a period of 18 months, ending on 30th June 2024. It was not deemed necessary to prolong the presumption in Regulation (EU) 2022/2577 since such a presumption separately applies by virtue of Article 16f of RED III, as referred to above, from 1st July 2024 onwards. Furthermore, Regulation (EU) 2022/2577 required that renewable energy projects be given priority in the planning and permit-granting processes when balancing legal interests in the individual case. This requirement was specifically prolonged by the amending legislation, Council Regulation (EU) 2024/223, until 30th June 2025 (and may be further extended).

The Maritime Spatial Planning Directive

The *Maritime Spatial Planning Directive 2014/89/EU* has been the catalyst for reforming marine planning and development legislation in Ireland. It requires the establishment of a maritime spatial planning framework across all member states by 2021. This Directive specifically stipulates that every member state must create a maritime area spatial framework and subsequent plan which enables blue growth initiatives across the zone, including production of energy from renewable sources.

European Environmental Legislation

Separately, the key pieces of environmental European legislation which apply to the decision-making process of the competent authority, An Bord Pleanála, in relation to this planning application, are the *Habitats Directive* (Directive 2009/147/EC), *Birds Directive* (Directive 2009/147/EC), *EIA Directive* (2011/92/EU and 2014/52/EU), *Water Framework Directive* (Directive 2000/60/EC), and *Marine Strategy Framework Directive* (2008/56/EC).

The Habitats Directive

The Habitats Directive focuses on the conservation of natural habitats and species of wild fauna and flora within the EU. Its aim is to maintain or restore these habitats and species to a favourable conservation status. The Directive establishes the framework for the creation and management of Special Areas of Conservation, which are part of the Natura 2000 network, alongside Special Protection Areas designated under the Birds Directive.

The Birds Directive

The Birds Directive is one of the core pieces of EU legislation aimed at conservation through the 'protection, management and control' of all wild bird species naturally occurring in the European Union. The Directive requires Member States to protect birds, their eggs, nests, and habitats. It establishes a network of Special Protection Areas, which, together with Special Areas of Conservation under the Habitats Directive, form the Natura 2000 network. The protection under the Birds Directive applies also to migratory and overwintering bird species.

The EIA Directive

The EIA Directive sets out a process by which the significant effects of a proposed project can be identified, described and assessed before a decision is made on whether to grant planning permission for a proposed project.

The Water Framework Directive

The Water Framework Directive is a key piece of EU legislation aimed at protecting and enhancing the quality of water resources across Europe. It establishes a comprehensive framework for the management of inland surface waters, transitional waters (such as estuaries), coastal waters (out to 1 nautical mile, and groundwater. The Directive's primary goal is to achieve 'good status' for all water bodies be preventing pollution, promoting sustainable water use, and protecting ecosystems.

The Marine Strategy Framework Directive

The Marine Strategy Framework Directive is a vital European regulation aimed at achieving and maintaining Good Environmental Status[4] of the EU's marine waters, which includes the coastal waters covered by the Water Framework Directive and extends out to include the waters of the Exclusive Economic Zone[5], including also the seabed and subsoil.

4 Good Environmental Status (GES) refers to the condition in which marine waters are ecologically healthy, resilient, and sustainably used.
5 EEZ (Exclusive Economic Zone) is the area of sea extending up to 200 nautical miles from a country's coastline, where the country has special rights to explore, use, and manage marine resources, including fishing, energy production, and seabed mining.

2.3 European policy

Energy Roadmap 2050

In 2011, the European Commission published the *Energy Roadmap 2050*, which served as a comprehensive strategy to guide Europe towards a sustainable and resilient energy future. Central to this vision was a shift away from fossil fuels towards renewable energy sources such as wind, solar, and hydroelectric power.

2030 Framework for Climate and Energy Policies

In 2014 the European Commission presented *'A 2030 Framework for Climate and Energy Policies*' which set out that a new target of a 40% emissions reduction below the 1990 level would be met through domestic measures alone. An EU-wide binding target for renewable energy of at least 27% of energy consumption by 2030 was introduced which would be enforced through a new governance system based on national energy plans. This was subsequently updated in 2018, forming the basis of the EU Energy Governance Regulation.

European Green Deal and Industrial Plan

In 2019, the *European Green Deal* was established, to enshrine Europe's commitment to achieving climate neutrality by 2050, and to set out a plan for reducing Europe's greenhouse gas emissions by 55% by 2030 compared to 1990 levels. This was later supplemented by the European Green Deal Industrial Plan (2023), which has led to several important initiatives in support of jobs, economic growth and sustainable development, including the Net Zero Industry Act, 2024.

Blue Economy Policy

The 2021 'Blue Economy' policy document also emphasises that how the blue economy can contribute to carbon neutrality by developing offshore renewable energy and by greening maritime transport and ports.

EU Strategy For Offshore Renewable Energy

In 2020, the European Commission unveiled the EU Strategy for Offshore Renewable Energy, a strategy to significantly boost offshore renewable energy production, aiming to make it a key component of Europe's energy system by 2050. The strategy seeks to increase offshore renewable electricity generation from 12 GW to over 60 GW by 2030 and 300 GW by 2050.

EU Fit for 55 Package

In 2021, the European Commission published the EU Fit for 55 Package, with the aim of reducing EU greenhouse gas emissions by at least 55% by 2030 compared to 1990 levels and making the EU carbon-neutral by 2050.

RePower EU Initiative

In 2022, the European Commission published RePower EU, with the aim of accelerating the transition to renewable energy while bolstering domestic energy production capabilities.

European Wind Power Action Plan

As the most recent climate relevant publication as of 2024, the European Wind Power Action Plan, published in October 2023, outlines a strategy to ensure a sustainable and competitive wind supply chain across the EU. It focuses on six key areas; accelerating deployment, improving auction designs, enhancing access to finance, ensuring fair international trade practices, developing skills, and encouraging industry engagement. The accompanying Wind Energy Charter, signed by Ireland and other member states, further reinforces commitments to meet EU renewable energy targets, including improving permitting processes, scaling up wind energy manufacturing, and delivering on post-2030 offshore wind energy targets. Ireland's commitment to the charter supports the development of projects such as Dublin Array, contributing to European decarbonisation efforts and enhancing the national grid with up to 824 MW of renewable energy.

EU Biodiversity Strategy

In relation to biodiversity, the relevant policy is set out in the EU Biodiversity Strategy 'Bringing Nature back into our lives', adopted on 20th May 2020. It recognises that 'Decarbonising the energy system is critical for climate neutrality, as well as for the EU's recovery from the COVID-19 crisis and long-term prosperity. More sustainably sourced renewable energy will be essential to fight climate change and biodiversity loss. The EU will prioritise solutions such as ocean energy, offshore wind, which also allows for fish stock regeneration, solar-panel farms that provide biodiversity-friendly soil cover, and sustainable bioenergy.

2.4 National legislation

The principal pieces of national legislation under which this planning application is being submitted to An Bord Pleanála are the Planning and Development Act 2000 as amended, the Planning and Development Regulations 2001 as amended and the Maritime Development Regulations 2023. Together, these provisions govern how the planning application is to be submitted and decided by An Bord Pleanála. Also relevant are the Maritime Area Planning Act 2021 as amended, the European Communities (Birds and Natural Habitats) Regulations 2011 (2011 Regulations) and the Wildlife Acts 1976-2023 (Wildlife Acts).

Planning and Development Act 2000

The Planning and Development Act 2000 is the key piece of legislation under which the planning application is being submitted to An Bord Pleanála. This Act, together with the Planning and Development Regulations 2001 as amended and the Planning and Development (Maritime Development) Regulations 2023, establish the decision making framework that applies, from submission of the application by the Applicant to consideration and determination by An Bord Pleanála.

Maritime Area Planning Act 2021

The Maritime Area Planning Act regulates the maritime area by means of a National Marine Planning Framework, marine planning policy statement and the granting of maritime area consents for the occupation of the maritime area for the purposes of prescribed maritime usages. Dublin Array has received three maritime area consents from the Maritime Area Regulatory Authority, who is the regulatory authority established under the Maritime Area Planning Act, which permit the occupation of the relevant areas for the purpose of the proposed development, as set out earlier in this document.

European Communities (Birds and Natural Habitats Regulations 2011 Wildlife Acts 1976-2023

The Wildlife Acts comprise the principal national legislation providing for the protection of wildlife and the control of some activities that may adversely affect wildlife, while the 2011 Regulations transpose the Habitats and Birds Directives into Irish law, in parallel with other legislative provisions. Volume 2, Chapter 2, 'Consents, Legislation and Policy', should be consulted for the full list of relevant legislation.

Climate Action and Low Carbon Development Act 2015 as amended

In relation to climate, the key piece of legislation is the Climate Action and Low Carbon Development Act 2015, which was substantially amended in 2021, giving it considerable weight and creating accountability on the part of public bodies to ensure that their functions are performed in accordance with the climate plans and strategies created under the Act. The Act established for the first time in 2015 a national objective of transitioning to a low carbon, climate resilient and environmentally sustainable economy by 2050. While the EU Effort Sharing Regulation requires a 42% reduction of emissions compared to 2005 levels by 2030, the Climate Action and Low Carbon Development Act 2015, as amended, has specified 2018 as the base year from which a 51% emission reduction is to be achieved by 2030.

Climate Action Plans and Strategies

Another key feature of the Act is the placing of Climate Action Plans on a legally enforceable footing. The Climate Action Plan 2024 is discussed below. Section 15 of the Climate Action and Low Carbon Development Act 2015, as amended, requires public bodies, including An Bord Pleanála, to perform their functions in a manner that is consistent with the latest approved Climate Action Plan, national long-term climate action strategy, national adaptation framework and approved sectoral adaptation plans, the furtherance of the national climate objective and the objective of mitigating greenhouse gas emissions and adapting to the effects of climate change in the State, insofar as is practicable. This constitutes an obligation on public authorities, including An Bord Pleanála, to act consistently with the climate plans and strategies and objectives specified in Section 15 insofar as is practicable, within the parameters of the law. This would involve favouring the grant of permission for a renewable energy project which goes towards achieving the objectives of the most recent approved Climate Action Plan, where this is permitted by law.

2.5 National and local policy

National Planning Framework

The National Planning Framework was published by the Government in February 2018. The National Planning Framework is a 20-year planning framework designed to guide public and private investment, to create and promote opportunities for Irish citizens, and to protect and enhance Ireland's built and natural environment. The National Planning Framework contains several National Strategic Outcomes over various topics. National Strategic Outcome 8 emphasises the importance of transitioning to a low carbon and climate-resilient economy, of relevance to Dublin Array. By aligning with National Strategic Outcome 8, offshore wind farms contribute to Ireland's goals for sustainable economic growth and environmental protection. The National Planning Framework also recognises that Ireland's territorial waters present significant opportunities in the offshore renewable energy sector, and its development is dependent on enabling infrastructure. The National Planning Framework outlines that a shift to predominately renewable energy is required to transition to a low carbon economy, and this is an integral part of Ireland's climate change strategy. Additionally, a series of National Policy Objectives provide context for regional and local planning policies in Ireland. This transition to a low carbon economy is supported through these. At the time of submission of this document to An Bord Pleanála, the draft first revision of the National Planning Framework is awaiting finalisation and subsequent publication.

National Development Plan 2021-2030

National Development Plan 2021-2030, published in October 2021, sets out the next decade of investment priorities that underpin the implementation and continuous objectives of the National Planning Framework. The National Development Plan outlines a number of key energy initiatives, that set out to diversify the nation's energy resources, and to assist in the transition towards a decarbonised society. The National Development Plan further emphasises National Strategic Outcome 8: Transition to a Climate-Neutral and Climate-Resilient Society, noting that: *'The target of delivering up to 80 per cent of Ireland's electricity from a combination of onshore and offshore renewable sources by 2030 will play a central role, not only in reducing emissions in the electricity sector itself, but in enabling emissions reductions in the transport sector through electrification of vehicles and in our homes, industry, and public and commercial buildings through electrification of heat.'* The National Development Plan also established the new Renewable Electricity Support Scheme to support up to 2.5 GW grid scale solar, 8 GW of onshore wind and 5 GW of additional offshore renewable electricity generation by 2030.

Offshore Renewable Electricity Support Scheme

Ireland's first Offshore Renewable Electricity Support Scheme, specifically focused on offshore renewable energy projects which were sufficiently well advanced to potentially deliver new installed generating capacity towards Ireland's 2030 renewable electricity targets. It provides conditional financial support for offshore projects that secure development permission from An Bord Pleanála and that deliver against pre-determined performance milestones. Dublin Array is the second largest of four offshore wind projects that succeeded in securing conditional financial support under the scheme.

Regional Spatial and Economic Strategy for the Eastern and Midland Region

The Regional Spatial and Economic Strategy for the Eastern and Midland Region came into effect on 28th June 2019. It sets out a strategy to implement the National Planning Framework at a regional level for the Eastern and Midland Region. The strategy recognises the urgency to transition to a low carbon future, accelerate the transition towards a low carbon economy and increase the use of renewable energy sources across the key sectors of electricity supply, heating, transport and agriculture in order to safeguard and enhance the region's environment through sustainable development, prioritising action on climate change across the region and driving the transition to a low carbon and climate resilient society.

National Marine Planning Framework

In relation to marine policy, the key document is the National Marine Planning Framework, which was published on 30th June 2021. It enables the Government to *'set a clear direction for managing our seas, to clarify objectives and priorities, and to direct decision makers, users and stakeholders towards more strategic and efficient use of marine resources. It informs decisions about the current and future development of the marine area, aiming to integrate needs.'* The framework contains a vision, objectives, and planning policies for all marine-based human activities.

Climate Action Plan 2024

In relation to climate policy, the Climate Action Plan 2024 was published in December 2023 and a final version was approved on 21st May 2024. It serves as a roadmap for implementing measures to cut Ireland's emissions by 50% by 2030, and ultimately attaining net-zero emissions by no later than 2050. According to the Sustainable Energy Authority of Ireland, Ireland's electricity emissions in the first half of 2023 were 16.7% lower than for the same period in 2022. In the first half of 2023, renewables accounted for 43% of electricity generated, an increase of 0.9 percentage points on the first half of the previous year. Despite these improvements, the plan identifies the immense challenge faced by the electricity sector in meeting demands for electricity from other sectors that must rapidly decarbonise, including transport, heating, and industry. The decarbonisation of these sectors relies to a significant degree on electrification. According to the Climate Action Plan 2024, the deployment rates of renewable energy and grid infrastructure required to meet the carbon budget programme for electricity is unprecedented and requires *'urgent action across all actors to align with the national targets.'* The plan identifies Ireland's ambition to deliver 80% of electricity demand with renewables by 2030. To deliver this, renewable energy and grid infrastructure, particularly, onshore wind, solar, and offshore wind resources must be deployed and scaled up at an unprecedented rate. At least 5 GW of offshore wind is targeted for 2030.

Offshore Renewable Energy Development Plan

Specifically in relation to offshore renewable energy policy, the first Offshore Renewable Energy Development Plan was published in 2014. This sets out a framework for the sustainable development of Ireland's offshore renewable energy resources. The plan was the subject of a strategic environmental assessment and prior to its adoption by Government. The Environmental Report for the strategic environmental assessment identified Dublin Array and other offshore renewable energy projects in the Irish Sea and off the west coast of Ireland that were proposed at that time. Offshore Renewable Energy Development Plan-II was drafted, following an interim review in 2018, which sets out Ireland's new spatial strategy for offshore renewable energy. Dublin Array is aligned with the objectives set out in both plans, both in terms of its contribution to renewable energy production and its adherence to sustainable development principles. The project's scale and location are consistent with the spatial assessments outlined in the plan, particularly regarding the Irish Sea's suitability for offshore wind development. As part of the strategic environmental assessment of the plan, the Irish Sea and its surrounding approaches were evaluated for their capacity to support offshore wind projects without causing significant adverse environmental effects. This assessment found that Dublin Array, crossing both northern and southern east coast assessment areas, fits within the strategic framework, with the region able to accommodate between 4,200 and 4,800 MW of offshore wind without adverse impacts on the environment or other marine users.

National Biodiversity Action Plan

In relation to biodiversity, Ireland's 4th National Biodiversity Action Plan 2023–2030 was adopted in 2023. As noted, under the Wildlife Amendment Act 2023, public authorities including An Bord Pleanála are required to have regard to it in the fulfilment of their statutory functions, including in decision-making under the Planning Act.

Local policies and plans

In addition, local policies play a crucial role in translating global, national, and regional climate and energy objectives into actionable measures at the community level. These policies provide the detailed frameworks necessary to ensure that developments, such as offshore wind farms, contribute positively to local sustainability, economic growth, and social well-being. For Dublin Array, several key documents guide and support the integration of offshore wind energy development into local planning and policy frameworks:

- Dún Laoghaire-Rathdown County Development Plan (DLRCDP) 2022–2028: This plan establishes a strategic vision for sustainable growth within the county, prioritising renewable energy projects that contribute to national climate goals while ensuring environmental protection and community benefits;

- Dún Laoghaire-Rathdown County Council Climate Action Plan 2024–2029: Focused on reducing carbon emissions and enhancing resilience to climate change, this plan underscores the importance of renewable energy as a key component of local climate action;

- Economic Plan for Dún Laoghaire Harbour 2021: This plan highlights the role of renewable energy projects in fostering economic development, enhancing the harbour's potential as a hub for green industry and innovation;

- Dún Laoghaire Town Spatial and Economic Study 2021: This study emphasises the integration of sustainable practices into urban and economic development, with offshore renewable energy seen as a driver for long-term sustainability; and

- Wicklow County Development Plan 2022–2028: Recognising the county's strategic coastal location, this plan supports offshore wind energy development as a means to align with Ireland's climate targets while fostering local economic and social benefits.

Together, these policies ensure that offshore wind farm projects are aligned with local objectives while contributing to broader climate and energy goals. They provide a comprehensive framework for sustainable development, encouraging the integration of renewable energy into the local economy, protecting natural and cultural heritage, and addressing the specific needs and aspirations of communities. This alignment strengthens the case for offshore wind energy as a key enabler of a sustainable and low-carbon future.

2.6 Guidance

The preparation of the EIAR follows the Environmental Protection Agency Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (2022) and the European Commission's Guidance on the Preparation of EIARs (2017). These guidelines together provide a comprehensive framework to ensure compliance with the EIA Directive, focusing on the responsibilities of developers to present thorough and accurate environmental information.

The guidelines highlight the importance of evaluating alternatives, avoiding significant adverse effects, implementing robust mitigation and monitoring measures, and ensuring transparency and public participation throughout the process. They also emphasise the need for objectivity and the provision of relevant, evidence-based information to support informed decision-making.

Where appropriate, relevant guidance from other jurisdictions has been considered in the preparation of this EIAR to incorporate the most up-to-date and effective practices. By integrating these considerations, the EIAR ensures a high standard of environmental assessment, aligned with both national and international expectations.

2.7 Alignment with legislative and policy frameworks

Dublin Array aligns with the EU's ambitious renewable energy targets and the objectives outlined in international, national, regional and local policy. In particular, Dublin Array will play a significant role in helping Ireland meet its 5 GW target and contribute to the overall goal of generating 80% of Ireland's electricity from renewable sources by 2030. By reducing the need for imported fossil fuels, this project will improve Ireland's energy security and help to decarbonise the country's power generation. Further, Dublin Array will strengthen the onshore electricity and grid infrastructure that exists in Ireland through its contribution to the national grid.

3 EIA Methodology

This section explains how the EIA has been undertaken for Dublin Array. The EIA process assesses the likely significant effects, and significant adverse effects, the project may have on the environment during its construction, operation, maintenance and eventual decommissioning. If any significant adverse environmental effects are identified, the EIAR proposes a range of mitigation measures (i.e. actions) to avoid, prevent and/or reduce as much as possible those effects. For a more detailed explanation of the process used in the EIA, see Volume 2, Chapter 3 of the EIAR.

3.1 EIA legislation and guidance

The EIAR has been prepared in accordance with Council Directive 2011/92/EU, as amended by Directive 2014/52/EU, known as the EIA Directive, and the relevant Irish transposing legislation, namely the Planning and Development Act 2000, as amended, and the Planning and Development Regulations 2001, as amended. This legislation requires that any project with the potential for significant environmental effects, whether they are public or private, undergo an EIA before receiving development approval.

Certain types of developments in Ireland are mandated to complete an EIA, as specified in Schedule 5 of the Planning and Development Regulations, which lists the development classes and their thresholds. For Dublin Array, the relevant classification is Part 2, Class 3 (Energy Projects). This classification requires an EIA for wind farms that have more than five turbines or exceed a total output of 5 MW. Given that Dublin Array includes more than five turbines and has a total capacity above 5 MW, an EIA is required to be carried out by the competent authority deciding the planning application, which in this case is An Bord Pleanála. Accordingly, the Applicant has submitted this EIAR with the planning application.

The EIAR is prepared in accordance with guidance from both the EPA and the European Commission, ensuring compliance with Irish environmental laws and best practices. An Bord Pleanála will take the EIAR into account in determining whether to grant permission for the proposed project.

3.2 Structure of the EIAR

The EIAR is structured in eight volumes, as follows:

- Volume 1 – Non-Technical Summary (this document);
- Volume 2 – Contains the introductory chapters to the EIAR, including the introduction, consents, policy and legislation, EIA methodology, cumulative impacts assessment methodology, consideration of alternatives, and project description;
- Volume 3 – Contains the offshore infrastructure assessment chapters, which assesses potential impacts of project infrastructure in the marine environment (seaward of (below) the high-water mark);

- Volume 4 – Contains the offshore infrastructure technical appendices, including baseline studies, modelling reports, and supporting documents;
- Volume 5 – Contains the onshore infrastructure assessment chapters, which assesses potential impacts of project infrastructure in the terrestrial environment (landward of (above) the high-water mark);
- Volume 6 – Contains the onshore technical appendices, including baseline studies, modelling reports, and supporting documents;
- Volume 7 – Contains the outline plans that support the planning application; and
- Volume 8 – Contains the interactions of the environmental factors, which discusses how the various impacts identified throughout the EIAR (such as ecological, social, economic, and cultural impacts) interact with one another. This volume also contains a concise summary of the main findings of the EIAR.

3.3 Approach to EIA

The EIA process is a systematic method for identifying and evaluating the potential impacts—both beneficial and adverse—of Dublin Array across all phases, including construction, operation and maintenance, and decommissioning. Each topic assessed forms a separate chapter within the EIAR, ensuring that interconnections among different environmental factors are clearly identified.

Each chapter encompasses the following key elements:

- Policy and statutory context: A review of relevant regulations and guidelines that frame the assessment process;
- Consultation responses: Documentation of stakeholder engagement and feedback specific to each topic to date;
- Scope and methodology: A detailed outline of the methods used for the assessment, based on established best practices and the EIA Directive;
- Description of the existing environment: An overview of the current environmental conditions relevant to the assessment topic;
- Key parameters for assessment: A definition of the project parameters that have been assessed in the EIA;
- Project design features and avoidance and preventative measures: A discussion of avoidant and preventative mitigation measures that were identified throughout design iteration and incorporated into the design to avoid and prevent likely significant effects;

- Assessment of potential environmental effects: An evaluation of anticipated effects related to each topic, including their likelihood, extent, magnitude, duration, and significance;
- Residual impacts: Identification of any remaining impacts after considering project design features, and avoidance and preventative measures;
- Cumulative, transboundary, and inter-related effects: An examination of how the proposed development may interact with other existing or planned projects, as well as the potential for transboundary impacts; and
- Further mitigation and monitoring requirements: Recommendations for any additional mitigation measures that may be needed to manage adverse effects.

Existing environment

In an EIAR, the description of the existing environment provides a clear picture of the current conditions at the project site and its surrounding area. This baseline information provides a clear description of the existing environment and acts as the foundation for assessing how Dublin Array might affect the environment.

To develop this description, various sources of information were used, including:

- Site-specific data – This includes direct observations and measurements taken from the defined study area, such as the types of plants and animals present, soil quality, water sources, air quality, and noise levels. This data gives a detailed overview of the local environment.
- Similar studies – Information from other projects or studies in nearby areas that have similar characteristics also contributes to understanding the existing environment.

The existing environment not only informs the identification of likely significant effects of the project but also establishes benchmarks for assessing the potential changes resulting from the development. By providing a clear and accurate depiction of the current state of the environment, this description enables stakeholders, regulators, and decision-makers to understand the potential impacts and the necessity of any proposed mitigation measures.

Key project parameters and design flexibility

Section 5 Project Description; provides an overview of the project components, including information on the site, design, size and other relevant features essential for the environmental assessment. It outlines the design parameters and construction requirements, such as working areas, working hours, construction methods, material management, traffic, vessel numbers, and environmental controls.

In relation to onshore infrastructure, key design parameters have been defined in the project description, representing different a) construction methodologies and b) geographic footprints that may be adopted by the project. For the environmental assessment, the design parameters that could have the greatest adverse effect are listed and explained in each onshore technical topic chapter and assessed. Since the design parameters that could have the greatest adverse effect are assessed we can be confident that any of the alternative construction methodologies or geographic footprints identified in the project description chapter, if utilised, will not give rise to greater effects than what are assessed in this report.

In relation to the offshore infrastructure, the Applicant has obtained an Opinion on Flexibility from An Bord Pleanála, confirming that the planning application may be made and decided before the Applicant has confirmed certain details of the proposed development. The unconfirmed details in this planning application are summarised below:

- The size, and number of turbines;
- The size of the offshore substation;
- The layout of the turbines;
- The type and size of foundations for the turbines and substation, including protection methods; and
- The length and layout of the offshore cables.

To ensure a robust, coherent, and transparent assessment of the proposed Dublin Array project, which takes into account this flexibility, the Applicant has identified and defined a Maximum Design Option (MDO) and Alternative Design Option(s) (ADO), relevant to each effect, for the purpose of assessing against.

- The MDO represents the design/combination of details which will give rise to the greatest magnitude of effect. The MDO is chosen, having regard to the effect in question. For example, the greatest noise effect may be generated by design option A, whereas the greatest effect associated with habitat loss may be generated by design option B. Hence, the MDO may be different depending on the effect/topic in question. Importantly, the MDO always represents the design/combination of details which will give rise to the greatest magnitude of effect.
- The ADO represents the design/combination of details which will give rise to the lowest magnitude of effect.

For completeness, the MDO and ADO also represent the confirmed project details, in respect of which flexibility is not being sought, so that the full project is assessed in the EIAR, SISAA and NIS (this being inclusive of the flexibility elements, and the confirmed elements).

Identification and assessment of impacts

Dublin Array has the potential to generate a variety of impacts and effects on the environment. According to the EPA (2022) Guidelines[6], an impact is defined as a change brought about by an action, such as the construction activity of laying underground cables, which may lead to increased soil disturbance (impact). These impacts can be classified as direct, indirect, secondary, cumulative, and interactive, and can be positive, neutral, or negative.

An effect describes the consequences of an impact, as outlined by the EPA (2022). For instance, if the laying of underground cables results in soil disturbance (impact), this could lead to potential erosion or habitat disruption for local wildlife (effect).

In this EIAR, each assessed impact is assigned a magnitude, which considers the spatial extent, duration, frequency, and reversibility of the impact stemming from the various phases of Dublin Array. Sensitivity refers to the potential of a receptor (e.g. species, ecosystems, or communities) to be significantly affected, taking into account its vulnerability, recoverability, and value as specified in the EPA (2022) Guidelines.

The overall significance of an effect is determined by correlating the magnitude of the impact with the sensitivity of the receptor. A matrix approach is commonly used to guide these topic-specific assessments. By cross-referencing the magnitude of impact with the sensitivity of the receptor, a significance of effect can be assigned for all impacts. The significance ratings, as outlined in the EPA (2022) Guidelines, range from imperceptible to major or profound. Generally, for the purposes of this EIAR, a significance of effect rated as moderate or greater is considered significant in EIA terms. The definitions for each significance level are established by the topic specialist, and while the EPA Guidelines provide useful classifications, more specific definitions may apply to certain topics and have been detailed in their respective chapter.

Mitigation

The EIA has identified measures to avoid, prevent and/or reduce potential impacts from the proposed development. Many of these measures were integrated into the project design, following best practices and standard protocols, and are referred to as project design features in the EIAR. These features of the Dublin Array project were selected as part of the iterative design process, which are demonstrated to avoid and prevent significant adverse effects on the environment.

During the early development phase of the project, additional avoidance and preventative measures were identified to further avoid and prevent likely significant effects, going beyond the project design features. These measures have been included as integral parts of the project, referenced in the project description, and are part of the development for which consent is being sought. They differ from the design features and are outlined in the suite of management plans.

6 EPA (2022). Guidelines on the information to be contained in Environmental Impact Assessment Reports (EIAR). Environmental Protection Agency.

If further impact reduction was needed following the assessment, additional mitigation measures were proposed. These measures address significant impacts identified during the EIA process and aim to reduce or avoid remaining significant adverse effects.

Transboundary effects

Considering transboundary effects is an important part of the EIA process. The Espoo Convention, established by the United Nations in 1991, requires that if a planned project could harm the environment in another country, it must be assessed beyond national borders.

The EIA Directive also states that projects in one country that might significantly affect the environment of another country need to be evaluated. The EPA Guidelines (2022) emphasise the need for communication with relevant authorities in other countries if significant transboundary effects are likely.

There was engagement with the relevant consultees in Northern Ireland, Great Britain (including Scotland, England, and Wales), and the Isle of Man to identify any potential cross-border impacts.

Each assessment in Volumes 3 and 5 of the EIAR includes a section on 'Transboundary Effects' however none were identified.

Cumulative effects

Cumulative effects are described in the EPA (2022) Guidelines as the combined impact of many minor or significant effects, including those from other plans or projects, which can lead to larger, more significant outcomes.

A cumulative effects assessment was undertaken for all topics, which examined how the likely impacts of Dublin Array may interact with the effects of other nearby developments, using publicly available information. These interactions can happen at any stage of the project—whether during construction, operation and maintenance, or decommissioning.

The projects considered in the cumulative assessment are discussed in the relevant chapters in Volumes 3 and 5 of the EIAR under the section titled 'Cumulative Effects Assessment'.

Consideration was also given to how different environmental effects from Dublin Array might interact with each other, such as how increased noise levels from construction activities could affect local bird populations, throughout the individual environmental topic chapters in the EIAR.

4 Consideration of Alternatives

As required by the EIA Directive, the EIAR must outline the site selection and consideration of alternatives considered by the Applicant to determine the most appropriate location and design for the Dublin Array Offshore Wind Farm project. The consideration of alternatives is an important step in determining and, where possible, avoiding the effects of a project on the environment through spatial and technical adjustments. As detailed in EIAR Chapter 5: Consideration of Alternatives, 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. The following sections provide a summary of the main alternatives considered for Dublin Array.

4.1 Do nothing alternative

The 'do nothing' scenario involves not building Dublin Array. While this would prevent immediate environmental impacts, it would also forgo significant economic and environmental benefits, such as job creation, enhanced energy security, and a reduction in reliance on energy arising from fossil fuels. As a key Phase 1 project not progressing with Dublin Array would seriously undermine the delivery of a key climate action target in the government's Climate Action Plan.

4.2 Initial wind farm site selection

The initial site selection process for Dublin Array involved a comprehensive evaluation of several critical factors to ensure the project's feasibility and minimal environmental impact. One of the primary considerations was the water depth and metocean conditions of the Irish Sea. The relatively shallow waters and favourable conditions in this area made it an ideal location for offshore wind development, as these factors facilitate easier installation and maintenance of wind turbines.

Another crucial factor was wind capacity. The Irish Sea is known for its high wind speeds, which indicated significant potential for energy generation. This made the area particularly attractive for the development of a wind farm, as higher wind speeds translate to greater energy output and efficiency.

Sites and locations which are legally protection for ecological conservation were also carefully considered during the site selection process.

Shipping and navigation routes were another important consideration. The chosen site was selected to minimise interference with major shipping routes, ensuring the safety of both the wind farm and maritime traffic.

Finally, the proximity to the electricity grid was an important factor in the site selection process. The east coast of Ireland has well-developed electricity grid infrastructure, making it a suitable choice for connecting the wind farm to the national electricity network. This proximity reduces transmission losses and infrastructure costs, enhancing the overall efficiency and economic viability of the project.

4.3 Alternative sites considered

During the site selection process for Dublin Array, several potential locations were evaluated to determine the most suitable site for development. These locations included Codling Bank, India Bank, Arklow Bank, Blackwater Bank, and Kish and Bray Banks. Each site was assessed based on various criteria, including water depth, wind capacity, environmental impact, and proximity to the grid and major demand centres.

Codling Bank is located approximately 13 km east of Greystones and Wicklow Head. While the wind speeds at Codling Bank were favourable, the wave and tidal conditions were considered challenging for construction, operation, and maintenance.

India Bank, situated approximately 10 km off the Wicklow Coast and 7.5 km south of Codling Bank, is smaller in size; the limited developable area and shallow water depth made it economically unviable for a large-scale offshore wind project.

Arklow Bank is situated 13 km east of Arklow and spans about 27 km in a north-south direction. It was considered a suitable location due to its high wind speeds and large area for development. However, 7 turbines had already been constructed on this site, with plans for a second phase of development underway.

Blackwater Bank, located about 5 km east of the Wexford Coast, extends for approximately 17 km in a north-south direction. Although the site had favourable wind speeds and water depths, its distance from major electricity demand centres and suitable electricity grid infrastructure made it less attractive compared to other options.

Kish and Bray Banks were ultimately selected as the preferred site for Dublin Array. These banks extend approximately 18 km in a north-south direction and are located about 10 km from the coast of Dublin. The proximity to Dublin, a major demand centre, and the existing grid infrastructure made this site highly favourable. Additionally, the water depths and wind conditions at Kish and Bray Banks were ideal for offshore wind development. The site also avoided significant shipping routes and designated environmental areas, further supporting its selection.

4.4 Alternative wind farm designs

Alternative wind turbine models

The project team explored different wind turbine models and layouts to maximise wind energy generation while minimising environmental impacts. Market research provided insight into the models expected to be available at the time of construction.

Three rotor diameter options (236 m, 250 m, and 278 m) were identified as potential candidates for Dublin Array. Each rotor diameter option has its own set of benefits and challenges. For example, larger rotor diameters (278 m option) can generate more energy per turbine, reducing the total number of turbines needed. This can minimise the overall footprint of the wind farm and potentially lower environmental impacts. Conversely, smaller rotor diameters (236 m option) might require more turbines to achieve the same energy output but may offer greater flexibility in layout and potentially lower visual impact. The final decision on which specific model to use will be made closer to the construction phase, allowing the project team to select the most efficient and technologically advanced model available at that time. The environmental impact assessment report considers all options.

Blade tip clearance

Blade tip clearance is the distance between the lowest point of the turbine blade and the sea surface. This clearance is important for safety and environmental reasons. The alternatives assessment calculated that a minimum clearance of 22.5 m LAT[7] was needed to ensure safe operations. Guidelines from the UK Maritime and Coastguard Agency were also considered, which recommend a minimum clearance of 26.6 m LAT. To minimise the risks to birds, the clearance was increased to 31.6 m LAT.

Alternative numbers of turbines

The number of turbines required for Dublin Array is directly influenced by the rotor diameter and corresponding power output. Larger rotor diameters typically mean higher generating capacity, which results in fewer turbines being needed to meet the required electricity generating capacity. Additionally, the potential level of bird and bat mortality is affected by the rotor diameter, blade tip clearance, and the number and alignment of turbines. Generally, larger rotor diameters with fewer turbines result in lower impacts to birds and bats.

The spacing between turbines was also considered to minimise wake effects, which are losses of energy capture due to the wind shadow of upwind turbines. Larger spacing between turbines also increases the overall energy yield of the wind farm and creates more space for fishing to occur within the wind farm.

The assessment concluded the following number of wind turbines for each rotor diameter option:

- 236 m: 50 turbines;
- 250 m: 45 turbines; and
- 278 m: 39 turbines.

7 LAT (Lowest Astronomical Tide) is the lowest tide level that can be predicted under average meteorological conditions and is used as a reference for charting water depths and elevations in coastal and marine environments.

Array layout options

The assessment of array layout options for Dublin Array involved several key considerations. Firstly, the layout had to maintain acceptable separation distances between turbines to ensure safe search and rescue operations, with search and rescue corridors of at least 500 m in width to minimise risks to search and rescue resources. Environmental constraints were also critical, with layout options informed by geophysical, geotechnical, and environmental survey data to position the turbines and the offshore substation platform in a way that avoided known and suspected archaeological features and associated exclusion zones. Additionally, the site bathymetry influenced the selection and operation of installation vessels, with foundation locations chosen within water depths ranging from 13 – 40 m LAT to ensure optimal installation and operation. The assessment identified a layout for each of the three turbine rotor diameter options.

Offshore substation platform

Initially, the installation of up to three Offshore Substation Platforms was considered to manage the energy transmission from the turbines to the grid. This approach was based on the need to step up the power voltage for efficient transmission. However, the design was later optimised to a single platform to reduce environmental impact and construction complexity. This decision was influenced by several factors, including the efficiencies gained in design, such as eliminating the need for multiple sets of common equipment, which also reduced the seabed footprint. Additionally, the single platform solution presented savings in the use of raw materials and a shorter fabrication and installation programme compared to multiple platforms. This optimisation will not only simplify the construction process but will also minimise the potential environmental impacts, particularly on seabed disturbance, seascape, landscape, and visual impact. The single Offshore Substation Platform is proposed to be located on the western side of the Bray Bank, approximately 13 km offshore at a water depth of about 19 m LAT.

4.5 Alternative electricity transmission grid connection locations

Connecting a wind farm to the national electricity grid is a strictly controlled process managed by EirGrid[8]. The wind farm can only be connected where EirGrid consider it to be appropriate. Four potential connection points on the grid were considered, including Carrickmines, Poolbeg, Belcamp, and Ballybeg. Carrickmines was ultimately selected as the optimal connection point due to its superior technical feasibility, economic performance, and minimal environmental impact.

[8] The Transmission System Operator (TSO) for Ireland, responsible for planning, managing, and developing Ireland's high-voltage electricity grid.

Poolbeg was considered the second-best option, with available grid capacity but significant risks were identified due to the lack of available land for an Onshore Substation. The potential environmental impacts were considered to be higher at Poolbeg due to the presence of a number of ecological sensitive sites surrounding the Poolbeg and its adjacent coastal waters.

Belcamp was less favourable compared to Carrickmines and Poolbeg. The long offshore route and the high number of sensitive ecological sites along the route made Belcamp less technically feasible. Economically, Belcamp was the worst-performing option due to the long offshore cable route which would be required.

Ballybeg was the least favourable option. The distance from the major electricity demand centre of Dublin and the limited capacity of the existing 220 kV network made Ballybeg the least technically feasible option. The site also required extensive reinforcements to increase capacity. Economically, Ballybeg performed poorly due to the long offshore cable route which would be required and the need for significant infrastructure upgrades.

4.6 Alternative Landfall options and submarine export cable corridors

With the identification of Carrickmines as being the appropriate location to the connect Dublin Array to the electricity grid, the assessment of alternative Landfall options and submarine Export Cable Corridors narrowed down the Landfall options to a site at Shanganagh Cliffs. The selection process considered various factors, including the avoidance of rocky outcrops, large cliffs, and densely populated areas, as well as the feasibility of onshore routes to the grid connection point. Shanganagh Cliffs emerged as the most viable option due to its favourable conditions and accessibility.

To connect the offshore substation to the Landfall site at Shanganagh Cliffs, two cable corridor options were identified. These corridors were designed to minimise environmental impact and ensure efficient installation. The northern cable corridor spans approximately 13.6 km and traverses Frazer Bank, while the southern cable corridor spans approximately 13.9 km and crosses the nearshore bedrock platform before extending over a relatively featureless seafloor.

The final decision on which corridor to use will be made based on pre-construction verification surveys. These surveys will determine the optimal cable installation and protection strategy, prioritising the minimisation of seabed clearance and the avoidance of sensitive archaeological and environmental features. This approach ensures that the cable installation process is both environmentally responsible and technically feasible. Both options have been considered and assessed in full in the EIAR.

4.7 Alternative Onshore Substation options

The assessment of alternative Onshore Substation options considered four potential sites: Dún Laoghaire-Rathdown County Council Recycling Park, Glenamuck Road, Cherrywood, and Kiltiernan Quarry. The preferred location for the Onshore Substation is at the Recycling Park and former landfill, adjacent to Carrickmines retail park. This site was selected due to its suitable land-use zoning, good access options, and separation from residential areas. The proximity to the existing 220 kV substation at Carrickmines made it a technically viable option, ensuring efficient connection to the grid with minimal environmental impact.

Glenamuck Road was considered but ultimately not selected due to its proximity to residential developments and the potential for significant disruption during construction. The area is also planned for further residential development, which could increase the potential for conflicts with the substation's operation.

Cherrywood was evaluated but the site would need to be located within the Cherrywood Strategic Development Zone, which has specific land-use objectives which do not support the development of a large-scale high voltage substation.

Kiltiernan Quarry was considered but not selected due to its location within an area zoned for rural amenity and agriculture. The site's access route through Mine Hill Lane presented safety considerations, and the potential for high groundwater levels increased the complexity of construction.

4.8 Alternative onshore cable corridor options

Seven onshore cable route options were evaluated based on a comprehensive set of criteria, including technical feasibility, environmental impact, socio-economic factors, and economic viability. Each route was assessed to determine its potential advantages and disadvantages, with the goal of identifying the most balanced and sustainable option. Figure 3 shows the onshore cable route options that were considered.

- Route 1: This route was considered for its direct path and minimal length, which could reduce construction time and costs. However, it posed significant environmental challenges due to its proximity to protected natural areas;
- Route 2: Emerging as the preferred route, Route 2 offered a balanced approach with minimal environmental impact and high feasibility. It avoided sensitive ecological locations and had fewer socio-economic disruptions, making it a sustainable choice;
- Route 3: While technically feasible, Route 3 was less favourable due to its higher economic costs and potential socio-economic impacts on local communities. The route also intersected several high-density residential areas;

- Route 4: This option provided a moderate balance between environmental and socio-economic factors but faced technical challenges related to terrain and existing infrastructure;
- Route 5: Route 5 was less feasible due to significant technical difficulties and higher construction costs. It also required extensive rerouting around existing infrastructure;
- Route 6: This route was evaluated for its economic benefits, offering the lowest construction costs. However, it posed substantial environmental risks and socio-economic disruptions, making it a less viable option; and
- Route 7: Although Route 7 minimised socio-economic impacts, it was technically challenging and had a higher environmental footprint compared to other routes.

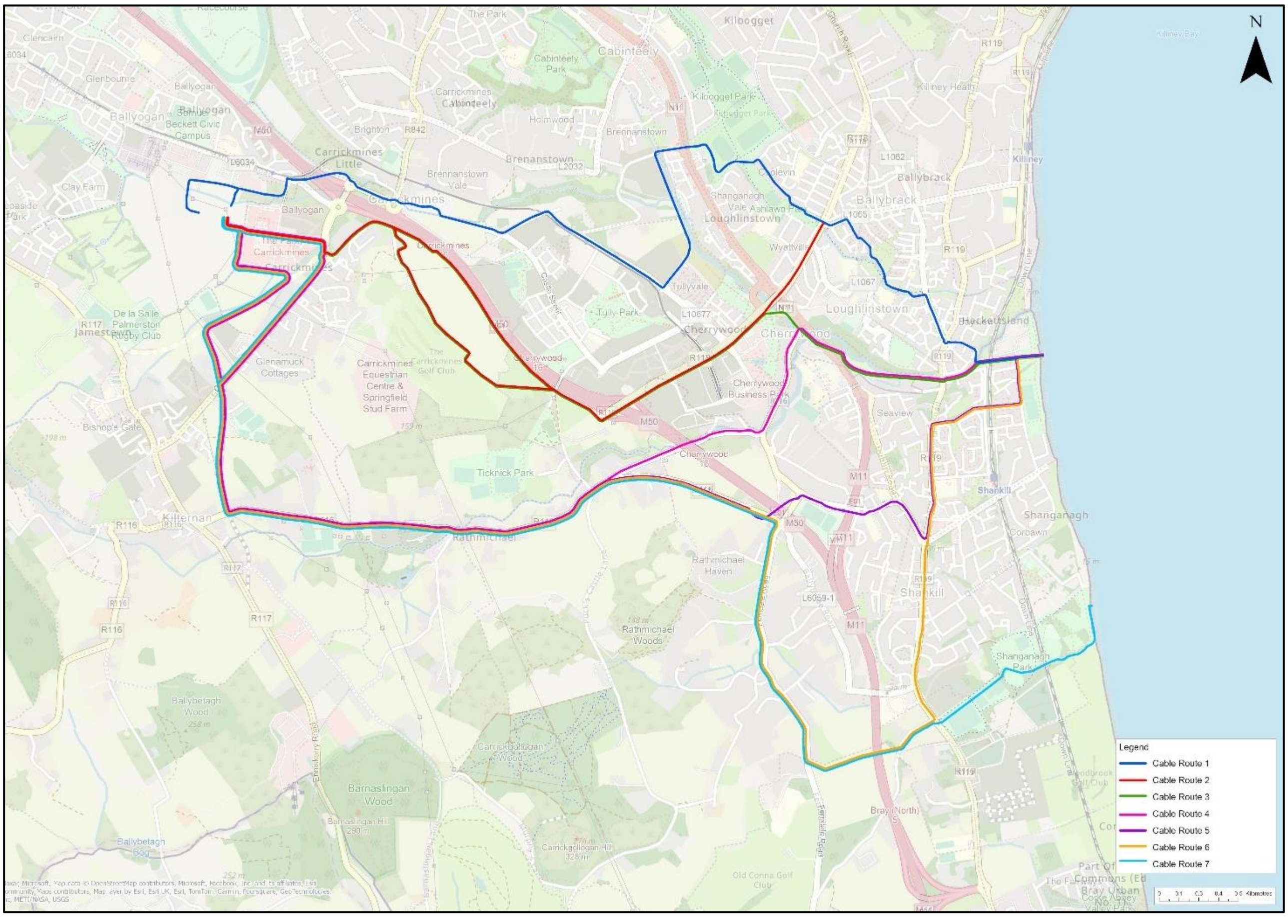


Figure 3 Onshore cable route options considered in the Route Selection Report

After thorough evaluation, Route 2 was identified as the emerging preferred route due to its optimal balance of environmental impact, technical feasibility, and reduced socio-economic disruptions.

4.9 Operations and maintenance base

Six potential locations for the Operations and Maintenance Base were assessed: Howth Harbour, Dublin Port, Dún Laoghaire Harbour, Bray Harbour, Greystones Harbour, and Wicklow Port.

The assessment of potential locations involved a detailed evaluation of each site's technical feasibility, environmental impact, socio-economic factors, and economic viability. Howth Harbour was considered due to its proximity to Dublin, but space limitations and environmental concerns posed significant disadvantages to this option.

Dublin Port in presented benefits from the availability of good infrastructure and accessibility but presented challenges arising from congestion and higher operational costs. Any potential site in this location would require significant quayside and potentially land-side engineering works. Dún Laoghaire Harbour emerged as the preferred option due to the availability of development options, its proximity to the wind farm, reducing fuel consumption (and therefore carbon footprint) and transit times. Bray Harbour lacked the necessary infrastructure and was more vulnerable to adverse weather conditions due to the orientation of the harbour and necessary infrastructural upgrades which would be required. Greystones Harbour was less accessible and had limited capacity for development. No suitable land-side or marine-side opportunities were identified at Wicklow Port.

Ultimately, Dún Laoghaire Harbour was selected as the most efficient and sustainable option, offering the best balance of proximity, infrastructure, and potential for future development.

5 Project Description

This section of the EIAR provides an overview of the offshore and onshore infrastructure for Dublin Array. The offshore infrastructure includes everything located in the sea, beyond the high-water mark. This consists of the wind turbines which convert wind energy into electricity. Each turbine is mounted on a foundation secured to the seabed. In addition to the turbines, there is an offshore substation platform, which collects the electricity generated by the turbines and prepares it for transmission to shore. The turbines and offshore substation are connected by inter-array cables, which link each turbine to the substation. This entire area, where the turbines and substation are located, is referred to as the 'Array Area'.

From the Array Area, the export cables are buried beneath the seabed to transport the electricity towards the shore, following a designated route known as the Export Cable Corridor. The Offshore Export Cable Corridor stretches from the Offshore Substation Platform to the Landfall point at Shanganagh, close to an existing wastewater treatment plant. At the Landfall Site, the export cables transition from the seabed to land to a Transition Joint Bay, where the offshore cables connect to the onshore export cables. The underground onshore cables are referred to as the Onshore Export Cable Route and ultimately connect to the Onshore Substation where the electricity is integrated into the national grid at Carrickmines 220kV substation. The onshore transmission infrastructure is referred to as the Onshore Electrical System.

To support the ongoing operation of Dublin Array, a permanent Operations and Maintenance Base will be located at Dún Laoghaire Harbour, ensuring the necessary facilities are in place to manage and maintain the offshore infrastructure.

5.1 Offshore infrastructure

The offshore wind industry is rapidly advancing, particularly in wind turbine technology and farm design. Choosing the right wind turbine is crucial, as it affects everything from foundation design to cable routing and operational plans. As the demand for larger and more efficient turbines grows, newer models may be available by the time Dublin Array is ready to select its turbines.

Due to the evolving nature of turbine technology, it is challenging to determine the best design for Dublin Array at the time of this assessment. To address this, the project team consulted with An Bord Pleanála and received permission to apply for development before finalising certain design details. As a result, the Applicant is seeking planning permission for three project design options with the agreement of An Bord Pleanála. These options include;

- The size and number of turbines;
- The size of the offshore substation;
- The layout of the turbines and offshore substation;
- The type and size of foundations for the turbines and substation; and

- The length and layout of the offshore cables.

This approach means the project can optimise its design based on future technological advancements and environmental considerations, while adapting to new developments as they arise within the strict options and parameters described in the planning application and the environmental impact assessment report.

Wind turbines

The proposed wind farm will consist of 39 to 50 turbines. Figure 5 illustrates the main components of a turbine. Each turbine will consist of a tower, nacelle[9], and three rotor blades, connected to the seabed by a foundation. The nacelle houses equipment that converts wind energy into electricity, with rotor blades designed to capture energy from the wind. The turbines will operate automatically within a wide range of wind speeds, self-starting at around 2 m/s and shutting down during storm conditions (approximately 35 m/s) to prevent damage.

Figure 4 Example of an operational offshore wind turbine

Each turbine will have safety markings and navigational aids, such as lighting and sound signals, in line with requirements from the Commissioners of Irish Lights and the Irish Aviation Authority. The turbines will be white, while their foundations will be painted yellow up to 15 m above the Highest Astronomical Tide for navigation visibility.

Three turbine models are being considered, with rotor diameters ranging from 236 m to 278 m. Larger rotors generate more power, allowing fewer turbines to meet the wind farm's energy output.

Technicians will access the turbines via external working platforms and internal entry points, with a boat landing system incorporated into the foundation design.

9 The nacelle is the housing at the top of a wind turbine tower that contains the main components of the turbine, including the gearbox, generator, and control electronics. It's like the 'engine room' of the wind turbine, where the mechanical energy from the spinning blades is converted into electrical energy.

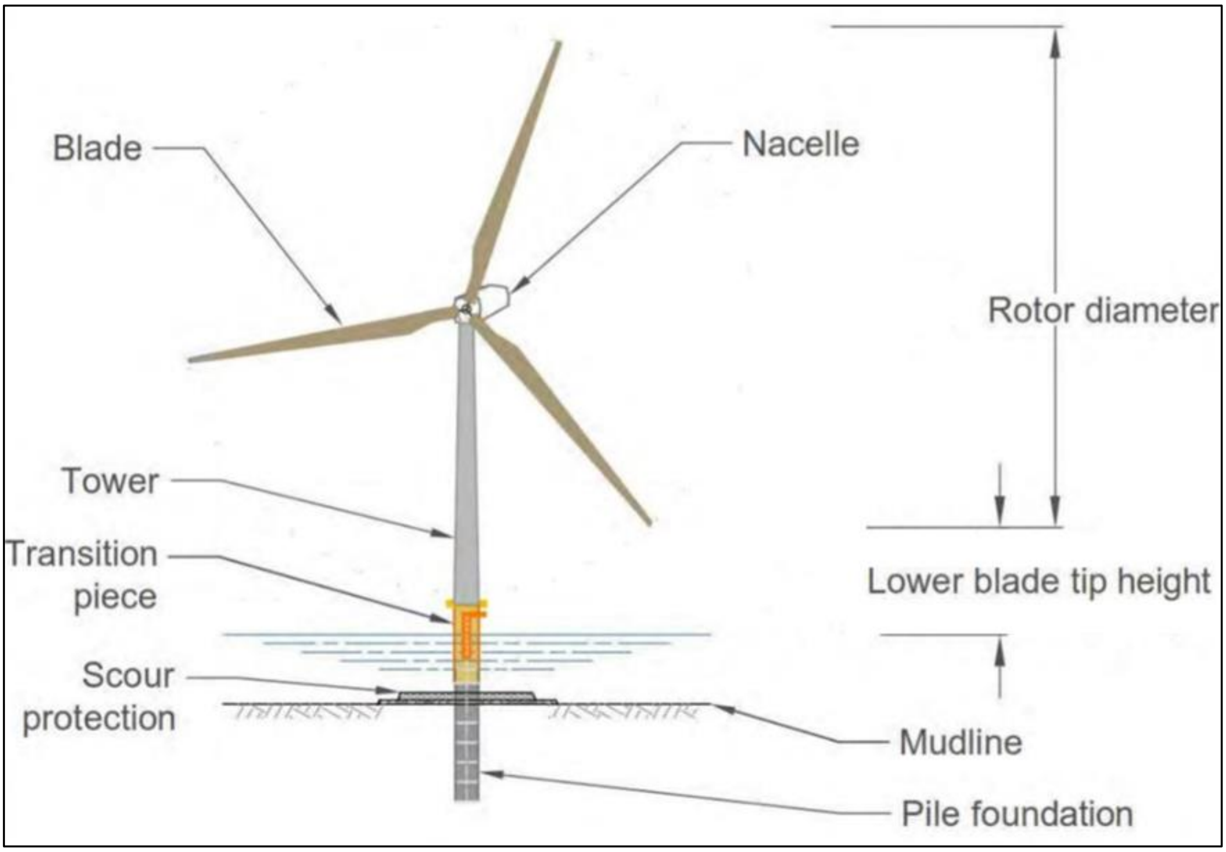
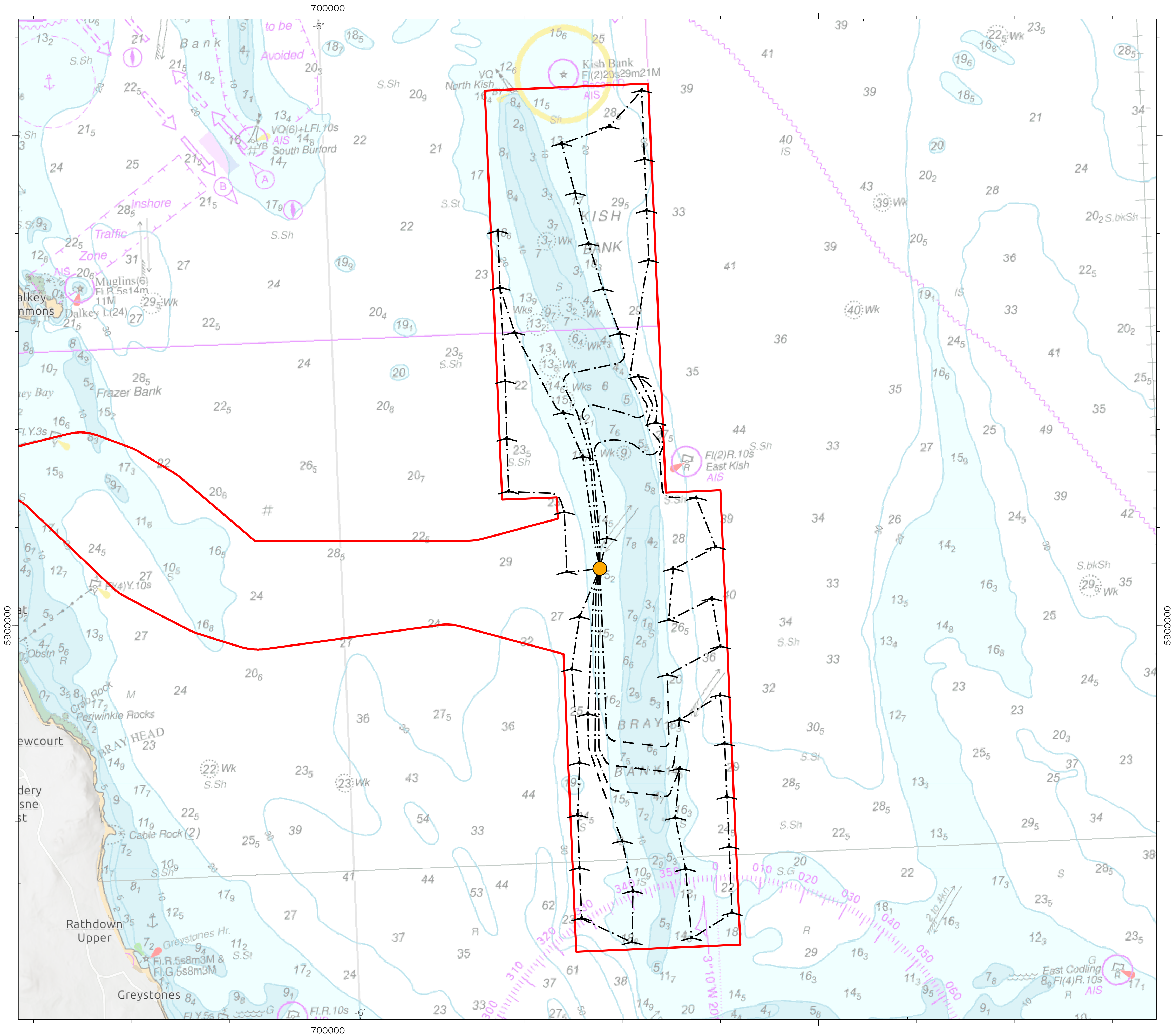


Figure 5 A typical offshore wind turbine generator mounted on a monopile foundation (*not to scale)

Layout

The layout of the turbines, offshore substation and connecting cables is influenced by several factors, including the seabed conditions, wind patterns, turbine size, marine archaeological and environmental considerations, and search and rescue routes. The spacing between turbines is determined by rotor size and the need to maintain clear search and rescue lanes, which prevents clustering in the wind farm. While the spacing may vary across the site, the minimum distance between turbines will be 944 m, except in cases where slight adjustments (micro-siting) are needed based on specific seabed conditions.

Three proposed layouts have been included in the planning application and EIAR, as shown in Figure 6 to Figure 8. There will be flexibility to move the turbines, up to 350 m to account for archaeological discoveries, ecological protection, or ground conditions during construction. Wide paths at least 500 m will be kept clear between the turbine blades to allow safe search and rescue operations from southwest to northeast through the Array Area.



Planning Application Boundary

Wind Turbine Generator (WTG)

Inter-array Cables (IAC)

Offshore Substation Platform (OSP)

DRAWING STATUS

PUBLIC

DISCLAIMER

MAP NOTES / DATA SOURCES:

PROJECT TITLE

Dublin Array

DRAWING TITLE

Site Layout Plans
Offshore Option A (236RD)

DRAWING NUMBER: **005532727-01** FIGURE NUMBER: **6**

VER	DATE	REMARKS	DRAW	CHEK	APRD
01	2025-01-10	Ready for release	DB	PM	PK

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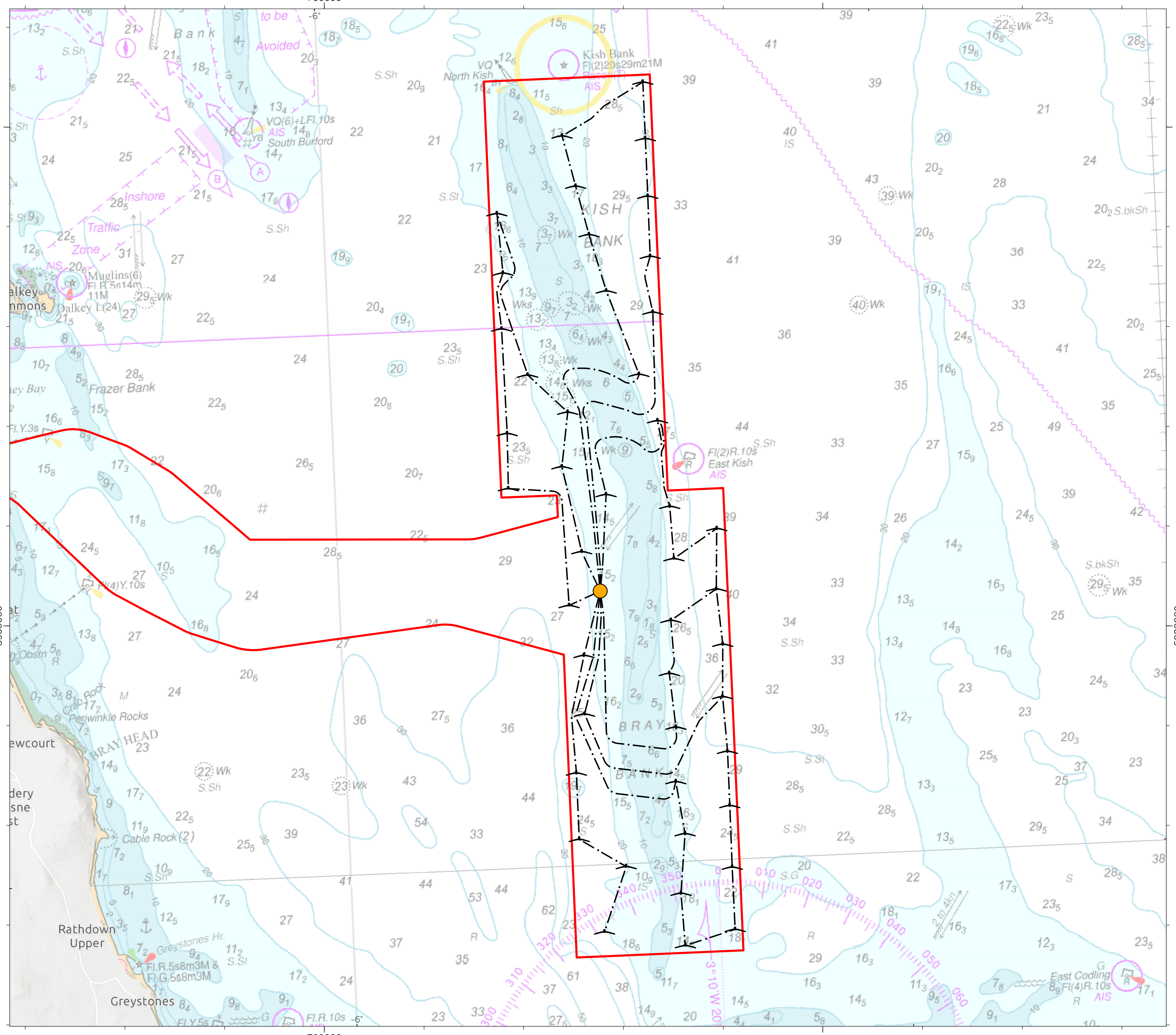
0 0.3 0.7 1 1.4 Miles

N GRID NORTH

SCALE	1:80,000	PLOT SIZE	A3
DATUM	WGS 1984	VERTICAL REF	LAT
PRJ	WGS 1984 UTM Zone 29N		

Dublin Array
Generation for generations
Kish Offshore Wind Limited - Bray Offshore Wind Limited



- Planning Application Boundary
- Wind Turbine Generator (WTG)
- Inter-array Cables (IAC)
- Offshore Substation Platform (OSP)

DRAWING STATUS: **PUBLIC**

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PROJECT TITLE: **Dublin Array**

DRAWING TITLE: **Site Layout Plans Offshore Option B (250RD)**

DRAWING NUMBER: **005532727-01** FIGURE NUMBER: **7**

VER	DATE	REMARKS	DRAW	CHEK	APRD
01	2025-01-10	Ready for release	DB	PM	PK

0 0.6 1.1 1.7 2.2 Kilometres

0 0.3 0.7 1 1.4 Miles

SCALE	1:80,000	PLOT SIZE	A3
DATUM	WGS 1984	VERTICAL REF	LAT
PRJ	WGS 1984 UTM Zone 29N		

Dublin Array

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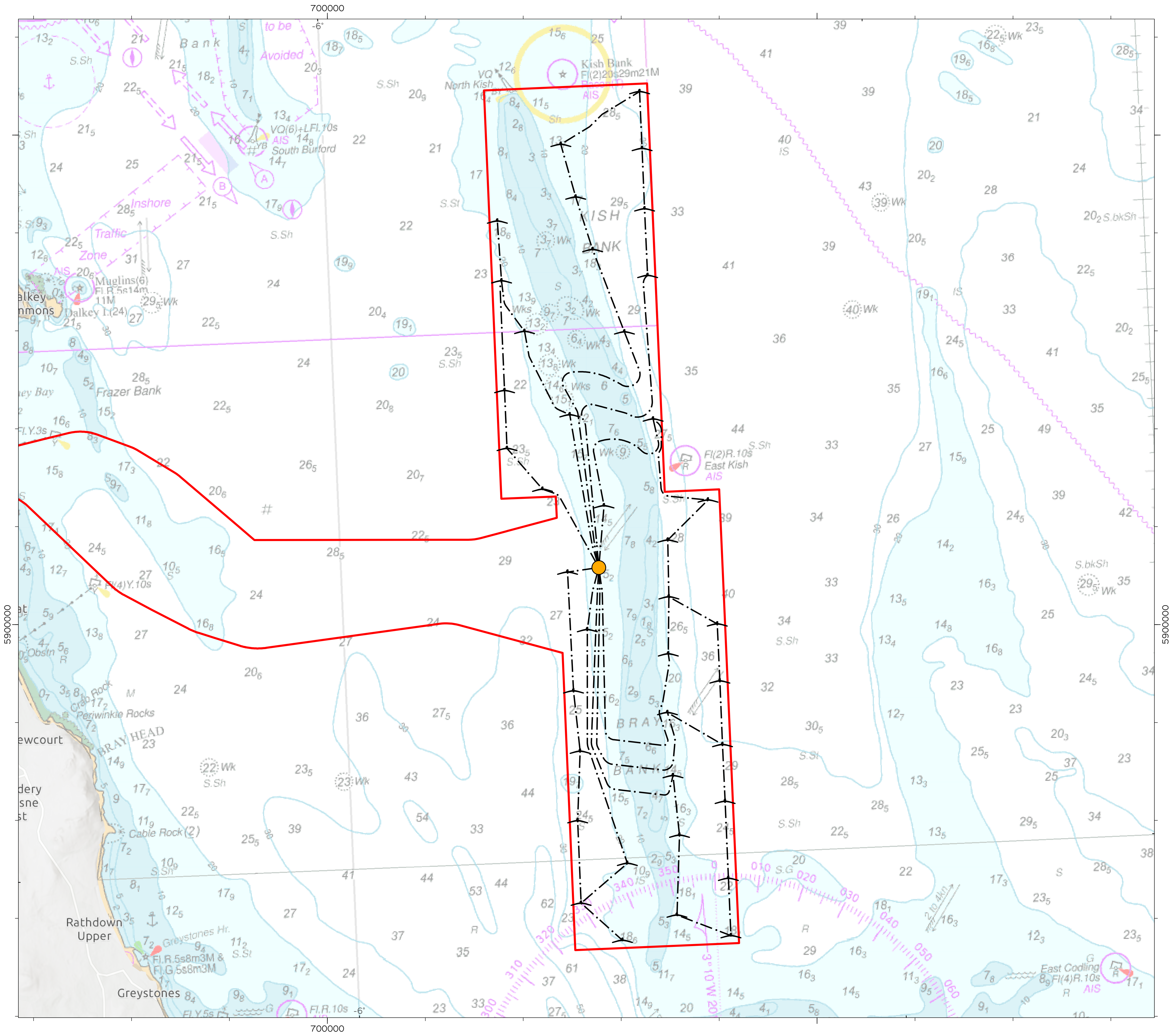

Planning Application Boundary

Wind Turbine Generator (WTG)

Inter-array Cables (IAC)

Offshore Substation Platform (OSP)

DRAWING STATUS **PUBLIC**

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PROJECT TITLE

Dublin Array

DRAWING TITLE

Site Layout Plans
Offshore Option C (278RD)

DRAWING NUMBER: **005532727-01** FIGURE NUMBER: **8**

VER	DATE	REMARKS	DRAW	CHEK	APRD
01	2025-01-10	Ready for release	DB	PM	PK

0 0.6 1.1 1.7 2.2 Kilometres
0 0.3 0.7 1 1.4 Miles

N GRID NORTH

SCALE	1:80,000	PLOT SIZE	A3
DATUM	WGS 1984	VERTICAL REF	LAT
PRJ	WGS 1984 UTM Zone 29N		

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Offshore structure foundations

The foundations for the turbines and the offshore substation ensure the structures remain stable in the marine environment. These foundations must support the weight of the turbines or substation while withstanding physical forces from wind, waves, and sea currents. They also provide safe access for technicians and maintenance personnel.

Various foundation options are being considered, and the final choice will depend on factors such as the specific design of the final turbine selected, seabed conditions, water depth, wind and wave patterns. The foundation types being considered include:

- Monopile foundations: These consist of a single large cylindrical steel tube, driven or drilled into the seabed. An Illustrative example of a monopile foundation is shown in Figure 9.

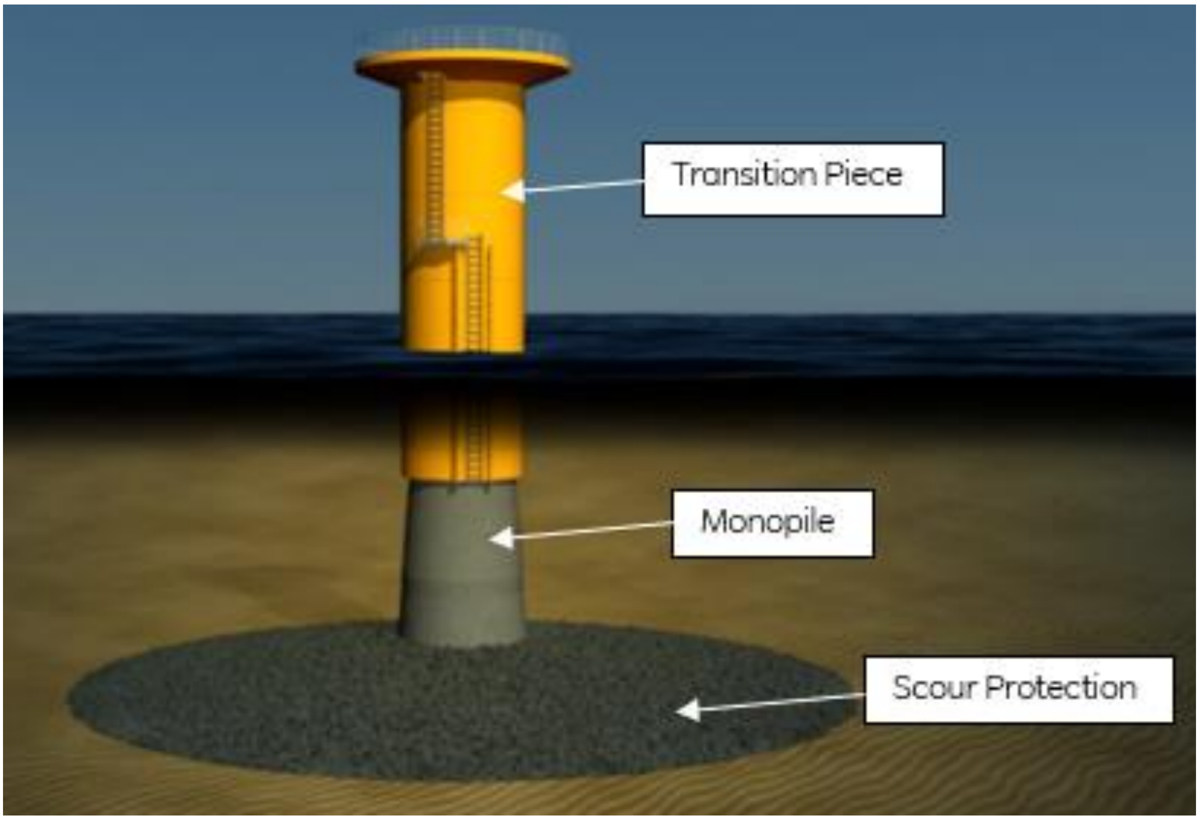


Figure 9 Illustrative example of a monopile foundation supporting a transition piece. (Source – Forewind Limited, Dogger Bank Teeside A & B)

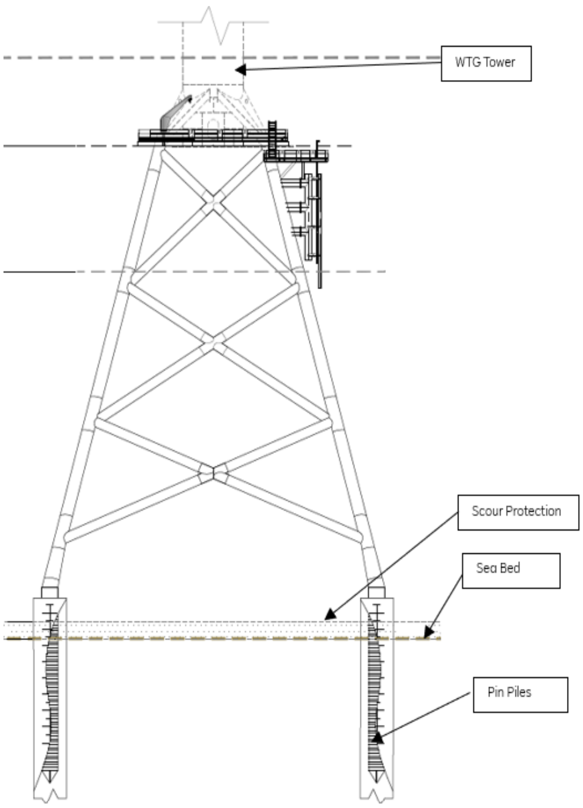


Figure 10 Example of multileg foundations supporting a wind turbine

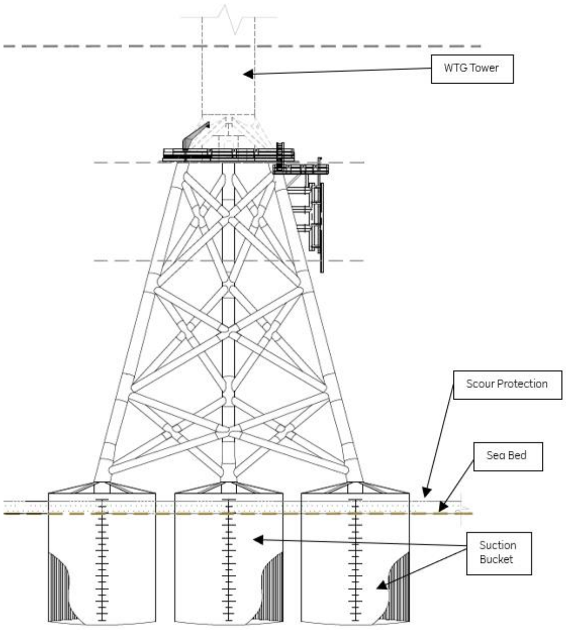


Figure 11 Example of a 3-legged suction bucket foundation supporting a wind turbine

- Multileg foundations: These have multiple legs (either three or four), each supported by driven piles or suction buckets. Access systems for maintenance include ladders or stairways, rest platforms, and safety equipment like fall arrest and fender systems to prevent accidents for technicians.
- Driven or Drill-Piled Multileg Foundations: These use piles to secure the legs of the foundation into the seabed, with resistance provided by the separation of the legs and friction against the seabed. An Illustrative example is shown in Figure 10; and
- Suction Bucket Foundations: These are large, cylindrical structures resembling inverted buckets that are ‘sucked’ into the seabed. They provide stability through the creation of a vacuum beneath the bucket. An Illustrative example is shown in Figure 11.

Offshore substation platforms

The Offshore Substation Platform will receive electricity from the turbines and increase the voltage of the electricity received so it can be efficiently transmitted to shore and connected to the national electricity grid.

It will have two main parts: the foundation and the topside, which will house the electrical equipment. The topside will include several decks, either open or enclosed, depending on the equipment. Weather-sensitive items will be stored in protected modules.

The planning application includes drawings showing typical layouts and the range of equipment to be used, like transformers, switchgear, and access facilities.

Figure 12 An example of an offshore substation platform on monopile foundation, Triton Knoll Offshore Wind Farm (RWE).

Offshore cables

Offshore submarine cables will carry the electricity generated by the wind turbines initially to the Offshore Substation Platform and then to shore. The cables also contain fibre-optic lines for transmitting data to control the wind farm and supply power to the wind farms control and monitoring systems.

There will be two main types of cables used:

- Inter-array cables; and
- Offshore export cables.

A typical cable installation vessel is shown in Figure 13.

Figure 13 Cable laying vessel (source: Van Oord)

Inter array cables

The inter-array cables collect the electricity generated by the turbines and send it to the Offshore Substation Platform, whilst also providing power and communication to the turbines.

Export cables

Two high voltage subsea export cables will carry electricity from the Offshore Substation Platform to the Landfall Site onshore.

The proposed development includes two 1 km wide Offshore Export Cable Corridors. The two export cables will be installed in one of the corridors (either the blue or the green corridor in the figure below) as shown in Figure 15. The preferred option will be selected based on pre-construction surveys to minimise impact on the seabed.

Cable and scour protection

Scour protection is essential to prevent seabed erosion around wind farm foundations and cables, which can be caused by water movement and sediment displacement. Without protection, this erosion can create scour pits that undermine the stability of structures. Scour protection methods include using concrete mattresses, rock-filled bags, and flow-dissipating devices like frond mats, with the most common solution being the placement of loose crushed rock around the base of the foundation. Scour protection can be installed either before or after the foundation, typically involving a rock armour layer over smaller graded rocks. Alternatively, heavier, larger rocks can be used in a single layer to avoid the need for a filter layer. The amount and type of protection will depend on the foundation design, water conditions, and available technology at the time of installation.

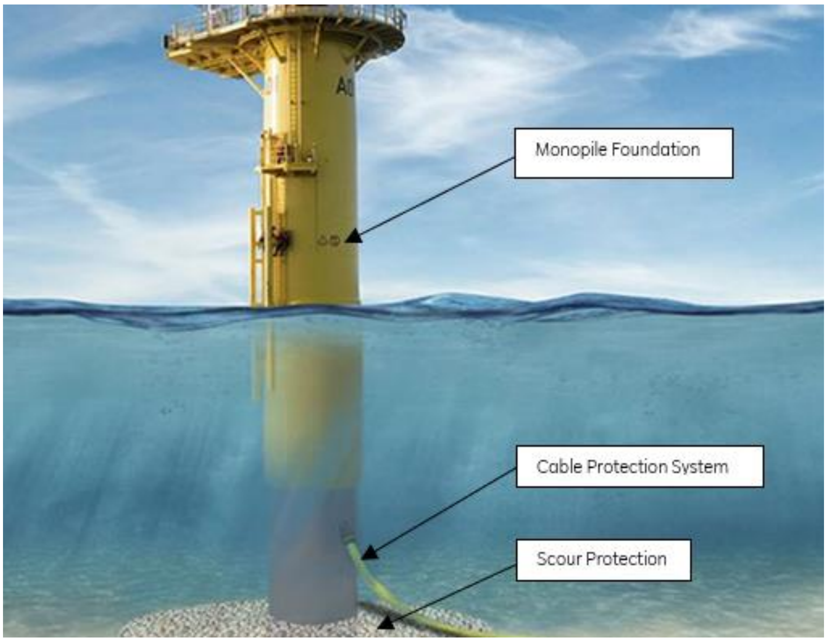
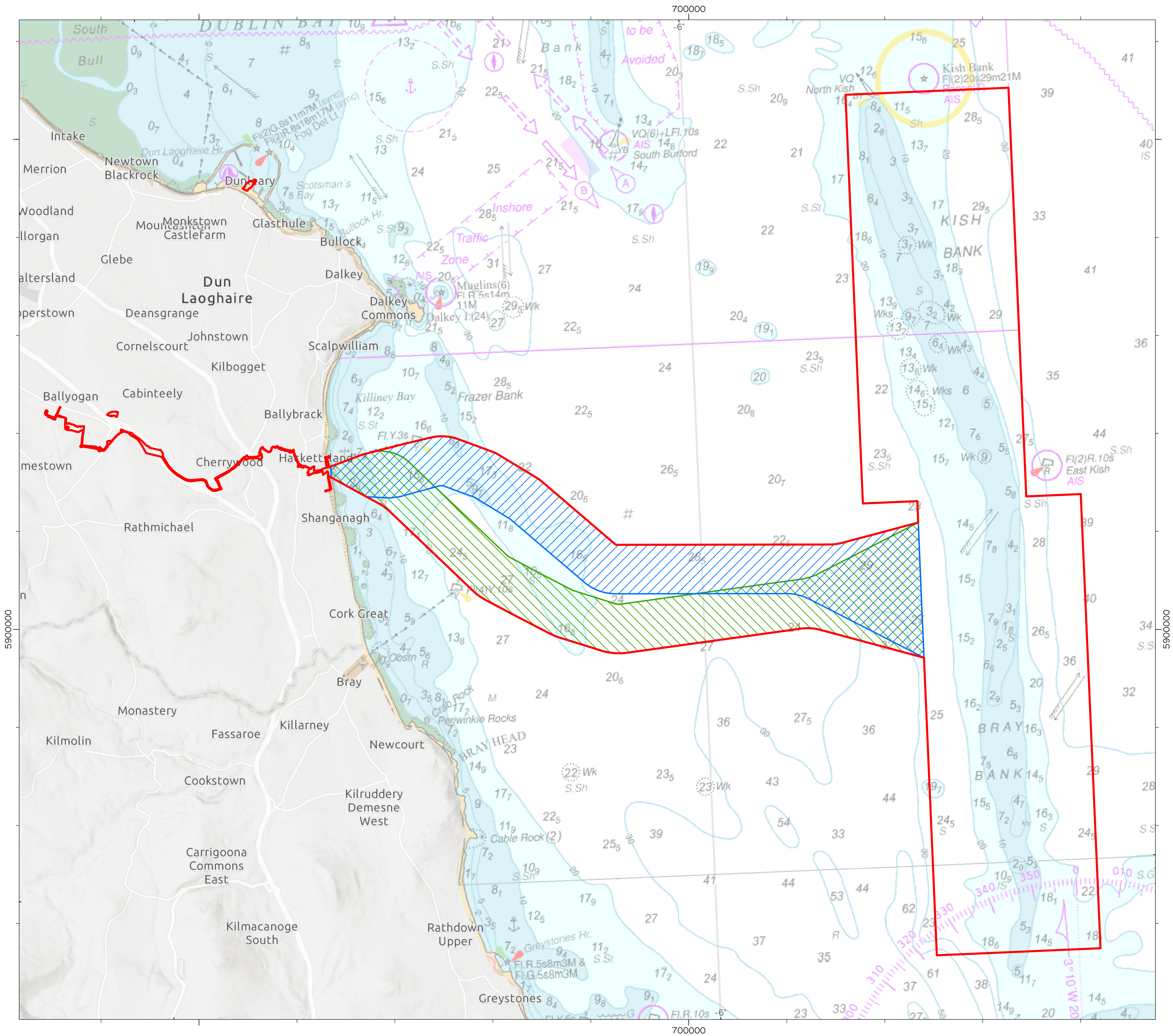


Figure 14 Example of cable protection system for a monopile foundation (source: www.trelleborg.com)

The preferred method for protecting subsea cables is to bury them within the seabed. However, if burial at the required depth is not feasible because of the nature of the seabed at a particular location (shallow bedrock for example), additional cable protection measures are similar to those for scour protection.



Planning Application Boundary

Northern Export Cable Corridor; OR

Southern Export Cable Corridor

DRAWING STATUS

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MAP NOTES / DATA SOURCES:

PROJECT TITLE

Dublin Array

DRAWING TITLE

Proposed Export Cable Corridors

DRAWING NUMBER: **005532727-01** FIGURE NUMBER: **15**

VER	DATE	REMARKS	DRAW	CHEK	APRD
01	2025-01-10	Ready for release	DB	PM	PK

0 0.6 1.1 1.7 2.2 Kilometres
0 0.3 0.7 1 1.4 Miles

N GRID NORTH

SCALE	1:80,000	PLOT SIZE	A3
DATUM	WGS 1984	VERTICAL REF	LAT
PRJ	WGS 1984 UTM Zone 29N		

Dublin Array
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Offshore construction

The offshore construction will follow a specific sequence of activities, which may overlap in some cases. With the natural movement of sand and sediment in the sea it is important that pre-construction verification surveys are completed to gain the most up to date information on the seabed in advance of commencement of works. With this information sea bed preparation may be required to remove large boulders or sandwaves. Additional early stage activities include installation of scour protection at the turbine foundation sites, if necessary, which can happen either before or after the foundation installation. Next, the foundation for the Offshore Substation Platform will be set up, followed by the installation of turbine foundations and the topside of the offshore substation.

Once the foundations are in place, the turbine installation will commence, along with the installation of cable ducts onshore. After that, the export cables will be laid to connect to the shore, and the inter-array cabling installation will begin. As the construction progresses, each string of turbines will undergo commissioning, leading up to the final commissioning of the entire project.

The construction schedule will take into account various uncertainties, including procurement times and potential weather-related delays, which may impact how long each activity takes.

Decommissioning phase

When Dublin Array reaches the end of its operational life, it will be decommissioned in a process similar to its construction. The Maritime Area Consent for the project requires the restoration of the maritime area affected by the wind farm, by December 2067. A Decommissioning Plan and Rehabilitation Schedule will be updated in accordance with the requirements of the Maritime Area Regulatory Authority and the relevant competent authorities at the time to ensure that the necessary assessments and approvals are in place before any structures are removed. Preliminary details about decommissioning specific project components are provided in the EIAR.

Table 1 Overview of typical offshore construction programme

Activity	Month																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Seabed Preparation	■	■																						
Foundation (WTG & OSP) installation			■	■	■	■	■	■	■															
Export cable lay, burial & Commissioning									■	■	■	■												
OSP topside installation & Commissioning									■	■	■	■	■											
Installation of offshore export cable at Landfall (trenchless installation)[7]												■	■											
IAC lay, burial & Commissioning								■	■	■	■	■	■	■	■	■				■	■	■	■	
WTG installation & commissioning														■	■	■	■	■	■	■	■	■	■	
Commercial Operations Date																								■

5.2 Operations and Maintenance

Operations and Maintenance Base

A permanent Operations and Maintenance Base will be located at Dún Laoghaire Harbour to support the ongoing operation of Dublin Array during its 35-year lifetime. The construction of the proposed base will require the removal of redundant infrastructure (concrete ramp, fender and support structures) on and adjacent to St. Michael's Pier which are no longer required in the harbour. Once operational, Dublin Array will require regular maintenance throughout its lifetime which is expected to be a maximum of 35 years. A full-time dedicated team including management, technical, administrative and other support staff will be based there.

The building will be a three-storey structure (similar in height to the existing ferry terminal building) providing office space, meeting rooms, toilet and changing facilities, an operations control centre, a warehouse for storing small spare parts, and a workshop. The building has also been sized to provide suitable facilities for the Dún Laoghaire Harbours operations and Harbourmaster activities.

This facility will include berthing facilities for crew transfer vessels[10] to transfer offshore maintenance technicians to the offshore wind farm on a daily basis to carry out the necessary maintenance activities. A new floating pontoon, 60 m long and up to 6 m wide, will be installed adjacent to the existing Berth 5 at the harbour to facilitate the berthing of these vessels. The pontoon will be anchored to the quay wall with steel guide beams and will include fendering, mooring points, emergency ladders, life-saving equipment, electrical, water, and lighting services. A new access gangway, approximately 26 m long, will be installed to provide access to the floating pontoon.

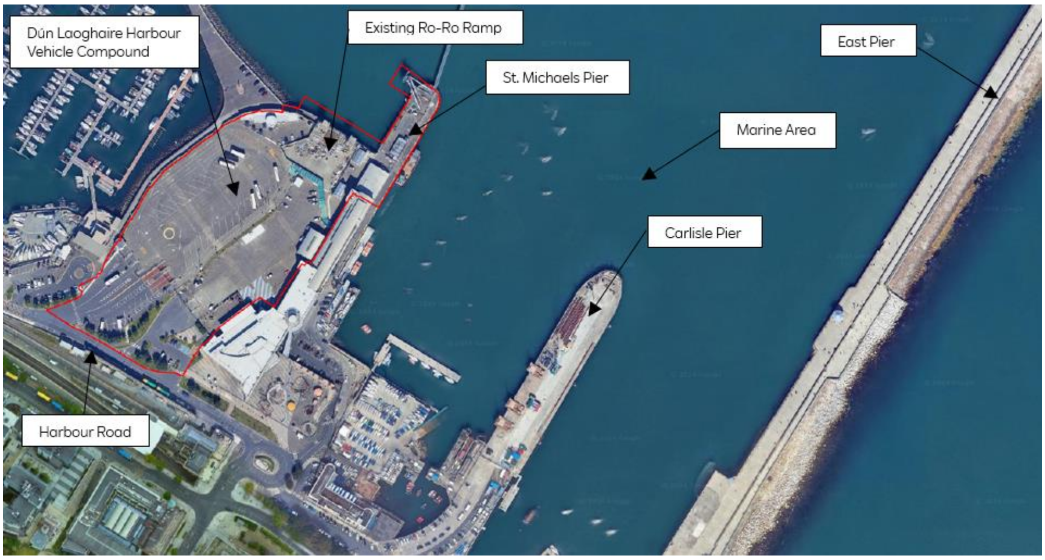


Figure 16 Location of the proposed Operations and Maintenance Base (Source: Google Maps)

10 Crew Transfer Vessels (CTVs) are specialised boats used in offshore wind farms to transport personnel, tools, and small equipment between the shore and offshore structures, such as wind turbines and substations.

Offshore Operations and Maintenance

Maintenance activities fall into two categories; preventative and corrective. Preventative maintenance is carried out according to regular scheduled services, whereas corrective maintenance covers unexpected repairs, component replacement, retrofit campaigns and breakdowns.

Each turbine will have its own IT system that controls its functions, and these systems will be overseen by a central system located at the O&M Base. This central system will be connected to the onshore communication network via the subsea cables. If any issues arise with a turbine, technicians can often diagnose the problem remotely, and any or all of the turbines can be automatically shut down if necessary.

Occasionally, there will be a requirement for heavy lift and cable laying vessels to visit the Array Area for major component exchanges, cable repair or other remedial works. When required these larger vessels will transit to site from their home port or other port dependent on the nature of the components being moved. The movement of major construction and maintenance plant and equipment will not occur within Dún Laoghaire Harbour.

5.3 Onshore Electrical System

The onshore electrical system for Dublin Array encompasses all the necessary electrical transmission components located above the high-water mark (i.e. on land). This includes Transition Joint Bays at the Landfall Site, the onshore export cables, and the Onshore Substation. These elements work together to enable the efficient transmission of electricity generated offshore to the national grid.

Landfall and Transition Joint Bays

The Landfall Site for Dublin Array is located at Shanganagh Cliffs, where the offshore export cables come ashore and connect to the onshore export cables. This connection is at two underground Transition Joint Bays, which will be constructed next to each other. The trenchless technique will commence at the Transition Joint Bay locations and involve either drilling or tunnelling from an entry pit onshore, beneath the cliff and beach to emerge, or punch out at the exit pit in the seabed.

The offshore cables ducts will be installed at the Landfall using trenchless technology, such as Horizontal Directional Drilling or Direct Pipe Method. An example schematic profile of Horizontal Directional Drilling is shown in Figure 17. The trenchless techniques have been chosen to eliminate the impacts associated with open-cut trenches.

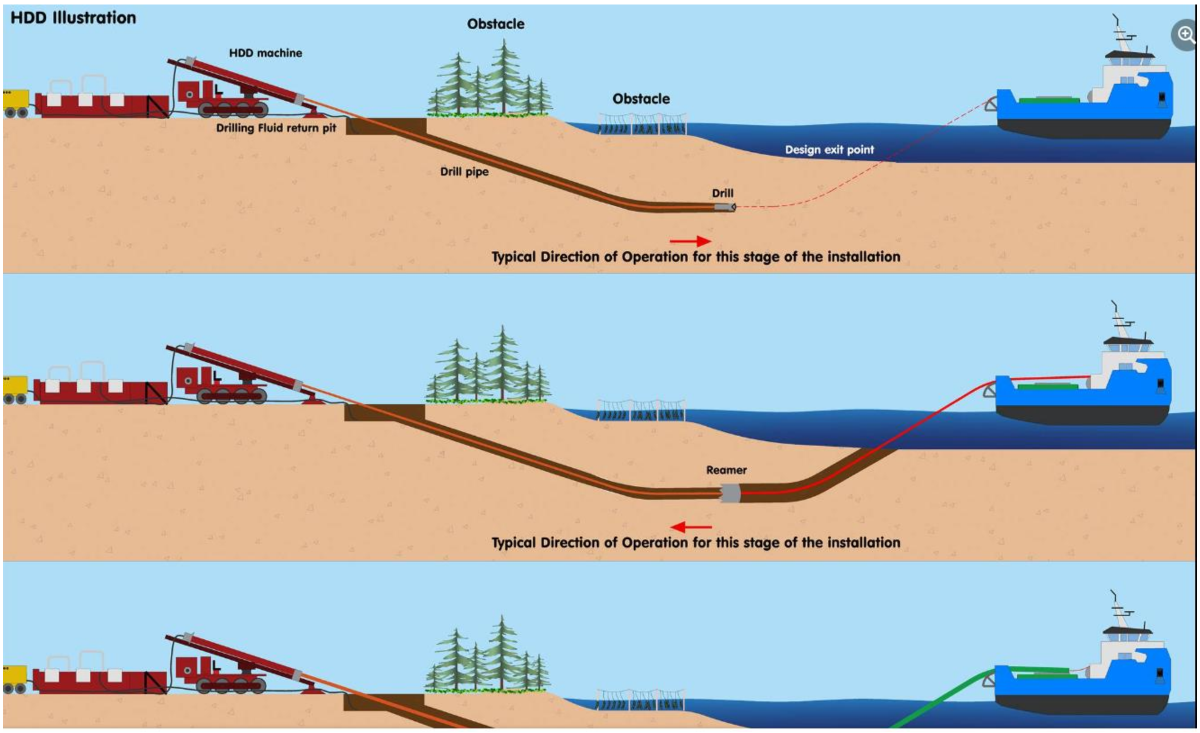


Figure 17 Schematic profile of HDD (source: Coffee Offshore)

Onshore cable

The Onshore Export Cable Route will run from the Transition Joint Bays at Shanganagh Cliffs to the proposed Onshore Substation at Jamestown, covering a distance of 7.4 km. The route will include two 220 kV electrical transmission circuits, telecommunications fibres, cable ducts, and associated infrastructure such as joint bays, link boxes, and communication chambers. The cables will be installed primarily using open-cut trenching techniques, with trenchless methods employed at significant crossings to avoid disruption. Each electrical circuit will be installed in its own trench meaning that there will be two trenches in total. Figure 18 shows an example of an electrical circuit being installed in the road and covered with concrete for protection purposes.

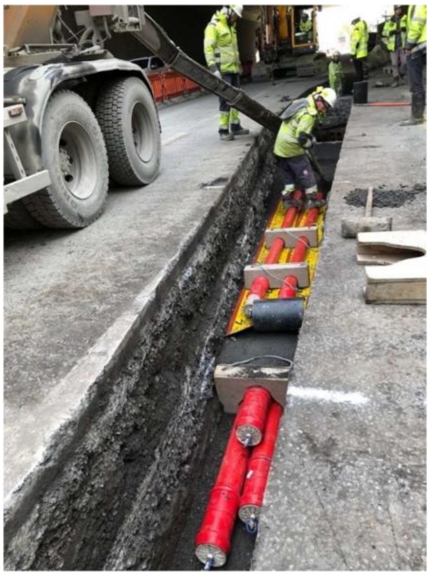


Figure 18 Example of cable ducts in a trench in the road, with telecommunication ducts positioned above

Both cables trenches will be installed using trenchless technology under the DART railway line near Shanganagh Cliffs, the Shanganagh River, the Shanganagh Road/Killiney Hill Road Roundabout, and the Kill o' the Grange Stream at two locations. Additionally, they will be installed under the N11 and Carrickmines Stream, the M50 motorway, the Glenamuck District Distributor Road, North Glenamuck Stream and Golf Stream. The rest of the route will be installed using standard open cut trenching.

Joint bays, which are underground chambers where sections of the cable are joined together, will be strategically located along the route to facilitate cable installation and future maintenance. Link boxes and communication chambers, small underground chambers that help manage and protect the electrical cables, will also be installed beside each joint bay.

Temporary construction compounds will be established at key locations to support the construction activities, providing storage, welfare facilities, and site offices. There will be four main construction compounds for the duration of the construction phase:

- Landfall Site temporary construction compound: Located at Shanganagh Cliffs, this compound will support the construction of the TJBs and the installation of the offshore and onshore export cable ducts;
- Clifton Park temporary construction compound: Situated in the open greenspace area bordered by Shanganagh River to the west and the DART railway line to the east. This compound will support trenchless crossing activities and the installation of the onshore export cables;
- Leopardstown temporary construction compound: Located in a brownfield site with deteriorated artificial surfaces, bordered by treeline and hedgerows. This compound will support storage and laydown activities; and
- Onshore substation site temporary construction compound: Located at the Onshore Substation site in Jamestown, this compound will support the construction of the substation and associated infrastructure.

Additionally, smaller localised short-term construction compounds will be placed at trenchless crossing points to ensure public safety and efficient construction. Measures will also be taken to ensure public access and safety during construction, including the creation of pedestrian paths and secure fencing around construction sites.

Onshore Substation

A new Onshore Substation will be built in Jamestown, close to the existing 220 kV Carrickmines substation, to connect the wind farm to the national electricity grid. The substation will include several key buildings and equipment such as a switchgear building, power control buildings, and devices that help manage and regulate the electricity. These components will help ensure that the electricity generated by Dublin Array is ready and safe to be sent to the national grid.

The GIS building[11] will be the largest structure, measuring around 39 m in length, 15 m in width and 15 m in height. It will house the main electrical equipment and control systems. The Statcom buildings[12], which help stabilise the voltage, will be single-story structures, each measuring approximately 23 m in length, 20 m in width and 7 m in height.

Figure 19 Example image of a GIS building with green cladding

The onshore substation will also include outdoor equipment like shunt reactors and harmonic filters, which will be securely fenced off in their own areas. To ensure security and reduce its visual impact, the entire site will be surrounded by a 4 m high perimeter wall with stone cladding.

Construction programme

The construction of the onshore infrastructure for the Dublin Array Offshore Wind Farm is planned to be carried out in several phases over approximately 36 months.

The construction activities will generally be carried out during the following working hours:

- Monday to Friday: 07:00 to 19:00; and
- Saturday: 08:00 to 14:00.

However, drilling and cable pulling operations at the Landfall, railway line, N11 and M50 will require extended working hours, including the possibility of 24/7 operations if necessary for safety reasons. These extended hours will be used to ensure the timely completion of critical tasks and to mitigate any potential delays due to weather or other unforeseen circumstances.

An indicative programme for the onshore transmission infrastructure is shown in Table 2.

11 GIS building refers to a Gas Insulated Switchgear building, which houses electrical equipment used to control, protect, and isolate electrical circuits in the substation. GIS technology uses pressurised gas insulate the equipment, allowing for a more compact and efficient design compared to traditional air-insulated switchgear.

12 Statcom buildings house equipment for a Static Synchronous Compensator (Statcom), which is a device used to stabilise and regulate the voltage in the power grid. It helps maintain a steady voltage level, ensuring that electricity is transmitted reliably and efficiently.

Table 2 Anticipated onshore construction programme for onshore electrical system works

Activity	Y1				Y2				Y3				Y4			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4[39]	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Landfall Site																
Site Preparation																
Installation of offshore export ducts at Landfall (trenchless installation)																
Onshore ECR activities (incl. TJBs)																
Cable pulling and jointing (onshore & offshore)																
Demobilisation & Reinstatement																
Duct laydown and assembly area																
Onshore ECR																
Cable ducts and JB installation (including trenchless crossings)																
Cable Pulling & Jointing																
Commissioning																
Landfall Site TCC																
Clifton Park TCC																
Leopardstown TCC																
OSS																
Site Preparation																
Civil Works																
Electrical Works																
Commissioning																
OSS TCC																

Decommissioning phase

Once constructed, ownership of the onshore electrical system will be transferred to EirGrid and become a state-owned asset. As the asset owner, EirGrid will become responsible for decommissioning at the end of its operational life. Therefore, this planning application does not seek permission for decommissioning but rather outlines a recommended approach for EirGrid, based on previous experience of decommissioning similar assets on previous projects.

When deciding to decommission, EirGrid will consider various factors such as the environmental conditions at the time, advancements in decommissioning technology, current best practices, input from interested parties, and any new regulatory requirements.

6 Offshore Infrastructure Assessment Chapters

This section provides a summary of the assessments undertaken for Dublin Array for the offshore infrastructure chapters. More detailed information is available within the topic-specific chapters found within each volume of the EIAR, as detailed in section 3.3.

6.1 Marine Geology, Oceanography and Physical Processes

Assessment methodology overview

The assessment methodology for the chapter on Marine Geology, Oceanography, and Physical Processes involved several key steps to understand the potential impacts of Dublin Array on the marine environment.

First, the study area was defined, focusing on the zones that might be affected by the project. Baseline data was collected to understand the current conditions of the marine environment, including tides, waves, and seabed characteristics. This data came from various sources, including comprehensive surveys conducted in the study area to gather detailed information on marine conditions, existing literature that provided insights from previous research and studies relevant to the region, and project-specific studies that were tailored to address the unique aspects and requirements of the Dublin Array.

The assessment used a source-pathway-receptor model. This meant identifying the source of potential impacts (like construction activities), the pathways through which these impacts might travel (such as water currents). Different analytical methods, including computer modelling, were used to predict how the project might change the marine environment. These models simulated scenarios like changes in water flow or sediment movement.

For the most part physical processes are not in themselves receptors but are instead 'pathways', there are a number of physical receptors that were identified which may be sensitive to changes to physical processes these principally include sand banks, sandwaves and the coastline. The sensitivity of different parts of the physical environment[13] was evaluated, to assess how they will respond to the works necessary for Dublin Array. The magnitude of potential impacts was also assessed, looking at factors like the extent and duration of changes. Combining these factors helped determine the overall significance of the impacts. Throughout the process, the methodology considered natural variations and long-term changes, such as those caused by climate change.

13 Changes to physical processes have the potential to indirectly impact other environmental receptors (Lambkin et al., 2009) such as seabed habitats. The potential significance of effects on marine habitats are assessed in the relevant ecology chapters.

Description of the existing environment

The wind farm location is characterised by dynamic marine conditions, including tides, waves, and sediment movements. The seabed is primarily composed of sand, with some areas containing gravel and mud. Sediments are actively moved by tidal currents and waves, creating dynamic seabed features like sandwaves[14]. Key physical receptors in this area include the sandbanks themselves, sandwaves and the coastline.

The area experiences strong tidal currents, with water moving north during flood tides and south during ebb tides. Waves predominantly come from the south and southeast, influenced by both local winds and distant storms from the Atlantic. The coastline near the proposed Landfall site, particularly the Shanganagh coastline, is characterised by cliffs and sandy/stony beaches. This area is susceptible to coastal erosion and flooding, especially during storm events.

Water quality in the general project area varies, with levels of suspended sediments increasing during storm events, affecting water clarity. The seabed supports various habitats that are important for marine life, including fish, shellfish, and benthic[15] organisms. Sensitive receptors include these diverse habitats and the protected species that rely on them.

Key findings of the assessment

One of the primary considerations in the assessment was the potential impact on the sandbanks and sandwaves. During construction, activities such as dredging and installation of foundations can temporarily alter the shape and structure of the sandbanks and sandwaves. These changes might include the levelling of parts of sandwaves or the displacement of sand from the sandbanks. However, the sandbanks and sandwaves are dynamic and resilient, meaning they can recover from these temporary changes. Natural processes, such as tidal currents and wave action, will gradually restore the sandbanks and sandwaves to their original state over time, ensuring that these habitats continue to support marine life.

When considering the coastline near the proposed Landfall site, the use of trenchless techniques for cable installation will minimise the impact on the coastline, ensuring that any changes will be temporary and localised. Trenchless techniques, such as horizontal directional drilling, will involve installing cables beneath the surface without the need for extensive excavation. This method will significantly reduce the disruption to the coastal environment and minimising the risk of erosion. By avoiding open trenching, the integrity of the cliffs and sandy beaches along the Shanganagh coastline will be maintained.

14 Sandwaves are large, wave-like structures on the seabed formed by the movement of sand and sediments due to tidal currents and waves. These features resemble underwater sand dunes and can vary in size, from small ripples to large, prominent formations.
15 Benthic refers to living in the lowest levels of the sea. It is the ecological region at the bottom of the sea including the sediment surface and subsurface layers.

During the construction phase, activities like preparing the seabed and installing equipment can stir up sediments, causing fine particles of sand, silt, and mud to become suspended in the water. This can make the water appear cloudy and reduce clarity. However, these particles will settle back to the seabed relatively quickly once the construction activities stop with the environment returning to its natural state and minimising any long-term effects on marine life.

During the operational phase, the assessment found that the wind farm structures will cause very small and localised changes to the tidal and wave regimes, which are expected to be negligible. Sediment transport pathways will remain largely unaffected, allowing the sandbanks and sandwaves to maintain their form and function. Localised scour around the foundations will be minimised with scour protection measures to maintain seabed stability. Marine geology, oceanography and physical processes receptors will not be significantly impacted, with any temporary increases in suspended sediments during maintenance activities quickly settling.

During the decommissioning phase of Dublin Array, the assessment found that the impacts will be similar to or less than those experienced during construction. The removal of structures will cause temporary increases in suspended sediments, but these levels will quickly return to normal.

The cumulative effects assessment concluded that the cumulative changes to the wave and tidal regimes as a result of the operational presence of other offshore wind farms would not be measurable at the coast. Sediment releases as a result of simultaneous activities at Dublin Array and other nearby projects are unlikely to combine and no significant cumulative effects are predicted.

No transboundary effects have been identified. The predicted changes to key physical processes, such as tides, waves, and sediment transport are not anticipated to extend beyond the Irish maritime jurisdiction. As a result, the project will not have any significant impact on neighbouring countries' marine environments.

Assessment results

The assessment of the project indicates that while there will be some temporary and localised impacts on marine geology, oceanography and physical processes during the construction, operational, and decommissioning phases, these effects are expected to be minimal. The project has included various design features and measures to reduce these impacts. These include using trenchless methods at the Landfall Site, disposing of spoil from dredging by redepositing it in the project area in areas with similar sediment types, and in regions where currents will naturally redistribute the material. Additionally, the decommissioning plan will be regularly updated to reflect the latest scientific knowledge and best practices.

Overall, the project is designed to ensure that marine geology, oceanography and physical processes remain largely unaffected in the long term, with any changes being reversible and minimal. Cumulative effects looked at the potential for changes to wave and tidal regimes alongside other operational offshore wind farms and cumulative increases to suspended sediment concentrations and seabed levels. No significant cumulative effects are predicted. No significant transboundary effects are anticipated, meaning that the project will not adversely impact neighbouring countries' marine environments. The careful planning and implementation of mitigation measures will help maintain the health and stability of the marine ecosystem throughout the project's lifecycle.

6.2 Marine Water and Sediment Quality

Assessment methodology overview

The study area for the marine, water and sediment quality assessment included the offshore wind farm site and surrounding waters, chosen to understand how the project might affect water and sediment quality. Specifically, the study area encompassed the Array Area, which is the location of the wind turbines, and the Offshore Export Cable Corridor, which is the path where the cables will be laid to connect the wind farm to the shore. The study area also included a buffer zone of 17 km around these locations to capture any potential indirect effects.

Impacts were assessed over two spatial scales:

- The far-field, which included the wider area surrounding the array and Offshore Export Cable Corridor where indirect changes may occur; and
- The near-field, which comprised the footprint of the project below mean high water springs[16].

Baseline data, which refers to the current state of the environment before any project activities begin, was collected through surveys and existing reports to understand the current natural conditions of the water and sediments.

The assessment methodology used a source-pathway-receptor model to identify how project activities (source) might affect the environment (receptor) through various pathways (e.g. water currents). The sensitivity of receptors, such as water quality, were assessed based on their ability to adapt to changes and recover from impacts.

Key parameters for assessment included suspended sediment concentrations, water clarity, and the presence of contaminants. These parameters allow for evaluation of potential changes in water and sediment quality due to the project.

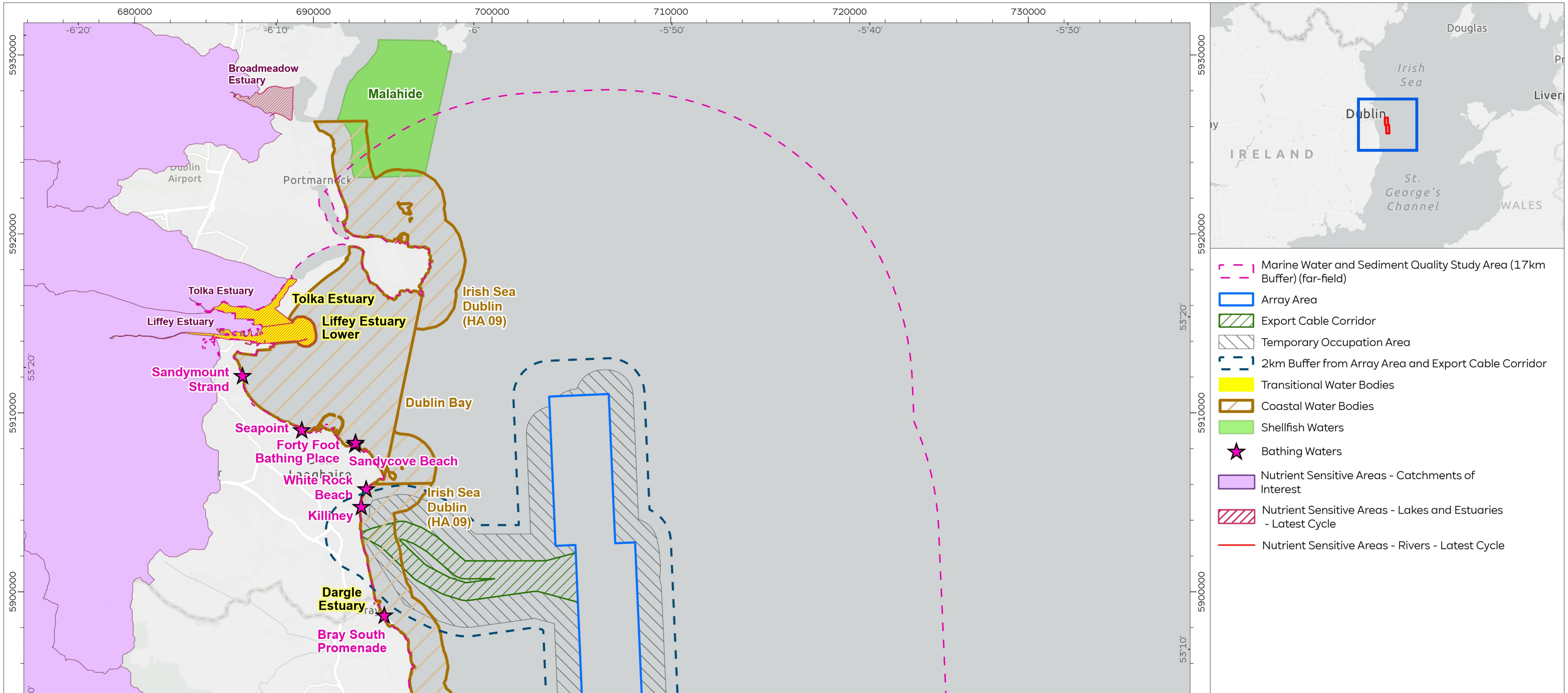
16 Mean High Water Springs refers to the average height of the highest tides recorded during spring tides, which occur twice a month when the sun, moon, and Earth align, causing particularly high and low tides. This is a reference point used in tidal studies and coastal planning.

Description of the existing environment

The area is characterised by a mix of sandy and muddy sediments, with some areas having coarser gravel. The water quality is generally good, with high levels of dissolved oxygen and low levels of contaminants. The area also experiences natural variations in water temperature and salinity, influenced by seasonal changes and tidal movements.

The following designated sites have been identified within the marine water and sediment quality study area, and are shown in Figure 20:

- Coastal water bodies:
  - Southwester Irish Sea – Killiney Bay: High ecological and chemical status
- Bathing waters:
  - Killiney Beach: Excellent water quality
  - White Roch Beach: Excellent water quality
- Shellfish waters:
  - Malahide Shellfish Water: High classification for quality, particularly for razor clams
- Nutrient sensitive areas:
  - Liffey Estuary and Tolka Estuary within Dublin Bay: Designated as nutrient-sensitive areas due to historical and recent issues with excess nutrients



DRAWING STATUS **FINAL**

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PROJECT TITLE
Dublin Array

DRAWING TITLE
Designated Sites Within the Marine Water and Sediment Quality Study Area

DRAWING NUMBER: 20 PAGE NUMBER: 1 of 1

VER	DATE	REMARKS	DRAW	CHEK	APRD
01	2024-04-12	For Issue	GB	BB	SS

SCALE 1:225,000 PLOT SIZE A3
DATUM WGS 1984 VERTICAL REF LAT
PRJ WGS 1984 UTM Zone 29N

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Dublin Array Generation for generations
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Key findings of the assessment

Compliance with relevant legislation, implementation of protocols to manage accidental releases of chemicals and good practice standards and control measures during construction and operation will minimise potential impacts on marine water and sediment quality.

During the construction phase, activities like preparing the seabed and installing equipment can stir up sediments, making the water temporarily cloudy. This can reduce the amount of light that reaches underwater plants and release nutrients and contaminants trapped in the sediment. This can reduce the amount of light that reaches underwater plants and release nutrients, reduce levels of dissolved oxygen which fish and many other organisms need to survive and release contaminants trapped in the sediment. The effects are expected to be short-lived and confined to the immediate area of the activity. The sediment will settle back down quickly once the work stops, returning the water to its normal clarity. There will be plans in place to protect the environment which will be detailed in a Marine Pollution Contingency Plan which will comply with relevant legislation and guidance.

During the operation and maintenance phase, if cables need to be reburied or replaced, it might stir up some sediments. However, these activities will be less extensive and shorter than during construction, therefore any cloudiness in the water will be temporary and localised.

The decommissioning phase will involve the removal of the offshore infrastructure which may lead to localised, temporary re-suspension of sediments similar to the construction phase.

The cumulative effects assessment considered the combined impact of Dublin Array along with other nearby projects. These included various dredging activities and the installation of subsea cables by Dublin Port Company, as well as the proposed MaresConnect power cable and the Codling Wind Park. The assessment found that while these projects might temporarily increase sediment in the water, the effects would be short-term and localised.

No transboundary effects have been identified. The predicted changes to marine water and sediment quality are not anticipated to influence transboundary receptors due to the distance of neighbouring states from the proposed works.

Assessment results

The assessment of marine water and sediment quality has identified potential impacts during the construction, operation and maintenance, and decommissioning phases. These impacts include increased suspended sediment concentrations, re-suspension of sediment-bound contaminants, and accidental releases of chemicals. However, the significance of these effects is assessed as slight adverse, with any residual effects not impacting water quality of coastal or marine waters. Project design measures and adherence to good practices ensure that environmental risks are minimised, maintaining the integrity of the marine ecosystem. The cumulative and transboundary effects have also been carefully considered, with no significant adverse impacts identified.

6.3 Benthic, Subtidal and Intertidal Ecology

Assessment methodology overview

The study area includes all offshore infrastructure (wind turbines, Offshore Substation Platform, and offshore cables) as well as the temporary works areas where activities such as the use of jack-up vessels and anchors will occur during construction and decommissioning phases. To ensure a thorough assessment, a Zone of Influence was defined, extending 17 km around Dublin Array to account for potential indirect impacts.

Baseline data was collected through site-specific surveys and existing data sources to characterise the current state of the benthic environment. Site-specific surveys conducted in 2021 and 2024 provided baseline data which was supported by a detailed review of existing scientific literature.

The assessment evaluated potential impacts on benthic habitats and species. This involved analysing how long, how often, and how extensively the impacts will occur, as well as how resilient the affected habitats will be to these changes. For example, the assessment looked at the effects of temporary increase in suspended sediment concentration and sediment deposition during construction on ecological receptors living on or within the seabed. It also considered the potential for habitat loss or disturbance from activities like dredging and cable installation.

The assessment outlined specific measures to avoid, minimise, or mitigate significant adverse impacts on benthic ecology, such as implementing best practices for construction and maintenance activities to reduce sediment disturbance and protect sensitive habitats. This ensured the protection and sustainability of these marine environments throughout the project's lifecycle.

Additionally, the methodology included a thorough analysis of cumulative effects from other nearby projects and activities, ensuring that the combined impacts were understood. This involved looking at how increased sediment in the water or disturbance of seabed habitats arising from multiple projects in the area may affect the receptors.

Description of the existing environment

The subtidal study area covers all offshore works such as the Array Area and Offshore Export Cable Corridors. Surveys carried out in 2021 and 2024 have provided information on the local environment, including sediment sampling and underwater imagery.

The seabed in the area is mostly sandy, with some patches of gravelly and muddy sand. Organic content in the sediment is low, suggesting little organic build-up. Contaminant levels in the sediment are generally low, though small increases in arsenic were found in some areas but were not at a level considered to present an ecological risk. Higher levels of aluminium were also noted which align with naturally expected levels associated with the local geology. The Kish and Bray Banks are made up of sandy and gravelly seabeds and support key marine habitats. Sandy sediments that characterise the Kish and Bray Banks sand bank features are typically colonised by burrowing polychaete worms, crustaceans[17] and bivalve molluscs[18]. In general, the faunal communities found suggest that the seabed is constantly changing and typical of an area with strong currents.

In the intertidal zone, the sediment is mostly sand, sandy gravel, and slightly gravelly sand with low organic content. Key habitats include areas of loose shingle with little plant life, patches of green and red seaweed, and rocky areas covered with *Fucus serratus* (toothed wrack seaweed) in the lower tidal zone.

Several designated sites are identified within the study area, including Special Areas of Conservation and Special Protection Areas. Rockabill to Dalkey Island, South Dublin Bay, and North Dublin Bay are Special Areas of Conservation noted for their habitats, including reefs and mudflats. Special Protection Areas are important for bird species, providing essential food resources in subtidal and intertidal habitats.

The Kish and Bray Banks are consistent with the Annex I habitat 'Sandbanks which are slightly covered by sea water all the time'. Additionally, both geogenic (rocky) and biogenic (created by organisms) reefs are present, with nearshore surveys identifying potential stony reef habitats. Overall, the benthic environment, which includes the sea floor and the organisms living there, is typical of a high-energy coastal environment with dynamic conditions.

Key findings of the assessment

During construction, some temporary effects on the seabed and shoreline are expected, but these will be limited in scale and duration, with measures in place to minimise their impact. Activities such as seabed preparation, foundation installation, and cable laying will cause temporary habitat disturbance. While this may have a moderate impact, it is not expected to cause lasting effects, habitats and organisms present are typical of those found in high energy environments and are exposed to high levels of physical disturbance from natural processes within the area. They will therefore recovery rapidly following seabed disturbance.

17 Marine life with no spine but a hard outer skeleton such as crabs and lobsters
18 Marine life with no spine, typically snails and molluscs for example

Dredging and cable installation may increase sediment levels in the water, but this effect will be short-lived, as the particles will settle quickly once activities stop. While a temporary increase in sediment may affect water quality and seabed organisms, the impact is expected to be minimal. The movement of construction vessels and the installation of subsea infrastructure could also increase the risk of introducing or spreading invasive species. However, strict biosecurity measures will be in place to manage this risk.

Disturbing the seabed may release small amounts of metals and hydrocarbons trapped in the sediments, but as these substances are present at very low levels, the impact is expected to be negligible.

During the operation and maintenance phase, potential long-term, localised impacts on the seabed and intertidal zones have been identified. The presence of foundations, scour protection, and cable protection will cause moderate, localised changes to the seabed habitat, potentially increasing local biodiversity around the infrastructure. Maintenance activities, such as jack-up vessels and cable repairs, may temporarily disturb the seabed, but these disturbances will be short-lived, with quick recovery. The impact of electromagnetic fields from the cables will be minimal, as the cables will be buried or protected, reducing exposure of benthic organisms.

During decommissioning, temporary and localised impacts on the seabed are expected, with measures to minimise effects. The removal of foundations, cables, and protection will cause short-term disturbances, but recovery is anticipated. Increased suspended sediments may occur briefly, and habitats around removed structures will be lost but are expected to recover.

The cumulative assessment considers the combined effects of Dublin Array and nearby projects, such as maintenance dredging in Dublin Port, on the ecological receptors on the seabed and within the intertidal zone. During construction, temporary habitat disturbance and increased suspended sediments are the main concerns, with impacts expected to be short-term and localised. In the operational phase, long-term changes from structures like foundations and cables are expected to have moderate, localised effects, with potential for increased biodiversity.

Assessment results

The assessment identifies several potential impacts on the ecological receptors on the seabed and within the intertidal zone. During construction, activities like seabed preparation and cable laying will cause temporary disturbances and habitat loss, with moderate but non-significant long-term effects as areas recover rapidly on cessation of construction activities. Increased suspended sediments may briefly affect water quality, but this impact will be low and short-term. The risk of invasive species introduction is moderate but manageable with strict biosecurity measures. The release of contaminants which may affect marine organisms is expected to be negligible due to low contaminant levels within the seabed.

In the operational phase, foundations and scour protection/cable protection will cause long-term, moderate, but localised changes to seabed habitats. Maintenance activities may cause temporary disturbances, but their scope and duration will be limited. The risk of invasive species spread is low with biosecurity measures. Changes to hydrodynamics and electromagnetic fields from cables are expected to be negligible.

During decommissioning, the removal of infrastructure will cause temporary disturbances similar to construction, with moderate but short-term impacts. Increased suspended sediments and contaminants will be low and manageable.

Measures such as careful planning, biosecurity protocols, and contamination management will minimise these effects. With these in place, long-term impacts on the benthic environment are not expected to be significant.

6.4 Fish and Shellfish Ecology

Assessment methodology overview

The study area for fish and shellfish ecology was defined based on the nature of impacts being studied. The study area included the seabed area which activities might disturb sediment. It also included extended up to 17 km from the Array Area and Export Cable Corridors, based on modelling that concluded sediment could travel this far during construction. The underwater noise study area assessed the impact of underwater noise on marine life and on a precautionary basis extended up to 30 km from the Array Area and Export Cable Corridors,

Baseline data was collected, which included a desktop review of existing information on fish and shellfish ecology, spawning and nursery grounds, and habitats from various sources. Site-specific surveys were also conducted to gather data on fish and shellfish species, their habitats, and environmental conditions within the study area.

The impact assessment process then identified potential impacts on fish and shellfish from activities such as seabed disturbance, underwater noise, and sediment deposition. The sensitivity of different species to these impacts was evaluated, considering their ability to adapt, tolerate, and recover. The magnitude of each impact was assessed based on its spatial extent, duration, and frequency. By combining sensitivity and magnitude, the significance of the effects was determined, categorising them as significant or not significant based on their potential to cause harm. Measures were incorporated to avoid or minimise impacts, including project design features like optimal cable burial depths and noise reduction technologies, as well as additional measures such as marine pollution contingency plans and biosecurity plans.

Description of the existing environment

Several designated conservation sites, such as Special Areas of Conservation and Special Protection Areas, are located within the study area. These sites are important for their habitats, such as reefs and mudflats, and for providing food resources for bird species. The assessment highlights the rich biodiversity of the area and the presence of several important conservation sites.

The assessment identified several sensitive receptors within the study area, including a variety of fish and shellfish species, as well as marine turtles, which are important for their ecological, social, and economic value. The key sensitive receptors were:

- Demersal fish: Species that live and feed on or near the seabed, such as plaice, common dab, common sole, lemon sole, Atlantic cod, whiting, haddock, poor cod, and anglerfish.
- Pelagic fish: Species that live in the water column, such as sprat, Atlantic mackerel, and Atlantic horse mackerel.
- Substrate-spawning fish: Species that lay eggs on the seabed, such as Atlantic herring and sandeel.
- Diadromous fish: Migratory species that move between fresh and saltwater, including European eel, Atlantic salmon, sea lamprey, river lamprey, sea trout, and twaite shad.
- Elasmobranchs: Sharks and rays, including basking shark, small-spotted catshark, nursehound, spiny dogfish, tope, starry smooth-hound, thornback ray, spotted ray, blonde ray, and cuckoo ray.
- Shellfish: Species such as common whelk, brown crab, European lobster, king and queen scallop, razor clams, *Nephrops* (Norway lobster), and blue mussels.
- Marine turtles: Species including leatherback turtle, loggerhead turtle, Kemp's ridley turtle, hawksbill turtle, and green turtle.

These receptors were identified due to their importance and potential sensitivity to impacts from the project development, such as seabed disturbance, underwater noise, and sediment deposition.

Key findings of the assessment

During construction, activities like preparing the seabed, anchoring, and laying cables will temporarily disturb the seabed. This can increase the amount of sediment in the water and affect fish and shellfish, especially those that can't move easily. Important areas for spawning, nursery, and feeding might be impacted. Underwater noise from construction can also harm marine life, causing injury or changes in behaviour.

Maintenance activities, such as cable maintenance and using vessels for foundation maintenance, will cause temporary and localised seabed disturbances. These impacts will be less extensive than during construction and will happen less often. The presence of underwater infrastructure may lead to long-term habitat changes.

To reduce noise impacts, the project will use a noise abatement system[19] and soft-start procedures during piling, which means gradually increasing the sound intensity over a period of time, allowing sensitive fish species to move away from the area before the noise reaches full volume. Bubble curtains will also be used during explosive clearance on unexploded ordnance[20] to reduce noise. This regularly used effective technology works by creating a barrier of bubbles in the water column, which helps to absorb and scatter sound waves, thereby reducing the noise levels that move through the water.

A marine pollution contingency plan will be in place to manage accidental spills and releases, ensuring compliance with relevant legislation. All cables will be buried where possible to reduce electromagnetic field exposure, and an offshore Project Environmental Management Plan with a biosecurity plan will be implemented to minimise the risk of introducing and spreading invasive species. These measures aim to mitigate the potential adverse effects on fish, shellfish, and marine turtle receptors throughout the project's lifecycle.

The cumulative assessment considered the combined effects of Dublin Array with other nearby projects, finding that while there are potential cumulative impacts, these are generally localised and temporary. Overall, the assessment highlights the importance of careful planning and management to protect the valuable habitats and species in the study area, with long-term impacts on fish and shellfish ecology not anticipated to be significant with appropriate mitigation measures in place.

Given the project's location in the Irish Sea, transboundary effects may include the dispersion of sediment plumes, underwater noise propagation, and the movement of migratory species. For instance, underwater noise generated during piling and unexploded ordnance clearance can travel significant distances, potentially affecting marine species in UK waters.

Assessment results

The environmental assessment concludes that the project is unlikely to have significant adverse effects on fish and shellfish ecology. Temporary increases in suspended sediment and deposition during construction are expected to be localised and short-lived, with sediment plumes dispersing quickly. Underwater noise from activities such as piling and unexploded ordnance clearance may travel further, but mitigation measures like a noise abatement system and soft-start procedures will minimise these effects. These disturbances are anticipated to be temporary and reversible, with marine species expected to resume normal behaviour shortly after works are completed.

19 A noise abatement system is a set of measures or equipment designed to reduce or control noise levels.
20 Unexploded Ordnance, which refers to military munitions (such as bombs, shells, or mines) that did not explode as intended and still pose a potential danger. They can remain in the ground or underwater and may become hazardous if disturbed.

The likelihood of significant transboundary effects is low due to the limited and short-term nature of the impacts, combined with the implementation of mitigation measures. Overall, the assessment finds that with these precautions in place, the project will not have significant long-term adverse effects on fish and shellfish ecology.

6.5 Marine Mammals

Assessment methodology overview

The assessment method for marine mammals involves defining the sensitivity of the environment and the magnitude of impacts using specific criteria. The study area included the Array Area and the Offshore Export Cable Corridor, and an extended area based on the movement patterns and population structures of the marine mammal species present in the region. This ensured that the assessment covered all areas that could potentially be impacted by the project. The study area was defined at two spatial scales: the Management Units scale for species-specific population units and the marine mammal survey area for local densities of each species.

Management Units are specific areas defined for different marine mammal species based on their population and movement patterns (Figure 21). These units help in understanding and managing the impacts on these species more effectively. For Dublin Array, the Management Units are:

- Harbour Porpoise: Celtic and Irish Seas;
- Bottlenose Dolphin: Irish Sea;
- Risso's Dolphin, Common Dolphin, Minke Whale: Celtic and Greater North Seas; and
- Grey Seal, Harbour Seal: East & South-east regions of the Republic of Ireland and Northern Ireland.

The marine mammal survey areas are the specific zones where detailed surveys were conducted to gather data on the presence and behaviour of marine mammals. These areas included the Array Area, the Offshore Export Cable Corridors, plus a buffer of 4 km to capture potential impacts on nearby marine mammals.

Baseline data was gathered from site-specific surveys and existing data sources, including vessel-based surveys, aerial surveys, and telemetry data. The assessment criteria involved defining the sensitivity of receptors based on their vulnerability, recoverability, and value/importance, with all marine mammals considered high value due to their protected status.

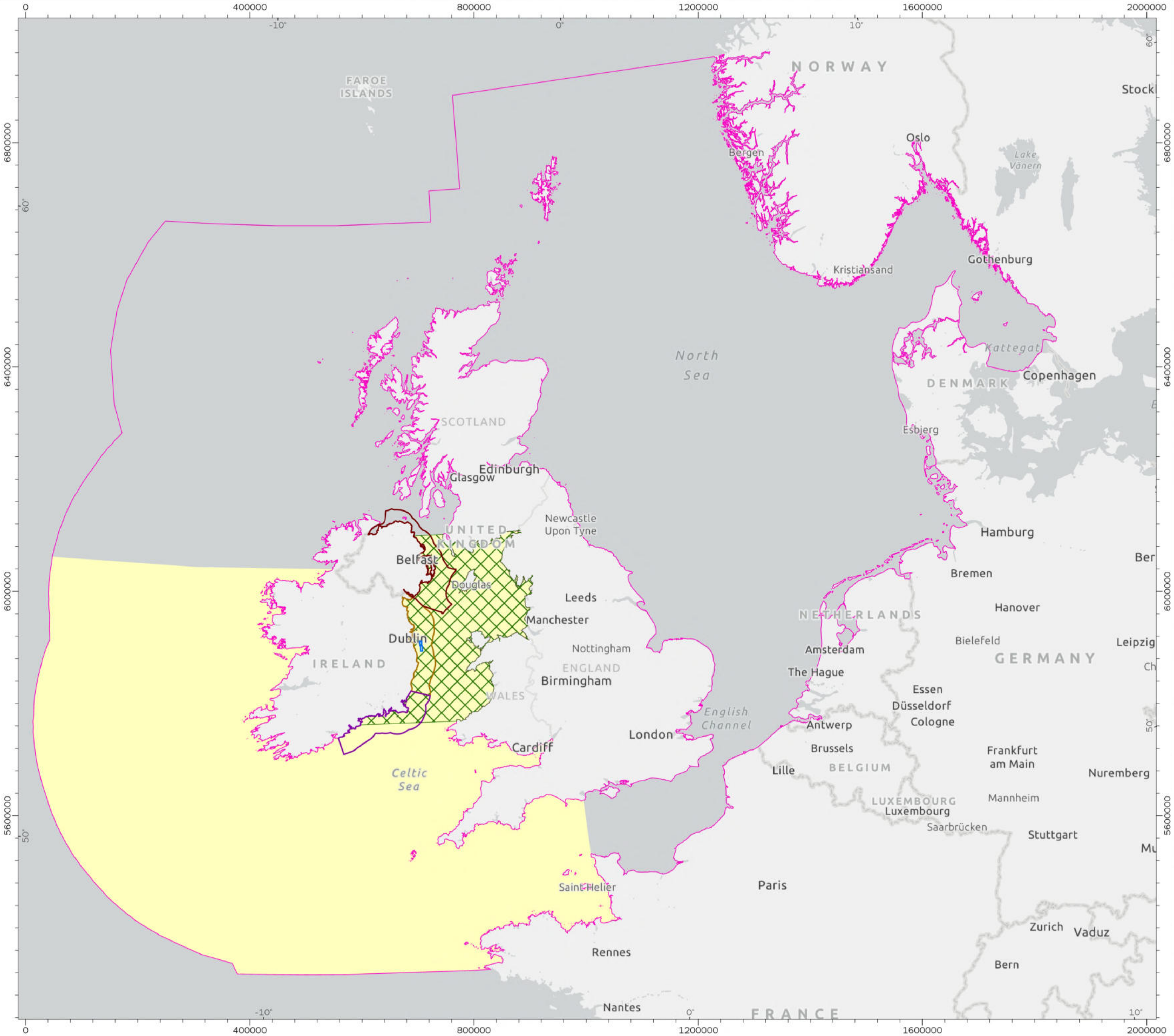
To assess the impact of underwater noise, a specialised model called INSPIRE was used to predict noise levels from pile driving(the hammering of wind turbine foundations into the seabed). The assessment included the inclusion of measures such as bubble curtains (a barrier of bubbles that dampens underwater noise) and pre-survey watches (checking for marine mammals before starting noisy activities). The likelihood of behavioural disturbance was estimated using established methods to determine when noise levels might significantly affect marine life.

A population model called iPCoD was used to predict the long-term effects of noise on marine mammal populations. This model considered both temporary disturbances and potential hearing damage, using expert input to estimate how these factors might impact survival and reproduction. By taking a detailed and precautionary approach, the assessment enabled potential effects on marine mammals to be carefully evaluated.

Description of the existing environment

The existing environment for marine mammals in the study area for the Dublin Array Offshore Wind Farm includes several species commonly found in the region. These include harbour porpoises, bottlenose dolphins, common dolphins, minke whales, grey seals, and harbour seals. Harbour porpoises are the most frequently sighted marine mammals, inhabiting the Celtic and Irish Seas. Bottlenose dolphins are present in the Irish Sea, often returning to the same areas due to their high site fidelity. Common dolphins, known for their large groups and wide distribution, are frequently recorded in Irish waters. Minke whales, typically seen in the spring and summer months, have a patchy distribution within the Irish Sea. Grey seals and harbour seals are found in the east and south-east regions of the Republic of Ireland and Northern Ireland, with grey seals known for their wide-ranging behaviour and harbour seals often seen near their haul-out sites on land. Seal haul-outs are areas where seals come ashore to rest, breed, molt or nurse their young.

To gather data on these species, monthly site-specific surveys were conducted over nearly two years, supplemented by additional information from previous studies and various sources. This comprehensive data collection provides a thorough understanding of the marine mammal populations in the area.



- Array Area
- Bottlenose Dolphin - Irish Sea Management Unit
- Common Dolphin and Minke Whale - Celtic and Greater North Seas Management Unit
- Harbour Porpoise - Celtic and Irish Sea Management Unit
- Grey Seal and Harbour Seal - Northern Ireland Management Unit
- Grey Seal and Harbour Seal - South East RoI Management Unit
- Grey Seal and Harbour Seal - East RoI Management Unit

DRAWING STATUS

FINAL

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MAP NOTES / DATA SOURCES:

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PROJECT TITLE

Dublin Array

DRAWING TITLE

Marine Mammal Study Area (Management Unit) for Each Species

DRAWING NUMBER: 21

PAGE NUMBER: 1 of 1

VER	DATE	REMARKS	DRAW	CHEK	APRD
01	2024-04-24	For Issue	GB	BB	SS

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0 30 60 90 120 nm

N GRID NORTH

SCALE	1:7,000,000	PLOT SIZE	A3
DATUM	WGS 1984	VERTICAL REF	LAT
PRJ	WGS 1984 UTM Zone 29N		

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Dublin Array Generation for generations

Kish Offshore Wind Limited - Bray Offshore Wind Limited

Key findings of the assessment

The assessment identified several potential impacts on marine mammals at different stages of the project. During construction, there is a risk of hearing damage from pile driving, geophysical surveys, and unexploded ordnance clearance. However, mitigation measures such as a noise abatement system, pre-survey watches and controlled use of deterrent devices will reduce these risks; these measures have been detailed in a Marine Megafauna Mitigation Plan included in the EIAR. Noise from construction activities could also disturb marine mammals, leading to temporary movement away from the area and changes in behaviour. Temporary increases in suspended sediment during construction could affect water quality and marine habitats, but these effects were expected to be short-lived and limited to specific areas and expected to not significantly impact marine mammals.

During operation, noise from wind turbines is predicted to be low and unlikely to disturb marine mammals. However, increased vessel traffic for maintenance could pose a risk of collisions and cause some disturbance. These risks will be minimised by implementing a code of conduct for vessel operators and ensuring vessels follow established route where practical. The assessment found no significant impacts from electromagnetic fields generated by the wind farm's electrical infrastructure.

During decommissioning, noise from removing structures could cause temporary hearing risks and behavioural disturbance, similar to the construction phase. Short-term increases in suspended sediment were also expected, but these effects were predicted to be localised and temporary.

The assessment also considered the combined impact of this project alongside other existing and planned developments in the region. Overall, it concluded that with the proposed mitigation measures, Dublin Array is unlikely to have significant long-term effects on marine mammals. Any disturbances are expected to be temporary, with marine species resuming normal behaviour once the activities stopped.

Assessment results

In summary, the study area includes several key species such as harbour porpoise, bottlenose dolphin, common dolphin, minke whale, grey seal, and harbour seal

During the construction phase, there is a risk of auditory injury from pile driving, geophysical surveys, and unexploded ordnance clearance, which could be significant without mitigation measures. However, with mitigation measures detailed in the Marine Megafauna Mitigation Plan which include a noise abatement system and pre-survey watches, the residual effects were reduced to not significant. Temporary increases in suspended sediment concentrations were considered slight adverse, with no significant residual effects expected.

During the operational phase, noise from operating wind turbines was rated as slight adverse, with residual effects not significant due to generally low noise levels. Increased vessel traffic for maintenance posed moderate adverse risks of collision and disturbance, but implementing a code of conduct for vessel operators and following existing routes reduced the residual effects to not significant. No significant impacts on marine mammals are expected from electromagnetic fields, with residual effects not significant.

During the decommissioning phase, noise from decommissioning activities was initially rated as moderate adverse, but with mitigation measures, the residual effects were reduced to not significant. Temporary increases in suspended sediment concentrations were considered slight adverse, with no significant residual effects expected. The assessment also considered the combined impacts of the Dublin Array project with other existing and planned projects in the region, ensuring that the overall impact remained within acceptable limits, with no significant residual effects.

Due to the mobile nature of marine mammals, there is potential for transboundary effects, as species assessed within the relevant Management Units may travel between the marine areas of different countries. Underwater noise during construction could cause behavioural disturbances over large ranges. However, these impacts are expected to be short-term and intermittent, with marine mammal populations recovering after construction. Disturbance to prey species from habitat loss and sediment deposition is predicted to be limited to a few kilometres. Overall, no significant transboundary effects will occur.

6.6 Offshore and Intertidal Ornithology

Assessment methodology overview

The assessment methods involved defining three specific study areas:

- The Offshore Ornithology Regional Study Area, which included the foraging ranges of breeding seabirds extending up to approximately 500 km from the Array Area;
- The Offshore Ornithology Study Area, which included the Array Area plus a 4 km buffer; and
- The Intertidal Ornithology Study Area, which included the intertidal zone from the high water mark to 1 km offshore.

Data collection involved several methods: monthly boat-based surveys from June 2019 to April 2021, intertidal surveys during the winters of 2019/2020 and 2023/2024, as well as autumn 2020, and comprehensive desk-based studies utilising published data and previous site surveys.

The assessment considered the magnitude and duration of impacts, their reversibility, timing and frequency, and the sensitivity and conservation importance of different bird species. Two main models were used: One for displacement effects, assessing how birds might be displaced from their habitats due to the wind farm, and another for collision risk modelling, estimating the number of birds that might collide with the wind turbines. Sensitivity was defined by the adaptability, tolerance, and recoverability of bird species, and their conservation importance. The magnitude of impact was defined by the extent, duration, frequency, and probability of the impact, and the significance of effect was determined by combining the sensitivity of the species with the magnitude of the impact.

Description of the existing environment

In the offshore study area, 28 seabird species were regularly recorded, with key species including red-throated diver, great northern diver, fulmar, Manx shearwater, gannet, cormorant, shag, common scoter, and various gulls and terns. The highest numbers of seabirds were recorded during the breeding season, with significant peaks for species such as Manx shearwater (3,785 birds in April) and gannet (1,167 birds in May). Different species showed varying patterns of abundance throughout the year, with some species like the red-throated diver being more prevalent in the non-breeding season.

In the intertidal study area, at least 30 species of waterbirds were recorded between November 2019 and October 2020. Key species included black-headed gull, shag, herring gull, great black-backed gull, oystercatcher, and ringed plover. Black-headed gulls and shags were the most frequently recorded species, with black-headed gulls present in 78% of counts and shags in 81% of counts. The highest counts for black-headed gulls were 120 birds in November 2019 and 100 birds in December 2019, while shags peaked at nine birds in December 2019.

The nearest SPA is Dalkey Islands SPA, approximately 3 km north of the intertidal study area, with the South Dublin Bay and River Tolka Estuary SPA about 7 km to the north.

Key findings of the assessment

The construction of Dublin Array will result in temporary disturbance and displacement of seabirds due to increased vessel activity and construction operations. Key activities include foundation installation, cable laying, and the use of jack-up vessels. These operations may cause direct disturbance to seabirds or indirectly affect them by altering the availability and distribution of prey. Species particularly sensitive to disturbance during construction include red-throated diver, cormorant, shag, guillemot, and razorbill.

During operation, seabirds may experience continued disturbance and displacement from ongoing vessel activity related to wind farm maintenance. Additionally, the presence of turbines could lead to long-term habitat loss and pose a collision risk for birds flying through the area. Artificial lighting on the turbines may further impact seabirds, potentially attracting or repelling them, which could lead to disorientation or collisions. Species most at risk from operational impacts include gannet, kittiwake, gulls, and terns. The collision risk modelling assessment indicates that collision rates would be low, particularly for gannet and kittiwake, due to natural avoidance behaviours and flight height distributions. Migratory species are at risk of colliding with turbines when passing through the Array Area on seasonal migration during spring and autumn. The migratory collision risk model predicted that annual collision of non-seabirds during migration would be less than one bird a year.

Decommissioning impacts are expected to be similar to or slightly lower than those of construction. Vessel activity and removal operations may disturb seabirds, while indirect effects on prey availability could occur due to sediment disturbance and underwater noise. The species affected during decommissioning are expected to be the same as those impacted during construction.

The assessment considered the potential cumulative effects of Dublin Array in combination with other offshore wind farms in the region. The focus was on cumulative collision risk, habitat loss, disturbance, and changes in prey availability. The majority of seabed disturbances will occur during construction and decommissioning, but affected habitats are expected to recover quickly, resulting in no significant impact on prey availability. Cumulative impacts on seabird populations, particularly gannet, kittiwake, guillemot, and razorbill, were assessed as negligible to low, with no significant population-level effects anticipated. The high mobility of seabirds and their ability to adapt to different prey sources further reduces cumulative impact significance.

Potential transboundary impacts were assessed, considering seabird foraging ranges and migration patterns in the Irish Sea.

Assessment results

The assessment found that Dublin Array will have minor and temporary effects on seabirds, with no significant long-term impact on their populations. During construction, increased vessel activity and installation work may disturb some birds, but these effects will be localised and short-term, allowing bird populations to recover once the work is completed.

During operation, the wind farm may cause some ongoing disturbance from maintenance vessels, and there is a small risk of birds colliding with the turbines. However, studies show that seabirds, including species like gannet and kittiwake, will tend to avoid the turbines, and collision rates are expected to be very low. Any potential habitat loss is also expected to have minimal impact on overall bird populations.

Decommissioning impacts are expected to be similar to construction, with temporary disturbance from vessel movements and seabed activity, but again, no lasting effects on seabirds.

The assessment also considered the combined effect of Dublin Array with other wind farms in the area. Since seabirds are highly mobile and can adapt their foraging behaviour, the overall impact is expected to be negligible to low, with no risk to seabird populations.

6.7 Bats in the offshore environment

Assessment methodology overview

The study area for the assessment of the potential impacts on bats in the offshore environment is located within the Irish Sea. The assessment primarily focused on bat presence and migration activity near the Array Area (where the proposed turbines will be located), covering both nearshore and offshore environments. Key locations for monitoring included Sorrento Point, Dalkey Island, and existing offshore structures such as Muglins and Kish Bank lighthouses. This range allowed for monitoring both onshore bat foraging and any possible bat movement offshore.

Data collection involved both desk research and direct field monitoring. The desk study gathered existing data from local bat groups on both sides of the Irish Sea and research reports on bat migration across the Irish Sea, focusing on historical sightings and records within 1–2 km of the coast. Fieldwork utilised automated bat detectors placed onshore and offshore to record bat activity and movement patterns. Sensitivity assessments of bat species were conducted using receptor criteria and impact magnitude levels, considering the limited data on bat behaviour in offshore environments. A precautionary approach was taken for species that may migrate or forage offshore.

Description of the existing environment

A literature review and desk study revealed that bat activity peaks for Leisler’s and Nathusius’ bats were observed along the Pembrokeshire coast during late summer and autumn (BSG Ecology, 2014). However, there was no clear evidence of migration between the UK and Ireland found. Additional studies, including a study on the bat migration over the Irish Sea in a Sustainable Environment Project in 2015, recorded low bat activity in coastal areas, with no offshore detections. The National Resources Wales Bat Migration Project (2017-2018) also recorded some bat activity at coastal locations but did not provide conclusive evidence of migration between Ireland and Wales. More recent monitoring from the Irish Bat Monitoring Programme (2018-2021) (a coastal/terrestrial monitoring programme) confirmed the presence of various bat species in the region, with Leisler’s bats being more frequently encountered than Nathusius’ pipistrelle, which was rarely detected.

Field surveys using static bat detectors were conducted for the Dublin Array project, from late spring to autumn at Sorrento Point, Dalkey Island, Muglins Lighthouse, and Kish Bank Lighthouse. The key findings were:

- Sorrento Point recorded the highest bat activity, with five species and the Myotis genus detected. Bat activity was consistently higher than at offshore locations;
- Dalkey Island recorded the same species as Sorrento Point but with half the activity levels;

- Muglins Lighthouse recorded four species, with bat activity at 6% of that at Sorrento Point; and
- Kish Bank Lighthouse recorded three species, with bat activity at 1.5% of that at Sorrento Point. Bats were detected on 21 out of 160 nights, primarily under low wind and warm night time conditions.

The following bat species were found within the study area:

- Leisler's bat (*Nyctalus leisleri*);
- Nathusius' pipistrelle (*Pipistrellus nathusii*);
- Common pipistrelle (Pipistrellus pipistrellus);
- Soprano pipistrelle (*Pipistrellus pygmaeus*);
- Brown long-eared bat (*Plecotus auritus*); and
- Myotis genus (likely *Myotis daubentonii*).

Key findings of the assessment

An offshore wind farm could impact bats in two main ways. Firstly, bats may be at risk of collision with turbine blades or barotrauma caused by pressure changes around the turbines, which can result in fatal injuries. Secondly, the presence of the wind farm could lead to displacement and disturbance. Noise and artificial lighting, particularly at night, could disrupt bats during migration or deter them from foraging in the area. These impacts may particularly affect species that migrate long distances or hunt for prey over open water.

The field surveys indicate that bat activity in the offshore environment is generally low. The highest activity levels were recorded at Sorrento Point on the coast, with significantly reduced activity at offshore locations such as Dalkey Island, Muglins Lighthouse, and Kish Bank Lighthouse. This suggests that while some bat species may forage or migrate offshore, their presence and activity are limited in these areas.

The study identified the presence of several bat species in the study area, including Leisler's bat, Nathusius' pipistrelle, common pipistrelle, soprano pipistrelle, brown long-eared bat, and the Myotis genus. However, the activity of these species was much lower offshore compared to nearshore areas.

During the construction, operational, and decommissioning phases of the offshore wind farm, potential impacts on bats are considered negligible. In the construction phase, disturbance could occur due to noise, light, and vibration, potentially affecting roosting bats or bats foraging and migrating at night. However, the likelihood of bats using partially constructed offshore structures for roosting is low, and bat activity offshore is minimal. During the operational phase, impacts could involve disturbance of bats roosting on turbines, collision with blades, barotrauma from pressure changes, or disturbance from lighting. Due to the low level of bat activity the risk of these impacts is low. In the decommissioning phase, potential disturbances will be similar to those during construction, such as disruption to roosting bats or removal of foraging resources. However, these impacts are also considered minimal due to the low likelihood of bats using the offshore structures. The assessment also found no significant cumulative or transboundary effects, with the minimal bat activity in the area suggesting no significant impacts when considered alongside other projects. No additional mitigation measures were deemed necessary beyond the project's design and operational plans, which aim to minimise environmental disturbance, ensuring that the impacts on bats remain negligible and no lasting adverse effects on local bat populations occur.

6.8 Nature Conservation

Assessment methodology overview

The study area for the Nature Conservation assessment was defined to ensure all potential impacts on designated sites were considered. It covered the offshore wind farm site, the Offshore Export Cable Corridor, temporary occupation areas[21], and a 17 km buffer around the offshore infrastructure.

This area included a range of ecological and physical features, such as marine and coastal habitats, protected species, and geological sites. Baseline data was gathered through a detailed review of existing studies and datasets to establish current conditions.

The assessment evaluated the sensitivity of nature conservation sites, considering factors such as adaptability, tolerance, recoverability, and ecological value. The potential impact magnitude was assessed based on its extent, duration, frequency, and consequences. By combining sensitivity and impact magnitude, the study determined the overall significance of potential environmental effects, ensuring a thorough and balanced evaluation.

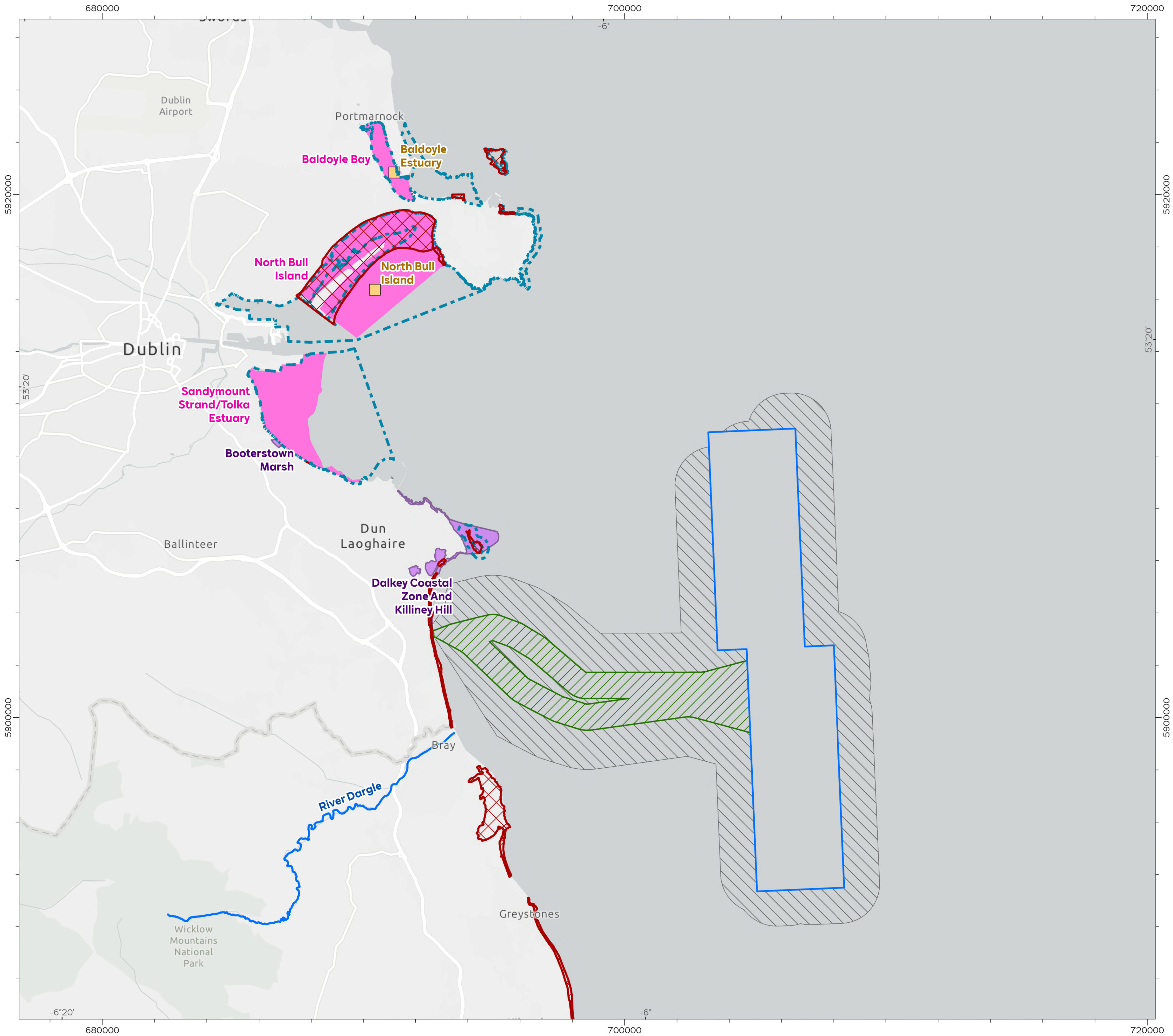
Description of the existing environment

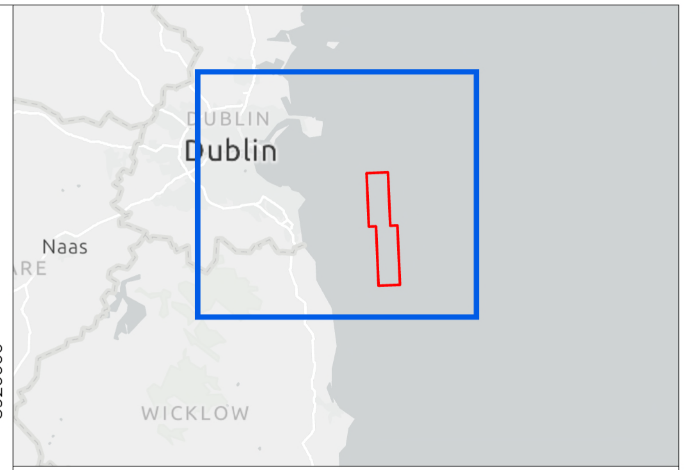
The existing environment includes various designated nature conservation sites within the study area, categorised by their international, European, national, and local significance, marine and coastal habitats, protected species, and geological features.

21 Temporary occupation areas are designated zones where land or marine space is temporarily used for activities related to the construction activities.

- **International designations**: These include Ramsar Sites (Baldoyle Bay, North Bull Island, Sandymount Strand/Tolka Estuary), the Dublin Bay UNESCO Biosphere Reserve, and Important Marine Mammal Areas like the Celtic Sea and Central Irish Sea.
- **European designations**: Natura 2000 sites, including Special Areas of Conservation and Special Protection Areas, such as Rockabill to Dalkey Island and South Dublin Bay Special Area of Conservation. The River Dargle is designated as a Salmonid Water to protect water quality for salmon and trout species.
- **National designations**: These include Natural Heritage Areas, Refuges for Fauna (e.g. Rockabill Refuge for Fauna), nature reserves (e.g. North Bull Island, Baldoyle Estuary), Special Amenity Area Orders like Howth Head, Wildfowl Sanctuaries (e.g. North Bull Island), and Wicklow Mountains National Park.
- **Local Designations**: County Geological Sites such as Dalkey Island and Killiney Bay.

Nature conservation sites scoped into the assessment are shown on Figure 22. Baseline data was collected through a detailed review of existing studies and datasets to understand the current state of these sites before any project activities begin. This comprehensive approach ensures all potential impacts on nature conservation sites are captured, aiming to protect important habitats and species while allowing for the development of the offshore wind farm.





- Array Area
- Temporary Occupation Area
- Export Cable Corridor
- Proposed Natural Heritage Areas
- RAMSAR Sites
- Geoheritage Audited Sites
- UNESCO Biosphere Reserve (Dublin Bay) Core Zone
- Salmonid Waters
- Nature Reserve

DRAWING STATUS **FINAL**

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PROJECT TITLE **Dublin Array**

DRAWING TITLE **Nature Conservation Sites Scoped in for Assessment**

DRAWING NUMBER: 22 PAGE NUMBER: 1 of 1

VER	DATE	REMARKS	DRAW	CHEK	APRD
01	2024-06-10	For Issue	GB	BB	SS

0 1.5 3 4.5 6 km
0 0.8 1.5 2.3 3 nm
N GRID NORTH

SCALE	1:150,000	PLOT SIZE	A3
DATUM	WGS 1984	VERTICAL REF	LAT
PRJ	WGS 1984 UTM Zone 29N		

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Dublin Array Generation for generations
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Key findings of the assessment

During the construction phase the installation of wind turbine foundations and cables can temporarily increase the levels of suspended sediments in the water, which may affect marine life, particularly benthic habitats and migratory fish. Additionally, the noise generated from construction activities, such as piling, can disturb marine mammals and fish, potentially causing them to avoid the area. Birds may also experience disturbance and displacement due to increased vessel traffic and construction activities.

In the operational phase, the presence of the wind turbines and associated infrastructure can lead to changes in the local environment. Birds may be at risk of collision with the turbines, and some species might avoid the area altogether, leading to potential displacement. The physical presence of the turbines and cables can alter local hydrodynamic conditions, which might affect sediment transport and benthic habitats.

During the decommissioning phase, the removal of the wind farm infrastructure can again lead to temporary increases in suspended sediments and noise, similar to the construction phase. The dismantling of turbines and other structures may disturb marine and bird species, causing temporary displacement. Additionally, the removal process can impact coastal geological features, particularly if any buried cables or foundations need to be extracted.

To minimise disruption to the shoreline and coastal cliffs, a below ground method will be used to install the offshore export cable where it comes ashore. A Marine Biosecurity Plan will be in place to stop the spread of invasive species. To protect marine life, vessel operators will follow a strict code of conduct, and piling activities will use a noise abatement strategy and soft start approach, gradually increasing noise levels to give marine animals time to move away. These measures are outlined in a Marine Mammal Mitigation Plan, included in the EIAR.

There will be no significant transboundary effects. Potential impacts of the wind farm will not extend beyond Ireland's territorial waters to affect neighbouring countries. The study area includes a buffer zone that overlaps slightly with UK waters, but no significant interactions with UK projects were identified. Therefore, the environmental effects of the wind farm are contained within Ireland's jurisdiction, ensuring that neighbouring countries will not experience any adverse impacts from the project.

Assessment results

During construction, activities like dredging and cable installation may temporarily increase sediment in the water, which could affect the habitats of marine life and migratory fish. However, these impacts are expected to be low, with species likely to recover quickly. Underwater noise from piling may disturb migratory fish, but this effect will be slight and short-lived. Construction activities may also temporarily disturb and displace birds, but again, the impact is minor and short-term. The use of trenchless techniques to install the cable at the Landfall reduces any potential impacts on coastal geological features, and any changes will be temporary and localised.

During the operational phase, the presence of infrastructure could slightly change local water movement and wave patterns, which may affect sediment movement and marine habitats, but the impact is minimal. Ongoing vessel activities and structures above the surface may disturb and displace birds, but this effect is also minor. The risk of birds colliding with the wind turbines is very low, with fewer than one collision expected per year. The operation of the infrastructure is not expected to significantly impact coastal geological features.

During decommissioning, activities are expected to create less suspended sediment than during construction, with minimal impact on marine habitats and wildlife. Underwater noise during this phase will also be much lower, leading to only slight, temporary disturbance to migratory fish. Decommissioning may temporarily disturb and displace birds, but the impact will be short-lived. Removing the infrastructure will have a low impact on coastal geological features.

Overall, the assessment found that the potential impacts on nature conservation sites throughout all phases of the project are generally low to moderate and not significant.

6.9 Commercial Fisheries

Assessment methodology overview

The study area for the Commercial Fisheries chapter was defined to include both the Array Area and the Offshore Export Cable Corridors. The International Council for the Exploration of the Sea (ICES) divides the seas into a system of statistical rectangles, which are further subdivided into smaller units called ICES triangles. These triangles provide a more detailed way to track and analyse fishing activities and landings data within specific areas. The study area falls within two of these statistical rectangles: 35E3 and 35E4. The area for the offshore wind farm is located within ICES rectangle 35E4, while the Offshore Export Cable Corridors span both 35E3 and 35E4. To get a clearer picture of fishing activities in the area, the study also looked at a larger surrounding region, which includes extra ICES rectangles (34-36E3 and 34-36E4). This wider area helps assess the potential impacts on fishing, including how the project might affect fishing activities in the region as a whole.

For cumulative effects assessment, the study area was extended to the entire Irish Sea (ICES Division 7a). This comprehensive approach ensures that all potential interactions with other projects and activities in the Irish Sea are considered.

By defining the study area to include the Array Area, offshore cables, and relevant ICES statistical rectangles, the assessment thoroughly evaluated the potential impacts on commercial fisheries and ensured that mitigation measures are appropriately targeted.

Baseline data was collected from various sources, including information on the types and quantities of fish and shellfish caught by Irish and EU vessels, sourced from official records. The movements of fishing boats were tracked to assess where and how often they fished. A survey was conducted on the Kish and Bray Banks to gather more detailed information about the local fish and shellfish populations. Additionally, extensive discussions were held with local fishermen and industry representatives to include their perspectives.

Description of the existing environment

The main fishing ports near the project area are Howth, Dún Laoghaire, Greystones, Wicklow, Arklow, and Kilmore Quay, with key species landed including whelk, brown crab, lobster, king scallop, and queen scallop. Whelk potting is a significant activity with up to 25 whelk potting vessels fish within the Array Area and Offshore Export Cable Corridor as part of their typical fishing grounds, with an additional five potting vessels that target a mixture of whelk, brown crab and lobster. Crab and lobster potting is more prominent in the inshore areas and less in the Array Area. Notable scallop dredging activity occurs along the southeast edge of the Array Area, while some demersal trawling is recorded mainly outside the 12 NM boundary. Minimal activity is noted for mussel seed and razor shell fisheries in the project area, and occasional inshore sprat fishery is highly seasonal.

The economic value of whelk landings from the Irish Sea was €8.3 million in 2022, with significant portions landed at local ports. Other species like plaice, sole, and scallops also contribute to the local economy. The Array Area overlaps with 3.2% of the whelk fishing grounds along the southeast coast, and scallop grounds are identified along the east edge of the Array Area.

Key findings of the assessment

During the construction phase, the presence of wind farm infrastructure and associated activities will reduce access to established fishing grounds, potentially displacing fishing activities and leading to gear conflict and increased fishing pressure on adjacent grounds. Construction activities may also disturb commercially important fish and shellfish resources, causing displacement or disruption of fishing activity. Additionally, increased vessel traffic related to construction may interfere with fishing operations.

During the operational phase, the presence of the offshore wind farm infrastructure may limit access to certain fishing areas. This could lead to some displacement of fishing activities, potentially causing fishermen to use nearby areas more intensively. While operation and maintenance activities are ongoing, there may be some temporary disturbance to fish and shellfish, and the movement of maintenance vessels might occasionally interfere with fishing operations. Additionally, there is a possibility of fishing gear becoming snagged on the infrastructure.

During decommissioning, similar impacts to construction are expected, including temporary restrictions on fishing areas and potential displacement of fishing activities. Fish and shellfish may be disturbed, and vessel traffic could interfere with fishing operations.

Cumulatively, the project, along with other developments, may further reduce access to fishing grounds and displace fishing activities, leading to increased gear conflict and fishing pressure on adjacent grounds.

Assessment results

During construction, access to fishing grounds will be temporarily reduced, with a moderate impact on the whelk potting fleet. Cooperation agreements[22] will help reduce this to a slight impact. Other fishing fleets will experience slight to minimal effects. Displacement, disturbance to fish and shellfish, and increased vessel traffic will have slight effects on potting and dredge fleets, while other fleets will see minimal impact.

During operation, reduced access to fishing grounds will continue to moderately affect the whelk potting fleet. However, gear trials and monitoring will help lessen this impact. These trials will allow fishers to test alternative methods or gear modifications, while ongoing monitoring will track changes in fish stocks and fishing patterns, ensuring adjustments can be made if needed. Other fleets will experience slight to minimal effects. Displacement, vessel traffic, and gear snagging will have slight impacts on potting and mobile gear fleets.

Decommissioning will have similar effects to construction, with temporary restrictions on fishing grounds. The whelk potting fleet will again experience a moderate impact, reduced to slight through cooperation agreements. Other fleets will face slight to minimal effects. Displacement, disturbance to fish and shellfish, increased vessel traffic, and gear snagging will cause slight impacts on potting and mobile gear fleets.

Cumulatively, the combined effect of Dublin Array and other developments, including Codling Wind Park, Arklow Bank Phase 2, NISA and Oriel Wind Farm, may further reduce fishing access and displace activities, potentially increasing competition for space and leading to occasional gear conflicts. The cumulative impact on most fleets will be slight to minimal, though the whelk potting fleet may experience a moderate impact, which will be reduced through effective implementation of the Fisheries Mitigation and Management Strategy included with the EIAR.

22 Cooperation agreements are formal arrangements between project developers and fishing industry representatives to minimise conflicts and manage potential impacts.

The project is not expected to have noticeable effects on commercial fish stocks at an international level, and any impact on foreign fishing fleets will be similar to those experienced by local fleets, remaining slight to minimal. Throughout the project, ongoing collaboration with the fishing industry—through cooperation agreements, gear trials, and regular communication—will be key to minimising disruptions.

6.10 Shipping and navigation

Assessment methods

This section outlines the assessment of shipping and navigation impacts for Dublin Array, focusing on a study area that extends 10 nautical miles from the project site. This distance is standard for evaluating how shipping traffic might interact with offshore developments and helps capture relevant information while remaining site-specific.

The assessment followed the Formal Safety Assessment approach, a widely recognised methodology for marine risk assessment. This approach, agreed upon with the Marine Safety Office and Irish Lights, involved several key steps. First, potential hazards in maritime operations were identified, ranging from collisions and groundings to equipment failures and environmental factors. Next, the risks associated with these hazards were analysed by assessing their likelihood and potential consequences. Following this, various risk control options were evaluated, which could have included procedural changes, new technologies, or additional crew training. A cost-benefit analysis was then conducted to determine which risk control options provided the greatest safety benefits relative to their costs. Finally, recommendations were made for implementing the most effective measures. This structured approach ensured that safety measures were both effective and economically viable, enhancing overall maritime safety.

Description of the existing environment

The Array Area is located on the Kish and Bray Banks, which are significant navigational features due to their shallow depths. Most vessel traffic already avoids this area. The primary port in the vicinity of Dublin Array is the Dublin Port with significant commercial traffic transiting to and from it. Other relevant ports and marinas include Dún Laoghaire, Wicklow, Bray, Greystones, and Howth. Access to Dublin Port is through the South Burford and North Burford Traffic Separation Schemes, with four pilot boarding areas nearby. The area between these separations schemes is designated as an “Area to be Avoided” due to shallow depths and overfalls.

There are eight charted wrecks within the Array Area, including the RMS Leinster to the east. Dive boats frequently visit these wrecks. Four anchorage areas were identified, with the Dublin anchorage often at capacity, leading vessels to anchor further south. Navigational features in the study area are shown in Figure 23.

Incident data from the Royal National Lifeboat Institution and Marine Casualty Investigation Board was reviewed to establish baseline incident rates. Seven significant incidents were reported by the Board, including groundings, collisions, and a capsize. The Royal National Lifeboat Institution responded to an average of 84 incidents per year, mostly within 3 nautical miles of the shore, with machinery failure being the most common cause.

Vessel traffic data from 2022 and 2023 showed an average of 58 unique vessels per day in winter and 81 in summer, with cargo, passenger, fishing, and recreational vessels being the most common types. Most commercial vessels were transiting to or from Dublin Port, while recreational and fishing vessels were mainly in coastal areas. Nine main vessel routes were identified, with the busiest being Dublin to Liverpool.

Key findings of the assessment

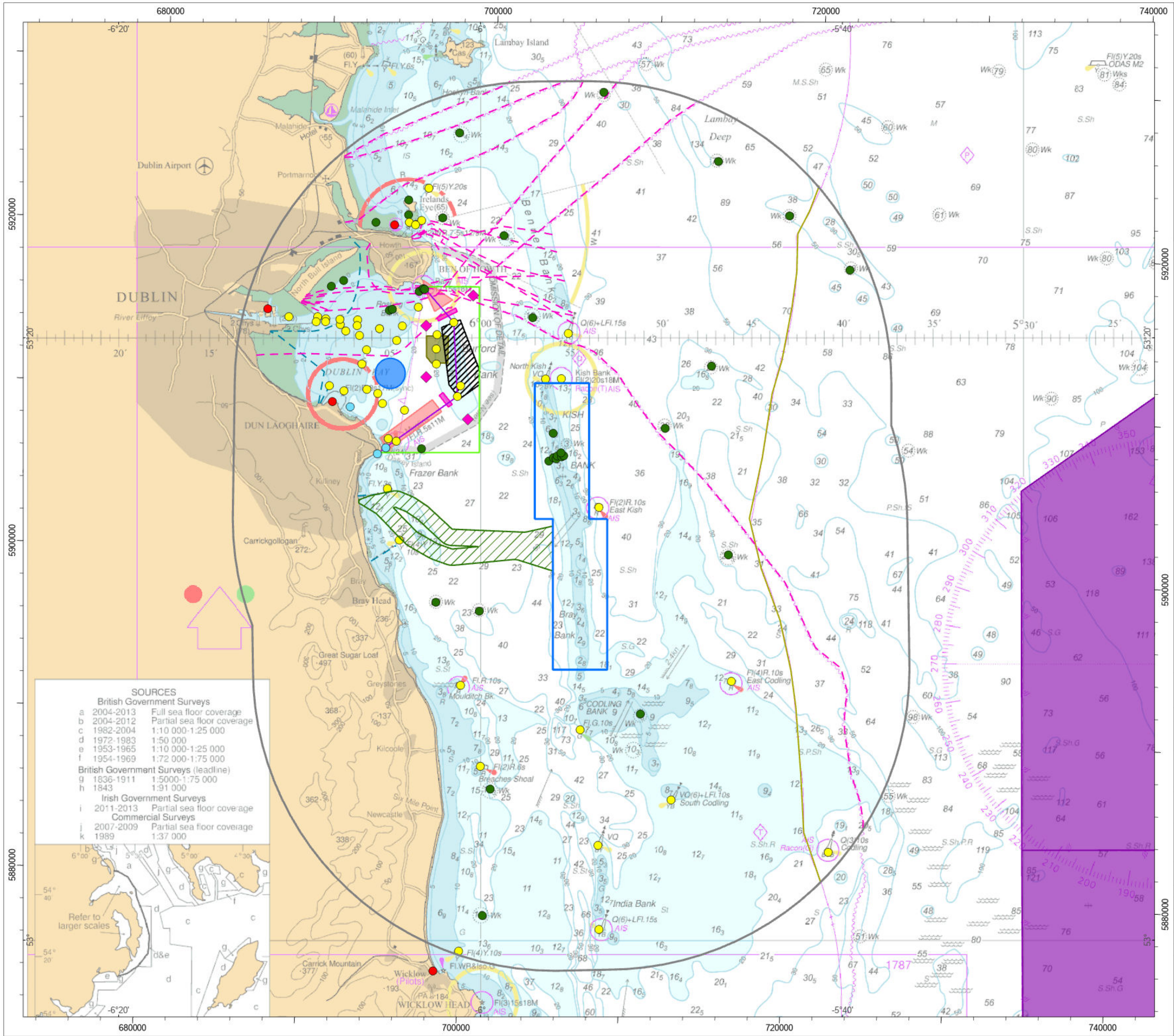
The presence of Dublin Array may cause minor deviations in vessel routes, especially for commercial vessels, but these changes are expected to be minimal. Smaller vessels, such as fishing and recreational boats, are likely to continue crossing the Kish and Bray Banks. The assessment concluded that these minor deviations would not significantly impact overall navigation safety or efficiency.

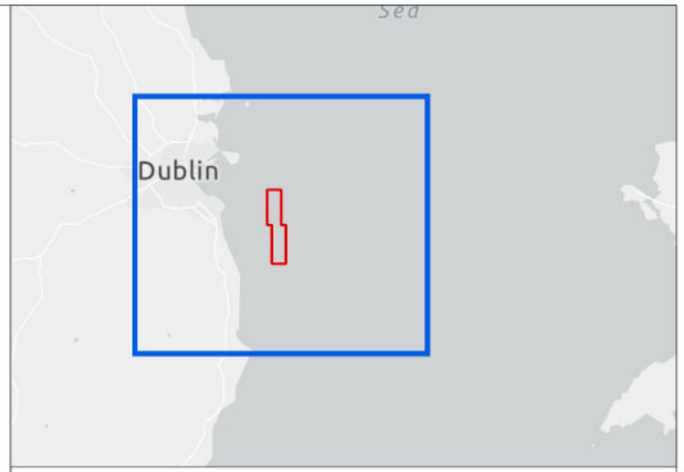
The risk of collisions between project vessels and other vessels is managed through adherence to international regulations and centralised marine coordination. The likelihood of vessels colliding with wind farm structures is low, particularly for commercial vessels that already avoid the shallow banks. The assessment emphasised that compliance with the International Regulations for Preventing Collisions at Sea and effective marine coordination would mitigate collision risks.

Access to ports and anchorages is not expected to be significantly affected by the wind farm. Movements of project vessels will be carefully coordinated to minimise any potential disruptions. Additionally, the presence of project vessels will enhance emergency response capabilities, providing extra resources if necessary. Emergency response plans will be developed in collaboration with relevant authorities to ensure effective coordination. The assessment highlighted that these measures will ensure that port operations and anchorage access remain efficient and safe.

The assessment did not identify any significant cumulative or transboundary effects. The low levels of vessel displacement and minimal impacts associated with this project suggest that there will be no significant cumulative effects when considered alongside other projects. The assessment concluded that, when combined with other existing or planned offshore developments, the project's impacts will not result in significant adverse effects on shipping and navigation.

Mitigation measures include advisory safe passing distances, inclusion of Dublin Array infrastructure on marine charts, emergency response plans, and the use of temporary guard vessels when necessary. These measures ensure that the impacts on shipping and navigation are minimised and kept within acceptable levels. The assessment recommended these measures to maintain high safety standards and minimise any potential disruptions to maritime activities.





- Array Area
- Offshore Export Cable Corridor
- Study Area

Navigational Features

- Aid to Navigation
- Charted Anchorage
- Charted Wreck
- Harbour / Marina
- Pilot Boarding Station
- Subsea Cable
- Subsea Pipeline
- Territorial Sea Limit
- Pilotage Limit
- Dublin Port Limit
- Area to be Avoided
- Anchorage Area
- Traffic Separation Scheme
- Inshore Traffic Area
- Spoil Ground
- Firing Practice Area

DRAWING STATUS **FINAL**

DISCLAIMER

MAP NOTES / DATA SOURCES:

PROJECT TITLE
Dublin Array

DRAWING TITLE
Figure 23 Navigational Features

DRAWING NUMBER: A4561-ANA-DA-EIAR-0113

PAGE NUMBER: 1 of 1

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01	06/08/2024	For Issue	DS	IK	AF

0 3.5 7 10.5 14 km
0 1 2 3 4 nm
GRID NORTH

SCALE	1:400,000	PLOT SIZE	A3
DATUM	WGS 1984	VERTICAL REF	LAT
PRJ	WGS 1984 World Mercator		

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Kish Offshore Wind Limited - Bray Offshore Wind Limited

Assessment results

Overall, Dublin Array is assessed to have no significant adverse effects on shipping and navigation. The assessment concluded that with the implementation of the proposed mitigation measures, the project would not pose significant risks to shipping and navigation, allowing for safe coexistence with existing maritime operations.

6.11 Marine Infrastructure and Other Users

Assessment methodology overview

The study area for the assessment of Marine Infrastructure and Other Users was defined based on the project's Zone of Influence, which includes all offshore works and a wider impact buffer, which extends 17 km around the Array Area and Offshore Export Cable Corridor. This includes 16 km to account for how far water moves during the strongest tides (spring tidal excursion), plus an extra 1 km.

Baseline data was gathered by reviewing existing licences, records, and maps from various sources such as the Environmental Protection Agency, Integrated Mapping for the Sustainable Development of Ireland's Marine Resources, and the Commission for Communications Regulation. Operators were also consulted to confirm accuracy and provide extra details.

The assessment of marine infrastructure and other users considered the magnitude and duration of potential impacts, their reversibility, and the timing and frequency of activities. The sensitivity of various assets, such as subsea cables, pipelines, and wastewater outfalls, was evaluated based on their current operational condition, structural integrity, and regulatory compliance (current status), as well as their economic value, functional significance, and potential environmental impact (importance). For telecommunications, a different approach was used, which involved mapping antenna and signal towers and consulting service providers to assess potential impacts on signal quality and coverage.

Description of the existing environment

The existing environment in the marine infrastructure and other users study area includes a variety of assets and activities. This includes subsea cables, such as telecommunications and gas pipelines, which connect Ireland to the UK, continental Europe, and the USA. The area also contains wastewater treatment works and outfalls associated with Shanganagh-Bray and Ringsend wastewater treatment plants. Additionally, there are designated Dumping at Sea sites used for the disposal of dredged material, such as the Burford Bank site used by Dublin Port. Kish Bank Lighthouse, an important navigational aid, is located within the study area, approximately 0.3 km from the Array Area.

Arklow Bank Wind Park is located within the study area, along with two proposed wind farm: Arklow Bank Phase 2 and Codling Wind Park. Telecommunications infrastructure, including antenna and signal towers, is present along the coastline.

Key findings of the assessment

During construction, potential impacts on existing marine infrastructure include disturbance or damage to wastewater outfalls from as cable installation. Temporary access restrictions may affect maintenance, and increased sediment deposition could bury infrastructure. Construction vessels may also interfere with telecommunications signals, though this is unlikely due to the distance from the nearest masts.

During operation, the main impacts involve restricted access to assets due to the wind farm infrastructure and maintenance activities. Changes in hydrodynamics, waves, and sediment transport may cause minor disturbances to assets, but these effects will be localised. Interference with telecommunications signals is considered unlikely due to the distance from masts. It should also be noted that the export cables associated with Dublin Array will also cross export cables from the proposed Codling Wind Park and needs to be carefully designed based on which cables are installed first.

Decommissioning will cause impacts similar to construction, including potential damage to assets, temporary access restrictions, and increased sediment deposition. Infrastructure removal may briefly raise sediment levels, but these effects will be short-term and localised.

No transboundary impacts have been identified; the predicted impacts on marine infrastructure and users are limited to Irish waters and are not expected to affect neighbouring jurisdictions.

Assessment results

The assessment of marine infrastructure and other users concludes that potential impacts, such as direct disturbance, damage to assets, restricted access, and increased sediment deposition, are not significant with appropriate mitigation measures. These measures include pre-construction surveys, cable crossing agreements, maintaining safe distances from wastewater outfalls, and engaging with relevant authorities for navigational safety. Cumulative impacts from other projects are also considered not significant. Overall, the project is expected to have minimal adverse effects when these mitigation measures are implemented.

6.12 Aviation and Radar

Methodology overview

The assessment of impacts on aviation and radar involved a comprehensive desk-based study, utilising existing evidence on the effects of offshore wind farms on aviation receptors. The study area includes the Array Area, the Offshore Export Cable Corridors, and the airspace extending from Point Rush in the north to Casement Aerodrome in the west, Newcastle Airfield to the south, and east to the Shannon Flight Information Region boundary. Radar within a wider region, which extends into the UK were also included in the assessment. The study area therefore encompasses all potentially affected airfields and aviation radar systems with consideration of detection range and operational coverage.

The assessment considered various factors, including radar systems, flight procedures, and potential physical obstructions. Consultations with relevant stakeholders, such as the Irish Aviation Authority, AirNav Ireland and the Department of Defence, were conducted to ensure all potential impacts were thoroughly evaluated.

Description of the existing environment

The sensitive receptors in the study area for aviation and radar include:

- Dublin Airport: Located 24.7 km from the Array Area, it operates under both Visual Flight Rules (VFR) and Instrument Flight Rules (IFR)[23].
- Weston Airport: Situated 36.2 km from the Array Area, it also operates under VFR and IFR.
- Casement (Baldonnel) Aerodrome: Located 33 km from the Array Area, it operates under VFR and IFR.
- Newcastle Airfield: Positioned 11.3 km from the Array Area, it operates under VFR with no published IFPs. The airfield supports light aircraft and occasional helicopter operations by the Irish Coast Guard and Irish Air Corps.
- Kish Lighthouse: Located on the northern edge of the Array Area, it is serviced by helicopter operations under VFR.
- Meteorological radar: The closest system is at Dublin Airport, more than 20 km from the study area. The impact on weather radar operations is considered minimal.

23 Visual Flight Rules (VFR): A set of regulations allowing pilots to fly using visual references to the ground and weather conditions, typically in clear skies and good visibility.
Instrument Flight Rules (IFR): A set of regulations for flying when visual references are not possible, relying on instruments and navigational aids for control, usually in poor weather conditions or at night.

- Military operations: While the project area is not within designated military exercise or training areas, military aircraft may operate autonomously in the surrounding airspace.
- Search and Rescue: The Irish Coast Guard conducts search and rescue operations in the area.

Key findings of the assessment

During construction, turbines and equipment could present as obstacles for aircraft, but safety measures such as aviation lighting, updated airspace charts, and notifications to pilots will help maintain safe operations. Helicopter flights supporting construction may slightly increase air traffic, though air traffic control and standard procedures will manage this effectively.

Turbine heights have been limited to 309.6 m above LAT to ensure that are located below published Instrument Flight Procedures heights. In addition, no turbines will be placed within 1.32 km of the Kish lighthouse to ensure safe helicopter access. Once operational, turbines will remain permanent obstacles, but ongoing safety measures and controls will ensure pilots are aware of their locations. The maximum blade tip height of the turbines has been restricted to 309.6 m LAT to remain below published Instrument Flight Procedures. The Applicant have also committed to not install turbines within 1,320 m of the Kish lighthouse to enable safe take off from the lighthouse by helicopters during most adverse condition, which is an engine failure following a take-off heading towards the wind farm. While turbines may create minor interference on radar systems, consultation with AirNav Ireland has concluded no significant impact on communication, navigation or surveillance systems.

Assessment results

Measures to minimise impacts on aviation and radar include appropriate lighting and marking of wind turbines to enhance visibility, notification to aviation stakeholders through Notices to Airmen, and inclusion of the wind farm on aviation charts. Emergency Response Plans will be coordinated with the Irish Coast Guard, and aviation stakeholders will be informed of construction and decommissioning activities. Additionally, aviation lighting will comply with the latest Irish guidance, and specific lighting requirements will be agreed upon with relevant stakeholders.

The results of the assessment indicate that with these measures being implemented , potential impacts on aviation and radar during construction, operation, and decommissioning phases are not significant. The measures ensure situational awareness for pilots, maintain safe flight operations, and address any potential radar interference.

6.13 Marine archaeology

Assessment methodology overview

The assessment methodology for the marine archaeology component involved a study of known archaeological resources, a review of geophysical site investigations, and on-site inspections and surveys. The marine archaeology study area included a 1.5 km buffer around the Array Area and the Offshore Export Cable Corridors to allow a thorough assessment of both known and potential underwater cultural heritage sites.

The methodology also incorporated the assessment of geophysical data, including side scan sonar, multi-beam echo sounder, magnetometer, and sub-bottom profiler data. The data was analysed to identify and categorise archaeological anomalies, potential wrecks, and other features of archaeological interest.

Description of the existing environment

The marine archaeology assessment identified key sensitive receptors, including known and potential shipwrecks, submerged prehistoric landscapes (palaeolandscapes), and geophysical anomalies. The study area, located in the western Irish Sea Basin, has been shaped by glaciation events, with significant sediment deposits from the Last Glacial Maximum[24]. Historical maritime activity is evident through numerous documented and undocumented shipwrecks. Geophysical surveys using side scan sonar, multi-beam echo sounder, magnetometry, and sub-bottom profiling have mapped the seabed and identified potential archaeological features. Known wrecks like the Loch Fergus and SS Vesper, along with numerous unknown wrecks, highlight the area's rich maritime history. The palaeogeographic assessment[25] further identifies geological units with varying archaeological potential, contributing to a comprehensive understanding of the marine archaeological environment.

Key findings of the assessment

During the construction phase, activities such as seabed preparation, foundation installation, and cable laying could disturb or damage underwater archaeological materials. These processes could remove, or compress buried remains, while jack-up vessels and anchoring may further disrupt or expose archaeological sites, making them vulnerable to natural decay.

In the operational phase, erosion around turbine and substation foundations poses a risk to marine archaeology, as it could uncover and accelerate the loss of archaeological materials. Maintenance activities, including cable repairs and vessel anchoring, may also disturb the seabed and impact archaeological sites.

24 The Last Glacial Maximum refers to the time during the last ice age when ice sheets were at their thickest and most extensive, about 20,000 years ago. It marks the peak of the last glaciation, with much of the Earth covered in ice.
25 A palaeogeographic assessment is the study and analysis of past geographical landscapes, including the positions of continents, seas, and climates at different points in Earth's history.

During decommissioning, the removal of foundations may cause sediment to shift, potentially exposing or displacing archaeological remains. Vessel anchoring and seabed disturbance during this phase also pose risks. To minimise these impacts, the decommissioning plan will be regularly updated to reflect best practices and regulatory requirements.

Assessment results

The project includes several measures to minimise effects on marine archaeological receptors. These measures include the establishment of Archaeological Exclusion Zones[26] around known and potential archaeological sites to avoid impacts. Archaeological monitoring will be conducted during intrusive activities to observe and protect archaeological materials. Pre- and post-construction verification surveys will be conducted to identify and protect archaeological receptors.

A Protocol for Archaeological Discoveries will be implemented as a safety net during activities, such as cable protection or foundation installation, where there will be no material recovered to deck or where the seabed has already been surveyed comprehensively and no archaeological features recorded. The protocol will be in place to ensure any unexpected finds are reported and managed effectively.

In conclusion, the assessment determines that with the inclusion of the measures in, the residual effects on marine archaeological receptors are not significant. Cumulative effects from sediment disturbance and interactions with other nearby projects were also considered, and with the measures to avoid and minimise effects, these are also considered to be not significant.

No transboundary effects are anticipated the predicted changes to key physical process pathways, such as tides, waves, and sediment transport, are not expected to influence marine archaeological receptors at a distance that would cause transboundary impacts.

6.14 Cultural heritage settings assessment (terrestrial archaeology and monuments)

Assessment methodology overview

The cultural heritage settings assessment study area is defined by the visible range of the wind turbines, approximately a 20 km radius around the offshore array. This ensures that all significant cultural heritage receptors within this visible zone are included. Baseline data were collected from sources such as the National Record of Monuments and Places, the National Inventory of Architectural Heritage, and local authority records.

26 Archaeological Exclusion Zones are designated areas around known or potential archaeological sites where development or construction activities are restricted to protect cultural heritage.

The assessment involved collecting relevant data for nationally important receptors, which were mapped and analysed using a GIS database. A visibility map identified receptors that could potentially see the turbines, and a list was created of those. This list was refined using advanced mapping and 3D modelling tools, considering visibility and the historical or cultural significance of each receptor. Special attention was given to maritime receptors with a unique connection to the sea. Receptors with similar characteristics were grouped for a targeted assessment. Site visits followed to evaluate the visibility of the turbines and potential impacts on each receptor's significance.

Description of the existing environment

The study identified 10 cultural heritage receptors considered potentially susceptible to adverse indirect effects. These includes Martello Towers[27], historic coastal fortifications, civilian coastal architecture, modern military coastal defences, churches, houses with seaward views, and prehistoric monuments.

Table 3 Cultural heritage receptors susceptible to adverse effects

Receptor	ID	Description
Bray Martello Tower	WI00117	A historical coastal defense tower located in Bray, known for its strategic maritime significance.
Killiney Martello Tower No. 7	DU02236	One of the Martello towers in Killiney, offering historical and architectural value with views over the sea.
Killiney Martello Tower No. 6	DU02247	Another Martello tower in Killiney, significant for its historical context and coastal defense role.
Dalkey Island Martello Tower	DU01961	Located on Dalkey Island, this tower is part of a historical defense network with panoramic sea views.
Dalkey Island Battery	DU01964	A historical military battery on Dalkey Island, important for its strategic defense history.
Bullock Martello Tower (Joyce's Tower)	DU01917	Known as Joyce's Tower, this Martello tower in Bullock is significant for its literary and historical associations.
Bullock Martello Tower (Bartra Tower)	DU01924	Another Martello tower in Bullock, notable for its historical and architectural value.
Sutton South Martello Tower	DU01532	A Martello tower in Sutton, contributing to the coastal defense history of the area.
Sandymount Martello Tower	DU01553	Located in Sandymount, this tower is part of the historical coastal defense system.
Vico Road, Sorrento Point, Dalkey: Architectural Conservation Area (ACA)	N/A	An area in Dalkey known for its architectural conservation, offering significant historical and visual value.

2 Martello towers are small defensive forts that were built across the British Empire during the 19th century, from the time of the French Revolutionary Wars onwards.

Key findings of the assessment

The construction of offshore wind turbines is anticipated to have some temporary impacts on nearby cultural heritage sites. Activities such as site preparation, equipment mobilisation, and marine works could create disturbances, including visual changes, that may affect the appreciation of these historical sites. However, these impacts are expected to be temporary, with their significance considered low to moderate, without compromising the overall integrity or character of the heritage receptors.

Once operational, the wind turbines will introduce a permanent change to the visual landscape around the heritage sites. While this change may lead to a modest reduction in the ability to appreciate these sites from certain viewpoints, it will not significantly erode their historical integrity or character. The moderate effects on cultural heritage receptors, such as the Bray Martello Tower and the various Killiney Martello Towers, are considered acceptable within the context of the evolving coastal landscape.

During the decommissioning phase, the removal of the wind turbines is expected to restore the visual landscape to its original state, thereby alleviating any operational impacts experienced during the wind farm's lifecycle.

No transboundary effects have been identified regarding onshore cultural heritage receptors.

In conclusion, the assessment indicates that the impacts will not be significant in EIA terms, supporting the sustainable integration of renewable energy initiatives with the protection of cultural heritage.

6.15 Seascape, landscape and visual impact assessment

Assessment methodology overview

The Seascape, Landscape and Visual Impact Assessment study area was defined based on guidance from the Landscape Institute and NatureScot, with a focus on areas within a 50 km radius of the wind farm. Baseline data was collected from maps, field surveys, and consultations with stakeholders, encompassing seascape character, landscape character, landscape designations, and visual receptors. The assessment considered effects on seascape and landscape character, views and visual receptors, and cumulative effects with other developments.

The methodology followed standard guidelines such as the Guidelines for Landscape and Visual Impact Assessment (GLVIA3) and used tools such as Zones of Theoretical Visibility[28] (ZTV) maps and photomontages to visualise impacts.

28 Zones of Theoretical Visibility (ZTV) maps show areas where a structure, like a wind turbine, could potentially be seen based on terrain and elevation.

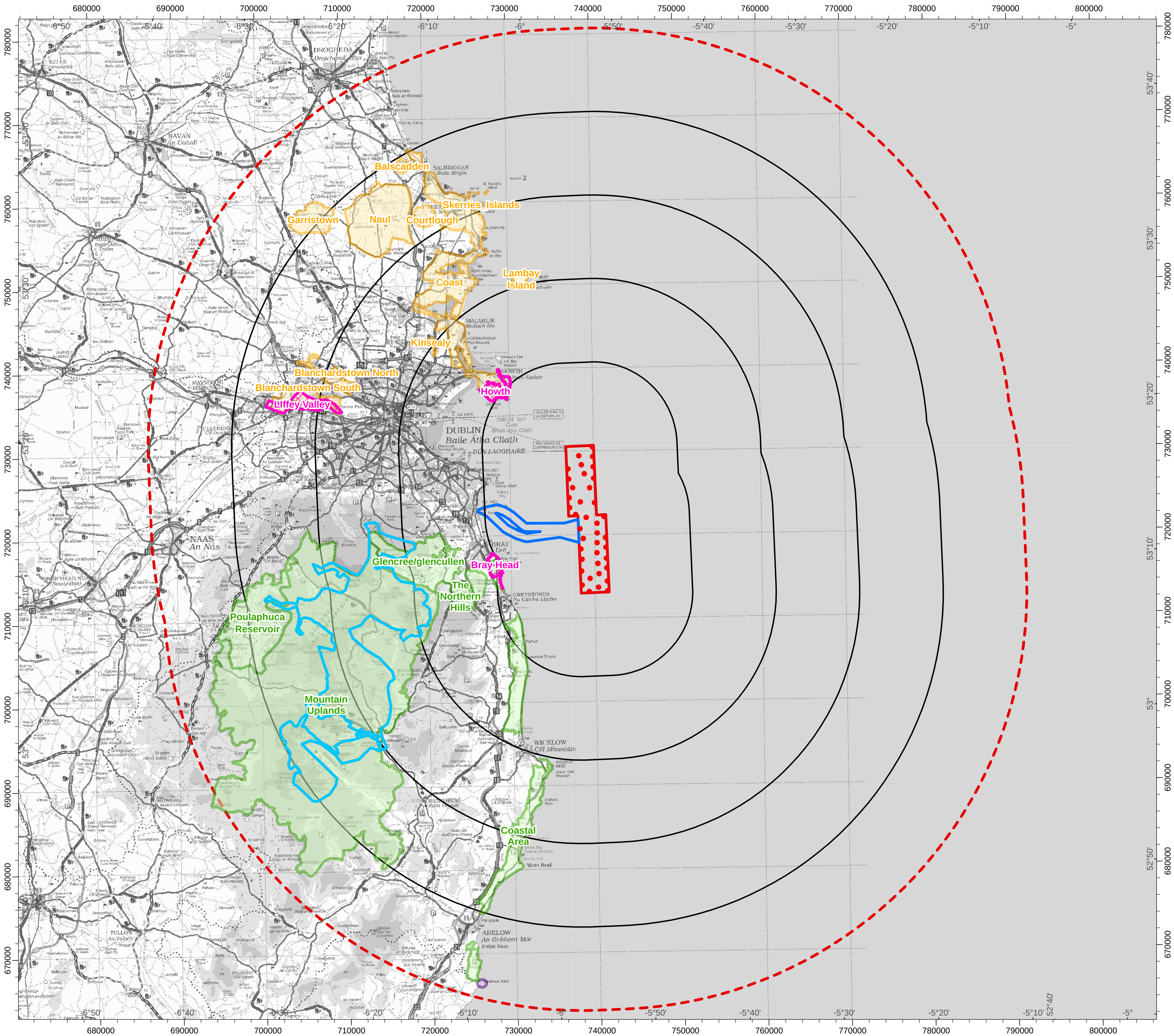
Description of the existing environment

The existing environment is a diverse and dynamic coastal and marine landscape, covering the eastern coast of County Dublin and County Wicklow, extending into the Irish Sea. The seascape is open and largely undeveloped, featuring the Kish and Bray Banks about 10 km offshore. The coastal landscape includes low-lying plains, sandy beaches, rocky headlands, elevated hills, and the scenic backdrop of the Wicklow Mountains.

The area is home to various visual receptors, such as residents and visitors in coastal towns like Bray, Greystones, and Wicklow, who enjoy panoramic sea views. Key visual corridors include the Dublin Area Rapid Transit (DART) system and coastal roads. The coastline is popular for recreational activities, including walking, cycling, and water sports, with well-known routes like the Bray to Greystones cliff walk and the Howth Head loop.

Designated landscapes, including the Wicklow Mountains National Park, Areas of Outstanding Natural Beauty, and Special Amenity Areas, emphasise the region's scenic and ecological value. The coastal environment supports diverse habitats, such as sandy beaches, rocky shores, salt marshes, and coastal wetlands, which are home to a wide range of flora and fauna, contributing to the area's ecological richness.

The study area encompasses four Regional Seascape Character Areas and six Seascape Character Types. Landscape character is described through various Landscape Character Areas and designations, with Landscape Designations shown in Figure 24.



- Proposed WTGs
- Array Area
- 10km Radii
- 50km Study Area
- Export Cable Corridor
- Wicklow Mountains National Park
- Special Amenity Area Order
- Fingal Highly Sensitive Landscape Areas
- Wexford Distinctive Landscape - Kilmichael Point
- Wicklow Area of Natural Beauty

DRAWING STATUS

FINAL

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PROJECT TITLE

Dublin Array

DRAWING TITLE

Landscape Designations

DRAWING NUMBER: 24

PAGE NUMBER: 1 of 1

VER	DATE	REMARKS	DRAW	CHEK	APRD
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02	2024-9-15	DRAFT	SH	JP	#####
03	2024-10-23	FINAL	SH	JP	#####

0 3.5 7 10.5 14 Kilometers

0 3 5 8 10 Miles

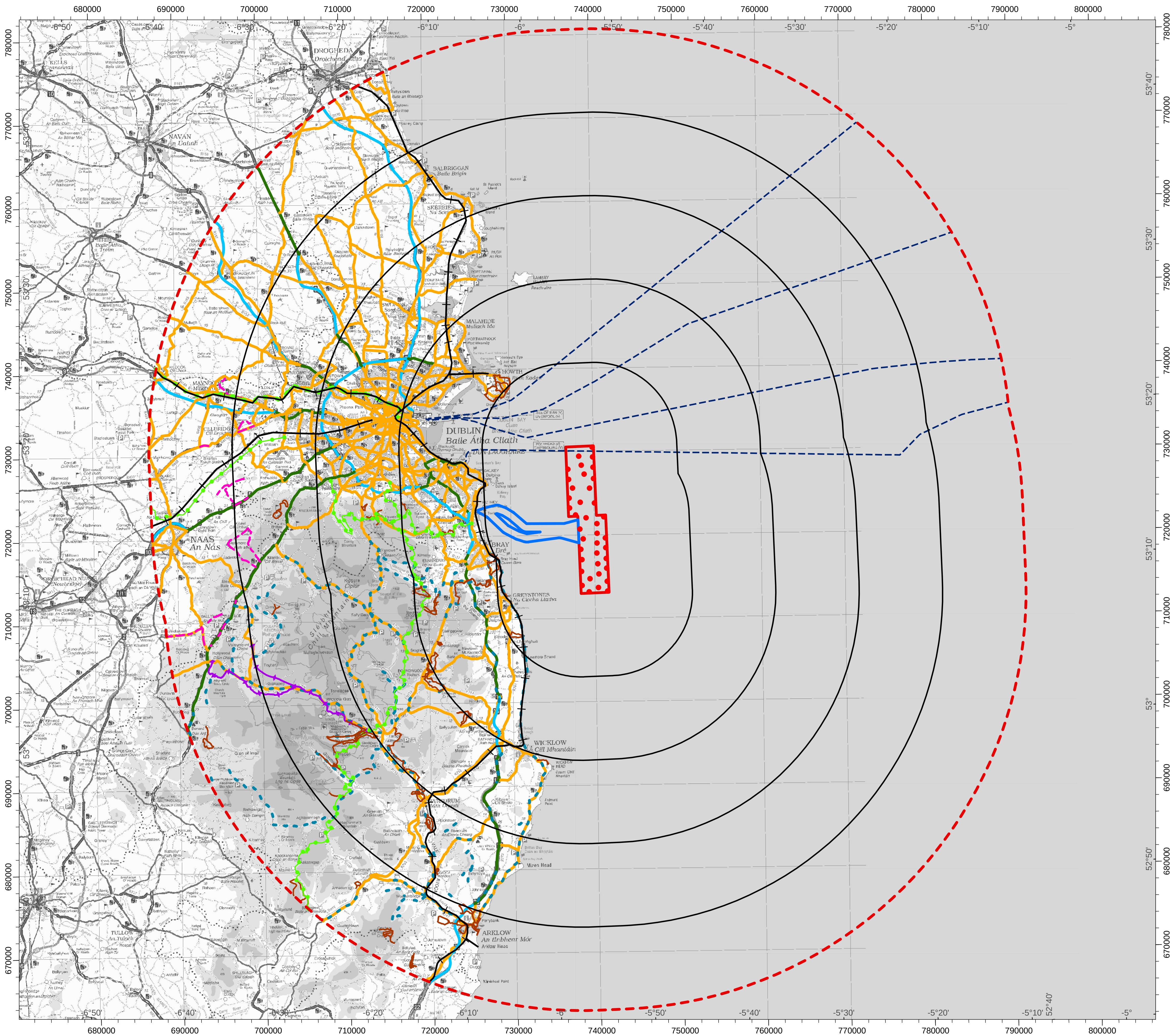
N GRID NORTH

SCALE	1:470,000	PLOT SIZE	A3
DATUM	WGS 1984	VERTICAL REF	ODN/LAT/MLLW
PRJ	WGS 1984 UTM Zone 29N		

open optimised environments PART OF SLR

Dublin Array Generation for generations

Kish Offshore Wind Limited - Bray Offshore Wind Limited



- Proposed WTGs
- Array Area
- 10km Radii
- 50km Study Area
- Export Cable Corridor
- Kildare Scenic Route
- Wicklow Prospects
- Long Distance Waymarked Way
- Pilgrim Path
- Walking Trail
- Railway
- Motorway
- National Route
- Regional Route
- Ferry Crossing

DRAWING STATUS

FINAL

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PROJECT TITLE

Dublin Array

DRAWING TITLE

Visual Receptors

DRAWING NUMBER: 25

PAGE NUMBER: 1 of 1

VER	DATE	REMARKS	DRAW	CHEK	APRD
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02	2024-09-13	DRAFT	SH	JP	#####
03	2024-10-23	FINAL	SH	JP	#####

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0 3 5 8 10 Miles

N GRID NORTH

SCALE	1:470,000	PLOT SIZE	A3
DATUM	WGS 1984	VERTICAL REF	ODN/LAT/MLLW
PRJ	WGS 1984 UTM Zone 29N		

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Dublin Array Generation for generations

Kish Offshore Wind Limited - Bray Offshore Wind Limited

Key findings of the assessment

During construction, the presence of construction vessels, the emerging turbines, the Offshore Substation Platform, and nighttime lighting will lead to visual intrusion, increased marine traffic, and changes to the seascape. In the operational phase, the permanent turbines, moving blades, operational vessels, and helicopters will cause ongoing visual impacts. Aviation and marine navigation lighting will also contribute to visual disturbance. During decommissioning, the removal of turbines and the Offshore Substation Platform, alongside decommissioning vessels, will cause visual intrusion and increase marine traffic.

To minimise these impacts, the project design and management plans incorporate several measures. The iterative design process optimised the layout, considering turbine placement and size to minimise environmental and visual effects. Lighting will be carefully chosen to minimise visual impact while ensuring safety, with aviation and marine lights used only when necessary and designed to reduce intensity. Construction and decommissioning management plans will carefully manage vessel and plant activity.

Assessment results

The introduction of large wind turbines and associated infrastructure will alter the seascape and landscape, particularly from various coastal viewpoints and elevated areas. The assessment predicts significant effects during the construction, operation, and decommissioning phases.

During construction, the presence and activity of vessels, cranes, and emerging structures will notably impact coastal and elevated viewpoints, particularly affecting 21 of the 26 representative viewpoints and 16 of the 20 principal visual receptors. In the operational phase, the permanent presence of the turbines and the offshore substation, along with aviation and marine navigation lighting, will continue to have significant visual impacts, especially along the coast and in elevated areas. The decommissioning phase will involve similar disruptions as the construction phase, with significant effects from the presence and activity of decommissioning vessels and the removal of turbines and the offshore substation.

Cumulative effects from the combined impact of the Dublin Array with other developments will further increase visual and landscape changes, especially for receptors with views of multiple developments. Specific viewpoints, such as those at Wicklow, Six Mile Point, Greystones Harbour, Bray Head Walkway, Vico Road, Dún Laoghaire Harbour, and Howth Head, will experience significant visual changes due to the introduction of the offshore infrastructure into previously undeveloped seascapes.

Significant effects on landscape and visual receptors be expected to arise as a result of the development of a large-scale offshore wind farm, such as Dublin Array. The findings of the assessment, in terms of the occurrence and extent of significant effects, are consistent with the findings of Seascape, Landscape and Visual Impact Assessments for other similar large-scale offshore wind farms in Ireland and the UK.

6.16 Noise and Vibration (Terrestrial Receptors)

Assessment methodology overview

The assessment assessed potential impacts from airborne noise and vibration, arising from the offshore activities and infrastructure, on noise sensitive receptors between Dalkey and Greystones, extending 200 m inland. It covered the construction, operation, and decommissioning phases of Dublin Array, including noise from turbine foundation building, turbine operation, and decommissioning activities. The study predicted noise levels using the BEK-135 method (Danish Ministry of the Environment and Food, 2019), which takes into account the behaviour of sound waves over water. The assessment models noise for both construction and operational phases, with the construction noise primarily coming from piling the foundations. The worst-case piling method with the highest noise potential was used for the assessment.

For the operational phase, noise levels were modelled based on turbines running at a typical wind speed of 8 m/s, with environmental conditions of 10°C and 80% humidity. The closest turbine to the receptor was used for the worst-case noise scenario. Additional adjustments were made to account for uncertainty, ensuring a thorough evaluation of noise impacts. The study also takes into account the effects of other nearby wind farms.

Description of the existing environment

The existing noise environment along the Dublin and Wicklow coast includes natural sources (wind, waves, birds) and anthropogenic sources (industry, transportation, shipping). Noise levels vary depending on location, wind speed, and weather conditions.

Noise Sensitive Receptors were identified within the study area (Table 4), focusing on habited dwellings along the coastline. These receptors were selected to represent typical noise levels experienced by those closest to the wind turbines.

Table 4 Noise sensitive receptors

ID	Description	Easting (ITM)	Northing (ITM)
NSR01	Sorrento House 1, Sorrento Terrace	727249	726165
NSR02	Killeen, Marino Avenue East	725868	724299
NSR03	Maravista, 2 Seafield	726066	722486
NSR04	Rear of 2 Royal Marine Terrace	726905	718957
NSR05	Montebello, Strand Row	727113	718436
NSR06	6 Fontenoy Terrace	727496	717883
NSR07	Gorse Hill Centre	728543	715575

ID	Description	Easting (ITM)	Northing (ITM)
NSR08	67 The Grove, Redford	728610	713743
NSR09	The Campion, Marina Village	729217	713172
NSR10	Carraig House	729523	712808
NSR11	White Lodge	729717	712544
NSR12	Park Lodge, Mill Road	729816	711925

Key findings of the assessment

During construction, the primary noise source will be piling for the turbine foundations, with the strongest noise near the coastline, decreasing inland. While the sound levels nearshore may be high, the temporary offshore activity is not expected to cause significant long-term impacts on coastal communities. During operation, the turbines will produce continuous noise from the movement of the blades, varying with wind speed. The noise is predicted to be low and blend with natural sounds like wind and waves, with no significant impact on coastal receptors. The decommissioning phase involves dismantling turbines and structures, which will not require piling and is unlikely to produce significant noise. Sound generated underwater is not expected to reach the shore, meaning the decommissioning process will not lead to noise effects on coastal communities.

During construction, noise will be managed according to British Standard BS 5228-1:2009, with contractors implementing the best practicable noise control methods. The Project Environmental Management Plan will outline environmental management measures for the construction phase. The piling programme will avoid simultaneous impact piling of Dublin Array foundations. These measures ensure compliance with relevant guidelines and minimise noise impacts on nearby communities.

A screening of transboundary impacts was conducted, which found no potential for significant effects from the Dublin Array on nearby countries. This is due to the distance between the offshore infrastructure and neighbouring states.

Assessment results

The assessment concluded that there would be no significant adverse effects. During construction, noise from piling activities was predicted to exceed night-time thresholds at some receptors during short periods of time but remained within acceptable limits during daytime and evening periods. This was concluded to be not significant. Operational noise levels were found to be below the threshold of significance at all receptors, ensuring minimal impact on nearby communities. Decommissioning activities will not generate significant noise levels. Cumulative effects with other projects, such as the Codling Wind Park, were also assessed and found to be insignificant.

6.17 Socio-economic, Tourism, Recreation, and Land Use

Assessment methodology overview

The study area for the socio-economic, tourism, recreation and land use assessment encompassed the Greater Dublin area for analysing jobs and Gross Value Added, coastal counties within Greater Dublin for evaluating tourism volume and value, and the marine and coastal study area for examining impacts on users and assets of tourism and recreation activities. A local onshore transmission infrastructure study area was used to assess the effects of the onshore infrastructure on tourism, recreation, and social community infrastructure. Commercial fishing impacts were also considered, incorporating findings from the commercial fisheries assessment.

Impacts on tourism and recreation relied on qualitative assessments, reflecting how residents and tourists might perceive and react to the project, particularly during construction.

Description of the existing environment

The existing environment is characterised by a diverse socio-economic landscape, with the Greater Dublin area being a significant hub for employment and economic activity. The tourism sector is vital, with Dublin attracting millions of visitors annually, contributing substantially to the local economy. The coastal and marine areas are popular for various recreational activities, including water sports, scuba diving, and coastal path walking. The local community infrastructure includes numerous recreational and social facilities that serve both residents and visitors. The commercial fishing industry, particularly the potting sector, is also an important economic activity in the region.

Sensitive receptors identified and assessed in the impact assessment include:

- Scuba divers: Popular dive sites include Lambay Island, Greystones Harbour, and Dalkey Island;
- Bathers: Killiney Beach, Shankhill Beach, and White Rock Beach;
- Watersports participants: Paddle boarding, wind and kite surfing, jet skiing, and kayaking/canoeing;
- Boat-based recreational fishers/anglers: Fishing activities in the offshore area, particularly around the Kish and Bray Banks;
- Recreational sailors and cruisers: Sailing and cruising activities, with key ports including Dún Laoghaire, Wicklow, and Howth;
- Shore-based recreational fishers/anglers: Fishing activities along the coastline, including popular spots like Scotsman's Bay and Dalkey Island;
- Users of coastal paths, cycle routes, and natural attractions: Coastal paths and cycle routes, such as the Dublin Mountains Way and the Sandymount to Dún Laoghaire cycle route;

- Local tourism and recreation infrastructure: Facilities and attractions such as the National Maritime Museum of Ireland, Harbour Splash, and various parks and gardens;
- Local social and community infrastructure: Community facilities including schools, hospitals, and recreational centres; and
- Commercial fishing industry: Particularly the potting sector targeting whelk, crab, and lobster, with key fishing ports including Howth, Dún Laoghaire, and Wicklow.

Key findings of the assessment

During construction, Dublin Array will generate significant economic value and create job opportunities, especially in construction and engineering, benefiting local businesses and supply chains. There may be temporary visual impacts and disruptions to the visitor economy, as well as slight effects on marine and coastal recreational activities, such as scuba diving, water sports, and recreational fishing. Commercial fishing, particularly for potting fleets targeting whelk, crab, and lobster, may experience temporary disruptions. As discussed in the Commercial Fisheries section, a Fisheries Management and Mitigation Strategy will be implemented to minimise impacts on the fishing industry. Onshore electrical system construction may also impact on users of walking and cycling routes, coastal paths, and local recreation and tourism receptors, with trenchless installation techniques used to reduce disruptions, with access to Shanganagh Beach remaining open during the cable installation operations.

In the operational phase, the project will provide long-term economic benefits and create jobs in operations and maintenance. While offshore infrastructure may cause minor visual impacts, it has potential to attract visitors interested in renewable energy. Marine and coastal recreational activities are expected to remain largely unaffected, and regular maintenance will minimise disruptions. Long-term changes in fishing patterns and habitat may occur, but mitigation, such as gear trials and ongoing dialogue with the fishing industry, will help minimise impacts (see Commercial Fisheries section).

During decommissioning, economic impacts will be smaller, with reduced job creation. Decommissioning activities are not expected to significantly affect the visitor economy or recreational assets, and measures will ensure safety and minimise disruptions.

Assessment results

During construction, the project will create up to 1,300 jobs annually and contribute up to €185 million to the economy. Tourism in Greater Dublin is unlikely to be affected, but temporary disruptions may occur for swimmers, water sports enthusiasts, and anglers, with moderate restrictions for scuba divers due to construction stage safety zones and reduced water clarity. Commercial fishing, particularly potting for whelk, crab, and lobster, may also face temporary impacts. Minor disruptions to local recreation, tourism, and community facilities may arise from the onshore electrical system works.

During operations, Dublin Array is expected to contribute €14-€17 million annually in Gross Value Added and support 200-240 full-time equivalent jobs per year. Tourism impacts are expected to be negligible, though maintenance activities may cause slight disruptions for some recreational users. The potting industry may experience moderate adverse effects. Decommissioning impacts will be similar to or lower than those during construction, with moderate effects on scuba divers and slight impacts on other recreational users and the potting industry.

Transboundary impacts on other European Economic Area states or the UK are minimal. If project components, labour, or staging ports are sourced from outside Ireland (e.g. Wales), those areas may see minor economic benefits, but these will be insignificant in the context of their larger economies.

Cumulative effects from other offshore wind projects and infrastructure developments in Greater Dublin will generate significant economic benefits, particularly in construction. Minor impacts on marine and coastal recreation are expected, while commercial fishing, especially the potting fleet, may experience moderate impacts, requiring joint mitigation efforts.

6.18 Climate Change

Assessment methodology overview

This Climate Change chapter focused on two main aspects: a greenhouse gas assessment, which evaluated the carbon emissions throughout the lifecycle of Dublin Array, and a climate change resilience assessment, which examined the project's ability to withstand and adapt to the impacts of climate change.

The project's greenhouse gas emissions were assessed through a full lifecycle analysis, covering everything from raw materials and manufacturing to installation, operation, and decommissioning. Emissions were calculated for different turbine layouts and foundation designs, using specialised carbon calculators to estimate the environmental impact of construction materials.

The climate change resilient assessment evaluated how well the project will withstand and adapt to future climate conditions, such as extreme weather, rising sea levels, and changing ocean patterns. It involved identifying potential risks to key infrastructure, assessing the likelihood and severity of these impacts, and implementing measures to strengthen resilience.

Description of the existing environment

Ireland has made progress in reducing greenhouse gas emissions, particularly in the energy sector, and has improved its ranking in climate performance. However, challenges remain in cutting overall emissions. Historical records show a steady rise in temperatures, with future projections suggesting hotter summers and more extreme weather. Rainfall patterns are expected to shift, leading to wetter winters and drier summers, which could affect water supply, farming, and flood risks. Sea levels around Ireland have been rising, with climate change likely to bring more storms, droughts, and flooding. Additionally, increasing carbon dioxide levels are making the ocean more acidic, threatening marine life.

Key findings of the assessment

Dublin Array will generate carbon emissions during its construction phase due to the production and transportation of materials. The manufacturing of materials like steel and concrete, as well as transporting large components (turbines, foundations, etc.) to the site, requires energy and contributes to emissions. Additionally, construction activities, such as installing turbines and infrastructure, involve the use of diesel-powered machinery and vessels, further adding to the carbon footprint. While these emissions occur during construction, they are offset over time by the renewable energy generated by the wind farm once operational.

During operation, the wind farm will require routine maintenance to keep it in good working order. This includes the consumption of a low level of grid electricity and the need for routine replacement components and materials. The intensity and duration of emissions during decommissioning are expected to be lower than those associated with the construction phase. This is because decommissioning primarily involves the removal and transportation of existing materials rather than the production and installation of new materials.

The project is designed to manage climate change impacts through several measures. Worker safety will be ensured with weather monitoring, protective gear, and fire safety. The infrastructure is built to withstand higher temperatures, humidity, and strong winds, with corrosion protection for turbines and foundations. Flood and erosion risks are addressed with water-compatible infrastructure and trenchless techniques. Routine maintenance will ensure the project adapts to changing conditions, and scour protection will prevent erosion around offshore structures. These measures ensure the project remains effective and safe in the face of climate challenges.

Assessment results

The Dublin Array project represents a significant step forward in the transition to a sustainable and low-carbon energy future. By generating renewable electricity with a much lower carbon footprint than traditional fossil fuel-based sources, the project will substantially reduce greenhouse gas emissions and contribute to Ireland's net-zero goals by 2050.

The greenhouse gas assessment estimates that Dublin Array will cut emissions by approximately 35 million tonnes of CO_2 over its lifetime, supporting Ireland's goal of reaching net-zero carbon emissions by 2050. While the construction, operation, and decommissioning phases will produce between 2.3 and 3.3 million tonnes of CO_2, these emissions will be offset within 2-3 years of operation due to the renewable energy generated. The project's carbon intensity is far lower than the current gas-derived electricity, with a potential reduction to 20.8g/kWh, compared to 371g/kWh. This will help avoid over one million tonnes of CO_2 annually and contribute to Ireland's national climate targets.

Dublin Array's resilience to climate change and its capacity to adapt to future conditions ensure its viability and effectiveness as a key component of national and international decarbonisation efforts. Ultimately, Dublin Array exemplifies how renewable energy projects can drive meaningful, long-term contributions to combating climate change while fostering a cleaner and more secure energy future for generations to come.

6.19 Major Accidents and Disasters

Assessment methodology overview

The assessment of major accidents and disasters follows the guidelines in Major Accidents and Disasters in EIA: an IEMA Primer (2020). It looks at both the offshore and onshore parts of the project, including the turbines, cables, and maintenance base.

The extent of the study area varied depending on the specific hazard and the relevant assessment topic. For instance, the study area relevant to shipping and navigation hazards aligned with the study area defined in the Shipping and Navigation Chapter. Similarly, other topic-specific hazards follow the relevant boundaries for their respective assessments.

The assessment identified potential risks, such as extreme weather or accidents like collisions and pollution and evaluated how likely these are. Once potential hazards were identified, each impact's probability, duration, and consequences were analysed to determine their severity and likelihood. This also included identifying pathways and receptors for hazards such as collisions, extreme weather, and infrastructure risks.

Description of the existing environment

The study area was carefully defined to include both offshore and onshore infrastructures, with boundaries adjusted according to specific hazard categories relevant to the assessment.

Key findings of the assessment

The assessment scoped in various risks related to the vulnerability of the project to major accidents and disasters, as well as the potential for the project to cause such events. Risks to the project include collision risks related to existing navigation and shipping activities, as well as aviation activities. The project is vulnerable to extreme weather events, such as strong winds, lightning, and storms, which could impact both offshore and onshore infrastructure. Flooding and storm surges pose risks to the onshore components, including the Landfall and Onshore Substation. Comprehensive traffic management measures are in place to mitigate collision risks with existing road users during the construction phase.

Risks originating from the project include potential accidents or pollution from cable installation and removal activities, which could damage existing seabed infrastructure and cause fuel or chemical spills. There is also a risk of encountering unexploded ordnance during construction, which could lead to uncontrolled explosions. Physical impacts such as collisions or allisions involving marine vessels and the offshore infrastructure pose risks throughout all project phases. Additionally, there are risks of marine environmental pollution from vessels and offshore structures, as well as potential fires at the turbines and Offshore Substation Platform. Snagging risks for commercial fisheries and collision risks for aviation were also considered.

Assessment results

To minimize the effects of major accidents and disasters, the Dublin Array project has implemented a comprehensive set of measures. These measures are detailed across various assessment chapters of the EIAR and include both design features and operational protocols. The project incorporates navigational safety protocols, emergency response plans, pollution prevention measures, and procedures for managing potential hazards. Additionally, fire detection and alarm systems, along with emergency response plans, are in place to mitigate fire risks. These measures ensure that the risks associated with major accidents and disasters are managed to an acceptable level, safeguarding both the project and the environment.

6.20 Operations and Maintenance Base Offshore Assessment

The Operation and Maintenance Base Offshore Assessment for Dublin Array evaluated potential impacts arising from construction, operation, and decommissioning activities.

Assessment methodology overview

The methodology for assessing the environmental impact of Operations and Maintenance Base involved a detailed review of existing data and studies, focusing on the specific area within Dún Laoghaire Harbour.

Description of the existing environment

The existing environment within Dún Laoghaire Harbour is characterised by several key features. The harbour is sheltered from offshore waves and experiences benign tidal currents, with the seabed primarily composed of sandy mud. Water quality in the area is generally good, although some sediment-bound contaminants such as nickel and copper are present. The benthic ecology includes habitats with species like white furrow shell (*Abra alba*) and the shiny nut clam *Nucula nitidosa*, as well as various seaweed and barnacle communities in the intertidal zones. The harbour supports a rich community of fish and shellfish, including juvenile flatfish, gobies, and sandeels. Marine mammals, such as harbour seals and grey seals, are present in low densities, with occasional sightings of harbour porpoises and bottlenose dolphins. Ornithological surveys have recorded low numbers of birds, with black guillemots breeding on Carlisle Pier and herring gulls nesting on nearby buildings. This diverse marine and coastal environment forms the baseline for assessing the potential impacts of the Operations and Maintenance Base.

Key findings of the assessment

The Operations and Maintenance Base is expected to have temporary effects on the marine environment. These include increased suspended sediment concentration and sediment deposition, which could affect water quality and marine habitats. The construction activities may disturb benthic habitats, potentially releasing sediment-bound contaminants and causing temporary habitat loss. Fish and shellfish in the area might experience changes in water quality and habitat conditions, while marine mammals could be exposed to increased underwater noise and suspended sediment, though the risk of significant disturbance is low. Additionally, birds such as black guillemots and herring gulls may face temporary disturbance, particularly during the non-breeding season. Overall, these impacts are expected to be localised and short-term, with various mitigation measures in place to minimise environmental effects.

The operational phase of the Operations and Maintenance Base is primarily onshore and does not significantly impact the marine environment. As all daily operations, including monitoring, storage, and welfare activities, occur onshore, there are no direct effects on the marine ecosystem. Therefore, the base's operation poses no significant environmental risks to surrounding marine habitats, water quality, or marine life and was scoped out of the assessment.

The decommissioning phase will involve the removal of marine-based infrastructure, such as the pontoon and access gangway. These activities are expected to have temporary and localised effects similar to those during the construction phase. Potential impacts include short-term increases in suspended sediment concentration and sediment deposition, which could affect water quality and marine habitats. The decommissioning process may also disturb benthic habitats and release sediment-bound contaminants. However, these impacts are anticipated to be minimal and short-lived, with appropriate mitigation measures in place to minimise environmental disruption. Overall, the decommissioning phase is managed to ensure that the marine environment is restored to its pre-construction state, with no long-term adverse effects.

The proposed mitigation measures for the Operations and Maintenance Base are designed to minimise environmental impacts of Dublin Array. These measures include implementing a Pollution Prevention Plan to prevent accidental spills and contamination, as well as monitoring and management plans to reduce habitat disturbance and prevent the spread of invasive species. Best practice guidelines will be followed to maintain water quality, and construction activities will be scheduled to avoid sensitive periods for marine mammals and birds. Noise reduction measures will be employed to protect marine mammals, and an Ecological Clerk of Works will oversee activities to ensure minimal disturbance to black guillemots during their breeding season. These comprehensive measures aim to protect the marine and coastal ecosystems throughout the project's lifecycle.

Assessment results

The key findings indicate that the construction phase will have several temporary effects on the marine environment, including increased suspended sediment concentration, habitat disturbance, and potential noise impacts. These effects are expected to be localised and short-term, with various mitigation measures in place to minimise environmental disruption. The decommissioning phase will have similar temporary impacts, managed to ensure the marine environment is restored to its pre-construction state. Overall, the assessment concludes that there are no significant effects predicted with any effects being highly localised and temporary across the project’s lifecycle.

Due to the project's location within Dún Laoghaire Harbour, no significant transboundary effects are anticipated.

The cumulative effects assessment examined the combined impact of the Operations and Maintenance Base with other existing or planned projects in the area, including shipping, fishing, and marine developments. It concluded that the primary impacts are localised and temporary, with no significant long-term cumulative effects expected.

7 Onshore Infrastructure

This section provides a summary of the assessments undertaken for Dublin Array to date for the onshore infrastructure chapters. More detailed information is available within the topic-specific chapters found within each volume of the EIAR, as detailed in section 3.2.

7.1 Biodiversity

Assessment methodology overview

The biodiversity chapter assessed the potential impacts and likely effects of the onshore infrastructure on onshore biodiversity. The study area included the proposed Landfall Site, Onshore Export Cable Route, Onshore Substation, Temporary Construction Compounds and the Operations and Maintenance Base. Zones of Influence for the biodiversity assessment were determined based on the sensitivity of different ecological features, with varying zones for designated sites, habitats, and species. The assessment examined various habitats, including rivers, grasslands, woodlands, and coastal areas, as well as protected species like birds, bats, otters, and badgers.

Baseline data for the biodiversity assessment was collected through a combination of a desk study and field surveys. The desk study utilised various data sources, including the National Parks and Wildlife Service for information on sites with statutory designations for nature conservation, the National Biodiversity Data Centre for data on protected habitats and species, and Habitats Directive Reports for records of Annex I habitats and Annex II and IV species. Local development plans were also reviewed for habitats listed under the County Development Plan[29].

Field surveys were carried out to assess baseline ecology, using Irish and EU habitat classification guides. Species surveys focused on protected wildlife, including birds, bats, badgers, amphibians, and reptiles as well as a range of legally protected species Incidental sightings of birds and mammals were recorded. Bat surveys included inspecting trees and structures for roosts, while aquatic surveys evaluated watercourses for species like otters, crayfish, lampreys, eels, and salmon.

Description of the existing environment

The biodiversity surveys identified a range of habitats and species across the project area. At the Landfall Site, sea cliffs, shingle shores, and dry grassland provide coastal habitats, while the Onshore Export Cable Route includes rivers, drainage ditches, woodlands, hedgerows, and grasslands. The Onshore Substation at Ballyogan features meadows and a settlement pond, and temporary construction sites include scrub and immature woodland. The Operations and Maintenance Base at Dún Laoghaire Harbour includes marine and urban habitats.

29 Dún Laoghaire-Rathdown County Development Plan 2022-2028

The area supports diverse wildlife, including shorebirds, raptors, and small songbirds in woodlands and hedgerows. Several bat species use the site for foraging and commuting. Mammals such as badgers, hedgehogs, otters, and red squirrels inhabit woodlands and watercourse areas. Amphibians like the common frog and smooth newt were recorded near the Onshore Substation, and fish species such as brown trout, European eel, and lamprey were found in local rivers. Various pollinating invertebrates contribute to the ecosystem. The surveys also identified invasive species, including giant hogweed, Japanese knotweed, and ring-necked parakeets, requiring management to protect native biodiversity.

Key findings of the assessment

During construction, habitat loss—both temporary and permanent—was identified, affecting rivers, drainage ditches, grasslands, woodlands, and coastal habitats. Wildlife, particularly birds and mammals, could experience disturbance due to noise, vibrations, and increased human activity. Dust arising from construction could impact vegetation and water quality, while accidental spills of hydrocarbons or other pollutants pose risks to aquatic habitats. Additionally, construction activities could facilitate the spread of invasive alien species, further threatening native biodiversity. Protected species such as amphibians, birds, bats, badgers, hedgehogs, and otters may also be affected by habitat disturbance and loss.

During the operational phase, the wind farm's planned and unplanned maintenance activities could disturb nearby wildlife, while noise and vibrations may have ongoing effects on sensitive species. Artificial lighting could disrupt nocturnal animals, altering natural behaviours. Long-term habitat effects from the construction phase may persist, requiring continued monitoring. The assessment also evaluated the effectiveness of mitigation measures put in place during construction to ensure their continued success in minimising ecological impacts.

The decommissioning phase presents similar impacts to construction, including habitat disturbance, noise, vibrations, dust creation, and the risk of pollution from accidental spills during infrastructure removal. However, this phase also provides an opportunity for habitat restoration and the removal of any remaining invasive species.

Mitigation measures include using trenchless technology (below ground installation techniques) to avoid direct impacts on sensitive habitats, implementing dust suppression techniques, and adhering to pollution prevention and control measures. An Ecological Clerk of Works[30] will oversee construction activities to ensure compliance with environmental management plans. Additionally, a pre-construction survey will identify any changes in species activity, and appropriate measures will be taken to protect important ecological features.

30 An Ecological Clerk of Works ensures compliance with environmental regulations by monitoring site activities, protecting wildlife and habitats, and advising on mitigation measures during construction.

Assessment results

During the construction phase, potential impacts include temporary habitat loss, disturbance, and potential pollution events. The use of trenchless technology for river crossings and the careful routing of the underground cable infrastructure significantly reduces the amount of habitat loss, damage, degradation or fragmentation[31].

The proposed development includes comprehensive mitigation measures to avoid, prevent and reduce any significant adverse effects on biodiversity. These measures are designed to prevent harm to species and habitats, including the risk of killing, disturbing, or damaging wildlife and their breeding sites. The onshore infrastructure is planned to ensure that any impacts on biodiversity do not affect the maintenance of species populations at a favourable conservation status. With these mitigation measures in place, the residual effects on biodiversity are expected to be minor and temporary, with no significant long-term adverse impacts.

The only predicted residual effect is to the scattered trees and parkland habitat, which will experience a short term adverse effect that is significant in EIA terms. This short term effect would only remain in place until proposed replacement tree planting is sufficiently mature, whereby the medium to long-term residual effects will not be significant (not significant in EIA terms). This applies to the project in isolation and cumulatively with other developments.

The assessment found that the combined effects of the Dublin Array Offshore Wind Farm's onshore infrastructure, along with other existing and planned projects, would not result in significant adverse impacts on any other important ecological features. The mitigation measures, including habitat restoration and careful management of construction activities, are designed to minimize the cumulative effects on biodiversity, ensuring that the overall impact remains within acceptable levels.

The assessment of transboundary effects concluded that the onshore infrastructure is unlikely to cause significant impacts beyond the local area.

7.2 Land, Soils, and Geology

Assessment methodology overview

The assessment involved a combination of desk studies and field surveys to understand the land, soils, and geology within the study area, which extended to 2 km around the proposed Onshore Electrical System (underground cable infrastructure and Onshore Substation) and Operations and Maintenance Base.

[31] The process by which habitats are broken into smaller, isolated patches, often due to human activities.

The desk study included reviewing existing data from sources including the Ordnance Survey of Ireland, Geological Survey of Ireland, and previous ground investigations. Field surveys were conducted to gather additional data and verify the desk study findings. Geotechnical surveys involved drilling holes to collect soil and rock samples and test how strong and stable the ground is. Walkovers were completed to visually inspect the area, noting land use, soil types, and any signs of contamination or hazards. Detailed maps were created using data from the Geological Survey of Ireland to identify different soil types, such as alluvial soils and glacial till. A survey of the Shanganagh Cliffs checked how quickly the cliffs are eroding providing a baseline for future monitoring. These activities helped understand the area's current condition and guide the assessment of potential impacts.

Description of the existing environment

The study area consists of a mix of residential, amenity, commercial, industrial, and recreational spaces. The onshore transmission infrastructure crosses various soil types, such as urban soils, alluvium soils along watercourses, and brown earth soils from glacial deposits. There are also many areas with made ground, particularly in urban areas, golf courses, and sports fields. The proposed onshore substation is near the former Ballyogan Landfill Facility, which is now capped and used for a recycling facility.

The Operations and Maintenance Base at Dún Laoghaire Harbour is mainly urban, with rocky shorelines and the Irish Sea. The area is a sea port with infrastructure like the DART[32] train line and active harbour facilities, used for storage and occasional cruise operations.

Overall, the study area has varied land uses and soil types, with some areas possibly contaminated from past industrial activities (although no evidence of contaminated land has been identified in the surveys undertaken for the project). The geological features include urban soils, glacial deposits, and made ground, with no significant or unique geological features identified. The coastline features prominent sea cliffs composed of limestone and shale, shaped by natural erosional processes over time.

Figure 26 shows the study area and land cover, mapped using 2018 satellite imagery and other sources and categorised using a standardised inventory of land cover across Europe (called Corine).

Key findings of the assessment

During construction, the main impacts will include changes to land use, soil loss or degradation, pollution risks from fuel or oil spills, and potential contamination from excavated soils. Construction activities will cause temporary and permanent land use changes, with the Onshore Substation site seeing the most significant permanent change. Soil loss will be managed carefully to reinstate areas of the underground cable infrastructure, reduce degradation, and pollution risks will be minimised through a strict environmental management plan. While the chance of encountering contaminated soils is low, there are procedures in place to handle them safely if necessary.

32 The DART (Dublin Area Rapid Transit) is a commuter rail service running along the east coast of Ireland, primarily serving Dublin and its surrounding areas.

During operations, potential impacts include the risk of accidental fuel leaks, which will be minimised through good site management practices, such as using double-skinned refuelling equipment and regular equipment checks.

In the decommissioning phase, impacts will be similar to construction and will be managed through a decommissioning plan that follows best practices and regulations.

The cumulative effects of nearby projects, like the Glenamuck District Road Scheme and the Beckett Road Re-alignment, have been assessed but will not cause significant additional impacts.

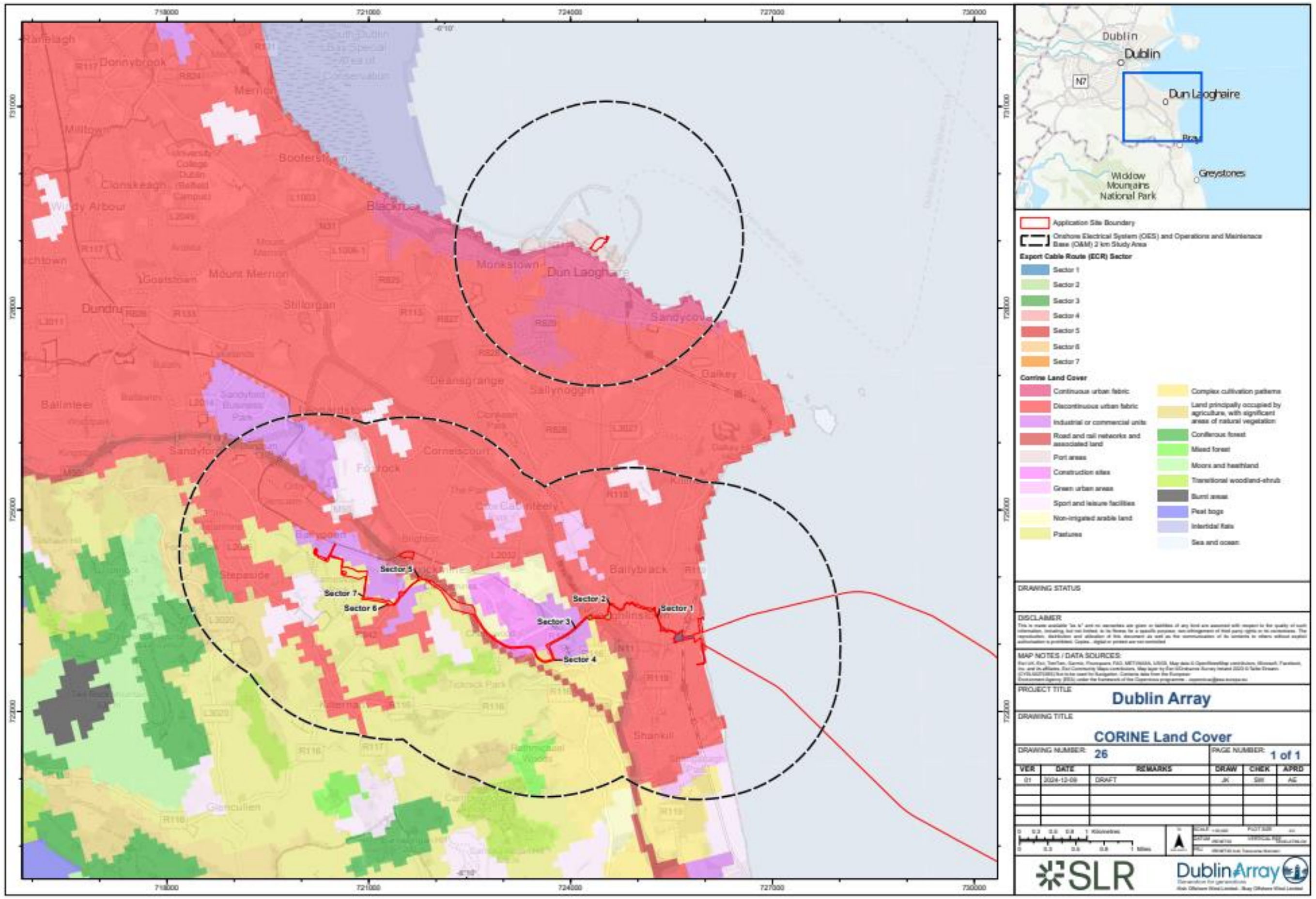


Figure 26 CORINE[33] Land Cover

[33] CORINE Land Cover (Coordination of Information on the Environment) is a program initiated by the European Commission to create a comprehensive and harmonised dataset on land cover and land use across Europe.

Assessment results

The assessment found that the potential impacts on land, soils, and geology are generally minimal and not significant. During the construction phase, most impacts, such as changes to land use, soil degradation, and pollution risks, are temporary and manageable through careful handling and project design measures. Underground installation techniques will prevent coastal erosion and avoid any cliff stability issues at Shanganagh Cliffs. In the operational phase, the risk of accidental fuel leaks will be minimised through good site management practices. The decommissioning phase will have similar impacts to construction, which will be effectively managed. Cumulative effects with nearby projects are not expected to cause significant additional impacts. Overall, with the proposed project design measures in place, the impacts on land, soils, and geology are not significant.

7.3 Water (Hydrology, Hydrogeology, and Flood Risk)

Assessment methodology overview

The study area was defined with a 2 km buffer around the onshore transmission infrastructure and the Operations and Maintenance Base. Baseline data was collected by reviewing various sources, such as maps from the Ordnance Survey of Ireland, soil and subsoil information from Teagasc (the Agriculture and Food Development Authority), Environmental Protection Agency, and Geological Survey of Ireland, flood risk data from the Office of Public Works, and other environmental records. This desktop review was complemented by site walkover surveys conducted in July and August 2020 and September 2024, which aimed to identify water features and sensitive water related receptors, and to confirm key features identified in the desktop study.

Description of the existing environment

The Shanganagh River, the Kill-o-the-Grange Stream, Loughanstown Stream, and the Carrickmines Stream are located within the study area. The study area is mostly urban, featuring parkland and open spaces along the river valleys. The watercourses have been heavily altered, particularly the Kill-o-the-Grange Stream, which has been canalised and culverted. The Shanganagh River is designated for drinking water extraction, although it is not currently used for this purpose. The EPA classifies water quality as generally good in the Shanganagh River and Carrickmines Stream, but poor in the Kill-o-the-Grange Stream.

The proposed Onshore Substation is located near the Ballyogan Landfill, where groundwater monitoring shows no significant changes due to landfill activity. Tufa springs, which are considered priority habitats, are located near Cherrywood, approximately 400 m from the onshore transmission infrastructure. The Operations and Maintenance Base at St. Michael’s Pier in Dún Laoghaire Harbour (which has good water quality) and is not at risk of coastal flooding.

The location of surface water features in relation to the onshore transmission infrastructure is shown on Figure 27 Groundwater across these areas generally maintains a good quality, although specific zones are noted to be at environmental risk due to factors such as industrial activities and geological limitations, impacting the feasibility of sustainable groundwater use.

The proposed Onshore Substation is situated within Flood Zone C, meaning it is at a very low risk of flooding. The Operations and Maintenance Base at St. Michael's Pier in Dún Laoghaire Harbour is also located within Flood Zone C, except for a small area at the north-western boundary that falls within Flood Zone A (high probability of flooding) however the development is acceptable at this location as it is a compatible land-use. Sections of the onshore underground cable route fall within Flood Zones A and B but this infrastructure is not sensitive to flood risk.

Key findings of the assessment

During the construction phase, potential impacts include pollution of surface and groundwater from accidental spills of chemicals, fuels, and other hazardous substances. Sedimentation of surface waters may occur from disturbed soils and excavation, potentially degrading water quality. Construction activities could also increase flood risk by altering drainage patterns and increasing surface runoff. Dewatering activities (removing water that collects in excavations during construction) may change groundwater levels and flow, which could affect groundwater-dependent ecosystems. These impacts are mitigated through trenchless drilling techniques for watercourse crossings that avoid works within the watercourse, temporary drainage measures, and a Construction Environmental Management Plan that includes best practices for runoff management and pollution prevention.

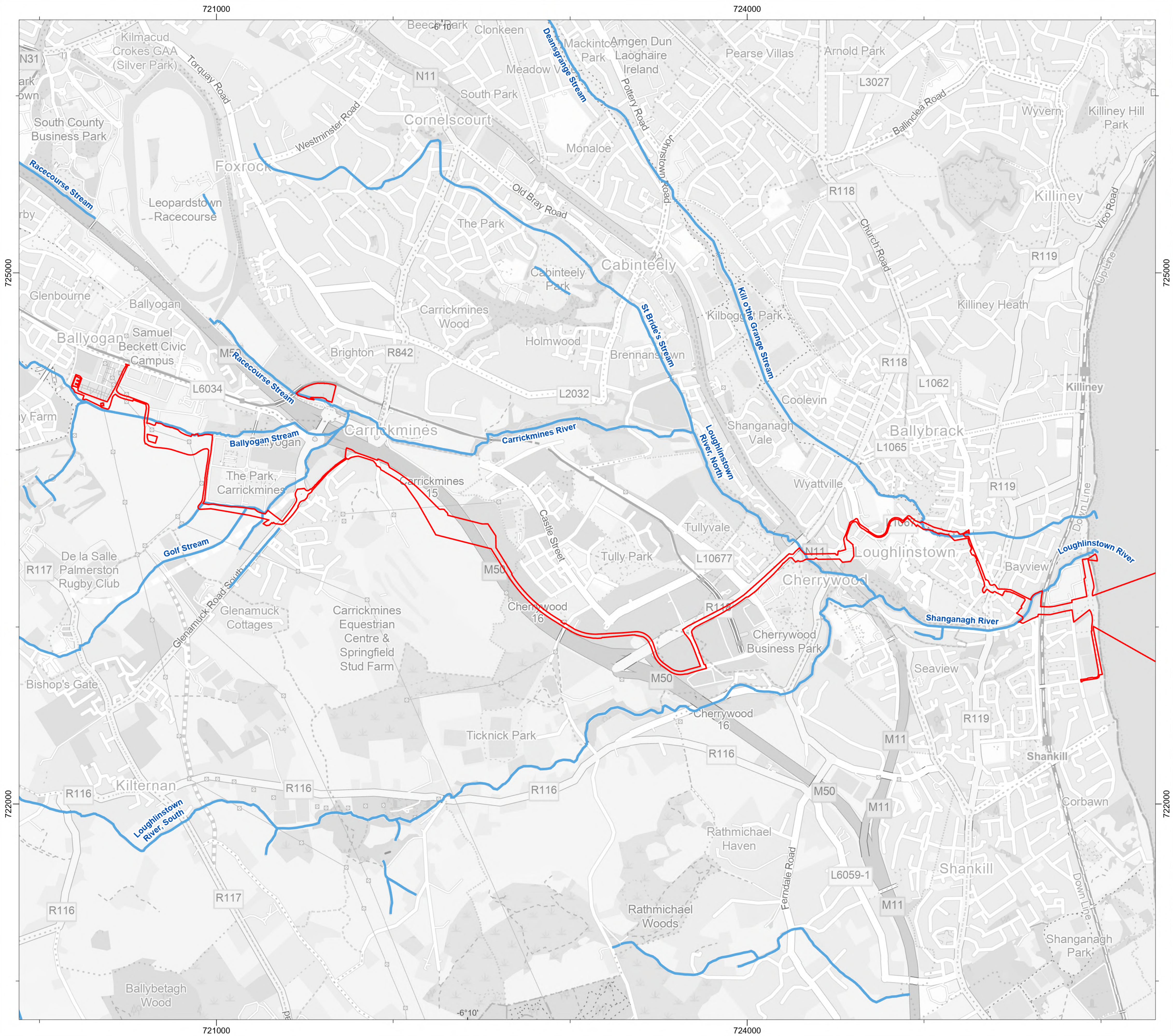
In the operational phase, potential impacts include the risk of pollution from accidental spills during maintenance activities and the potential for increased surface water runoff from impermeable surfaces, which could elevate the risk of flooding. These risks are managed through sustainable drainage systems[34] that control surface water runoff. Regular monitoring and maintenance of these systems will ensure their effectiveness in preventing pollution and managing flood risk.

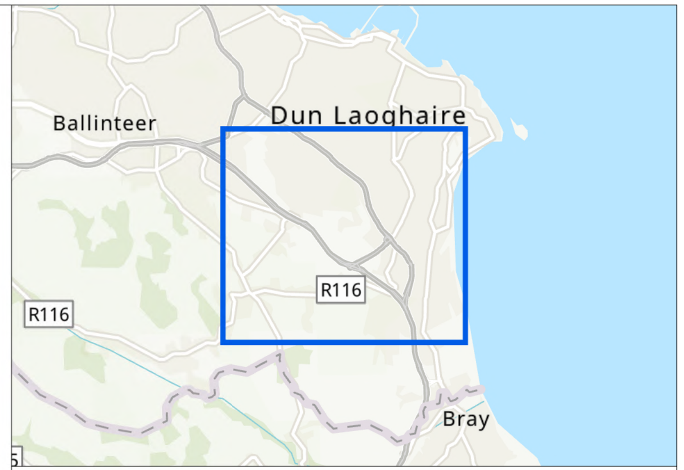
The decommissioning phase is expected to have similar impacts to the construction phase, including potential pollution from the removal of infrastructure and the risk of sedimentation from soil disturbance. These impacts will be managed through a decommissioning plan that adheres to best practices and regulatory requirements.

34 Sustainable urban drainage systems are design approaches used to manage surface water runoff in a way that reduces the impact on the environment. They aim to mimic natural drainage processes by using methods like permeable surfaces, rain gardens, swales, and ponds to slow, filter, and store rainwater, helping to prevent flooding, improve water quality, and enhance biodiversity.

Assessment results

Overall, the assessment concludes that with the proposed project design measures in place, including trenchless drilling techniques at the majority of watercourse crossings along the Onshore ECR, the potential impacts on hydrology, hydrogeology, and flood risk from Dublin Array are not significant. The project design incorporates robust measures to manage and mitigate risks, ensuring the protection of water resources and the surrounding environment.





Application Site Boundary

Watercourse

DRAWING STATUS

PUBLIC

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PROJECT TITLE

Dublin Array

DRAWING TITLE

Surface Water Features

DRAWING NUMBER: **Figure 27**

PAGE NUMBER: **1 of 1**

VER	DATE	REMARKS	DRAW	CHEK	APRD
01	2025-02-12	DRAFT	JK	AB	AE
02	2025-01-30	Public	JK	AM	AM

0 125 250 375 500 Meters
0 0.1 0.2 0.3 0.4 Miles

N GRID NORTH

SCALE	1:22,148	PLOT SIZE	A3
DATUM	IRENET95	VERTICAL REF	ODN/LAT/MLLW
PRJ	IRENET95 Irish Transverse Mercator		

SLR

Dublin Array Generation for generations

Kish Offshore Wind Limited - Bray Offshore Wind Limited

7.4 Noise and Vibration

Assessment methodology overview

The study areas for the noise and vibration assessment were defined to capture the potential impacts on nearby noise sensitive receptors[35], as follows:

- Onshore transmission infrastructure: The study area extends from the proposed Landfall Site at Shanganagh Cliffs to the point of connection on the existing national electricity transmission network at Carrickmines. The closest noise sensitive receptors are located 5 – 10 m from the onshore underground cable infrastructure;
- Onshore Substation: The study area extends to the nearest residential receptors to the north, south, east, and west of the proposed Onshore Substation. The closest noise sensitive receptors are located approximately 780 m from the Onshore Substation; and
- Operations and Maintenance Base: The nearest residential receptors are located approximately 290 – 320 m from the proposed Operations and Maintenance Base.

Baseline noise surveys were carried out at representative locations near these sites, including two at Shanganagh, three at trenchless crossing points, four in Carrickmines, and two in Dún Laoghaire Harbour. Daytime and nighttime noise levels were measured to understand how much noise there is during different times of the day. The noise was monitored over several days to provide robust data, which was then used to calculate noise threshold limits for both the construction and operation of the onshore infrastructure.

Description of the existing environment

The study area is characterised by a mix of urban, residential, and natural settings. The onshore infrastructure noise sensitive receptors are listed in Table 5. The noise monitoring surveys showed that daytime noise levels were generally higher at all locations due to human activities and construction, while night-time levels were significantly lower.

Table 5 Onshore infrastructure noise sensitive receptors

Location	Description	Coordinates	Distance to closed working area (m)
Landfall			
SHN1	Shanganagh Cliffs	325876, 223050	10
SHN2	Shanganagh Cliffs	325888, 222904	130

35 Noise Sensitive Receptors are places where noise could have a significant impact on people or the environment. These typically include homes, schools, hospitals, offices, and wildlife areas where excessive noise may cause disturbance.

Location	Description	Coordinates	Distance to closed working area (m)
SHN3	Shanganagh Cliffs	325909, 222776	260
SHN4	Seafield	326041, 222597	460
Onshore underground cable infrastructure			
HDDN1	Shanganagh Cliffs	125425, 379682	50
HDDN2.1	Clifton Park, Hackettsland	125332, 379653	60
HDDN2.2	Bayview Glen, Hackettsland	325605, 223113	80
HDDN3	Bayview Crescent, Hackettsland	125175, 379870	15
HDDN4	Norwood, Ballybrack	325219, 223517	15
HDDN5	Glencar Lawn, Ballybrack	124826, 380278	30
HDDN6	Cherrywood, Loughlinstown	324557, 223424	40
HDDN7	Beckett Park Rd, Laughanstown	122497, 380308	170
HDDN8	Happy Valley, Glenamuck Road South (R842), Carrickmines	121098, 380548	40
Onshore substation site			
CMOSS1	Ballyogan Rd	120981, 381250	220
CMOSS2	Cruagh Rise	119684, 380974	780
CMOSS3	Ballyogan Rd	120568, 381354	160
CMOSS4	Avalon, Glenamuck Road	120915, 380420	640
Operations and Maintenance Base			
DLN1	Pavilion Apartments, Marine Road	124675, 385394	320
DLN2	Harbour View, Crofton Road	124483, 385547	290

Key findings of the assessment

The noise assessment identified potential impacts across the construction, operational, and decommissioning phases. During the construction phase, elevated noise levels are expected from activities such as trenchless drilling, excavation, and the operation of heavy machinery, particularly during the daytime. Mitigation measures, including the use of acoustic barriers, careful scheduling of noisy activities, and adherence to best practices for noise management, which will be implemented to reduce these impacts.

In the operational phase, the primary noise sources include the Onshore Substation and maintenance activities at the Operations and Maintenance Base. The assessment focused on potential impacts on nearby residential and commercial receptors. The Onshore Substation design incorporates features such as a 4 m high boundary wall and an 8 m high fire wall which will also act as noise barriers.

The decommissioning phase is anticipated to have similar noise impacts to the construction phase, including noise from the removal of infrastructure and soil disturbance. A decommissioning plan will be developed, adhering to best practices and regulatory requirements to manage noise impacts effectively.

Assessment results

The assessment concludes that with the proposed mitigation measures in place, the potential noise and vibration impacts from Dublin Array across all phases (construction, operational, and decommissioning) are not significant. The project design incorporates robust measures to manage and mitigate noise and vibration risks, ensuring the protection of noise sensitive receptors and the surrounding environment. The project is not expected to have any transboundary noise or vibration effects. No cumulative effects are predicted for either the construction or operational phases of the project.

7.5 Traffic and Transport

Assessment methodology overview

The study area for the assessment of impacts on traffic and transport encompasses roads impacted by the transportation of construction materials, movement of construction staff, and the operation and maintenance of the onshore infrastructure. Baseline data was collected through desktop appraisals, automatic traffic counter surveys[36], and digital turning count surveys at various locations. Key locations such as the temporary construction sites at the Landfall Site, Clifton Park and Leopardstown, along the route of the onshore underground cable infrastructure, the Onshore Substation, and the Operations and Maintenance Base were assessed for their current traffic conditions, road safety, and the presence of sensitive receptors like residential areas, schools, and community facilities.

The assessment focused on potential effects such as community severance, road vehicle driver delay, pedestrian and non-motorised user delay, non-motorised user amenity, road safety, and the impact of hazardous or large loads.

The study also included future baseline traffic forecasts, considering cumulative developments and growth rates. The assessment identified sensitive receptors and evaluated the significance of impacts based on the Institute of Environmental Management and Assessment Guidelines for the Environmental Assessment of Traffic and Movement, which suggest thresholds for traffic flow increases.

Description of the existing environment

Roads in the vicinity of the Landfall Site include the N11, a busy dual carriageway extending south from Dublin, and the R837 Dublin Road, which links the N11 to Shankill and features footways, cycle paths, and frequent bus services. Local roads such as Rathsallagh Drive and Shanganagh Cliffs are quieter but important for residents, providing access to schools and the Shankill railway station.

The underground electricity infrastructure will be constructed mainly by means of open cut trenching through a mix of residential streets, local roads, and major transport routes between the Landfall Site and the Onshore Substation. It will traverse areas with residential streets, local amenities, and some dual carriageways with footways, cycle lanes, and bus services. Certain areas will require trenchless crossings under major roads, and temporary traffic management will be implemented during construction on specific roads along the cable route.

The Onshore Substation will be located in Ballyogan which has good access from the M50 motorway. The general area of the Onshore Substation is also well served with pedestrian footways, cycle lanes, and public transport services.

36 An Automatic Traffic Counter survey is a way to measure how many vehicles use a road, how fast they are going, and what types of vehicles they are. Sensors are placed on the road to automatically record this information over a period of time.

The Operations and Maintenance Base will be situated in Dún Laoghaire Harbour, which is well-connected by public transport and features footways, cycle lanes, and pedestrian crossings.

Key findings of the assessment

During the construction phase there will be an increase in traffic, especially from heavy goods vehicles (HGVs)[37], however total traffic flows will not increase above 30%, with the largest increase expected on Rathsallagh Drive and Shanganagh Cliffs at 5%. HGV traffic on Shanganagh Cliffs is expected to rise by 107%. This could moderately disrupt local residents' access to amenities. Pedestrians and cyclists may experience minor delays and a slight decrease in the pleasantness of their journeys. The rise in traffic, particularly HGVs, could also moderately impact road safety.

To mitigate these impacts, temporary traffic management measures such as lane closures and traffic lights will be used to minimise disruption. Local residents will be kept informed to reduce stress and anxiety related to construction activities. A Construction Traffic Management Plan[38] will be developed by the contractor to manage construction traffic, including abnormal load deliveries, signage, and vehicle cleaning. Additionally, a Travel Plan[39] will be prepared to promote sustainable transport options for construction workers.

During the operational phase, the impact on traffic and transportation will be minimal. The Operations and Maintenance Base is expected to generate some additional traffic due to staff movements, but this will be relatively low. The increase in traffic on Marine Road will be less than 1%, and on Harbour Road, approximately 29.6%. This slight increase is not expected to significantly affect the overall traffic flow or cause noticeable delays. A Travel Plan will be implemented to encourage sustainable transport options for staff, such as car-sharing and using public transport.

During the decommissioning phase of Dublin Array, impacts on traffic and transport are expected to mirror those experienced during the construction phase at the Onshore Substation and Operations and Maintenance Base. The removal of this infrastructure will lead to a temporary increase in traffic volumes, particularly from HGVs. Sensitive receptors that might be affected include residential areas, schools, and community centres near the Onshore Substation and Operations and Maintenance Base, such as those along Ballyogan Road and Harbour Road.

37 HGVs (Heavy Goods Vehicles) are large vehicles used for transporting goods, typically weighing over 3.5 tonnes when fully loaded. This includes lorries, trucks, and articulated vehicles.
38 A Construction Traffic Management Plan is a document that outlines how vehicle movements, particularly heavy goods vehicles and construction traffic, will be managed on and around a construction site to minimise disruption, ensure safety, and comply with regulations.
39 A Travel Plan encourages people to use greener and more efficient ways of getting around, like walking, cycling, or public transport, instead of driving alone.

Assessment results

The assessment concludes that, although there will be a rise in traffic volumes, with the largest increase during the construction phase, these increases are not expected to reach levels of significant impact. The operational phase will generate minimal traffic, primarily from periodic maintenance visits, and the decommissioning phase will follow a reverse sequence of the construction process, with similar traffic management measures in place.

Overall, the project is not anticipated to have significant transboundary or cumulative effects on traffic and transport.

7.6 Landscape and Visual

Assessment methodology

The Landscape and Visual Impact Assessment methodology for the onshore infrastructure was based on the Guidelines for Landscape and Visual Impact Assessment (GLVIA3). The study area includes the onshore transmission infrastructure study area from Shanganagh to Carrickmines and the area around the Operations and Maintenance Base in Dún Laoghaire Harbour. It includes a 100 m buffer on either side of the onshore underground electricity cables, a 3 km buffer around the Landfall Site and Onshore Substation, and a 500 m buffer around the Operations and Maintenance Base.

Baseline data was collected through desk-based studies and field surveys. This included reviewing existing landscape character assessments and conducting site visits to capture current landscape and visual conditions.

The assessment of Dublin Array’s onshore infrastructure considers three main categories of effects. Firstly, landscape character effects involve changes to the physical landscape and its inherent character. Secondly, views effects pertain to alterations in the views experienced by people, impacting their visual amenity. Lastly, cumulative effects encompass the combined impacts of the project when considered alongside other existing or planned developments, potentially leading to a greater overall effect on the landscape and visual environment.

Description of the existing environment

The existing baseline for Dublin Array's onshore infrastructure encompasses a diverse range of landscapes and visual environments. The study area includes the urban environment between Shanganagh and Carrickmines, the surrounding areas of Dún Laoghaire Harbour, and the increasingly rural and upland areas to the west and southwest of Carrickmines, including the north-eastern slopes of the Dublin Mountains.

The landscape between Shanganagh and Carrickmines is mainly urban, with residential areas, parks, and major roads. Key features include the Killiney Architectural Conservation Area and Killiney Hill Park, offering scenic views. To the southwest, the landscape becomes more rural, with agricultural land and the Dublin Mountains, including Two Rock and Three Rock Mountains. The Dún Laoghaire Harbour area is flat, featuring a mix of historic and modern buildings, including landmarks like the Mariner's and St. Michael's Churches.

Urban views are often restricted by buildings, trees, and the flat terrain, though some areas provide views of Killiney Hill and the Dublin and Wicklow Mountains. The Dublin Mountains offer panoramic views over Dublin Bay. In the harbour, the Operations and Maintenance Base site is visible from Dún Laoghaire Harbour and nearby roads, while the East and West Piers block views of the old ferry terminal.

The study area includes protected views, such as those from Shanganagh Cliffs towards Killiney Hill and views along Ballyedmonduff Road, as well as seafront views from the East and West Piers. These views have been considered to ensure they are not negatively impacted by the development.

Viewpoints were selected for the assessment based on their potential to representatively capture the visual impacts on various receptors. Figure 28 shows the location of the viewpoints, alongside the study area and designations. Photomontages were created for these viewpoints to visually represent the proposed development's impact on the landscape and visual receptors, illustrating the location, size, and appearance of the proposed structures.

Key findings of the assessment

During the construction phase, the development of the onshore transmission infrastructure and Operations and Maintenance Base will result in temporary visual impacts, particularly affecting residents and recreational users near the Landfall site at Shanganagh Cliffs. The presence of construction compounds and noise mitigation measures will alter the views in these areas, but these effects will be short-term and reversible, lasting only for the duration of the construction activities.

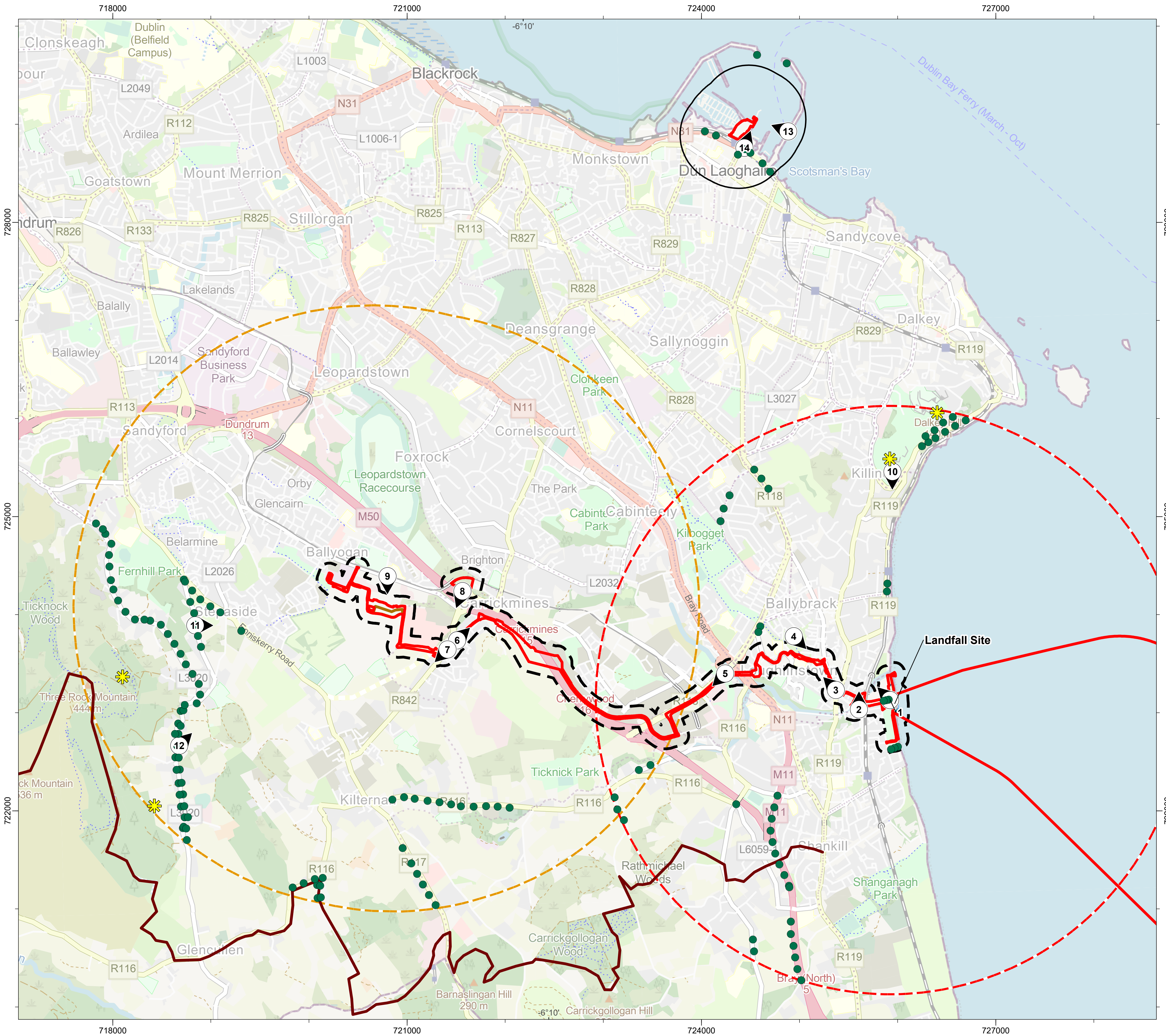
The number of trees affected by the OES has been minimised by careful design of the route and impacts to trees will be kept to a minimum through the implementation of suitable mitigation measures. There will be some individual trees removed as a result of the Onshore Export Cable Route, however any tree removed during construction will be replaced through replanting. To support this work and ensure that the correct measures are taken a suitably qualified arboriculturist will be retained for the duration of construction works.

In the operational phase, the impacts will be minimal. The above ground components of the onshore transmission infrastructure will be largely screened by existing vegetation and buildings, which will help to integrate the new structures into the surrounding environment. The Onshore Substation and the Operations and Maintenance Base will blend into the existing industrial and harbour settings, resulting in only minor visual changes. This integration will minimise the visual intrusion and maintain the overall character of the landscape.

The decommissioning phase is expected to have impacts similar to those during construction. Temporary visual disturbances are anticipated as the infrastructure is removed or repurposed. However, these effects will also be short-term and reversible, ensuring that the landscape can return to its previous state once the decommissioning activities are completed.

Assessment results

Overall, the assessment concluded that while there will be some significant adverse effects on some visual receptors during the construction phase, these will be short-term and reversible. The operational phase will have minimal impacts on landscape and visual receptors. No potential significant effects during the decommissioning phase of the onshore infrastructure of Dublin Array, or cumulative effects with other permitted/proposed developments or developments under construction, were identified.



- Application Site Boundary
- Onshore Electrical System (OES) 100 m Study Area
- Operations and Maintenance (O&M Base) 500 m Study Area
- Onshore Substation (OSS) Boundary
- Onshore Substation (OSS) 3 km Buffer
- Landfall Site
- Landfall Site 3 km Buffer
- Viewpoints

Landscape and Visual Designations

- Scenic Views
- To Preserve Views
- Dublin Mountains Way

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PROJECT TITLE **Dublin Array**

DRAWING TITLE

Landscape and Visual Assessment: LV Designations and Photograph Locations

DRAWING NUMBER: **Figure 28** PAGE NUMBER: **1 of 1**

VER	DATE	REMARKS	DRAW	CHEK	APRD
01	2025-02-14	DRAFT	JK	SW	AE
02	2025-01-16	PUBLIC	JK	SW	AE

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0 0.1 0.3 0.4 0.5 Miles

N GRID NORTH

SCALE 1:40,000 PLOT SIZE A3
DATUM IRENET95 VERTICAL REF ODN/LAT/MLLW
PRJ IRENET95 Irish Transverse Mercator

Generation for generations
Kish Offshore Wind Limited - Bray Offshore Wind Limited

7.7 Archaeology and Cultural Heritage

Assessment methodology overview

The study area for onshore archaeology and cultural heritage included the onshore transmission infrastructure and the Operations and Maintenance Base, with a 500 m study area established around the onshore underground electricity cables and Landfall Site, and a 1 km study area around the Onshore Substation and Operations and Maintenance Base. Baseline data was collected from sources such as the National Register of Monuments in Ireland, the National Inventory of Architectural Heritage, and local authority planning applications. The methodology involved reviewing existing records, conducting site visits, and using GIS databases[40] to identify and assess cultural heritage receptors.

The methodology also included a settings assessment, which evaluated the potential indirect effects on the setting of cultural heritage receptors. This involved field inspections and the use of GIS to assess inter-visibility and potential impacts on the setting of heritage assets.

Description of the existing environment

The study area for Dublin Array's onshore infrastructure encompasses a diverse range of environments, each with unique archaeological and cultural heritage features (see Figures 29-31). The Landfall Site is situated at Shanganagh Cliffs, adjacent to the Shanganagh-Bray wastewater treatment plant. This area includes the Shanganagh Battery/Loughlinstown Battery, a designated cultural heritage receptor of high sensitivity, located on top of the cliffs. The surrounding landscape is characterised by modern residential developments, with historical elements such as the Shanganagh Enclosure and Loughlinstown Martello Tower[41] adding to the area's cultural significance.

The onshore underground cable infrastructure study area includes areas with historical landmarks such as the Shanganagh Dolmen and listed buildings, along with open greenspaces, modern housing estates, and established roadways, reflecting both historical and contemporary land use. The route also intersects sites like Loughlinstown House and Castle, as well as archaeological features such as the Cherrywood Ring Barrow and Laughanstown Military Camp. Additionally, it passes near significant prehistoric and medieval sites, including the Laughanstown Wedge Tomb and Linear Field System, amid ongoing development linked to the Cherrywood Masterplan.

40 GIS databases (Geographic Information System databases) are digital systems used to store, manage, and analyse spatial and geographic data.
41 A Martello Tower is a small, circular coastal fort built in the 19th century to defend against naval attacks.

The Onshore Substation site, near the former Ballyogan landfill is surrounded by modern commercial and industrial developments, with archaeological features like the Ballyogan Linear Earthwork (the Pale Ditch). Finally, the Operations and Maintenance Base at Dún Laoghaire Harbour is located within a highly developed commercial harbour environment, which includes historical military structures such as the Dunleary Martello Tower and Battery, blending historical and modern infrastructure.

Key findings of the assessment

The assessment identified several potential impacts. At the Landfall Site, the Shanganagh Battery/Loughlinstown Battery[42] may experience temporary adverse indirect effects due to construction activities. No direct impacts on this or other cultural heritage receptors within the Landfall Site will occur, as the infrastructure has been designed to avoid these receptors.

The onshore underground cable infrastructure passes through areas with cultural heritage sites, but impacts are expected to be negligible. The Shanganagh Dolmen, Loughlinstown House and Castle, Cherrywood Ring Barrow, Laughanstown Military Camp, and Carrickmines Castle will experience minimal indirect effects due to the alignment of the infrastructure along already developed or disturbed land. At the Onshore Substation site, cultural heritage sites such as the Jamestown Enclosure, Ballyogan Linear Earthwork, and Kilgobbin Church will experience negligible impacts due to the site's location in an industrial/retail area. No direct impacts are anticipated as no cultural heritage receptors were identified within the Onshore Substation site.

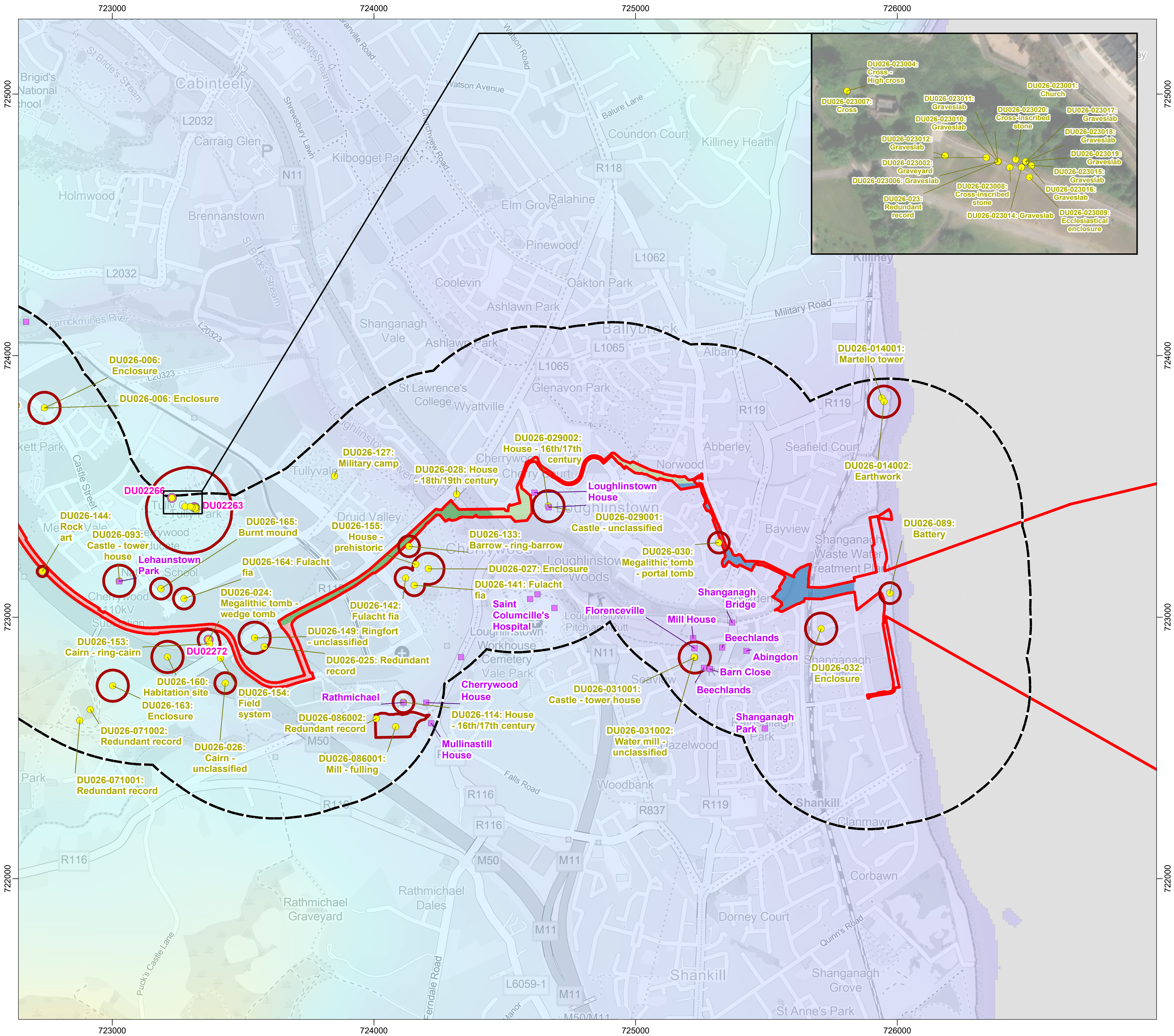
The Operations and Maintenance Base at Dún Laoghaire Harbour is set within a highly developed commercial harbour environment, therefore historical military structures such as the Dunleary Martello Tower and Battery, and the Glasthule Martello Tower and Battery, will experience negligible indirect impacts.

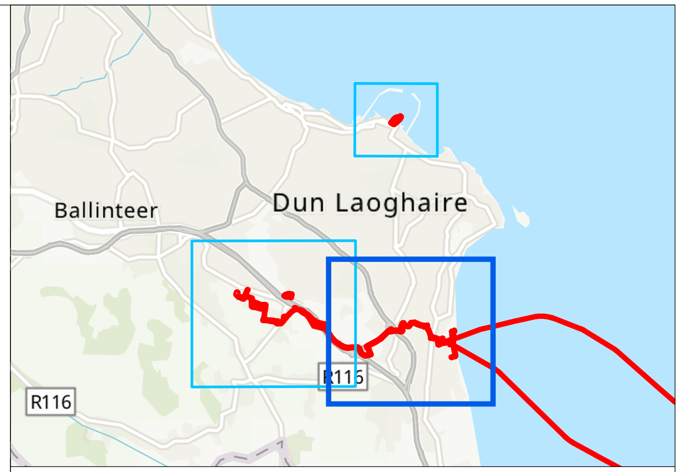
Measures to minimise these potential impacts include conducting pre-construction surveys to confirm the integrity of cultural heritage sites and implementing archaeological monitoring under license during construction to manage any unexpected discoveries. Temporary fencing will be erected around sensitive sites to prevent encroachment, and site personnel will be briefed and trained on the importance of these sites and the protective measures in place. Additionally, a Construction Environmental Management Plan will outline environmental management measures, including archaeological mitigation supervised by a qualified archaeologist.

42 A battery is a military site with artillery or coastal defence guns, built to protect against naval or land threats.

Assessment results

The assessment of impacts on archaeology and cultural heritage for Dublin Array indicates that potential disturbances have been minimised across all project phases through careful design and alignment of the Onshore Export Cable Route to avoid key heritage sites. No significant adverse residual effects were identified. Stringent construction management practices will further protect culturally significant areas.





Application Site Boundary

Onshore Electrical System (OES) 500 m Study Area

Export Cable Route (ECR) Sector

- Sector 1
- Sector 2
- Sector 3
- Sector 4

Heritage Assets

- Sites and Monuments Record (SMR)
- National Inventory of Architectural Heritage Building / Recorded Protected Structure
- Monument in State Care Included in Setting Assessment
- SMR Zone of Notification

Height (Metres Above Ordnance Datum Malin (ODM))

High: 270

Low: -10

DRAWING STATUS

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PROJECT TITLE

Dublin Array

DRAWING TITLE

Cultural Heritage: Heritage Assets Assessment

DRAWING NUMBER: 29

PAGE NUMBER: 1 of 1

VER	DATE	REMARKS	DRAW	CHEK	APRD
01	2025-02-13	DRAFT	JK	SW	AE

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GRID NORTH

SCALE	1:15,000	PLOT SIZE	A3
DATUM	IRENET95	VERTICAL REF	ODN/LAT/MLLW
PRJ	IRENET95 Irish Transverse Mercator		

SLR

Dublin Array
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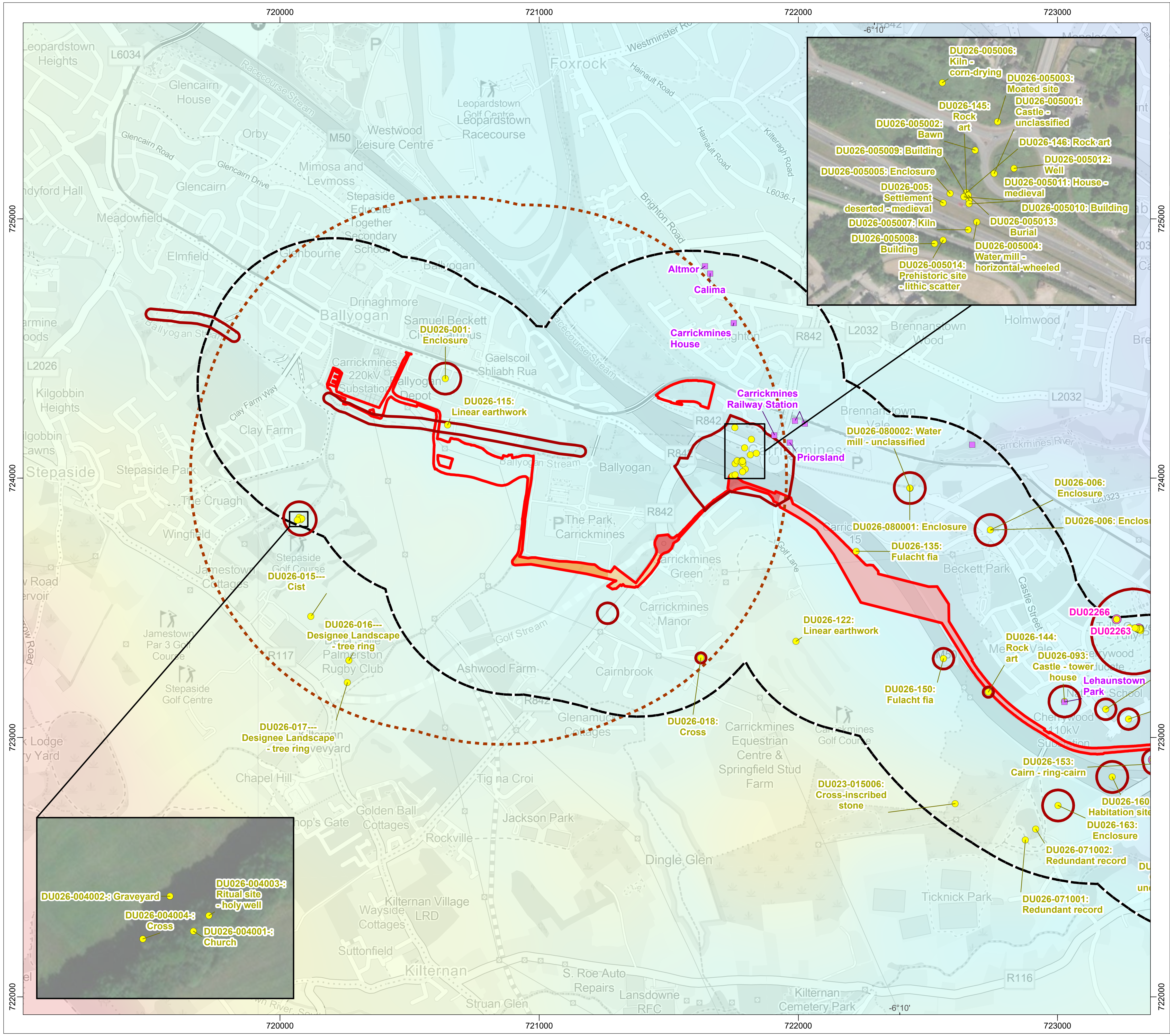

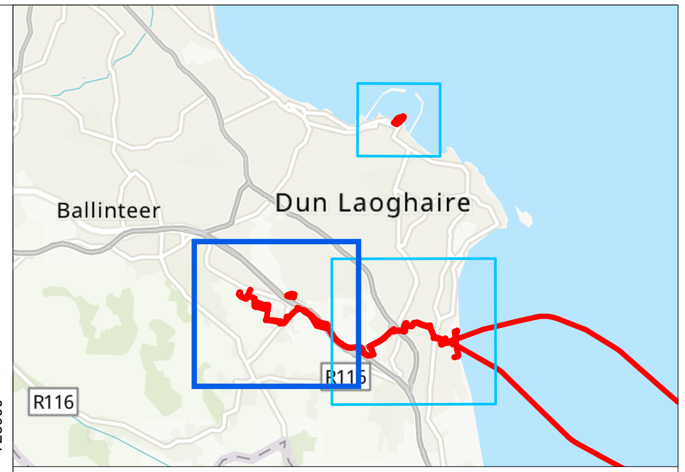

Application Site Boundary

Onshore Electrical System (OES) 500 m Study Area

Onshore Substation (OSS) 1 km Study Area

Export Cable Route (ECR) Sector

Sector 4

Sector 5

Sector 6

Sector 7

Heritage Assets

Sites and Monuments Record (SMR)

National Inventory of Architectural Heritage Building / Recorded Protected Structure

Monument in State Care Included in Setting Assessment

SMR Zone of Notification

Height (Metres Above Ordnance Datum Malin (ODM))

High: 270

Low: -10

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PROJECT TITLE

Dublin Array

DRAWING TITLE

Cultural Heritage: Heritage Assets Assessment

DRAWING NUMBER: 30

PAGE NUMBER: 1 of 1

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N GRID NORTH

SCALE 1:15,000 PLOT SIZE A3

DATUM IRENET95 VERTICAL REF ODN/LAT/MLLW

PRJ IRENET95 Irish Transverse Mercator

SLR

Dublin Array Generation for generations

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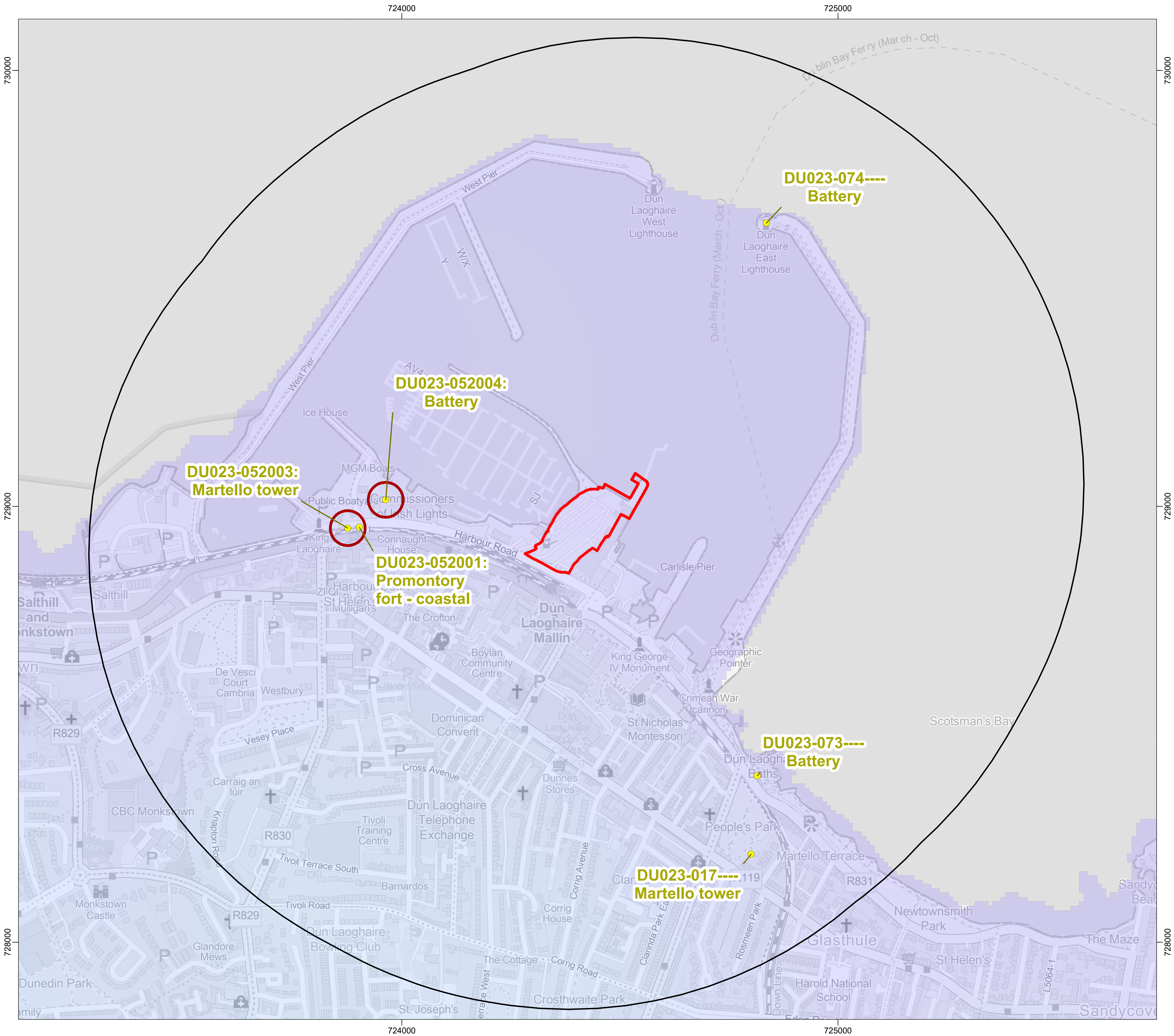

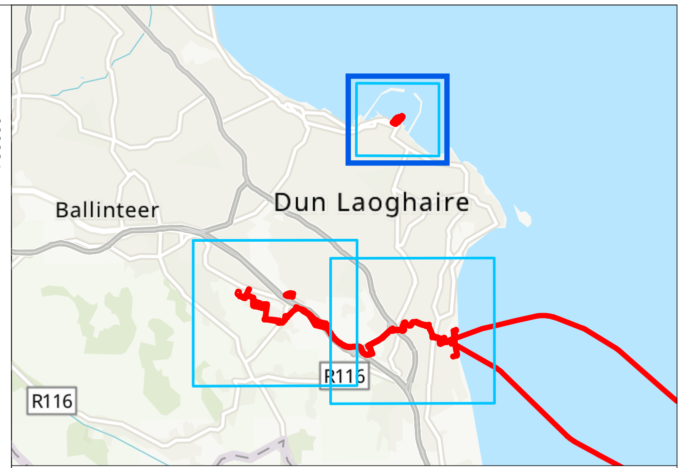

Application Site Boundary

Operations and Maintenance Base (O&M Base) 1km Study Area

Heritage Assets

Sites and Monuments Record (SMR)

SMR Zone of Notification

Height (Metres Above Ordnance Datum Malin (ODM))

High: 270

Low: -10

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PROJECT TITLE **Dublin Array**

DRAWING TITLE **Cultural Heritage: Heritage Assets Assessment**

DRAWING NUMBER: 31

PAGE NUMBER: 1 of 1

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0 100 200 300 400 Feet

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GRID NORTH

SCALE	1:9,000	PLOT SIZE	A3
DATUM	IRENET95	VERTICAL REF	ODN/LAT/MLLW
PRJ	IRENET95 Irish Transverse Mercator		

SLR

Dublin Array

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7.8 Human Health

Assessment methodology overview

The study area for the assessment of human health impacts has been defined by the individual study areas for each of the environmental factors as outlined in their respective chapters of the EIAR. For example, the Noise and Vibration chapter defines the study area based on the proximity to noise-sensitive receptors, while the Air Quality chapter considers areas affected by potential emissions from construction activities. Similarly, the Traffic and Transport chapter focuses on routes and areas impacted by construction traffic, and the Socio-economic, Tourism, Recreation, and Land Use chapter assesses the effects on local communities and amenities.

A desktop study was undertaken to gather and analyse existing data on the health characteristics of the population within the study area. This included reviewing census data, health statistics, and socio-economic indicators to establish a comprehensive baseline of the current health status and potential vulnerabilities of the local communities. The desktop study also involved mapping the locations of sensitive receptors, such as residential areas, schools, healthcare facilities, and recreational spaces, to assess their proximity to the proposed onshore infrastructure and identify any potential health impacts.

Description of the existing environment

The existing environment is a mix of urban and suburban settings with varying levels of socio-economic status and health conditions.

The receiving environment benefits from several community health initiatives under the Healthy County Plan 2019–2022 for Dún Laoghaire-Rathdown. This plan promotes both physical and mental well-being across demographic groups through supportive infrastructure and programs. Local residents report generally higher health outcomes than national averages, with Dún Laoghaire-Rathdown noted for one of the highest rates of sports and physical activity participation in Ireland. The population's access to green spaces is significant, with 80% of households located within 600 m of a park. The area also has lower rates of disability compared to state and Dublin averages, reflecting a relatively healthy population. However, mental health challenges are present, with over half of those surveyed by Healthy Ireland (2016) reporting direct or indirect experience with mental health issues, highlighting the importance of local services and support systems.

Electoral Divisions present a unique socioeconomic profile that offers insight into the local demographic composition, employment and income levels, educational attainment, and modes of transport commonly used. The divisions that best represented the local population near the onshore infrastructure were identified. Dún Laoghaire-West Central was selected for its proximity to the Operations and Maintenance Base, Shankill-Rathsallagh represents the Landfall Site, Glencullen corresponds to the Onshore Substation, and Cabinteely-Loughlinstown was chosen to represent the Onshore Export Cable Route.

The baseline data reveals that the populations near the onshore infrastructure generally have good health levels, with a higher percentage of residents reporting very good or good health compared to national averages. However, specific areas like Dún Laoghaire-West Central and Shankill-Rathsallagh have higher proportions of elderly residents and individuals with disabilities, making them more susceptible to potential health impacts from construction activities.

The study also highlights the socio-economic status of these areas, noting that while most are above average in terms of deprivation, Shankill-Rathsallagh is slightly below average.

Key findings of the assessment

During construction without effective controls in place, noise, vibration, and air quality impacts have the potential to affect nearby residents, including school children, the elderly, and those with health conditions. These effects could contribute to stress, sleep disturbances, and temporary disruptions to daily activities. Dust and vehicle emissions could also impact air quality. Temporary disruptions to footpaths and public spaces may affect accessibility, physical activity and well-being.

The operational phase is expected to bring wider societal benefits, including the generation of renewable energy and the reduction of greenhouse gas emissions. These benefits contribute to improved public health by reducing air pollution and mitigating climate change.

The decommissioning phase is likely to have less impact than the construction period, but there may still be temporary noise and air quality impacts associated with the dismantling of infrastructure. The decommissioning process will follow best practices and adhere to relevant guidelines to minimise any adverse effects on human health.

To mitigate the potential impacts on human health during the construction, operation, and decommissioning phases, several measures will be implemented, as outlined in the topic chapters. These include adhering to construction hours restrictions, implementing a Construction Environmental Management Plan, and providing temporary alternative paths where public rights of way are impacted. During the operational phase, noise monitoring and management plans will be in place to ensure that noise levels remain within acceptable limits. For the decommissioning phase, a decommissioning plan will be prepared, and environmental management measures will be implemented to minimise any adverse effects on human health.

Assessment results

The assessment concludes that the construction phase may temporarily affect human health through noise, vibration, air quality changes, and disruptions to physical activity. However, these impacts are not expected to be significant with measures such as restricted construction hours, noise control, dust suppression, and alternative pedestrian and cyclist routes.

The operational phase is expected to deliver significant public health benefits by generating renewable energy and reducing greenhouse gas emissions, though localised noise from wind turbines may occur. Decommissioning is anticipated to have a lower impact than construction, with temporary noise and air quality effects mitigated through best practices.

Overall, with the proposed measures, the project is not expected to have significant long-term, cumulative, or transboundary effects on human health.

7.9 Air Quality

Assessment methodology overview

The study area for the air quality assessment includes a 500 m buffer around the onshore transmission infrastructure and the Operations and Maintenance Base, and 50 m buffer along construction access routes. The baseline data for the air quality assessment was collected through a review of existing studies and datasets, including EPA air quality reports from 2019 to 2023. This data was supplemented by a desktop review of sensitive receptors, such as residential properties, schools, hospitals, and recreational areas within the study area.

The air quality assessment followed national and international guidelines to evaluate potential impacts, focusing on dust emissions during construction.

Description of the existing environment

The environment around the onshore infrastructure is a mix of residential, educational, healthcare, recreational, and business areas, with good air quality and significant biodiversity. The existing environment for the Dublin Array's onshore infrastructure is situated within Zone A[43], representing the Dublin area. The Environmental Protection Agency manages air quality monitoring in this zone, with data collected from stations in Dún Laoghaire, Clonskeagh, and Tallaght. These stations indicate generally good air quality, with occasional exceedances in PM_{10} and $PM_{2.5}$[44] concentrations.

The study area includes a variety of sensitive receptors such as residential properties, schools, healthcare facilities, recreational areas, and business centres. Notable locations include St. Columbanus School, St. Columcille's Hospital, Shanganagh Community Gardens, and The Park in Carrickmines. Public open spaces like Killiney and Shanganagh beaches, and several parks, provide recreational opportunities for the community.

Biodiversity in the area is supported by nationally designated sites like Dalkey Coastal Zone and Killiney Hill natural heritage site, and locally important biodiversity sites. These areas contribute to the ecological network and offer ecosystem services to the community.

43 The Environmental Protection Agency manages the national ambient air quality network and has established four air quality zones for Ireland: Zone A (Dublin), Zone B (Cork), Zone C (other cities and large towns), and Zone D (rural Ireland).
44 PM_{10} and $PM_{2.5}$ refer to airborne particulate matter. PM_{10} includes particles up to 10 micrometres in diameter, while $PM_{2.5}$ includes particles up to 2.5 micrometres.

Key findings of the assessment

The air quality assessment identified potential impacts during the construction, operational, and decommissioning phases. During construction, activities such as earthworks, construction operations, and vehicle movements will generate fugitive dust emissions. These activities could potentially affect local sensitive receptors, including residential properties, schools, healthcare facilities, and recreational areas. Measures, such as water spraying, wheel washing, and road sweeping, will be implemented to control dust emissions.

In the operational phase, Dublin Array is expected to generate minimal additional traffic, with the onshore cable route and Onshore Substation resulting in negligible traffic increases. The Operations and Maintenance Base will have a limited number of vehicle movements associated with staff activities. The traffic estimates were evaluated against screening criteria to assess the need for a detailed air quality study. As the projected changes in daily traffic volume, HGV movements, and average speeds remained below Transport Infrastructure Ireland thresholds, traffic emissions are not significant compared with baseline conditions.

During the decommissioning phase, activities similar to those in the construction phase, such as demolition and site clearance, may generate dust emissions. The same mitigation measures used during construction will be applied to manage dust emissions effectively.

Assessment results

The air quality assessment concluded that the project will not have significant adverse effects during construction, operation, or decommissioning. Effective mitigation measures, including water spraying, wheel washing, and road sweeping, will minimise dust emissions. Traffic projections for both construction and operation are considered to result in negligible additional impact. As the project is entirely within the Republic of Ireland, no transboundary effects will occur. The cumulative assessment also found no significant impact when considered alongside other developments. Overall, Dublin Array is not expected to adversely affect air quality.

7.10 Material Assets

Material assets, for the purposes of this assessment, refer to built services and infrastructure such as electricity, telecommunications, gas, water supply, wastewater and surface water drainage systems, as well as road and rail networks.

Assessment methodology overview

The study area for the assessment of material assets was defined as a 100 m buffer around the onshore transmission infrastructure and the Operations and Maintenance Base. The assessment considered potential impacts on land use, public utilities, and infrastructure during the construction, operational, and decommissioning phases. Baseline information was gathered through a desktop review and consultations with utility providers. The assessment considered potential temporary or permanent changes to land use, impacts on public utilities, and the need for connections to these utilities during both the construction and operational phases. This includes evaluating the effects on land use, public utilities such as electricity, telecommunications, gas, water supply, and wastewater and surface water drainage infrastructure, and ensuring that these utilities are adequately protected and connected as needed throughout the project's lifecycle.

Description of the existing environment

The existing environment includes a variety of land uses and infrastructure. The Landfall Site is located at Shanganagh Cliffs, near the Shanganagh Wastewater Treatment Plant, and is bordered by Shanganagh Beach and the Irish Sea to the east. The onshore underground electricity cable route crosses public amenities, residential roads, and the Dublin/Rosslare railway (DART line), which is also a major commuter route. The area includes residential zones, open spaces, and the Cherrywood strategic development zone. The proposed Operations and Maintenance Base is situated within Dún Laoghaire Harbour, an operation harbour with existing infrastructure from a former ferry terminal. The study area also includes various utilities such as electricity, telecommunications, gas, water supply, and wastewater systems, which are integrated into the existing road network. The environment is characterised by a mix of residential, recreational, and commercial uses, with significant infrastructure supporting the community.

Key findings of the assessment

During construction, temporary land take will be required for construction activities, which could disrupt current land uses and public access. The onshore underground cable infrastructure will cross the Dublin/Rosslare railway, the M50 and the N11 via trenchless techniques, and underneath the Luas Green Line. Other utilities will also be crossed, such as electricity, telecommunications, gas, water supply, and wastewater systems.

The Operations and Maintenance Base will be located at Dún Laoghaire Harbour. The harbour's commercial and recreational activities are expected to continue without significant disruption, as the Operations and Maintenance Base will be designed to align with existing land use policies and ensure public accessibility to the harbour and shorefront.

Decommissioning effects are anticipated to be similar to or less than those experienced during the construction phase. The approach to decommissioning will be informed by best practices, technological developments, and regulatory requirements at the time.

Measures to minimise or avoid potential effects include the use of trenchless crossing techniques for major roads and railways to avoid direct impacts, comprehensive utility surveys to identify and protect existing infrastructure, and the implementation of a Construction Environmental Management Plan. Additional measures include securing road opening licences, providing portable welfare facilities, and establishing temporary safety exclusion zones around high-voltage overhead lines. These measures aim to prevent significant adverse effects on material assets and ensure the continued functioning of essential services during the project's construction, operation, and decommissioning phases.

The majority of land uses crossed by the Onshore Export Cable Route are of local importance (low sensitivity) only and will be fully reinstated, with areas of amenity land restored to maintain the current aesthetic appeal and usability of the area for the community. Habitats will be reinstated, or allowed to reinstate naturally, following the completion of the construction phase.

Assessment results

The assessment concluded that the construction phase will have slight adverse effects on land use and public roads, but no significant impacts on national or regional road and railway infrastructure, or utilities such as electricity, telecommunications, gas, water supply, and wastewater. The operational phase will not significantly affect the operation of Dún Laoghaire Harbour. The decommissioning phase will have impacts similar to or less than those during construction. Cumulative effects with other projects will not be significant. No transboundary effects were identified.

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