Iarnród Éireann
Irish Rail

Rosslare ORE Hub

Natura Impact Statement

Part 3 – Appropriate Assessment Reporting

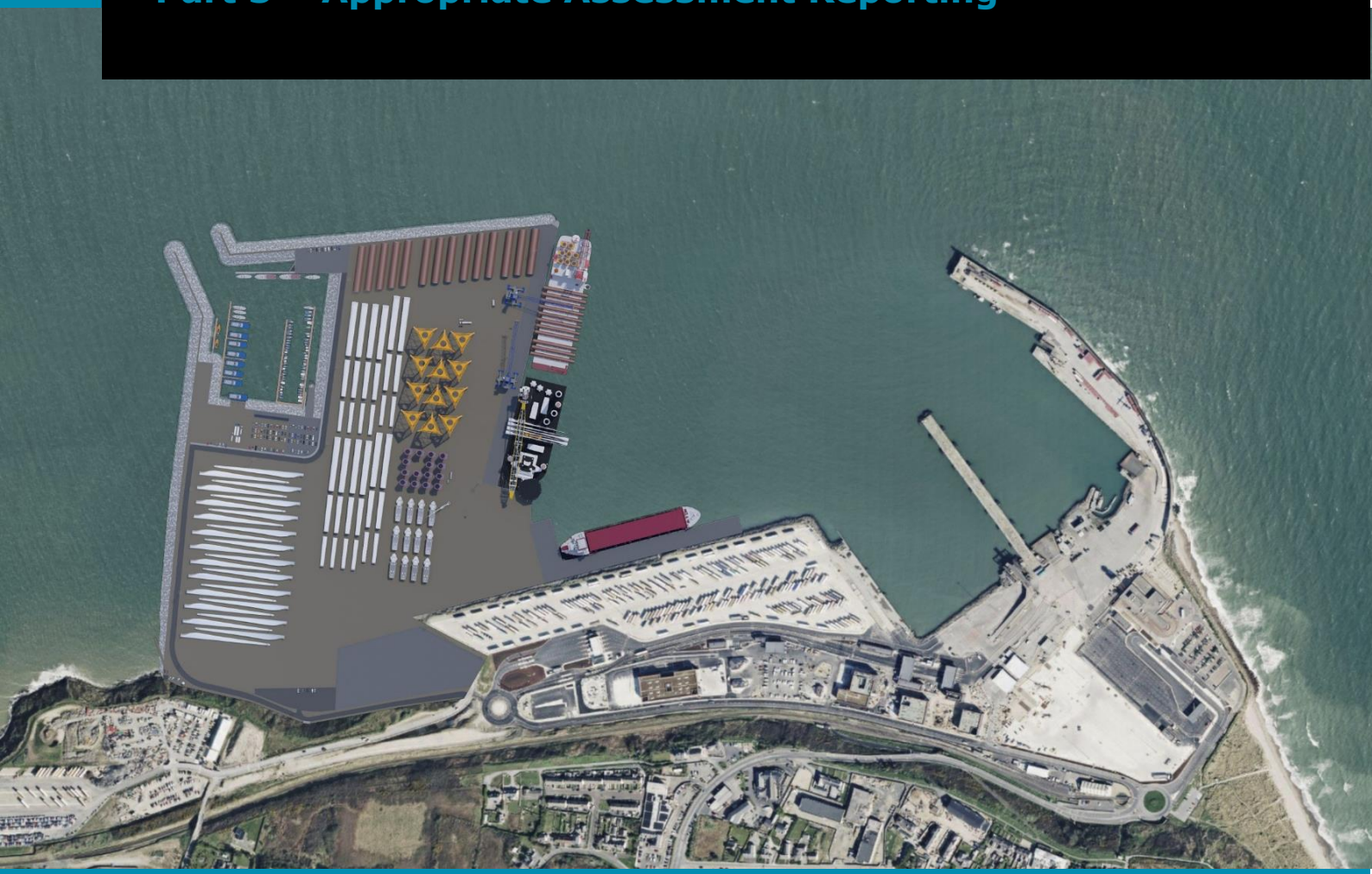

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

AA	Appropriate Assessment
ADD	Acoustic Deterrent Devices
AON	Apparently Occupied Nests
BSc	Bachelor of Science
CD	Chart Datum
CIEEM	Chartered Institute of Ecology and Environmental Management
CO	Conservation Objective
cSEL	Cumulative Sound Exposure Level
CTV	Crew Transfer Vessel
DAHG	Department of Arts, Heritage and the Gaeltacht
DEHLG	Department of Environment, Heritage and Local Government
DHPLG	Department of Housing, Planning and Local Government
EC	European Commission
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
F-POD	Frequency – Porpoise Detector
FWCC	Freshwater White-Clawed Crayfish
FWPM	Freshwater Pearl Mussel
GDG	Gavin and Doherty Geosolutions Ltd.
Ha	Hectares
HF	High Frequency
IAS	Invasive Alien Species
IFI	Inland Fisheries Ireland
IEMA	Institute of Environmental Management & Assessment
IROPI	Imperative Reasons of Overriding Public Interest
JNCC	Joint Nature Conservation Committee
kHz	Kilohertz
kj	Kilojoule
LF	Low Frequency
LSE	Likely Significant Effects
MMO	Marine Mammal Observer
m/s	Meters per Second
MSc	Master of Science
MZ	Monitored Zone
NIS	Natura Impact Statement
NPWS	National Parks and Wildlife Service
O&M	Operation and Maintenance
OPR	Office for Planning Regulation
ORE	Offshore Renewable Energy
PTS	Permanent Threshold Shift
QI	Qualifying Interests
RNLI	Royal National Lifeboat Institution

RoPAX	Roll-on/Roll-off passenger
RoRo	Roll On Roll Off
SAC	Special Area of Conservation
SAM	Static Acoustic Monitoring
SEL	Sound Exposure Level
SPL	Sound Pressure Level
SSCO	Site-Specific Conservation Objectives
TTT	Temporary Threshold Shift
TSHD	Trailing Suction Hopper Dredger
TTS	Temporary Threshold Shift
VHF	Very High-Frequency
WMO	World Meteorological Organisation

GLOSSARY OF TERMS

Appropriate Assessment (AA)	An Appropriate Assessment (AA) is an assessment of the potential adverse effects of a plan or project (in combination with other plans or projects) on Special Areas of Conservation and Special Protection Areas. These Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) are protected by both National and European Law.
Benthic Ecology	Benthic ecology is the study of organisms that make up bottom communities (sediments, seagrass communities and rock outcrops) in lakes, streams, estuaries and oceans, to determine environmental health and conduct environmental appraisals.
Ecology	Ecology is a branch of biology concerning the spatial and temporal patterns of the distribution and abundance of organisms, including the causes and consequences.
Estuaries	Estuaries are coastal inlets with a significant freshwater influence. They are diverse, dynamic habitats that help maintain the health of coastal ecosystems. They are a significant resource for bird and mammal species for feeding, breeding, and resting, and depending on their geomorphology and hydrology support a mosaic of other habitats, including Annex I habitats such as mudflats.
Favourable Conservation Status	The European Union Habitats Directive requires EU Member States to achieve Favourable Conservation Status of natural habitats and species, defined with respect to species by Article 1 (i) of the Directive as below: "conservation status will be taken as 'favourable' when: population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis."
Habitats Directive	Adopted in 1992, the Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora aims to promote the maintenance of biodiversity, taking account of economic, social, cultural and regional requirements. It forms the cornerstone of Europe's nature conservation policy with the Birds Directive and establishes the EU wide Natura 2000 ecological network of protected areas, safeguarded against potentially damaging developments.
In-combination effects	Some projects are unlikely to have significant effects on their own. However, the effects in- combination with other plans or projects could be significant. The in-combination assessment should concentrate on projects/plans that could in fact act in-combination with the current project to affect Site-Specific conservation objectives.
Mudflats	Tidal mudflat habitat is comprised of the intertidal section of the coastline where muds dominate.
Natura Impact Statement	A Natura Impact Statement (NIS) is the statement prepared following Appropriate Assessment (AA) of Natura 2000 sites as required under the EU Habitats Directive which presents information on the assessment and the process of collating data on a project and its potential significant impacts on Natura 2000 site(s).

Precautionary Principle	The precautionary principle means that where the most reliable information available leaves obvious doubt as to the absence of significant effects, the project cannot be screened out and an appropriate assessment must be carried out.
Receiving Environment	The receiving environment is the environment upon which a proposed activity might have effects.
Reefs	Reefs are marine features with hard substrate available for colonisation by plants and animals. In Irish waters they range from the intertidal to depths of 4,500m and more than 400km from the coast.
Sandbanks	Sandbanks are distinct banks that arise from horizontal or sloping plains of sediment that range from gravel to fine sand. They are primarily composed of sandy sediments permanently covered by water, at depths of less than 20m below chart datum.
Source-Pathway-Receptor	The Source-Pathway-Receptor model is the universally accepted method of determining if a link (pathway) exists between the source of an impact and the environmental receptor that may result in an effect (positive or negative) on the environmental receptor
Special Areas of Conservation (SAC)	These are prime wildlife conservation areas considered to be important on a European as well as national level. The EU Habitats Directive lists certain habitats and species that must be protected within SACs.

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1 INTRODUCTION

1.1 GENERAL

This report provides the Natura Impact Statement (NIS) for the construction and operation of an Offshore Renewable Energy (ORE) Hub at Rosslare Europort (hereafter the 'Proposed Development'). Iarnród Éireann (Irish Rail) intends to develop port infrastructure within a maritime area adjacent to and immediately to the north of the existing Rosslare Europort, in County Wexford on the south-east coast of Ireland, which will be reclaimed to support the development of offshore wind farms in the Celtic and Irish Seas. The existing small boat harbour will be incorporated through infilling into the newly reclaimed port area and a new substitute small boat harbour created with permanent access to deeper water.

This report has been prepared by Nicholas O'Dwyer Ltd. (NOD) and Gavin and Doherty Geosolutions (GDG) on behalf of Iarnród Éireann (Irish Rail) to help inform Stage 2 of the Appropriate Assessment to be undertaken by An Coimisiún Pleanála (hereafter 'the Commission'), as the competent authority, in considering the application for consent to develop the Proposed Development.

1.2 AIM OF THIS REPORT

This report includes information to support Stage 2 of the Appropriate Assessment (AA) process, as required under the Habitats Directive (92/43/EEC), as transposed in Ireland under Part X of the Planning and Development Act 2000 as amended.

This document follows on from Stage 1: Screening for Appropriate Assessment (Rosslare ORE Hub Screening for Appropriate Assessment Report) and is included as part of the planning submission for the Proposed Development.

1.3 REPORT STRUCTURE

This report is structured into the following sections, which include information relating to the Appropriate Assessment process, proposed development activities and potential impacts and the receiving environment, including relevant Natura 2000 sites and features. Specifically, the sections of this report are as follows:

- Section 1: Introduction
- Section 2: Appropriate Assessment background and methodology
- Section 3 Proposed Development
- Section 4: Stage 2 Appraisal to Inform an Appropriate Assessment

Supporting documents included as part of the planning submission for the Proposed Development include:

- Rosslare ORE Hub Screening for Appropriate Assessment Report
- Accompanying EIAR: Chapter 6: Project Description included in Volume 2
- Accompanying EIAR: Chapter 13: Marine Mammals included in Volume 2.

1.4 STATEMENT OF AUTHORITY

This report has been prepared by Charlotte Manwaring (BSc. Hons Geological Science, MSc. Geochemistry) and Maggie Starr (BSc. Hons Marine Sciences).

Charlotte is a Senior Environmental Scientist at GDG with 25 years' experience and an IEMA Practitioner. She has worked across the environmental, compliance, planning and monitoring industries for both the public and private sector. She has experience in environmental impact assessment of port expansion, onshore windfarm and energy from waste projects and of marine licencing.

Maggie is a Marine Ecologist and Ornithologist specialising in ecological impact assessment across terrestrial, freshwater, and marine environments. Maggie is a trained Marine Mammal Observer (MMO; JNCC accredited) and has a strong technical background in underwater noise impact assessment, marine mammal mitigation, and ornithological survey design and interpretation. Her expertise spans ecological surveys for protected mammal and bird species (including aerial and vantage point surveys), habitat and freshwater assessments, and the preparation of statutory assessments.

This report has been reviewed by Joey O'Connor (BSc. Hons Marine Science, MSc. Engineering in the Coastal Environment) and Nick Marchant (BSc. Environmental Science, MSc in Ecosystem Conservation and Landscape Management, MCIEEM).

Joey is an environmental impact assessment practitioner and marine ecologist with coastal engineering expertise and extensive experience of environmental assessment for both the public and private sectors. Joey has had an overview role in this project as EIA coordinator.

Nick has coordinated ecological assessments for over 500 projects throughout the island of Ireland, including wind farms, infrastructural projects (power lines, water pipelines), and a range of residential and commercial developments. He has also worked as project manager, senior scientist, and ecological consultant with the Borneo Nature Foundation in Indonesia, and as a biodiversity officer with Galway County Council.

2 APPROPRIATE ASSESSMENT

The purpose of this report is to inform Stage 2 of the AA process as required under the Habitats Directive (92/43/EEC).

2.1 GUIDANCE DOCUMENTS

Preparation of this report has been informed with due consideration of the following guidance documents:

- Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities (Department of Environment, Heritage and Local Government, 2010 revision)
- European Commission Notice C (2021) 6913 'Assessment of plans and projects in relation to Natura 2000 sites – Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC', Office for Official Publications of the European Communities, Luxembourg (EC,2021)
- Office of the Planning Regulator (2021). Appropriate Assessment Screening for Development Management. OPR Practice Note 01 – PN01.

2.2 OVERVIEW OF THE AA STAGES

The European Commission's methodological guidance (EC, 2021) promotes a three-stage process to complete an AA and outlines the issues and tests at each stage. An important aspect of the process is that the outcome at each successive stage determines whether a further stage in the process is required. The steps and procedures involved in completing each stage, as described in the guidance, are shown below (Figure 2.1).

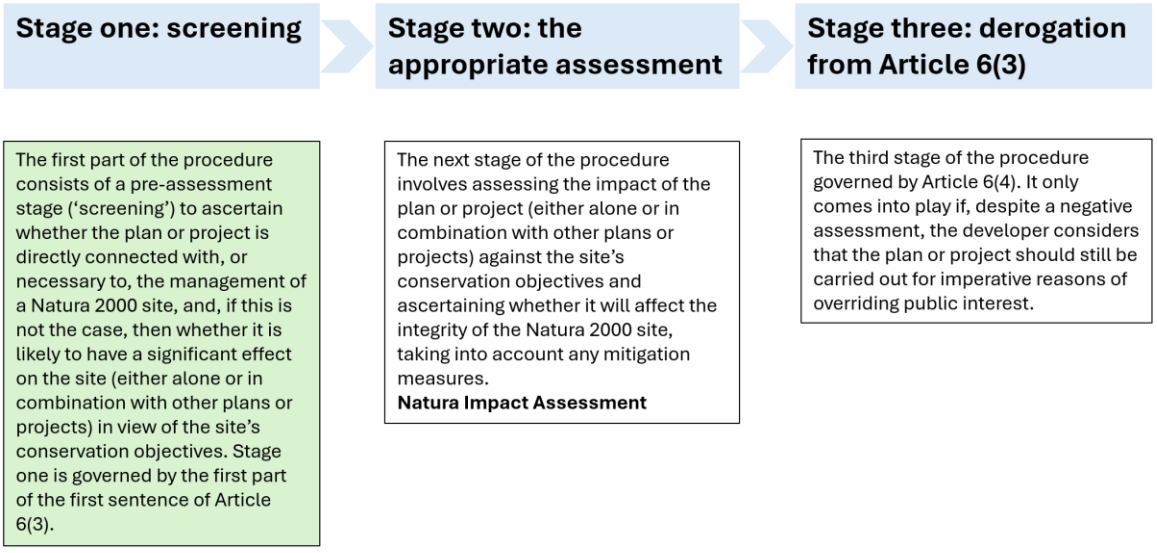

Figure 2.1: Stages in the AA process (EC, 2021)

2.2.1 STAGE 1. SCREENING FOR APPROPRIATE ASSESSMENT

Screening is the process that considers the first two tests of Article 6(3):

- whether a plan or project is directly connected to or necessary for the management of the site and,
- whether a plan or project, alone or in combination with other plans and projects, is likely to have significant effects on a Natura 2000 site in view of its conservation objectives.

If the effects are deemed to be significant, potentially significant, or uncertain then the process must proceed to Stage 2 (AA). Screening should be undertaken without the inclusion of mitigation, unless potential impacts clearly can be avoided through the modification or redesign of the plan or project, in which case the screening process is repeated on the altered plan. The greatest level of evidence and justification will be needed in circumstances when the process ends at screening stage on grounds of no impact.

2.2.2 STAGE 2. APPROPRIATE ASSESSMENT (IF REQUIRED)

This stage considers whether the plan or project, alone or in combination with other projects or plans, will have adverse effects on the integrity of a Natura 2000 site, and includes any mitigation measures necessary to avoid, reduce or minimise negative effects.

The proponent of the plan or project is required to submit a Natura Impact Statement, which is a report of a targeted, professional, scientific examination of the plan or project and the relevant Natura 2000 sites, to identify and characterise any possible implications for the site in view of the site's Site-Specific Conservation Objectives (SSCOs), taking account of in-combination effects. This provides information to enable the competent authority to carry out the Appropriate Assessment. If the assessment is negative (i.e. if adverse effects on the integrity of a site cannot be excluded) then the process must proceed to Stage 3, or the plan or project should be abandoned. The AA is carried out by the competent authority and is supported by the NIS.

2.2.3 STAGE 3. IMPERATIVE REASONS OF OVERRIDING PUBLIC INTEREST (IROPI)/DEROGATION (IF REQUIRED)

Stage 3 is the main derogation process of Article 6 (4), which examines whether there are imperative reasons of overriding public interest (IROPI) for allowing a plan or project that will have adverse effects on the integrity of a Natura 2000 site to proceed in cases where it has been established that no less damaging alternative solution exists.

Extra protection measures for Annex I priority habitats come into effect when making an IROPI case. Compensatory measures must be proposed and assessed. The European Commission must be informed of the compensatory measures. Compensatory measures must be practical, implementable, likely to succeed, proportionate and enforceable, and they must be approved by the Minister for Housing, Planning and Local Government.

2.3 METHODOLOGY

The following steps have been followed:

- Assessment of the implications of the plan or project in view of the SSCOs of Natura 2000 sites 'screened in' by Rosslare ORE Hub Screening for Appropriate Assessment Report
- Determination of whether the plan or project can have adverse effects on the integrity of the Natura 2000 sites 'screened in' by Rosslare ORE Hub Screening for Appropriate Assessment Report
- Consideration of mitigation measures
- Conclusion of the Appropriate Assessment

The examination, analysis and evaluation of the relevant information that supported the AA process conducted and documented in this report has followed the precautionary principle throughout.

2.3.1 DETERMINING ADVERSE EFFECTS

The **'integrity of a site'** relates to the site's conservation objectives, its key natural features, ecological structure and function. It also concerns the main ecological processes and factors that sustain the long-term presence of the species and habitats in a Natura 2000 site. When a permanent loss of a part of a habitat or a species population for which the site is designated, or a long- lasting deterioration of the site's ecological structure, function and processes are expected from the implementation of a plan or project, it can be concluded that it will cause an adverse effect on the integrity of the site.

2.3.2 CONSIDERING MITIGATION MEASURES

Mitigation measures include integrated measures built into the project design, and secondary mitigation measures. These measures may be required in order to remove, pre-empt or reduce the impacts identified in the Stage 1 Appropriate Assessment to a level where they will no longer impact on the affected Natura 2000 site.

2.3.3 CONSERVATION OBJECTIVES

Conservation Objectives (CO) for Irish Natura 2000 sites are prepared by NPWS, who have prepared Site-Specific Conservation Objectives (SSCO) for Natura 2000 sites since 2011.

Ireland has been held in breach of the Birds and Habitats Directive for not having such specific objectives for all the Natura 2000 sites (European Commission v Ireland 2021/03933, known as the Measures Case). Since this judgement, NPWS have accelerated publication of SSCOs and have stated that all sites are now covered by Site Specific Conservation Objectives (DHLGH, 2025).

The published NPWS SSCO documents note that an Appropriate Assessment based on the most up-to-date Conservation Objectives will remain valid even if the targets are subsequently updated, providing they were the most recent objectives available when the assessment was carried out.

As documented in Appendix C of the Rosslare ORE Hub Screening for Appropriate Assessment Report which accompanies this application, the most up-to-date, publicly available information

regarding SSCOs has been used for the Natura 2000 sites considered in this assessment, sourced from the NPWS website in May 2025. Details in relation to the Qualifying Interests and Special Conservation Interests and associated conservation measures and targets of these Natura 2000 sites are also based on information for these sites sourced from the NPWS website in May 2025.

3 PROPOSED DEVELOPMENT

3.1 OVERVIEW

Iarnród Éireann – Irish Rail is applying for development permission for the Rosslare Offshore Renewable Energy Hub (hereafter the 'Proposed Development'), located immediately adjacent and to the northwest of the existing Rosslare Europort at Rosslare Harbour in County Wexford, which is operated by Iarnród Éireann. The Proposed Development includes capital dredging to achieve navigable depths for vessels delivering ORE components; land reclamation to create a storage area for these components; and construction of two new berths to facilitate loading and unloading of ORE components. The land reclamation works include infilling the existing small boat harbour, after the construction of a new small boat harbour. The Proposed Development also includes the installation of a new slipway and facility for local clubs, such as the Sea Scouts.

The purpose of the Proposed Development is to provide a facility for the efficient handling and storage, marshalling, staging and integration of ORE components to facilitate installation of offshore wind energy projects by ORE developers and operators. The Proposed Development is designed to provide facilities that accommodate a wide range of infrastructure uses, both for current requirements and anticipated future needs. For instance, the Proposed Development could be used for traditional port activities if required, including during periods of reduced ORE-related activity. Refer to EIAR Chapter 6: Project Description for further detail.

The EIAR considers a project design life for the quay structures and marine works of 50 years from completion of construction. All port facilities developed for the ORE Hub will be retained and required by Iarnród Éireann – Irish Rail for traditional port activities[1] beyond this time period (with ongoing maintenance and repairs undertaken) and therefore it is not considered necessary to plan for decommissioning and reinstatement works or for closure of the quays, storage areas, new Small Boat Harbour or parts of the ORE Hub once they are in-place.

The site location and Proposed Development Boundary are shown on Figure 3.1. The Proposed Development Boundary (i.e., the area where development permission is sought to construct and operate the Proposed Development) encompasses a total area of 80.3 hectares (ha), lying mostly within the marine area, and includes the areas proposed for dredging and land reclamation.

The Proposed Development Boundary includes an area for capital dredging of 48.4ha and 27.7ha of reclamation from the sea providing operational areas for the storage, marshalling, staging and integration of ORE components, traditional Ro-Ro port activities and a new replacement 'Small Boat' harbour (Figure 3.2). The new Small Boat Harbour will be securely separated from the much larger vessels and operations in the main ORE facility.

Proposals for the new Small Boat Harbour include marine enabling works and installation of services for potential future developments which may include Operations & Maintenance (O&M) facilities

[1] Traditional port activities as defined in the Rosslare Europort Masterplan (March 2020) are roll-on/roll-off (RoRo) and passenger ferry services (RoPAX); storage and movement of trade cars and trailers; freight and passenger check-in operations; Customs and Immigration processing; marine services such as berthing, mooring and vessel turnaround; and some bulk cargo handling.

required by the ORE industry for major repairs and replacement of turbine components and a new RNLI base. Undertaking these advance works as part of the Proposed Development ensures construction and environmental efficiencies while marine plant is readily available. The buildings and facilities required for these potential future uses are not included in the Proposed Development.

The key elements of the Proposed Development are listed in Table 3.1.

Table 3.1: Summary of the Proposed Development

Development / Activity	Description
Site preparation and mobilisation	• Site clearance involving removal of the existing small storage sheds, pontoons, gangways, timber mooring posts and timber structures at the small boat harbour; and establishment of a temporary site compound.
Capital dredging	• The navigation channel will be dredged to a depth of -10 metres Chart Datum (m CD). The berth pocket for ORE Berth 1 will be dredged to a depth of -12m CD. The total area to be dredged is 48.4 hectares (ha).
Land reclamation	• Land reclamation including infilling of the small boat harbour, using the marine dredged material and imported rockfill to create 27.7ha of land for the Proposed Development. • Installation of rock armour revetments around the perimeter of the reclamation area
ORE Storage Area	• Creation of an ORE Storage Area of 19.7ha, within the reclaimed lands, for the handling and storage, marshalling, staging and integration of ORE components.
ORE Berth 1	• Construction of ORE Berth 1, a heavy lift berth with a continuous open piled quay length of 330 metres (m).
ORE Berth 2	• Construction of ORE Berth 2, with a continuous open piled quay length of 240m.
ORE Compound	• A compound area of 0.2ha for installation of temporary modular buildings for site offices, welfare, logistics, and parking to service ORE developers.
New Small Boat Harbour	• Construction of a new Small Boat Harbour consisting of: ○ a 50m long fixed quayside berth and an 80m long floating pontoon ○ a 2.4m wide pontoon to provide 64 berths ○ a 127m long floating pontoon with 10 no. berths ○ 1 no. fixed berth for emergency service vessels ○ 10 single storey storage sheds ○ a slipway for launching and recovery activities ○ marine enabling works and installation of services to provide for potential future uses.
Sea Scouts Facility	• Construction of a slipway to the western flank of the newly reclaimed lands with a new storage shed and parking to accommodate local clubs, such as the Sea Scouts.
Ancillary works	• Site access to the Proposed Development and a new access road and footpath/cycle track to the proposed new Small Boat Harbour. • A medium voltage single storey electrical substation and switch room • Lighting • Fencing and security measures • Parking • Waste management facilities • Fire water network and storage • Landscaping • Foul water network and pumping infrastructure • Water mains network • Surfacing and drainage • Environmental enhancements

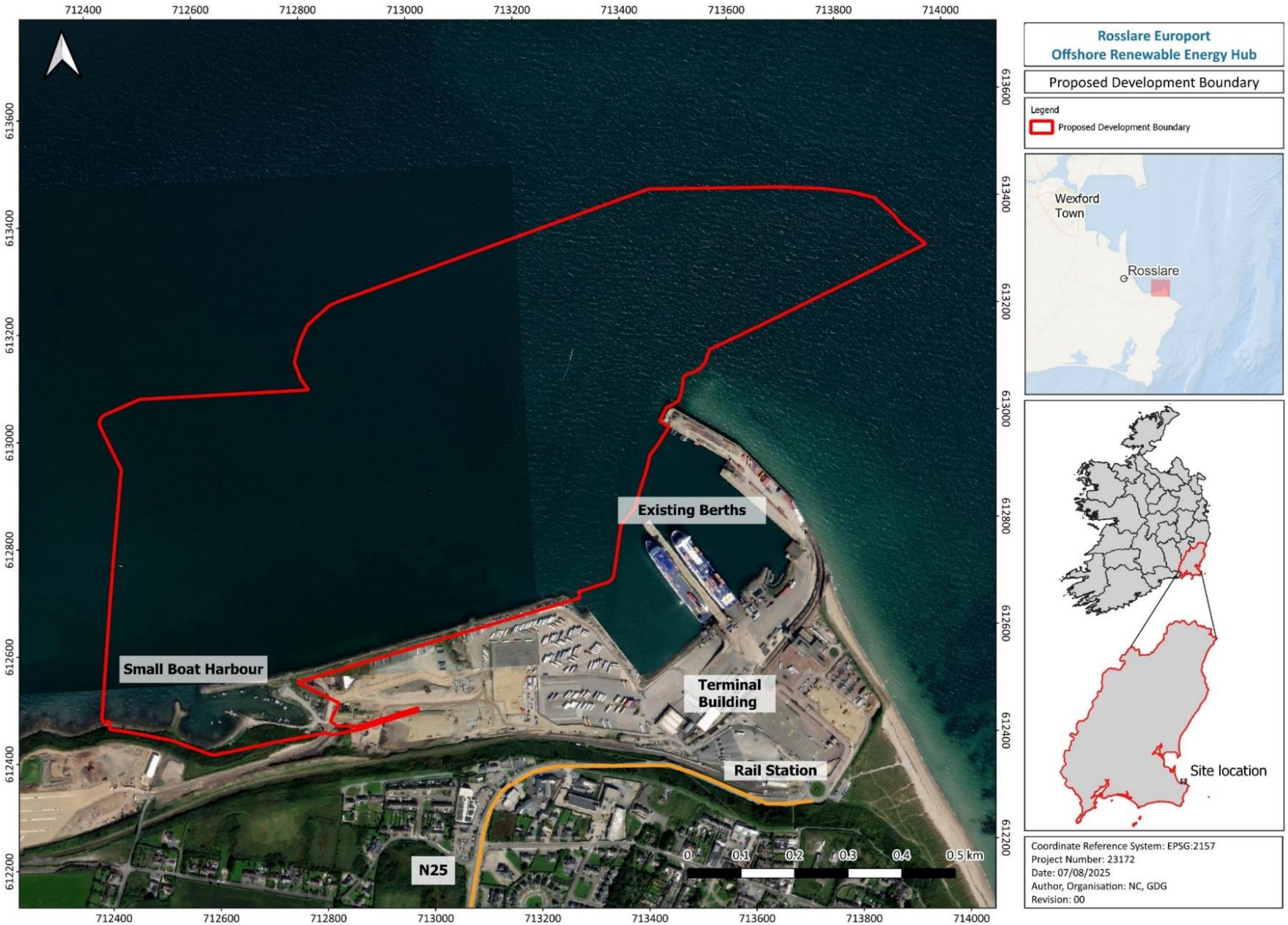

Figure 3.1: Proposed Development Boundary and location

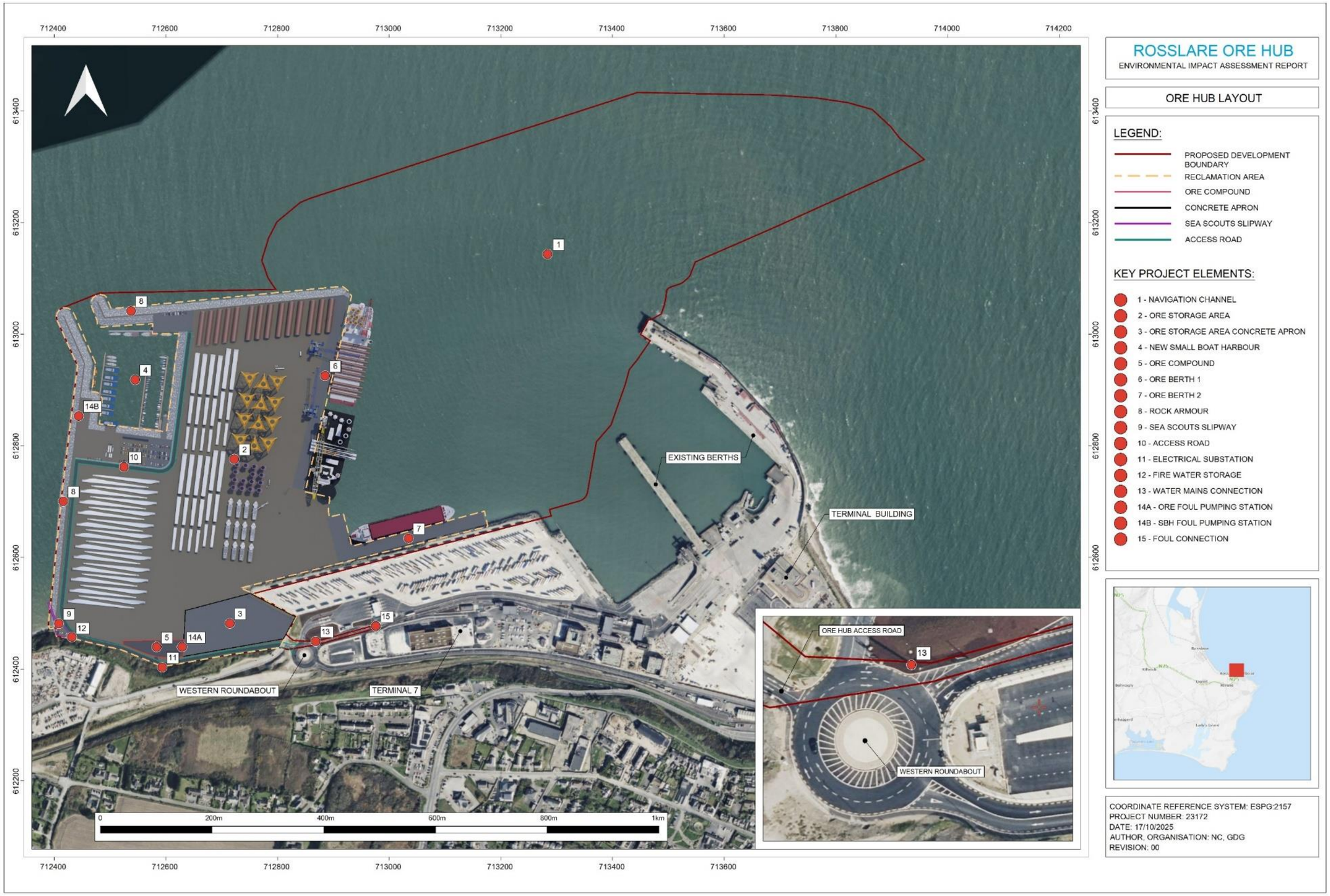

Figure 3.2: General layout of the Proposed Development

Table 3.2 provides a breakdown of areas for the Proposed Development.

Table 3.2: Table of Areas for works in Proposed Development

Boundary	Elements	Area (ha)
Proposed Development Boundary	**All**	**80.3**
	Dredging area (includes side slopes and berth pockets)	48.4
	Marine reclamation area (includes enclosed water in new Small Boat Harbour)	27.7
	Terrestrial reclamation and existing land area	4.2
Proposed Development Operational Area	**All** (excludes rock armoured revetments, perimeter landscaping, pontoons, berths and enclosed water in new Small Boat Harbour)	**24.5**
	ORE Storage Area (includes concrete apron area of 1.6ha)	19.7
	ORE office and parking compound	0.2
	ORE quays	2.0
	Access roads, new Small Boat Harbour and Sea Scouts Facility	2.6
New Small Boat Harbour Enclosed Water	Enclosed water in New Small Boat Harbour (includes area taken by pontoons and navigable berths)	2.2

3.2 CONSTRUCTION ACTIVITIES

The principal construction works are listed below.

- Mobilisation and Establishing the Temporary Site Compound
- Dredging and Reclamation Works
- Piling Works
- Construction of Rock Armour Revetments
- Concrete Works
- Ancillary Works

Construction works (excluding dredging and reclamation) will be undertaken between 7am to 7pm Monday to Saturday. Work outside of these hours may be required on an infrequent basis. If, in exceptional circumstances, works are required outside of these hours, the relevant statutory authorities will be notified in advance.

Dredging activities are expected to be ongoing for up to 24 hours per day, 7 days per week (24/7). The dredged material needs to be continually transported to the reclamation area to enable

continuous dredging activities. For this reason, the reclamation activities will also need to be carried out on the same schedule.

It is expected that the construction phase will span 24 months from commencement to completion, with multiple tasks ongoing in parallel (Figure 3.3).

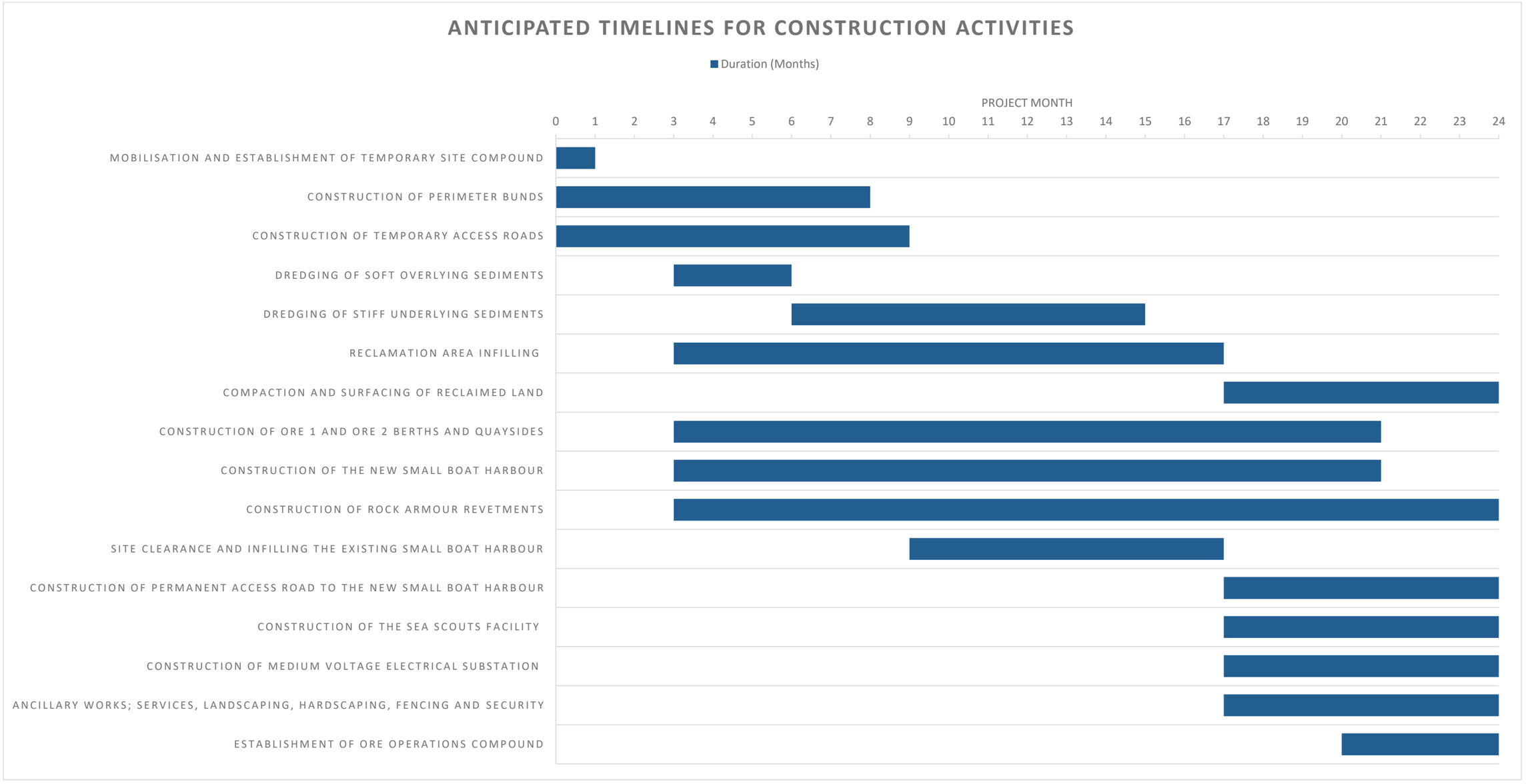

Figure 3.3: Anticipated timelines for construction activities

3.3 OPERATIONAL ACTIVITIES

The Proposed Development will allow for efficient handling and storage, marshalling, staging and integration of ORE components to facilitate the installation of ORE projects. The Proposed Development will be used as the final staging point between globally distributed supply chains and the offshore wind farm sites.

The anticipated number of project vessels using the ORE berths is relatively low, with peak traffic numbers during an Offshore Wind Farm lifecycle of up to one large vessel every two days to ORE Berth 1. Vessels will typically range from 160m to 250m in length and will either rely on steel legs that are lowered into the seabed for stability or be dynamically positioned to hold station in the water.

Vessels which will use ORE Berth 2 will typically range from 160m to 180m in length and will deliver components by Load-on Load-off (LoLo) or RoRo methods, depending on the size and weight of components being delivered.

The proposed berth sizes provide sufficient space for the typical range of anticipated vessels, with an additional safeguarded allowance for potential future increases in the size of vessels engaged in ORE activities.

For the purpose of establishing an Assessment Envelope (refer to EIAR Chapter 6: Project Description), it is assumed that, during times of paused or infrequent ORE activity, the proposed berths will serve a back-up function of accepted deliveries associated with traditional port activities (i.e., if ORE Berths are available and the existing berths within Rosslare Europort are occupied).

The heavy-lift quayside will be used for the temporary assembly of towers and preparation for integration of ORE components, prior to out-loading onto installation vessels. Component Transfer Vessels will be used to transport components to the Proposed Development and these components will be brought on to the quayside by crane for transport to the storage area.

Assembly activities will include the preassembly of certain tower elements, turbine and transition piece elements, as well as other specific welding activities as required. Partially erected towers and components such as blades and turbines being transited from the ORE Storage Area, awaiting out-loading to the installation vessels, will be temporarily stored on the ORE Berth 1 quay during this time. Components will then be loaded by crane onto the Turbine and Foundation Installation Vessel for deployment to the offshore windfarm sites.

Electrical testing and commissioning of assembled components will also be undertaken within the Proposed Development.

Both ORE Berth 1 and ORE Berth 2 will be used to facilitate the delivery of incoming components without hindering the integration and out-loading of components onto an installation vessel.

While the primary function of the ORE Storage Area is for ORE-related activities, it will be capable of serving as an overflow for traditional port activities if required, such as during less busy times for ORE activities.

The new Small Boat Harbour will be used by up to 64 no. local boat owners and local fishermen. The Small Boat Harbour also includes 8 no. berths to be used by Crew Transfer Vessels and a berth for use by the RNLI. The personnel using these facilities are anticipated to travel to and from the SBH by land-based vehicle. They will use the fixed berths, pontoons and slipway provided to set sail and dock their vessels, as well as loading and unloading of equipment and materials.

The slipway and associated parking area (6 no. spaces) at the proposed Sea Scouts Facility will also be used by local groups, including the Sea Scouts, for training young seafarers. The local groups will use the proposed storage shed for their equipment.

The number of staff at the Proposed Development will fluctuate depending on installation activity and weather, and depending on the construction logistics and methodology used by each ORE developer utilising the Proposed Development. At any one time, there will typically be between 40 to 60 personnel at the Proposed Development (comprising 20 to 30 compound/office based staff and 20 to 30 quayside staff), with an anticipated maximum peak scenario of 150 personnel considered for more intense operations over short-durations i.e. when the installation vessel is in port there will be a short-term peak (e.g. 24-hour period) with incoming and outgoing crew, and vessel replenishment and possibly service technicians coming to do maintenance on the vessel.

4 STAGE 2 APPROPRIATE ASSESSMENT

4.1 OUTCOME OF STAGE 1 SCREENING FOR APPROPRIATE ASSESSMENT

The Report for Appropriate Assessment Screening which accompanies this application describes the Stage 1 Screening for Appropriate Assessment undertaken. In summary, the Natura 2000 sites to be assessed for likely significant effects (LSE) were identified using a Zone of Influence, based on site-specific information and modelling data, to inform an understanding of the potential for connectivity between Natura 2000 sites and the impacts associated with the Proposed Development activities. The Screening for Likely Significant Effects relevant to each Natura 2000 site for which Source Pathway Receptor (S-P-R) connectivity has been identified considered the Site-Specific Conservation Objectives, and related attributes and targets for each SCI or QI and their associated Natura 2000 site.

Following the Stage 1 Screening for AA, it was determined that Likely Significant Effects (LSEs) from the Proposed Development could be excluded for all SPAs (including cSPAs) and most SACs, and could not be excluded for the following three Natura 2000 sites listed in Table 4.1, due to potential mortality, injury, displacement and/or disturbance from underwater noise on their Qualifying Interests (QIs).

Table 4.1: Summary of LSE Screening for SACs

Site Name	Qualifying Interest	Effect
Carnsore Point SAC (1.4km)	Harbour porpoise	Mortality, injury, displacement and/or disturbance from underwater noise
Blackwater Bank SAC (4.9km)	Harbour porpoise	Mortality, injury, displacement and/or disturbance from underwater noise
Slaney River Valley SAC (6.6km)	Harbour seal	Mortality, injury, displacement and/or disturbance from underwater noise (during breeding season)

The following projects were screened in for Stage 2 Appropriate Assessment of potential in-combination effects on the Natura 2000 Sites:

- Iarnród Éireann - Rosslare Europort Maintenance Dredging
- Extension of Berth 3

4.2 DETERMINING ADVERSE EFFECTS

4.2.1 ASSESSMENT OF PROJECT AGAINST SITE SPECIFIC CONSERVATION OBJECTIVES

This section provides a detailed assessment of the potential for adverse effects due to underwater noise on the Site-Specific Conservation Objectives (SSCOs) of the three SACs identified during the Stage 1 Screening

- Carnsore Point SAC
- Blackwater Bank SAC

- Slaney River Valley SAC

and the SSCOs associated attributes and targets, and the QIs relevant to each site - Harbour Porpoise for Carnsore Point and Blackwater Bank, and Harbour Seal for Slaney River Valley.

4.2.2 IN SITU AND EX SITU EFFECTS

For the purpose of assessing potential adverse effects on the integrity of European sites, effects that occur ***in situ*** are distinguished from those that may occur ***ex situ***, as defined below.

- ***In Situ* Effects** refer to any changes or pressures occurring within the physical boundary of the European site itself. These may include direct impacts to habitats, acoustic disturbance within the site, physical barriers to movement across the site, or any changes that undermine the Site-Specific Conservation Objectives (SSCOs) as defined by NPWS (e.g., access to suitable habitat, minimisation of disturbance, or maintenance of population and distribution of the QI species within the site)
- ***Ex Situ* Effects** refer to impacts that occur outside the site boundary, but which affect individuals belonging to the QI population that make functional use of areas beyond the designated site. For mobile marine species such as Harbour Porpoise and Harbour Seal, individuals may forage or transit widely beyond the SAC boundary. Therefore, any adverse impacts in these areas that lead to injury, sustained displacement, or disruption to critical behaviours (e.g., foraging, communication) can result in an indirect effect on the QI population, and may have implications for site integrity, particularly if those effects are of sufficient scale, duration, or frequency to undermine the SSCOs.

Site integrity and the SSCOs are intrinsically linked; an adverse effect on site integrity arises where a plan or project is likely to undermine one or more SSCOs.

In this assessment, both ***in situ*** and ***ex situ*** effects are considered, with a precautionary approach applied where zones of potential impact approach or lie near the boundary of the SACs. The potential for **adverse effects on site integrity** is determined based on whether any predicted effect, either within or outside the site, has the capacity to compromise the relevant SSCOs.

4.2.3 UNDERWATER NOISE EFFECTS

Likely Significant Effects on QIs of SACs have been identified for underwater noise impacts from the Proposed Development.

As described in the Screening for Appropriate Assessment Report and EIAR Technical Appendix 13: Marine Mammals which accompany this application, spatial extent and intensity of underwater noise impacts on marine species, including marine mammal QIs of SACs, have been determined through numerical modelling.

Underwater noise can result in injury and mortality of marine mammal QIs. Two forms of injury are considered in this assessment for Harbour Porpoise and Harbour Seal marine mammal QIs:

- Permanent Threshold Shift (PTS) refers to permanent auditory damage

- Temporary Threshold Shift (TTS) is temporary and reversible, although it may impair foraging and communication over periods from minutes to days

As outlined in the Screening for Appropriate Assessment Report, disturbance effects from underwater noise are also considered in this assessment, where relevant.

4.2.3.1 NOISE MODELLING AND ASSUMPTIONS

Numerical noise modelling has been undertaken based on assumptions regarding piling and marine mammal swim speeds which are discussed below.

Piling

- Noise modelling has assumed impact piling is undertaken in open water, using a high hammer energy of 240 kJ, as a conservative worst-case scenario. This conservative approach has been employed to ensure that predicted thresholds for Permanent Threshold Shift (PTS), Temporary Threshold Shift (TTS), and behavioural disturbance are not underestimated.
- In practice, piling for the main berths of the Rosslare ORE Hub will be carried out using rotary piling techniques, which are significantly quieter than impact piling as rotary piling generates substantially lower sound pressure levels, particularly in the low-frequency ranges relevant to marine mammal auditory thresholds
- Where impact piling is required - limited to the new Small Boat Harbour - lower hammer energies than have been modelled (up to approximately 180 kJ) will be used
- As a result, actual underwater noise levels associated with piling activities will be lower than those predicted by the modelling.

Swim Speed

- Animal movement behaviour strongly influences the predicted extent of auditory injury and disturbance zones
- Faulkner *et al*. (2018) caution that assumptions regarding animal movement behaviour are a recognised source of uncertainty in noise modelling. Some individuals may remain in an affected area due to prey availability or social behaviours, while assuming stationary exposure for a full 24-hour period may also be unrealistic
- While modelling has considered a range of swim speeds for marine mammals, for the purposes of assessing cumulative sound exposure levels (cSEL) from piling and blasting for this NIS - a swim speed of 2.0 m/s has been applied for both Harbour Porpoise and Harbour Seal. This value represents an ecologically realistic yet precautionary assumption, consistent with observed sustained swimming capabilities in both species (Otani *et al*., 2001; Kastelein *et al*., 2018; Gallon *et al*., 2007; Williams & Kooyman, 1986; Thompson *et al*., 1992; Hind & Gurney, 1997).

4.2.3.2 UNDERWATER NOISE ASSESSMENT AND PREDICTED ZONES OF IMPACT: HARBOUR PORPOISE QI OF SCREENED-IN SACS

The following subsections summarise the noise modelling results for each activity and identify the relevant impact zones used to assess whether screened-in SAC populations of Harbour Porpoise QIs could be affected.

Following the precautionary approach, the largest predicted zone of impact for PTS and TTS,- whether derived from Sound Pressure Level (SPL) or cumulative Sound Exposure Level (cSEL), have been taken forward in the assessment for each activity. This ensures all potential *in situ* and *ex situ* effects are captured and assessed under a worst-case scenario framework.

Displacement zones have been considered where *in situ* disturbance effects are possible.

These impact zones are then used to determine whether mitigation is required to protect the integrity of the SACs.

Piling

Two metrics were considered in the modelling of underwater noise from piling:

- Zero-to-peak sound pressure level (SPL): measures the loudest single pulse (used for assessing immediate injury) - Table 4.2
- Weighted cumulative sound exposure level (cSEL): considers energy received over time (used for both PTS and TTS when animals are swimming away) - Table 4.3.

Based on the modelling (Table 4.2) and the best available scientific data (Southall *et al.*, 2019), it was predicted that for SPL:

- A single loud pulse from impact piling could cause PTS to Harbour Porpoise up to 110 m away from the piling source
- A single loud pulse could cause TTS up to 270 m away.

For cSEL it was predicted that:

- To avoid cSEL threshold for PTS, Very High Frequency (VHF) cetaceans such as Harbour Porpoise would need to swim away from the piling activity from an initial distance of at least 20 m if swimming at a speed of 2.0 m/s.
- To avoid cSEL threshold for TTS, VHF cetaceans would need to begin swimming away from the source from a starting distance of at least 1,800 m at a swim speed of 2.0 m/s.

As shown in

Table 4.3, these distances decrease with faster swim speeds due to reduced duration of exposure.

The maximum predicted zone of impact for auditory injury or temporary hearing impairment to Harbour Porpoise QIs is therefore the 1,800 m TTS zone, which has been taken forward for further assessment.

Table 4.2: Maximum predicted distances to zero-to-peak SPL thresholds for instantaneous PTS and TTS to marine mammals from piling

Hearing group	Species relevant to this assessment	Zero-to-peak SPL threshold (dB re 1 µPa²)		Maximum distance to threshold (m)	
		PTS	TTS	PTS	TTS
VHF cetaceans	Harbour Porpoise	202	196	110	270

Table 4.3: Predicted distances to weighted cSEL thresholds for PTS and TTS to marine mammals from piling

Hearing group	Species relevant to this assessment	Weighted cSEL threshold (dB re 1 µPa²s)		Swim speed (m/s)	Distance to threshold (m)	
		PTS	TTS		PTS	TTS
VHF cetaceans	Harbour Porpoise	155	140	2.0	20	1,800

Displacement to Harbour Porpoise from piling noise has also been assessed using a single-pulse unweighted cSEL threshold of 145 dB re 1 µPa²s, which is based on field studies of Harbour Porpoise displacement in response to impulsive sound (Brandt *et al.,* 2016; Thompson *et al*., 2013; Lucke *et al*., 2009). The underwater noise modelling predicts that impact piling at the Proposed Development could result in displacement of Harbour Porpoise out to a maximum distance of 4.6 km from the piling source, with an estimated area of 16.3 km² affected during a given day of piling.

Overlap with Screened-In European Sites

Carnsore Point SAC overlaps with the modelled TTS zone of 1,800 m from piling activities. In addition, the predicted displacement zone from impact piling - extending up to 4.6 km - also overlaps with this SAC. As such, Carnsore Point SAC is carried forward for further assessment to consider the potential for adverse *in situ* effects on site integrity.

Due to the high mobility and wide-ranging behaviour of Harbour Porpoise, potential functional connectivity with Carnsore Point SAC and Blackwater Bank SAC is also considered in Section 4.2.4.2 to assess the potential risk of adverse *ex situ* effects to QI individuals that may be functionally linked to these designated populations.

Blasting

Noise modelling of rock blasting was undertaken to assess potential auditory effect on marine mammals, including Harbour Porpoise. Although blasting is expected to occur infrequently and in a semi-confined nearshore setting, a precautionary approach was adopted due to the high intensity of sound generated by explosive events. As set out in Chapter 6: Project Description which accompanies this application, the minimum quantity of explosive energy mixture necessary to achieve the required breakage will be used.

The modelling was conducted using a semi-empirical blasting model and focused on identifying average zero-to-peak SPL thresholds for PTS and TTS. The cSEL metric was not applied, as it is not appropriate for short-duration impulsive events like blasting, where the exposure occurs instantaneously rather that over time.

The predicted distances at which PTS and TTS thresholds for Harbour Porpoise may be exceeded are summarised in Table 4.4 below.

Table 4.4: Maximum predicted distances to zero-to-peak SPL thresholds for PTS and TTS to Harbour Porpoise - Rock Blasting

Hearing group	Species relevant to this assessment	Zero-to-peak SPL threshold (dB re 1 µPa^2)		Maximum distance to threshold (m) [1]	
		PTS	TTS	PTS	TTS
VHF cetaceans	Harbour Porpoise	202	196	**1,630** (490 – 2,670)	**3,000** (900 – 4,920)

[1] **Bold** highlighted numbers indicate the mean maximum predicted distances to threshold exceedance whilst the numbers in brackets indicate predicted lower and upper bounds.

The maximum predicted zone of impact for adverse effects to Harbour Porpoise QIs is therefore the mean maximum 3,000 m (range: 900-4,920 m) TTS zone, which has been taken forward for further assessment.

If rock blasting is required, only a single event will occur on any given day, and blasting events are expected to be spaced at least 2-3 weeks apart. Blasting events will be short-duration, infrequent activities and not associated with sustained sound levels above recognised behavioural disturbance thresholds. Therefore, displacement from rock blasting is not assessed.

Overlap with Screened-In European Sites

Carnsore Point SAC overlaps with the modelled TTS zone of 3,000 m (range: 900-4,920 m) from blasting activities and is therefore carried forward for further assessment to consider the potential for adverse effects on site integrity.

Due to the high mobility and wide-ranging behaviour of Harbour Porpoise, potential functional connectivity with Carnsore Point SAC and Blackwater Bank SAC is also considered in Section 4.2.4.2 to assess the potential risk of adverse *ex situ* effects to QI individuals that may be functionally linked to these designated populations.

Dredging

Underwater noise levels generated during dredging is highly variable and can depend on numerous factors such as the type of dredger undertaking the work (e.g., trailing suction hopper dredger (TSHD), cutter suction dredger, backhoe dredger etc.), operational conditions of the dredger, the type of sediment being dredged, water depth and other environmental conditions (Jones *et al.,* 2015).

The most detailed publicly available study of noise levels from dredging is Robinson *et al.* (2011), which derived Sound Levels (SLs) from measurements of six different TSHDs undertaking aggregate

extraction in the English Channel and North Sea. SLs during full dredging ranged from approximately 176 - 190 dB re 1 μPa^2m^2 for the different dredgers that measurements were made for.

The dredger with the highest SL recorded by Robinson *et al.* (2011) has been used in the modelling to be representative of the underwater noise levels that may be generated during dredging activities at the Proposed Development. Noise modelling was carried out for dredging using thresholds for non-impulsive sound sources as defined by Southall *et al*. (2019).

The modelling predicts that zero-to-peak SPL thresholds for both PTS and TTS are not exceeded for any marine mammal hearing group, including Harbour Porpoise (Table 4.5).

Table 4.5: Maximum predicted distances to zero-to-peak SPL thresholds for PTS and TTS to Harbour Porpoise from Dredging

Hearing group	Species relevant to this assessment	Zero-to-peak SPL threshold (dB re 1 μPa^2)		Maximum distance to threshold (m)	
		PTS	TTS	PTS	TTS
VHF cetaceans	Harbour Porpoise	202	196	Threshold not exceeded	Threshold not exceeded

The modelling indicates that the risk of weighted cSEL TTS thresholds may be exceeded for VHF cetaceans such as Harbour Porpoise. To avoid cSEL thresholds for TTS, VHF cetaceans would need to swim away from the dredging source from an initial distance of at least 320 m if swimming at a speed of 2.0 m/s (Table 4.6).

Table 4.6: Predicted distances to weighted cSEL thresholds for PTS and TTS to Harbour Porpoise - Dredging

Hearing group	Species relevant to this assessment	Weighted cSEL threshold (dB re 1 μPa^2s)		Swim speed (m/s)	Distance to threshold (m)	
		PTS	TTS		PTS	TTS
VHF cetaceans	Harbour Porpoise	173	153	2.0	Threshold not exceeded	320

The maximum predicted zone of impact for injury to Harbour Porpoise QIs is therefore the 320 m TTS zone, which has been taken forward for further assessment.

Displacement from dredging was assessed using an SPL threshold of 140 dB re 1 μPa^2, consistent with studies on non-impulsive noise disturbance (Southall *et al.*, 2008). The modelling predicts potential displacement of marine mammals from dredging activities up to a distance of 1.3 km.

Overlap with Screened-In European Sites

No screened-in SACs overlap with the modelled TTS zone of 320 m or the displacement distance of 1.3 km from dredging activities.

Due to the high mobility and wide-ranging behaviour of Harbour Porpoise, potential functional connectivity with Carnsore Point SAC and Blackwater Bank SAC is also considered in Section 4.2.4.2 to assess the potential risk of adverse *ex situ* effects to QI individuals that may be functionally linked to these designated populations.

4.2.3.3 UNDERWATER NOISE ASSESSMENT AND PREDICTED ZONES OF IMPACT: HARBOUR SEAL QI OF SCREENED-IN SACS

The following subsections summarise the noise modelling results for each activity and identify the relevant impact zones used to assess whether screened-in SAC populations of Harbour Seal QIs could be affected.

Following the precautionary approach, the largest predicted zone of impact for PTS and TTS, whether derived from zero-to-peak SPL or cSEL, have been taken forward in the assessment for each activity.

Displacement zones are also considered for impacts during the Harbour Seal breeding season. This ensures all potential *in situ* and *ex situ* effects are captured and assessed under a worst-case scenario framework.

These impact zones are then used to determine whether mitigation is required to protect the integrity of the SACs.

Piling

Underwater noise generated during piling at the Proposed Development has the potential to affect Harbour Seal QIs through PTS and TTS.

The maximum distances at which PTS and TTS may occur are summarised in Table 4.7 and Table 4.8 below.

Based on the modelling (Table 4.7) and the best available scientific data (Southall *et al.*, 2019), it was predicted that for zero-to-peak SPL:

- A single loud pulse from impact piling could cause PTS to Harbour Seal up to 8 m away from the piling source
- A single loud pulse could cause TTS up to 20 m away.

Table 4.7: Maximum predicted distances to zero-to-peak SPL thresholds for instantaneous PTS and TTS to Harbour Seals - Piling

Hearing group	Species relevant to this assessment	Zero-to-peak SPL threshold (dB re 1 µPa^2)		Maximum distance to threshold (m)	
		PTS	TTS	PTS	TTS
Phocid carnivores in water	Harbour Seal	218	212	8	20

For cSEL (Table 4.8) it was predicted that:

- cSEL threshold for PTS are not exceeded for Harbour Seals.
- To avoid cSEL threshold for TTS, Harbour Seals would need to begin swimming away from the source from a starting distance of at least 40 m at a swim speed of 2.0 m/s.

The maximum predicted zone of impact for auditory injury or temporary hearing impairment to Harbour Seal QIs is therefore the 40 m TTS zone, which has been taken forward for further assessment.

Table 4.8: Predicted distances to weighted cSEL thresholds for PTS and TTS to Harbour Seal - Piling

Hearing group	Species relevant to this assessment	Weighted cSEL threshold (dB re 1 µPa²s)		Swim speed (m/s)	Distance to threshold (m)	
		PTS	TTS		PTS	TTS
Phocid carnivores in water	Harbour Seal	185	170	2.0	Threshold not exceeded	40

Displacement of Harbour Seals during the breeding season due to impact piling was assessed by comparing estimated noise levels to a single-pulse unweighted SEL threshold of 145 dB re 1 µPa²s, based on Harbour Porpoise displacement thresholds. The same displacement threshold applies to seals, meaning that similar displacement effects are expected in response to these noise levels from impact piling (Tougaard, 2016). Modelling predicts that seals could be displaced out to 4.6 km from the piling source.

Summary of Zones of Impact – Harbour Seal (Piling):

- PTS (cSEL/SPL): up to 8 m
- TTS (cSEL): up to 40 m
- Displacement (cSEL): up to 4.6 km

The maximum predicted zone of impact for injury to Harbour Seal QIs is therefore the 40 m TTS zone, which has been taken forward for further assessment. The maximum predicted zone of impact for displacement is up to 4.6 km.

Overlap with Screened-In European Sites

There is no overlap spatially with screened-in SACs designated for protection of Harbour Seal QIs. However, due to the high mobility and wide-ranging behaviour of Harbour Seal, potential functional connectivity with Slaney River Valley SAC which is located approximately 6.6 km from the Proposed Development is considered in Section 4.2.4.3 to assess the potential risk of adverse *ex situ* effects to QI individuals that may be functionally linked to the designated population.

Blasting

Noise levels from blasting were assessed using zero-to-peak SPL thresholds defined by Southall *et al*. (2019) for phocid carnivores in water (seals). The predicted distances to exceedance of PTS and TTS

thresholds for Harbour Seals are presented in Table 4.9 below. Because blasting involves a single, high-energy pulse, cSEL metrics are not applicable and long-term displacement effects on Harbour Seals are not predicted to occur.

Table 4.9: Maximum predicted distances to zero-to-peak SPL thresholds for PTS and TTS to Harbour Seals - Rock Blasting

Hearing group	Species relevant to this assessment	Zero-to-peak SPL threshold (dB re 1 µPa^2)		Maximum distance to threshold (m) [1]	
		PTS	TTS	PTS	TTS
Phocid carnivores in water	Harbour Seal	218	212	**320** (95 - 525)	**590** (175 - 965)

[1] **Bold** highlighted numbers indicate the predicted distances to threshold exceedance whilst the numbers in brackets indicate predicted lower and upper bounds.

The largest zone of impact for Harbour Seals is the TTS threshold, extending to 590 m (range: 175 – 965 m), and this is therefore carried forward as the zone of impact for the assessment.

Overlap with Screened-In European Sites

There is no overlap spatially with screened-in SACs designated for protection of Harbour Seal QIs. However, due to the high mobility and wide-ranging behaviour of Harbour Seal, potential functional connectivity with Slaney River Valley SAC which is located approximately 6.6 km from the Proposed Development is considered in Section 4.2.4.2 to assess the potential risk of adverse *ex situ* effects to QI individuals that may be functionally linked to the designated population.

Dredging

The modelling results indicate that zero-to-peak SPL thresholds for auditory injury (PTS or TTS) are not exceeded for any marine mammal group, including Harbour Seals (Table 4.10).

Table 4.10: Maximum predicted distances to zero-to-peak SPL thresholds for PTS and TTS in Harbour Seals - Dredging

Hearing group	Species relevant to this assessment	Zero-to-peak SPL threshold (dB re 1 µPa^2)		Maximum distance to threshold (m)	
		PTS	TTS	PTS	TTS
Phocid carnivores in water	Harbour Seal	218	212	Threshold not exceeded	Threshold not exceeded

Assessment of weighted cSEL confirms that neither PTS nor TTS thresholds are exceeded for Harbour Seals at any modelled swim speed (Table 4.11).

Table 4.11: Predicted distances to weighted cSEL thresholds for PTS and TTS in Harbour Seals from Dredging

Hearing group	Species relevant to this assessment	Weighted cSEL threshold (dB re 1 µPa²s)		Swim speed (m/s)	Distance to threshold (m)	
		PTS	TTS		PTS	TTS
Phocid carnivores in water	Harbour Seal	201	181	2.0	Threshold not exceeded	Threshold not exceeded

Therefore, there is no predicted risk of auditory injury or temporary hearing impairment to Harbour Seal QIs from dredging activities.

Potential for displacement during the breeding season was assessed by comparing predicted SPL levels to a 140 dB re 1 µPa² disturbance threshold for non-impulsive noise, as proposed by Southall *et al*. (2008). The modelling predicts that Harbour Seals may be displaced from dredging activities out to a distance of 1.3 km.

Overlap with Screened-In European Sites

There is no overlap spatially with the Slaney River Valley SAC (located approximately 6.6 km from the Proposed Development). There is no predicted risk of auditory injury or temporary hearing impairment to Harbour Seal QIs from dredging activities.

This predicted zone of potential displacement does not overlap spatially with the Slaney River Valley SAC, which lies approximately 6.6 km to the northwest of the Proposed Development. However, the possibility of displacement of *ex situ* Harbour Seal QIs during the breeding season functionally linked to the SAC is considered further below.

4.2.4 ASSESSMENT OF EFFECTS ON SCREENED-IN SACS

4.2.4.1 CARNSORE POINT SAC

Carnsore Point SAC is located at its closest 1.4 km south of the Proposed development. The SAC encompasses a dynamic marine environment characterised by exposed and moderately exposed reef systems, kelp forests, and areas of intertidal sediment - habitats that contribute to its designation under Annex I of the Habitats Directive. In 2024, Harbour Porpoise was formally added as a QI for this site, recognising its role in supporting the species conservation in Irish waters.

Given the Proposed Development's location within an existing port and commercialised headland environment, the Proposed Development is not anticipated to interfere with core ecological functions of the SAC such as breeding, calving or migration. Although Harbour Porpoise may occasionally use sheltered inshore waters near coastal infrastructure, these areas are not typically regarded as critical habitats for key life stages such as calving or nursing.

The SSCOs for Harbour Porpoise within Carnsore Point SAC aim to maintain the species' favourable conservation condition. These are defined by the following two key attributes:

- Access to Suitable Habitat: The species' range within the site should not be restricted by artificial barriers to site use. This objective is relevant to any activity that may permanently prevent

access to, or result in the permanent exclusion of, Harbour Porpoise from suitable habitat within the SAC

- Disturbance: Human activities should occur at levels that do not adversely affect the Harbour Porpoise population at the site. This includes avoiding the introduction of underwater noise or other anthropogenic energy at levels that could impact individual behaviour, social interactions, or the community structure across the annual cycle.

These objectives inform the assessment presented below, with a focus on evaluating potential adverse effects from underwater noise during the construction phase, including piling, blasting, and dredging.

Piling

Based on the noise modelling results for impact piling (in open water using a hammer energy of 240 kJ), to avoid the weighted cSEL threshold for TTS, VHF cetaceans would need to swim away from the piling activity from an initial distance of at least 1,800 m if swimming at a speed of 2.0 m/s.

The actual zone of impact for adverse effects during piling is expected to be smaller than modelled due to the following factors:

- The predominant use of rotary bored piling rather than impact piling is anticipated. Rotary piling generates lower-level, continuous noise, which is substantially less likely to induce TTS (Erbe & McPherson, 2017; Niu et al., 2023)
- Where impact piling is required, it will employ a lower hammer energy (110 kJ) than the 240 kJ value used in the conservative modelling scenario.

Harbour Porpoise are known to exhibit strong avoidance responses to impulsive noise. For example, Graham *et al*. (2019) observed over 50% of individuals departing a 7.4 km radius at the onset of piling. Benhemma-Le Gall *et al*. (2023) also demonstrated that vessel activity and pre-piling operations can reduce porpoise presence by 33% up to 48 hours before piling begins, potentially reducing exposure to peak noise levels.

The 'acoustic shielding' effect of the harbour infrastructure further limits the effective range of underwater noise transmission into open water, consistent with observations of rapid noise attenuation in complex port and harbour environments. For example, Strykowska *et al*. (2023), observed that in Gdynia Harbour, received underwater noise levels from industrial activity were often too low to detect reliably at distances beyond 1,500 m, due to both attenuation and interference from ambient harbour noise.

Accordingly, the actual zone of impact for adverse effects during piling, particularly with the inherent noise reduction from rotary piling and the influence of the project's physical structures, is expected to be significantly reduced from the modelled zone of impact**.**

The modelling predicts that piling at the Proposed Development could displace Harbour Porpoise out to a distance of up to 4.6 km.

<u>Adverse Effects Assessment – Carnsore Point SAC and Harbour Porpoise QI and Piling</u>

- *In situ*:

- The modelled TTS zone from impact piling extends up to 1,800 m, which overlaps with the Carnsore Point SAC boundary (closest at 1.4 km from the Proposed Development). Therefore, there is a potential for adverse effects to Harbour Porpoise individuals within the SAC, which could constitute a potential for adverse effects on site integrity. Therefore, the possibility of adverse *in situ* effects on the SSCOs of Carnsore Point SAC cannot be ruled out in the absence of mitigation
- The predicted displacement zone overlaps with the SAC boundary. Therefore, the possibility of adverse effects on individuals *in situ* cannot be ruled out in the absence of mitigation.

- *Ex situ*:
  - The modelled TTS zone from impact piling extends up to 1,800 m, which overlaps with the Carnsore Point SAC boundary. Therefore, there is potential for adverse effects to Harbour Porpoise QI individuals outside the SAC and inside the zone of impact, which could constitute a potential risk for adverse effects on site integrity. Therefore, the possibility of adverse *ex situ* effects on QI individuals of Carnsore Point SAC cannot be ruled out in the absence of mitigation

Blasting

Based on the noise modelling results for rock blasting, the modelled extent of TTS for as Harbour Porpoise extends up to 3,000 m from the blast source (range: 900 – 4,920 m), based on the zero-to-peak SPL threshold.

Harbour porpoises are sensitive to high-amplitude impulsive noise, including that produced during blasting. However, they are known to avoid areas where construction activities occur due to pre-activity disturbances (Benhemma-Le Gall *et al*., 2023).

The infrequent nature of blasting events, the expectation that only one event will occur per day, and that they will be spaced 2–3 weeks apart, reduces the risk of chronic exposure.

Adverse Effects Assessment of Blasting –Carnsore Point SAC and Harbour Porpoise QI

- *In situ*:
  - The modelled TTS zone from blasting extends up to 3,000 m (range: 900 – 4,920 m), which overlaps with the Carnsore Point SAC boundary (closest at 1.4 km from the Proposed Development). Therefore, there is a potential for adverse effects to Harbour Porpoise individuals within the SAC and for adverse effects on site integrity. Therefore, the possibility of adverse *in situ* effects on the SSCOs of Carnsore Point SAC cannot be ruled out in the absence of mitigation.

- *Ex situ*:
  - The modelled TTS zone from impact piling extends up to 3,000 m (range: 900 – 4,920 m), which overlaps with the Carnsore Point SAC boundary. Therefore, there is a potential for adverse effects to Harbour Porpoise individuals outside the SAC and inside the zone of impact, which could constitute a potential for adverse effects on site integrity. Therefore, the possibility of adverse *ex situ* effects on the SSCOs of Carnsore Point SAC cannot be ruled out in the absence of mitigation.

Dredging

Based on the noise modelling results for dredging, to avoid the weighted cSEL threshold for TTS, a Harbour Porpoise would need to swim away from the dredging activity from an initial distance of at least 320 m, assuming a sustained swim speed of 2.0 m/s.

As dredging is a non-impulsive and continuous activity, the onset of exposure is gradual, potentially allowing animals to detect and avoid the source before thresholds are exceeded. Harbour Porpoise are known to be responsive to non-impulsive noise, and displacement responses may reduce the likelihood of TTS exposure (Diederichs, *et al.*, 2010; Verboom, 2014). The nature of dredging (slower-moving vessels, predictable operations) further reduces the probability of close-range exposure required to exceed TTS thresholds. Based on the 140 dB re 1 µPa² SPL displacement threshold (Southall *et al*., 2007), noise modelling predicts that dredging may cause temporary behavioural avoidance in Harbour Porpoise within a zone extending up to 1.3 km from the source.

The predicted displacement zone from dredging does not overlap with the Carnsore Point SAC boundary. As a result, there is no spatial pathway for displacement of QI Harbour Porpoise *in situ*.

Adverse Effects Assessment of Dredging – Carnsore Point SAC and Harbour Porpoise QI

- *In situ*:
    - The modelled TTS zone extends up to 320 m, which does not overlap with the Carnsore Point SAC boundary (closest at 1.4 km from the Proposed Development). Therefore, there is no spatial overlap and no potential for adverse *in situ* effects on the integrity of Carnsore Point SAC
    - Noise modelling predicts that dredging may cause temporary behavioural avoidance in Harbour Porpoise within a zone extending up to 1.3 km from the source. Therefore, there is no overlap with the SAC and no potential for adverse effects on the integrity SSCO of Carnsore Point SAC due to in situ behavioural disturbance or displacement from dredging noise.
- *Ex situ*:
    - The modelled TTS zone from dredging extends to a maximum of 320 m, does not overlap with the Carnsore Point SAC boundary. However, there is a potential for adverse effects to Harbour Porpoise individuals outside the SAC and inside the zone of impact, which could constitute a potential for adverse effects on site integrity. Therefore, the possibility of adverse *ex situ* effects on the SSCOs of Carnsore Point SAC cannot be ruled out in the absence of mitigation.

4.2.4.2 BLACKWATER BANK SAC

Blackwater Bank SAC is located approximately 4.9 km east of the Proposed Development. The SAC encompasses a long, narrow offshore sandbank system, supporting dynamic marine processes and benthic habitats. In 2024, Harbour Porpoise was formally added as a QI for the site (NPWS, 2024), recognising the area's importance as part of the species' wider foraging and transit range in the Irish Sea.

The Proposed Development lies entirely outside the boundary of the Blackwater Bank SAC and does not overlap with any Annex I habitats or other ecological features for which the SAC is designated.

The conservation objectives for Harbour Porpoise in Blackwater Bank SAC are focused on maintaining the species' favourable conservation condition. These are defined by two key attributes:

- **Access to Suitable Habitat**: The species' range within the SAC should not be restricted by artificial barriers to site use. This objective is relevant to any activity that may cause long-term exclusion of Harbour Porpoise from accessible and suitable habitat
- **Disturbance**: Anthropogenic activities should occur at levels that do not adversely affect the Harbour Porpoise community at the site. This includes avoiding the introduction of underwater noise or other forms of energy that could alter porpoise behaviour, social interactions, or usage of the site across its seasonal cycle.

These objectives provide the framework for assessing potential adverse effects on site integrity from construction-phase underwater noise generated by piling, blasting, and dredging associated with the Proposed Development.

Piling

Based on the noise modelling results for impact piling, to avoid exceeding the weighted cSEL threshold for TTS, a Harbour Porpoise would need to begin swimming away from the source at a distance of at least 1,800 m if swimming at a speed of 2.0 m/s.The modelling predicts that Harbour Porpoise could be displaced from impact piling at the Proposed Development out to a maximum distance of 4.6 km.

The predicted TTS and displacement zones remain outside the boundary of the Blackwater Bank SAC, which is 4.9 km from the Proposed Development.

<u>Adverse Effects Assessment of Piling – Blackwater Bank SAC and Harbour Porpoise QI</u>

- *In situ*:
    - The modelled TTS zone from impact piling extends up to 1,800 m and does not overlap with the Blackwater Bank SAC boundary (closest at 4.9 km from the Proposed Development). Given the absence of any *in situ* pathways, there is no potential for adverse effects to Harbour Porpoise individuals within the SAC
    - The predicted displacement zone does not overlap with the SAC. Given the absence of any *in situ* pathways, there is no potential for disturbance to QI Harbour Porpoise within the Blackwater Bank SAC that would affect the site's SSCOs
    - Accordingly, there is no possibility of adverse *in situ* effects on the SSCOs of Blackwater Bank SAC.
- *Ex situ*:
    - There is a potential for adverse effects to Harbour Porpoise QI individuals outside the SAC and inside the TTS zone of impact, which could constitute a potential risk for adverse effects on site integrity. Therefore, the possibility of adverse *ex situ* effects on QI individuals of Carnsore Point SAC cannot be ruled out in the absence of mitigation.

Blasting

The modelled zone of TTS extends up to 3,000 m (range: 900 – 4,920 m), based on zero-to-peak SPL thresholds.

Adverse Effects Assessment of Blasting – Blackwater Bank SAC and Harbour Porpoise QI

- *In situ*:
    - There is no potential for adverse *in situ* effects on the SSCOs of Blackwater Bank SAC.
- *Ex situ*:
    - There is a potential for adverse effects to Harbour Porpoise QI individuals outside the SAC and inside the TTS zone of impact, which could constitute a potential risk for adverse effects on site integrity. Therefore, the possibility of adverse *ex situ* effects on QI individuals of Carnsore Point SAC cannot be ruled out in the absence of mitigation.

Dredging

Based on the noise modelling results for dredging, to avoid exceeding the weighted cSEL TTS threshold, a Harbour Porpoise would need to begin swimming away from the source from a distance of 320 m, assuming a swim speed of 2.0 m/s.

Dredging activities are characterised by non-impulsive, relatively low-level and predictable sound. This allows Harbour Porpoise to exhibit avoidance behaviour by temporarily displacing from the immediate area. Such avoidance significantly reduces the potential for auditory injury or other significant adverse effects, with porpoises typically returning once activities cease (Diederichs *et al*., 2010; Verboom, 2014).

The maximum predicted displacement zone is 1.3 km.

Adverse Effects Assessment of Dredging – Blackwater Bank SAC and Harbour Porpoise QI

- *In situ*:
    - The modelled TTS zone extends up to 320 m, which does not overlap with the Blackwater Bank SAC boundary (closest at 4.9 km from the Proposed Development). Considering the absence of any predicted *in situ* effect pathways, there is no potential for disturbance to QI Harbour Porpoise within Blackwater Bank SAC. Therefore, there is no potential for adverse *in situ* effects on the integrity of Blackwater Bank SAC
    - Noise modelling predicts that dredging may cause temporary behavioural avoidance in Harbour Porpoise within a zone extending up to 1.3 km from the source. Therefore, there is no potential for adverse effects on the SSCOs of Blackwater Bank SAC due to *in situ* behavioural disturbance or displacement from associated underwater noise from dredging activities**.**
- *Ex situ*:
    - There is a potential for adverse effects to Harbour Porpoise QI individuals outside the SAC and inside the TTS zone of impact, which could constitute a potential risk for adverse effects on site integrity. Therefore, the possibility of adverse ex situ effects on QI individuals of Blackwater Bank SAC cannot be ruled out in the absence of mitigation.

4.2.4.3 ASSESSMENT OF EFFECTS ON SLANEY RIVER VALLEY SAC

The Slaney River Valley SAC is located approximately 6.6 km northwest of the Proposed Development. The SAC encompasses a broad estuarine system that includes sand and mudflats, saltmarshes, and shallow coastal waters, supporting key ecological processes and species of conservation concern. Harbour Seal is a QI for the site, reflecting the SAC's importance for breeding, resting, and foraging activities. The estuary provides high-quality habitat, particularly during sensitive life stages such as pupping and moulting (NPWS, 2011; 2012).

The conservation objectives for Harbour Seal in the Slaney River Valley SAC are focused on maintaining the species' favourable conservation condition within the site. These objectives are defined by six key attributes:

- Population Size: The Harbour Seal population at the site should be stable or increasing
- Distribution: There should be no significant reduction in the range of Harbour Seals within the SAC
- Breeding Sites: The extent of breeding habitat should not significantly decrease, subject to natural processes
- Resting Sites: The area of resting habitat should remain stable
- Foraging Habitat: The quality of foraging habitat within the SAC should be maintained
    - Disturbance: Human activities should occur at levels that do not adversely affect the Harbour Seal population at the site.

These SSCOs form the basis for assessing potential adverse effects on site integrity from activities associated with the Proposed Development. While the SAC lies outside the predicted zones of auditory injury or behavioural displacement from construction-phase noise (as outlined above in Section 4.2.3.2), the potential for ex situ effects on QI individuals is considered below.

The Proposed Development is situated within an active port at a coastal headland and is not expected to obstruct migratory routes or overlap with known breeding or moulting habitats, which typically occur in more secluded areas, such as the outer Wexford Harbour which forms part of the Slaney River Valley SAC (NPWS, 2011). While seals may haul out on quieter artificial structures within port limits, these areas are not considered key habitats for sensitive life stages. However, individual Harbour Seals associated with the SAC are likely to forage widely and may occur within or near the Proposed Development Area.

Piling

Based on the noise modelling results for impact piling (in open water using a hammer energy of 240 kJ), to avoid the weighted cSEL threshold for TTS, Harbour Seals would need to swim away from the piling activity from an initial distance of at least 40 m if swimming at a speed of 2.0 m/s.

The modelling predicts that Harbour Seals could be displaced from impact piling at the Proposed Development out to a maximum distance of 4.6 km. This displacement zone does not overlap with the SAC boundary.

The actual zone of impact for adverse effects during piling is expected to be smaller than modelled due to the following factors:

- The predominant use of rotary bored piling rather than impact piling is anticipated. Rotary piling generates lower-level, continuous noise, which is substantially less likely to induce TTS (Erbe & McPherson, 2017; Niu et al., 2023)
- Where impact piling is required (in the new Small Boat Harbour), lower hammer energies (110 kJ) are expected than the 240 kJ value used in the conservative modelling scenario (as described in Chapter 6: Project Description).

Auditory injury is considered unlikely to occur due to the small spatial extent of the predicted zones and the high likelihood of avoidance behaviour by Harbour Seals. Research indicates that Harbour Seals demonstrate active avoidance behaviour in response to underwater noise generated by offshore wind farm construction, particularly during impulsive pile driving activities (Russell *et al*., 2016). This proactive avoidance, which is also anticipated in response to pre-activity noise and vessel presence, significantly reduces the likelihood of auditory injury to the seals. Furthermore, while exposed to high-amplitude vessel noise in industrialised/commercialised waters (Nachtsheim *et al*., 2023), Harbour Seals have shown behavioural responses, including interruptions of functional activities, which suggest avoidance (Tougaard *et al*., 2015). Rotary piling will be the dominant method, and where impact piling is used, lower hammer energies (up to 180 kJ) are expected.

<u>Effects Assessment of Piling – Slaney River Valley SAC and Harbour Seals QI</u>

- *In situ*:
    - The modelled TTS zone from impact piling extends up to 40 m and does not overlap with the Slaney River Valley SAC boundary (closest at 6.6 km from the Proposed Development). Given the absence of any *in situ* pathways, there is no potential for adverse effects to Harbour Seal individuals within the SAC, which could constitute a potential for adverse effects on site integrity. Therefore, there is no possibility of adverse *in situ* effects on the SSCOs of Slaney River Valley SAC
    - Based on the SEL displacement threshold, the predicted displacement zone extends up to 4.6 km from the piling activity and does not overlap with the SAC. Given the absence of any *in situ* pathways, there is no potential for disturbance to the Harbour Seal QI within the Slaney River Valley SAC that would affect the SSCOs. Accordingly, there is no possibility of adverse *in situ* effects on QI individuals.
- *Ex situ*:
    - There is a potential risk for adverse effects to Harbour Seal QI individuals outside the SAC and inside the TTS zone of impact, which could constitute a potential risk for adverse effects on site integrity. Therefore, the possibility of adverse *ex situ* effects on QI individuals of Slaney River Valley SAC cannot be ruled out in the absence of mitigation
    - While this displacement zone (4.6 km) does not overlap with the SAC boundary, it extends to within approximately 2 km of the site. There is potential for *ex situ* displacement during the breeding season which could adversely affect the Harbour Seal population of the SAC.

Therefore, the potential for adverse effects due to displacement of *ex situ* QI individuals of the Slaney River Valley SAC during the breeding season cannot be ruled out in the absence of mitigation.

Blasting

Noise modelling predicts that Harbour Seals may experience TTS within 590 m (range: 175 - 965 m). These zones do not overlap with the Slaney River Valley SAC boundary, which lies approximately 6.6 km northwest of the Proposed Development. However, foraging individuals from the designated population may occur within these zones. Displacement effects are not assessed for blasting due to the infrequent nature of the activity.

Adverse Effects Assessment of Blasting – Slaney River Valley SAC and Harbour Seal QI

- *In situ*:
    - The modelled TTS zone from blasting extends up to 590 m (range: 175 - 965 m) and does not overlap with the Slaney River Valley SAC boundary (closest at 6.6 km from the Proposed Development). Therefore, there is a no potential for adverse effects to Harbour Seals individuals within the SAC. Therefore, there is no possibility of adverse *in situ* effects on the SSCOs of Slaney River Valley SAC
- *Ex situ*:
    - There is a potential risk for adverse effects to Harbour Seal QI individuals outside the SAC and inside the TTS zone of impact, which could constitute a potential risk for adverse effects on site integrity. Therefore, the possibility of adverse *ex situ* effects on QI individuals of Slaney River Valley SAC cannot be ruled out in the absence of mitigation.

Dredging

Noise modelling predicts that no thresholds for TTS or PTS are exceeded (at any swim speeds) for Harbour Seals. Therefore, there is no predicted risk of auditory injury or temporary hearing impairment to Harbour Seal QIs from dredging activities.

The modelling predicts that Harbour Seals may be displaced from dredging activities out to a distance of 1.3 km, corresponding to an affected area of 2.7 km² on any given day of dredging.

Adverse Effects Assessment of Dredging – Slaney River Valley SAC and Harbour Seal QI

- *In situ*:
    - The modelled TTS and PTS thresholds are not exceeded. Therefore, there is no potential for auditory injury or temporary hearing impairment on *in situ* Harbour Seal QIs
    - Noise modelling predicts that dredging may cause temporary behavioural avoidance in Harbour Seal within a zone extending up to 1.3 km from the source. Therefore, there is no overlap with Slaney SAC and no potential for adverse effects on the integrity SSCO of Slaney River Valley SAC due to *in situ* displacement from dredging activities.
- *Ex situ*:

- The modelled TTS and PTS thresholds are not exceeded. Therefore, there is no potential for auditory injury or temporary hearing impairment on *ex situ* Harbour Seal QIs
- There is potential for *ex situ* displacement during the breeding season which could adversely affect the Harbour Seal population of the SAC. Therefore, the potential for adverse effects due to displacement of *ex situ* QI individuals of the Slaney River Valley SAC from dredging noise during the breeding season cannot be ruled out in the absence of mitigation.

4.2.5 SUMMARY OF ADVERSE EFFECTS ASSESSMENT

Table 4.12, Table 4.13 and Table 4.14 provide summaries of the adverse effects assessment of underwater noise impacts from key construction-phase activities - piling, blasting, and dredging - on the integrity of Carnsore Point SAC, Blackwater Bank SAC and Slaney River Valley SAC respectively, in the absence of mitigation.

Predicted zones for PTS, TTS, and behavioural displacement are presented for completeness.

Table 4.12: Summary of Adverse Effects Assessment - Carnsore Point SAC

Activity and Impact	In situ/ Ex situ	Predicted Zone of Impact	Overlap with SAC	Potential Adverse Effect on Site Integrity without mitigation	Justification
Piling					
Permanent Threshold Shift (PTS)	*In situ*	**110 m** (zero-to-peak SPL)	No	No	No spatial overlap between PTS zone and SAC.
	Ex situ	**110 m**	N/A	Yes	Potential for adverse *ex situ* effects.
Temporary Threshold Shift (TTS)	*In situ*	Initial distance of at least **1,800 m** (cSEL) swimming away at a speed of 2 m/s	Yes	Yes	Spatial overlap between TTS zone and SAC.
	Ex situ	Initial distance of at least **1,800 m** (cSEL) swimming away at a speed of 2 m/s	N/A	Yes	Potential for adverse *ex situ* effects
Behavioural Disturbance / Displacement	*In situ*	**4.6 km**	Yes	Yes	Spatial overlap between displacement zone and SAC.
	Ex situ	**4.6 km**	N/A	N/A	N/A
Blasting					
Permanent Threshold Shift (PTS)	*In situ*	**1,630 m** (zero-to-peak SPL)	Yes	Yes	Spatial overlap between PTS zone and SAC.
	Ex situ	**1,630 m**	N/A	Yes	Potential for adverse *ex situ* effects.
Temporary Threshold Shift (TTS)	*In situ*	**3,000 m** (zero-to-peak SPL)	Yes	Yes	Spatial overlap between TTS zone and SAC.
	Ex situ	**3,000 m**	N/A	Yes	Potential for adverse *ex situ* effects.
Behavioural Disturbance / Displacement	*In situ*	N/A	N/A	N/A	N/A
	Ex situ	N/A	N/A	N/A	N/A

Activity and Impact	In situ/ Ex situ	Predicted Zone of Impact	Overlap with SAC	Potential Adverse Effect on Site Integrity without mitigation	Justification
Dredging					
Permanent Threshold Shift (PTS)	*In situ*	N/A	No	No	PTS thresholds not exceeded.
	Ex situ	N/A	N/A	No	PTS thresholds not exceeded.
Temporary Threshold Shift (TTS)	*In situ*	Initial distance of at least **320 m** (cSEL) swimming away at a speed of 2 m/s	No	No	No spatial overlap between TTS zone and SAC.
	Ex situ	Initial distance of at least **320 m** swimming away at a speed of 2 m/s	N/A	Yes	Potential for adverse *ex situ* effects.
Behavioural Disturbance / Displacement	*In situ*	**1.3 km**	No	No	No spatial overlap between displacement zone and SAC.
	Ex situ	**1.3** km	N/A	N/A	N/A

Table 4.13: Summary of Adverse Effects Assessment - Blackwater Bank SAC

Activity and Impact	In situ/ Ex situ	Predicted Zone of Impact	Overlap with SAC	Potential Adverse Effect on Site Integrity without mitigation	Justification
Piling					
Permanent Threshold Shift (PTS)	*In situ*	**110 m** (zero-to-peak SPL)	No	No	No spatial overlap between PTS zone and SAC.
	Ex situ	**110 m**	N/A	Yes	Potential for adverse *ex situ* effects.
Temporary Threshold Shift (TTS)	*In situ*	Initial distance of at least **1,800 m** (cSEL avoidance) swimming away at a speed of 2 m/s	No	No	No spatial overlap between TTS zone and SAC.
	Ex situ	Initial distance of at least **1,800 m** (cSEL) swimming away at a speed of 2 m/s	N/A	Yes	Potential for adverse *ex situ* effects.
Behavioural Disturbance / Displacement	*In situ*	**4.6 km**	No	No	No spatial overlap between displacement zone and SAC.
	Ex situ	**4.6 km**	N/A	N/A	N/A
Blasting					
Permanent Threshold Shift (PTS)	*In situ*	**1,630 m** (zero-to-peak SPL)	No	No	No spatial overlap between PTS zone and SAC.
	Ex situ	**1,630 m** (zero-to-peak SPL)	N/A	Yes	Potential for adverse *ex situ* effects.
Temporary Threshold Shift (TTS)	*In situ*	**3,000 m** (zero-to-peak SPL)	No	No	No spatial overlap between TTS zone and SAC.
	Ex situ	**3,000 m** (zero-to-peak SPL)	N/A	Yes	Potential for adverse *ex situ* effects.

Activity and Impact	In situ/ Ex situ	Predicted Zone of Impact	Overlap with SAC	Potential Adverse Effect on Site Integrity without mitigation	Justification
Behavioural Disturbance / Displacement	*In situ*	N/A	No	No	No spatial overlap between displacement zone and SAC.
	Ex situ	N/A	N/A	N/A	N/A.
Dredging					
Permanent Threshold Shift (PTS)	*In situ*	N/A	No	No	PTS thresholds not exceeded.
	Ex situ	N/A	N/A	No	PTS thresholds not exceeded.
Temporary Threshold Shift (TTS)	*In situ*	Initial distance of at least **320 m** (weighted cSEL) swimming away at a speed of 2 m/s to avoid TTS	No	No	No spatial overlap between TTS zone and SAC.
	Ex situ	Initial distance of at least **320 m** (weighted cSEL) swimming away at a speed of 2 m/s to avoid TTS	N/A	Yes	Potential for adverse *ex situ* effects.
Behavioural Disturbance / Displacement	*In situ*	**1.3 km**	No	No	No spatial overlap between displacement zone and SAC.
	Ex situ	**1.3 km**	N/A	No	N/A

Table 4.14: Summary of Adverse Effects Assessment - Slaney River Valley SAC

Activity and Impact	In situ/ Ex situ	Predicted Zone of Impact	Overlap with SAC	Potential Adverse Effect on Site Integrity without mitigation	Justification
Piling					
Permanent Threshold Shift (PTS)	*In situ*	**8 m** (zero-to-peak SPL)	No	No	No spatial overlap between PTS zone and SAC.
	Ex situ	**8 m** (zero-to-peak SPL)	N/A	Yes	Potential for adverse *ex situ* effects.
Temporary Threshold Shift (TTS)	*In situ*	Initial distance of at least **40 m** (weighted cSEL) swimming away at a speed of 2 m/s	No	No	No spatial overlap between TTS zone and SAC.
	Ex situ	Initial distance of at least **40 m** (weighted cSEL) swimming away at a speed of 2 m/s	N/A	Yes	Potential for adverse *ex situ* effects.
Behavioural Disturbance / Displacement during breeding season	*In situ*	**4.6 km**	No	No	No spatial overlap between displacement zone and SAC.
	Ex situ	**4.6 km**	N/A	Yes	Harbour Seals may be displaced during breeding season which could adversely affect SAC population
Blasting					
Permanent Threshold Shift (PTS)	*In situ*	320 m (zero-to-peak SPL)	No	No	No spatial overlap between PTS zone and SAC.
	Ex situ	320 m (zero-to-peak SPL)	N/A	Yes	Potential for adverse *ex situ* effects.
Temporary Threshold Shift (TTS)	*In situ*	**590 m** (zero-to-peak SPL)	No	No	No spatial overlap between TTS zone and SAC.
	Ex situ	**590 m** (zero-to-peak SPL)	N/A	Yes	Potential for adverse *ex situ* effects.

Activity and Impact	In situ/ Ex situ	Predicted Zone of Impact	Overlap with SAC	Potential Adverse Effect on Site Integrity without mitigation	Justification
Behavioural Disturbance / Displacement	*In situ*	N/A	N/A	N/A	N/A
	Ex situ	N/A	N/A	N/A	N/A.
Dredging					
Permanent Threshold Shift (PTS)	*In situ*	N/A	No	No	PTS thresholds not exceeded.
	Ex situ	N/A	N/A	No	PTS thresholds not exceeded.
Temporary Threshold Shift (TTS)	*In situ*	N/A	No	No	TTS thresholds not exceeded.
	Ex situ	N/A	N/A	No	TTS thresholds not exceeded.
Behavioural Disturbance / Displacement	*In situ*	**1.3 km**	No	No	No spatial overlap between displacement zone and SAC.
	Ex situ	**1.3 km**	N/A	Yes (during breeding season)	Harbour Seals may be displaced during breeding season which could adversely effect SAC population

4.2.6 IN-COMBINATION EFFECTS ASSESSMENT

In-combination screening for cumulative effects has been undertaken following the approach outlined in the European Commission Notice Assessment of plans and projects in relation to Natura 2000 sites – Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive (EC, 2021).

Plans from other projects were examined as part of the Stage 1 AA Screening Report submitted as part of this application.

Iarnród Éireann - Rosslare Europort Maintenance Dredging and the Extension of Berth 3 were identified as having the potential for construction overlap and there is potential for adverse effects on the integrity of Natura 2000 European sites as a result of cumulative effects from the Proposed Development and these projects. For this reason, measures to mitigate these effects are proposed and are presented in Section 4.3.

4.3 MITIGATION MEASURES

This report has identified the potential for adverse effects on the integrity of three Natura 2000 European sites as a result of the Proposed Development. For this reason, measures to mitigate these effects are proposed and are presented below.

These measures are designed to ensure that the activities assessed (piling, blasting, and dredging) do not result in injury or, where relevant, disturbance or displacement to marine mammal QI species of Carnsore Point SAC, Blackwater Bank SAC and Slaney River Valley SAC.

The following mitigation measures will be implemented during the construction phase of the Proposed Development to minimise the risk of injury or disturbance to marine mammals in the area of operations, in accordance with the NPWS "*Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters*" (DAHG, 2014).

4.3.1 GENERAL MITIGATION MEASURES

Measures described below will be implemented during piling, blasting and dredging (including perimeter bund installation and reclamation area infilling) works:

- A trained and experienced Marine Mammal Observer (MMO) or MMOs shall be appointed to monitor for marine mammals. The MMO(s) will scan the surrounding area to ensure no marine mammals are in the pre-determined exclusion zone in the 30-minute period prior to operations. The activity-specific Monitored Zone (MZ), as recommended by NPWS (DAHG, 2014), will be implemented during these activities.
- For dredging activities (including perimeter bund installation and reclamation area infilling), MMOs will ensure no marine mammals are present within the bunded areas by conducting a 30-minute pre-watch prior to any materials placement activities. The 30-minute pre-watch is only required if the MMO has not been continuously present leading up to the materials placement activities. For example, if the MMO is already conducting a pre-watch during dredging operations, this monitoring will continue through the dredging activities and the transit from the

Dredging Area to the Reclamation Area, covering the requirements for materials placement. If materials placement occurs prior to or following dredging activities, the pre-watch can be coordinated to include all activities within a single continuous monitoring period

- MMOs must be located on an appropriate elevated platform from which the entire MZ can be effectively covered without any obstruction of view. MMOs will be positioned as near to the centre of the MZ as is practicable, i.e., adjacent to the sound source
- Noise-producing activities will only commence in daylight hours where effective visual monitoring, as performed and determined by the MMO, has been achieved. Where effective visual monitoring is not possible, the sound-producing activities will be postponed until effective visual monitoring is possible. Visual scanning for marine mammals will only be effective during daylight hours and if the sea state is World Meteorological Organisation (WMO) Sea State 4 (≈Beaufort Force 4 conditions) or less
- A clear communication protocol, agreed on-site, will be established between the MMO and the Works Superintendent to confirm whether the relevant activity may proceed or resume following a break. Activities shall only commence or resume upon positive confirmation from the MMO
- All marine mammal detections will be systematically recorded, encompassing both sightings observed during formal monitoring watches and incidental observations made outside of these designated periods, including observations made by additional personnel on board. Detailed records of all marine mammal sightings documented will be reported to the NPWS
- Any approach by marine mammals into the immediate (<50m) works area will be reported to NPWS
- The MMO will keep a record of the monitoring and log all relevant events using standardised data forms available from NPWS and submit to the NPWS on completion of the works.

4.3.2 MITIGATION MEASURES FOR PILING

4.3.2.1 ROCKFILL BUND AND UNDERWATER NOISE ATTENUATION RISK MINIMISATION MEASURES

NPWS (2014) recommends incorporation of the use of fully enclosing or confined bubble curtains, encircling absorptive barriers (e.g., isolation casings, cofferdams) or other demonstrably effective noise reduction methods at the immediate works site, in order to reduce underwater sound propagation from on-site operations, as studies have shown that such methods can provide a significant reduction in sound input to the wider aquatic environment in the order of 10-30 dB. Use of these recommended risk minimisation measures is further supported by modelling undertaken by Stokes *et al*. (2010), which predicted noise reductions of approximately 20 dB when employing large de-watered cofferdams, and a review completed by JNCC (2024), which found physical noise abatement systems used for offshore piling can reduce underwater noise levels by up to 24 dB.

To reduce underwater noise transmission into the open sea, the piling operations to construct the quays for ORE Berth 1 and ORE Berth 2 will be carried out using land-based equipment positioned on

sequentially advanced rockfill bunds. These bunds will be pushed out from the shore along the ORE Berth 1 and ORE Berth 2 alignments, allowing piling to occur on a stable platform. This eliminates the need for floating or jack-up platforms and minimises direct noise transmission into the water column, thereby dampening underwater noise levels during rotary bored piling at the ORE berths.

For piling at the New Small Boat Harbour, the rockfill bunds forming part of the permanent perimeter of the reclamation area will be temporarily extended to fully enclose the Small Boat Harbour to contain underwater noise generated by impact piling. This will create a closed lagoon during piling works, shielding the open sea from underwater noise propagation.

Once piling within the Small Boat Harbour is complete, the temporary rockfill closure will be removed and the material reused in subsequent phases of the works.

Implementation of these mitigation measures will reduce underwater noise transmission from piling.

4.3.2.2 OTHER MITIGATION MEASURE FOR PILING

The following mitigation measures will also be implemented during piling activities, in accordance with the NPWS "*Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters*" (DAHG, 2014):

- **1,000 m Monitored Zone (MZ):** A 30-minute pre-watch will be conducted by a suitably qualified MMO prior to commencing piling, blasting, dredging, or dumping. No marine mammals may be observed within the defined MZ of 1,000 m during this period (DAGH, 2014)
    - Once operations are underway with appropriate ramp-up, activities will continue regardless of night-time conditions, reduced visibility, or the presence of marine mammals within the MZ
- **Bunded Area Checks:** For works within the enclosed Small Boat Harbour or partially enclosed ORE Berths, MMOs will confirm the absence of marine mammals within the enclosed areas before works commence
- **Timing Restrictions:** Underwater noise-generating activities will only begin during daylight and favourable weather conditions (≤ WMO Sea State 4) to ensure effective visual monitoring
- **Ramp-Up Procedures:** A ramp-up or soft-start will be used for piling where practicable, increasing noise levels gradually over 20–40 minutes after the pre-watch. The protocol will be repeated after any break of more than 30 minutes
- **Real-Time Static Acoustic Monitoring (SAM):** During the harbour seal breeding season (May–July), real-time underwater noise monitoring will be used to constrain disturbance. The 145 dB re 1 μPa^2 (SPLrms) displacement threshold will be used to ensure that noise remains below this level beyond the 1,000 m MZ. If the threshold is exceeded outside the MZ, works will cease. Appropriate adjustments will then be implemented to ensure that displacement thresholds remain below this level outside the MZ before piling can resume. As per NPWS guidance (DAHG, 2014), once piling operations are underway following the 30-

minute pre-watch by the MMO and an appropriate ramp-up procedure, activities will continue regardless of the presence of a marine mammal within the MZ. By ensuring that any displacement impact zones are restricted to the MZ, displacement of harbour seals during the breeding season will be reduced to negligible levels, further decreasing the likelihood of impacts on breeding populations

- **Reporting Requirements:** All sightings will be logged and reported to NPWS.

4.3.3 MITIGATION MEASURES FOR BLASTING

4.3.3.1 ROCKFILL BUND AND NOISE ATTENUATION MEASURES

NPWS (2014) recommends incorporation of the use of fully enclosing or confined bubble curtains, encircling absorptive barriers (e.g., isolation casings, cofferdams) or other demonstrably effective noise reduction methods at the immediate works site, in order to reduce underwater sound propagation from on-site operations, as studies have shown that such methods can provide a significant reduction in sound input to the wider aquatic environment in the order of 10-30 dB. Use of these recommended risk minimisation measures is further supported by modelling undertaken by Stokes *et al*. (2010), which predicted noise reductions of approximately 20 dB when employing large de-watered cofferdams, and a review completed by JNCC (2024), which found physical noise abatement systems used for offshore piling can reduce underwater noise levels by up to 24 dB.

To reduce underwater noise transmission into the open sea, blasting works will be carried out from land-based equipment positioned directly on the sequentially advanced rockfill bunds constructed along the ORE Berth 1 and ORE Berth 2 alignments. The blasting, if required, is expected to use 90mm diameter holes at 2m centres along the line of the quay wall edge and with up to 15 No. holes drilled in preparation for a single blast. Each hole is expected to receive 50kgs of explosive such as 'Kemex 70' and be detonated using non-electric starter line for safety considerations on site.

This construction methodology ensures that blasting occurs entirely within a physically enclosed and bunded environment. The presence of the rockfill bund between the blast point and the open marine environment significantly dampens the transmission of impulsive sound waves. The bund acts as a natural acoustic barrier, interrupting the direct path of noise propagation into the water column.

4.3.3.2 OTHER MITIGATION MEASURE FOR BLASTING

The following mitigation measures will also be implemented during blasting activities, in accordance with the NPWS "*Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters*" (DAHG, 2014) and the JNCC "Guidelines on the use of underwater explosives near marine mammals" (JNCC, 2025).

The JNCC (2025) guidelines recommend that Acoustic Deterrent Devices (ADD) are used for predicted injury ranges exceeding 1 km (i.e. the MZ), with the objective of encouraging marine mammals to vacate the area before detonation.

The following will be applied in all blasting operations:

- **1,000 m MZ:** A 1,000 m exclusion zone (as per DAHG, 2014) will be established around the blasting location. A 30-minute pre-blast watch will be conducted by a qualified MMO to confirm that no marine mammals are present within the MZ. If any are observed, detonation will be postponed until the zone is clear
- **Acoustic Deterrent Device (ADD) Use:**
    - An ADD(s) will be deployed prior to detonation to encourage marine mammals, particularly harbour porpoise, to vacate the 1,000 m MZ. ADDs will be deployed as follows:
        - Positioned as close to the detonation site as safely possible
        - Activated only after a 30-minute visual check confirms no marine mammals within 100 m of the device(s)
        - Remain active during any delay due to mammal presence; if delays are prolonged, the ADD may be paused to avoid habituation and restarted after 20 minutes to reinitiate deterrence
        - ADD duration and configuration will be agreed with the statutory authority and tailored to ensure effective deterrence from the full PTS zone.
- **Species-Specific ADD Configuration:**
    - To avoid unnecessary auditory impacts on marine mammals from underwater noise generated by the ADD, an ADD specifically designed for harbour porpoise (e.g. FaunaGuard Porpoise Module) will be used. These devices emit high-frequency signals (60–150 kHz) at lower sound pressure levels, aligned with the species' auditory range and outside the auditory range of other marine mammals. They also include:
        - **Ramp-up features** to gradually increase signal strength
        - **Variable signal sequences** to minimise habituation. This approach reduces the risk of TTS while ensuring porpoises vacate the area prior to detonation (Schaffeld *et al.*, 2019).
- **Explosive Charge Management:** Only the minimum quantity of explosives required for effective rock fracture will be used. Where practicable, multiple smaller blasts will be used instead of fewer large detonations to reduce peak sound levels
- **Charge Containment:** Explosives will be placed in boreholes or shallow depressions and stemmed using appropriate materials (e.g. gravel, crushed rock) to reduce the propagation of underwater sound
- **Daylight-Only Blasting:** All blasting will be conducted during daylight hours to ensure effective visual monitoring. Early-day scheduling will allow flexibility for postponement in case of marine mammal presence or poor conditions

- **Fixed MMO Location and Continuous Monitoring:** MMOs will maintain a fixed observation point throughout the 30-minute pre-watch and up to the point of detonation. If any marine mammal enters the MZ during this period, the blast will be cancelled or delayed until the zone is clear
- **Blast Delay Protocol:** If harbour porpoise or other QI species remain within the MZ, blasting will not proceed until clearance is confirmed through visual observation and/or ADD effectiveness
- **Data Recording and Reporting:** All sightings and mitigation actions will be recorded using NPWS standardised forms and submitted post-works.

4.3.4 MITIGATION MEASURES FOR DREDGING

The following mitigation measures will be implemented during dredging activities, in accordance with the NPWS "*Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters*" (DAHG, 2014):

- **500 m MZ:** A 30-minute pre-watch will be undertaken by a qualified MMO before the onset of any dredging or sediment disposal activity. No dredging will commence unless the MMO confirms that no marine mammals have been observed within a 500 m MZ during this period
- **No Requirement to Halt Once Active:** In line with NPWS guidance, once dredging has commenced (following the pre-watch and a soft start or ramp-up where appropriate), operations may continue regardless of visibility, weather conditions, or marine mammal presence within the MZ
- **Best Practice During Operations:** MMOs will remain present during active dredging and, where feasible, may recommend brief pauses or adjustments to the works to allow nearby animals to move away from the source
- **Seasonal Real-Time Monitoring:** During the harbour seal breeding season (May to July), real-time SAM will be deployed to measure received underwater noise levels. A displacement threshold of 140 dB re 1 μPa^2 will be used to manage the spatial extent of potential disturbance
    - If SAM detects that this threshold is exceeded beyond 1,000 m, dredging will be paused and adjustments made before recommencing.

These mitigation measures, which incorporate both visual observation and acoustic monitoring, will ensure that underwater noise from activities associated with the Proposed Development does not result in any adverse effects on the integrity of European sites supporting QI marine mammal populations.

4.3.5 CONSTRUCTION PHASE MITIGATION MEASURES FOR IN-COMBINATION EFFECTS

Iarnród Éireann is responsible for maintenance dredging at Rosslare Harbour, a routine activity independent of the Proposed Development, and for the Extension of Berth 3 project.

To minimise cumulative effects, Iarnród Éireann will not schedule maintenance dredging activities to occur simultaneously with the capital dredging required for the Proposed Development.

This approach will avoid cumulative effects from separate dredging operations being undertaken in close proximity to each other and at the same time, avoiding potential environmental impacts from associated elevated levels of turbidity and underwater noise being introduced into the marine environment.

Iarnród Éireann will schedule works such that piling activities for the Berth 3 extension do not occur simultaneously with the piling required for the Proposed Development.

This approach will avoid cumulative effects from separate piling operations being undertaken in close proximity to each other and at the same time, avoiding potential environmental impacts from associated elevated levels of underwater noise being introduced into the marine environment.

4.4 ASSESSMENT CONCLUSION: INTEGRITY OF EUROPEAN SITES

This NIS has considered the potential for adverse *in situ* and *ex situ* effects of the Proposed Development at Rosslare Europort on three European sites:

- Slaney River Valley SAC (site code: 000781)
- Carnsore Point SAC (site code: 002269)
- Blackwater Bank SAC (site code: 002953).

The assessment has been undertaken in consideration of the requirements of Article 6(3) of the Habitats Directive and considers all aspects of the project that could affect the SSCOs and QIs of the above sites. Mitigation measures have been developed and incorporated into the project design to ensure that the risk of adverse effects on the SSCOs *in situ* and QIs occurring *ex situ* from project activities alone and in combination with other plans and projects is minimised.

Based on the best available scientific data, site-specific noise modelling, and the implementation of proposed mitigation measures, it is concluded that the Proposed Development will not result in adverse effects on the integrity of any European site, either alone or in combination with other plans or projects.

5 APPROPRIATE ASSESSMENT CONCLUSION

This NIS has assessed the potential for adverse effects arising from the Proposed Development on the integrity of three SACs and their Harbour Porpoise and Harbour Seal Qualifying Interests. The assessment focused on underwater noise-related impacts during the construction phase, including injury (PTS and TTS) and disturbance and displacement. The three SACs considered are:

- Carnsore Point SAC (Harbour Porpoise QI and SSCOs):
    - Injury, Disturbance and Displacement
- Blackwater Bank SAC (Harbour Porpoise QI and SSCOs):
    - Injury, Disturbance and Displacement
- Slaney River Valley SAC (Harbour Seal QI, SSCOs):
    - Injury, Disturbance and Displacement.

An in-combination effects assessment for cumulative effects has been undertaken considering the potential for adverse effects arising from the Proposed Development in combination with the Iarnród Éireann - Rosslare Europort Maintenance Dredging campaign and the Iarnród Éireann Berth 3 extension project.

The assessment has considered the Project both alone and in combination with other plans or projects. It has incorporated a precautionary approach using best available scientific knowledge, and applied relevant impact thresholds and guidance, including Southall *et al*. (2019) and NPWS (DAHG, 2014).

Integrated noise attenuation measures designed into the Proposed Development as risk minimisation measures include:

- Sequential outward extension of the bund, through which rotary piling and blasting will be conducted
- Blasting within the bunded area using pre-drilled copper pipes to ensure precise charge placement; the amount of explosive will be reduced and charge containment methods (i.e., within the bund and drilled boreholes) will be used to minimise underwater noise propagation
- Impact piling within the fully enclosed temporary lagoon created by the closure of the new Small Boat Harbour

Activity-specific mitigation measures include:

- Establishment of appropriate MZs for piling, blasting, and dredging
- Deployment of trained MMOs
- 30-minute pre-start watches prior to commencement of sound-generating activities
- Use of soft-start procedures for piling

- Deployment of Acoustic Deterrent Devices (ADDs) for blasting
- Implementation of real-time Static Acoustic Monitoring (SAM) during the Harbour Seal breeding season (May–July) to ensure displacement thresholds are not exceeded during piling and dredging activities.

To minimise cumulative effects, Iarnród Éireann will not schedule maintenance dredging activities to occur simultaneously with the capital dredging required for the Proposed Development, and will not schedule piling activities for the Berth 3 extension to occur simultaneously with the piling required for the Proposed Development.

The effectiveness of these mitigation measures ensures that zones of impact for PTS, TTS, and displacement do not overlap with any SAC boundary, and *ex situ* QI individuals are protected, under realistic worst-case scenarios. Consequently:

- There is no risk of *in situ* adverse effects on the integrity of any SAC; and,
- There is no risk of *ex situ* adverse effects on QIs occurring outside SAC boundaries

Furthermore, these mitigation measures will ensure that there are no adverse effects to the SSCOs for all three SACs being met as a result of the Proposed Development activities.

Based on complete, precise, and definitive findings using the best available scientific knowledge, and subject to full implementation of the proposed mitigation measures, it is concluded that the Proposed Development will not result in adverse effects, either *in situ* or *ex situ*, on the integrity of Carnsore Point SAC, Blackwater Bank SAC, or Slaney River Valley SAC, either alone or in combination with other plans or projects.

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