

SUPPORTING INFORMATION FOR APPLICATION FOR DEROGATION LICENCE: ROSSLARE ORE HUB

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1 INTRODUCTION

1.1 OBJECTIVE

This supporting information forms part of an application for a Regulation 54 derogation application on behalf of Iarnród Éireann – Irish Rail ('the Applicant'). The multi-disciplinary consultancy team from Nicholas O'Dwyer Limited (NOD) and Gavin and Doherty Geosolutions Limited (GDG) have prepared this derogation licence for the development of dedicated Offshore Renewable Energy (ORE) Hub at Rosslare Europort, An Coimisiún Pleanála (ACP) Ref. 323952-25.

The Rosslare ORE Hub planning submission including documents and drawings, the Environmental Impact Assessment Report (EIAR) and Natura Impact Statement (NIS) also support this derogation licence.

1.2 STATEMENT OF AUTHORITY

This report has been prepared by Charlotte Manwaring (BSc. Hons Geological Science, MSc. Geochemistry). Charlotte is a Senior Environmental Scientist with extensive experience (20+ years) as an environmental consultant, undertaking various multi-disciplinary projects within consulting engineering.

This report has been reviewed and approved by Joey O'Connor, Principal Marine Environmental Scientist at GDG, specialising in Environmental Impact Assessment and Appropriate Assessment. Joey holds an MSc in Engineering in the Coastal Environment from the University of Southampton and a BSc (Hons) in Marine Science from the University of Galway. He has 17 years' experience as a marine and coastal environmental professional across the public and private sectors, including 10+ years' project and team management experience. Joey has delivered and overseen numerous environmental assessments and consents for infrastructure projects, including ports and offshore and onshore windfarms, and has extensive experience in offshore survey, Marine Protected Area monitoring, and regulatory advisory roles, including as a statutory adviser to the UK government and devolved administrations with the Joint Nature Conservation Committee (JNCC).

2 BACKGROUND

2.1 PROPOSED DEVELOPMENT

The primary 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. Development of the Rosslare ORE Hub 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 and incorporating a new small boat harbour into the Rosslare ORE Hub at a new location in deeper water. The Proposed Development also includes the installation of a new slipway and facility for local clubs, such as the Sea Scouts.

The Proposed Development will consist of the following key elements:

- Site preparation and mobilisation
- Capital dredging
- Land reclamation
- ORE Storage Area
- ORE Berth 1
- ORE Berth 2
- ORE Compound
- New Small Boat Harbour
- Slipway and Sea Scouts facility
- Ancillary works

2.2 LOCATION OF LICENCE AREA

The Proposed Development is located in a site immediately adjacent to the Rosslare Europort, which is situated in County Wexford. The port lies southeast of Wexford Town and is strategically positioned at the southern end of the Irish Sea, offering direct maritime access to key offshore wind development zones in the Celtic Sea and Irish Sea.

Rosslare Europort is bounded by the Irish Sea to the east, the village of Rosslare Harbour to the west, and a mix of residential, commercial, and transport infrastructure in the immediate vicinity. The port is accessible via the N25 national primary road and is connected to the national rail network, providing multimodal transport options for cargo and personnel.

The Proposed Development Boundary (PDB) (i.e., the area where development permission is sought to construct and operate the Proposed Development) encompasses a total area of 80.3ha, lying

mostly within the marine area, and includes areas for dredging and land reclamation. The site of the Proposed Development is defined by the red line PDB shown in Figure 2-1.

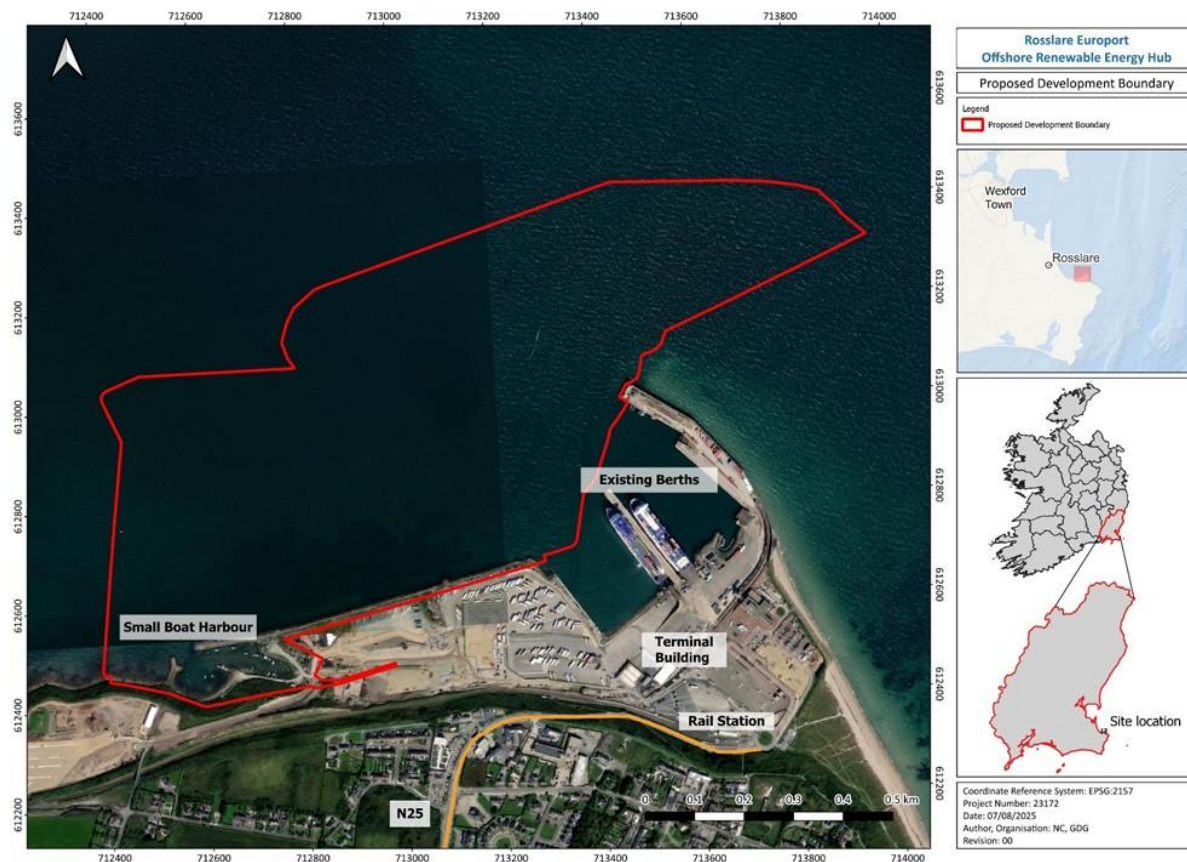


Figure 2-1: Site Location.

2.3 NEED FOR THE PROPOSED ACTIVITY

The ORE Hub is part of IE's strategic plan for Rosslare Europort. The ORE Hub will enable efficient handling and storage, marshalling, staging and integration of ORE components for offshore wind farm projects. The ORE Hub aligns with policy frameworks across all governance levels and is critical to meeting Ireland's climate and energy security goals.

Offshore wind farms being progressed in Ireland are proposed in direct response to Ireland's Climate Action Plan 2025 target to have 5 Gigawatts (GW) of offshore wind operational by 2030, with further aims of 20GW of ORE generation by 2040 and 27GW by 2050 set out in the Government's 2024 'Future Framework for Offshore Renewable Energy' and in the 2024 'Powering Prosperity Ireland's Offshore Wind Industrial Strategy'. There are currently five applications for consent for offshore wind farms in the Irish Sea (Ireland's east coast) targeting for deployment by 2030. Further developments are planned for the Celtic Sea (Ireland's south coast) under the South Coast Designated Maritime Area Plan. The Proposed Development seeks to make an important contribution by facilitating ORE developments.

In 2021, the Minister for Transport undertook an assessment of the options for Irish State ports to facilitate the ORE sector, and published its Policy Statement on the facilitation of Offshore Renewable Energy by Commercial ports in Ireland wherein it is stated that a multiport approach will

be required to address the needs of the ORE industry, to deliver on the ORE targets set out in national policy, and to take advantage of the economic opportunity created by the roll out of fixed and floating offshore wind in Irish waters.

By providing the facility to enable offshore wind development in the Irish Sea and Celtic Sea, the proposed Rosslare ORE Hub will support the achievement of the climate action objectives and will contribute to energy security. The proposed Rosslare ORE Hub is therefore considered urgent and in the public interest.

2.4 LEGISLATION AND GUIDANCE

Article 16 of the Habitats Directive provides for derogations from the strict protection provisions set out in Articles 12 and 13. Such derogations may only be granted in strictly limited circumstances, where it can be demonstrated that a series of stringent and cumulative tests are satisfied. Article 16 is transposed into Irish law through Regulation 54 of the European Communities (Birds and Natural Habitats) Regulations 2011.

An application for a Regulation 54 derogation may arise where an applicant proposes to undertake a specific activity and cannot avoid committing one or more offences under Article 12. Any derogation application must clearly identify the specific prohibited activity or activities for which consent is sought. Where granted, the authorised prohibited activity or activities will be explicitly stated within the derogation licence.

Before granting a derogation, the National Parks and Wildlife Service (NPWS) applies the following three cumulative tests, which are assessed sequentially:

- Test 1: The derogation must be required for one or more of the reasons specified under Regulation 54(2)(a)–(e)
- Test 2: There must be no satisfactory alternative to the proposed activity; and
- Test 3: The derogation must not be detrimental to the maintenance of the populations of the species concerned at Favourable Conservation Status (FCS) within their natural range.

Each test must be satisfied in turn. Where an application fails Test 1, it is not considered further and must be refused. Likewise, failure to satisfy Test 2 precludes consideration of Test 3. A derogation may only be granted where all three tests are met.

All species of cetacean (whales, dolphins and porpoises) occurring in European Union (EU) waters are considered European Protected Species (EPS) under Annex IV of the Habitats Directive (Council Directive 92/43/EEC). As directed by Article 12 of the Directive, species listed in Annex IV are considered species of community interest in need of strict protection across their entire natural range within the EU, both within and outside Natura 2000 sites. In addition to cetaceans, other EPS occurring in Irish waters are the Eurasian otter (*Lutra lutra*) and the leatherback turtle (*Dermochelys coriacea*).

The regulations provide for the strict protection of Annex IV listed species, in their natural range. As such, it is an offence to:

- a) Deliberately capture or kill any specimen of these species in the wild
- b) Deliberately disturb these species particularly during the period of breeding, rearing, hibernation and migration
- c) Deliberately take or destroys eggs of those species from the wild
- d) Damage or destroy a breeding site or resting place of such an animal or
- e) Keep, transport, sell, exchange, offer for sale or offer for exchange any specimen of these species taken in the wild, other than those taken legally as referred to in Article 12(2) of the Habitats Directive.

Article 12(1)(a)–(c) of the Habitats Directive prohibits the deliberate capture or killing of protected species, deliberate disturbance, and the deliberate destruction or taking of eggs from the wild. The interpretation of the term “deliberate” must be read in light of relevant Court of Justice of the European Union (CJEU) case law, in particular Cases C-103/00 and C-221/04

An action is considered deliberate where a person or body knows, or should reasonably have known, that their activity is likely to result in an offence against a protected species, and nevertheless proceeds by consciously accepting the foreseeable consequences. This includes actions not intended to harm protected species but undertaken with awareness of the associated risk.

Principle of Proportionality

Whilst derogations may only be granted subject to meeting stringent legal requirements, European Commission guidance emphasises that the principle of proportionality should be applied when assessing compliance with each of the Article 16 tests. As stated in Commission guidance, “as a general rule, the severity of any of the conditions or ‘tests’ will increase with the severity of the potential impact of a derogation on a species or population.”

Accordingly, derogation applications are assessed on a case-by-case basis, with the level of justification, assessment detail and mitigation required being proportionate to the scale, duration and potential significance of the predicted impacts on the species concerned.

Precautionary Principle

Article 191(2) of the Treaty on the Functioning of the European Union establishes the precautionary principle as a core component of EU environmental policy. This principle applies where there is a risk of environmental harm and scientific uncertainty exists regarding the magnitude, likelihood or reversibility of potential effects.

In this context, applicants are required to provide sufficient, relevant, and up-to-date scientific information to allow the competent authority to evaluate risks objectively and to determine whether proposed mitigation measures are adequate to prevent or minimise adverse effects on protected species. Where uncertainty remains, a precautionary approach is adopted in the assessment of potential impacts and compliance with the derogation tests.

3 PROPOSED ACTIVITY

3.1 OVERVIEW

Detailed information regarding construction methodology and operational activities is included in EIAR Chapter 6: Project Description and summarised below. Figure 3-1 shows the general operational layout of the Proposed Development.

The site preparation and mobilisation, land reclamation and construction of Sea Scout facilities will impact the terrestrial areas of the current coastline. Underwater noise impacts will occur from the capital dredging and piling works for the ORE berths.

The key elements of the Proposed Development are listed in Table 3-1 with additional details provided in Sections 3.2 to 3.4.

Table 3-1: Summary of the Proposed Development

Development / Activity	Description
<u>Site preparation and mobilisation</u>	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.
<u>Capital dredging</u>	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).
<u>Land reclamation</u>	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
<u>ORE Storage Area</u>	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.
<u>ORE Berth 1</u>	Construction of ORE Berth 1, a heavy lift berth with a continuous open piled quay length of 330 metres (m).
<u>ORE Berth 2</u>	Construction of ORE Berth 2, with a continuous open piled quay length of 240m.

Development / Activity	Description
<u>ORE Compound</u>	A compound area of 0.2ha for installation of temporary modular buildings for site offices, welfare, logistics, and parking to service ORE developers.
<u>New Small Boat Harbour</u>	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 no. berths a 127m long floating pontoon with 10 no. berths 1 no. fixed berth for emergency service vessels 10 no. single storey storage sheds a slipway for launching and recovery activities marine enabling works and installation of services to provide for potential future uses.
<u>Sea Scouts Facility</u>	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.
<u>Ancillary works</u>	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

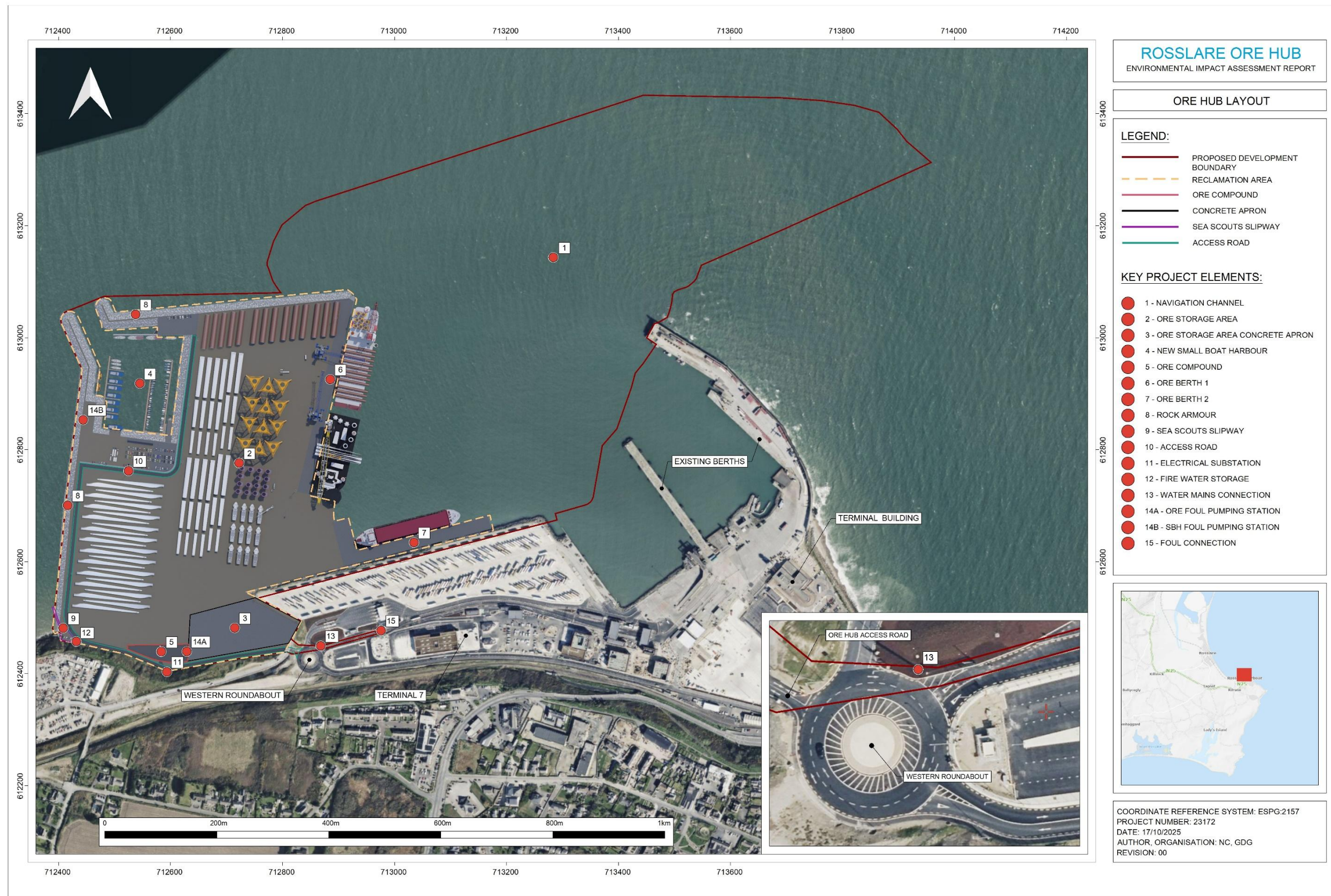


Figure 3-1: General layout of the Proposed Development

3.2 SITE PREPARATION AND MOBILISATION

The preparation of the site and contractor mobilisation will include site clearance, removal of fishing related equipment and sheds at the existing small boat harbour and set up of a temporary site compound. A temporary site compound will be provided and will be used for the duration of the construction works. The compound will accommodate temporary site cabins for offices and welfare facilities, dedicated areas for wheel wash, and waste storage. Sufficient area is available to accommodate parking for 50 vehicles for the staffing required during construction. The compound will be fenced and gated for security.

An indicative layout of the Temporary Site Compound is shown on Figure 3-2.

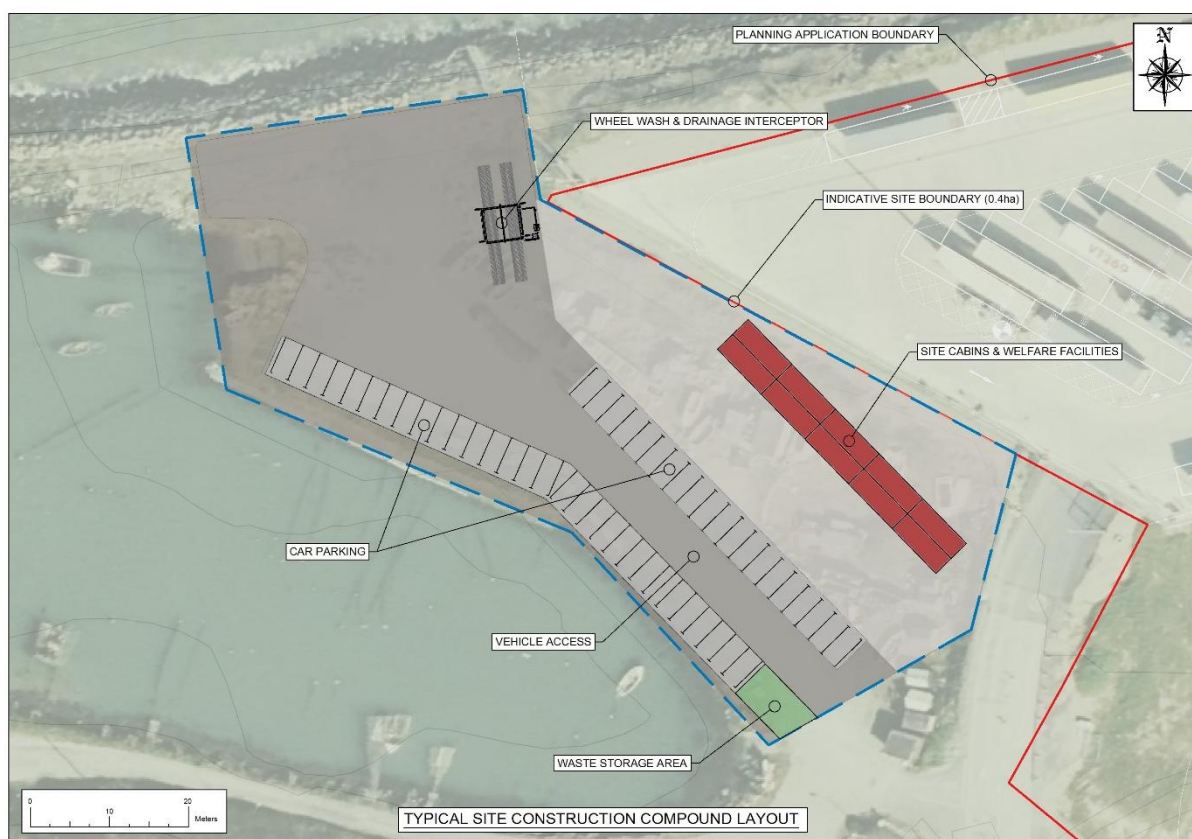


Figure 3-2: Typical Site Construction Compound Layout

3.3 LAND RECLAMATION

Land reclamation will be undertaken to create 27.7ha of additional land for the Proposed Development. The reclamation works will primarily consist of the material arising from the marine dredging activities, along with some imported rockfill for specific locations, such as perimeter bunds, revetments, rock armour and the capping layer at the surface. The reclamation works will also involve infilling of the existing Small Boat Harbour (SBH), after the construction of a new SBH. The reclamation works will be undertaken in sections. The reclaimed land will also be surrounded on the seaward facing sides by rock armour.

3.4 SLIPWAY AND SEA SCOUTS FACILITY

The Proposed Development includes a dedicated slipway for local groups, including the Sea Scouts, on the western flank of the newly reclaimed land area (Figure 3-1, location ID 9). It will allow safe and direct access to sheltered open water for sailing cadets and young seafarers. A new steel shed will be provided to accommodate storage of sailing and boating equipment. The area will be surfaced with asphalt and will drain via gullies to the adjacent road drainage network for discharge via an interceptor into the new Small Boat Harbour. The layout of the proposed slipway and Sea Scouts facility is shown on the drawings submitted with the application.

3.5 PILING FOR THE ORE BERTHS

A summary of the piling including blasting is described as follows: Piling for the ORE berths will commence once the rockfill bund construction has sufficiently advanced to enable safe access to conduct the piling works. This approach is proposed so that continuous piling progress can be made while the remainder of the bund construction is being progressed.

Bearing piles for the two main quays will comprise rotary bored piles since it is better suited to boring through harder sections of rock, compared to impact driving. Rotary drilling is much quieter than conventional impact driving since the effort is based on rotary drilling tools that advance relatively slowly by removing spoil as they progress.

Bearing piles are conservatively estimated to take 15 to 18 months to install in both ORE berths, based on rotary bored piling, which is significantly slower than conventional impact piling. This timeline includes for any associated piling along the quay face as an integrated activity. Two rotary piling rigs (or three at peak productivity) are expected to be used on site to progress the bearing pile installation.

It is anticipated that the face of the quay will be rotary drilled. However, the design allows for a contingency scenario where pre-drilling and blasting is used, using explosives to fracture the underlying rock and so allow for short lengths of driven sheet piles to connect between the main bearing piles. Clutches would be aligned on the bearing piles so that these infill sheet piles could be installed from ground level and driven into the pre-blasted rock. This contingency scenario would only be required if ground conditions are encountered where the compressive strength of underlying rock is observed locally to be higher than that observed in the Site Investigations.

The blasting, if required, would be expected to use 90mm diameter holes at 2m centres along the line of the quay wall edge and with up to 15No. holes drilled in preparation for a single blast. Thus, a length of c. 30m could be prepared in a single day's blast. This would correspond to a worst-case scenario, considered in this EIAR, of approximately 20 individual days where a blasting event would be required to cover the full length of both ORE Berth 1 and ORE Berth 2.

There would be 2-3 weeks between each blast to allow progress on the main quay wall bearing piles that would follow the blasts as they progress sequentially along the quays. Each drill hole would be drilled to approximately -16mCD to allow sufficient fracturing of the rock and allow toe penetration by the sheet piles. All drilling and blasting work would be done from the dry rock filled platform laid

along the line of the quay wall so there would be an effective blanket of rock overburden to a platform level of approximately +4mCD to dampen vibrations from each blast.

3.6 DURATION AND SEQUENCING OF WORKS

The duration of the construction works is anticipated to be 24 months. Key elements are described for the terrestrial works for this derogation licence. The first element will be site preparation and mobilisation. Dredging activities for land reclamation and piling for the construction of the ORE quays will overlap. The new Small Boat Harbour will be constructed before the infilling of the existing Small Boat Harbour.

The exact timing of specific activities will be confirmed once the start date of the works is known, to ensure compliance with all applicable environmental constraints, including seasonal restrictions.

4 ECOLOGICAL SURVEY & ASSESSMENT

4.1 BACKGROUND

The EIAR Chapter 10: Terrestrial Ecology and the associated technical appendix (EIAR Technical Appendix 10) describe the ecological surveys undertaken as relate to otter.

During the Mammal Walkover Survey undertaken on 04/09/2025, evidence of otter activity was recorded. Multiple spraints and couches were observed along the hard breakwater on the western boundary of the Small Boat Harbour and along the sedimentary cliff habitat, and well-defined otter trails were noted through dense horsetail, scrub, and reed vegetation along the sedimentary cliffs. In addition, remains of otter prey were recorded within these areas, as well as along the hard breakwater adjacent to the trailer yard and extending towards the existing port berths.

Couches are above-ground resting sites, distinct from holts, and are typically located in areas of dense cover close to water. In Ireland, they most often comprise flattened patches of vegetation such as reeds, tall grass, or scrub, but may also occur amongst driftwood, boulders, or within rock armour. They are usually associated with well-defined otter trails leading to and from the water's edge and are often accompanied by other signs of use such as spraints and prey remains.

The locations described above are shown on Figure 4-1.

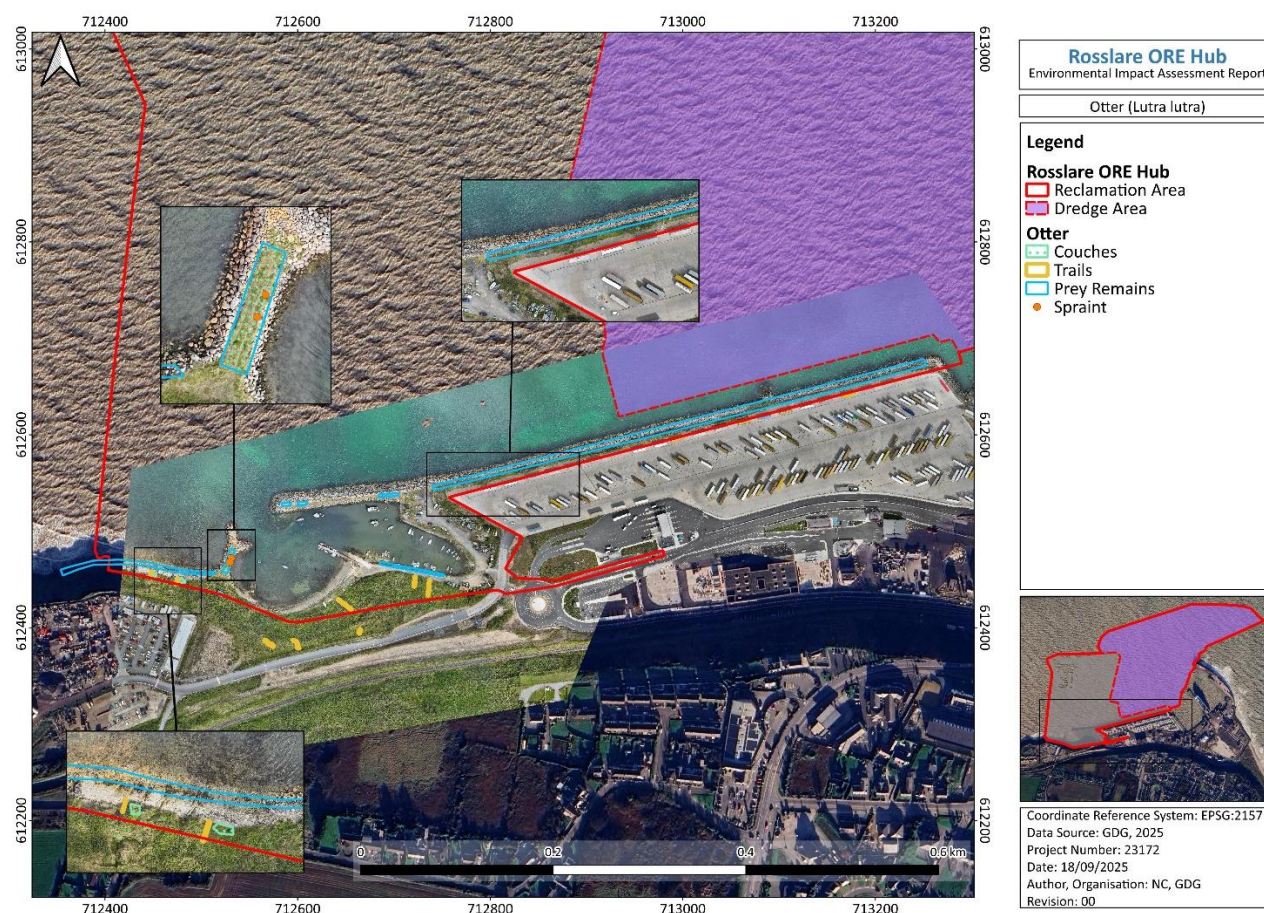


Figure 4-1: Mammal Walkover Survey: Otter (GDG, September 2025)

5 DEROGATION TESTS

5.1 TEST 1 REASON FOR DEROGATION

The reason for the derogation application under Regulation 54(2)(a-e) or Regulation 54A(2)(a-e) of the European Communities (Birds and Natural Habitats) Regulations, for the proposed works is as follows:

- c). In the interests of public health and public safety, or for other imperative reasons of overriding public interest, including those of a social or economic nature and beneficial consequences of primary importance for the environment

The primary 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. ORE is necessary for Ireland to achieve renewable electricity and decarbonisation targets, drive Ireland's response to the global climate emergency, and contribute to the security of energy supply for Ireland and Europe.

There are live and proposed future planning applications for offshore wind farm developments in the Irish Sea and Celtic Sea which could be constructed and supported from Rosslare Europort. Consultation with the ORE industry, which was undertaken early in the design process, has resulted in a project which is fit for purpose and can be ready for use in sufficient time to support construction and for future O&M of offshore wind farms in the Irish Sea and Celtic Sea.

Due to its prime location in relation to the offshore wind farm projects currently in the pipeline and planned for the future, the Rosslare ORE Hub can serve as the primary port in Ireland for storage, marshalling, staging and integration of ORE components, and is perfectly placed to support an entire offshore renewable energy project from construction through to operation and maintenance.

The need for the project is primarily driven by the requirement to service the ORE industry in the Irish Sea and Celtic Sea. By providing facilities that support various uses of infrastructure both currently and in the future (i.e., provisioning for further O&M, RoRo trailer parking, and new Small Boat Harbour and slipway and facilities for the local Sea Scouts) the proposed Rosslare ORE Hub fulfils National Marine Planning Framework (Department of Climate, Energy and the Environment, 2021) requirements for maritime economic development and aligns with overarching marine planning policies on co-existence and sustainable infrastructure.

5.2 TEST 2 ABSENCE OF ALTERNATIVE SOLUTIONS

Test 2 involves determining whether there is a satisfactory alternative to the derogation i.e. whether the problem the applicant faces, or the objective of the activity, can be solved or met in a way that does not involve a derogation.

Alternative options were identified and evaluated including alternative locations, alternative designs and alternative construction methods.

The following options were considered:

Option 1: Use of existing port facilities

Option 2: Reclamation to the east of the existing harbour

Option 3: Partial reclamation to the west of the existing harbour

Option 4: Reclamation to the west of the existing harbour

Option 5: No reclamation.

5.2.1 ALTERNATIVES ASSESSED

5.2.1.1 OPTION 1: THE 'DO NOTHING' OPTION

The “do nothing” option would mean that the ORE Hub would not be constructed at Rosslare Europort.

It is possible that existing port facilities such as Fisherman’s Quay could be upgraded to facilitate a limited amount of offshore wind activity such as cable reel storage, survey vessels, site investigation, and some Operations and Maintenance. To date, the only offshore wind project installed in Irish waters is the Arklow Bank Phase 1 demonstration project, with a total capacity of 25.2MW. This project was commissioned in 2004 and was built out of Rosslare Europort (**Error! Reference source not found.**). It demonstrates the potential for this type of activity at the port.



Figure 5-1: Fisherman’s Quay in Rosslare Europort being used for the Arklow Bank Phase 1 project

However, the current port layout has a limited depth of navigational channels, limited laydown and manoeuvring space in existing quays, limited quay space, limited storage space, as well as limited heavy-equipment availability and capability. Given the above-described constraints and the increased scale of the equipment used in ORE developments since the Arklow Bank Phase 1 project, the existing port is unsuitable in its current configuration for servicing the full life cycle of offshore wind developments.

In environmental terms, this option would entail no dredging from the marine area, and there would be no environmental effects on coastal processes or marine life, which would be a positive aspect of

this option. In socio-economic terms, due to the above-described constraints, this option would not be capable of addressing the Project Need.

The “do nothing” option would also mean a potential loss of opportunities to the south-east region and Ireland as a whole. In the absence of an ORE Hub at Rosslare, construction of offshore wind farms in the Irish Sea and Celtic Sea would have to be serviced from ports further afield, some potentially outside of the Irish state. This option would also represent a loss of opportunity to make a significant contribution to achieving Ireland’s climate action objectives.

5.2.1.2 OPTION 2: RECLAMATION TO THE EAST OF ROSSLARE EUROPORT

This option would involve the reclamation of land to the east of Rosslare Europort, just north-east of the existing harbour, using dredged material. An indicative outline of this option is presented in Figure 5-2.

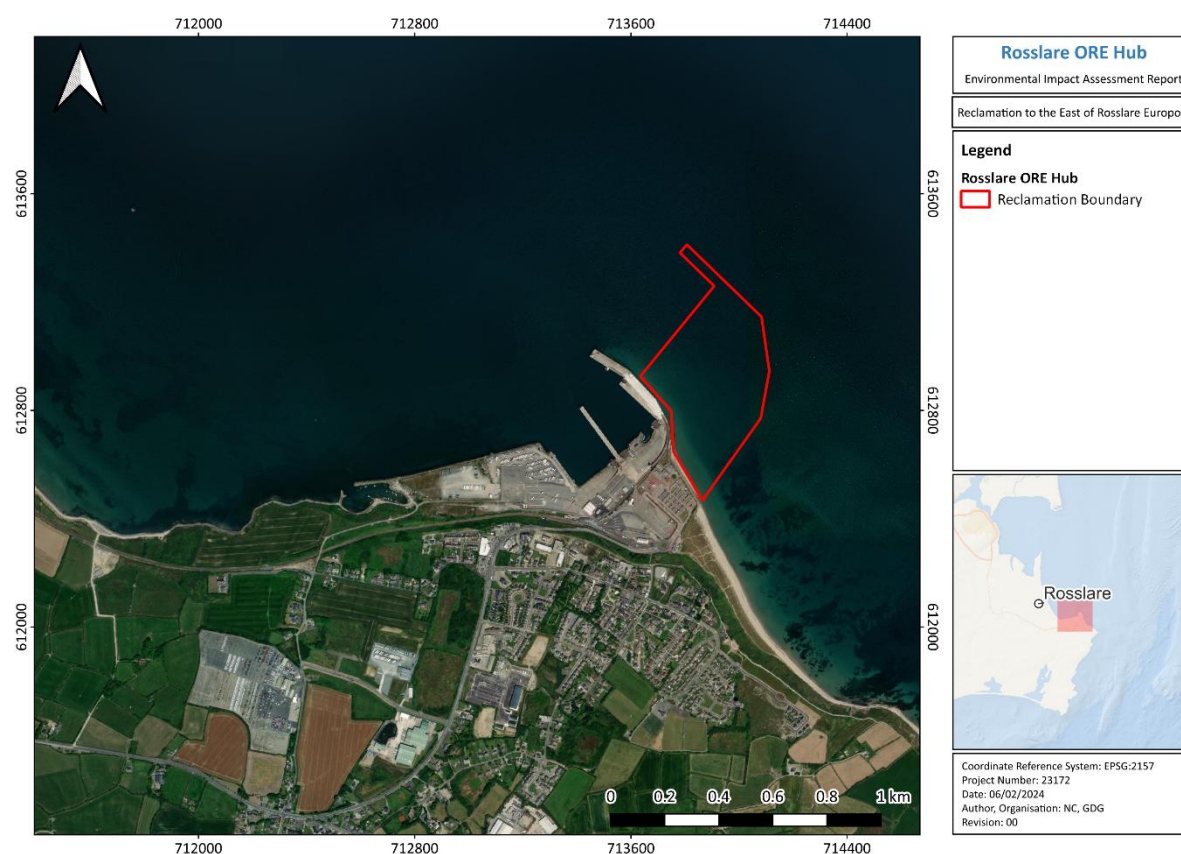


Figure 5-2: Option 2 - Reclamation to the east of Rosslare Europort

Given that this option relies on land reclamation, operationally, there would be no significant spatial constraints on the ORE developments due to existing port activities.

This option introduces environmental effects from dredging and land reclamation activities in the marine environment. This option also has some potential to affect sensitive receptors on land.

Due to its location east of the existing breakwater for Rosslare Europort, this option would be more exposed to wind, wave and tidal action.

5.2.1.3 OPTION 3: RECLAMATION TO THE WEST OF ROSSLARE EUROPORT

This option involves the reclamation of land to the west of Rosslare Europort, using dredged material. The indicative outline of this option is provided in Figure 5-3.

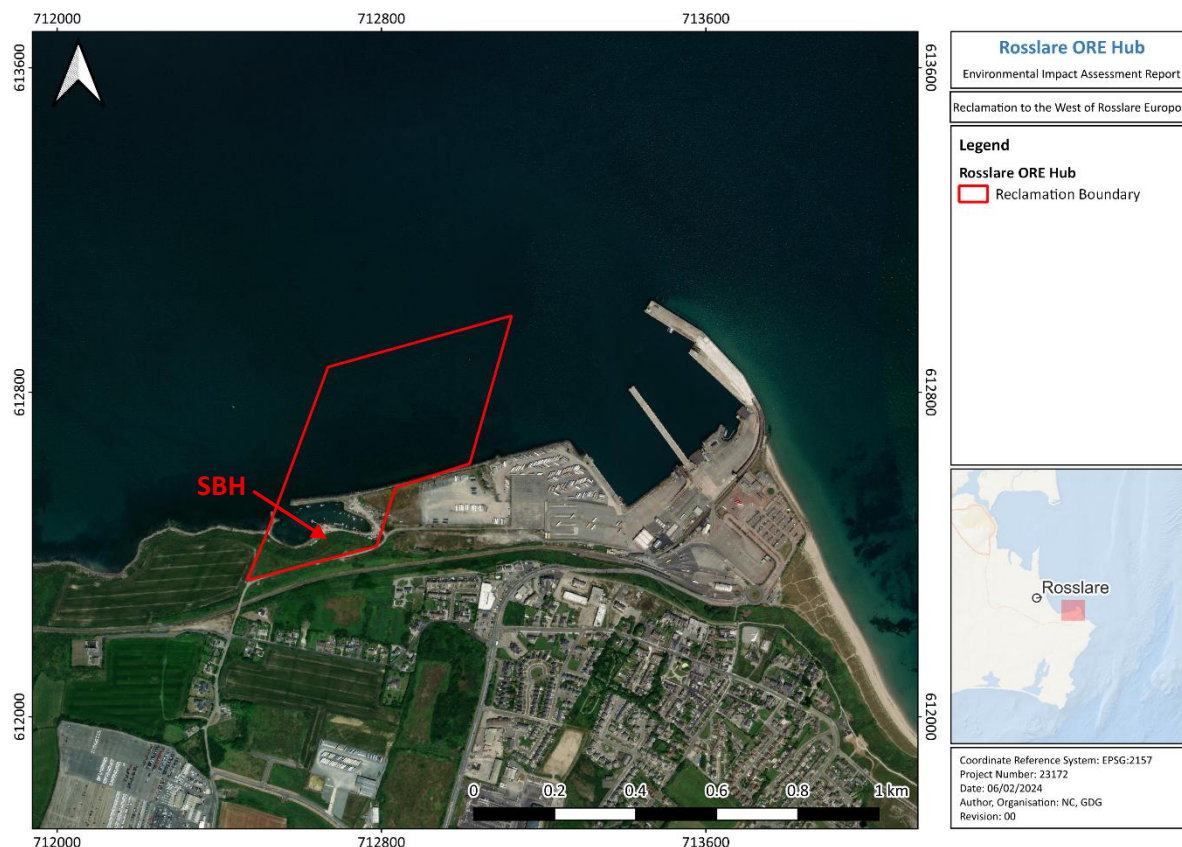


Figure 5-3: Option 3 – Reclamation to the west of Rosslare Europort

Given that this option relies on land reclamation, there would be no significant spatial constraints on the ORE developments due to existing port activities. This option would benefit from the position within the sheltered conditions of the inner harbour. This option would however require the relocation of the Small Boat Harbour (SBH).

Similarly to Option 2, this option introduces environmental effects from dredging and land reclamation activities in the marine environment. This option also has some potential to affect sensitive receptors on land.

5.2.1.4 OPTION 4: PARTIAL RECLAMATION TO THE WEST OF ROSSLARE EUROPORT

Option 4 involves partial reclamation to the west of Rosslare Europort. This option is at a similar location to Option 3, with the key difference being that approximately half of the development would be on reclaimed land, with the other half being provided within existing lands. An indicative outline of this option is provided in Figure 5-4.

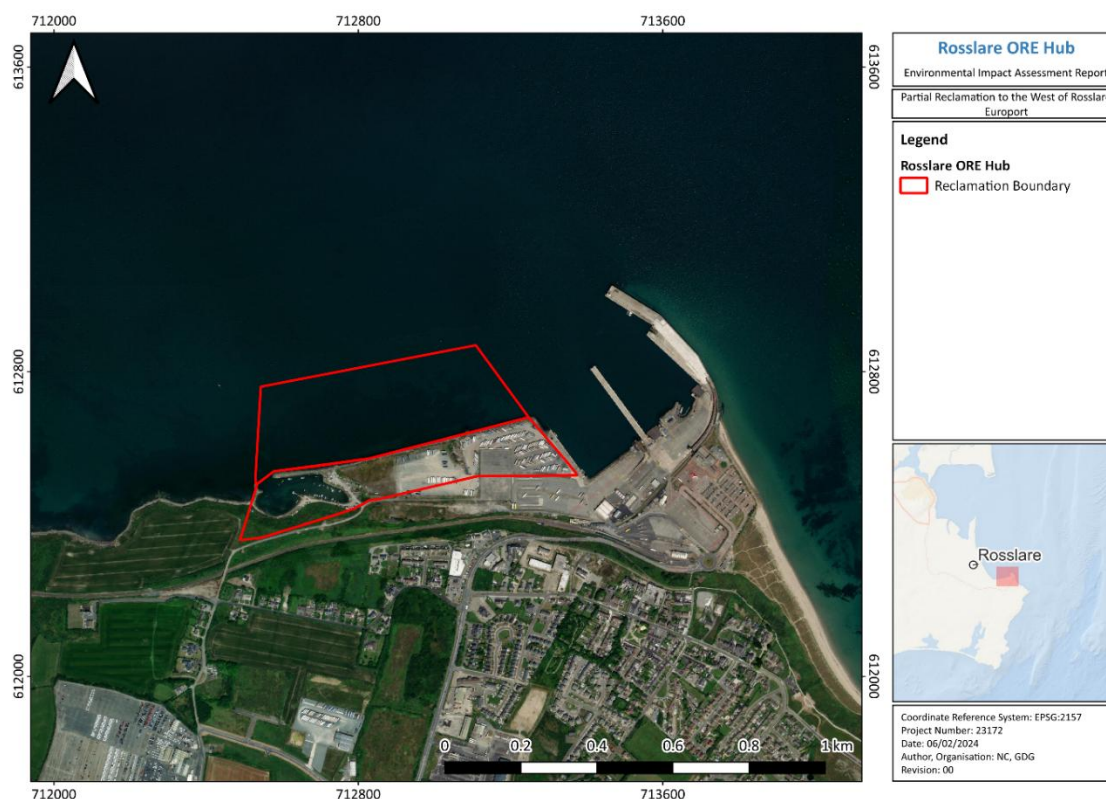


Figure 5-4: Option 4 – Partial reclamation to the west of Rosslare Europort

While this option includes the reclamation of land from the marine environment, the land-based portion of this development would be subject to spatial constraints due to existing port activities. This option would involve the relocation of some facilities associated with existing port operations and would involve the relocation of the Small Boat Harbour. However, given that this option also includes land reclamation from the marine environment, it is less spatially constrained than options which are solely land-based.

This option would benefit from the position within the sheltered conditions of the inner harbour.

This option introduces environmental effects from dredging and land reclamation activities in the marine environment.

5.2.1.5 OPTION 5: NO RECLAMATION

Option 5 involves no reclamation and instead utilises existing lands to locate the proposed ORE Hub activities. This option would be located within existing lands to the west of the port, as shown in Figure 5-5.



Figure 5-5: Option 5 – No reclamation

This option avoids the environmental effects of dredging and land reclamation activities as it does not involve land reclamation.

An ORE development at this location would benefit from its position within the sheltered conditions of the inner harbour. However, this option is significantly spatially constrained by the railway line to the south, the existing harbour to the east and the outer limits of the assessment boundary to the west and the sea to the north. This option overlaps significantly with existing port operations and would involve the relocation of some facilities associated with these operations. It would also involve the relocation of the Small Boat Harbour. This option would need to use all available lands to the west of Rosslare Europort, which are in the ownership of Iarnród Éireann – Irish Rail. There is not sufficient available land under the ownership of Iarnród Éireann, to accommodate a relocation on this scale at Rosslare Europort.

5.2.2 OPTION APPRAISAL

The options screening eliminated Option 1 and Option 5. This left a shortlist of the following options to progress to Stage 2:

Option 2: Reclamation to the east of the existing harbour,

Option 3: Partial reclamation to the west of the existing harbour,

Option 4: Reclamation to the west of the existing harbour.

Stage 2 option appraisal methodology followed EPA Guidelines, details included in EIAR Chapter 5. Various criteria were assessed under four categories: Environmental, Construction, Operational and Financial and scored. This approach to decision-making was designed to enable a holistic evaluation of all the key factors which differentiate the options under consideration.

Table 5-1: shows the final results of the Stage 2 matrix, with category Sub Totals and the Overall Total Scores for each option.

Table 5-1: Table of Results of the Appraisal Matrix

	Option 2	Option 3	Option 4
Category	Normalised Score	Normalised Score	Normalised Score
Environmental	3.25	2	4
Constructability	1	1	2
Operational	2	0	1
Financial	1.2	0.5	1
Total	7.45	3.5	8

The results of the appraisal matrix show that Option 3 has the lowest number of negative characteristics and impacts in all four categories. Option 3 is the best performing option by a significant margin under three categories (environmental, operational and financial) and is the joint best option (joint with Option 2) under the constructability category. Overall, Option 3 is the best-performing option.

5.2.3 CONCLUSION

Having considered all reasonable alternatives and the results of the appraisal matrix, it was concluded that Option 3 is the most suitable option. Accordingly, Test 2 is satisfied.

5.3 TEST 3 IMPACT OF DEROGATION ON CONSERVATION STATUS

Test 3 requires consideration of whether the proposed derogation would be detrimental to the maintenance of the populations of the species concerned at favourable conservation status (FCS) within their natural range, taking account of the scale of impact, the conservation status of the species, and the effectiveness of mitigation measures.

5.3.1 POPULATION-LEVEL CONSIDERATIONS

EIAR Chapter 10: Terrestrial Ecology, describes the population behaviour in the marine environment. Desk study results from National Biodiversity Data Centre (NBDC) included a search of 14 no. 2km² grids, where 5 no. grids contained documented otter records, albeit low counts (1-2 records per grid). The Slaney River Valley SAC is the closest Natura 2000 site designated for otter, located c. 6.6km north of the Proposed Development directly via the marine environment.

Coastal otters, although largely foraging in the marine environment, depend on nearby freshwater sources for essential behaviours such as drinking and maintaining fur condition by removing salt deposits. As a result, their distribution along the coastline is closely linked to the presence of freshwater inputs, with coastal streams and their outfalls representing key resource areas.

In productive coastal environments, such as Wexford Harbour, otters typically occupy smaller territories than in freshwater systems due to higher prey availability, with foraging ranges recorded at as little as 2 km of coastline. By contrast, otters in less productive freshwater habitats may range over distances exceeding 20 km.

5.3.2 NATURE AND SCALE OF POTENTIAL IMPACTS

The construction phase activities that are relevant to otters are:

- **Habitat Removal/Degradation:** The infilling of the existing small boat harbour will result in the loss of shoreline, scrub habitat and vegetated sedimentary sea cliffs, as well as localised degradation of adjacent habitats due to construction disturbance (e.g., edge effects, compaction, and altered drainage). These works will also alter local topography and landforms through excavation and earthworks.
- **Sediment Dispersal:** Dredging and the disposal of dredged material may cause sediment dispersion, potentially affecting adjacent terrestrial and coastal habitats through changes in sediment transport and deposition patterns.
- **Underwater Noise:** Piling, blasting, and dredging will generate underwater noise, which may cause temporary or permanent hearing damage (PTS/TTS) in otters and could lead to short-term displacement from foraging areas.
- **Displacement Effects:** Airborne noise, vibration and dust emissions from construction activities may lead to temporary displacement of otters, but due to their expected return after disturbance, long-term displacement is unlikely.

5.3.3 MITIGATION MEASURES AND THEIR EFFECTIVENESS

Mitigation measures are described in detail within the EIAR Chapter 10: Terrestrial Ecology and included in Chapter 26: Summary of Secondary Mitigation Measures and Monitoring.

Three types of mitigation measures are considered in this EIAR, following IEMA (2024).

- Primary mitigation is an inherent part of the project design. Primary mitigation relates to the location, design or timing of the project, and these measures are intended to avoid and reduce significant adverse effects on the environment.
- Secondary mitigation is further activity required to achieve the anticipated outcome where potentially significant adverse effects have not been avoided by project location, design or timing or require to be further reduced to within acceptable levels.
- Tertiary mitigation is the measures that are required regardless of an EIA assessment. It includes measures that are set out in legislation and/or are standard sectoral guidance and practices. These measures are standardised and are covered by law or other controls.

5.3.4 CONCLUSION

With the implementation of the proposed mitigation and monitoring measures (Section 6), the construction activities will not result in:

- a reduction in population size or density
- a contraction of species range
- impairment of reproduction or recruitment or
- degradation of essential ecological functions required to maintain populations in the long term.

Accordingly, the proposed derogation will not be detrimental to the maintenance of Annex IV species at favourable conservation status within their natural range. Any disturbance that may occur will be proportionate, temporary and reversible, and will not undermine the system of strict protection established under Article 12 of the Habitats Directive.

This derogation licence application is therefore made with due consideration of the “Precautionary Principle”.

6 MITIGATION AND MONITORING

The EIAR Chapter 10: Terrestrial Ecology identifies the following mitigation, monitoring and reporting measures.

6.1 PRIMARY & TERTIARY MITIGATION MEASURES

Primary Mitigation

Noise Attenuation Measures

Rotary Bored Piling Technique and Noise Reduction

The bearing piles for the two main quays will generally comprise rotary bored piles due to the presence of underlying rock that does not ideally allow for impact driving. Rotary bored piling uses a slow, controlled drilling to advance piles, rather than percussive hammering. As such rotary piling is considerably quieter than conventional impact piling.

The primary use of rotary bored piling techniques for the majority of the Proposed Development's piling activities represents a fundamental 'designed-in' noise mitigation measure. Unlike impact piling - known to generate intense, impulsive broadband noise with peak sound pressure levels often exceeding 210-240 dB re 1 μ Pa @ 1m - rotary drilling produces continuous, lower-level noise. Scientific studies, such as Erbe and McPherson (2017), have measured source levels for geotechnical drilling in the range of 142-145 dB re 1 μ Pa rms @ 1m, demonstrating a reduction in overall noise energy and peak pressure by tens of decibels compared to impact piling. Rotary piling substantially reduces the potential for high-intensity noise exposure to marine fauna, rendering the modelled worst-case impacts for impact piling (110m PTS, 1800m TTS) as highly precautionary in the context of the proposed methodology.

Additionally, since piling will be undertaken from a rockfill bund rather than directly through the water column, the risk of sound transfer into the marine environment is further reduced compared to piling from a barge.

Depending on the Contractor's approach, pile installation is expected to take 15-18 months, as rotary bored piling is generally slower than impact piling. During peak productivity, two to three rotary piling rigs are expected to be operational on-site.

Rock Blasting Approach and Environmental Controls

As part of the Proposed Development, rock blasting may be required along the quay wall to facilitate the installation of infill sheet piles between the main bearing piles. The method assumes that a line of retaining wall along the quay face will be pre-drilled and blasted using explosives to fracture the underlying rock.

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, with Stokes *et al.* (2010) predicting ~20 dB for de-watered cofferdams, and JNCC (2024) reporting reductions of up to 24 dB for physical abatement systems.

In this case, blasting works will be carried out from land-based equipment positioned directly on the sequentially advanced rockfill bunds along the ORE Berth 1 and ORE Berth 2 alignments. The bunds serve dual functions - providing a safe working platform for land-based piling/blasting equipment, and acting as an acoustic barrier that significantly reduces noise transmission into open waters.

To further control sound propagation, only the minimum quantity of explosives required to achieve effective rock fracture will be used, and where practicable, multiple smaller blasts will be favoured over fewer large detonations to reduce peak sound levels. In addition, explosive charges will be placed within boreholes or shallow depressions and stemmed with suitable materials (e.g. gravel, crushed rock) to further reduce propagation of underwater sound.

To ensure controlled execution and minimise environmental impacts, each blast will be spaced approximately 2–3 weeks apart, progressing sequentially along the quay wall to allow for installation of the main quay wall bearing piles. Each blast is expected to prepare a length of c. 30 m of quay wall, requiring approximately 20 individual blasting days to complete both ORE Berths. Each blast will involve up to 15No. holes, 90mm in diameter, drilled at 2m centres to a depth of c. -16 mCD. Each hole will receive 50kgs of explosive such as 'Kemex 70' (as used at Rossaveel Fishery Harbour Centre, Co. Galway) and will be detonated using non-electric starter line for safety considerations on site.

All drilling and blasting work will be conducted from the dry rock-filled platform, with an effective rock overburden to c. +4 mCD above the blast point. This significantly dampens vibration and sound propagation into the water column. The bund therefore provides an effective natural acoustic barrier, materially reducing the transmission of impulsive sound waves and minimising potential impacts on marine mammals and other sensitive receptors. A sloping revetment will also be installed as shown on the application drawings.

In addition, to ensure controlled execution and minimise environmental impacts, each blast will be spaced approximately 2–3 weeks apart, progressing sequentially along the quay wall to allow for installation of the main quay wall bearing piles.

Perimeter Bund and Noise Attenuation Measures for Piling

As described in Chapter 6: Project Description and shown on the application drawings, a perimeter bund of rockfill will be constructed in advance of piling activities. This integrated design feature will act as a physical barrier between the piling works and the open marine environment. These bunds serve dual functions: (i) providing a safe and stable platform for land-based piling equipment, and (ii) attenuating underwater noise transmission into the wider marine environment. At the ORE Berth 1 and ORE Berth 2 quay walls, bunds will be progressively advanced from the shoreline, ensuring that

piling is always carried out within an enclosed environment. As piling progresses, the bunds will be excavated and repositioned forward, ensuring that piling always occurs within an enclosed environment.

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.

This bundled piling approach will result in a substantial reduction in noise transmission into open water compared to conventional offshore piling operations. By acting as a natural noise barrier, the bund will limit the spatial extent of auditory injury and behavioural disturbance for marine mammals and semi-aquatic mammals such as the otter. The containment of piling noise within the bundled area considerably reduces noise propagation into open water, thereby lowering the potential impact on sensitive mammal species.

Pollution Event

Chapter 7: Soils, Geology, Hydrogeology and Contamination and Chapter 9: Water Quality and Flood Risk describe primary mitigation incorporated into the design of the Proposed Development that will function during operation of the Proposed Development. It describes the measures that will be employed to avoid the release of pollutants, including waste, sewage and the accidental release of hydrocarbons, during the operational phase of the Proposed Development.

Tertiary Mitigation

The International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 (MARPOL 73/785), is an international marine environmental convention which aims to prevent both operational and accidental discharge into the marine from sea going vessels. Ireland ratified the various elements of the MARPOL Convention through the Sea Pollution Act 1991, the Sea Pollution (Amendment) Act 1999 and the Sea Pollution (Miscellaneous Provisions) Act 2006. MARPOL 73/78 was given further legal effect through Statutory Instruments introduced under these Acts. The Acts place a legal obligation upon operators of vessels to implement measures to prevent both operational and accidental discharges from ships of substances, which may damage the marine environment as well as human health.

The construction and operational activities will result in an increase in vessels and therefore a potential risk of accidental spills however an incidence of pollution whether from an accidental occurrence or operational activities is not considered likely considering the legal obligations to comply with MARPOL 73/78.

The Wildlife Act 1976, as amended, provides that it is an offence to destroy vegetation on uncultivated land between 1st March and 31st August (inclusive). As such, pre-construction site clearance works and removal of any vegetation including trees, scrub, hedgerows and shrubs will

take place outside this period, which will ensure that there will be no disturbance to these habitats within the Proposed Development Boundary during this period.

Integrated measures for surface water runoff will include the collection and treatment of surface water through oil interceptors before discharge, maintaining water quality standards and preventing pollutants from reaching local watercourses. Additionally, an Oil Spill Response Plan will be implemented to manage any potential spills of oil or Hazardous and Noxious Substances (HNS) within the Harbour Limits, following Rosslare Europort's established protocols (Rosslare Europort, 2018).

The following good practice guidelines during the Construction Phase will be implemented for all species:

Any excavations left open overnight will have a means of escape for otters (and all other species), a ramp at least 30cm in width and angled no greater than 45° will be placed inside the hole/trench overnight to allow the mammal to escape.

Temporary fencing is essential and will be placed around the machinery at the end of the working day (cordoned off) and any machinery that could potentially harm mammals (and other species such as common lizard) will be made safe overnight.

All proposed works for the Proposed Development during the construction phase will be restricted to daylight hours (where possible), to minimise disturbance to nocturnal creatures.

To avoid risking mammals and other species becoming trapped in excavations created during site works, holes and trenches will also be covered with timber mats or appropriately fenced off. Fencing will be designed with adequate height to keep deer out while being low enough to prevent entry by smaller mammals, such as badgers and otters, as well as herpetofauna (common lizard, smooth newt and common frog). N.B. Fencing will be checked regularly to ensure no animals are trapped.

Timber mats will be placed on wet concrete as this could present a hazard to wildlife where small mammals or herpetofauna may become stuck.

Good practice guidelines during construction as described above, will be implemented to mitigate construction impacts on other mammals and herpetofauna potentially resting (e.g. hibernating hedgehogs, smooth newt and common lizard), commuting and foraging in the Proposed Site.

Additional tertiary mitigation measures relevant to terrestrial ecology receptors are set out to mitigate the potential for the accidental release of pollutants including hydrocarbons and cementitious material during the construction phase by Chapter 7: Soils, Geology, Hydrogeology and Contamination, Chapter 9: Water Quality and Flood Risk of the EIAR and the outline Construction Environmental Management Plan (oCEMP) which accompanies the application.

6.2 SECONDARY MITIGATION AND MONITORING

ElAR Chapter 10: Terrestrial Ecology

Mitigation and Monitoring

Pre-construction surveys will be undertaken by a suitably qualified Ecological Clerk of Work (ECoW) for protected species prior to vegetation clearance and/or construction.

These will include the following:

- Otter
 - Pre-construction surveys will be undertaken by an experienced ecologist no more than 10-12 months in advance of the commencement of works to confirm whether otter holts, couches, or intensified activity have become established within or adjacent to the Proposed Development Boundary.
 - Exclusion zones will be established around identified holts, with a buffer distance determined based on guidance from the NRA Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes (2008).
 - Timing restrictions will be implemented on construction activities to avoid peak otter activity periods, particularly during crepuscular and nocturnal hours.
 - Monitoring by the ECoW during construction will ensure compliance with mitigation measures and allow a rapid response to any unforeseen otter activity.
 - Toolbox talks will be delivered to all construction staff by the ECoW prior to works commencing, highlighting the presence of otters, the mitigation measures in place, how to identify otter signs, and the procedures to follow if otters are encountered during construction, as set out above.

The following measures will be implemented for otter during piling, blasting and dredging (including perimeter bund installation and reclamation area infilling) works:

- A trained and experienced Marine Mammal Observer/s(MMO/s) will be appointed to monitor for otters during piling, dredging, dumping of sediment, rock placement and blasting operations. The MMO will scan the surrounding area to ensure no otters are in the pre-determined exclusion zone in the 30-minute period prior to operations. The appropriate Monitored Zone (MZ) recommended by National Parks and Wildlife Service (NPWS) (DAHG, 2014¹) will be implemented during dredging works, including dumping, piling and blasting activities.
- For dredging and material placement within the enclosed lagoon (Small Boat Harbour) and bunded areas (ORE Berths), MMOs will conduct a 30-minute pre-watch prior to commencement to ensure no otters are present within the bunded areas prior to any material placement activities. The 30-minute pre-watch is only required if the MMO has not been continuously present leading up to the rock 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 material placement. If material 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 will be positioned on appropriate elevated platforms 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 otters will only be effective during daylight hours and if the sea state is World Meteorological Organisation 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 will only commence or resume upon positive confirmation from the MMO.
- All otter 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 onsite. Detailed records of all otter sightings documented will be reported to the NPWS.
- Any approach by otters into the immediate (<50m) works will be reported to NPWS without delay.

¹ https://www.npws.ie/sites/default/files/general/Underwater%20sound%20guidance_Jan%202014.pdf

Piling Specific Remedial and Mitigation Measures

- A 1,000 m Monitored Zone (MZ) will be applied, with a 30-minute pre-watch required before commencement. No otters may be present in the MZ during this period.
 - 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 bunded areas at the ORE Berths, MMOs will confirm the absence of otters within the enclosed areas before works commence.
- Ramp-Up Procedures: A ramp-up or soft start will be used for where practicable, and possible to do, gradually increasing underwater noise levels over 20–40 minutes after pre-start monitoring.
 - Where the measures outlined for a ramp-up procedure cannot be implemented, alternative approaches must be considered. These alternatives should involve introducing underwater acoustic energy in a consistent, gradual, and sequential manner over a period of 20–40 minutes before reaching full output.
- Real-Time 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 applied 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 an otter or marine mammal within the MZ.

Blasting Specific Remedial and Mitigation Measure

- 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 or otters 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 and otters to vacate the 1,000 m MZ. ADDs will be deployed as follows:

I. Positioned as close to the detonation site as safely possible.

II. Activated only after a 30-minute visual check confirms no marine mammals or otters within 100 m of the device(s).

III. 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.

IV. ADD duration and configuration will be agreed with the statutory authority and tailored to ensure effective deterrence from the full PTS zone.

- To avoid unnecessary auditory impacts, 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. This frequency band also falls well within the functional hearing range of phocid carnivores (100 Hz–130 kHz in water) as defined by Southall et al. (2007), which are used here as a recognised proxy for otters. On this basis, the ADDs are expected to elicit effective avoidance responses not only in porpoises but also in otters, ensuring that both species are deterred from the MZ prior to blasting. They also include:

I. Ramp-up features to gradually increase signal strength.

II. Variable signal sequences to minimise habituation. This approach reduces the risk of TTS while ensuring mammals vacate the area prior to detonation (Schaffeld et al., 2019).

- 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 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 mammal enters the MZ during this period, the blast will be cancelled or delayed until the zone is clear.
- **Blast Delay Protocol:** If mammals remain within the MZ, blasting will not proceed until clearance is confirmed through visual observation and/or ADD effectiveness.

Dredging Specific Remedial and Mitigation Measures

- **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 or otters 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 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:** Although dredging noise is not predicted to exceed auditory injury thresholds for otters, behavioural disturbance and temporary displacement remain possible within the predicted 1.3 km disturbance range. To manage this risk, real-time Static Acoustic Monitoring (SAM) will be used during the harbour seal breeding season (May to July)
- **A displacement threshold of 140 dB re 1 μPa^2 will be applied as a precautionary benchmark, consistent with thresholds established for sensitive hearing groups.**

If SAM detects that this threshold is exceeded beyond 1,000 m from the dredging operations, works will be paused and adjustments made before recommencing.

6.3 ADDITIONAL OTTER MITIGATION MEASURES

In addition to the measures outlined above, the current design of the outer edge of the harbour wall will provide additional foraging habitat and could be used as a new 'couch' feature. It may also be feasible to install an artificial holt at the western end of the Proposed Development Boundary, near the Sea Scouts area, more removed from the busy port environment. These proposals are shown in Figure 6-1.

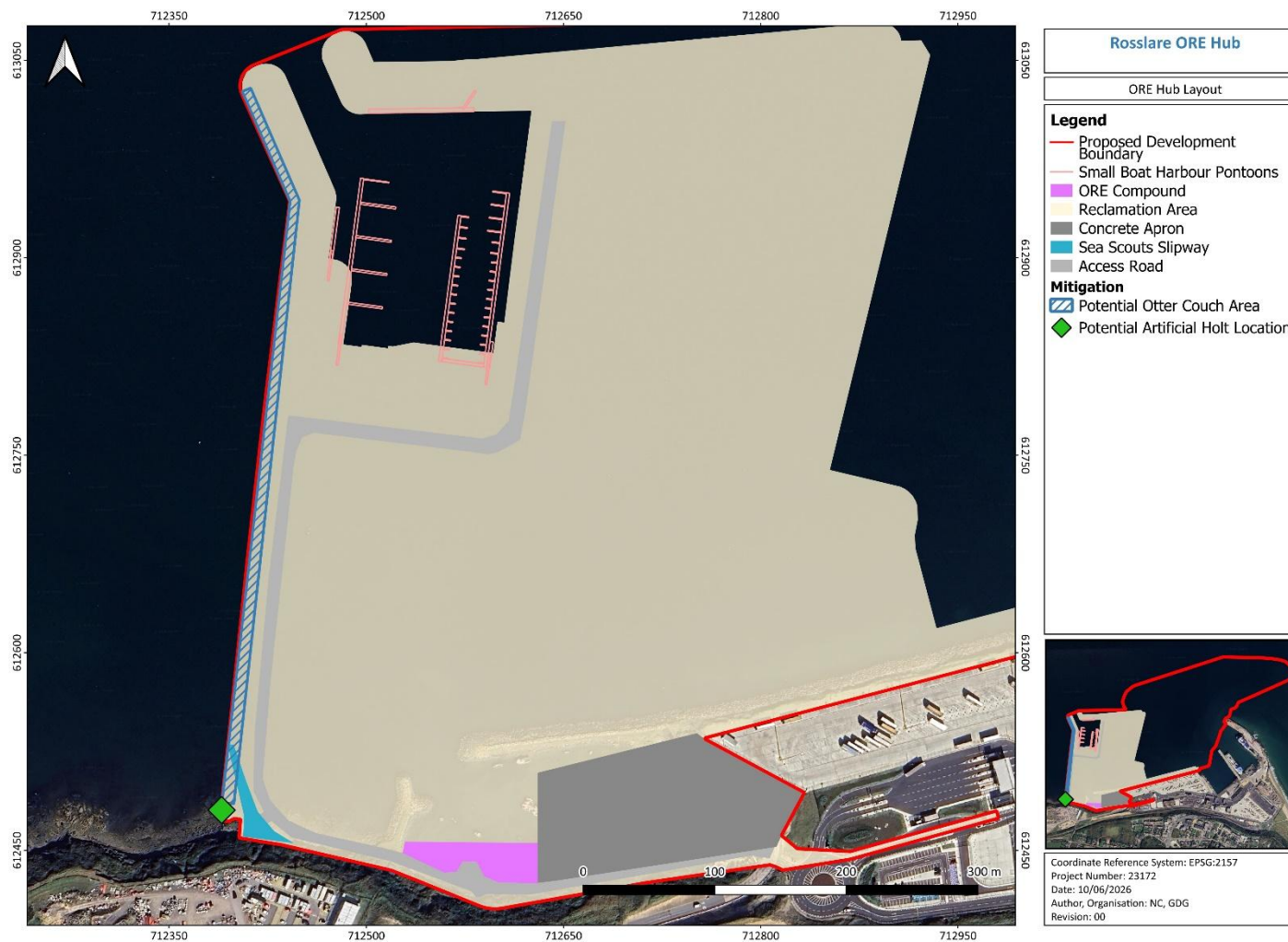
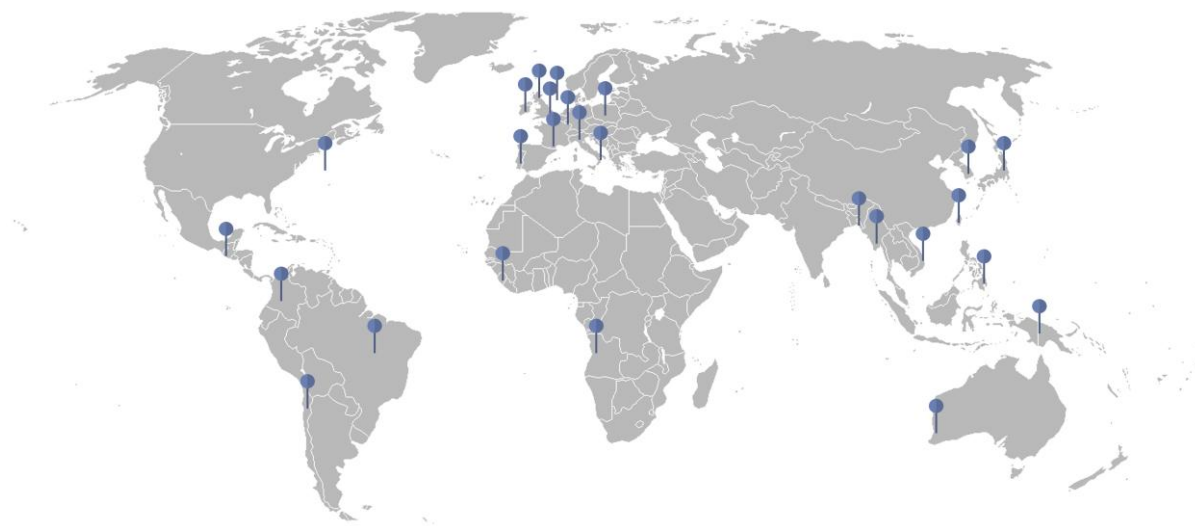


Figure 6-1: Locations of Additional Potential Otter Mitigation Measures

APPENDIX A – EIA CHAPTER 10 TERRESTRIAL ECOLOGY

APPENDIX B – EIA TECHNICAL APPENDIX 10 TERRESTRIAL ECOLOGY

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