Iarnród Éireann
Irish Rail

Rosslare ORE Hub

EIAR Introductory Chapters

Chapter 5:

Assessment of Alternatives and Project Design

venterra | GDG GAVIN & DOHERTY GEOSOLUTIONS | NICHOLAS O'DWYER an RSK company

Co-funded by the European Union

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

CD	Chart Datum
cSPA	Candidate Special Protection Area
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EPA	Environmental Protection Agency
ORE	Offshore Renewable Energy
SAC	Special Area of Conservation
SBH	Small Boat Harbour
SPA	Special Protection Area

Funded by the European Union. Views and opinions expressed are however those of the Author(s) only and do not necessarily reflect those of the European Union. Neither the European Union nor any granting authority can be held responsible for them.

5 ASSESSMENT OF ALTERNATIVES AND PROJECT DESIGN

5.1 INTRODUCTION

This chapter of the Environmental Impact Assessment Report (EIAR) presents the assessment of reasonable alternatives considered during the development of the proposed project, in accordance with the requirements of the EU Environmental Impact Assessment (EIA) Directive (Directive 2011/92/EU as amended by Directive 2014/52/EU). Specifically, Article 5(1)(d) and Annex IV of the Directive requires that the Environmental Impact Assessment Report (EIAR) includes *"a description of the reasonable alternatives studied by the developer, which are relevant to the project and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the environmental effects."*

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

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

The assessment of alternatives described in this Chapter includes a consideration of alternative locations, alternative designs and construction methods. This chapter describes how the environmental effects of the alternatives were considered throughout this process and the rationale for selection of the preferred option. This chapter also describes the subsequent process undertaken in developing the project design for the preferred option.

5.2 STRUCTURE OF THE CHAPTER

This section describes the structure of the assessment of alternatives which was conducted for this project, as well as the subsequent project design steps undertaken for the preferred option.

A detailed assessment of alternatives was carried out to identify the preferred location for the proposed ORE Hub. This involved a multi-step process, outlined below:

- Scope of Assessment: this involved establishing the boundary conditions of the assessment of alternatives. This is explained in Section 5.3.1.

- Options Assessed: Section 5.3.2 describes the options which were considered as part of this assessment of alternatives.
- Stage 1 Option Screening: Section 5.3.3 describes the initial screening process to determine whether each option is capable of addressing the Project Need. Those options which can address the Project Need are shortlisted and progress for further assessment. Those which do not are eliminated.
- Multi-Criteria Analysis Methodology: Section 5.3.4 describes the MCA methodology which was adopted for the Stage 2 Appraisal.
- Stage 2 Criteria: Section 5.3.5 explains the criteria used to compare each option and the rationale used to appraise the options under each criterion.
- Stage 2 Appraisal Matrix: Section 5.3.6 presents the results of the Stage 2 appraisal matrix, based on the method established in the previous section and includes the selection of preferred option (Section 5.3.6.5).
- Development of Site Layout: having established the preferred location (i.e., the footprint of the site), Section 5.4 describes how the site layout was established within that footprint.
- Design Development: Section 5.5 provides details of subsequent design considerations and design decisions which informed the project design presented in the Application Drawings.

5.3 ALTERNATIVE LOCATIONS AND LAYOUT

5.3.1 SCOPE OF ASSESSMENT

This section describes how the boundary conditions were established for the consideration of alternative locations and layout.

EIAR Chapter 3 describes the Project Need, with reference to Ireland's Climate Action Plan (Department of Climate, Energy and the Environment, 2025) and a Policy Statement by the Department of Transport (2021) on the facilitation of Offshore Renewable Energy by Commercial Ports in Ireland, which states *"a multiport approach will be required to address the needs of the ORE industry"*, whereby Rosslare Europort is identified as a port that can play a significant role in providing the required largescale port infrastructure. The Climate Action Plan and Department of Transport's Policy Statement establish the suitability of Rosslare Europort for the development of an ORE Hub, and its importance in supporting the achievement of Ireland's climate action objectives and in contributing to national energy security.

As also highlighted in EIAR Chapter 2: Legislation and Policy Context, in addition to national policy, local plans identify Rosslare Europort as important for the development of offshore renewable energy infrastructure. The Wexford County Council Development Plan 2022-2028, and the Wexford County Council Climate Action Plan 2024-2029, recognise the critical contribution Rosslare Europort can make in supporting the development of offshore renewable energy and grid infrastructure, requiring investment to handle, plant, equipment and cabling, and associated shipping during the construction and maintenance phases of future ORE projects. The Wexford County Council Climate Action Plan 2024-2029 calls for engagement with stakeholders under policy BET19, to progress the

development of Rosslare Europort as a renewable energy hub, having due regards to environmental sensitivities. These plans were subject to Strategic Environmental Assessment in accordance with the SEA Directive 2001/42/EC.[1]

Having regard to the above national and local policy sources, which identify Rosslare Europort as a strategic location for offshore renewable energy infrastructure, Rosslare Europort is established in policy as an appropriate location for the proposed development. As the Applicant (Iarnród Éireann – Irish Rail) owns and operates these lands, alternative locations outside of Rosslare Europort were not subject to assessment, in accordance with the requirement under Article 5(1)(d) of the EIA Directive to describe *"reasonable alternatives studied"*.

Further, the EIA Directive requires under Annex IV(2) that the EIAR should include "*A description of the reasonable alternatives (for example in terms of project design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects."*

The areas considered in the assessment of alternatives included: (i) lands at or near Rosslare Europort, (ii) lands under the ownership of Iarnród Éireann; and (iii) the marine areas immediately surrounding these lands.

Figure 5.1 shows the assessment boundary which was used for this assessment of alternatives.

[1] Directive 2001/42/EC of the European Parliament and of the Council of 27 June 2001 on the assessment of the effects of certain plans and programmes on the environment.

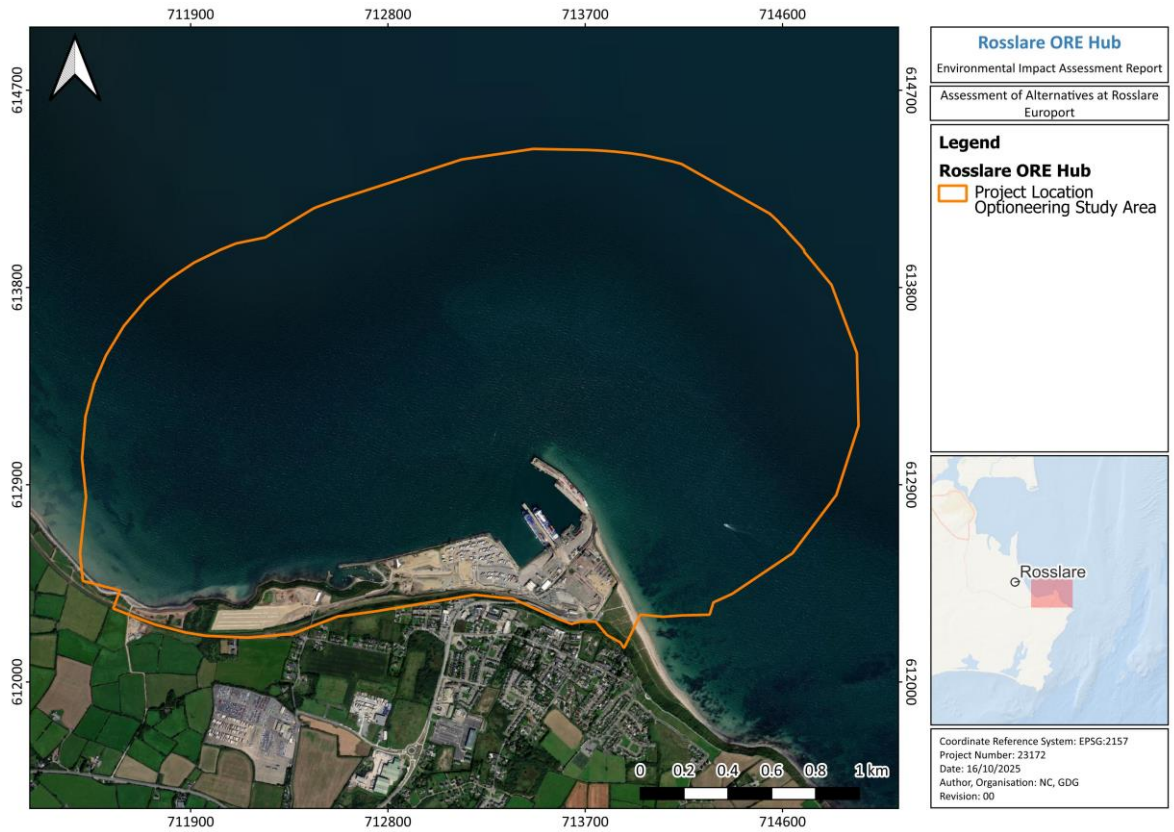

Figure 5.1: Assessment boundary used for the assessment for alternatives

5.3.2 ALTERNATIVES ASSESSED

This section presents the options included in the consideration of alternative locations, for developing an ORE Hub. Five 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.

Note: the term “partial reclamation” refers to a solution where part of the ORE Hub would be constructed on reclaimed land and part would be constructed on existing land.

A high-level description of these options is provided in Section 5.3.2.1 to Section 5.3.2.5, with further details provided in the assessment stages thereafter.

The list of options considered did not include the areas within the inner harbour as a development of this scale in the inner harbour would have a major disruption to existing port operations which could be avoided by the other options assessed.

It should be noted that the boundaries shown for each option are indicative. They are provided for illustrative purposes to explain the concept associated with each option. For the purpose of this assessment, it is the key differences between each option at a conceptual level that are appraised,

with the design of the preferred option further developed and refined subsequently. The detailed description of the preferred option is presented in Chapter 6: Project Description.

5.3.2.1 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 (Figure 5.2). It demonstrates the potential for this type of activity at the port.

Figure 5.2: 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.

5.3.2.2 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 5.3.

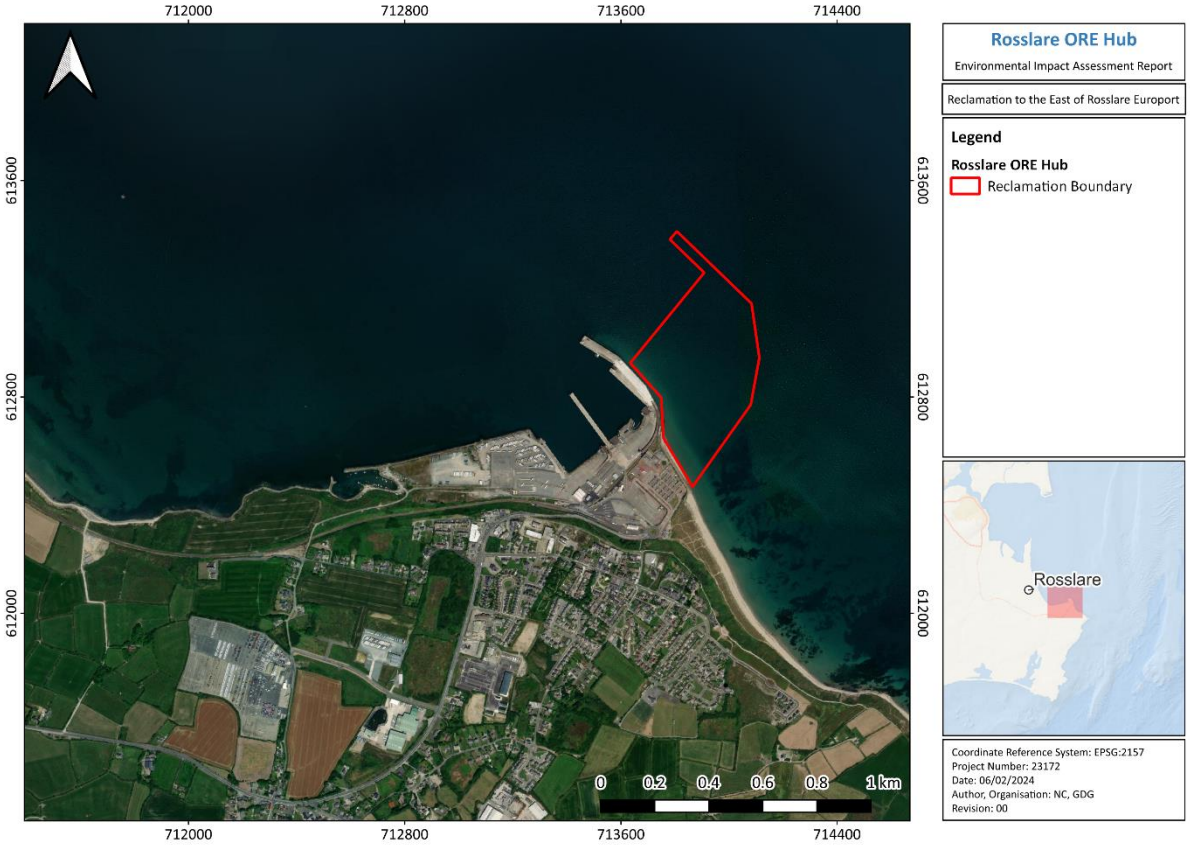

Figure 5.3: Option 2 - Reclamation to the east of Rosslare Europort

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.

5.3.2.3 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 5.4.

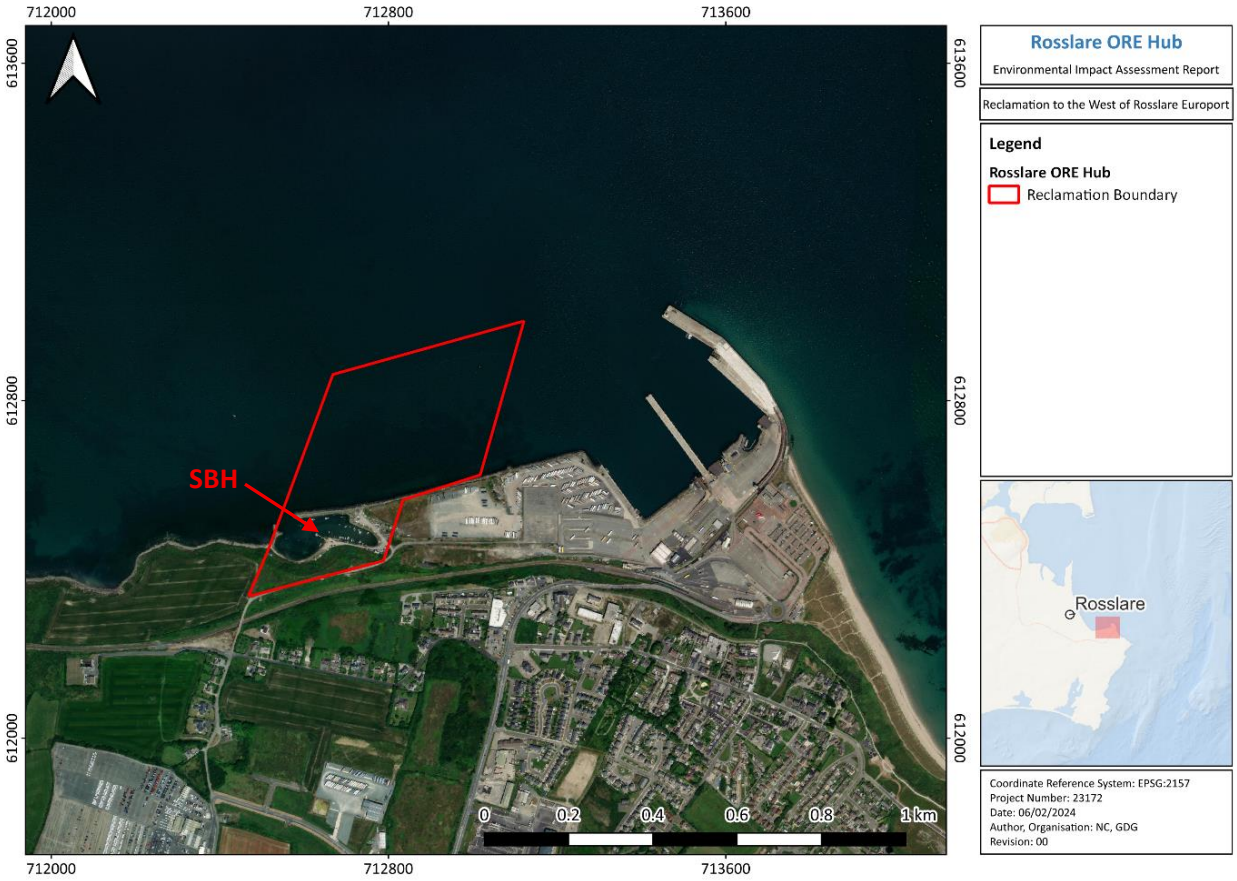

Figure 5.4: Option 3 – Reclamation to the west of Rosslare Europort

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.

5.3.2.4 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 5.5.

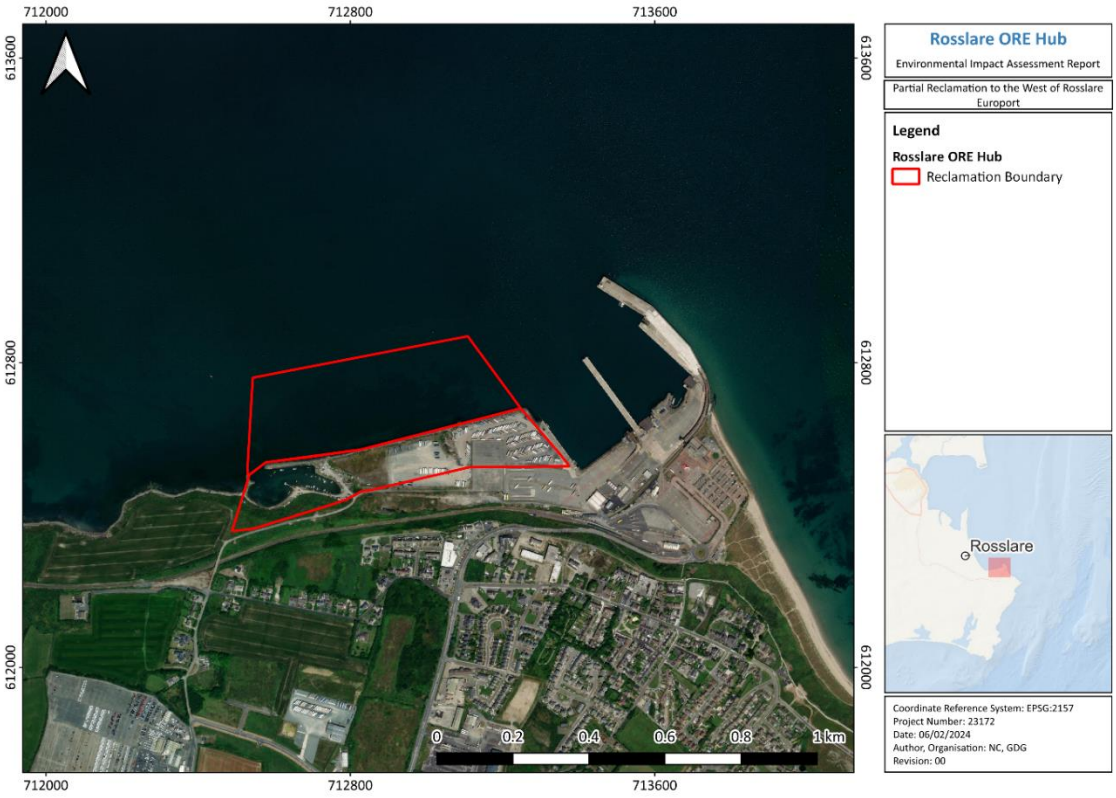

Figure 5.5: Option 4 – Partial reclamation to the west of Rosslare Europort

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.

5.3.2.5 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 5.6.

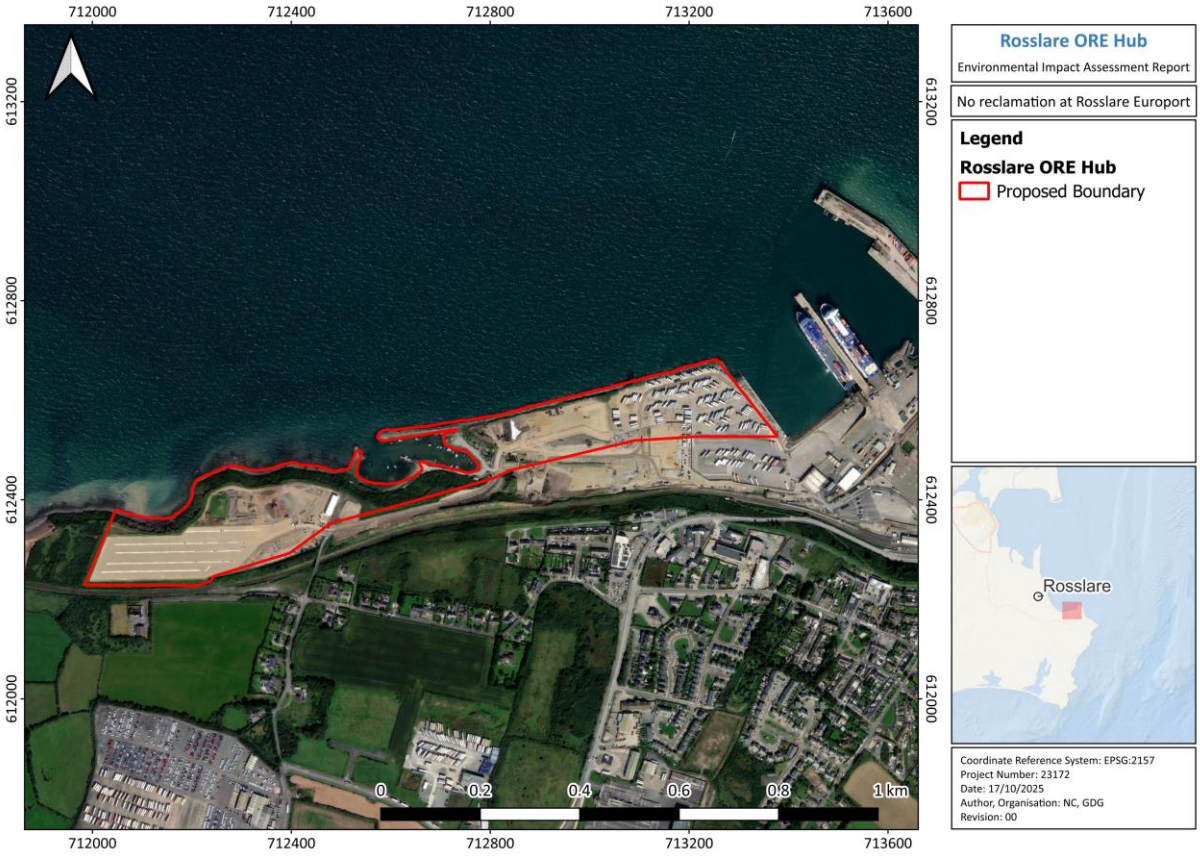

Figure 5.6: Option 5 – No reclamation

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.

5.3.3 STAGE 1 SCREENING FOR REASONABLE ALTERNATIVES METHODOLOGY

The options screening stage was designed to eliminate options which would not address the Project Need.

In order to address the Project Need, the ORE Hub needs to provide adequate space for ORE activities to be carried out. This includes the handling and storage, marshalling, staging and integration of ORE components to facilitate installation of offshore wind energy projects by ORE developers and operators. Without the provision of adequate space for these activities, the Project Need and the requirements of the Climate Action Plan cannot be satisfied. For this reason, a minimum spatial requirement was applied as the initial screening criterion.

Based on case study research and consultation with developers in the ORE sector, a minimum area of 15ha is typically required, with areas of greater than 15ha preferable where feasible. Consultation with ORE developers informed the Stage 1 screening and continued throughout the design development stage. The key outcomes of this consultation process are summarised later in Section 5.5.1.

Based on the above, the Stage 1 screening focussed on whether each option could provide the minimum area requirement. Any option which could not provide at least 15 ha for the purpose of ORE activities was screened out. Any option which could provide at least 15 ha progressed for further evaluation at the Stage 2 appraisal.

It is acknowledged that other minimum requirements need to be met in order to address the Project Need, such as the depth of water and length of berth. However, it was deemed that the ability of each option to meet these specific requirements would be dependent on design development, rather than the selection of a preferred location. The key consideration for option screening was to ensure that there is sufficient space overall at the location selected, such that these design requirements can be met as the design progresses.

5.3.3.1 SCREENING OF ALTERNATIVES

The screening of alternatives is presented in Table 5.1. Red indicates the options which are eliminated, and green indicates the options which progressed to Stage 2.

Table 5.1: Screening of alternatives

Option	Screening Description	Screening Outcome
Option 1	Option 1 “do nothing” does not address the Project Need as it does not provide sufficient area for ORE. This option is thus eliminated from further consideration because it does not achieve the stage 1 screening criteria.	**Eliminated at Stage 1**
Option 2	Option 2 involves the reclamation of land and there are no significant spatial constraints preventing it from providing the required area for ORE developments.	**Progress to Stage 2**

Option	Screening Description	Screening Outcome
Option 3	Option 3 involves the reclamation of land and there are no significant spatial constraints preventing it from providing the required area for ORE developments.	**Progress to Stage 2**
Option 4	Option 4 involves partial land reclamation and partial land-based development. The land-based portion is subject to spatial constraints due to the existing railway line to the south. However, it meets the minimum area requirement and can therefore be progressed to the next stage. While the land-based portion overlaps with areas used for existing port activities, these could potentially be relocated to enable the ORE developments.	**Progress to Stage 2**
Option 5	This option involves no reclamation, with only land-based developments to the west of the existing harbour. There are significant spatial constraints due to the railway line to the south of the site and the sea to the north. The maximum area which can be provided by this option, within lands under the ownership of the Applicant, is 13.5 ha. This is less than the minimum required area of 15ha. Further, this option primarily comprises areas which are already used for existing port operations. Given that this option uses all available lands to the west of Rosslare Europort, which are in the ownership of Iarnród Éireann – Irish Rail, it would not be feasible to relocate these operations to another location at Rosslare Europort. This means that it would not be feasible to make the 13.5ha of land available, let alone the minimum required 15ha. For these reasons, this is not a realistic alternative capable of addressing the Project Need.	**Eliminated at Stage 1**

5.3.3.2 SHORTLIST OF ALTERNATIVES FOR FURTHER ASSESSMENT

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.

5.3.4 STAGE 2 METHODOLOGY

The EPA Guidelines on the information to be contained in Environmental Impact Assessment Reports (2022) include the following guidance for the assessment of alternatives:

"The alternatives should be described with 'an indication of the main reasons for selecting the chosen option'. It is generally sufficient to provide a broad description of each main alternative and the key issues associated with each, showing how environmental considerations were taken into account in deciding on the selected option."

The assessment of alternatives considered the key issues associated with each option, with a particular emphasis on the environmental considerations, as reflected in the environmental criteria included in the Stage 2 appraisal matrix (Section 5.3.6).

Stage 1 screening involved the elimination of options which would not address the Project Need. For the Stage 2 appraisal, the reasons for selecting one option over the others were based on a comparison of unfavourable characteristics or negative impacts which would be incurred by each option, thus detracting from meeting the Project Need. As the options are being compared based on these unfavourable characteristics, a "negative scoring" scale was adopted which assigns a score based on impacts incurred by the option under each criterion. This approach involved a comparative appraisal of the options under each criterion, in order to highlight the key differential factors between them i.e., the specific ways in which their respective characteristics or impacts differ.

For instance, for the "impact on coastal processes" criterion, Options 3 and 4 would have the least impact on coastal processes due to their sheltered location to the west of the harbour, so these options received a score of 0. Option 2 is located to the east of the harbour in a more exposed location and would have a greater impact on coastal processes as a result. Option 2 therefore received a score of 1.

The approach adopted for this assessment restricted the decision-making process to a series of objective comparisons between options under each criterion.

This approach to decision-making is designed to enable a holistic evaluation of all the key factors which differentiate the options under consideration.

The main advantages of this approach are as follows:

- It does not introduce a bias to any option or criterion (scores can be normalised to eliminate bias in criteria evaluation);
- It reduces problems with many assessment criteria to a series of simple comparisons.

The Stage 2 appraisal is presented without the application of criteria weightings for simplicity, in order to display the aggregated characteristics and impacts of each option, without the potentially subjective process of assigning weightings. However, a commentary on the sensitivity of the Stage 2 appraisal outcomes to the application of weightings is provided in Section 5.3.6.4.

It should be noted that some criteria are measured based on more than one differential factor. For example, consider a scenario where one criterion has three differential factors, and one option is the worst performing under all three factors. This option would receive a negative score of three, which means that criterion would have a maximum score of 3 whereas many other options would have a maximum score of 1. It is therefore necessary to "normalise" the scores to avoid this criterion having a disproportionally large influence on the overall outcome. For the purpose of this assessment, the

term to “normalise” the scores, means to divide the score assigned to each option by the highest score received by any option under that criterion. This ensures that each criterion has a maximum score of 1, so that no disproportionate weighting is incurred by the scoring system.

The appraisal matrix included a broad range of criteria, comprising environmental, construction, operational and financial considerations. This enabled a holistic evaluation to be carried out to establish a preferred option, which is reflective of the combined project objectives and location-specific factors which apply.

5.3.5 STAGE 2 CRITERIA

The criteria considered in the Stage 2 appraisal are listed in Table 5.2.

Table 5.2: Criteria Considered in Stage 2 Appraisal

Category	No.	Criterion Title
Environmental	1.1	Impact on existing coastal processes
Environmental	1.2	Impact on European Sites
Environmental	1.3	Impact on Marine Ecology
Environmental	1.4	Dumping at Sea
Environmental	1.5	Impact on commercial marine activity (Mussels)
Environmental	1.6	Climate and Carbon Impact
Environmental	1.7	Impact on SBH users (during construction)
Construction	2.1	Risk of down-time during construction
Construction	2.2	Risk of rock presence
Construction	2.3	Impact on traditional port activities (for ORE construction)
Operational	3.1	Risk of down-time during operation
Operational	3.2	Impact on maintenance dredging
Operational	3.3	Impact to traditional port activities (for ORE operation)
Financial	4.1	Capital Cost Comparison
Financial	4.2	Operational Asset Value

5.3.6 STAGE 2 APPRAISAL MATRIX

This section describes the Stage 2 appraisal matrix used to determine the preferred option.

Section 5.3.6.1 describes the assumptions which underpin this matrix, as well as its limitations.

Section 5.3.6.2 details the rationale behind the comparisons under each criterion i.e., the basis for determining the preferred option(s) under that criterion.

Section 5.3.6.3 presents the results of this appraisal matrix, followed by a sensitivity analysis in Section 5.3.6.4, culminating in the identification of the preferred option (Section 5.3.6.5).

5.3.6.1 ASSUMPTIONS AND LIMITATIONS

A list of key assumptions and limitations is provided below:

- It is assumed that there will be no significant difference in the volume of dredging required for Option 3 and 4. While Option 4 includes a portion of land-based development, it is assumed that an equivalent volume of dredging will be needed to provide the required water depth at the proposed ORE berths, given the significant overlap of these two options in terms of location.
- It is assumed that a lower dredging volume will be required for option 2, owing to the bathymetry at that location, which is characterised by deeper water, compared to options 3 and 4.
- It is assumed that there will be no significant difference between the three options in terms of the following considerations, resulting in them not being included as criteria in the appraisal matrix:
    - Marine ecology: it is assumed that each option will have an equivalent impact on marine ecology during the operation of the ORE Hub as each option will involve a similar type and extent of infrastructure and similar operational activities. For this reason the “Impact on Marine Ecology” criterion focusses on construction-stage impacts.
    - Landscape and Visual: this was not included in the matrix as the landscape and visual impact is a function of the nature and scale of development, which would be equivalent for each option, rather than the location.
    - Operational impact on Small Boat Harbour (SBH) users: any option involving construction at the existing SBH would require an equivalent SBH facility at a minimum. The operational impact is assumed to be neutral across all options on this basis.
    - Traffic impact: this was not included in the matrix as traffic impact is a function of traffic numbers rather than location. It is assumed that, for options with additional disposal or imported fill, most if not all of these would be via marine vessels. For this reason, the traffic numbers would be anticipated to be approximately equivalent for these options. It is assumed that any location without a current access route would require a new one so the impact of these traffic numbers on the affected routes would also be equivalent for each option.

- Operational impact on marine navigation: it is assumed that the options would each have an equivalent impact on marine navigation during the operation of the ORE as they are all located close to, but not directly within, the marine navigation channel.
- Cultural heritage: no cultural heritage sites, structures or finds would be expected to be impacted by any of the three options. This means there would be no differential factor between the options in this respect.
- Noise and vibration: the key differential factor in terms of noise and vibration during construction is the impact on marine ecology and the risk of rock-breaking, which are both already considered in in the appraisal matrix,
- Impact on terrestrial ecology and ornithology: the key difference between the options in this respect is that Option 4 has more land-based development. However, these lands are currently used for port operations and there is a relatively limited area of suitable habitat available for terrestrial and ornithological species at Rosslare Europort. For these reasons, it was deemed that there would be no significant difference between the impacts of these options, based on the information available at the time of assessment[2].
- Suitability for multi-use: this was not included in the matrix as each option has equivalent potential to be designed for multi-use compatibility i.e., to serve a back-up function for other uses (e.g., traditional port activities), as well as its primary function as an ORE Hub.
- Compatibility with future development: this was not included in the matrix as this is dependent on design development, rather than location. Each option has equivalent potential to be designed for compatibility with future developments.

- Health and Safety: the only specific differential factors identified which are relevant to health and safety are (i) their relative exposure to wind and wave action, and (ii) their relative impact on traditional port activities. These considerations are already assessed in the appraisal matrix. It was therefore not deemed necessary to include a separate health and safety category of criterion as the key risks are adequately addressed. Further steps to manage potential health and safety risks were taken at the design development stage.

5.3.6.2 APPRAISAL MATRIX RATIONALE

This section describes the appraisal method that was adopted in the Stage 2 appraisal matrix in order to compare the options under each criterion. Table 5.3 details, for each criterion, the basis for the comparison of options, the key differentiators between the options and the scoring rationale applied to reflect these factors.

The scoring rationale outlined is based on a negative scoring scale. The option(s) are assigned marks based on differential factor(s) (i.e., the negative characteristics which set the options apart under that criterion). The options which are not subject to the differential factor(s) being evaluated receive a score of 0. The option(s) which are subject to the differential factor as assigned 1 mark.

[2] Note in spring 2025, subsequent to this assessment being undertaken, kittiwake and black guillemot were recorded nesting on the outer Harbour wall. While this information arose after the assessment had concluded, this would have meant a higher impact to ornithology for Option 2: Reclamation to the east of Rosslare Europort, compared to the other options considered.

Thus, a score of 0 means that option is not subject to the differential factor(s) or negative characteristic(s) being evaluated. This indicates a relatively favourable option for the criterion under appraisal when compared to the other options.

The option with the lowest score when all criteria scores are totalled, is the preferred option as it involves fewer differential factors than the others and is therefore the most favourable option overall.

Table 5.3: Appraisal Matrix Rationale

Category	Criterion No.	Project Criterion	Method of Appraisal
Environment	1.1	Impact on existing coastal processes	This criterion compares the relative impact of each option on existing coastal processes, i.e. how the coastline is shaped by erosion, transportation and the deposition of sediment, throughout the lifespan of the proposed development. The key potential impacts under this criterion are changes to tidal regime, wave climate and sediment transport. All options would require an equivalent scale of development, the key differentiator is whether they are located to the west in the sheltered inner harbour (lower impact on tides, waves and sediment transport) or to the east of the Europort, which is directly exposed to tidal and wave action (higher impact). **Scoring:** 0 - (locations to west of the Harbour, with lower impact to coastal processes); 1 - (locations to east of the Harbour, with higher impact to coastal processes) **Exclusions:** Construction stage impacts on water quality (e.g. due to dredging) are not included in the scoring of this criterion. While there may be differences between the options in terms of construction-stage impacts, these would be temporary in nature, whereas the operational impact would be permanent. For this reason, operational impact was used as the key differential factor.

Category	Criterion No.	Project Criterion	Method of Appraisal
Environment	1.2	Impact on European Sites	This criterion compares the impact on European Sites for each potential option, across the operational life span of the development. The key differential between these options in this respect is their relative distance from those European Sites. The SACs included for the purpose of scoring are Carnsore Point SAC, Long Bank SAC and Blackwater Bank SAC. SPAs were not included for the purpose of scoring as there was no key differential factors between the options in this sense (see below exclusions). Locations to the east of the existing Harbour are located closer to the above-listed SACs. They are also more exposed to tidal and wave action, thereby more likely to impact sediment transport and consequently affect these European Sites. Those to the West are located further from these SACs at a more sheltered location in the inner harbour and are therefore considered to have a lower risk of impact. **Scoring:** 0 - locations to west of the Harbour, further from Carnsore Point SAC, Long Bank SAC and Blackwater SAC; 1 - locations to the east of the Harbour, in closer proximity to Carnsore Point SAC, Long Bank SAC and Blackwater SAC. **Exclusions:** It is acknowledged that all options overlap with the cSPA Seas off Wexford but they would all be expected to have an equivalent impact for this reason. Further, there is no significant difference in distance from each option to the Wexford Harbour and Slobs SPA, the Raven SPA or the Slaney River Valley SAC. Given that all options have an equivalent risk of impact to these European Sites, they are not differential factors between the options under this criterion and are therefore not part of the method of appraisal for this criterion.

Category	Criterion No.	Project Criterion	Method of Appraisal
Environment	1.3	Impact on Marine Ecology	This criterion compares the impact of each option on marine ecology during construction. The key differential factors between these options in this respect are detailed below: **Factor 1**: the larger the volume of dredging involved for a particular option, the greater the impact in terms of disturbance of benthos, turbidity in the surrounding areas and underwater noise. **Factor 2**: The risk of rock presence increases the closer a location is to the shore, as the bedrock tends to be higher in these locations. This also means that, for a given depth of excavation, the rock encountered is likely to be of a harder composition closer to shore and therefore more likely to require rock breaking or blasting, thereby increasing the potential underwater noise impact to marine ecology. The partial reclamation options are located closer to shore and are therefore considered to be higher risk in this respect, compared to the full reclamation options. **Scoring**: **Factor 1**: dredging volume: 0 - lower dredging volume; 1 - larger dredging volume. **Factor 2**: proximity to shore: 0 - "Full reclamation" options; 1 - "Partial reclamation" options. Exclusions: It is assumed that each option will have an equivalent impact on marine ecology during operation of the ORE Hub as they will all involve a similar type and extent of infrastructure and similar operational activities.

Category	Criterion No.	Project Criterion	Method of Appraisal
Environment	1.4	Dumping at Sea	This criterion compares the requirement for dumping at sea, which can increase suspended sediment levels and turbidity in the vicinity of the dumping site, thereby potentially impacting marine ecology outside of the immediate project location. The likelihood or extent of dumping at sea is determined by whether and how much of the dredged material can be reused in land reclamation. If all dredged material is re-used, then no dumping at sea is required. If all dredged material cannot be reused, then dumping at sea may be required. The exact volumes of dredged material and reclamation fill required were not known at the time when this assessment was conducted, nor was the composition of the material to be dredged or its suitability for reuse. In the absence of this information, a simplified comparative assessment was conducted as follows. **Scoring:** 0 - Options involving "full reclamation", facilitate a greater level of reuse of dredged material, thereby reducing or potentially eliminating dumping at sea; 1 - Options involving "partial reclamation" present less opportunity for reuse, creating the risk that a significant volume will need to be dumped at sea.
Environment	1.5	Impact on commercial marine activity (Mussels)	This criterion compares the relative impact of each option on areas which are monitored for the production of mussels, which is the key differentiator between the options identified under this criterion. This relative impact is determined by the proximity of each option to locations with mussel or mussel seed presence, as identified by annual surveys conducted by Bord Iascaigh Mhara (BIM). The options to the west of the existing harbour are located farther from these observed mussel and mussel seed locations. Given these options also have a lower impact on coastal processes, they are also less likely to impact the mussel sites by causing changes in sediment transport. Conversely, options to the east of the harbour are located closer to the mussel sites, will have a greater impact on sediment transport and are therefore more likely overall to impact the mussel sites. **Scoring**: 0 - options located to the west of the inner harbour; 1 - options located to the east of the inner harbour.

Category	Criterion No.	Project Criterion	Method of Appraisal
Environment	1.6	Climate and Carbon Impact	This criterion compares the relative impact of each option in terms of carbon footprint and climate impact due to construction. Given that all options would involve the same operational ORE activities, it is assumed that they would have no significant difference in terms of operational carbon footprint. Each option involves the construction of similar infrastructure, the key differences in terms of infrastructure are as follows: **Factor 1: Relocation of existing port facilities**: this sub-criterion assesses which options would involve relocation of existing port facilities, based on the extent of overlap between the proposed ORE storage area and the existing port. The other key differentiators between the options in this criterion are described below: **Factor 2: Cut / fill balance**: a surplus of dredged material results in the requirement for disposal. Partial reclamation options present less opportunity for reuse, creating the risk that a significant volume will need to be disposed of. Conversely, having insufficient dredged material for the land reclamation results in additional volumes of imported fill. Options with a volume of dredged material which is significantly lower or significantly higher than the required reclamation volume, will incur an additional carbon impact, compared to those with a neutral cut / fill balance, due to disposal of surplus material or importing fill. **Factor 3: Dredging volume:** options with a higher required dredging volume will have a higher carbon impact for dredging activities. **Factor 4**: Not all options involve the construction of a **new Small Boat Harbour**. It is assumed that those options which do not overlap with the existing SBH site do not require the construction of a new SBH or demolition of the existing SBH. This avoids the carbon impact associated with these activities. **Scoring**: **Factor 1:** Relocation of existing port facilities required? 0 - (not required); 1 - (required). **Factor 2:** Cut/fill balance; 0 - (volume of dredged material is approximately equal to the required reclamation volume). 1 - (volume of dredged material is significantly lower or significantly higher than the required reclamation volume); **Factor 3**: Dredging volume; 0 - (lower volume); 1 - (higher volume).

Category	Criterion No.	Project Criterion	Method of Appraisal
			Factor 4: New Small Boat Harbour; 0 - (not required); 1 - (required).
Environment	1.7	Impact on SBH users (during construction)	This criterion compares the relative construction-stage impact of each option on the users of the Small Boat Harbour. The key differentiator in terms of construction stage impact is whether or not the option involves construction at the existing Small Boat Harbour. **Scoring**: 0 - construction not required at the location of the existing SBH; 1 - construction required at the location of the existing SBH. **Exclusions:** This criterion did not assess the operational impact of each option. This is because any option involving construction at the existing SBH would have to involve an equivalent SBH facility at a minimum. The operational impact is assumed to be neutral across all options on this basis.

Category	Criterion No.	Project Criterion	Method of Appraisal
Construction	2.1	Risk of down-time during construction	This criterion compares the relative risk of down-time associated with each option, during construction. The key differentiator between the options under this criterion is their relative exposure to wave and current action, which leads to a greater likelihood of construction being interrupted due to weather conditions. Options in the sheltered inner harbour area to the west of the existing harbour are the most suitable under this criterion. Locations to the east of the existing harbour are more exposed to tidal, wave and wind action and are therefore less suitable in this respect. **Scoring:** 0 - locations to west of the Harbour; 1 - locations to the east of the Harbour.
Construction	2.2	Risk of rock presence	This criterion compares the relative risk of each option in terms of rock presence within the areas proposed for dredging and quay wall construction. The greater the presence of rock, the slower and more technically complex construction will be. The key differential factors in this criterion are the proximity of each option to the shore (factor 1) and the volume of dredging required (factor 2). **Factor 1:** The risk of rock presence increases the closer the construction is located in relation to the shore, as the bedrock tends to be higher in these locations. This also means that, for a given depth of excavation, the rock encountered is likely to be of a harder composition closer to shore and therefore more likely to require breaking or blasting. The partial reclamation options are located closer to shore and are therefore considered to be higher risk in this respect, compared to the full reclamation options. **Factor 2:** the larger the volume of dredging involved for a particular option, the greater the volume of rock likely to be encountered for that option. **Scoring:** **Factor 1:** proximity to shore: 0 - "Full reclamation" options; 1 - "Partial reclamation" options. **Factor 2:** dredging volume: 0 - lower dredging volume; 1 - larger dredging volume.

Category	Criterion No.	Project Criterion	Method of Appraisal
Construction	2.3	Impact on traditional port activities (during ORE construction)	This criterion compares the relative impact of each option on traditional port activities during construction. The key differentiators between the options in this regard are: **Factor 1:** Impact on navigation channel. Dredging across the existing navigation channel will be required for all options (temporary construction impact). However, while the dredging area for an option to the east of the existing harbour would certainly overlap significantly with the navigation channel, it would involve less dredging within the inner harbour and therefore have comparatively less impact, compared to the options to the west. Any impacts to marine navigation would be more easily managed at locations farther out to sea, compared to locations closer to or within the existing harbour. **Factor 2**: Relocation of existing port operations. Options involving partial reclamation provide a significant portion of the ORE development on land with existing port developments, resulting in a significant impact in terms of relocating existing port operations (e.g. RoRo trailer parking). Options based on "full reclamation" require a much lesser extent of relocation of port operations, if any. **Scoring:** **Factor 1:** Impact on navigation channel: 0 - options located to the east of the existing harbour; 1 - options located to the west of the existing harbour **Factor 2:** Relocation of existing port operations: 0 - options involving full reclamation; 1 - options involving partial reclamation.
Operational	3.1	Risk of down-time during operation	This criterion compares the relative risk of downtime during operation of the ORE Hub. The primary differential factor between the options in this respect is their relative exposure to wind, wave and current action. The options located in the sheltered inner harbour to the west of the existing Europort are the least exposed. Any option to the east is more exposed and therefore have a greater risk of down-time due to weather conditions. **Scoring:** 0 - options located to the west of the existing harbour; 1 - located to the east of the existing harbour.

Category	Criterion No.	Project Criterion	Method of Appraisal
Operational	3.2	Impact on maintenance dredging	This criterion compares the impact of each option in terms of the frequency and / or extent of maintenance dredging required during the operation of the ORE Hub. All options will require maintenance dredging, however, their location relative to the existing harbour is the differential factor in terms of their relative impact on maintenance dredging. The sheltered area to the west of the existing harbour will be less susceptible to sedimentation and require less dredging compared to locations to the east. The area to the east of the existing harbour is more exposed to coastal processes and therefore likely to require more frequent dredging. **Scoring:** 0 - options in the sheltered inner harbour to the west; 1 - options to the east of the existing harbour which are more exposed to coastal processes.
Operational	3.3	Impact to traditional port activities (during ORE operation)	This criterion compares the relative impact of each option on traditional port activities during the operation of the ORE Hub. The key differentiator between the options in this regard is the relocation of traditional port activities. Options which involve partial reclamation (i.e. they also involve some land-based development) will necessitate the relocation of traditional port activities from the land-based areas and will therefore have a higher impact than the options involving full reclamation. **Scoring:** 0 - options involving full reclamation; 1 - options involving partial reclamation.

Category	Criterion No.	Project Criterion	Method of Appraisal
Financial	4.1	Capital Cost Comparison	This criterion compares the relative impact of each option in terms of capital cost. Given the early stage of design, it was not feasible for accurate cost estimates to be undertaken for each option. Instead, a qualitative comparison of their respective impacts was undertaken. The key differential factors between the options in terms of capital cost were identified as follows: **Factor 1:** Cost of dredging. The options involving a larger volume of dredging will incur a larger cost as dredging equipment and personnel will be required for a longer duration. **Factor 2:** Cost of relocating existing port operations. Options which involve partial reclamation also require partial land-based development will incur significant additional cost due to the required relocation of traditional port activities to make way for the proposed ORE Hub. **Factor 3:** Cut / Fill balance; Options with a surplus of dredged material (i.e. more than is required for land reclamation) will incur an additional cost due to disposal of the surplus material. Options with a shortage of dredged material (i.e. less than is required for land reclamation) will incur an additional cost due to the requirement for additional imported fill. Options with a neutral cut / fill balance i.e. dredged volume equals reclamation volume, are preferred in this respect. **Factor 4:** new SBH; options involving the construction of a new SBH will incur an additional cost. **Factor 5:** rock presence; options with a higher risk of rock presence have a higher risk of incurring additional cost due to rock breaking or blasting **Scoring:**

Category	Criterion No.	Project Criterion	Method of Appraisal
			Factor 1: 0 (lower dredging volume); 1 (larger dredging volume). **Factor 2:** 0 (full reclamation); 1 (partial reclamation). **Factor 3:** 0 (options with a neutral cut / fill balance); 1 (options with either a surplus or insufficient volume of dredged material). **Factor 4:** 0 (new SBH not required); 1 (new SBH required). **Factor 5:** this factor uses normalised scores from criteria 2.2 "risk of rock presence".
Financial	4.2	Operational Asset Value	This criterion compares the relative operational asset value of each option. The key differentiator between the options in this respect is the risk of down-time during operation. The risk of down-time for each option is compared based on their relative exposure to wind, wave and current action. Options with an increased risk of down-time during the operation of the ORE Hub would have a lower potential operational asset value as an increased risk of down-time reduces the potential efficiency of the developers activities. **Scoring**: Use scores assigned under criteria 3.1 "risk of down-time during operation". **Exclusions**: Relocation of port facilities is not considered as a factor under this criterion as it's assumed that this would be done before the developer is in place at the ORE Hub. Other than the risk of down-time, it is assumed an equivalent facility would be provided at each site with no significant difference in terms of operational asset value.

5.3.6.3 APPRAISAL MATRIX RESULTS

Table 5.4 shows the scores assigned to each option under each criterion assessed, along with a description of the rationale behind those scores.

Table 5.4: Appraisal Matrix Results

Category	Criterion No.	Project Criterion	Option 2			Option 3			Option 4		
			Score Rationale	Score	Normalised Score	Score Rationale	Score	Normalised Score	Score Rationale	Score	Normalised Score
Environment	1.1	Impact on existing coastal processes	1 = Located towards the east of the harbour which would have a higher impact on coastal processes	1	1	0 = located to the west of the Harbour which would have a lower impact on coastal processes	0	0	0 = located to the west of the Harbour which would have a lower impact on coastal processes	0	0

Category	Criterion No.	Project Criterion	Option 2			Option 3			Option 4		
			Score Rationale	Score	Normalised Score	Score Rationale	Score	Normalised Score	Score Rationale	Score	Normalised Score
Environment	1.2	Impact on European Sites	1 = Located to the east of the Harbour which is in closer proximity to Carnsore Point SAC, Long Bank SAC and Blackwater SAC	1	1	0 = located to the west of the Harbour which is further from Carnsore Point SAC, Long Bank SAC and Blackwater SAC	0	0	0 = located to the west of the Harbour which is further from Carnsore Point SAC, Long Bank SAC and Blackwater SAC	0	0
Environment	1.3	Impact on Marine Ecology	Factor 1 = 0 - This option requires less dredging than other options, due to the bathymetry at this location, which reduces the potential impact to marine ecology. 'Factor 2 = 0 - This option is a full reclamation	0	0	Factor 1 = 1 - This option requires more dredging than other options, which increases the potential impact to marine ecology. 'Factor 2 = 0 - This option is a full reclamation option, meaning much of the dredging will take farther	1	0.5	Factor 1 = 1 - This option requires more dredging than other options, which increases the potential impact to marine ecology. 'Factor 2 = 1 - This option is a partial reclamation option, meaning more dredging activity will	2	1

Category	Criterion No.	Project Criterion	Option 2			Option 3			Option 4		
			Score Rationale	Score	Normalised Score	Score Rationale	Score	Normalised Score	Score Rationale	Score	Normalised Score
			option, meaning much of the dredging will take farther from the shore where rock presence is less likely, reducing the noise risk to marine ecology.			from the shore where rock presence is less likely, reducing the noise risk to marine ecology.			take closer to the shore where rock presence is more likely, which increases the risk to marine ecology.		
Environment	1.4	Dumping at Sea	0 = This option involves full reclamation which would facilitate a greater level of reuse of dredged material, thereby reducing or potentially eliminating dumping at sea.	0	0	0 = This option involves full reclamation which would facilitate a greater level of reuse of dredged material, thereby reducing or potentially eliminating dumping at sea.	0	0	1 = This option would involve partial reclamation and would present less opportunity for reuse, creating the risk that a significant volume will need to be dumped at sea	1	1

Category	Criterion No.	Project Criterion	Option 2			Option 3			Option 4		
			Score Rationale	Score	Normalised Score	Score Rationale	Score	Normalised Score	Score Rationale	Score	Normalised Score
Environment	1.5	Impact on commercial marine activity (Mussels)	1 = Located to the east of the existing harbour which is in closer proximity to the mussel sites.	1	1	0 = Located to the west of the existing harbour which is further from the mussel sites.	0	0	0 = Located to the west of the existing harbour which is further from the mussel sites.	0	0
Environment	1.6	Climate and Carbon Impact	Factor 1 = 0 - Relocation of existing port facilities is not required Factor 2 = 1 - The volume of dredge material is significantly lower than the required reclamation volume Factor 3 = 0 -	1	0.25	Factor 1 = 0 - Relocation of existing port facilities is not required Factor 2 = 0 - The volume of dredged material would be approximately equal to the required reclamation value	2	0.5	Factor 1 = 1 - Relocation of existing port facilities is required Factor 2 = 1 - The volume of dredge material is significantly higher than the required reclamation volume Factor 3 = 1 -	4	1

Category	Criterion No.	Project Criterion	Option 2			Option 3			Option 4		
			Score Rationale	Score	Normalised Score	Score Rationale	Score	Normalised Score	Score Rationale	Score	Normalised Score
			This option would require lower dredging volumes than the other options Factor 4 = 0 - This option does not require the construction of a New Small Boat Harbour			Factor 3 = 1 - This option would involve larger dredging volumes than option 2 Factor 4 = 1 - This option requires the construction of a New Small Boat Harbour			This option would require larger dredging volumes than option 2 Factor 4 = 1 - This option requires the construction of a New Small Boat Harbour		
Environment	1.7	Impact on SBH users (during construction)	0 = This option does not require construction at the location of the existing Small Boat Harbour	0	0	1 = This option requires construction at the location of the existing Small Boat Harbour	1	1	1 = This option requires construction at the location of the existing Small Boat Harbour	1	1
			Category SubTotal	**4**	**3.25**		**4**	**2**		**8**	**4**

Category	Criterion No.	Project Criterion	Option 2			Option 3			Option 4		
			Score Rationale	Score	Normalised Score	Score Rationale	Score	Normalised Score	Score Rationale	Score	Normalised Score
Construction	2.1	Risk of down-time during construction	1 = This option is located to the east of the harbour and therefore more susceptible to downtime during construction	1	1	0 = This option is located to the west of the harbour and therefore less susceptible to downtime during construction	0	0	0 = This option is located to the west of the harbour and therefore less susceptible to downtime during construction	0	0
Construction	2.2	Risk of rock presence	Factor 1 = 0 - This option is a full reclamation option and therefore has a lower risk of rock presence. Factor 2 = 0 - This option requires less dredging than other options, due to the bathymetry at this location, so therefore it is less likely to encounter rock	0	0	Factor 1 = 0 - This option is a full reclamation option and therefore has a lower risk of rock presence. Factor 2 = 1 - This option requires a larger dredging volume which increases the risk of rock being encountered	1	0.5	Factor 1 = 1 - This is a partial reclamation option and therefore rock encountered is likely to be of a harder composition. Factor 2 = 1 - This option requires a larger dredging volume which increases the risk of rock being encountered	2	1

Category	Criterion No.	Project Criterion	Option 2			Option 3			Option 4		
			Score Rationale	Score	Normalised Score	Score Rationale	Score	Normalised Score	Score Rationale	Score	Normalised Score
Construction	2.3	Impact on traditional port activities (during ORE construction)	Factor 1 = 0 - This option is located to the east of the Harbour and would have comparatively less impact on shipping and navigation during construction Factor 2 = 0 - This option would involve full reclamation which results in less disruption to existing port operations during construction	0	0	Factor 1 = 1 - This option is located to the west of the Harbour and would have a greater impact on shipping and navigation during construction Factor 2 = 0 - This option would involve full reclamation which results in less disruption to existing port operations during ORE construction	1	0.5	Factor 1 = 1 - This option is located to the west of the Harbour and would have a larger impact on shipping and navigation during construction Factor 2 = 1 - This option would involve partial reclamation which results in more disruption to existing port operations during ORE construction	2	1
			Category SubTotal	**1**	**1**		**2**	**1**		**4**	**2**

Category	Criterion No.	Project Criterion	Option 2			Option 3			Option 4		
			Score Rationale	Score	Normalised Score	Score Rationale	Score	Normalised Score	Score Rationale	Score	Normalised Score
Operational	3.1	Risk of down-time during operation	1 = This option is located to the east of the harbour and therefore more susceptible to downtime during operation	1	1	0 = This option is located to the west of the harbour and therefore less susceptible to downtime during operation	0	0	0 = This option is located to the west of the harbour and therefore less susceptible to downtime during operation	0	0
Operational	3.2	Impact on maintenance dredging	1 = This option is located to the east of the harbour, is more exposed to coastal processes and therefore expected to require more maintenance dredging	1	1	0 = This option is located to the west of the harbour, is less exposed to coastal processes and therefore require less maintenance dredging	0	0	0 = This option is located to the west of the harbour, is less exposed to coastal processes and therefore require less maintenance dredging	0	0

Category	Criterion No.	Project Criterion	Option 2			Option 3			Option 4		
			Score Rationale	Score	Normalised Score	Score Rationale	Score	Normalised Score	Score Rationale	Score	Normalised Score
Operational	3.3	Impact to traditional port activities (during ORE operation)	0 - This option would involve full reclamation which results in less disruption to existing port operations	0	0	0 - This option would involve full reclamation which results in less disruption to existing port operations	0	0	1 - This option would involve partial reclamation which results in more disruption to existing port operations	1	1
			Category SubTotal	**2**	**2**		**0**	**0**		**1**	**1**

Category	Criterion No.	Project Criterion	Option 2			Option 3			Option 4		
			Score Rationale	Score	Normalised Score	Score Rationale	Score	Normalised Score	Score Rationale	Score	Normalised Score
Financial	4.1	Capital Cost Comparison	Factor 1 = 0 - This option has a lower dredging volume and lower dredging costs Factor 2 = 0 - This option involves full reclamation, less disruption to existing port operations and therefore a lower cost for relocations	1	0.2	Factor 1 = 1 - This option has a higher dredging volume and higher dredging costs Factor 2 = 0 - This option would involve full reclamation, less disruption to existing port operations and therefore a lower cost for relocations	2.5	0.5	Factor 1 = 1 - This option has a higher dredging volume and higher dredging costs Factor 2 = 1 This option would involve partial reclamation, more disruption to existing port operations and therefore a higher cost for	5	1

Category	Criterion No.	Project Criterion	Option 2			Option 3			Option 4		
			Score Rationale	Score	Normalised Score	Score Rationale	Score	Normalised Score	Score Rationale	Score	Normalised Score
			Factor 3 = 1 - The volume of dredge material is lower than the required reclamation volume Factor 4 = 0 - This option does not require construction at the location of the existing Small Boat Harbour Factor 5 = 0 - This option is a full reclamation option and therefore has a lower risk of rock presence.			Factor 3 = 0 - The volume of dredge material is approximately equal to the required reclamation value Factor 4 = 1 - This option requires the construction of a New Small Boat Harbour Factor 5 = 0.5 - This option is a full reclamation option and therefore has a lower risk of rock presence.			relocations Factor 3 = 1 - The volume of dredge material is significantly higher than the required reclamation volume Factor 4 = 1 - This option requires the construction of a New Small Boat Harbour Factor 5 = 1 - This is a partial reclamation option and therefore rock encountered is likely to be of a harder composition.		

Category	Criterion No.	Project Criterion	Option 2			Option 3			Option 4		
			Score Rationale	Score	Normalised Score	Score Rationale	Score	Normalised Score	Score Rationale	Score	Normalised Score
Financial	4.2	Operational Asset Value	1 - This option is located to the east of the harbour and therefore more susceptible to downtime during operation	1	1	0 - This option is located to the west of the harbour and therefore less susceptible to downtime during operation	0	0	0 - This option is located to the west of the harbour and therefore less susceptible to downtime during operation	0	0
			Category SubTotal	**2**	**1.2**		**2.5**	**0.5**		**5**	**1**

Table 5.5 shows the final results of the Stage 2 matrix, with category Sub Totals and the Overall Total Scores for each option.

Table 5.5: 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, with a 113% score differential compared to the 2nd best performing (Option 2) and a 139% score differential compared to Option 4.

5.3.6.4 SENSITIVITY ANALYSIS

The Stage 2 results showed that Option 3 is the best performing option by a significant margin. Nonetheless, it was necessary to carry out a sensitivity analysis of these results before confirming Option 3 as the preferred option. This analysis focussed on the sensitivity of the outcomes to the application of criteria weightings.

The findings of this analysis showed that no acceptable set of criteria weightings would result in either option 2 or option 4 being the preferred option, as explained below.

The sensitivity analysis assessed the scale of weighting adjustment required for another option to be preferred. For this task, scenarios were considered where weightings were applied in favour of Option 2. This established how large a weighting adjustment would be needed to change the outcome, as illustrated by the following worked example for the environmental category:

> *Worked Example (Environmental Category):*
>
> *Option 3 was preferred in the environmental category by a margin of 62.5%, from Option 2 in 2nd place. The criterion with the largest margin in favour of Option 2 was 1.7 "Impact on SBH Users (during construction)". The following criteria had the largest margins in favour of Option 3:*
>
> - *Criterion 1.1 (impact on coastal processes),*
> - *Criterion 1.2 (Impact to European Sites), and*
> - *Criterion 1.5 (Impact on Commercial Marine Activity - Mussels).*

Under this worked example, the weighting of Criterion 1.7 was increased to be 75% higher than the weighting of Criterion 1.1 and 1.2, and 250% higher than Criterion 1.5. With this application of weightings, Option 2 would match the Option 3 weighted score. However, Criterion 1.1 and Criterion 1.2 are both crucial in terms of assessing the environmental impact of the Proposed Development. For this reason, Criterion 1.7 being assigned a weighting of 75% more than those criteria would not be an acceptable distribution.

Other scenarios assessed all required a significantly imbalanced and unacceptable distribution of weightings to change the outcome. This was also the case under the operational and financial categories.

The scoring in the constructability category is even between option 2 and option 3. The application of weightings which favour the criteria Option2 performs best in would result in option 2 being preferred in the constructability category. However, to change the overall outcome of the appraisal would require the constructability criteria to be assigned criteria weightings that are multiple times larger than the criteria for all three other categories. It would not be an acceptable weighting distribution, for instance, to assign constructability criteria weightings which were multiple times larger than the environmental criteria weightings.

The sensitivity analysis therefore concluded that any acceptable combination of weightings applied would result in Option 3 being preferred, by a significant margin.

5.3.6.5 PREFERRED OPTION

The results of the appraisal matrix show that Option 3 is the most suitable option. The findings of the sensitivity analysis subsequently verified that it would take an imbalanced and unacceptable distribution of weightings to change this outcome. For this reason, Option 3 has been identified as the preferred option.

5.4 DEVELOPMENT OF SITE LAYOUT

This section summarises how the Site layout was developed at the location identified above as the preferred option. This includes an explanation of the underlying reasons for this layout, as well as a description of how environmental factors were considered throughout the process.

This section should be read in conjunction with the description of design development tasks in Section 5.5, as many of them are inter-dependent with the layout decisions described in this section. Many of these design and layout decisions were carried out on an iterative basis, with refinements made to each based on the results of analytical exercises (e.g. hydrodynamic modelling). For simplicity, this section presents the outcomes of this iterative process. For further details, refer to Section 5.5.

Having identified the preferred location of the proposed ORE Hub, the process of designing the layout within that footprint started by configuring the infrastructure to be provided along the perimeter. This included the proposed berth structures to facilitate marine deliveries to and from the ORE Hub, as well as the facilities for local marine users i.e. the SBH and Sea Scouts facility.

The proposed berths were located on the eastern part of the site and the SBH and sea scouts on the western side. This was done so that the marine vessels using the ORE berth will be located on the

side nearest to the existing harbour, thereby mitigating the overall extent of the marine area impacted by activities at Rosslare Europort. This layout will also reduce the area requiring future maintenance dredging, which is a significant environmental benefit.

Locating the SBH and Sea Scouts facility to the west of the Proposed Development, remote from ORE activities and existing port operations, will provide safer conditions for users of these facilities. The SBH is proposed to be located closer to the north-west corner, with the Sea Scouts facility to the south-east. This is because the SBH is better suited to the deeper water at that location owing to the requirements of future users. The Sea Scouts facility is better suited to the location in the south-west of the Site, owing to its shallower water depths and shelter from wave action which provide safer conditions for its users.

The northern face of the Proposed Development is relatively exposed to wave, tidal and wind action, compared to the eastern and western perimeter. For this reason, the northern perimeter has been designed as a rock armour revetment, with a proposed breakwater to provide shelter from waves and current action, for the safety of the SBH users. The design of the length and orientation of the breakwater is further described in Section 5.5.5.

The above decisions fixed the layout of the facilities on the outer perimeter, the remaining reclaimed land in the central areas of the ORE Hub was then configured as follows:

- The areas for ORE storage, marshalling and assembly account for the majority of the central area of reclaimed land, enabling sufficient space to meet the spatial requirements of prospective developers and positioned to enable ease of access to and from the proposed berths.
- The ORE operations compound was positioned to the south of the ORE storage area. This will facilitate ease of access from the public road network and to ensure separation between the ORE operations compound and areas where heavy plant would be in operation, for the safety of those travelling to and from the compound area.

5.5 DESIGN DEVELOPMENT

Once the outline layout for the proposed ORE Hub was selected, the emerging project design was then subject to a series of design development tasks. This section outlines a number of key design considerations which were assessed during this process. The design considerations described in this section are as follows:

- ORE hub design parameters (industry engagement)
- Separation distance from the ORE berths to the existing pier
- Beneficial reuse of dredged material
- ORE Berth design
- Small Boat Harbour design
- Sea Scouts facility location and design

5.5.1 ORE HUB DESIGN PARAMETERS

On behalf of Iarnród Éireann – Irish Rail, the project team engaged with interested parties in the offshore wind industry to determine their requirements for a port that could service offshore wind farm construction on Ireland's east and south coasts. The aim of this engagement was to establish the minimum required technical parameters for the design of the Proposed Development. This included key design inputs such as quay length, water depth and channel width, as necessary to ensure that a port can safely and efficiently accommodate ORE construction vessels.

The project team engaged with experienced ORE developers and obtained feedback from them through information sharing sessions, questionnaires and follow-up engagements. Data obtained from this process was collated to inform the design development process. The minimum technical parameters were established by this process, and these were factored into the emerging project design. The "unconstrained" requirements were also established for these technical parameters, which is based on a scenario where there are no constraints, and an idealised layout could be provided.

Based upon the information collated, the following findings were noted in relation to the technical parameters for an ORE Hub:

- Water depth required at quayside should be at least 10m below Chart Datum (CD), but preferably 12m below CD
- No significant differentiation between required access channel draft and quay draft
- Quay berth length should be at least 250m, but preferably 300m
- Access channel width should be at least 120m, but preferably 200m
- Quay berth width should be at least 30m, but preferably 60-80m
- Laydown area should be at least 15 ha, but preferably 20 ha
- Minimum space for welfare/office space requirements of 500m2 required (preferably 700m2)

Through subsequent design development steps, location-specific constraints and environmental impact of providing above and beyond the minimum required technical parameters was considered.

For instance, dredging below the minimum required depth throughout the navigation channel would carry a significant environmental impact, due to greater disturbance of the benthos, increased sedimentation and the increased risk of needing to dump at sea. The dredging depth was increased locally at ORE Berth 1, however, to avoid constraining the types of vessels which could use that berth, which will be used by the larger marine vessels.

There would be minimal additional impact in providing above and beyond the minimum required quay length, given the scale of the development already being provided. For this reason, the proposed berth sizes provide sufficient space for the typical range of anticipated vessels, with a safeguarded allowance for potential future increases in the size of vessels engaged in ORE activities.

A laydown area of greater than the minimum required area is proposed, to provide headroom for the potential future increase in the size of components used in the ORE industry. However, it was

decided to keep the laydown area below 20ha to balance the need to provide adequate headroom with the need to avoid excessive dredging and land reclamation.

With consideration of the above, the project team derived a set of parameters to be met in the design of the Rosslare ORE Hub, as shown in Table 5.6.

Table 5.6: Proposed project parameters compared with minimum industry requirements

Requirement (unit)	Minimum ORE Industry Requirements	Unconstrained ORE Industry Requirements	Proposed
Access Channel Width (m)	120	300	300
Access Channel Draft (m CD)	10	15	10
Quay Water Depth (m CD)	10	15	12m at ORE Berth 1 and 10m at ORE Berth 2
Quay Berth Length (m)	200	600	330m at ORE Berth 1 and 240m at ORE Berth 2
Laydown Area (ha)	15	30	19.7
Quay Area (ha)	0.75	3.6	2

During the course of design development, further refinements were made to ensure that the proposals for the ORE Hub were suitable for the anticipated operational activities.

5.5.2 SEPARATION DISTANCE

In order to establish an alignment of the eastern face of the ORE Hub, it was necessary to establish a safe separation distance from the existing piers.

The first step in this process was to benchmark the current safe separation distance based on existing port operations. It was observed that there is currently a separation distance of 421m from the existing eastern quay face (at Berth 4) to the navigation buoy located on the west side of the harbour basin as shown below in Figure 5.7. It was therefore decided that, to ensure there was no reduction to the available space for marine navigation, a proposed minimum separation distance of 421m should be maintained from the eastern quay face (at Berth 4) to the nearest point of ORE Berth 1.

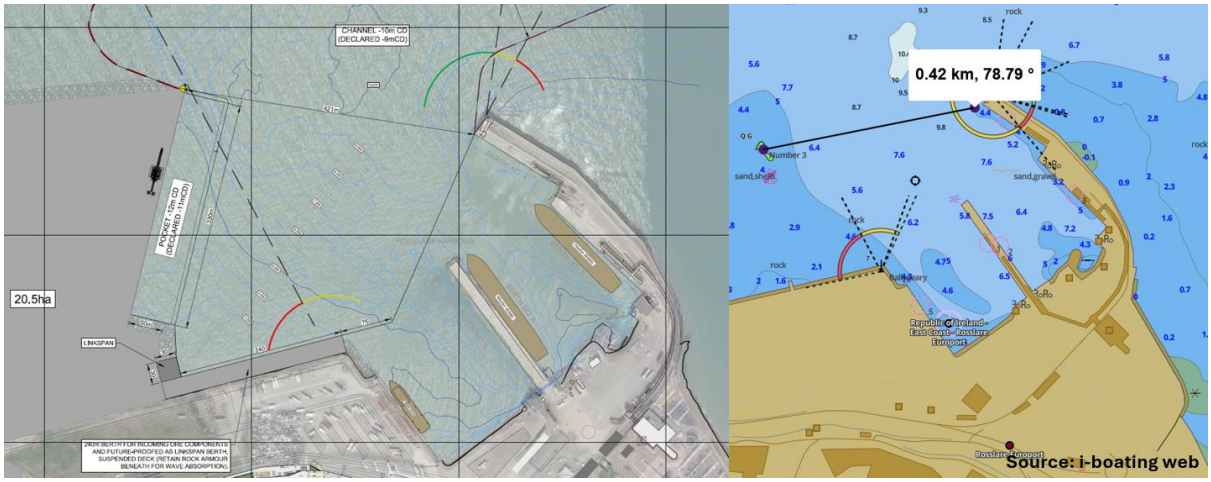

Figure 5.7: Concept Design Separation Distance

Having established the minimum separation distance, further analysis was carried out to establish the optimum separation distance. This would be a separation distance which balances the practical benefits of the ORE Hub being in close proximity to the existing port, with the need to avoid negatively impacting the marine navigation channel.

A navigation simulation study was carried out, which considered the existing RoRo vessel movement routes and the anticipated geometrical configurations of the ORE construction vessels. This analysis was carried out based on the minimum separation distance and an alternative scenario which involved an increase of 100m to the separation distance (total separation of 521m). The results of this study demonstrated that the increased separation distance would enhance useability of the proposed infrastructure whilst improving navigational safety. With the updated layout, the available navigation area within the harbour basin increases with respect to the current situation, thereby providing an acceptable safety distance with respect the passing vessel and a vessel moored at the ORE berth. The increased separation distance was then incorporated into the project design, based on these findings.

5.5.3 BENEFICIAL RE-USE OF DREDGE MATERIAL FOR RECLAMATION

In order to provide adequate water depth required by the Proposed Development, it will be necessary to deepen a large proportion of the harbour through dredging.

Dredged material is typically disposed of under licence from the Environment Protection Agency (EPA) at marine Dump Sites, used for beach replenishment or, for hazardous material, brought ashore for processing and specialised disposal. All of these options would necessitate transport of the material from the Proposed Development site and associated expenditure of carbon as well as localised impacts on the environment where the dredged material would ultimately be deposited.

Following a review of project-specific geotechnical information, it was confirmed that the dredge material will comprise a mixture of materials suitable for use as reclamation fill. All of the dredge materials have therefore been targeted for beneficial re-use within the proposed reclamation area. Transportation of these materials will therefore be localised i.e. within the Proposed Development boundary, which reduces the extent of area impacted by the works.

If the dredged material were not used for the reclamation, then this material would need to be sourced elsewhere and transported to the Proposed Development area, with an associated expenditure of carbon. With the use of the dredge materials for beneficial re-use within the proposed reclamation area, only the rockfill perimeter bunds, rock armour and the top capping layer need to be transported to the Proposed Development area.

This will avoid the need to dump at sea, which is a significant environmental benefit. It also reduces the volume of imported fill required which provides benefits in terms of carbon footprint and cost.

5.5.4 ORE BERTH WALL DESIGN

Hydrodynamic modelling was undertaken to determine the effects of wave climate on the Proposed Development. The outcomes of this modelling are described in greater detail in Chapter 8: Coastal Processes and EIAR Technical Appendix 8: Hydrodynamic Modelling. This section presents the key impact of this analysis in terms of design development. During development of the design, it was initially proposed that the ORE Berths should be constructed using a 'solid' form of quay wall, where a vertical wall is created by the installation of a 'combi wall' using circular piles installed at intervals with intermediate sheet piles installed in between these circular piles (Refer to Figure 5.8).

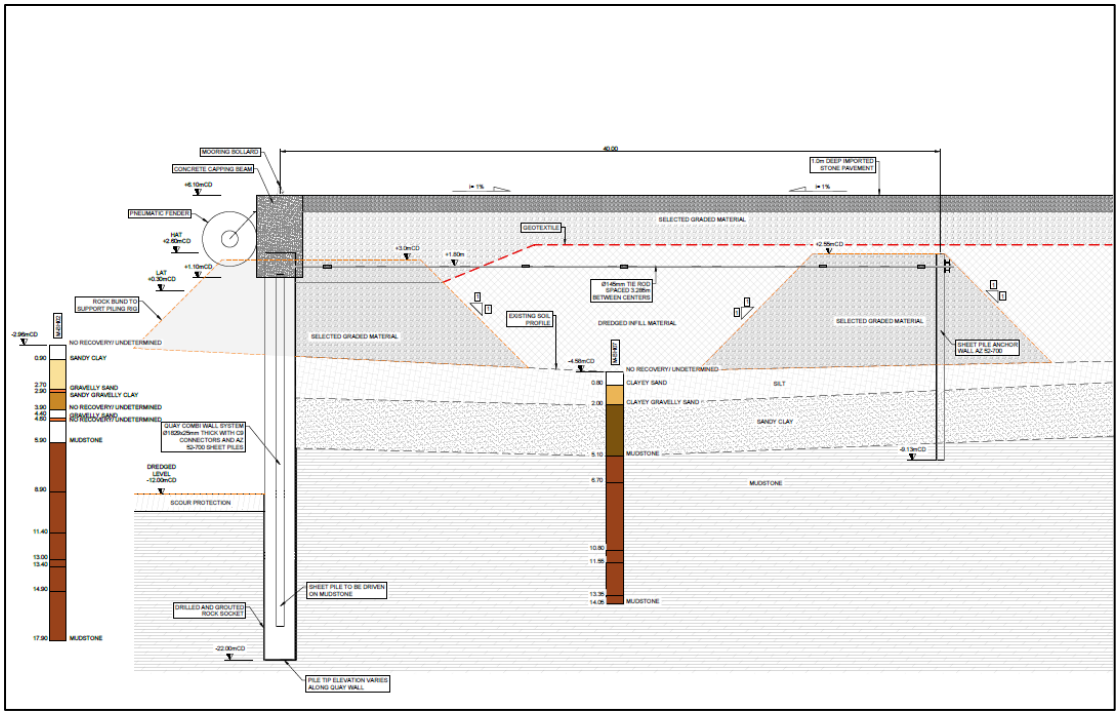

Figure 5.8: ORE Berth solid quay wall design option

Upon review of the hydrodynamic modelling results, it was determined that this 'solid' quay wall would reflect incoming waves from the east and north-east directions into the existing harbour, which could detrimentally impact on navigational safety in this area. To reduce these effects, an alternative, more wave absorbent, 'open' quay wall form of construction, with a reflection coefficient of 50% was tested in the hydrodynamic modelling analyses (Refer to Figure 5.9).

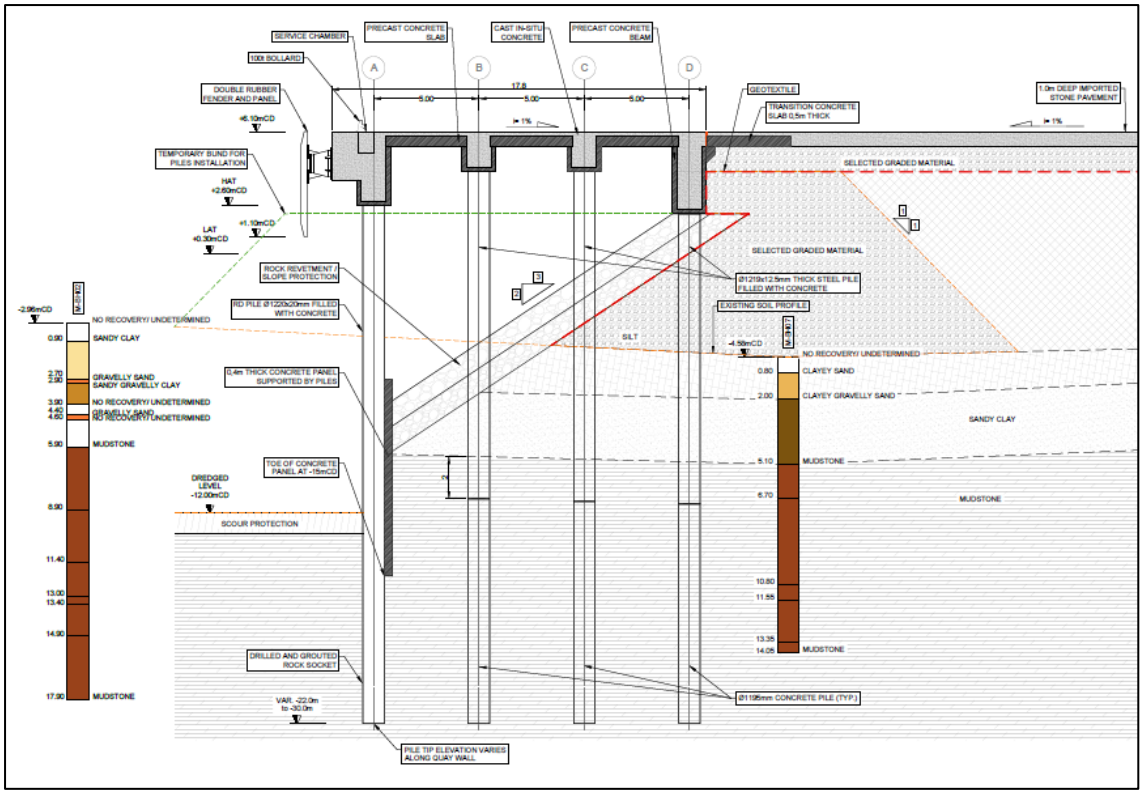

Figure 5.9: ORE Berth open quay wall design

Modelling results indicate that the change of quay wall type, from solid to open, significantly improved the wave climate within the existing harbour. It was therefore decided that the 'open' quay wall type would be taken forward in the proposed design.

5.5.5 SMALL BOAT HARBOUR LAYOUT

As part of the preliminary design of the new Small Boat Harbour, careful consideration has been given to the proposed geometry of the entrance configuration to accommodate suitable vessel sizes as well as understanding the potential effects from hydrodynamic (wave) modelling and sediment dispersion modelling.

Consultation with the Rosslare Europort's port operations team, the general public and relevant stakeholders, including Small Boat Harbour Association and the Rosslare Harbour Fisheries Consultative Group, has also provided an insight in terms of how sediment has been historically transported in the context of the wider bay area of Rosslare Europort. Due to tidal patterns and the shape and relative location of the bay, sediment is deposited in an anticlockwise fashion (i.e., westerly incoming direction) into the port.

A sensitivity analysis was carried out by iteratively modelling wave conditions associated with alternative entrance configurations for the Small Boat Harbour. Through this process, it was determined that the optimal configuration was to include for a 30m clear separation between the toe levels of the rock armour revetments on either side of the entrance and to allow the two breakwater legs to extend north-north-west. This configuration will help to dissipate north-easterly approaching waves and limit the effects of sediment deposition on the new Small Boat Harbour. A comparison between the initial concept design and the preliminary design, incorporating the

proposed breakwater, is shown in Figure 5.10. The image below shows the concept design (left) with a significant wave height of 0.3-0.5m observed for a localised area along the inner face of the north-western breakwater. Under the preliminary design model run (right), the extended breakwater prevents this from occurring, with significant wave heights below 0.3m observed at all locations within the harbour, thereby providing calmer and safer conditions within the harbour for boat users.

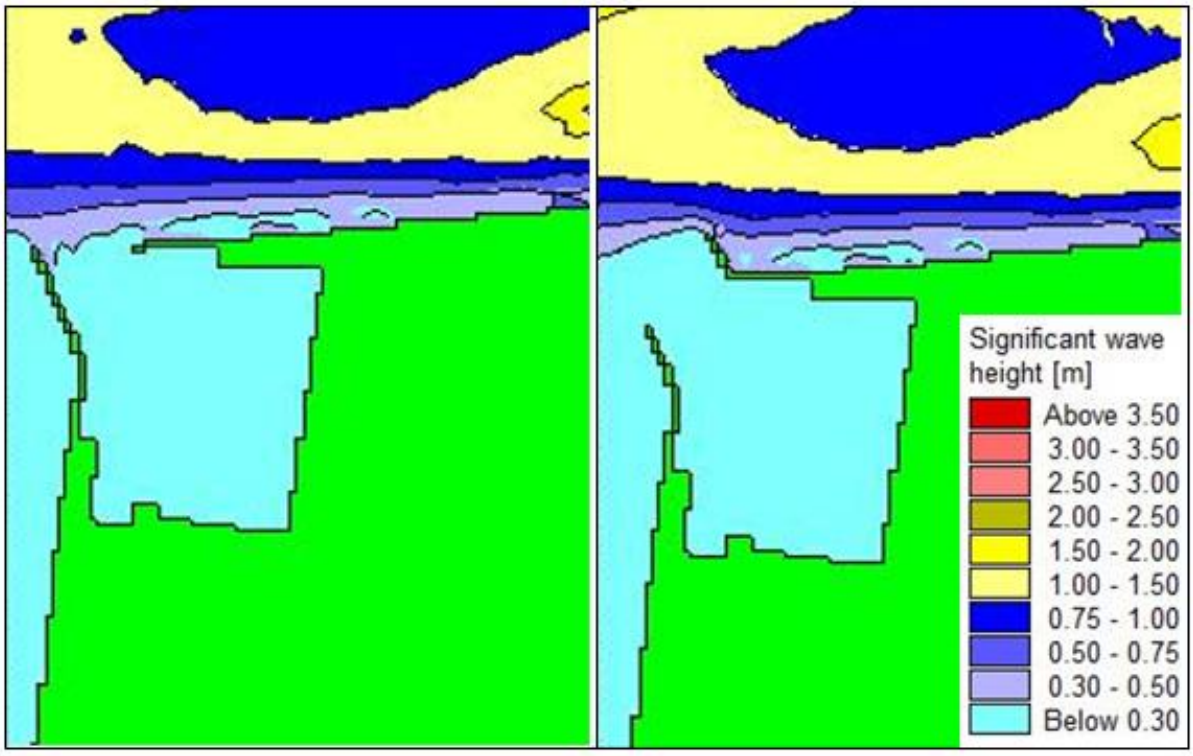

Figure 5.10: Wave Modelling Results: Concept Design (left) and Preliminary Design (right)

Another important consideration for design of the new Small Boat Harbour was ensuring that it caters for appropriate numbers of small boat harbour users. This process was refined over time and was informed by consultation with the Rosslare Europort and stakeholders including the Small Boat Harbour Association and the Rosslare Harbour Fisheries Consultative Group.

It was concluded at preliminary design stage, based on the stakeholder consultation process (see Chapter 4: Scoping and Consultation), that up to 64 small boats should be facilitated. The configuration of the new small boat harbour was developed based on the total number of berths and distribution of vessels detailed below:

- 64 berths for fishing/leisure small boats with the following anticipated dimensions:
  - 49 vessels up to 6m length overall
  - 11 vessels up to 8m length overall
  - 3 vessels up to 10m length overall
  - 1 vessel up to 14m length overall
- 7 berths for Crew Transfer Vessels up to 26m long
- 2 tug berths

The preliminary design of the Small boat Harbour was then developed based on the above user requirements and the configuration was also chosen to suit the sediment patterns described earlier in this section.

5.5.6 SEA SCOUTS FACILITY

The need for infrastructural provisions relating to the local Sea Scouts group (Tuskar Sea Scouts) was not clear at concept design stage, and therefore it was assumed at that stage of the project that the Sea Scouts would be able to utilise existing marine space at a non-defined location within the extents of the new Small Boat Harbour. The following requirements were subsequently provided by the Tuskar Sea Scouts at the consultation event held in June 2024:

- Provision of a relatively small slipway would significantly improve the quality of their activities,
- Equipment storage sheds are required,
- Vehicular access to the site, preferably be via the public road network for vehicular turning (for drop-off),
- A small allowance for parking is required.

Consideration was given to two alternative locations for the Sea Scouts as part of the Preliminary Design Stage; namely a) the new small boat harbour, which is located to the north-west of the Proposed Development; and b) a location to the south-west of the Proposed Development. The east of the site was not considered for safety reasons as that is where ORE activities will take place.

The south-west of the site, as illustrated in Figure 5.11, was identified as the most suitable location to meet the requirements of the Sea Scouts, as it is an area which provides suitable space for the slipway and storage area, suitable water depth and it allows users to safely avail of the public access provisions to the Proposed Development.

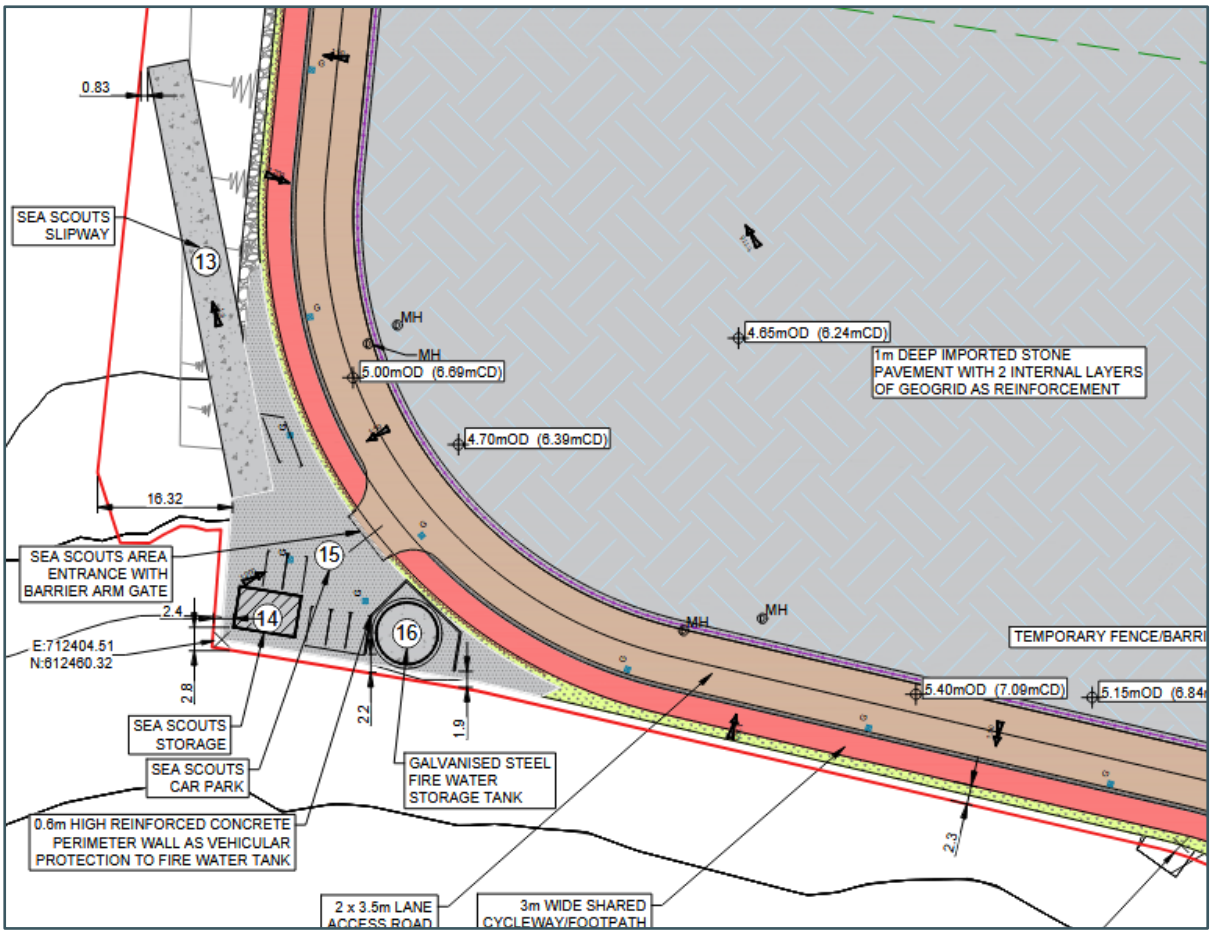

Figure 5.11: Sea Scouts storage – preferred location

5.5.7 ENVIRONMENTAL MITIGATION MEASURES

A series of environmental mitigation measures were identified during the design development stage, based on the outcomes of the studies and assessments carried out in support of the EIAR. This section presents some examples of mitigation measures which were identified and incorporated into the project design to lessen environmental impacts. These measures apply in addition to the measures previously described in earlier sections of this chapter.

This is not an exhaustive list, this is merely intended to show how certain key environmental issues were factored into the design development process. For further details of the mitigation measures recommended for the Proposed Development, refer to Chapter 26 of this EIAR.

5.5.7.1 UNDERWATER NOISE

Underwater noise has been identified as one of the main potential impacts to marine ecology, if adequate protection is not provided. The construction methodology has therefore been designed to provide suitable mitigation of underwater noise.

- A perimeter bund of rockfill will be constructed prior to piling activities. This bund will provide a physical barrier between the piling operations and the open marine environment, serving both

structural and environmental functions. It allows piling to occur using land-based equipment while significantly attenuating underwater noise propagation.

- Rotary Bored Piling for ORE Berths 1 and 2: This technique is notably quieter than conventional impact piling, as it avoids percussive hammering and instead relies on slower, controlled rotary excavation. The risk of sound transfer into the marine environment is further reduced compared to piling from a barge.

5.5.7.2 LIGHTING

The following measures have been incorporated into the design of the Proposed Development to lessen the potential impact of the proposed lighting:

- Hours of lighting operation will be restricted to essential times only, where possible, to minimise nighttime illumination, and will ideally avoid peak bat activity times, particularly during dusk and dawn when bats are most active. By restricting lighting during these peak activity periods, the impact on foraging, commuting, and roosting behaviour is reduced.
- Where possible, motion-activated lights will be installed instead of continuous illumination. This reduces the duration of lighting in areas that are not actively in use, thereby reducing potential disturbance to bats.
- Directional lighting fixtures will be used to focus light away from bat foraging and commuting routes, and where possible they will be cowled to reduce significant light splay into foraging features, as well as away from any roosting sites (if identified during pre-commencement bat emergence survey). This will help reduce light spillage into areas that bats use.

5.5.7.3 SURFACE WATER CONTAMINATION

- Due to the activities which will take place in the Proposed Development, there is the potential for surface water contamination. If adequate protection is not provided, there is a risk of contaminated surface water being discharged untreated to the marine environment. In order to prevent this, the proposed drainage system is designed to convey surface water to oil interceptors for the removal of hydrocarbons before discharge.

The design development process described in this chapter culminated in the project design presented in the Application Drawings.

5.6 REFERENCES

Department of Transport (2021). Policy Statement on the facilitation of Offshore Renewable Energy by Commercial Ports in Ireland. https://www.gov.ie/en/department-of-transport/policy-information/facilitation-of-offshore-renewable-energy-by-commercial-ports-in-ireland/

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

Wexford County Council. Climate Action Plan 2024-2029.

Wexford County Council County Development Plan 2022-2028.

Department of Climate, Energy and the Environment. (2025). Climate Action Plan 2025.

Iarnród Éireann
Irish Rail

venterra | GDG GAVIN & DOHERTY GEOSOLUTIONS

NICHOLAS O'DWYER an RSK company

Co-funded by the European Union