

NON-TECHNICAL SUMMARY

The Burrow CFERM Scheme



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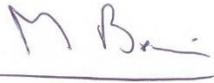
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1. INTRODUCTION

1.1. Context

This Non-Technical Summary (NTS) summarises the findings of the Environmental Impact Assessment Report (EIAR) prepared by RPS on behalf of Fingal County Council (FCC) in support of development consent applications for the proposed construction of coastal flood and erosion protection works at the Burrow in Fingal, County Dublin, hereafter referred to as the 'Proposed Development'. This NTS is intended to be an easily accessible summary of the content of the EIAR presented without technical jargon, hence understandable to anybody without a background in the environment or the Proposed Development.

1.2. Purpose of the EIAR

Environmental Impact Assessment (EIA) is a procedure under the terms of European Directives¹ for the assessment of the likely significant effects of a project on the environment. An EIAR is a statement prepared by the applicant, providing information on the likely significant effects on the environment based on current knowledge and methods of assessment. It is carried out by competent persons, with appropriate expertise, to provide an informed assessment of impacts within their discipline.

The primary objectives of the EIAR are to identify the baseline environmental context of the Proposed Development, predict potential beneficial and/or adverse effects of the Proposed Development and propose appropriate mitigation measures where necessary. In preparing this EIAR, the following legal provisions and guidelines were considered:

- The requirements of EU Directives and Irish law regarding *Environmental Impact Assessment (including the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018)*.
- European Commission Environmental Impact Assessment of Projects Guidance on the preparation of the Environmental Impact Assessment Report (Directive 2011/92/EU as amended by 2014/52/EU) (European Commission, 2017).
- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (Environmental Protection Agency, May 2022).
- Guidelines for Planning Authorities and An Bord Pleanála (APB) on carrying out Environmental Impact Assessment, 2018.

In addition, specialist disciplines have had regard to other relevant guidelines, as noted in the specific chapters of the EIAR.

¹ EU Directive 85/337/EEC as amended by Directives 2011/92/EU and DIRECTIVE 2014/52/EU

1.3. Function of the EIAR

This EIAR is a report on the effects, if any, which the Proposed Development, if carried out, would have on the environment, and includes the information specified in Annex IV of the Environmental Impact Assessment Directive. The EIAR is the document prepared on behalf of the applicant that presents the output of the assessment and contains information regarding:

- The Proposed Development.
- The likely significant effects of the Proposed Development.
- The baseline scenario.
- Reasonable proposed alternatives.
- The features and measures to avoid, prevent, reduce or offset significant adverse effects.
- Any additional information specified in Annex IV of the EIA Directive.

The EIAR must include the information necessary for the competent authority to reach a reasoned conclusion and should be of sufficient quality to enable this judgement to be made. Many of the EIA Directive's requirements and provisions aim to ensure that the EIAR can effectively serve this purpose. Article 5 of the EIA Directive sets out what must be included in the EIAR, and how to ensure that it is of high quality and complete.

This EIAR has been prepared following an examination, analysis and evaluation of the direct and indirect significant effects of the Proposed Development in relation to the receiving environment.

1.4. The Proposed Development

The Proposed Development is outlined below, whilst a detailed description can be found in Chapter 3 of the EIAR. The Proposed Development comprises the following elements:

- Construction of a c.190m long earth embankment at the end of Burrow Road.
- Construction of a combination of a c.130m long sheet piled flood wall and a c.200m embankment along Marsh Lane.
- Installation of back drainage behind the proposed defences with associated outfalls.
- Installation of non-return valves to existing outfalls to prevent backflow of water from the estuary.
- The construction of c. seven fishtail (or 'Y' shaped) groyne structures in combination with a beach renourishment scheme. These groyne structures will help control the longshore and cross-shore transport elements of the prevailing littoral drift along c.1.3km of the coastline of the Burrow.
 - Each groyne will extend seaward by approximately 70m at a spacing of c.175m to create seven sediment sub-cells along the Burrow. The total footprint of the proposed groynes will equate to c.1.36 hectares.
 - The beach renourishment will involve transporting dredged material from a licenced marine aggregate extraction site (presently assumed to be Liverpool Bay) to the Burrow and pumping the material ashore to fill each of the seven sediment sub-cells created by the fishtail groyne structures.

1.5. Methodology & Structure of the EIAR

The main aim of the EIAR is to provide information on the Proposed Development and its potential impacts to the public, prescribed bodies and the competent authority. To this end, Article 3(1) of the EIA Directive requires that significant effects are identified, assessed, and described in an ‘appropriate manner’. The EIAR clearly sets out the methodological considerations and reasoning behind the identification and assessment of likely significant effects.

1.5.1. EIAR Content

The EIAR includes a description of;

- The project;
- The baseline scenario;
- The environmental factors affected;
- The effects on the environment;
- Alternatives considered;
- Mitigation measures proposed;
- And Monitoring proposed.

The EIAR has been prepared by competent experts with specialist knowledge of the relevant subjects.

1.5.2. Assessment of Environmental Effects

1.5.2.1. Assessment Methodology

The assessment of whether the Proposed Development is likely to have a significant effect on the environment has been undertaken through a variety of methods:

- Professional judgment and experience based on published guidance criteria.
- Assessment of both temporary and permanent effects (direct, indirect, secondary and residual).
- Assessment of interaction and cumulative effects.
- Assessment of duration and reversibility of these effects.
- Assessment against local, regional and national planning policy.
- Consultation with statutory and non-statutory consultees.

Significance criteria were based on the type of potential consequences, the probability of the consequence occurring, and the magnitude of the consequence as illustrated in Figure 1.1.

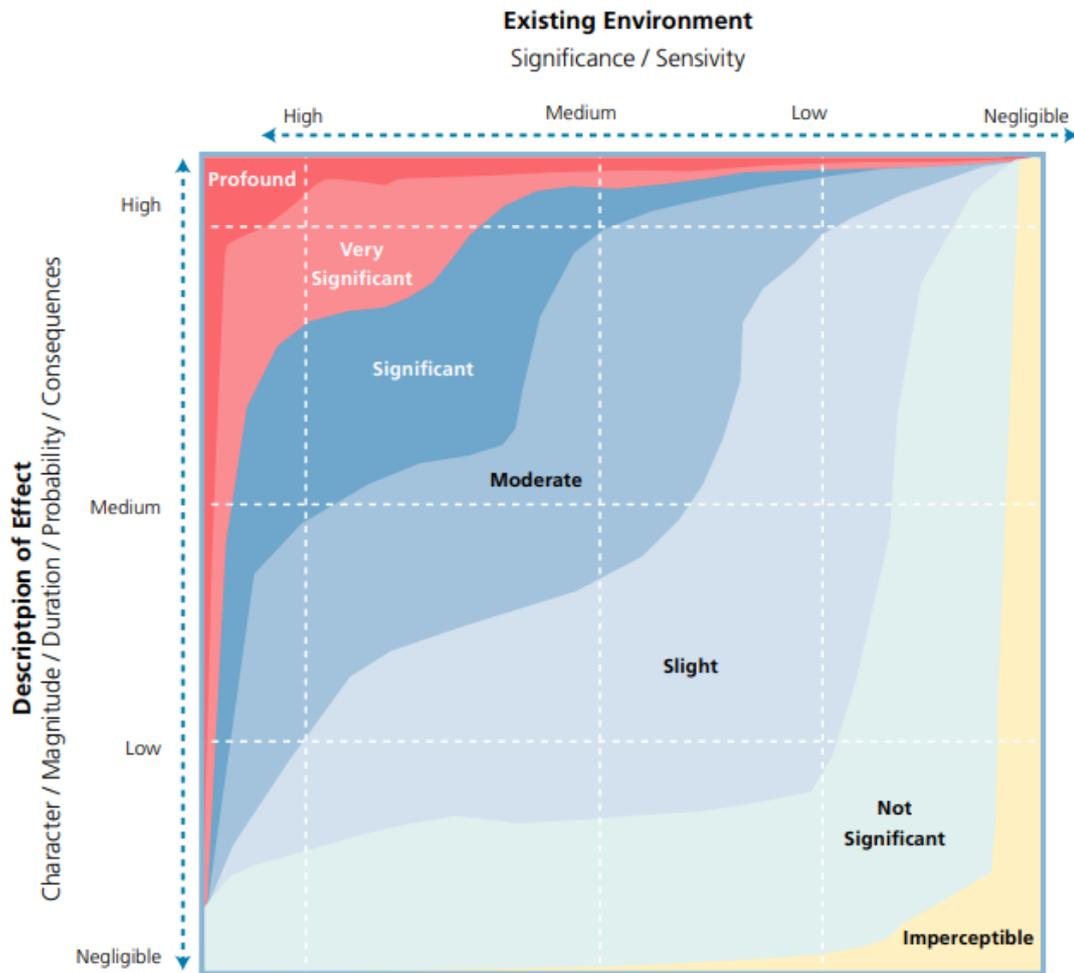


Figure 1.1: Chart Showing Typical Classifications of the Significance of Effects (EPA, 2022)

The cumulative effects of the Proposed Development, in conjunction with other proposed projects, were considered within each topic chapter. Relevant developments considered within the cumulative assessments include those which are:

- Under construction.
- Permitted, but not yet implemented.
- Submitted, but not yet determined.
- Identified in the Local Development Plan (and emerging Local Development Plans), recognising that much of the information for any relevant proposals is limited.

Each chapter further considers whether there are significant cumulative effects which are likely to arise as a result of interactions within topic chapters and/or as a result of the Proposed Development.

1.5.2.2. Mitigation and/or Compensation Measures

Where required, mitigation measures are identified and described within individual topic chapters. These are measures which could avoid, prevent, reduce and, where possible, offset likely significant adverse effects upon the environment.

1.5.2.3. Monitoring

Further to mitigation measures, appropriate and proportionate monitoring measures are also identified and summarised within individual topic chapters.

1.5.2.4. Conclusion on Likely Significant Effects

A conclusion by the authors of the EIAR on the likely significant effects of the Proposed Development on the environment, taking into account the results of the examination of the information presented in the EIAR is provided. In addition, a summary of the key impacts and mitigation and monitoring measures associated with the Proposed Development is provided, along with a discussion of cumulative impacts, interactions and inter-relationships between environmental topics. These will inform the reasoned conclusion to be made by the competent authority in conducting the Environmental Impact Assessment.

1.5.3. Structure of the EIAR

The EIAR has been structured in accordance with the European Commission's Guidance "Environmental Impact Assessment of Projects Guidance on the preparation of the Environmental Impact Assessment Report (Directive 2011/92/EU as amended by 2014/52/EU)" (2017).

This EIAR is broken down into the Chapters indicated in Table 1.1 overleaf. This format allows each environmental topic to be examined in one place and facilitates easy cross-reference to specialist studies undertaken as part of the assessment.

The EIAR is presented in three volumes of the application documentation, as follows:

- **Volume I** EIAR Non-Technical Summary
- **Volume II** EIAR Main Document
- **Volume III** EIAR Appendices

The following companies were involved in the preparation of the EIAR:

- RPS – Lead Environmental consultants.
- ADCO – Archaeology and Cultural Heritage.
- Savills – Population and Human Health.

The production of the EIAR has been co-ordinated by RPS.

Table 1.1: EIAR Chapter Structure Breakdown

| Chapter Number | Chapter Title | Additional Information |
|----------------|---|--|
| N/A | Glossary of Terms | Glossary of terms |
| Chapter 1 | Introduction | Introduction to the Proposed Development, purpose and function of the EIAR and methodology and structure of the EIAR. |
| Chapter 2 | Need for the Project | Description of the current baseline conditions at the Burrow and the objectives of the Proposed Development. |
| Chapter 3 | Project Description | Description of the Proposed Development being assessed through the EIAR. Includes a description of the site location. |
| Chapter 4 | Consideration of Alternatives | Summary of alternative options explored as part of the Proposed Development. Includes strategic level and project level options. |
| Chapter 5 | Project Scoping and Consultation | Summary of EIA Scoping and consultation was undertaken to date. |
| Chapter 6 | Coastal Processes | These Chapters address specific environmental factors and provide a description of the existing environment, the likelihood of effects, the significance of effects, remedial and mitigation measures, residual impacts and monitoring measures. The specific environmental factors considered, following Environmental Impact Assessment Scoping as described in Chapter 5 of the EIAR. |
| Chapter 7 | Noise and Vibration | |
| Chapter 8 | Flood Risk | |
| Chapter 9 | Water Quality | |
| Chapter 10 | Soils, Geology & Contamination | |
| Chapter 11 | Archaeology and Cultural Heritage | |
| Chapter 12 | Marine Biodiversity | |
| Chapter 13 | Terrestrial & Coastal Biodiversity | |
| Chapter 14 | Traffic and Transportation | |
| Chapter 15 | Air Quality and Climate | |
| Chapter 16 | Waste Management | |
| Chapter 17 | Material Assets and Land Use | |
| Chapter 18 | Landscape and Visual | |
| Chapter 19 | Population and Human Health | |
| Chapter 21 | Major Accidents & Disasters | |
| Chapter 22 | Cumulative Effects & Environmental Interactions | Summary of the assessment of cumulative effects which may arise from adjacent or nearby developments together with those predicted for the Proposed Development as well as the environmental interactions which have been examined within the individual technical assessment chapters. |
| Chapter 23 | Mitigation Measures | A summary of all mitigation measures proposed within the EIAR for all topics. |
| Chapter 2323 | Conclusions | Summary and Conclusions. |

2. NEED FOR THE PROJECT

Chapter 2 of the EIAR details the need for the Proposed Development and examines this in the context of relevant spatial planning policy having regard to international, national, regional, and local policy objectives.

2.1. Introduction

RPS were initially commissioned by FCC to assess the feasibility of a localised, small-scale coastal defence scheme to reduce the coastal flood risk that exists in the Rogerstown Estuary area. Following Storm Emma and several other arduous storm events in the winter period of 2017/2018 the position of the shoreline along the Burrow retreated by more than 20m in some areas. In recognition of the on-going risk of coastal erosion risk across the Burrow, the scope of RPS' commission was updated to include an assessment of the coastal erosion risk and to develop a suitable and sustainable coastal management plan to mitigate these risks in addition to the coastal flood risk.

Based on this revised commission, RPS subsequently undertook a detailed Coastal Erosion and Flood Risk Management (CFERM) study in line with a series of study objectives developed by the OPW as specified in Schedule A.1 of the CFERM guidance².

2.2. CFERM Report Findings

A summary of the findings of the Rogerstown Estuary CFERM study, and subsequent updates is outlined below.

2.2.1. Historical Coastal Change

A review of historical maps and orthophotography for the period 1973 and 2024 and provided insight into the evolution of the beach over a c.50-year period. Using historical trend analyses software developed by United States Geological Survey (USGS), RPS quantified the rate of coastal change along the Burrow. Based on this analysis it was concluded that some regions of this coastline continue to erode at a rate of between c.2m and 4m per year.

2.2.2. Coastal Erosion Assessment

Future coastal retreat over the next 50 years was assessed based on incremental sea level rise in line with the medium range future scenario recommended by the OPW whereby sea levels are expected to rise by +0.50m by 2100. In summary, the output of this assessment found that retreat of the coastline along the Burrow could result in between 17 and 243 buildings being lost to erosion over the next 50 years.

2.2.3. Coastal Flooding Assessment

² <https://www.gov.ie/en/publication/b15dd0-technical-specifications-and-guidance-notes/>

The potential for flooding from both combined tide and surge and wave overtopping was assessed under a range of return period and climate change conditions. In summary, the coastal flood risk assessment found that:

- The number of buildings at risk during a 1 in 200-year return period could increase from 9 under present day conditions to 82 or 29³ over the next 50 years depending on the rate of erosion.
- The coastal flood risk at the Burrow will be greatly exacerbated by the erosion of the existing dune system which currently acts as a natural flood barrier to the lower-lying hinterland.
- Coastal flooding could affect up to 50 buildings during a relatively modest 1 in 2-year storm event in 50 years' time only +0.25m of sea level rise.

When compared to the number of buildings affected by coastal erosion it is evident that coastal flooding poses a lower risk to the Burrow over the long term. However, it is important to recognise that the erosion of the existing dune system, including the shifting and fixed dune habitats that form part of the Rogerstown SAC along the Burrow, significantly increases the coastal flood risk by creating additional flood routes into the hinterland.

2.2.4. Economic Appraisal

An initial economic appraisal was undertaken following the guidance in "The Benefits of Flood and Coastal Defence: A Manual of Assessment Techniques" (Middlesex University, 2005). Based on this appraisal, the net present value of a scheme for the Burrow ranged between € -4.6 mil and € +80.8 mil depending on the assumed erosion rate and threshold for flooding.

This economic appraisal accounted for direct damages to land and property and applied standard OPW allowances for indirect damages to residential properties and for emergency services attendance but did not account for other damages/disruptions which could enhance the benefit of any scheme, including:

- Recreational gains and losses or intangible losses (i.e. loss of community etc).
- Road Traffic Disruption,
- Vehicle Damage,
- Post scheme increases in property values,
- Future development benefits.

The economic appraisal considered a range of erosion and flooding thresholds and three discount rates, and concluded that based on a 50-year life the proposed scheme would yield a Benefit Cost Ratio of greater than unity for 8 out of the 12 scenarios considered.

³ The number of properties affected by flooding under the higher erosion scenario drops as many properties are lost to erosion.

3. PROJECT DESCRIPTION

Chapter 3 of the EIAR describes the Proposed Development and provides information on the site, design, size, and other relevant features.

3.1. Location and Site Characteristics

The Proposed Development is located at the Burrow which is a sandy spit (depositional coastal landform that forms by longshore drift) that separates the outer Rogerstown Estuary from the Irish Sea as illustrated in Figure 3.1. The Burrow is fronted by a wide sandy beach and is bordered by rock headlands at Rush to the north and Portrane to the south.

The nature of the spit and beach is strongly influenced by the tidal action of the estuary and waves approaching the shoreline from the Irish Sea. Lambay Island, which lies around 5km east of the beach, also influences both the wave and tidal conditions. The beach at the Burrow is around 1.8km long, with a bathing area at its southern end that has been awarded Blue Flag status. It is a popular recreational location that offers many amenities to the public and tourists throughout the year.

The site is of HIGH conservation value owing to the range of Annex I species (subject of special conservation measures) and the Annex II habitats (subject of special conservation measures) for which it is designated as a Special Protection Area and Special Area of Conservation, a Natural Heritage area, a Ramsar Conservation Wetland and a Statutory Nature Reserve.

For more than a decade, the Burrow has been adversely affected by episodes of acute coastal erosion which were in turn driven by extreme storm events. In 2018 Storm Emma and a succession of other events resulted in the shoreline retreating by more than 20m along some sections of the Burrow. The coastal retreat during this episode was so severe that a private residential property had to be demolished some months later.



Figure 3.1: Location of the Proposed Development site at the Burrow, Fingal, County Dublin.

3.2. Proposed Development

The Proposed Development builds on the preferred option as identified in the initial RPS study (RPS, 2020) and is split into three areas, the northern extent of the spit at the end of Burrow Road, at Marsh Lane, and along Portrane beach. The Proposed Development, the extent of which is illustrated in Figure 3.2 consists of the following main elements:

- Construction of a c.190m long vegetated embankment at the end of Burrow Road. Construction of a c.130m long sheet piled flood wall and a c.200m embankment along Marsh Lane.
- Installation of back drainage behind the proposed defences with associated outfalls.
- Installation of non-return valves to existing outfalls to prevent backflow of water from the estuary.
- The construction of seven fishtail (or ‘Y’ shaped) groynes structures in combination with a beach renourishment scheme. These groyne structures will help control the longshore and cross-shore transport elements of the prevailing littoral drift along c.1.3km of the coastline of the Burrow.
 - Each groyne will extend seaward by approximately 70m at a spacing of c.175m to create seven sediment sub-cells along the Burrow. The total footprint of the proposed groynes will equate to c.1.36 hectares.
 - The beach renourishment will involve transporting dredged material from a licenced marine aggregate extraction site (presently assumed to be Liverpool Bay) to the Burrow and pumping

the material ashore to fill each of the seven sediment sub-cells created by the fishtail groyne structures.

The primary objectives of the Proposed Development are to:

- Provide effective coastal flood protection during a 0.5% Annual Exceedance Probability (AEP) event based on the Medium Range Future Scenario (MRFS) whereby sea levels are expected to rise by +0.50 m by 2100.
- Mitigate the ongoing coastal retreat along the beach frontage.
- Restore and enhance the recreational value of the natural beach amenity which has significantly deteriorated over recent years due to an overall loss of sand material from the beach.
- Enhance and protect the fixed and shifting dune systems that are qualifying features of the Rogerstown SAC which have been deteriorated by chronic and acute erosion over recent years.

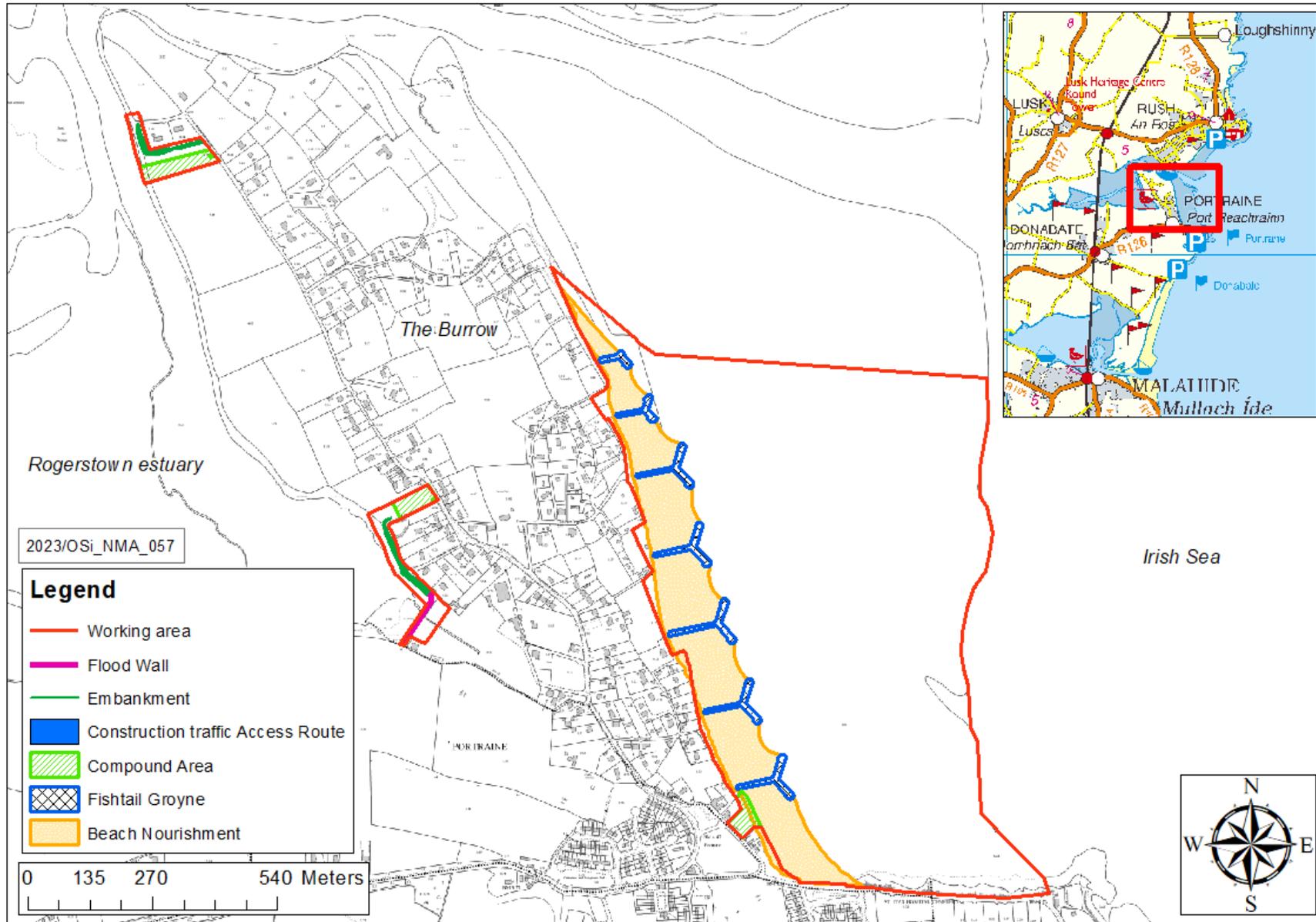


Figure 3.2: Overview of the Proposed Development at the Burrow, including Site Boundary and Working Areas.

3.2.1. Flood Embankments at Burrow Road & Marsh Lane

The function of the proposed flood embankment structures at Burrow Road and Marsh is to prevent coastal flooding caused by tidal inundation. An overview of the design details for these structures is listed below:

- The vegetated embankments will be constructed with 1 in 2.5 side slopes on both sides.
- The vegetated embankments will be constructed with a 1m wide create to allow for easy and safe access to inspect and maintain the embankment.
- The core will be comprised of suitable clay material which will be compacted within a trench to the sub-formation level.
- The embankments will be built up to the design crest level of 4.02mOD using compacted layers of suitable granular fill to SHW Series 600.
- The embankments will be covered by topsoil and seeded to promote the growth of vegetation.

3.2.2. Flood Wall at Marsh Lane

The function of the proposed flood wall structure at Marsh Lane is to tie into the proposed flood embankment (see previous section) and prevent coastal flooding caused by tidal inundation. An overview of the design details for this structure is listed below:

- The c.130m flood wall will consist of sheet piling to the defined defence level with a concrete strip foundation to support the cladding on both sides.
- The sheet piling will be completed with coping detail along the crest.
- Based upon preliminary ground investigation work, the toe depth is likely to be in the region of -10mOD. This should be confirmed at the detailed design phase.
- Facing panels or cladding can be implemented if required to give the appearance of a concrete or masonry wall.
- Back drainage will be installed at the dry side of the piled flood wall.

3.2.3. Fishtail Groyne Structures

To limit the loss of beach renourishment material along the beach and to provide wave protection to the coast, the Proposed Development includes the construction of seven fishtail groyne structures along c.1.3km of the beachfront. An overview of the design details for these structures is listed below:

- Each groyne structure will extend seaward for approximately 70m, before splitting into a “fishtail” or a “Y-shape”. Each groyne will then extend seaward for an additional c.40m at a 120° angle.
- The core of the c.70 trunk of each groyne will be constructed by re-using the existing seabed units which are already on the beach.
- The landward edge of each groyne structure will be constructed 10m seaward of the coastline to facilitate pedestrian access along the upper foreshore.

- The seabee units will be placed on a bedding layer and a 0.3 – 1.0T underlayer, separated from the beach using a heavy-duty geotextile.
- A single layer of 0.3 – 1.0T rock armour will be placed over the Seabee units at a slope of 1:1.5.
- The fishtail structures will be constructed exclusively of rock fill and rock armour (i.e. no seabee units).
- The filter layer of each fishtail structure will be placed onto and wrapped in a heavy-duty geotextile.
- The crest level of each groyne structure will be constructed to c.4.25mOD at the shoreline and slope to c.2.85mOD at the seaward side of the fishtails.
- The fishtails will be constructed with a consistent crest level of c.2.85mOD.

The total footprint of the seven groyne structures equates to c.13,615m², whilst approximately 42,000T of rock armour/core material will be required to construct the seven groynes (subject to detailed design).

3.2.4. Beach Renourishment

Upon completion of the groyne structures, the areas between will be filled with beach renourishment material imported from a licenced marine aggregate extraction site (presently assumed to be Liverpool Bay). Based on present-day beach levels, it is envisaged that c.425,000m³ of material will be required to achieve the required beach profile. The renourished beach profile has been designed to provide a c.25m flat upper foreshore at 3.00mOD before sloping down to meet existing beach levels.

3.3. Preliminary Construction Programme

A preliminary construction programme taking into consideration environmental constraints (i.e. no construction during the wintering bird period (October to March)) and necessary phasing of the works has been estimated at 23 weeks.

4. CONSIDERATION OF ALTERNATIVES

Assessment of reasonable alternatives is mandatory under the EIA Directive. The process allows for adjustment to minimise overall environmental impact thus minimising significant effects on the environment.

Alternatives are defined as different ways of carrying out a Project in order to meet its agreed objective(s). There are a range of alternative types that can be considered in relation to a Project, relating to, design, technology, location, size and scale.

The assessment of alternatives for the EIAR was undertaken in accordance with the following guidance documents:

- The EU Commission's *Environmental Impact Assessment of Projects Guidance on the Preparation of the Environmental Impact Assessment Report* (Directive 2011/92/EU as amended by 2014 /52/EU).
- The Department of Housing, Planning and Local Government's *Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment* (August 2018).
- *Guidelines on the information to be contained in Environmental Impact Assessment Reports* (EPA, 2022).

The assessment of alternatives included consideration of the avoidance, prevention, reduction, or offsetting of adverse environmental effects, at a number of levels including:

- Those assessed at the plan stage (which the EU guidance states "*it would likely be unnecessary to consider them again*") and
- Those assessed at design stage (which the EU guidance describes as "*alternatives or variants of Project components in order to mitigate significant environmental impacts that emerge during assessment*").

4.1. Examination of Strategic Level Alternatives

At a strategic level, the following planning policy document was used to inform the development and selection of the Proposed Development:

- Fingal Development Plan 2023 – 2029, Interim Publication (FCC, 2023).

This plan recognises that the coast is an ever-changing dynamic environment, subject to the continuous natural processes of erosion and deposition. It also recognises that there are several available strategies in respect of coastal zone management best practice, including No Active Intervention (i.e., 'Do Nothing'), Hold the Line, Managed Realignment and Managed Retreat. Given the finite space available at this site, all policies except hold the line were not considered technically feasible solutions.

From a social perspective, any policy other than hold the line would result in a very significant impact to the community of Portrane, particularly for those landowners directly affected by coastal erosion. Any strategy other than hold the line would also result in very significant adverse impacts on the wider local economy in context of the local housing market and valuations of property etc. This is a particularly important consideration given that at present there is no national strategic policy in Ireland regarding relocation, buy-back, and/or buy-out programs

to facilitate compensation of local residents, landowners and/or local communities affected by a strategy of managed retreat.

Based on the technical, socio-economic and legislative challenges and impacts associated with other management policies, hold the line was considered the only viable solution for the risk posed to the Burrow.

4.2. Examination of Project Level Alternative Options

Having identified “Hold the Line” as the most sustainable coastal zone management strategy to mitigate the very extensive coastal erosion and flooding risk at the Burrow, RPS undertook an extensive appraisal to examine the feasibility of a long list of hard and soft engineering measures (RPS, 2020). Each option was appraised to produce a short list of options. This initial appraisal was based on the following criteria:

- **The Environment** - The proposed option must not adversely impact the natural environment including existing coastal process. Nor will the proposed option negatively impact nearby environmentally designated areas.
- **Society** - The proposed option must effectively reduce the damages/losses associated with the predicted coastal flood and erosion risk.
- **The Economy** - The cost of constructing and maintaining the proposed option has the potential to be financially viable, i.e. the benefits of an option should outweigh the costs of an option.

4.3. Summary of Consideration of Alternative Options

At a strategic level, the Fingal Development Plan provides a number of key aims and objectives in relation to coastal protection and coastal development. Building upon the themes laid out in this plan, the Proposed Development is considered the only option that represents a sustainable and technically effective solution to mitigate the extensive coastal flooding and erosion along the Burrow.

Other coastal zone management strategies were considered including No Active Intervention, Managed Realignment and Managed Retreat. However, these strategies were ruled out on the basis that they did not achieve the Proposed Developments objective of mitigating the coastal flood or erosion risk across the Burrow.

At the project level, an extensive optioneering exercise was undertaken to identify potential alternative “Hold the Line” options. This included a high-level appraisal of a long list of hard and soft coastal engineering measures. The resulting short list of options was then considered as part of a Multi-Criteria Analyses (MCA) to identify feasible options that could be used to develop an overall coastal management plan for the Burrow. Based on this assessment, only one potentially viable alternative option was identified.

An alternative option involved mitigating the coastal erosion risk by constructing a new c.1,250m rock revetment along the Burrow coastline *in lieu* of the seven fishtail groynes and beach nourishment as per the Proposed Development was identified. This was discounted on the basis that it would interrupt the natural exchange of sediment between the dune system and the foreshore and result in significant beach squeeze and impact nearby environmentally designated areas. Furthermore, the anticipated beach squeeze and loss of foreshore would have a significant and irreversible impact on the public amenity value of Portrane beach and the overall area.

In summary, the Proposed Development was considered the only option that achieves the Proposed Developments objectives of mitigating the significant coastal flooding and erosion risk posed to the Burrow, whilst maintaining the high public amenity of a useable beach area and minimising potential environmental impacts to nearby protected areas.

5. PROJECT SCOPING & CONSULTATION

5.1. Introduction

The Proposed Development was brought forward for implementation based on the duties of FCC and requirements of the Local Development Plan. A process of early consultation enabled FCC to solicit opinions on general development options and facilitated the consideration of differing perspectives in the initial stages of the Proposed Development.

Scoping for the Proposed Development was undertaken in accordance with the European Commission's 2017 "Environmental Impact Assessment of Projects Guidance on Scoping". The scoping process identified the sources or causes of potential environmental effects, the pathways by which the effects could happen, and the sensitive receptors, which were likely to be affected. It defined the appropriate level of detail for the information to be provided in the EIAR.

In relation to consultation, the EIA Directive, implementing legislation and guidance documentation make clear that there are specific requirements regarding the use of the EIAR, both as a tool to inform concerned stakeholders and the public, as well as to make decisions regarding development consent for projects. Accordingly, the EIAR provides evidence of effective consultations which have already taken place and provides the basis for effective consultations to come.

5.2. Scoping

5.2.1. Scoping Approach

An EIA Scoping Report, developed by RPS, was submitted to An Bord Pleanála in August 2021, accompanied by a request for a Scoping Opinion. A subsequent EIA Scoping Opinion was received from An Bord Pleanála in February 2022.

5.2.2. Scoping Responses

An Bord Pleanála distributed the EIA Scoping Report to a variety of statutory consultees for a Scoping Opinion. Only two responses were received, one from the Department of Housing, Local Government and Heritage – Development Applications Unit and one from the Department of Agriculture, Food and the Marine – Marine Engineering Unit. RPS shared all feedback from the Scoping Opinion and consultation process with each of the chapter lead authors to ensure all feedback was incorporated into the EIAR. Based on the Scoping Opinion response, additional ecology surveys were undertaken to further inform the impact assessment of the Proposed Development on terrestrial and coastal biodiversity.

6. COASTAL PROCESSES

6.1. Introduction

Chapter 6 of the EIAR describes the assessment of coastal processes via an extensive programme of computational modelling. Baseline models were checked against a range monitoring data specific to the Proposed Development and subsequently used to assess the construction and operational impacts of the Proposed Development. This was undertaken using RPS' in-house suite of coastal process modelling software.

In respect to coastal processes, the potential impacts during the construction phase include:

- The dispersion and settlement of sediment plumes generated during beach nourishment.
- The impact from wave and current dynamics were considered significantly less than operational phase impacts.

The potential operational impacts identified include:

- Changes to the tidal regime or inshore wave climate.
- Sediment dynamics and the morphological response to the Proposed Development.

These potential impacts were assessed by comparing the differences between the post and pre-Proposed Development conditions. The likelihood for significant impacts was then determined by considering these differences in relation to monitoring data specific to the Proposed Development.

6.2. Construction Phase Impacts

Model simulations assessed the potential construction phase impacts of the beach nourishment works. This assessment found that:

- The process of beach renourishment unavoidably results in the loss of sediment material to the water column; results showed the maximum suspended sediment concentrations (SSCs) during the beach renourishment campaign can, at times, reach very high levels within the immediate vicinity of the discharge pipeline. This can be attributed to the fact that the nourishment material is transferred from the barge by pumping water through the hopper, which mobilises the sediment material for pumping ashore in the form of a very high concentration sand/water mixture.
- The *average* total SSCs do not generally extend for more than c.600m beyond the discharge locations, with the highest values typically limited to within c.200m of the discharge locations.
- No beach nourishment material settles onto the seabed beyond the immediate foreshore area at the Burrow.

6.3. Operational Phase Impacts

In respect to the operational phase impacts of the Proposed Development, results from the model simulations found that:

- The Proposed Development will have very little effect on tidal currents outside of highwater times, with no notable changes to the tidal regime were detected outside the immediate vicinity of the Proposed Development.
- There was a substantial change to the significant wave heights during extreme storm events, but no discernible changes to the wave climate in surrounding areas, including at Rush beach or within the Rogerstown estuary.
- There were no discernible changes to the rate of sediment transport in the surrounding area, other than a very modest decrease in sediment transport rates at the northern extent of the Burrow that is considered beneficial.
- There was a significant reduction in sediment transport rates during storm events as a result of the Proposed Development.
- The change in beach profile results in an increase in sediment transport seaward of the Proposed Development due to wave breaking during storm events.

6.4. Mitigation Measures and Residual Effects

The Proposed Development has been designed, as far as practical, to minimise the impacts on coastal processes beyond the immediate area the scheme is intended to protect thus minimising any residual effects.

The mitigation recommended is limited to;

- requiring the appointed contractor to develop a Construction Environmental Management Plan (CEMP) in order to avoid potential environmental impacts whilst working within a Special Area of Conservation and Special Protection Area.
- Undertaking the works associated with the construction of the fishtail groynes at exposed low tides using land-based plant, therefore negating the need to work within the water column.
- Undertaking the beach renourishment activities after the construction of the fishtail groynes to reduce the rate of sediment losses to the marine environment.

There are no mitigation measures proposed as part of the operational phase of the Proposed Development.

Beach nourishment is considered a “soft” nature-based solution and sediment material will gradually be lost between the groyne structures; it is therefore expected that future beach renourishment campaigns will be undertaken as per the original construction methodology.

On the basis that the appropriate mitigation measures are fully implemented during the construction and operational phases, the impact of the Proposed Development on coastal processes is considered to be imperceptible.

7. NOISE & VIBRATION

7.1. Introduction

Chapter 7 of the EIAR discussed the potential impacts and likely significant effects of noise and vibration associated with the Proposed Development. These were assessed against noise sensitive receptors including residential, industrial and commercial premises identified through a baseline noise monitoring survey.

Noise and vibration were assessed solely for the construction phase of the Proposed Development, as no new significant noise or vibration sources are introduced to the environment during the operational phase. The potential significant noise and vibration sources during the construction phase include:

- Bulk earthworks - excavation and preparatory groundworks at the Burrow to facilitate the construction and positioning of the groyne structures, movement of materials to facilitate the construction of embankments;
- Installation of new walls and embankments;
- Groyne Construction; and
- Beach Nourishment (Collection, transportation and depositing of dredged sediment to nourish beach).

7.2. Construction Phase Impacts

During the construction phase, the methods of working will comply with all relevant legislation and best practice in reducing the environmental impacts of the Proposed Development. Overall, it was concluded that there was the potential for Moderate to Major significant impacts arising from the Proposed Development during the construction phase without mitigation, however these effects will be temporary in nature.

There are several proposed and permitted developments in the area around the Proposed Development. However, due to the distance of these other developments it is unlikely that cumulative construction noise impacts will arise. Hence cumulative construction impacts are predicted to be temporary minor.

7.3. Operational Phase Impacts

Operational noise was not assessed as there are no new significant noise sources associated with the operation of the Proposed Development.

Similarly operational vibration has not been included as there are no new significant vibration sources associated with the Proposed Development.

7.4. Mitigation Measures and Residual Effects

During the construction phase, the following mitigation measures should be implemented so that noise and vibration targets are not exceeded:

- Construction scheduling should be planned to minimise overlap in construction activities and carefully control activities when being carried out close to sensitive receptors.

- A detailed CEMP, including a specific Noise Management Plan, prepared by the appointed contractor should specify the mitigation measures that will be employed to reduce the noise and vibration impacts of the development during the construction phase.
- Engagement with community stakeholders on the timing, duration and type of activities that need to be carried out is required, along with a commitment to specific hours of work and the use of quiet work methods such as the selection of low-noise plant and operating methods.
- Temporary noise barriers should be used as an effective method of construction noise management and control.

With mitigation measures in place temporary slight adverse impacts due to construction noise have been identified at the closest receptors to proposed construction works. No permanent residual noise and vibration impacts are predicted to arise from the construction of the Proposed Development. Therefore, no significant residual effects will arise.

8. FLOOD RISK

8.1. Introduction

Chapter 8 of the EIAR addresses the potential impact of the Proposed Development on flood risk within the study area. Baseline flood conditions were established, which that under present day conditions up to 82 properties could be flooded at the Burrow during a 1 in 200-year storm event. Flood risk at the Burrow was identified as very sensitive to future sea level rises caused by climate change.

8.2. Construction Phase Impacts

Works within the Rogerstown Estuary are unavoidable, during construction, there will be a risk of flooding to the construction works from extreme tidal events that will need to be managed. Impacts would include flooding of the works, flooding of plant and machinery, and a risk to construction workers.

Without mitigation, the magnitude of impact can be considered medium adverse during construction.

8.3. Operational Phase Impacts

One of the primary objectives of the Proposed Development is to provide effective coastal flood protection, therefore flood protection can be considered as 'Primary mitigation' as it is an inherent part of the Proposed Development and does not require additional action to be taken. The design standard used for the Proposed Development was a 1 in 200-year event with an allowance for future climate change outlook (2050). The Proposed Development will not be adversely affected during extreme tidal events as it has been designed for these events. The proposed new groynes, beach renourishment and flood defences will not increase the risk from coastal flooding elsewhere. Infilling of the coastal floodplain will have a negligible effect on the extent of the coastal floodplain, now or in the future, considering anticipated climate change.

8.4. Mitigation Measures and Residual Effects

Temporary works may be required to prevent coastal waters interacting with works activities throughout the duration of the construction period. Met Éireann provide a weather warnings alert service which can be used during construction to manage the risk of flooding to the works from extreme events.

'The Planning System and Flood Risk Management Guidelines' classify different types of development in terms of their vulnerability class. 'Flood control infrastructure' is classed as a 'Water-compatible development'. 'Water-compatible development' is appropriate in all flood zones and therefore a Justification Test is not required.

There will be a residual flood risk as the flood defences may be exceeded by a flood that is greater than that which they were designed to resist. However, the defences have been designed to a good standard of protection hence the residual risk is therefore low. Overall, the operational residual effects can be deemed to be positive and not significant in terms of flood risk by reducing the risk to properties at the Burrow.

After considering the mitigation proposed during construction, any impact on the working area would likely be temporary and managed through monitoring of the weather forecast. The residual effect is therefore considered very significant and beneficial by reducing the coastal flood risk in the area to residents.

9. WATER QUALITY

9.1. Introduction

Chapter 9 of the EIAR addresses the potential impact of the Proposed Development on water quality at the Burrow in terms of the receiving environment and Water Framework Directive (WFD) compliance. The baseline water quality was defined through desk-based assessment and consultation with relevant statutory organisations. Information on the water bodies that could potentially be impacted was collated from the most recent published information from the WFD monitoring programme ensuring the potential impact from the Proposed Development was considered based on the most up to date information on water quality. The principal aim of the water quality assessment was to ensure that the Proposed Development did not compromise the achievement of the environmental objectives of the affected water bodies as established under the WFD.

The Proposed Development at The Burrow is located within two surface water bodies: 'Rogerstown Estuary' transitional water body and 'North-western Irish Sea' coastal water body. The 'Ballyboghil' river water body is situated upstream of the works. The overall WFD Water Quality Status (2016-2021) for the relevant water bodies is:

- Rogerstown Estuary transitional water body – 'Poor'
- North-western Irish Sea coastal water body – 'Good'
- Ballyboghil river water body – 'Poor'

9.2. Construction Phase Impacts

The potential construction phase impacts include increased suspended solids in the water environment, and potential risks to water quality and WFD objectives as a result of pollution from concrete, oils and other chemicals. The magnitude of the impact associated with construction phase was considered to be large adverse. The significance of the environmental effect is therefore profound in the absence of mitigation based on the extremely high sensitivity of the receiving environment.

9.3. Operational Phase Impacts

The structures proposed to protect against coastal erosion have the potential to cause changes in coastal processes and impact on morphological conditions of the Rogerstown Estuary and the North-western Irish Sea coastal water body, therefore potentially impacting on their ecological status. In accordance with the modelling undertaken in support of the Proposed Development, hydromorphological changes would have negligible impacts and therefore the significance of effect was assessed to be imperceptible on these water bodies. The maintenance will require some beach nourishment works periodically but the impact on water quality has been assessed to be negligible and the significance of effect is therefore imperceptible.

9.4. Mitigation Measures and Residual Effects

Proposed mitigation measures include careful management, implementation and adherence to best practice guidelines during construction particularly when working in the vicinity of water features within the site which are

connected to the downstream water bodies identified above. The significance of the effects for the operational phase have been assessed as imperceptible and therefore mitigation is not required.

An assessment of the significance of the residual impacts for the construction and operational phases of the Proposed Development with the implementation of the mitigation measures proposed, resulted in a residual impact considered to be negligible with the likely significant effects on the objectives of the water bodies affected assessed to be imperceptible.

There are also no likely significant effects from the Proposed Development during the construction and operation which would result in either positive or negative cumulative effects with other developments on the existing water resource in the area.

10. SOILS, GEOLOGY & CONTAMINATION

10.1. Introduction

Chapter 10 of the EIAR addresses the potential impact of the Proposed Development on the soils, geology and hydrogeology of the site and surrounding areas. A Preliminary Risk Assessment (PRA) Desk Study was prepared to examine the potential for ground contamination to be present on the site. This considered the potential for both current and historical onsite and off-site contamination sources. The desk study concluded that no significant pollutant linkages are considered to be present within the study.

A ground investigation was carried out between January and March 2022, with in-situ testing including boreholes, groundwater monitoring and environmental laboratory testing. Results obtained were used to examine the ground conditions of the site and assess the potential effects of the construction and operation phase of the Proposed Development.

10.2. Construction Phase Impacts

The impact of the development on groundwater dynamics is considered to be negligible as there will be no significant earthworks which would impact quality or flow.

10.3. Operational Phase Impacts

The operational impacts of the Proposed Development on groundwater quality and flow are considered to be negligible as the PRA has not identified a risk to human health through an active pollutant linkage. No new sources of contamination will be introduced by the proposed coastal protection scheme during operation. The operational impacts of the Proposed Development on groundwater quality and flow are considered to be negligible as the end use will not include any live activities such as excavation. There may be localised changes of groundwater flow around the piling for the flood walls which would be minor, with groundwater back drainage included in the design to facilitate water flow. Overall, a medium beneficial effect has been identified for soils and geology due to the reduction of soil erosion along the Burrow coastline.

10.4. Mitigation Measures and Residual Effects

No specific mitigation measures are proposed for the Proposed Development due to the negligible impact on the environment.

After establishing the sensitivity of the baseline environment, assessing the magnitude of impact during construction and operation, and then considering mitigation measures, no likely significant adverse effects upon the environment have been identified. A medium beneficial effect has been identified for soils and geology due to the reduction of soil erosion along the Burrow coastline.

There are no developments within the surrounding area which may interact with the Proposed Development in terms of geology and soils.

11. ARCHAEOLOGY & CULTURAL HERITAGE

11.1. Introduction

Chapter 11 of the EIAR addresses the potential impact of the Proposed Development with respect to archaeology and cultural heritage assets within the Study Area at the Burrow, based on desktop review and intertidal archaeology survey carried out by the Archaeological Diving Company (ADCO).

There is a series of known archaeological sites in proximity to the development, but only two sites may be described as being adjacent to the development: a chapel site and a Holy Well site.

The intertidal archaeology survey recorded two additional sites, a jetty and slipway at the north end of the Burrow, and a sea wall at Quay Road. The sea wall lies within the development area.

11.2. Construction Phase Impacts

The construction of the groynes represents a direct and permanent impact on the foreshore. However, there are no known shipwreck material or associated archaeological features within the area of the groyne construction and consequently there will be no impacts on known archaeological assets at this location. The potential remains for the construction works to expose previously unrecorded archaeological features, such as buried shipwreck remains or other features that can occur on the foreshore. It was therefore recommended that any excavation and seabed/ground disturbance works are monitored archaeologically to ensure the opportunity is taken to record and recover any material of archaeological interest that may be exposed in the course of the groyne construction.

11.3. Operational Phase Impacts

No potential impacts to heritage assets are expected to occur during the operational phase as archaeological material will be exposed during the construction phase.

11.4. Mitigation Measures and Residual Effects

The following mitigation measures are recommended:

- Prior to construction works commencing, an archaeological photographic record survey of the concrete retaining wall on Marsh Lane should be completed, to provide a permanent record of the wall before it is demolished.
- Fencing will be erected at the chapel site and Holy Well prior to construction proceeding to ensure that no impacts, direct or indirect, occur at the protected sites.
- Archaeological monitoring will be carried out by suitably qualified and experienced maritime archaeological personnel licensed by the Department of Housing, Local Government and Heritage. Archaeological monitoring is conducted during all terrestrial, inter-tidal/foreshore and seabed disturbances associated with the development.

- In the event of archaeologically significant features or material being uncovered during the construction phase, machine work will cease in the immediate area to allow the archaeologist(s) to inspect any such material.
- Once the presence of archaeologically significant material is established, full archaeological recording of such material will be recommended. If it is not possible for the construction works to avoid the material, full excavation will be recommended. The extent and duration of excavation will be a matter for discussion between the client and the licensing authorities.

It is not anticipated that archaeological material will come to light as a residual effect of the Proposed Development because the archaeological risk will be resolved during the archaeological monitoring that will be carried out during the construction phase.

However, in the event that new archaeological material is exposed during construction, such finds must be reported to Fingal County Council and the National Monuments Service.

12. MARINE BIODIVERSITY

12.1. Introduction

Chapter 12 of the EIAR addresses the potential impact to key marine biodiversity receptors of relevance to the Proposed Development during the construction and operational phase. In this context, marine biodiversity refers to the variety of life in the water column or on and in the seabed. This may include various commercially and ecologically important fish, crustaceans, molluscs, marine mammals, and also includes seabed habitat types. The marine biodiversity at the Burrow was characterised through a variety of desktop data sources, and site-specific surveys across the Rogerstown Estuary. The desktop review and survey results indicated the presence of a range of fish (including shark and ray), with spawning or nursery grounds in the vicinity of the Proposed Development and in the wider Rogerstown Estuary, along with shellfish, marine mammals, and a variety of habitat types.

A number of potential impacts on habitat types, fish and shellfish, and marine mammals, associated with the construction and operational phases of the Proposed Development were assessed. These included temporary, direct habitat loss; increased suspended sediments; injury/disturbance from underwater noise; changes in prey availability; and long-term habitat loss. All these impacts resulted in predicted effects of either negligible or moderate adverse significance.

12.2. Construction Phase Impacts

Benthic ecology receptors have negligible potential to be affected on a temporary timescale by habitat loss during the construction, operational and maintenance phases, of the installation of walls and embankments. During the construction phase, benthic ecology receptors also have the potential to be negligibly affected by the beach renourishment and groyne works due to an increase in suspended sediments, while long-term habitat loss has the potential for minor adverse effect on benthic ecology receptors.

Fish and shellfish receptors have the potential to be negligibly affected by temporary, direct habitat loss; increased suspended sediments; injury/disturbance from underwater noise; and direct disturbance from underwater noise.

Marine mammal receptors have the potential to be negligibly affected by increases in suspended sediments, injury/disturbance from underwater noise, direct disturbance from underwater noise, and from changes in prey availability.

12.3. Operational Phase Impacts

During the operational phase fish and shellfish receptors and marine mammal receptors have the potential to be negligibly affected by temporary habitat loss due to beach renourishment through the smothering of sediments and associated species under the deposited material. This is expected to be of short term and temporary nature, having a medium reversibility through hydrodynamic reworking of sediments over time.

The presence of groyne structures during the operational phase of the Proposed Development will cause long-term habitat loss and represent a change from intertidal baseline sedimentary habitats to hard substrates. However, only c.2.5% of the Rogerstown Estuary SAC is subject to this permanent loss.

Hard substrates exist in the SAC, and it is considered that some of these hard substrate communities will extend to, and colonise, the groynes. Particularly on soft sediment shores, new hard substrate can be colonised by species previously absent and species richness can increase with the age of rock groynes. The sensitivity of benthic habitat receptors within the direct spatial footprint of the groyne construction is considered **high**. However, based on a low magnitude of impact and high sensitivity of receptors, the significance of the effect of long-term habitat loss on benthic intertidal habitats is predicted to be of moderate significance.

12.4. Mitigation Measures and Residual Effects

No mitigation is required based on the evidence available. As no mitigating measures have been proposed for marine biodiversity, residual effects remain moderate. Cumulative effects are negligible, with the only other planned development in the vicinity of the Burrow being the Flood Relief Scheme (FRS) proposed at Rush south (north of the Rogerstown Estuary). Subject to detailed design and planning, it is intended that construction for the Proposed Development at the Burrow will not coincide with the construction for the proposed works at Rush South, the intent is for the two projects to be completed consecutively, so that the area impacted at any one time is reduced and that marine species are not displaced from two areas at once.

13. TERRESTRIAL & COASTAL BIODIVERSITY

13.1. Introduction

Chapter 13 of the EIAR presents the Ecological Impacts Assessment, both in terms of the terrestrial aspects and surrounding coastal and marine habitats, as relevant to adjacent designated sites for the Proposed Development. Ecological constraints within the study area were identified by means of the following:

- Identifying the Zone of interest (Zol) of the Proposed Development on the natural environment.
- Establishing the baseline with regard to terrestrial and aquatic habitats, ecotopes, flora and fauna (volant and non-volant mammals, invertebrates, avifauna etc.) within the Zol.
- Ascertaining the potential impacts upon all ecological receptors within the development footprint and Zol to include, but not be limited to, species protected under the European and National Legislation, including the EU Habitats and Birds Directives and Irish Wildlife Acts (1976 to 2012, as amended).

Potential effects upon sites designated for their nature conservation value were considered, principally this included the Rogerstown Estuary SAC, Rogerstown Estuary SPA, North-west Irish Sea SPA, Rockabill to Dalkey Island SAC, Lambay Island SPA, Lambay Island SAC and Rockabill SPA. With sites further afield considered where relevant as the Proposed Development site is hydrologically linked with these sites via adjacent marine waters.

13.2. Construction Phase Impacts

The Proposed Development will give rise to a range of potential adverse impacts to designated sites, in the absence of mitigation, including the loss of habitat, spread of invasive species, potential for release of construction phase sediments and pollutants into the marine and estuarine waters, aerial noise and visual disturbance, underwater noise and vibrational disturbance, and altered coastal processes.

Significant adverse impacts during the construction phase were predicted to arise at three sites designated on account of their natural heritage or conservation interests, namely the Rogerstown Estuary SAC, Rogerstown Estuary SPA and Rogerstown Estuary pNHA.

Identified potential impacts to the Rogerstown Estuary SAC, SPA and pNHA designations during the construction phase were:

- Loss of Annex I habitat within the footprint of the proposed flood walls, embankments, fishtail groynes and beach nourishment as a result of construction.
- Decrease of foraging and roosting habitat for bird populations.
- Potential for environmental toxicity to impact species if water quality deteriorates.
- Limited potential to spread invasive species through construction works.

Potential impacts to the Rockabill to Dalkey Island SAC designations during the construction phase include the potential for auditory injury to harbour porpoise originating from or otherwise associated with the Rockabill to

Dalkey Island SAC. The Proposed Development was not expected to significantly impact upon the Rockabill SPA due to the small populations that make use of the site for foraging habitat.

Remaining designated sites within the local area are significantly spatially separated from the Proposed Development and in addition there is a lack of hydrological connections to such sites and an associated lack of impact pathways. On this basis it was considered that there was no potential for the Proposed Development to give rise to significant effects upon any further designated sites at construction phase.

Construction phase impacts to habitats within the site were considered to be largely limited to the direct loss of habitat required to facilitate the Proposed Development, whether temporary or permanent.

The construction phase of the Proposed Development has the potential to give rise to major adverse and significant effects upon wintering bird populations of special conservation interest and national importance within the Study Area as a result of habitat loss. Likewise impacts can be expected for non-breeding bird species populations as well as nesting and foraging populations that utilise the site outside of the wintering period.

13.3. Operational Phase Impacts

Potential impacts to the Rogerstown Estuary SAC, SPA and pNHA designations during the operational phase include:

- Potential enhancement of Annex I habitats including areas of annual vegetation of drift lines, embryonic shifting dunes and shifting dunes along the shoreline with *Ammophila arenaria*, through decreased susceptibility to coastal erosion.
- Qualifying interests of the designated sites are not likely to suffer adverse effects associated with any small-scale and localised changes to sediment transport regimes which would arise as a result of the Proposed Development.

It was considered that no further operational phase adverse effects upon qualifying habitats within the Rogerstown Estuary SAC, SPA or pNHA as a result of altered coastal processes will occur. Effects are predicted to be negligible and not significant.

No potential significant effects were expected for the Rockabill to Dalkey Island SAC and Rockabill SPA given their distance from the Proposed Development.

The Proposed Development at operational phase will have extremely limited potential to give rise to adverse effects upon habitats as it will involve the ongoing functioning of flood defence structures, which will not cause significant effects to sediment transport regimes within intertidal habitats. Proposed flood walls and embankments would only interact with tidal waters during rare periods of coastal flooding and as such would not interfere with typical coastal processes within the estuary. Proposed groynes and associated beach nourishment is not predicted to give rise to significant changes to coastal processes beyond the immediate vicinity of the proposed infrastructure, as such no significant operational phase effects upon estuarine and intertidal habitats within the site are predicted to arise as a result of the Proposed Development.

No other operational phase pathways for effects upon habitats are predicted to arise as a result of the Proposed Development.

13.4. Mitigation Measures and Residual Effects

A range of mitigation measures will be put in place to ensure that potential releases to the marine environment are minimised or eliminated where possible, in addition to further construction phase measures including the appropriate management of invasive species and timing of works. Residual impacts upon the Rogerstown Estuary SAC and SPA will still arise as a result of small-scale habitat losses which are to occur at construction phase.

Residual effects on natural heritage and biodiversity as a result of the Proposed Development are limited to **major adverse** and **significant** effects associated with the loss of Annex I habitats of the Rogerstown Estuary SAC and loss of areas of foraging habitat for SCI bird populations of the Rogerstown Estuary SPA.

14. TRAFFIC & TRANSPORTATION

14.1. Introduction

Chapter 14 of the EIAR compares the baseline transport conditions against the development proposals to establish the impacts of the extent of the area of influence. The Proposed Development Study Area in relation to traffic and transport considered the road network impacts along Burrow Road and R126, as these will comprise the primary construction traffic route to and from the Proposed Development site. No additional operational changes are proposed to the site, and therefore no additional operational assessment of the site is being undertaken, as operational trip generation for the area would remain unchanged.

14.2. Construction Phase Impacts

The construction phase was proposed to last 23 weeks, and it was that delivery of materials to the site would occur uniformly over the construction period. The Proposed Development was estimated to require a total of 39 staff across the three elements, the flood wall, the embankment and the groyne structures.

It was assumed that a worst-case scenario of c.90 two-way vehicle trips could be made over the course of a day, including staff trips and delivery of goods, which would be arriving and departing outside of the traffic network's peak periods. The overall construction traffic (vehicle & HGV) equates to an increase of 1.7% on the R126, and 5.9% on Burrow Road. The increase in flows is considered a negligible increase in trips and will not result in any increase in peak-hour trips.

14.3. Operational Phase Impacts

The Proposed Development of the site is not expected to create any additional operational trips; therefore, the greater impact of development is related traffic is likely to occur during the construction phase.

14.4. Mitigation Measures and Residual Effects

It is expected that the Proposed Development may cause localised and temporary increase in traffic flows due to construction. This increase would be mitigated and controlled by the contractor as part of the approval process. Deliveries are expected to occur daily and to be scheduled to prevent conflict between vehicle arrivals and departures, preventing queueing and delays within the road network. Construction staff arrivals and departures, along with travel trends will be laid out within the contractor's CEMP.

A Construction Traffic Management Plan (CTMP) would also be developed for the Proposed Development at the detailed design stage to outline the requirements for safety risks for road users and the general public. The CTMP would also specify any construction access requirements for the scheme and traffic management schemes required across the construction phase of the scheme, including details for road closures.

At the preliminary stage, it is assumed that Marsh Lane and Burrow Road would require closures, with local access for residents only during the construction phase.

Traffic generated during the operational phase of the Proposed Development will be negligible, consisting of routine maintenance vehicles only, and therefore would not require any mitigation.

The nature of the Proposed Development does not generate any additional operational trips. The Proposed Development is to mitigate the risk of coastal erosion and flooding through the provision of flood walls, an embankment, groyne structures and the renourishment of Portrane beach. The only vehicular trips expected because of the Proposed Development would be infrequent maintenance trips undertaken approximately once per year to the site.

After considering the proposed mitigation for traffic management during the construction phase of the Proposed Development, temporary and localised impacts are likely to be experienced. These impacts would be experienced by local residents due to the temporary arrangements required to access their properties, however as this is temporary and can be managed safely, the impacts are not deemed to be significant.

15. AIR QUALITY & CLIMATE

15.1. Introduction

Chapter 15 of the EIAR addresses the potential impact on air quality and climate arising from the Proposed Development within the Study Area. It considers air quality and climate features within the Proposed Development and provides information on the key receptors that have the potential to be subject to likely significant effects resulting from the Proposed Development, and how that assessment is to be conducted.

Atmospheric pollution in the vicinity of the Proposed Development is largely dominated by road traffic exhaust fumes and commercial and residential emissions. Therefore, the primary contaminants of concern identified were Nitrogen Oxides and Particulate Matter.

Climate is described as the average weather prevailing in an area over a period of time. The weather in Ireland is influenced by the Atlantic Ocean, resulting in mild, moist weather dominated by maritime air masses. The prevailing wind direction is from a quadrant centred on west-southwest. These are relatively warm winds from the Atlantic and frequently bring rain.

To counteract the effects of climate change, climate adaptation has been identified as a vital strategy. The Intergovernmental Panel on Climate Change (IPCC) defines climate adaptation as “the process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities. In some natural systems, human intervention may facilitate adjustment to expected climate and its effects”.

15.2. Construction Phase Impacts

Construction traffic will give rise to particulate matter and nitrogen oxides during the construction phase of the Proposed Development which can impact on air quality and climate. As these emissions will only be associated with the construction phase of the development, the impact will be short term in nature. With mitigation measures in place, the Proposed Development will have a short-term negligible impact on air quality and climate during the construction phase.

In relation to air quality, for the construction phase, an important consideration is dust. In the absence of mitigation, there is the potential for significant, negative, short-term impacts to nearby sensitive receptors as a result of dust emissions. With mitigation measures in place, impacts associated with construction traffic would be negligible due to the small scale of the Proposed Development and is deemed not significant.

In terms of climate change, the effects of greenhouse gases and climate change resilience were considered, due to the increased flooding events associated with the Burrow area as a result of the changing climate. There is likely to be a direct, temporary, short-term, adverse effect on carbon emissions which is considered to be negligible and therefore not significant. Effects are considered to be negligible and not significant in terms of climate change resilience for construction.

15.3. Operational Phase Impacts

Operational traffic movements are not anticipated to change traffic flows on the road network; therefore, air quality and climate are not deemed significant. Consequently, operational traffic air quality and climate have been scoped out of the assessment of the Proposed Development.

15.4. Mitigation Measures and Residual Effects

The CEMP will contain measures to mitigate construction dust emissions during the construction phase based upon the industry guidelines and a monitoring programme will be implemented. The potential for dust to be emitted depends on the type of construction activity being carried out in conjunction with environmental factors including levels of rainfall, wind speeds and wind direction. The potential for impact from dust depends on the distance to potentially sensitive locations and whether the wind can carry the dust to these locations.

The mitigation measures indicated above would ensure that the risk of adverse dust effects is negligible and therefore not significant.

Notwithstanding the successful implementation of mitigation during construction, the impact of construction dust from the Proposed Development on nearby receptors is considered negligible.

As the construction traffic volumes predicted with the Proposed Development are not considered significant, the resultant air quality impact from construction traffic is negligible.

The greenhouse gas emissions associated with the Proposed Development are negligible after considering mitigation during the construction phase such as efficient use of plant and vehicles and utilising low carbon and reusing materials where possible.

16. WASTE MANAGEMENT

16.1. Introduction

Chapter 16 of the EIAR addresses the likely significant impacts of the Proposed Development, in terms of the potential waste streams generated during construction and operation. The quantities of waste that will be produced and the proposed management routes have been assessed in the context of the effects on waste management infrastructure and legislation, policy and strategy targets. Mitigation measures are proposed to reduce the impact of waste generated by the Proposed Development.

16.2. Construction Phase Impacts

The demolition of the existing wall on Marsh Lane is likely to generate inert/non-hazardous waste arisings during the enabling works phase. Waste will also arise from the excavation of soils if they cannot be reused onsite and from the excavation and removal of invasive species if identified during site works. Seabee units currently on Portrane beach will be reused to construct the core of the c.70m trunk of each groyne which is in line with Circular Economy principles of reusing site assets. General construction related waste will arise during the construction phase such as packaging.

16.3. Operational Phase Impacts

Low quantities of general construction waste are anticipated to be generated during the operational phase from maintenance activities on flood walls, embankments, non-return valves and back drainage as well as future beach-renourishment every 5-10 years. If waste is transported and disposed/recovered through licenced operations in accordance with national waste legislation, then the impact of the operational phase on waste is considered to be Neutral or Slight.

16.4. Mitigation Measures and Residual Effects

A CEMP will be developed by the contractor which will detail how mitigation measures will be implemented. A site-specific pre-construction Resource Waste Management Plan (RWMP) will also be prepared which will contain procedures for waste management during the construction phase and assist with providing a complete audit trail. Wastes will be segregated and stored appropriately in a designated area onsite, and material will be reused onsite where possible to divert waste from landfill.

The appointed contractor will be;

- required to ensure that all waste materials leaving the site are transported via a licensed carrier and disposed or recovered through licenced operators.
- required to consult with the EPA prior to construction to ensure that the appropriate licences, permits and exemptions are in place prior to initiation if wastes are to be stored onsite.
- responsible for recording all waste types and amount generated during the construction phase.

By implementing these mitigation measures, the impact of the enabling works and construction phase on waste is considered to be Neutral or Slight. No significant residual effects are expected after mitigation measures.

17. MATERIAL ASSETS & LAND USE

17.1. Introduction

Chapter 17 of the EIAR addresses the potential impacts of the Proposed Development on the character and type of land use activities within and adjacent to the site, as well as the potential impacts on buildings, built services and existing infrastructure within and adjoining the indicative Study Area.

Effects on land use may arise during the construction phase of the Proposed Development, however, as the Proposed Development is located on vacant or agricultural land subject to flooding, the baseline sensitivity of the existing land use is considered low.

17.2. Construction Phase Impacts

The construction of the Proposed Development does not impact on the implementation and delivery of the development potential of the site, granted through the previous approval, or on any recent/extant planning approvals within the vicinity of the site. Thus, the magnitude of impact is predicted to be low beneficial, and the significance of effect is not significant.

During the construction phase, there are potential impacts on existing ESB networks, and broadband providers infrastructure located within proximity to the site. The magnitude of impact is predicted to be low adverse, and the significance of effect is minor adverse.

There is no gas infrastructure located within the Proposed Development site, and as such there will be no effect to the gas infrastructure as a result of the construction phase. The magnitude of impact is identified to no change and the significance of effect is no change.

There are several existing watermains which require diversion to facilitate this development and potential future developments. However, the magnitude of impact is predicted to be low, and the significance of effect is negligible.

17.3. Operational Phase Impacts

The operation of the Proposed Development embodies the long term, permanent, aspiration for coastal protection at this location, as identified in the Fingal Development Plan 2023-2029. This will occur through the introduction of several new features of a coastal flooding and erosion management scheme, including 'Y' shaped groyne structures, beach renourishment and sea walls. As such, the magnitude of impact is predicted to be low beneficial, and the significance of effect is considered moderate beneficial.

With respect to the existing ESB networks, the potential impact during the operational phase is considered to be of negligible magnitude and the significance of effect is also negligible, as no further impacts are expected.

With respect to the several existing watermains which will be required to be diverted to facilitate this development the magnitude of impact is predicted to be negligible during the operational phase once diversions are completed during construction if required.

17.4. Mitigation Measures and Residual Effects

The following mitigation measures have been identified:

- Good overall site management practices and procedures will be carried out, including the provision of high-quality hoarding/signage.
- Proactive communications with adjacent landowners, regarding phasing, timing, and duration of works.
- Safe and appropriate access to adjacent properties will be maintained throughout the construction process, and signage provided where necessary.
- Further investigations into existing services are required during detailed design to review all information regarding below ground infrastructure.
- Electrical work to be carried out by ESB or their approved contractors using their pre-established safe systems of work and procedures.

A proactive and consistent communication process will be established and maintained with the key statutory agencies in regard to the potential impacts and disturbance on existing infrastructure.

The residual effects during construction are considered minor adverse due to the temporary disturbance associated with construction activities. However, the residual effects associated with the long-term benefits of the scheme during the operational phase are considered highly beneficial due to mitigating the risk of coastal flooding and erosion in the area and providing development opportunities for the future. The residual effects are therefore deemed beneficial for both the construction and operation of the Proposed Development after considering the mitigation outlined above.

18. LANDSCAPE & VISUAL

18.1. Introduction

Chapter 18 of the EIAR examines the potential landscape and visual impacts associated with the Proposed Development and determines the effects on landscape character, landscape features, visual receptors, and visual amenity as a result of the Proposed Development. The assessment of effects has been undertaken for both the Construction Phase and Operational Phase of the Proposed Development.

The Proposed Development and associated environs lie within areas covered by Fingal County Council and the associated Fingal County Development Plan 2023 - 2029, which has been reviewed to establish and identify areas of protected landscapes or landscape designations that are relevant to the Landscape Visual Impact Assessment (LVIA). This review established that the Proposed Development lies on land that has been classified as being of High Amenity, which is applied to areas of the County of high landscape value. A review of the CDP has also identified that lands associated with the Proposed Development do not fall within areas that have been classified as 'Preserve Views'.

A total of five viewpoints were selected and assessed as part of the LVIA, with viewpoint locations selected to represent; views from where the main direction of the view is towards the Proposed Development, a range of views along the length of the Proposed Development, views representing areas known to be available to the community where people may frequently congregate and locations of interest e.g., settlements.

18.2. Construction Phase Impacts

Potential impacts on landscape character around the Estuary during the construction phase include:

- The introduction of new walls, embankments and groynes into the landscape.
- The introduction of construction equipment and activities that will be locally visible during the construction phase.

Construction works will result in the localised temporary loss of rough grass/grazing lands, along with replacement of existing walls along shoreline area of Marsh Lane. It is considered that construction activities will have a localised effect on landscape character, as construction phase activities are readily absorbed into the surrounding landscape and will become screened by existing vegetation, including roadside hedgerows and garden boundary vegetation which includes coniferous species. Indirect effects as a consequence of the formation of the new elements, are negated by surrounding vegetation which provides visual containment. Overall, the potential impact to the landscape character is considered to be of minor to moderate significance owing to the short-term duration of localised effects.

Potential impacts to the landscape character of the coast during the construction phase include:

- The physical construction of the new beach groynes and works associated with the beach nourishment.
- The establishment of the compound area located on open land, within the existing development of the Burrow.
- The use of construction equipment and activities that will be visible during the construction phase.

The compound area will be locally prominent and may require the removal of existing council equipment adjacent to Burrow Road and result in localised temporary loss of grassed open space. It is considered that construction activities will have a localised effect only, as construction phase activities are readily absorbed into the surrounding landscape. Indirect effects as a consequence of the works, are negated by vegetation and development which provide visual containment. The impact to coastal landscape character during the construction phase is considered to be of moderate to major significance.

With respect to potential visual impacts assessed for the construction phase it is considered that the Proposed Development will not have any significant effects on viewpoints, preserved views, or residential properties.

18.3. Operational Phase Impacts

For the Estuary the new walls and embankments will be perceived, in a landscape character sense, as a very minor addition locally, as the introduction of walls is not uncharacteristic within the surrounding landscape and will not be obvious within the wider context. Therefore, the potential impact to landscape character during the operational phase can be considered localised and negligible. The significance of potential impacts to landscape character is therefore considered to be minor and localised.

At the coast the new beach groynes will be perceived as a minor addition locally, as the introduction of such features, whilst new and uncharacteristic will be readily absorbed within the surrounding landscape and will not be obvious within the wider context. The significance of potential impacts to landscape character is therefore considered to be minor and localised.

With respect to potential visual impacts assessed for the operational phase it is considered that the Proposed Development will not have any significant effects on viewpoints, preserved views, or residential properties.

18.4. Mitigation Measures and Residual Effects

It has been judged that the Proposed Development will not result in any significant landscape or visual impacts. It is therefore considered that there are no specific landscape mitigation measures required.

The design evolution of the Proposed Development has incorporated the following built-in design measures:

- Appropriate colour/form of new walling to reflect the existing coastal and estuary character.
- Grass seeding of proposed embankments to ensure softening of outline and blending with surrounding character.
- Re-use of existing concrete coastal elements to ensure integration with coastal areas on eastern side of the Burrow peninsula.

Within the wider landscape, the Proposed Development will generally blend with existing features and elements of the landscape, with no significant residual landscape character impacts predicted. With regards to visual impact on sensitive receptors, predicted impacts on existing views are largely offset by the existing visual context of the varied coastal landscape with new elements blending well with the existing coastal area and generally perceived as a minor alteration or addition to the overall expansive views available.

19. POPULATION & HUMAN HEALTH

19.1. Introduction

Chapter 19 of the EIAR assessed the potential impact of the Proposed Development on population and human health, by considering the impact on conventional health impacts such as disease, accidents and risk from environmental changes such as air quality, noise, and transport nature and flow rate. In addition, the population and human health assessment looked at the impact on wider socio-economic determinants of good health and wellbeing, such as access to recreational facilities and changes in local amenity.

The health baseline showed that health status is generally better than the national average, while this does not exclude the probability that there will be individuals within the population who are particularly sensitive, generally speaking, the sensitivity of the Study Area population to environmental and socio-economic changes associated with the Proposed Development during construction and/or operation was considered to be low.

19.2. Construction Phase Impacts

During the construction phase, there would be temporary adverse changes in local air quality, noise exposure, and transport nature and flow rate; however, these impacts would not be significant. Changes in water quality and flood risk (including the potential safety implications of this for construction workers) are also effectively mitigated to a level which is not significant.

The presence of construction compounds would temporarily impact access to recreational facilities such as the outdoor gym equipment directly adjacent to Pipers Takeaway. However, many alternative recreational/open spaces exist within the local area, the majority of which is considered an area of high amenity. As a result, there would be no significant effects associated with this.

19.3. Operational Phase Impacts

Operation of the Proposed Development reduces flood risk, with associated population and human health benefits due to the protection of residential and community assets. While reductions in flood risk represent a beneficial effect, this is not considered to be significant.

The flood protection infrastructure would not alter access to the beach and would directly safeguard green space within the Burrow. The presence of the flood protection infrastructure would be readily absorbed within the surrounding landscape and would not have a significant effect on local amenity.

19.4. Mitigation Measures and Residual Effects

Public health is by definition preventative in nature. Therefore, mitigation measures adopted as part of the construction and operation of the Proposed Development are embedded in nature and focus on precursors to population and human health outcomes, thereby providing an opportunity for intervention to prevent any adverse impacts.

Construction would be undertaken in accordance with a CEMP which sets out the key mitigation measures that contractors would be required to adopt and implement in order to control the generation or release of

environmental pollutants with the potential to cause adverse population and health outcomes. Similarly, a CTMP would be prepared which details any required traffic calming measures.

Once operational, one of the primary objectives of the Proposed Development is to provide effective coastal flood and erosion protection, with associated significant population and human health benefits.

On the basis that no significant adverse population and human health effects are identified, no additional population and human health mitigation measures are necessary.

On the basis that no additional mitigation measures are proposed, the residual effects remain the same as those of the construction phases and operational phases.

20. MAJOR ACCIDENTS & DISASTERS

20.1. Introduction

Chapter 20 of the EIAR assessed the potential risk of major accidents and disasters presented by the Proposed Development. This assessment has been undertaken with regard to relevant guidance and legislation for the construction and operational phases of the Proposed Development. The Study Area for the assessment of Major Accidents & Disasters covers the area in which the works will be undertaken (Working Area) as well as the Rogerstown Estuary, the village of Portrane, the road network from where the R126 road begins to the Working Area and a section of the Irish Sea comprising a 10km buffer from the Working Area.

This chapter identifies how risks of major accidents and/or disasters relevant to the Proposed Development have been identified and subsequently managed.

This chapter considered:

- Major accidents and/or disasters that the Proposed Development may be vulnerable to;
- Major accidents and/or disasters that the Proposed Development may potentially cause;
- Whether likely significant effects could result from a major accident and/or disaster to which the Proposed Development may be vulnerable, or which the Proposed Development may cause, and if so, the identification of these effects; and
- Any existing and/or proposed mitigation measures to prevent or mitigate the likely significant adverse effects of any potential major accidents and/or disasters on the environment.

20.2. Construction Phase Impacts

During the construction phase there would be potential for ten risk events to occur including:

- Major construction vessel collision/allision during construction works;
- Major road traffic collision,
- Flooding of construction areas and/or site storage areas / compounds / welfare facilities;
- Major pollution or sedimentation event affecting nearby designated areas;
- Accident to construction workers due to heavy lift or machinery failure;
- Accident involving general public in the vicinity of the construction works;
- Man overboard during the beach nourishment activities;
- Severe weather conditions leading to storm surges, high tides and large waves affecting construction areas;
- Piling activities causing damage to the soil structure leading to an accident involving land slippage or sinking; and

- Fire/explosion.

Assuming implementation of mitigation measures defined within other chapters of the EIAR, all risk events identified in the construction phase were determined to be low risk events and were below the threshold of significance set for the purposes of this assessment.

20.3. Operational Phase Impacts

During the operational phase there would be potential for seven risk events including:

- Major vessel collision/allision during periodic beach renourishment;
- Major pollution or sedimentation event affecting nearby designated sites during periodic beach renourishment;
- Severe weather conditions leading to storm surges, high tides and large waves affecting beach renourishment;
- Man overboard during periodic beach renourishment;
- Major traffic collision when travelling to undertake inspections;
- Severe flood event; and
- Fire/explosion.

Assuming implementation of mitigation measures defined within other chapters of the EIAR, all risk events identified during the operational phase were determined to be low risk events and were below the threshold of significance set for the purposes of this assessment.

20.4. Mitigation Measures and Residual Effects

Mitigation measures defined throughout the topic chapters of the EIAR were considered within the assessment undertaken in Chapter 20. As all risk events were within the low-risk category with these existing recommended mitigation and safety procedures, no further mitigation measures were recommended in Chapter 20.

Through the implementation of mitigation measures as defined within the environmental topic chapters of the EIAR, there were no identified incidents or examples of major accidents and/or natural disasters that presented a sufficient combination of risk and consequence that would lead to significant negative residual impacts or environmental effects.

21. CUMULATIVE EFFECTS

21.1. Introduction

Chapter 21 of the EIAR presents a summary of the assessment of cumulative effects which may arise from adjacent or nearby developments together with those predicted for the Proposed Development as well as the environmental interactions which have been examined within the individual technical assessment chapters in the EIAR.

21.1.1. Cumulative Effects

Cumulative effects address long-term changes that may result from the construction and operation of the Proposed Development in combination with other developments in the area. Cumulative assessment is undertaken to ensure that the combined effects of the Proposed Development and other influences are assessed together, and not as individual aspects of the environmental assessment. The coexistence of impacts may increase or decrease their combined impact. Impacts that are considered to be not significant, when assessed individually, may become significant when combined with other impacts.

Cumulative effects can occur at different temporal and spatial scales. The spatial scale can be local, regional or global, while the frequency or temporal scale includes past, present and future impacts on a specific environment or region.

The experts leading each of the technical assessments (as presented in Chapters 6 – 20), have defined significance thresholds and criteria for the cumulative effects assessment, using professional judgement and consideration of the relevant standards and guidelines via a collaborative approach, involving all the interested parties in the process of data collection and analysis, to determine whether in-combination effects give rise to additional levels of significance.

21.2. Assessment Methodology

The first step in determining cumulative effects comprised the identification of a list of other projects which may have the potential to overlap with the proposed redevelopment based on available information. Other projects and plans that have been considered as part of this cumulative assessment have been identified through a desk study involving general internet searches and in particular, scrutiny of consenting authority websites.

The different developments that were considered as part of this cumulative assessment were those in close proximity to the Proposed Development and with the potential to interact with it. Other projects whose impacts could foreseeably overlap with the construction or operation of the proposed redevelopment or where construction impacts may be consecutive but cumulative, were also considered.

Upon review of available information, RPS determined that the vast majority of the applications recently, submitted or approved within proximity to the Proposed Development are small-scale schemes such as dwelling extensions, amendments to previous permissions, proposed outbuildings and similar projects. The assessment found no source-pathway-receptor linkage between these small-scale proposals and the Proposed

Development, and therefore no potential for these proposals to act in-combination with the Proposed Development.

However, the Flood Relief Scheme at Rush is the only other project which gives potential for cumulative effects to arise. This is summarised below in Chapter 21 of the EIAR.

FCC currently plan to phase the construction of this scheme **after** that of the Proposed Development. As such, there will be no temporal or spatial overlap between the two developments.

However, there remains the potential for both schemes to result in an in-combination effect during the operational phase of both developments. The potential operational in-combination effects are discussed further in the Section 21.4 of the EIAR.

Overall, the assessment concluded that cumulative impacts were not significant for the majority of subject areas apart from the following where cumulative impacts were considered to be as indicated:

- Noise & Vibration – Minor;
- Marine Biodiversity – Negligible; and
- Waste – Neutral or Slight.

22. SUMMARY OF MITIGATION MEASURES

Chapter 22 of the EIAR presents a tabulated summary of mitigation measures identified in the preparation of the EIAR. No mitigation measures have been identified as being required for Soils, Geology & Contamination, Marine Biodiversity, Landscape & Visual, Population & Human Health or Major Accidents & Disasters. The mitigation proposed for other subject areas would generally be considered the implementation of good construction practices and planning. In this regard it is emphasised that FCC is committed to achieving the highest possible standards of environmental management during both the construction and operational phases of the Proposed Development.

23. CONCLUSIONS

Chapter 23 of the EIAR presents a summary of the environmental impacts arising from the Proposed Development. These impacts have been assessed as to whether or not they are likely to result in significant effects. Where significant effects have been predicted, measures to avoid or mitigate these effects have been included so that, where possible, they are no longer significant. With adherence to a CEMP and with implementation of the mitigation laid out in the EIAR, most negative effects from the Proposed Development will generally not be significant. However, some negative effects will remain and result in potential adverse impacts to a number of internationally important receptors. The impacts associated with each of the EIAR chapters are summarised below.

23.1.1. Coastal Processes

Once operational, the Proposed Development would have a permanent beneficial significant effect in reducing the existing coastal flooding and erosion risk along the Burrow. This would protect existing communities and facilitate potential investment and regeneration in the area. Crucially, the Proposed Development was found not to result in any significant impacts to the existing tidal regime, wave climate or sediment transport beyond the immediate vicinity of the scheme, including along Rush beach or within the Rogerstown estuary.

23.1.2. Noise & Vibration

Through the implementation of construction mitigation measures as described in the EIAR, the noise impacts of construction activities are predicted to be temporary minor. No operational noise or vibration impacts are anticipated from the operation of the Proposed Development.

23.1.3. Flood Risk

The long-term operation of the Proposed Development would have a very significant beneficial effect upon the Study Area in terms of flood risk, and the residents whom the flood defences would serve.

23.1.4. Water Quality

With the appropriate mitigations measures fully implemented during the construction phase, the impact of the Proposed Development on the water quality will be imperceptible. As such, the Proposed Development works are compliant with the requirements and environmental objectives of the EU Water Framework Directive and the other relevant water quality objectives for these water bodies.

23.1.5. Soils & Geology

Neither the construction or operational phases of the Proposed Development are anticipated to result in significant adverse effects upon soils and geology.

23.1.6. Cultural Heritage and Marine Archaeology

In circumstances where the mitigations measures are fully implemented during the construction phase, the impact of the Proposed Development on cultural heritage and marine archaeology in the area will be imperceptible. The Proposed Development at the Burrow is therefore not expected to have a significant effect on cultural heritage and marine archaeology.

23.1.7. Marine Biodiversity

Benthic ecology, fish and shellfish and also marine mammal receptors have the potential to be impacted by the Proposed Development. However, these impacts which relate primarily to an increase in suspended sediments, habitats loss and underwater noise were considered to be negligible during the construction, operation and maintenance phases of the Proposed Development.

23.1.8. Terrestrial and Coastal Biodiversity

The Proposed Development has potential to give rise to a range of significant impacts upon natural heritage and biodiversity receptors.

Significant adverse impacts are predicted to arise to three sites designated on account of their natural heritage or conservation interests, namely the Rogerstown Estuary SAC, Rogerstown Estuary SPA and Rogerstown Estuary pNHA. These impacts are associated with losses to small areas of Annex I saltmarsh, mudflat and estuary habitats which will occur at construction phase which form qualifying interests of the SAC and provide foraging habitat for foraging SCI bird populations associated with the SPA. Synchronous impacts are predicted to the Rogerstown Estuary pNHA.

23.1.9. Traffic and Transportation

Through the implementation of construction mitigation measures as described in this document, the impacts of construction activities to traffic and transport are not considered significant. During the operational phase, the Proposed Development is not expected to create any additional operational trips and are therefore considered negligible.

23.1.10. Air Quality and Climate

In relation to both air quality and climate change for the operational phase, operational traffic movements were not anticipated to change traffic flows on the road network. Therefore, operational effects on air quality and climate are considered to be negligible.

23.1.11. Waste Management

Through the implementation of construction mitigation measures as described in the EIAR, the residual effects of the construction and operational phases of the Proposed Development on waste management are not considered significant.

23.1.12. Material Assets & Land Use

Through the implementation of construction mitigation measures as described in the EIAR, the residual effects of the construction and operational phases of the Proposed Development on material assets are not considered significant.

23.1.13. Landscape & Visual

Within the wider landscape, the Proposed Development will generally blend with existing features and elements of the landscape, with no significant residual landscape character impacts predicted. With regards to visual impact on sensitive receptors, predicted impacts on existing views are largely offset by the existing visual context of the varied coastal landscape with new elements blending well with the existing coastal area and generally perceived as a minor alteration or addition to the overall expansive views available.

23.1.14. Population & Human Health

During the construction phase, there would be temporary adverse changes in local air quality, noise exposure, and transport nature and flow rate; however, these impacts would not be significant. Changes in water quality and flood risk (including the potential safety implications of this for construction workers) are also able to be effectively mitigated to a level which is not significant.

The presence of construction compounds would temporarily impact access to recreational facilities such as the outdoor gym equipment directly adjacent to Pipers Takeaway. However, many alternative recreational/open spaces exist within the local area, the majority of which is considered an area of high amenity. As a result, there would be no significant effects associated with this.

Operation of the Proposed Development reduces flood and erosion risk, with associated population and human health benefits due to the protection of residential and community assets. This reduction in coastal flood and erosion risk represents a significant beneficial effect to the community at the Burrow.

23.1.15. Major Accidents & Disasters

The Risk of Major Accidents and Disasters assessment identified ten potential risk events during the construction phase (vessel collision/allision, road traffic collision, flooding of construction areas, major pollution or sedimentation event, accident due to heavy lift or machinery failure, accident involving general public, man overboard, severe weather conditions, land slippage or sinking and fire/explosion) and seven during the operational phase (vessel collision/allision, major pollution or sedimentation event, severe weather conditions, man overboard, road traffic collision, severe flood event and fire/explosion).

A wide variety of mitigation measures have been identified throughout the topic chapters of this report, which, when implemented will significantly reduce the potential for major accidents and disasters relating to the Proposed Development. Despite mitigation measures, a (low level) risk of a major accident or disaster occurring will remain. However, it is determined that this risk is not likely to be significant in EIA terms.

23.1.16. Cumulative Effects

Cumulative effects with other proposed and permitted developments in the area around the Proposed Development may arise however these would be very limited. Cumulative effects predominantly owe themselves to in combination impacts with the Flood Relief Scheme at Rush South, owing to the lack of source-pathway-receptor linkage between the other small-scale proposals. FCC plan to phase the construction of this scheme **after** that of the Proposed Development. As such, there will be no temporal or spatial overlap between the construction phase of the two developments. The cumulative effects assessment outlined no significant effects between the Proposed Development and other relevant projects.