

## 12.0 Benthic Ecology

### Introduction

- 12.1 The proposed development will occupy subtidal and intertidal areas of Loch Ryan that provide habitat for benthic communities. This chapter of the Environmental Impact Assessment (EIA) Report (EIAR) will provide an assessment of the potential impacts on these receptors.

### Competency Statement

- 12.2 This Chapter has been prepared by David Alexander, BSc (Hons) MSc, and Bethany Reed, BSc (Hons) MSc. David has over 15 years of experience providing consultancy advice to development projects and working on marine ecological assessments, including Nationally Significant Infrastructure Projects in the UK. David has principally worked within ports and harbours sector, the aggregates/dredging industry and various renewable energy development and interconnector projects. He has been the lead author for numerous publications and has overseen the conduct of multiple published research works. Bethany is a Senior Consultant with numerous years of experience working on infrastructure development projects. She is experienced in a wide range of essential skills including survey techniques, statistical data analysis, literature reviews and reporting, all which have been developed through involvement in multi-sectoral projects.

### Legislation, Policy and Guidance

- 12.3 The benthic ecology assessment will be undertaken within the context of the following relevant legislation, planning policies, and guidance documents:
- **Marine (Scotland) Act 2010<sup>1</sup>**  
Framework for managing Scotland's seas through marine planning, licensing, and conservation, with the goal of achieving sustainable development and protection of the marine environment;
  - **Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017<sup>2</sup>**  
Regulations requiring environmental impact assessments for certain marine works to ensure potential environmental effects are considered before development consent is granted;
  - **The Harbour Works (Environmental Impact Assessment) Regulations 1999<sup>3</sup>**

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<sup>1</sup> Scottish Government: Marine (Scotland) Act 2010: February 2010.

<sup>2</sup> Scottish Government: Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017: May 2017

<sup>3</sup> UK Government: The Harbour Works (Environmental Impact Assessment) Regulations 1999: February 2000

Legislation mandating environmental impact assessments for harbour-related developments that may significantly affect the environment, aiming to minimize harm through early-stage planning;

- **Wildlife and Countryside Act 1981**<sup>4</sup>  
Legislation for the protection of native species, habitats, and Sites of Special Scientific Interest, in addition to supporting biodiversity conservation and the control of invasive species;
- **Conservation of Habitats and Species Regulations 2010 (commonly referred to as the Habitats Regulations)**<sup>5</sup>  
Regulations to transpose the EU Habitats and Birds Directives into UK law, protecting important habitats and species through designated sites and legal safeguards;
- **National Marine Plan (Scotland)**<sup>6</sup>  
Policies to guide sustainable development and decision-making in Scottish marine areas;
- **UK Marine Policy Statement**<sup>7</sup>  
Guides for the development of marine plans across the UK, setting principles for sustainable use of marine resources and ecosystem protection;
- **Scottish National Planning Framework 4 (NPF4)**<sup>8</sup>  
Scotland's long-term spatial strategy integrating land use planning with national policies on climate change, biodiversity, and sustainable development; and
- **Dumfries and Galloway Local Development Plan 2**<sup>9</sup>  
Local level plan outlining land use policies and proposals specific to Dumfries and Galloway, guiding development and protecting natural and cultural assets in the region.

## Methodology Used for Assessment

### Introduction

- 12.4 In order to characterise the benthic habitats and communities present within and adjacent to Stranraer Marina, it was determined that a dedicated benthic survey would be necessary to collect primary data from within the study area.

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<sup>4</sup> UK Government: Wildlife and Countryside Act, 1981: November 2019

<sup>5</sup> UK Government: Conservation of Habitats and Species Regulations 2010 (commonly referred to as the Habitats Regulations): March 2010

<sup>6</sup> Scottish Government: National Marine Plan (Scotland): March 2015

<sup>7</sup> UK Government: UK Marine Policy Statement: March 2011

<sup>8</sup> Scottish Government: National Planning Framework 4: February 2023

<sup>9</sup> Dumfries and Galloway Council: Local Development Plan 2: October 2019

- 12.5 Due to the potential presence of seagrass within the survey area, advice from NatureScot indicated that the benthic survey should take place no earlier than late May 2025 given the seasonal dieback and growth of seagrass beds. As such, a benthic survey of Stranraer Marina and the surrounding environment was undertaken in late May 2025 in order to inform the impact assessment to be undertaken in this chapter. The benthic survey undertaken included drop down video (DDV), benthic grab sampling and an intertidal walkover survey.
- 12.6 Given the recent completion of the survey, the data gathered are still being processed. It is anticipated that the analysis of data will be completed by late July 2025 and that the benthic ecology impact assessment will be complete in August 2025. As such, it is proposed that this assessment is submitted as an addendum to the main EIAR.
- 12.7 This interim chapter is therefore intended to serve as an introduction and to give an explanation to the addendum submission.

### *Study Area*

- 12.8 The study area for this EIA topic comprises the predicted maximum area in which potential environmental effects may occur. The study area for this impact assessment has been principally informed by the hydrodynamic and sedimentary plume modelling undertaken. In addition, consultation with NatureScot lead to intertidal areas east and west of the proposed development being included within the scope of the characterisation surveys and potential impact assessments.

### *Methodology*

- 12.9 This assessment has been prepared in accordance with the Chartered Institute of Ecology and Environmental Management (CIEEM) Guidelines for Ecological Impact Assessment<sup>10</sup>, the Institute of Ecological and Environmental Management (IEEM) Guidelines for Ecological Impact Assessment (Marine and Coastal)<sup>11</sup>.
- 12.10 The methodology is summarised below:
- Data are obtained on the benthic habitats and communities present in the vicinity of the proposed development which will potentially be affected, through a targeted benthic and intertidal survey of the location as primary resources. This is supplemented where possible with secondary sources through desk-based assessments;
  - The value and sensitivity of the identified benthic habitats and communities that have been defined are determined;

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<sup>10</sup> CIEEM. (2018). Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine version 1.3. Chartered Institute of Ecology and Environmental Management, Winchester.

<sup>11</sup> IEEM. (2010). Guidelines for Ecological Impact in Britain and Ireland. Marine and Coastal. Council of the Institute of Ecology and Environmental Management.

- Potential impacts on benthic habitats and communities are quantified on the basis of their magnitude, nature, probability, duration, and reversibility. The potential for cumulative and combined effects are also considered where appropriate;
- Where potential significant environmental effects are identified in the assessment process, mitigation and/or compensation measures are identified alongside specific monitoring needs, and the residual effects after mitigation/compensation are evaluated; and
- The significance of any residual effects is reported.

12.11 The sensitivity of the identified receptors is determined according to the relative importance of the existing environmental features or the potential susceptibility of the receptors to change. The criteria for the determination of sensitivity/value of the receptors are established based on relevant guidance, legislation, statutory designation, and/or professional judgment.

12.12 The definitions of receptor sensitivity/value for the purposes of benthic ecology are shown in **Table 12-1**.

*Table 12-1: Criteria used to define receptor value/sensitivity.*

Sensitivity/ Value Criteria	Definition
<b>High</b>	The receptor is of high environmental value or contains species/habitats of international or national importance. There is likely to be little capacity for the receptor to absorb change without considerable alterations to the current state.
<b>Medium</b>	The receptor has some environmental value or contains species/habitats of regional importance. There is likely to be medium capacity for the receptor to absorb change without considerable alterations to the current state.
<b>Low</b>	The receptor is of low environmental value or contains species/habitats of local importance. The receptor is tolerant of change without detriment to its character.
<b>Negligible</b>	The receptor is of limited environmental value and is resistant to change.

12.13 The impact assessment considers impacts during both construction and operational phases of the proposed development (as identified in the EIA Scoping Opinion<sup>12</sup>), defined as short to medium term impacts and long-term impacts. Short to medium term impacts are considered to be those associated with the construction phase of the proposed development, and long-term impacts are those associated with the development once operational. These factors are considered along with the scale of potential changes and reversibility in the definition of magnitude. **Table 12-2** shows the definitions of impact magnitude adopted for the assessment of benthic ecology.

<sup>12</sup> Marine Scotland: Scoping Opinion adopted by the Scottish Ministers under Part 4 of The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017 Dumfries and Galloway Council Stranraer Marina Development: February 2023

**Table 12-2: Criteria used to define the magnitude of impacts**

Magnitude Criteria	Definition
<b>High</b>	Total loss or substantial alteration to the integrity of the receptor or key features of baseline conditions that are likely to be irreversible, even in the long-term, such that the fundamental character of the receptor is permanently changed.
<b>Medium</b>	Loss or clear impact on one or more key features of the baseline conditions resulting in a material change to the character of the receptor, though likely to be reversible in the long-term.
<b>Low</b>	Slight shift away from baseline conditions such that any changes to the baseline conditions will be detectable but not material and similar to the pre-development situation. Changes likely to be reversible in the short to medium term.
<b>Negligible</b>	Very slight change from baseline conditions. Any impacts likely to be reversible in the very short term.

12.14 A combination of the value/sensitivity of the identified receptors and the magnitude of potential impacts will be used determine the significance of the resulting effects. **Table 12-3** illustrates the matrix based on these parameters which will be used for guidance in the assessment of significance, which will be informed by professional judgement.

**Table 12-3: Significance of Effects Matrix**

Magnitude of impact	Sensitivity of Receptor			
	High	Medium	Low	Negligible
<b>High</b>	Substantial	Substantial	Moderate	Slight
<b>Medium</b>	Substantial	Moderate	Slight	Negligible
<b>Low</b>	Moderate	Slight	Negligible	Negligible
<b>Negligible</b>	Slight	Negligible	Negligible	Negligible

12.15 Significance criteria will be based on the type of potential consequences, the probability of the consequence occurring, and the magnitude of the consequence. **Table 12-4** identifies the scale that will be used to evaluate significance of effect.

**Table 12-4: Definitions of sensitivity used in the benthic ecology assessment.**

Significance Criteria	Definition
<b>Substantial Adverse/ Beneficial Effect</b>	Substantial deterioration/improvement compared to the current scenario e.g. high impact on a regionally or nationally importance resource
<b>Moderate Adverse/ Beneficial Effect</b>	Noticeable deterioration/improvement compared to the current scenario e.g. moderate to high impact on a locally important resource
<b>Slight Adverse/ Beneficial Effect</b>	Slight deterioration/improvement compared to the current scenario e.g. low impact on a locally important resource
<b>Neutral</b>	No noticeable alterations to the current scenario

12.16 The following potential impacts on benthic ecology have been identified for the marine works associated with the proposed development:

- Potential for temporary disturbance/loss of habitat arising from dredging activity within the harbour;

- Potential for water quality impacts due to dredging;
- Potential for permanent habitat loss arising from the berth extension and the area of land reclamation;
- Potential effects of increased suspended sediment concentrations and sediment deposition within Stranraer Marina on marine ecology receptors;
- Potential for resuspension of contaminated sediments with effects on marine ecology receptors;
- Potential for increased risk of importing marine INNS to the area due to the higher numbers of visiting boats and the potential to further spread INNS already present; and
- Potential impacts of creating new artificial habitat surrounding the new berths and breakwater extension.

### *Field Survey*

12.17 The principal source of data used to inform the assessment is the targeted benthic and intertidal survey conducted on behalf of the proposed development. This comprised the following features:

- Drop down video survey;
- Benthic grab sampling survey; and
- Intertidal survey.

12.18 A benthic technical report will be prepared following analysis of the survey data. This will be included as an appendix to this EIA chapter.

### *Desk Study*

12.19 In order to characterise the benthic habitats in the vicinity of the study area, the following resources were consulted:

- Marine Scotland National Marine Plan interactive (NMPi) maps<sup>13</sup>;
- Stranraer Marine Environmental Impact Assessment Scoping Report<sup>14</sup>;
- Loch Ryan Management Plan 2014<sup>15</sup>;
- Priority Marine Features (PMF) distribution data from Scotland NMPi online;
- Marine Invasive Non-Native Species in the Solway Firth<sup>16</sup>;

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<sup>13</sup> Marine Scotland. (2024). Marine Scotland Maps NMPi part of Scotland's environment. Available at: Marine Scotland - National Marine Plan Interactive ([atkinsgeospatial.com](https://atkinsgeospatial.com)). Accessed on: 4th November 2024.

<sup>14</sup> RPS Consulting Engineers. (2021). Environmental Impact Assessment Scoping Report - Stranraer Marina. Prepared on behalf of Dumfries and Galloway Council. NI2285. 93pp.

<sup>15</sup> Solway Firth Partnership. (2014). Loch Ryan Management Plan 2014. Using marine planning to identify management needs and opportunities for enhanced community amenity and economic regeneration of the surrounding area. Solway Firth Partnership. 58pp.

<sup>16</sup> Solway Firth Partnership (2017). *Marine Invasive Non-Native Species in the Solway Firth*. Revised for 2018 – 2021. Solway Firth Partnership. 46pp.

- EMODnet Habitat Maps<sup>17</sup>;
- Seagrass Spotter Tool<sup>18</sup>.

12.20 Online searches for relevant literature were also made though very little additional data on benthic habitats were found.

### *Dredge Plume Modelling*

12.21 The details and full results of the dredge plume modelling exercise that has been completed are set out within the Coastal Processes Chapter (**Chapter 7.0** of this EIAR).

12.22 Modelling was undertaken to identify the potential zone of influence in which suspended sediment concentration and sedimentation would be elevated compared to background levels during and subsequent to the dredging programme. The modelling examined realistic worst-case scenarios to ensure any method proposed by the contractor would be well within the envelope of effects. To give an accurate assessment, plumes were modelled under conditions representative of both the beginning of the dredging programme, e.g. offshore sediment deposition and existing breakwater layout, and near the end, e.g. onshore sediment reclamation and the new breakwater layout, as well as at all states of tide. The models also incorporated the potential of material being resuspended on subsequent tides after the cessation of dredging.

12.23 Within this chapter, the outputs of these models have been used to aid in assessing the potential effects of changes in the levels of suspended sediment and water quality on sensitive marine receptors, specifically benthic habitats and communities.

### *Summary of Consultation*

12.24 Consultation responses of relevance to this chapter were received from the organisations in **Table 12.5** below.

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<sup>17</sup> EMODnet. 2024. The European Marine Observation and Data Network (EMODnet). Available at: EMODnet Central Portal | Geoviewer. Accessed on: 28 May 2024.

<sup>18</sup> Seagrass Spotter (2024). Seagrass Location Tool. Available at: seagrassspotter.org. Accessed on: 28 May 2024.

**Table 12.5: Summary of Consultation Responses with Relevance to Benthic Ecology**

<b>Consultee</b>	<b>Summary Response</b>	<b>Comment/Action Taken</b>
<b>Marine Scotland</b>	<p>Impacts are likely on benthic habitats. The potential impacts of habitat creation should be scoped into the EIA report.</p> <p>The EIA report must consider the possible impacts of the proposed works on Priority Marine Features (PMFs) and any Invasive Non-Native Species (INNS).</p> <p>The Scottish Ministers highlight the SeagrassSpotter tool and the native oyster information referenced in the MSS advice and encourage the Applicant to consider the inclusion of these in the EIA Report.</p>	<p>Potential effects from habitat creation on benthic habitats and communities will be considered in this chapter.</p> <p>Any potential impacts on either PMFs or INNS will be considered in this chapter.</p> <p>The Seagrass Spotter tool and the information on native oyster beds have been consulted as part of the desk-based assessment for this chapter. Additionally, the targeted benthic survey conducted for the project was specifically designed to capture evidence of any seagrass or native oyster communities in the area.</p>
<b>NatureScot</b>	<p>The benthic survey to be undertaken must include use of drop down video to identify any PMFs within the area of potential impacts, specifically seagrass beds and native oyster reefs, alongside grab sampling.</p> <p>An intertidal survey must also be undertaken along the foreshore east and west of Stranraer Marina to assess for any presence of seagrass or other PMFs in these areas.</p> <p>Any survey work must be timed from late May through to autumn to make sure that no areas of seagrass are missed due to seasonal dieback.</p>	<p>The benthic survey plan was designed in consultation with NatureScot and drafts were provided for comment and agreement prior to mobilisation.</p> <p>DDV to be included as part of the benthic survey, including drops at each grab sampling station in addition to seven video transects.</p> <p>Intertidal surveys designed to cover the east and west beaches at Stranraer for a minimum of 1km in either direction from the proposed development.</p>

### **Limitations**

- 12.25 Site specific surveys have been undertaken in relation to the proposed works in order to provide primary evidence as part of the characterisation process for benthic and intertidal habitats. As such, there are no significant limitations that are applicable to this chapter.
- 12.26 The benthic survey was designed ahead of the dredge plume modelling exercise being completed due to project logistics. The extent of the survey area (and area of potential secondary impacts) was informed by a sediment plume model adapted from previous work undertaken in the area by RPS rather than the specific plume model for this project, though the two models are closely aligned. The impact assessment will be based on the dredge plume modelling exercise that has been as set out within the Coastal Processes Chapter (**Chapter 7.0** of this EIAR).

## Baseline Conditions

- 12.27 A dedicated benthic and intertidal survey has been undertaken in order to characterise the baseline conditions within and adjacent to Stranraer Marina. The results of this are still being processed and will be reported in a technical report which will be included as an appendix to the impact assessment on benthic ecology in due course.

## Impact Assessment

- 12.28 The potential impacts of the proposed development on benthic ecology will be assessed following completion of the analysis of the results from the benthic and intertidal survey. It is intended that this will form an addendum to the main EIAR and will be submitted in August 2025. This will include assessment against the potential impacts identified in this chapter. As part of the assessment, embedded mitigation will be assessed, alongside operational mitigation and the potential for cumulative effects when considered alongside other committed and reasonably foreseeable projects.