



# **Sporad na Mara Offshore Wind Farm**

## **Offshore Project**

### **Environmental Impact Assessment Report**

#### **Chapter 23: Combined Effects Assessment, Volume 2a**

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## 23 COMBINED EFFECTS ASSESSMENT

### 23.1 INTRODUCTION

23.1.1.1 This chapter of the Environmental Impact Assessment Report (EIAR) presents the results of the assessment of the likely significant combined effects of the proposed Spiorad na Mara Offshore Wind Farm (hereafter referred to as 'the Offshore Project') resulting from the combination of effects on the different offshore environmental aspects assessed in **Chapter 6: Socio-Economics, Volume 2a** to **Chapter 22: Offshore Human Health, Volume 2a**.

23.1.1.2 This chapter presents a combined effects assessment for the Offshore Project. The chapter includes 3 stand-alone assessments to satisfy Environmental Impact Assessment (EIA) Requirements and in response to feedback received in the Scoping Opinion. This assessment includes:

- Combined Effects Assessment: Considers potential project-lifetime and receptor-led combined effects to relevant receptors as a result of the Offshore Project;
- Ecosystem level Assessment: Considers potential combined effects across trophic levels of the wider ecosystem as a result of the Offshore Project;
- In-combination Climate Impact (ICCI) Assessment: Considers the potential for relevant impact pathways to interact with future climate hazards.

23.1.1.3 This chapter should be read in conjunction with the project description provided in **Chapter 3: Project Description, Volume 1a**.

23.1.1.4 This technical chapter describes the following:

- Legislation, planning policy and other documentation that has informed the assessments (Section 23.2: Summary of policy and legislative context and **Chapter 2: Policy and Legislative Context, Volume 1a**);
- Outcome of consultation and engagement that has been undertaken to date, including how matters relating to combined effects, ecosystem level assessment and In-combination Climate Change Impact assessment have been addressed (Section 23.3: Scoping and consultation);
- Methodology and scope of the assessment for the combined effects assessment and the approach and methodology for the ecosystem level assessment and the In-combination Climate Change Impact (Section 23.4: Methodology and scope of the assessment);
- Assessment of Combined Effects (Section 23.5: Assessment of combined effects);
- Ecosystem level assessment (Section 23.6: Ecosystem level assessment);
- Assessment of In-combination Climate Change Impacts (Section 23.7: In-combination Climate Change Impact);
- Glossary and abbreviations used in the Combined Effects assessment (Section 23.8: Glossary of terms and abbreviations);
- Information sources and documentation referred to in this chapter (Section 23.9: References).

## 23.2 SUMMARY OF POLICY AND LEGISLATIVE CONTEXT

23.2.1.1 This section outlines the legislation, policy and guidance that is relevant to the assessment of likely significant combined effects associated with the construction, operation, maintenance and decommissioning of the Offshore Project. In addition, other national, regional, and local policies are considered within this assessment where they are judged to be relevant. Further information on policies relevant to the EIA is provided in **Chapter 2, Volume 1a**.

23.2.1.2 A summary of the legislation, policy and guidance relevant to Combined Effects is provided in **Table 23.1**.

Table 23.1 Legislation and Policy in relation to Combined Effects

Title	Relevance to Combined Effects
<b>National Legislation/Policy</b>	
Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017	<p>Schedule 4 requires the description of <i>"The description of the likely significant effects on the factors specified in regulation 5(3) should cover the direct effects and any indirect, secondary, cumulative, transboundary, short-term, medium-term and long-term, permanent and temporary, positive and negative effects of the works."</i></p> <p>This chapter therefore provides an assessment of the interaction of direct and indirect effects which may arise as a result of the Offshore Project, in the context of combined effects.</p>
The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017	<p>Schedule 4(2) requires the description of <i>"The environmental impact assessment must identify, describe and assess in an appropriate manner, in light of the circumstances relating to the proposed development, the direct and indirect significant effects of the proposed development (including, where the proposed development will have operational effects, such operational effects) on the factors specified in paragraph (3) and the interaction between those factors."</i></p> <p>This chapter therefore provides an assessment of the interaction of direct and indirect effects which may arise as a result of the Offshore Project, in the context of combined effects.</p>
<b>Technical Guidance</b>	
Cumulative Impact Assessment Guidelines: Guiding Principles For Cumulative Impacts Assessment in Offshore Wind Farms (RenewableUK, 2013)	The guidance considers cumulative effects and inter-related effects (combined effects) in relation to offshore wind farms. It emphasises the importance of assessing potentially significant impacts, rather than all possible impacts (RenewableUK, 2013, p.6). The guidance outlines eleven guiding principles to help inform assessments.
Planning Advice Note (PAN) 1/2013:	This PAN outlines the principles and procedures for conducting EIAs, including the need to consider the interaction of effects across Project stages and environmental technical aspects.

Title	Relevance to Combined Effects
Environmental Impact Assessment	
'EIA Guide to: Climate Change Resilience and Adaptation 2020' (IEMA, 2020)	This guidance provides a framework for the effective consideration of climate change resilience and adaptation in the EIA process, with specific reference to ICCI assessment.

## 23.3 SCOPING AND CONSULTATION

### 23.3.1 OVERVIEW

23.3.1.1 This section describes the stakeholder engagement undertaken for the Offshore Project. This consists of early engagement, the outcome of, and response to, the Scoping Opinion in relation to the Combined Effects assessment, informal consultation and consultation undertaken through the Preliminary Application Consultation (PAC) process (hereafter referred to as the 'formal consultation'). An overview of engagement undertaken for the Project as a whole can be found in **Chapter 5: Approach to EIA, Volume 1a** and **Appendix 5.4: Stakeholder Consultation and Engagement, Volume 1c**.

23.3.1.2 Consultation is a key feature of the EIA process and continues throughout the lifecycle of the Offshore Project, from the initial stages through to consent and post consent.

23.3.1.3 Consultation captures all consultation and engagement and has been ongoing with a number of prescribed and non-prescribed consultation bodies and local authorities in relation to Combined Effects. All consultation to date has been undertaken in line with the process described in **Chapter 5, Volume 1a** and **Appendix 5.4, Volume 1c**. Feedback received during this process has been incorporated into the EIAR wherever possible as appropriate.

### 23.3.2 EARLY ENGAGEMENT

#### Scoping Opinion

23.3.2.1 Spiorad na Mara Limited (hereafter referred to as 'the Applicant') submitted a Scoping Report (Spiorad na Mara Limited, 2023) and request for a Scoping Opinion to the Marine Directorate Licensing Operations Team (MD-LOT) in September 2023. A Scoping Opinion was received in May 2024. The Scoping Report outlines the proposed combined effects assessment methods, the baseline data collected to date and planned, and the overall scope of the assessment. The comments received in the Scoping Opinion and how these have been addressed in this EIAR is provided in **Appendix 5.2: Response to Scoping Opinion, Volume 1c**.

23.3.2.2 A summary of those responses relevant to Combined Effects is shown in **Table 23.2**. Regard has also been given to other stakeholder comments that were received in relation to the Scoping Report.

Table 23.2 Scoping Opinion responses – Combined effects

Consultee	Date / Document	Comment	Response/where this is addressed in the EIAR
NatureScot	Licensing Operations Team Scoping Opinion, May 2024  Appendix I - Consultation representations	Increasingly, there is a need to understand potential impacts holistically at a wider ecosystem scale in addition to the standard set of discrete individual receptor assessments. This assessment should focus on potential impacts across predator prey interactions both on and offshore. This will enable a better understanding of the consequences (positive or negative) of any potential changes in prey distribution and abundance from the development of the wind farm on bird and mammal (and other top predator) interests and what influence this may have on population level impacts.	An eco-system level assessment is provided in Section 23.6 of this chapter.

## 23.4 METHODOLOGY AND SCOPE OF THE ASSESSMENT

### 23.4.1 Introduction

23.4.1.1 This section sets out the approach and methodology for the:

- Combined Effects Assessment;
- Ecosystem Level Assessment;
- ICCI Assessment.

23.4.1.2 The scope of these assessments has been developed as the Offshore Project has evolved and responds to feedback received to date as set out in Section 23.3.

### 23.4.2 Combined Effects Assessment

#### Overview

23.4.2.1 The assessment of combined effects considers the effects of the Offshore Project and consideration of the relevant elements of the Onshore Transmission Works (OTW) Project, which have the potential to result in an additive impact to the Offshore Project. The combined effects assessment does not consider impacts from other developments (cumulative effects), which are considered within the relevant sections provided within the aspect chapters (**Chapter 6, Volume 2a** to **Chapter 22, Volume 2a**).

23.4.2.2 Combined effects can be categorised into 2 types of effects:

- **Project-lifetime effects:** Assessment of the scope for effects that occur throughout more than one phase of the project (i.e. construction, operation and maintenance (O&M), decommissioning), to interact to potentially create an effect upon a single, specific receptor or receptor group, which is of greater significance than if assessed just within individual/isolated project phases;
- **Receptor-led effects:** Assessment of the scope for effects to interact, spatially and temporally, to create an effect on a receptor/receptor group of greater significance than when the effects are considered in isolation. Receptor-led effects may be short term, temporary or transient effects, or incorporate longer term effects. The receptor-led assessment only considers combined effects of multiple environmental aspects across receptors considered within the Offshore Project EIA.

23.4.2.3 Therefore, to undertake the combined effects assessment the findings of the individual aspect chapters have been incorporated to understand and interpret the potential additional effects that may be of greater significance when compared to individual effects acting on a single receptor (or group). Where additional effects are identified, these are considered additively and qualitatively using expert judgement.

23.4.2.4 The proposed approach is summarised in the following steps. For each EIA topic chapter:

- **Step 1: Review and identification** of relevant receptors from assessments undertaken for each aspect chapter;
- **Step 2: Source-pathway-receptors identification** for the potential combined effect receptors. This process involves cross referencing to all aspect chapters and the impacts assessed to understand if there is potential for combined effects on the same receptor through an interaction of impact pathways relating to different activities or environmental aspects which have been considered separately. This process also determines whether there is potential for project-lifetime combined effects from the same impact across the project phases;
- **Step 3: Production of a tabulated combined effects assessment** within this chapter for both project-lifetime and receptor-led effects.

23.4.2.5 There is the potential for combined effects to occur where effects that have a significance of negligible or higher occur (as reported in the aspect chapters), and interactions between these effects that could cause an impact to any step of the source-receptor-pathway model. These have then been considered through expert judgement in this chapter. When combined with other impacts, effects that have no impact pathway to a receptor and/or cause no change to the baseline (for instance no impact) are unlikely to have combined effects, thus they can be scoped out from the Combined Effects assessment.

23.4.2.6 For project-lifetime effects to occur, an impact of negligible or higher is required over sequential project phases, if an effect only occurs over one project phase (e.g. only during the construction

phase) there is no potential for interaction with effects of the same nature over multiple project phases and can therefore be scoped out of the assessment. Where effects occur in the construction and decommissioning phases (but not the O&M phase), these are considered to be isolated and recovery between the two phases is expected. Therefore, it is not considered that there is potential for a project-lifetime combined effect and can be scoped out of the assessment.

23.4.2.7 The EIA process takes a holistic approach to ensuring environmental assessments are comprehensive and assess all relevant potentially significant effects upon all relevant receptors. As a result of this, some elements of the aspect assessments provided in **Chapter 6, Volume 2a** to **Chapter 22, Volume 2a** inherently consider combined effects.

### Spatial scope and study area

23.4.2.8 To have a potential combined effect, a receptor or receptor group must be within the zone of influence (Zol) of more than one environmental aspect, such as third-party vessels, which are considered in **Chapter 16, Volume 2a; Chapter 20, Volume 2a** and **Chapter 21, Volume 2a**. The Zol informs the study area of each environmental aspect, and therefore the study area for each aspect is applied as the spatial scope for this Combined Effects assessment. The spatial scope of the Combined Effects assessment is based on the aspect spatial Study Areas outlined in **Chapter 6, Volume 2a** to **Chapter 22, Volume 2a**. These spatial Study Areas have been informed through desk study and engagement with stakeholders throughout the development of the Offshore Project.

23.4.2.9 An illustrative example of this is described in **Plate 23-1**; in the graphic, only the green receptors have the potential to experience combined effects as they are within the Study Area for environmental aspect 1 and environmental aspect 2.

Plate 23-1 Illustrative example of the spatial scope and study area for an example receptor



## Temporal scope

23.4.2.10 The temporal scope of the assessment of Combined Effects is the entire lifetime of the Offshore Project, which therefore covers the construction, O&M, and decommissioning phases. A summary of the temporal scope of the Offshore Project is as follows:

- A 5-year construction period is anticipated for offshore infrastructure, with work programmed between April and October each year to allow for optimal weather conditions, except for offshore Landfall construction works located within the Horizontal Directional Drilling (HDD) Exit Pit Area. Construction is anticipated to commence in 2028/2029 with an estimated completion in 2032/2033, with working hours expected to be 24 hours, 7 days a week during the construction period;
- The O&M phase will commence immediately after the construction phase is complete. The operational lifetime of the Proposed Development is expected to be around 35 years;
- Decommissioning will take place after the O&M phase of the Offshore Project. It is anticipated that decommissioning will generally be a reverse of the construction phase, so may take up to 5 years.

23.4.2.11 For the purposes of this Combined Effects assessment, each of these phases will be treated as an entire period, rather than assessing individual years within the phases.

23.4.2.12 Full details of the temporal scope of the Offshore Project can be found in **Chapter 3, Volume 1a**.

## Combined Effects Assessment Scope

23.4.2.13 As discussed in paragraph 23.4.2.7, the EIA follows a holistic approach that ensures a comprehensive environmental assessment is undertaken and many aspect chapters address elements of combined effects by the nature of their assessment.

23.4.2.14 Therefore, this chapter provides a summary of how combined effects have been considered within the aspect chapters (**Chapter 6, Volume 2a** to **Chapter 22, Volume 2a**) and also provides further detail of how effects may give rise to additional combined effects. Potential effects that have been scoped out of the aspect assessments and the EIA are not considered in this chapter.

23.4.2.15 **Table 23.3** outlines the aspects that are included and excluded from the Combined Effects assessment and the reasoning for this.

Table 23.3 Combined Effects Aspect Scope

Environmental aspect	Project-lifetime combined effects	Receptor-led combined effects
<b>Socio-Economics</b>	With respect to project-lifetime combined effects, <b>Table 23.4</b> provides consideration of socio-economics impact pathways which are anticipated to span multiple consecutive phases of the Offshore Project.	<b>Chapter 6, Volume 2a</b> inherently considers receptor-led combined effects for potential interactions, assessing the secondary impacts from pathways identified in other environmental aspect assessments on socio-economic receptors. These assessments include <b>Chapter 15: Offshore Archaeology and Cultural Heritage, Volume 2a; Chapter 16: Shipping and Navigation, Volume 2a; Chapter 18: SLVIA, Volume 2a; Chapter 19: Offshore Airborne Noise, Volume 2a; Chapter 20: Other Sea Users and Recreation, Volume 2a</b> and <b>Chapter 21: Commercial Fisheries, Volume 2a</b> . As such, there are no further receptor-led combined effects identified and so these are not considered further in this chapter.
<b>Climate Resilience</b>	The impact of climate change will occur throughout the project lifetime, and the climate resilience assessment ( <b>Chapter 7: Climate Resilience, Volume 2a</b> ) has considered the impacts for the full duration of the project lifecycle (construction, O&M, and decommissioning phases) on the Offshore Project, as the receptor. As such, there are no further project-lifetime combined effects identified and so these are not considered further in this chapter.	The interface with climate resilience and the other EIA aspects is captured in the ICCI assessment (Section 23.7). This an assessment of how the impacts of climate change could exacerbate or ameliorate potential environmental effects on relevant receptors or affect the efficacy of the proposed environmental measures in the future.

Environmental aspect	Project-lifetime combined effects	Receptor-led combined effects
<b>Climate - Greenhouse Gases</b>	<p>Emissions of greenhouse gases to the atmosphere have the potential to contribute to climate change, and therefore the effects are global and cumulative in nature. This is considered in defining the receptor (the global atmosphere) as high sensitivity.</p> <p>On this basis, project-lifetime and receptor-led combined effects are inherently considered, since all significant activities contributing to greenhouse gas emissions associated with the Offshore Project are accounted for in the overall assessment (<b>Chapter 8: Greenhouse Gases, Volume 2a</b>). No combined effects are therefore identified and so these are not considered further in this chapter.</p>	
<b>Physical and Coastal Processes</b>	<p>The project-lifetime combined effects assessment for physical and coastal processes is considered further and the assessment is presented in <b>Table 23.5</b>.</p>	<p><b>Chapter 9: Physical and Coastal Processes, Volume 2a</b> provides what are essentially impact pathways (secondary effects) for separate technical aspect assessments. For example, <b>Chapter 11: Benthic and Intertidal Ecology, Volume 2a</b> considers the effects arising from increased suspended sediment concentrations (SSC), using modelling undertaken as part of the physical and coastal processes assessment, on benthic and intertidal ecological receptors. Therefore, these chapters have considered the potential combined effects between physical and coastal processes and receptors identified within their assessments. As such, there are no further receptor-led combined effects identified and so are not considered further in this chapter.</p> <p>Receptor-led combined effects with respect to physical and coastal processes have therefore been inherently assessed where they arise in other technical assessments, including <b>Chapter 10: Marine Sediment and Water Quality, Volume 2a; Chapter 12: Fish Ecology, Volume 2a; Chapter 13: Marine Mammals, Volume 2a; Chapter 15, Volume 2a and Chapter 20, Volume 2a and Chapter 21, Volume 2a</b>, and are not considered further in this chapter.</p>

Environmental aspect	Project-lifetime combined effects	Receptor-led combined effects
<p><b>Marine Sediment and Water Quality</b></p>	<p>The project-lifetime combined effects assessment for marine sediment and water quality is considered further and the assessment is presented in <b>Table 23.6</b>.</p>	<p><b>Chapter 10, Volume 2a</b> inherently considers receptor-led combined effects, resulting from the interaction of Offshore Project activities and the physical and hydrological regime, with respect to impacts on relevant receptors within and adjacent to the Offshore Project Boundary. For example, an assessment of effects associated with a sequential pile drilling and jet trenching scenario, as modelled in <b>Chapter 9, Volume 2a</b> is considered within the chapter.</p> <p>The assessment considers modelling and assessment reported in <b>Chapter 9, Volume 2a</b> to define what are essentially impact pathways (secondary effects) for other technical aspect assessments, with respect to seabed disturbance and contaminant mobilisation. For example, <b>Chapter 13, Volume 2a</b> considers impacts to water quality on relevant marine mammal receptors. Therefore, receptor-led effects are not considered further in this chapter.</p>
<p><b>Benthic and Intertidal Ecology</b></p>	<p>The project-lifetime combined effects assessment for benthic and intertidal ecology is considered further and the assessment is presented in <b>Table 23.7</b>.</p>	<p>Receptor-led effects have been considered where relevant in <b>Chapter 11, Volume 2a</b>, for potential interactions. Specifically, these include for example interactions pertaining to physical and coastal processes or increases in SSC and turbidity that could subsequently have the potential to impact benthic and intertidal ecology receptors or habitats, as detailed in <b>Chapter 9, Volume 2a; Chapter 10, Volume 2a; Chapter 12, Volume 2a</b> and <b>Chapter 21, Volume 2a</b> where relevant. Therefore, receptor-led combined effects on benthic and intertidal ecology receptors are not considered further in this chapter.</p> <p>Section 23.6 provides an ecosystem level assessment, which describes the ecological connectivity of species through the food web, and how the relationships between species may be impacted by the Offshore Project.</p>

Environmental aspect	Project-lifetime combined effects	Receptor-led combined effects
<b>Fish Ecology</b>	The project-lifetime combined effects assessment for fish ecology is considered further and the assessment is presented in <b>Table 23.8</b> .	<p>Receptor-led effects have been considered where relevant in <b>Chapter 12, Volume 2a</b>, for potential interactions with other technical aspects, such as changes in SSC (<b>Chapter 10, Volume 2a</b>) and changes in prey availability: shellfish assemblage (<b>Chapter 11, Volume 2a</b>). Therefore, receptor-led combined effects on fish ecology receptors are not considered further in this chapter.</p> <p>Section 23.6 provides an ecosystem level assessment, which describes the ecological connectivity of species through the food web, and how the relationships between species may be impacted by the Offshore Project.</p>
<b>Marine Mammals</b>	The project-lifetime combined effects assessment for marine mammals is considered further and the assessment is presented in <b>Table 23.9</b> .	<p>Receptor-led effects have been considered where relevant in <b>Chapter 13, Volume 2a</b>, for potential interactions with other technical aspects, such as changes in SSC (<b>Chapter 10, Volume 2a</b>) changes in prey availability: shellfish assemblage (<b>Chapter 11, Volume 2a</b>), fish assemblage (<b>Chapter 12, Volume 2a</b>) and changes in vessel movements (<b>Chapter 16: Shipping and Navigation</b>). Therefore, receptor-led combined effects on marine mammals receptors are not considered further in this chapter.</p> <p>Section 23.6 provides an eco-system level assessment, which describes the ecological connectivity of species through the food web, and how the relationships between species may be impacted by the Offshore Project.</p>
<b>Marine and Nearshore Ornithology</b>	The project-lifetime combined effects assessment for marine and nearshore ornithology is considered further and the assessment is presented in <b>Table 23.10</b> .	Receptor-led effects have been considered where relevant in <b>Chapter 14: Marine and Nearshore Ornithology, Volume 2a</b> , for potential interactions with other technical aspects, such as habitat loss and disturbance and changes in prey availability ( <b>Chapter 11</b> and <b>Chapter 12, Volume 2a</b> ). Therefore,

Environmental aspect	Project-lifetime combined effects	Receptor-led combined effects
		<p>receptor-led combined effects on marine and nearshore ornithology receptors are not considered further in this chapter.</p> <p>Section 23.6 provides an eco-system level assessment, which describes the ecological connectivity of species through the food web, and how the relationships between species may be impacted by the Offshore Project.</p>
<b>Offshore Archaeology and Cultural Heritage</b>	The project-lifetime combined effects assessment for offshore archaeology and cultural heritage is considered further and the assessment is presented in <b>Table 23.11</b> .	Receptor-led effects have been considered where relevant in <b>Chapter 15, Volume 2a</b> , for potential interactions. Specifically, these include for example interactions pertaining to changes in physical and coastal processes ( <b>Chapter 9, Volume 2a</b> ) as a result of the Offshore Project and the secondary effects which may uncover or bury any maritime, aviation, or prehistoric sites of known (identified through records and surveys) or unknown sites of archaeological potential. Therefore, receptor-led combined effects on marine archaeological and cultural heritage receptors are not considered further in this chapter.
<b>Shipping and Navigation</b>	The project-lifetime combined effects assessment for shipping and navigation is considered further and the assessment is presented in <b>Table 23.12</b> .	<b>Chapter 16, Volume 2a</b> assesses receptor-led combined effects inherently within the assessment, with respect to impacts to aquaculture support vessels and commercial fishing vessels, as per <b>Chapter 20, Volume 2a</b> and <b>Chapter 21, Volume 2a</b> . Therefore, receptor-led combined effects on military and civil aviation receptors are not considered further in this chapter.
<b>Military and Civil Aviation</b>	The project-lifetime combined effects assessment for military and civil aviation is considered further and the assessment is presented in <b>Table 23.13</b> .	<b>Chapter 17: Military and Civil Aviation, Volume 2a</b> inherently considers receptor-led combined effects, where there is the potential for interactions to occur. Specifically, with respect to potential impacts to Search and Rescue (SAR)

Environmental aspect	Project-lifetime combined effects	Receptor-led combined effects
		<p>operations arising from the Offshore Project, which are also assessed in <b>Chapter 16, Volume 2a</b>.</p> <p><b>Chapter 17, Volume 2a</b> considers the development of appropriate aviation lighting and marking via the <b>Outline Lighting and Marking Plan (LMP), Volume 3</b> as part of the embedded measures the Offshore Project has committed to. The secondary effect of lighting is appropriately assessed in <b>Chapter 14, Volume 2a, Chapter 16, Volume 2a</b> and <b>Chapter 18, Volume 2a</b>. Therefore, receptor-led combined effects on military and civil aviation receptors are not considered further in this chapter.</p>
<b>Seascape, Landscape and Visual Impact Assessment (SLVIA)</b>	<p>The project-lifetime combined effects assessment for SLVIA is considered further and the assessment is presented in <b>Table 23.14</b>.</p>	<p><b>Chapter 6, Volume 2a</b> and <b>Chapter 22, Volume 2a</b> consider SLVIA along with cultural heritage, shipping, offshore airborne noise, other sea users, and commercial fisheries in the context of receptor-led combined effects on relevant receptors, specifically residents, visitors and users where there is the greatest potential for the Study Areas for multiple assessments to overlap (i.e. residents of the west-coast of the Isle of Lewis/<i>Eilean Leòdhais</i>). Therefore, receptor-led combined effects on SLVIA receptors are not considered further in this chapter.</p>
<b>Offshore Airborne Noise</b>	<p>The offshore airborne noise assessment considers the impact of percussive piling activity during the construction phases, and Wind Turbine Generator (WTG) noise during the O&amp;M phase. As each activity is temporally restricted to an individual phase, there is no pathway for project-lifetime combined effects and so these are not considered further in this chapter.</p>	<p><b>Chapter 6, Volume 2a</b> and <b>Chapter 22, Volume 2a</b> consider offshore airborne noise along with cultural heritage, shipping, SLVIA, other sea users, and commercial fisheries impacts in the context of receptor-led combined effects on relevant receptors, specifically residents, visitors and users of the west-coast of the Isle of Lewis/<i>Eilean Leòdhais</i>. Therefore, receptor-led combined effects on offshore airborne noise receptors are not considered further in this chapter.</p>

Environmental aspect	Project-lifetime combined effects	Receptor-led combined effects
<b>Other Sea Users, Tourism and Recreation</b>	The project-lifetime combined effects assessment for other sea users, tourism and recreation is considered further and the assessment is presented in <b>Table 23.15</b> .	Receptor-led effects have been considered where relevant in <b>Chapter 20, Volume 2a</b> , for potential interactions with other technical topic assessments on other sea users, tourism and recreation receptors, such as reduced access to port facilities ( <b>Chapter 16, Volume 2a</b> ), visual amenity effects ( <b>Chapter 18 Volume 2a</b> ) and the interaction of aquaculture and commercial fishing operations ( <b>Chapter 21, Volume 2a</b> ). As such, there are no further receptor-led combined effects identified and so these are not considered further in this chapter.
<b>Commercial Fisheries</b>	The project-lifetime combined effects assessment for commercial fisheries is considered further and the assessment is presented in <b>Table 23.16</b> .	Receptor-led effects have been considered where relevant in <b>Chapter 21, Volume 2a</b> , for potential interactions with other technical aspects, such as the ecological assessment of commercially valuable species ( <b>Chapter 11 and Chapter 12, Volume 2a</b> ) and the collision and allision risk of commercial fishing vessels ( <b>Chapter 16, Volume 2a and Appendix 16.1: Navigation Risk Assessment, Volume 2c</b> ). Therefore, receptor-led combined effects on commercial fisheries receptors are not considered further in this chapter.
<b>Offshore Human Health</b>	The project-lifetime combined effects assessment for offshore human health is considered further and the assessment is presented in <b>Table 23.17</b> .	Receptor-led effects have been considered where relevant in <b>Chapter 22, Volume 2a</b> , for potential interactions with other technical topic assessments on offshore human health receptors, such as employment ( <b>Chapter 6, Volume 2a</b> ) visual amenity effects ( <b>Chapter 18, Volume 2a</b> ) and noise amenity effects ( <b>Chapter 19, Volume 2a</b> ). As such, there are no further receptor-led combined effects identified and so these are not considered further in this chapter.

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### 23.4.3 ECOSYSTEM LEVEL ASSESSMENT METHODOLOGY

- 23.4.3.1 Impacts on ecosystems are not explicitly required as information for inclusion in an EIAR by the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017, or the Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017.
- 23.4.3.2 There is no regulatory guidance or industry best-practice how to define an ecosystem for the purposes of an offshore wind farm EIAR, nor is there a well-established methodology for assessing impacts to ecosystems from an offshore wind development. It is therefore essential to define and delineate the ecosystem in question for the purposes of this assessment.
- 23.4.3.3 As the request for an ecosystem assessment came from the Scoping Opinion for the Offshore Project, the ecosystem assessed in this section relates to the marine and coastal environment up to Mean High Water Springs (MHWS). This aligns with the jurisdiction of the consenting regime to which this EIAR applies (see **Chapter 2, Volume 1a**).
- 23.4.3.4 The Offshore Project is located on the northwestern coast of the Isle of Lewis/*Eilean Leòdhais*, which is on the eastern side of the Atlantic Ocean. The marine area surrounding the Offshore Project includes the northern end of the Irish shelf, with the deeper water of the Rockall Trough to the northwest and west. To the east of the Isle of Lewis/*Eilean Leòdhais* is the Minch, which are the relatively shallow waters that separate the Western Isles from mainland Scotland.
- 23.4.3.5 There is open ocean between the northwestern coast of the Isle of Lewis/*Eilean Leòdhais* and Iceland and Greenland, and these waters connect the open Atlantic ocean with the Arctic Ocean via the Norwegian Sea, Greenland Sea, and Barents Sea. The marine waters in these locations are characterised by cold temperatures, high levels of nutrients, and gradients of temperature and salinity created by oceanic currents.
- 23.4.3.6 These water bodies are connected in physical, hydrological and ecological terms and therefore the ecosystem may be considered to be very large. For the purposes of this assessment, the ecosystem in question comprises the northern Atlantic Ocean (i.e. north of the equator, as the southern Atlantic Ocean is influenced by different oceanic currents) to the west and southwest, the Norwegian Sea, Greenland Sea, and Barents Sea to the north, and the Minch to the east.
- 23.4.3.7 This ecosystem-level assessment describes the ecological connectivity of species through the food web, and how the relationships between species may be impacted by the Offshore Project. Using the assessment findings from the aspect chapters, this ecosystem assessment establishes how impacts upon one receptor or group of receptors within the ecosystem can influence other dependent species, particularly where predator-prey relationships exist.
- 23.4.3.8 The aspect chapters of most relevance to this assessment and that should be read in conjunction with this assessment are:

- **Chapter 11, Volume 2a;**

- **Chapter 12, Volume 2a;**
- **Chapter 13, Volume 2a;**
- **Chapter 14, Volume 2a.**

23.4.3.9 Given the large scale of the ecosystem in question and the inherent uncertainty in the conclusions that would result, this ecosystem assessment does not attempt to quantify impacts. The assessment presents a qualitative interpretation of predator-prey interactions and population level impacts, which aligns with the Scoping Opinion request from NatureScot. The ecosystem level assessment has considered potential impacts and interactions for receptors/receptors groups that are included within the Offshore Project EIA.

#### 23.4.4 In-Combination Climate Change Impact (ICCI) Assessment Methodology

23.4.4.1 The ICCI assessment considers the receptors identified in the environmental aspect chapters (**Chapter 6 to Chapter 23, Volume 2a**) with the combined consideration of future climate change trends and impacts. The ICCI takes account of appropriate guidance 'EIA Guide to: Climate Change Resilience and Adaptation 2020' (IEMA, 2020).

23.4.4.2 Stage 1 of the ICCI presents a screening matrix of technical aspects included within the Offshore Project EIAR to identify whether relevant receptors are sensitive to the potential for climatic trends to interact with and exacerbate other environmental impact pathways. The climate hazards considered are those reported in **Appendix 7.1: Climate Vulnerability Assessment, Volume 2c** and carried forward for assessment in **Chapter 7, Volume 2a**. Where sensitivity is identified, these environmental aspects are carried forward for assessment in Stage 2.

23.4.4.3 Stage 2 of the ICCI presents a summary assessment of the environmental aspects and associated receptors which are considered to be sensitive to future climatic trends, utilising professional judgement and literature reviews, as appropriate. The assessment sets out:

- The climate hazard(s) which the receptors are anticipated to be sensitive to over the construction, O&M, and decommissioning of the Offshore Project, as screened in Stage 1;
- A description of the identified impact pathway(s) which may be sensitive to future climate hazards;
- A qualitative description of the identified potential ICCI;
- A qualitative assessment of the interaction between the relevant impact pathway and ICCI, applying professional judgement to determine whether the anticipated ICCI has the potential to exacerbate the assessed effects on receptors to such a degree which would result in a Not Significant effect when assessed alone, to become a potentially Significant effect, or to further exacerbate an existing Significant effect, when assessed alone;
- A description of the application of embedded measures for predicted ICCI.

## 23.5 ASSESSMENT OF COMBINED EFFECTS

### 23.5.1 OVERVIEW

23.5.1.1 This section systematically assesses the potential for combined effects across environmental aspects considered in the EIA Report, which are not excluded from further assessment in **Table 23.3**. For each receptor group, both project-lifetime and receptor-led combined effects have been evaluated, drawing on the findings of individual aspect chapters and applying professional judgement.

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Table 23.4 Socio-Economics Project-Lifetime Combined Effects Assessment

Impact type	Residual effects			Lifetime combined effects assessment
	Construction	Operation and maintenance	Decommissioning	
<b>Socio-economic Impacts – Employment Effects and Gross Value Added (GVA)</b>	Negligible to Minor beneficial (Not Significant)	Negligible to Moderate beneficial (Not Significant)	Negligible to Minor beneficial (Not Significant)	<p>Jobs and GVA are assessed for the Project, including both Offshore and Onshore elements. The construction, operation and decommissioning of the Offshore Project will create direct, indirect and induced employment and GVA in the local and national economy.</p> <p>Socio-economics impacts are relative to the phase of works being completed, as it is proportional to the number of jobs and GVA generated. Therefore across the project lifetime, it is not anticipated that socio-economics impacts on employment and GVA will result in a combined effect which is of greater significance than is reported in each phase.</p>
<b>Wider Socio-economic Effects – Tourism Sector / Fisheries, Aquaculture and Fish/Shellfish Processing Sector / Transport and Storage Sector</b>	Minor Adverse (Not Significant)	Minor Adverse (Not Significant)	Minor Adverse (Not Significant)	<p>The assessment of wider socio-economics effects consider effects on relevant local sectors, where there is potential to experience a socio-economic effect via other environmental aspects and associated impact pathways, such as those assessed in <b>Chapter 16, Volume 2a; Chapter 18, Volume 2a; Chapter 19, Volume 2a; Chapter 20, Volume 2a</b> and <b>Chapter 21, Volume 2a</b>.</p> <p>The Applicant has committed to appropriate embedded measures such as the accommodation of the offshore workforce on vessels during the construction phase (M041), additional mitigation via <b>Chapter 21, Volume 2a</b> and with specific reference to the tourism sector, additional mitigation in the development of a Tourism Support Strategy (A0004), to reduce the magnitude of impact to these aspects, industries and sectors, which may arise as a result of the Offshore Project. Wider socio-economics effects are assessed as <b>Minor Adverse (Not Significant)</b> across each respective stage. Across the project lifetime, it is not anticipated that socio-economics impacts will result in a combined effect which is of greater significance than individually assessed phases.</p>
<b>Socio-cultural Effects - Population Change, Housing Availability and Availability of Community Services</b>	Negligible to Minor Adverse (Not Significant)	Negligible to Minor Beneficial (Not Significant)	Negligible to Minor Adverse (Not Significant)	<p>Throughout the duration of the Offshore Project, the presence of a temporary workforce during construction and decommissioning phases, as well as the influx of personnel during the operations and maintenance phase, may affect relevant stakeholders through shifts in local demographics and increased demand for housing, services, and transportation infrastructure. Both temporary and permanent changes in the population and environment associated with the Project also have the potential to influence culture and identity, including considerations related to the Gaelic language.</p> <p>During the construction phase, the offshore workforce will be accommodated on vessels, with medical facilities to be provided on board vessels to treat minor injuries/illness and reduce additional pressure on existing services (M041). The implementation of this embedded mitigation measure results in the magnitude of impact to socio-cultural effects to Negligible to Low.</p> <p>During the O&amp;M phase, workers required for routine maintenance are expected to be accommodated offshore and that many permanent O&amp;M roles are expected to be recruited locally. Therefore, the incoming workforce is estimated to account for a relatively small proportion of the total population of the islands, which reduces the likely impact to relevant receptors of the additional demand on the local housing market, transport, community services and infrastructure and effects on culture and identity. The Applicant has committed to appropriate measures to engage with key stakeholders (M042) and local communities (M044), and to develop a Cultural Integration Plan (M045) the magnitude of which is assessed as Negligible to Low.</p>

	Residual effects			Lifetime combined effects assessment
Impact type	Construction	Operation and maintenance	Decommissioning	
				<p>Therefore, across the Offshore Project lifetime, socio-cultural effects are assessed as <b>Negligible to Minor Beneficial (Not Significant)</b>. Beneficial effects are associated with population change during the O&amp;M phase. With the application of appropriate mitigation (M041) in the construction phase, the potential for socio-cultural effects occurs predominantly in the O&amp;M phase, due to the influx of personnel to the Island. Therefore, it is not anticipated that socio-economics impacts will result in a combined effect which is of greater significance than individually assessed phases.</p>

Table 23.5 Physical and Coastal Processes Project Lifetime Combined Effects Assessment

Impact type	Residual effects			Lifetime combined effects assessment
	Construction	Operation and maintenance	Decommissioning	
<b>Sediment Disturbance and Seabed Change</b>	Negligible (Not Significant)	Negligible (Not Significant)	Negligible (Not Significant)	<p>The construction parameters applied in the physical and coastal processes assessment (<b>Chapter 9, Volume 2a</b>) ensures that the maximum extent of sediment disturbance and seabed change is appropriately considered, arising from the most impactful methods of WTG foundation installation, cable installation and Horizontal Directional Drilling (HDD) activities to assess impacts to physical and coastal processes receptors, defined as the surrounding sub-tidal seabed, surrounding coastline and designated site of geological interest, within the Study Area.</p> <p>Activities associated with the O&amp;M are expected to occur with a lower intensity than those during construction, such as the maintenance and repair of Offshore Project infrastructure, and thus result in sediment disturbance and seabed change which is of a lesser magnitude and extent.</p> <p>Decommissioning activities within the Offshore Project Boundary are expected to follow the reverse of the construction phase of the Offshore Project, with the potential for some infrastructure to be left in place, and surface infrastructure likely to be fully removed utilising similar types and number of vessels and equipment, thus resulting in a level of effect which is no greater than the Construction phase.</p> <p>Although sediment disturbance and seabed change is anticipated across the three phases of the Offshore Project lifecycle, the effects (such as increased suspended sediment) are considered to be localised and temporary, as supported by modelling (<b>Appendix 9.2: Physical and Coastal Processes Modelling Results Report, Volume 2c</b>) and therefore result in a lifetime combined effect which is of no greater significance than the phases individually.</p>
<b>Effects related to the Presence of Infrastructure (changes to water depth, scour, waves and stratification)</b>	N/A	Negligible (Not Significant)	N/A	<p>This impact is limited to the O&amp;M phase and therefore does not have a pathway to generate a lifetime combined effect.</p>

Table 23.6 Marine Sediment and Water Quality Project Lifetime Combined Effects Assessment

Impact type	Residual effects			Lifetime combined effects assessment
	Construction	Operation and maintenance	Decommissioning	
<b>Direct seabed disturbance resulting in mobilised suspended sediment</b>	Negligible to Minor (Not Significant)	Negligible (Not Significant)	Negligible to Minor (Not Significant)	<p>The construction parameters applied in the marine sediment and water quality assessment (<b>Chapter 10, Volume 2a</b>) ensures that the maximum extent of seabed disturbance and associated increase in suspended sediment, is appropriately considered, arising from the most impactful methods of seabed preparation, WTG foundation installation, cable installation and HDD activities to assess impacts to relevant marine sediment and water quality receptors, defined as marine water quality and marine sediment quality within the Study Area.</p> <p>Activities associated with the O&amp;M are expected to occur with a lower intensity than those during construction, as the works are not anticipated to result in detectable change in sediment disturbance and associated increase in suspended sediment.</p> <p>Decommissioning activities within the Offshore Project Boundary are expected to follow the reverse of the construction phase of the Offshore Project, with the potential for some infrastructure to be left in place, and surface infrastructure likely to be fully removed utilising similar types and number of vessels and equipment, thus resulting in a level of effect which is no greater than the Construction phase.</p> <p>Although disturbance to the seabed and mobilisation of suspended sediment is anticipated across the 3 phases of the Offshore Project lifecycle, the effects to marine water quality and marine sediment quality are considered to be localised and temporary. The Array Area is made up of coarser sediments which will settle out quickly within the Zol and thus suspended sediments in the water column are anticipated to return to baseline conditions within days of the disturbance, due to dispersion and dilution. Therefore, increased SSC will not interact across multiple project phases to result in a lifetime combined effect which is of greater significance than the phases individually.</p>
<b>Changes in contaminant concentrations in water and sediment</b>	Negligible (Not Significant)	Negligible (Not Significant)	Negligible (Not Significant)	<p>Baseline characterisation indicates that sediment contaminant concentrations are low and are not considered to be of ecological concern. As such, mobilised sediment in the water column as a result of construction activities are not anticipated to result in an exceedance of water column Environmental Quality Standards (EQS) for Water Framework Directive (WFD) coastal water bodies or failure of compliance with sediment quality guidelines and are therefore assessed as <b>Negligible (Not Significant)</b>.</p> <p>The maintenance and remedial works required during the O&amp;M phase are not anticipated to result in detectable change in sediment disturbance, and thus mobilisation of suspended sediment.</p> <p>Mobilisation events during different project phases are also temporally separated and therefore there is unlikely to be a cumulative interaction. Therefore, there is no pathway for lifetime combined effects to occur as a result of changes in contaminant concentrations in water and sediment.</p>
<b>Changes in Blue Carbon Resource</b>	Minor (Not Significant)	N/A	Minor (Not Significant)	<p>As the maintenance and remedial works required during the O&amp;M phase are not anticipated to result in detectable change in sediment disturbance, there is no pathway for lifetime combined effects to occur as a result of changes in blue carbon resource.</p>

Table 23.7 Benthic and Intertidal Ecology Project Lifetime Combined Effects Assessment

Impact type	Residual effects			Lifetime combined effects assessment
	Construction	Operation and maintenance	Decommissioning	
<b>Temporary habitat loss and/or disturbance</b>	Negligible to Minor adverse (Not significant)	Negligible to Minor adverse (Not significant)	Negligible to Minor adverse (Not significant)	<p>The benthic habitat receptors, such as Annex I Bedrock and/or Stony Reef, Kelp beds, and Offshore subtidal sands and gravel that characterise the Offshore Project Boundary are not geographically restricted to within it and are typically present in coastal waters around the UK. The shellfish ecology receptors identified in the Study Area include decapod crustaceans, common welk, and bivalve molluscs. Disturbance of these habitats and associated benthic communities (including the assessed commercially important species groups) by construction activities such as ground clearance, seabed preparation, the use of jack up vessels and laying of cables will be temporary and reversible in nature as construction activities will take place over a 5 year period, with construction activity restricted to the months of April-October each year (Commitment M023). The magnitude of impact during the construction phase is therefore considered to be Negligible to Low.</p> <p>During the O&amp;M phase, temporary habitat loss and/or disturbance as a result of repair or replacement of cable sections and major component replacement of WTGs will affect only a small proportion of available habitat relative to the wider marine area, and will be intermittent and short term, which is considered to be highly localised and reversible through natural recovery processes. The magnitude of impact during the O&amp;M is therefore considered to be Low.</p> <p>The impacts during decommissioning are likely to be of the same magnitude as during the construction phase, as assessed under temporary habitat disturbance.</p> <p>With the application of appropriate embedded measures, such as the completion of pre-construction surveys (M001) and micro-siting of cable routes (M002) during the construction phase; and the utilisation of best practice seabed excavation methods (M005) during the O&amp;M Phase, the level of effect of temporary habitat disturbance as a result are considered to be <b>Negligible to Minor Adverse (Not Significant)</b>.</p> <p>The impacts from Offshore Project activities are anticipated to fall within natural variability or constitute partial, recoverable alteration to habitats or communities, with recovery expected within fewer than 5 years. Therefore, due to the Negligible to Low magnitude assessed across the construction and O&amp;M phases, any overlap in recovery and further effects are not anticipated to result in a combined effect which is of greater significance than is reported in each phase.</p>
<b>Long-term loss of habitat and/or habitat disturbance</b>	-	Negligible to Minor adverse (Not significant)	-	This impact is limited to the O&M phase and therefore does not have a pathway to generate a lifetime combined effect.
<b>Temporary Increase in SSC and Turbidity</b>	Negligible to Minor adverse (Not significant)	Negligible to Minor adverse (Not significant)	Negligible to Minor adverse (Not significant)	The construction parameters applied in the marine sediment and water quality assessment ( <b>Chapter 10, Volume 2a</b> ) ensures that the maximum extent of seabed disturbance and associated increase in suspended sediment and turbidity, is appropriately considered, arising from the most impactful methods of cable burial, WTG foundation pile drilling and HDD Exit Pit Construction to assess effects from the resultant temporary increase in SSC and turbidity to habitats and associated benthic community receptors.

Impact type	Residual effects			Lifetime combined effects assessment
	Construction	Operation and maintenance	Decommissioning	
				<p>As the most intensive works occur during the construction phase, this is the worst-case period. Although mobilised sediment may be transported up to 6 km from the point of release, it is assessed to be temporary and reversible in nature, with modelling predicting that peak sediment concentrations could remain in the water column for a period of up to 2 days. The magnitude of impact during the construction phase is therefore considered to be Low.</p> <p>Although repair and maintenance works are required during the O&amp;M phase, elevated SSCs are expected to be short-term, intermittent, and spatially limited, resulting in highly localised and naturally reversible change through natural processes, including wave action, tidal action and prevailing currents. Temporary increases in SSC and turbidity as a result of decommissioning activities (which are assumed to be the reverse of construction activities) are also considered to be temporary, localised, adverse and reversible impact, within natural variability. The magnitude of impact during the O&amp;M and decommissioning phases are therefore also considered to be Low.</p> <p>When all appropriate embedded measures are taken into account, depending on the sensitivity of the receptor, this effect is assessed as <b>Negligible to Minor (Not Significant)</b>. Due to the modelled rate of resettlement of suspended settlement, it is not anticipated that effects from increased SSC and turbidity will result in an effect which will be experienced across consecutive phases and thus have the potential to be of greater significance than is reported in each phase.</p>
<b>Temporary Increase in sediment deposition</b>	Negligible to Minor adverse (Not significant)	Negligible to Minor adverse (Not significant)	Negligible to Minor adverse (Not significant)	<p>Temporary increase in sediment deposition from increased SSC in the water column due to mobilisation of sediment during the Construction phase will occur as a result of Offshore Project construction activities, as assessed in <b>Chapter 9, Volume 2a</b>. These activities include WTG foundation works and cable installation, which have the potential to impact sensitive receptors: habitats and associated benthic communities. Changes to baseline conditions as a result of construction activities are considered to be within the range of natural variability or due to partial loss and/or recoverable alteration to the extent, composition or character of a habitat/community, or population of a species, with recovery expected within less than 5 years. Therefore, the magnitude of impact is considered to be Low.</p> <p>Although repair and maintenance works are required during the O&amp;M phase, elevated SSCs are expected to be short-term, intermittent, and spatially limited, resulting in highly localised and reversible change through natural processes, including wave action, tidal action and prevailing currents. Similarly, it is likely that the levels of suspended sediments released and subsequent sediment deposition during decommissioning, will be of the same or lower magnitude than those generated during the construction phase of the Offshore Project. Therefore, impacts to habitats and associated benthic communities during the O&amp;M phase are assessed as being of Low magnitude.</p> <p>Therefore, when all appropriate embedded measures are taken into account, such as following best practice techniques for seabed excavation (M005), depending on the sensitivity of all the relevant habitats and benthic community receptors, this effect is assessed as <b>Negligible to Minor (Not Significant)</b> in each phase respectively.</p>

Impact type	Residual effects			Lifetime combined effects assessment
	Construction	Operation and maintenance	Decommissioning	
				As the sediment within the Turbine Area is frequently re-mobilised due to wave action and tidal currents, the areas of deposition are likely to return to baseline conditions rapidly after deposition and are therefore considered to be within the range of natural variability. It is therefore not anticipated that effects from increased sediment deposition will result in an effect which is experienced across consecutive phases and thus with the potential to be of greater significance than is reported in each phase.
<b>Disturbance from underwater noise and Vibration generated during Piling and cable route preparation</b>	Negligible to Minor adverse (Not significant)	N/A	N/A	This impact is limited to construction phase and therefore does not have a pathway to generate a lifetime combined effect.
<b>Release of drilling fluid mud, drilling arising or bentonite from HDD employed at the cable landfall location</b>	Negligible to Minor adverse (Not significant)	N/A	N/A	This impact is limited to construction phase and therefore does not have a pathway to generate a lifetime combined effect.
<b>Introduction and colonisation by Invasive Non-Native Species (INNS)</b>	Negligible to Minor adverse (Not significant)	Negligible to Minor adverse (Not significant)	Negligible to Minor adverse (Not significant)	<p>Construction activities associated with the Offshore Project have the potential to introduce INNS species and provide the artificial substrate for colonisation through the presence of construction vessels and equipment from international / inter-regional locations. INNS may also be introduced through the release of bilge and ballast water, and import or transfer of construction materials. The introduction of INNS creates the potential for competition for resources with native habitats and associated benthic communities receptors.</p> <p>The length of the O&amp;M phase of the Offshore Project (up to 35 years) provides more opportunities for the introduction and colonisation of INNS than the construction phase (5 years), due to the presence of physical infrastructure such as WTGs in the marine environment. However, with the implementation of the <b>INNS Management Plan, Volume 3</b> (M006) and adherence to International Maritime Organisation (IMO) best practice guidance for vessels (M021), the magnitude of impact across the project lifetime is Low.</p> <p>Activities associated with the maximum design scenario of decommissioning, through the removal of infrastructure including the introduction and colonisation by INNS are expected to occur with no greater (likely lower) intensity than those during construction.</p> <p>Therefore, when all appropriate embedded measures are taken into account, depending on the sensitivity of the specific receptor, this effect is assessed as <b>Negligible to Minor (Not Significant)</b> across the project lifetime. The prior to the commencement of construction, a Biosecurity Plan will be detailed in the <b>INNS Management Plan, Volume 3</b> to ensure that the risk of potential introduction and spread of marine INNS from increased vessel activity is minimised. Across the project lifetime, it is not anticipated that effects associated with the introduction of INNS result in a combined effect which is of greater significance than is reported in each phase as there will not be a discernible change for any length of time, and does not threaten benthic and intertidal ecology features, undermine regional ecosystem functions, or diminish biodiversity.</p>

Impact type	Residual effects			Lifetime combined effects assessment
	Construction	Operation and maintenance	Decommissioning	
<b>Protection of benthic habitats through fishing restrictions</b>	Minor Beneficial (Not Significant)	N/A	Minor Beneficial (Not Significant)	This impact is limited to construction and decommissioning phases and therefore do not have a pathway to generate a lifetime combined effect.
<b>Thermal emissions from subsea electrical cables</b>	N/A	Negligible (Not Significant)	N/A	This impact is limited to O&M phase and therefore does not have a pathway to generate a lifetime combined effect.

Table 23.8 Fish Ecology Project Lifetime Combined Effects Assessment

Impact type	Residual effects			Lifetime combined effects assessment
	Construction	Operation and maintenance	Decommissioning	
<b>Short-term habitat loss and disturbance</b>	Negligible to Minor (Not Significant)	Negligible to Minor (Not Significant)	Negligible to Minor (Not Significant)	<p>Short term habitat loss and disturbance will occur during the construction phase as a result of boulder clearance activities, the use of jack up vessels and laying of cables. For fish ecology receptor groups, defined as marine fish and diadromous fish this has potential to degrade or remove habitats, including foraging, spawning, and nursery areas. the impacts to fish will likely be adverse, medium-term in duration (over a period of 5 years commencing in 2028 or 2029), but intermittent (restricted to the months of April to October each year (except for offshore Landfall construction works located within the HDD Exit Pit Area which may occur all year round). The primarily sediment type across the Offshore Project Boundary comprise non sedimentary substrates including rock outcrop, cobbles and boulders that by their nature are not vulnerable to sediment disturbance.</p> <p>Short term seabed loss/disturbance impacts considered to be localised and reversible through natural recovery processes. With the application of appropriate embedded measures, such as micro-siting (M001), best practice techniques for seabed excavations (M005) and construction period timing (M023), the magnitude of impact is considered to be Low.</p> <p>Short term disturbance impacts from maintenance and repair activities during the O&amp;M phase represent repeated disturbance events across the O&amp;M phase (up to 35 years) to for example repair sections of Offshore Cable, and are considered to be episodic and limited in spatial extent in the context of the wider marine environment. With the application of appropriate embedded measures, such as micro-siting (M001), best practice techniques for seabed excavations (M005) and construction period timing (M023), the magnitude of impact to fish ecology receptors is considered to be Low.</p> <p>The magnitude of impact from decommissioning is predicted to be equivalent to or lower than that of the construction phase.</p> <p>The seabed habitats that may be temporarily disturbed within the Offshore Project Boundary are widespread throughout the wider Fish Ecology Study Area. As a result, any effects occurring over the project's lifetime represent only a small proportion of the available habitat. This conclusion is further supported by the strong capacity of these habitats to recover from temporary disturbance and the high likelihood that fish receptors will return to areas once conditions normalise. The significance of effect for short term habitat loss/and or disruption is assessed as <b>Negligible to Minor (Not Significant)</b> depending on the sensitivity of the specific fish ecology receptor. This reflects the extent of habitat disturbance expected during the Project lifetime, and the level of recoverability associated with the sediment types found within the Offshore Project Boundary. It is therefore not anticipated that this effect will generate an impact which is of sufficient magnitude to result in a combined effect of greater significance than is reported in each phase.</p>
<b>Increased SSC and associated sediment deposition</b>	Negligible to Minor (Not Significant)	Negligible to Minor (Not Significant)	Negligible to Minor (Not Significant)	<p>Temporary increase in SSC and sediment deposition from mobilised sediment during the construction phase will occur as a result of activities including WTG foundation works and cable installation. Modelling to inform this assessment is provided in <b>Chapter 9, Volume 2a</b> and <b>Appendix 9.2, Volume 2c</b>. The impacts to marine fish and diadromous species will likely be adverse, medium-term in duration (over a period of 5 years commencing in 2028 or 2029).</p>

Impact type	Residual effects			Lifetime combined effects assessment
	Construction	Operation and maintenance	Decommissioning	
				<p>Temporary increases in SSC and sediment deposition during the construction phases and associated sediment deposition are considered to be highly localised and naturally reversible through tidal processes. With the application of appropriate embedded measures, such as micro-siting (M001), pre-construction surveys (M002), best practice techniques for seabed excavations (M005) and construction period timing (M023), the magnitude of impact is considered to be Low.</p> <p>Temporary increases in SSC and sediment deposition as a result of maintenance and repair activities during the O&amp;M phase represent repeated disturbance events across the O&amp;M phase (up to 35 years) to for example repair sections of Offshore Cable, and are considered to be temporary, localised, and reversible through natural recovery processes. With the application of appropriate embedded measures, such as micro-siting (M001), best practice techniques for seabed excavations (M005) and construction period timing (M023), the magnitude of impact fish ecology receptors is considered to be Low.</p> <p>Temporary increases in SSC and subsequent sediment deposition are predicted to occur during the decommissioning phase, from activities, such as removal of cables, and use of jack-up vessels. The magnitude of impact from decommissioning is predicted to be equivalent to or lower than that of the construction phase.</p> <p>When all appropriate embedded measures are taken into account this effect is assessed as <b>Negligible to Minor (Not Significant)</b> in EIA terms across the project lifetime.</p> <p>The significance of effect for temporary increases in SSC and sediment deposition is assessed as <b>Negligible to Minor (Not Significant)</b> depending on the sensitivity of the specific fish ecology receptor. This reflects the extent of temporary increases in SSC and sediment deposition and the natural reversibility through tidal processes. It is therefore not anticipated that this effect will generate an impact which is of sufficient magnitude to result in a combined effect of greater significance than is reported in each phase.</p>
<b>Underwater noise and vibration (Impulsive)</b>	Negligible to Minor (Not significant)	N/A	N/A	This impact is limited to the O&M phase and therefore does not have a pathway to generate a lifetime combined effect.
<b>Underwater noise and vibration (Continuous)</b>	Negligible (Not Significant)	Negligible (Not Significant)	N/A	<p>Underwater noise and vibration (continuous noise) impacts to hearing sensitive fish groups are anticipated to occur during the construction phase. Relevant continuous construction noise sources include cable laying, foundation installation via drilling (drill and grout), and vessel movements. Impact ranges for all activities were less than 50 m and are therefore considered to be Negligible in magnitude.</p> <p>Sources of continuous noise during the O&amp;M phase, such as mechanically generated vibration from the rotation of WTGs. Impact ranges for impacts to hearing sensitive species were less than 50 m and are therefore considered to be Negligible in magnitude.</p> <p>The <b>Negligible (Not Significant)</b> extent of effects in each phase are so limited that it is not anticipated that the combination of them could give rise to an effect of greater significance.</p>

Impact type	Residual effects			Lifetime combined effects assessment
	Construction	Operation and maintenance	Decommissioning	
<b>Release of drilling muds during trenchless construction</b>	Negligible to Minor (Not Significant)	N/A	N/A	This impact is limited to the construction phase and therefore does not have a pathway to generate a lifetime combined effect.
<b>Electro-Magnetic Field (EMF)</b>	N/A	Negligible to Minor (Not Significant)	N/A	This impact is limited to the O&M phase and therefore does not have a pathway to generate a lifetime combined effect.
<b>Fish aggregation effects</b>	N/A	Negligible to Minor (Not Significant))	N/A	This impact is limited to the O&M phase and therefore does not have a pathway to generate a lifetime combined effect.
<b>Long term seabed habitat loss/change</b>	N/A	Negligible to Minor (Not Significant)	N/A	This impact is limited to the O&M phase and therefore does not have a pathway to generate a lifetime combined effect.

Table 23.9 Marine Mammals Project Lifetime Combined Effects Assessment

Impact type	Residual effects			Lifetime combined effects assessment
	Construction	Operation and maintenance	Decommissioning	
<b>Auditory injury from piling noise</b>	Negligible (Not Significant)	N/A	N/A	This impact is limited to the construction phase and therefore does not have a pathway to generate a lifetime combined effect.
<b>Auditory injury from other construction noise</b>	Negligible (Not Significant)	N/A	N/A	This impact is limited to the construction phase and therefore does not have a pathway to generate a lifetime combined effect.
<b>Disturbance from noise</b>	Negligible (Not Significant)	Negligible (Not Significant)	Negligible (Not Significant)	<p>Underwater noise from percussive piling activities, such as WTG foundation piling are a source of disturbance to marine mammals receptor groups, defined as cetaceans (odontocetes and mysticetes), pinnipeds and protected features of North-east Lewis and Sea of the Hebrides MPAs. Underwater noise from percussive piling activities is limited to the construction phase.</p> <p>Underwater noise from other noise sources is also a source of disturbance to marine mammals receptors. Relevant 'other' construction noise sources include cable laying, foundation installation via drilling (drill and grout) and vessel movements. Sources of noise during the O&amp;M phase include vessel movements and cable repair activities.</p> <p>The worst-case scenario for disturbance from other noise sources during decommissioning is on par, or less than anticipated during the construction phase. Therefore, the magnitude and sensitivity assessments for the construction phase can also be applied to decommissioning.</p> <p>The Magnitude of impact associated with disturbance from percussive piling is considered to be Negligible to Low during the construction phase only. The magnitude of impact to marine mammals from other noise sources is considered to be Negligible across all phases. This is based on the guidelines for magnitude which state a transient recoverable effect on a few individuals, within the envelope of natural variability, no potential effect on the Favourable Conservation Status and/or the long-term viability of the population, and very short-term effect and no changes to population size or future trajectory.</p> <p>With the application of appropriate embedded measures, such as the Marine Mammal Mitigation Plan (MMMP) (M003) and Outline Environmental Management Plan (OEMP) (M019) during the construction phase, the effect for noise sources from percussive piling activities is assessed as <b>Negligible (Not Significant)</b> for all marine mammal receptors. Similarly, the effect from other noise sources is also assessed as <b>Negligible (Not Significant)</b> across the Project lifetime. Due to the transient nature of the disturbance and Negligible extent of effects in each phase, it is not anticipated that the combination of them could give rise to an effect of greater significance.</p>
<b>Vessel collision</b>	Negligible to Minor (Not Significant)	Negligible to Minor (Not Significant)	Negligible to Minor (Not Significant)	<p>The construction, operation and decommissioning of the Offshore Project will require an increased number of vessels to be utilised within the Offshore Project Boundary and surrounding waters, above baseline vessel traffic levels, which therefore increases the risk of collision between a vessel and a marine mammal.</p> <p>Despite differences in the work being undertaken between the construction and operational phases, the hazard of collision with vessels is largely the same, and its magnitude can be broadly related to the volume of marine traffic. Marginally fewer vessels return trips are planned for each year of the operational phase,</p>

Impact type	Residual effects			Lifetime combined effects assessment
	Construction	Operation and maintenance	Decommissioning	
				<p>and therefore the magnitude of effects of vessel collision is considered to approximately the same as in the construction phase, which is Low.</p> <p>The worst-case scenario for vessel movements during decommissioning is on par, or less than during the construction phase. Therefore, the magnitude and sensitivity assessments for the construction phase can also be applied to decommissioning.</p> <p>Vessels will follow prescribed routes and set transit speeds to reduce the probability of collision and adhere to the measures set out in the NSVMP (<b>Outline NSVMP, Volume 3</b>). Also, marine mammal receptors have the ability to move away from oncoming construction vessels and recover from vessel interactions (notwithstanding the risk in extreme cases of permanent injury or mortality) and as such, this impact pathway is assessed as <b>Negligible to Minor (Not Significant)</b> across all Project phases, depending on the relative sensitivity of specific marine mammal receptors.</p> <p>As the magnitude of impact for vessel strikes is broadly related to the volume of marine traffic, which is anticipated to reduce into the O&amp;M phase, it is not anticipated that vessel collisions will result in a combined effect which is of greater significance than is reported in each phase.</p>
<b>Disturbance or temporary habitat loss from presence of vessels</b>	Negligible (Not Significant)	N/A	N/A	This impact is limited to construction phase and therefore does not have a pathway to generate a lifetime combined effect.
<b>Accidental release of pollutants</b>	Minor (Not Significant)	Minor (Not Significant)	Minor (Not Significant)	<p>Accidental pollutant spills from construction, O&amp;M and decommissioning activities, such as from leakage from vessels, plant or equipment may negatively impact marine mammal populations through prolonged exposure to chemical pollutants, ingestion of contaminated prey and habitat degradation. Potential sources of pollutants may be released as a result of an accidental spill or leak of substances, such as hydraulic oils or lubricants, or long-term leaching of chemical pollutants such as coatings of paint on ship hulls.</p> <p>However, adherence to appropriate measures, defined in the OEMP, which will comply with requirements and best practices in accordance with the International Convention for the Prevention of Pollution from Ships (MARPOL) and SOPEPs.</p> <p>Therefore, when all appropriate embedded measures are taken into account, this effect is assessed as <b>Minor (Not Significant)</b> across each phase respectively. Prior to the commencement of construction, the <b>Marine Pollution Contingency Plan, Volume 3</b> will be further developed to incorporate specific measures based on the detailed design of the Offshore Project. This will ensure that the risk of potential accidental release of pollutants is minimised. Across the project lifetime, it is not anticipated that effects associated with this effect will result in a combined effect which is of greater significance than is reported in each phase. As there will not be a discernible change for any length of time across Project phases, and does not threaten marine mammal features.</p>
<b>Increases in suspended sediment concentration and reduction in water quality</b>	Negligible (Not Significant)	Negligible (Not Significant)	Negligible (Not Significant)	Temporary increase in sediment deposition from mobilised sediment during the Construction phase will occur as a result of activities including WTG foundation works and cable installation, and during Decommissioning, due to the removal of infrastructure, although noting some could be left in-situ.

Impact type	Residual effects			Lifetime combined effects assessment
	Construction	Operation and maintenance	Decommissioning	
				<p>As modelled in <b>Chapter 9, Volume 2a</b> and <b>Appendix 9, Volume 2c</b> the sediment within the Turbine Area is frequently re-mobilised due to wave action and tidal current. The areas of sediment deposition are likely to return to baseline conditions rapidly after deposition and are therefore considered to be within the range of natural variability.</p> <p>The magnitude of impacts to marine mammal receptors from increases in SSC and reduction in water quality is dependent on factors reported in <b>Chapter 10, Volume 2a</b>, which concludes that the significance of effect of changes in suspended sediment concentration and changes in contaminant concentrations are <b>Negligible to Minor (Not Significant)</b>. As such, with the implementation of appropriate embedded measures, such use of best practice techniques for seabed excavations (M005), short-term changes in suspended sediment concentration or reductions in water quality as a result of Offshore Project construction activities are unlikely to affect marine mammals, resulting in an effect which is <b>Negligible (Not Significant)</b>. Due to the temporarily and spatially limited nature of the disturbance and Negligible extent of effects in each phase, it is not anticipated that the combination of them could give rise to an effect of greater significance.</p>
<b>Indirect effects of impacts on prey availability</b>	Negligible (Not Significant)	Negligible (Not Significant)	Negligible (Not Significant)	<p>There is the potential for disruption across trophic levels, as a result of the construction, operation and decommissioning of the Offshore Project, which may result in indirect impacts to marine mammals, due a change in prey resource. This is considered within the Ecosystem Assessment presented in Section 23.6.</p> <p>However, as marine mammals are highly mobile and can forage across a wide area, consuming a varied diet and have the ability therefore to adapt to localised short-term changes in prey availability, this effect is assessed as <b>Negligible (Not Significant)</b>.</p> <p>Across the project lifetime, it is therefore not anticipated that indirect effects of impacts to prey species will result in a combined effect which is of greater significance than is reported in each phase.</p>
<b>Barrier Effects</b>	N/A	Negligible (Not Significant)	N/A	This impact is limited to O&M phase and therefore does not have a pathway to generate a lifetime combined effect.
<b>Long-term changes in habitat and foraging opportunities</b>	N/A	Negligible (Not Significant)	N/A	This impact is limited to O&M phase and therefore does not have a pathway to generate a lifetime combined effect.

Table 23.10 Marine and Nearshore Ornithology Project Lifetime Combined Effects Assessment

Impact type	Residual effects			Lifetime combined effects assessment
	Construction	Operation and maintenance	Decommissioning	
<b>Habitat loss and, disturbance and displacement</b>	Negligible to Minor (Not Significant)	Negligible to Minor (Not Significant)	Negligible to Minor (Not Significant)	<p>The majority of the habitat loss and disturbance during construction and decommissioning will be highly localised and the habitats affected are predicted to recover quickly following completion of construction and decommissioning activities. The construction phase is predicted to last five years, with decommissioning likely to occur over a similar timeframe or shorter.</p> <p>The physical presence of the Offshore Project will result in the long-term alteration or loss of some areas of marine habitat within the Offshore Project Boundary, as a result of direct reliance of birds on the habitats that are lost or altered or the displacement of birds from potential areas of foraging habitat.</p> <p>Decommissioning will occur at least 35 years after the finalisation of the construction phase therefore, across the lifetime of the Offshore Project, the effects on seabird receptors are not anticipated to interact in such a way as to result in project-lifetime effects of greater significance than the assessments presented for each individual phases.</p> <p>As a result, the project-lifetime effects are of minor adverse significance which is not significant in EIA terms and does not constitute a change from the assessment concluded in each phase individually.</p>
<b>Indirect effects through effects on prey species</b>	Negligible to Minor (Not Significant)	N/A	Negligible to Minor (Not Significant)	<p>This impact is temporary and is limited to the Construction and Decommissioning phases. as such, the intervening O&amp;M phase (up to 35 years) means there is no pathway to generate a lifetime combined effect. However, effects across trophic levels are considered further in Section 23.6.</p>
<b>Response to artificial lighting</b>	Negligible to Minor (Not Significant)	Negligible to Minor (Not Significant)	Negligible to Minor (Not Significant)	<p>Artificial light emissions are anticipated during the construction, O&amp;M, and decommissioning phases of the Offshore Project. These impacts are assessed to be <b>Negligible to Minor adverse (Not Significant)</b>, depending on the sensitivity of the bird species assessed. Given that construction and decommissioning activities are temporary and will not overlap with operational activities, there is no potential for these effects to combine across project phases in a way that would increase their overall significance. N.B. it is possible that some overlap may occur if construction is being undertaken whilst some locations are operational. However, the lighting in any portion that is operational will be as per the MDS for the operation phase, and the lighting in any section under construction will be as per the MDS for the construction phase, and therefore overall the amount of lighting will always be less than or equal to whichever of those is greater.</p> <p>The nature of artificial light impacts is such that they are greatest during the construction and decommissioning phases associated with the marine vessels, but of a temporary, localised and transient nature. O&amp;M light sources are less impactful due to the emitting light source. As a result, across the lifetime of the Offshore Project, the effects on sensitive receptors are not expected to interact in a manner that would lead to greater significance than assessed for each individual phase.</p> <p>The project-lifetime combined effects associated with artificial light are considered to be of minor adverse significance, which is not significant in EIA terms and does not constitute a change from the assessment concluded in each phase individually.</p>

Impact type	Residual effects			Lifetime combined effects assessment
	Construction	Operation and maintenance	Decommissioning	
<b>Collision risk</b>	N/A	Negligible to Minor (Not Significant)	N/A	This impact is limited to O&M phase and therefore does not have a pathway to generate a lifetime combined effect.
<b>Distributional responses (displacement) associated with the Offshore Project</b>	N/A	Negligible to Minor (Not Significant)	N/A	This impact is limited to O&M phase and therefore does not have a pathway to generate a lifetime combined effect.
<b>Collision and displacement combined</b>	N/A	Minor (Not Significant)	N/A	This impact is limited to O&M phase and therefore does not have a pathway to generate a lifetime combined effect.
<b>Barrier effect</b>	N/A	Negligible to Minor (Not Significant)	N/A	This impact is limited to O&M phase and therefore does not have a pathway to generate a lifetime combined effect.

Table 23.11 Marine Archaeology and Cultural Heritage Project Lifetime Combined Effects Assessment

Impact type	Residual effects			Lifetime combined effects assessment
	Construction	Operation and maintenance	Decommissioning	
<b>Direct Impacts</b>	Minor (Not Significant to Moderate (Significant))	Negligible to Minor (Not Significant)	Minor (Not Significant) to Moderate (Significant)	<p>Construction, repair and maintenance and decommissioning activities have the potential to cause total or partial loss of (known or unknown) offshore heritage receptors through removal or truncation of remains during activities which interact with the seabed.</p> <p>Adherence to the embedded environmental measures, such as the establishment of Archaeological Exclusion Zones (M008), the production of a Written Scheme of Investigation (WSI) and Protocol for Archaeological Discovery (PAD) (Commitment M007) result in an assessment conclusion of Minor Adverse (Not Significant) in EIA terms for all known heritage assets across the construction, O&amp;M and decommissioning phases.</p> <p>However during the construction phase only, a <b>Moderate Adverse (Significant)</b> is identified for unknown archaeological remains, in a scenario where direct impact during discovery (i.e. during Offshore Project construction activities) damages multiple key components of the archaeological materials or contexts.</p> <p>Accordingly, direct impacts to marine archaeology and cultural heritage assets are temporally restricted to the phase in which the relevant seabed-interacting activity is undertaken and do not result in an assessment conclusion which is greater than is determined in each individual phase.</p>
<b>Indirect Impacts</b>	Negligible to Minor Adverse (Not significant)	Negligible to Minor (Not significant)	Negligible to Minor (Not significant)	<p>Construction, repair and maintenance and decommissioning activities may cause changes to the hydrodynamics and sediment distribution linked to indirect impacts, that may uncover or bury any maritime, aviation, or prehistoric sites of known (identified through records and surveys) or unknown sites of archaeological interest.</p> <p>The potential for indirect effects to heritage assets are as a result of the Offshore Project's impact to the hydrological and sediment transport regimes (see <b>Table 23.5</b>) within the physical and coastal processes ZOI, which is defined in <b>Chapter 9, Volume 2a</b>. Although sediment disturbance and seabed change is anticipated across the 3 phases of the Offshore Project lifecycle, the effects (such as increased suspended sediment) are considered to be localised and temporary, within the natural variability of the baseline environment. The construction phase requires the most intensive activities, such as the installation of WTGs and Offshore Cables it is anticipated to result in the greatest level of sediment disturbance, the effect of which is assessed as <b>Negligible (Not Significant)</b> in <b>Chapter 9, Volume 2a</b>.</p> <p>The physical presence of the Offshore Project infrastructure may cause potential changes to hydrodynamics (water levels and current speeds), seabed (scour), waves, and stratification during the O&amp;M phases however these effects are limited to the O&amp;M phase and are assessed as <b>Negligible (Not Significant)</b> in <b>Chapter 9, Volume 2a</b>, as these effects anticipated to be within the natural variability. Due to designed in scour protection measures, no scour is expected to develop at the base of the foundations.</p> <p>The adherence to the embedded environmental measures, such as the establishment of Archaeological Exclusion Zones (M008) production of a WSI and PAD (Commitment M007) result in an assessment conclusion which is <b>Negligible to Minor Adverse (Not Significant)</b> across the construction, O&amp;M and decommissioning phases, depending on the sensitivity attributed to the specific marine archaeology and cultural heritage receptor.</p>

Impact type	Residual effects			Lifetime combined effects assessment
	Construction	Operation and maintenance	Decommissioning	
				As is concluded in <b>Chapter 9, Volume 2a</b> sediment disturbance and effects to the sediment transport regime as a result of the Offshore Project are anticipated to be temporary and within the natural variability of the baseline environment. Therefore, there is not anticipated to be a project lifetime combined effect which results in indirect effects to heritage assets which are of greater significance than is determined in each individual phase.
<b>Changes to the settings of designated and significant non-designated onshore archaeology and cultural heritage assets</b>	N/A	Minor Adverse (Not Significant) to Moderate (Significant)	N/A	This impact is limited to O&M phase and therefore does not have a pathway to generate a lifetime combined effect.

Table 23.12 Shipping and Navigation Project Lifetime Combined Effects Assessment

Impact type	Residual effects			Lifetime combined effects assessment
	Construction	Operation and maintenance	Decommissioning	
<b>Vessel displacement</b>	Tolerable with Mitigation (Not Significant)	Tolerable with Mitigation (Not Significant)	Tolerable with Mitigation (Not Significant)	<p>As a result of the physical presence of construction/decommissioning vessels and ultimately the operational WTG and associated infrastructure, there is the potential to displace vessels which intend to transit within the vicinity of the Offshore Project Boundary, via 2 of the 10 routes within the Shipping and Navigation Study Area.</p> <p>There will be no restrictions on entry into the buoyed construction/decommissioning area, or Turbine Area once construction is complete, other than through active safety zones. However, based on experience at other OWFs and consultation, it is anticipated that the majority of commercial vessels and fishing vessels will choose not to navigate internally within the buoyed construction area or Turbine Area.</p> <p>With adherence to appropriate measures, as proposed by the Applicant, such as the development and adherence to a Fisheries Mitigation Monitoring and Communication Plan (FMMCP) (Commitment M026), Compliance with MGN 654 and its annexes (Commitment M010) and timely and efficient distribution of Notice to Mariners (NtMs), Kingfisher notifications, and other navigational warnings of the position and nature of works associated with the Offshore Project (Commitment M012), including information for vessel routes, timings and locations, safety zones (around surface piercing infrastructure) and advisory passing distances (Commitment M013), the risk is determined to be Tolerable with Mitigation (<b>Not Significant</b>).</p> <p>Across the project lifetime, it is therefore not anticipated that vessel displacement effects will result in a combined effect which is of greater significance than is reported in each phase.</p>
<b>Increased third-party vessel to third-party vessel collision risk</b>	Tolerable with Mitigation (Not Significant)	Tolerable with Mitigation (Not Significant)	Tolerable with Mitigation (Not Significant)	<p>Vessel displacement as a result of construction/decommissioning activities and surface structures (during operations) associated with the Offshore Project may increase encounters and collision risk between third-party vessels operating in the area.</p> <p>Post-OWF collision frequency modelling represents an increase of less than 1% vs the pre-OWF scenario, reflecting the small-scale nature of the main commercial route deviations as well as the low volumes of traffic associated with them.</p> <p>The promulgation of information relating to activities associated with the Offshore Project and charting of infrastructure as required by appropriate embedded measures, will allow vessel Masters to passage plan in advance, minimising any displacement and hence collision risk. Therefore, the risk is determined to be Tolerable with Mitigation (<b>Not Significant</b>).</p> <p>Across the project lifetime, it is therefore not anticipated that third-party vessel to third-party vessel collision effects will result in a combined effect which is of greater significance than is reported in each phase.</p>
<b>Third-party to Offshore Project vessel collision risk</b>	Tolerable with Mitigation (Not Significant)	Tolerable with Mitigation (Not Significant)	Tolerable with Mitigation (Not Significant)	<p>Offshore Project vessels associated with construction/O&amp;M/decommissioning activities may increase encounters and collision risk for third-party vessels already operating in the area.</p> <p>Encounters and collision risk involving Offshore Project vessels will be managed by marine coordination including the application of traffic management procedures such as the designation of entry and exit points</p>

Impact type	Residual effects			Lifetime combined effects assessment
	Construction	Operation and maintenance	Decommissioning	
				<p>to/from the buoyed construction area/Turbine Area (once constructed) and routes to and from construction/base ports. Therefore, the risk is determined to be Tolerable with Mitigation (<b>Not Significant</b>).</p> <p>Across the project lifetime, it is therefore not anticipated that vessel displacement effects will result in a combined effect which is of greater significance than is reported in each phase.</p>
<b>Reduced access to local ports, harbours, and facilities</b>	Tolerable with Mitigation (Not Significant)	Broadly Acceptable (Not Significant)	Tolerable with Mitigation (Not Significant)	<p>Offshore Project vessels associated with construction/O&amp;M/decommissioning activities may increase the risk of reduced access to local harbours.</p> <p>It is not yet known which base ports will be used for the Offshore Project, however Loch Roag/<i>Loch Ròg</i> is the closest. It is understood that Loch Roag/<i>Loch Ròg</i> is currently at capacity, and the use of Loch Roag/<i>Loch Ròg</i> as a base port may reduce access to facilities which may impact on aquaculture operations and restrict recreational vessels from accessing safe anchorage during adverse weather.</p> <p>However, the effect will be managed by marine coordination including the application of traffic management procedures such as the designation of entry and exit points to/from the buoyed construction area/Turbine Area (once constructed) and routes to and from construction/base ports, which will be set out in the NSVMP (Commitment M022).</p> <p>Across the project lifetime, it is therefore not anticipated that effects associated with reduced access to ports and harbours will result in a combined effect which is of greater significance than is reported in each phase.</p>
<b>Powered vessel to structure allision risk</b>	N/A	Tolerable with Mitigation (Not Significant)	N/A	This impact is limited to O&M phase and therefore does not have a pathway to generate a lifetime combined effect.
<b>Drifting vessel to structure allision risk</b>	N/A	Tolerable with Mitigation (Not Significant)	N/A	This impact is limited to O&M phase and therefore does not have a pathway to generate a lifetime combined effect.
<b>Internal vessel to structure allision risk</b>	N/A	Tolerable with Mitigation (Not Significant)	N/A	This impact is limited to O&M phase and therefore does not have a pathway to generate a lifetime combined effect.
<b>Reduction in under keel clearance</b>	N/A	Broadly Acceptable (Not Significant)	N/A	This impact is limited to O&M phase and therefore does not have a pathway to generate a lifetime combined effect.
<b>Vessel interaction with subsea cables</b>	N/A	Tolerable with Mitigation (Not Significant)	N/A	This impact is limited to O&M phase and therefore does not have a pathway to generate a lifetime combined effect.

Table 23.13 Military and Civil Aviation Project Lifetime Combined Effects Assessment

Impact type	Residual effects			Lifetime combined effects assessment
	Construction	Operation and maintenance	Decommissioning	
<b>Creation of an aviation obstacle environment</b>	Minor Adverse (Not Significant)	Minor Adverse (Not Significant)	Minor Adverse (Not Significant)	<p>Physical plant (for WTG installation during construction) and the WTG array during the operational phase may pose as a physical obstruction to aircraft utilising the airspace in the vicinity of the Array Area, potentially increasing the risk of obstacle collision or requiring aircraft to fly extended routes to avoid obstacles.</p> <p>With the implementation and adherence to the defined embedded measures such as the appropriate charting of the Offshore Project infrastructure on Admiralty and aeronautical charts (M011), sharing information regarding construction with the Defence Geographic Centre (DGC) and the General Aviation Awareness Council (GAAC) (M017) and adherence to the Lighting and Marking Plan (M033), effects are assessed as <b>Minor Adverse (Not Significant)</b> across all phases.</p> <p>Across the project lifetime, it is therefore not anticipated that effects associated with the creation of an aviation obstacle will result in a combined effect which is of greater significance than is reported in each phase.</p>
<b>Increased air traffic related to wind farm activities</b>	Minor Adverse (Not Significant)	Minor Adverse (Not Significant)	Minor Adverse (Not Significant)	<p>The use of helicopters to support activities associated with the Offshore Project may impact on existing air traffic in the vicinity of the Array Area. The potential increase in air traffic associated with construction activities brings with it a potential increased possibility of aircraft collision in the airspace around the Array Area.</p> <p>The impact is predicted to be of local spatial extent (i.e. limited to the military and civil aviation study area), short to medium term duration, intermittent and high reversibility and will be managed via existing ATS infrastructure, in accordance with national procedures.</p> <p>Across the project lifetime, it is therefore not anticipated that effects associated with the increase air traffic associated with the Offshore Project will result in a combined effect which is of greater significance than is reported in each phase.</p>
<b>Impact to military radars</b>	N/A	Minor Adverse (Not Significant)	N/A	This impact is limited to O&M phase and therefore does not have a pathway to generate a lifetime combined effect.
<b>Impact to NATS radio communications</b>	N/A	Minor Adverse (Not Significant)	N/A	This impact is limited to O&M phase and therefore does not have a pathway to generate a lifetime combined effect.

Table 23.14 SLVIA Project Lifetime Combined Effects Assessment

Impact type	Residual effects			Lifetime combined effects assessment
	Construction	Operation and maintenance	Decommissioning	
<b>Changes to views experienced by people from specific and representative viewpoints and from visual receptors.</b>	Moderate-Minor (Not Significant) to Major (Significant)	Moderate-Minor (Not Significant) to Major (Significant)	Moderate-Minor (Not Significant) to Major (Significant)	<p>Although impacts are broken down into different receptors (viewpoints and visual receptors) the actual receptor is the same in each case i.e., the people perceiving the effect. Therefore, these people will only perceive the effect one way (visually) at one point in time, and will not experience the construction, operation, and decommissioning phases simultaneously, or across multiple pathways.</p> <p>It is therefore not anticipated that changes to views experienced by people from specific and representative viewpoints and from visual receptors will result in a combined effect which is of greater significance than is reported in each phase.</p>
<b>Changes to the perceived seascape (coastal) character of coastal character areas.</b>	Minor (Not Significant) to Major (Significant)	Minor (Not Significant) to Major (Significant)	Minor (Not Significant) to Major (Significant)	<p>Although impacts are broken down into different receptors based upon physical and perceived characteristics (coastal character areas) the actual receptor is the same in each case i.e., the people perceiving the effect on coastal character. Therefore, these people will only perceive the effect one way (visually) at one point in time, and will not experience the construction, operation and decommissioning phases simultaneously, or across multiple pathways.</p> <p>It is therefore not anticipated that changes to the perceived seascape (coastal) character of coastal character areas will result in a combined effect which is of greater significance than is reported in each phase.</p>
<b>Changes to the perceived landscape character and qualities of designated landscapes.</b>	Moderate-Minor (Not Significant) to Major (Significant)	Moderate-Minor (Not Significant) to Major (Significant)	Moderate-Minor (Not Significant) to Major (Significant)	<p>Although impacts are broken down into different receptors based upon physical and perceived characteristics (landscape character types) and planning policies (landscape designations) the actual receptor is the same in each case i.e., the people perceiving the effect on coastal character. Therefore, these people will only perceive the effect one way (visually) at one point in time, and will not experience the construction, operation and decommissioning phases simultaneously, or across multiple pathways.</p> <p>It is therefore not anticipated that changes to the perceived landscape character and qualities of designated landscapes will result in a combined effect which is of greater significance than is reported in each phase.</p>
<b>Changes to night-time views and perceived character of coastal character as a result of aviation and navigation lighting of the Offshore Project.</b>	N/A	Minor (Not Significant) to Major (Significant)	N/A	<p>This impact is limited to O&amp;M phase and therefore does not have a pathway to generate a lifetime combined effect.</p>

Table 23.15 Other Sea Users and Recreation Project Lifetime Combined Effects Assessment

Impact type	Residual effects			Lifetime combined effects assessment
	Construction	Operation and maintenance	Decommissioning	
<b>Loss of access to aquaculture support vessels</b>	Negligible to Minor (Not Significant)	Negligible to Minor (Not Significant)	Negligible to Minor (Not Significant)	<p>Across the construction, O&amp;M and decommissioning phases the deviation to vessel routing for receptor groups defined as multinational aquaculture companies and local aquaculture companies is considered to be minimal, due to the temporary nature/intermittent vessel activity and spatial limitation of 500 m safety zones around applicable activities.</p> <p>With the application of appropriate embedded measures such as the timely and efficient distribution of Notice to Mariners (M012), the magnitude of impact is considered to be Low for both multinational and local aquaculture companies. As the sensitivity of multinational aquaculture companies is considered to be Low, the effect is assessed as <b>Negligible (Not Significant)</b> in all phases. The sensitivity for local aquaculture companies is High and therefore <b>Minor (Not Significant)</b>.</p> <p>As the establishment of safety zones are limited spatially and temporally to specific works in discrete phases, which reduce in frequency and extent for the majority of the Offshore Project lifetime (35 year O&amp;M phase), it is therefore not anticipated that effects associated with the loss of access to aquaculture support vessels will result in a combined effect which is of greater significance than is reported in each phase.</p>
<b>Increased demand for port services</b>	Negligible to Minor (Not Significant)	Negligible to Minor (Not Significant)	Negligible to Minor (Not Significant)	<p>Across the construction, O&amp;M and decommissioning phases, the demand for port services is anticipated to be experienced by 2 receptor groups; small ports and Stornoway Port. It is considered that increased demand for small port services will only be disrupted indirectly due to disturbance to tourism and recreational vessels operating from small ports.</p> <p>Any disturbance to tourism and recreational vessels during the construction phase is expected to be associated with individual installation activities, such as piling and cable laying, which will be temporary and short-term during the overall 5-year construction period. Project vessel activity during the O&amp;M phase is expected to be less than that of construction and will be infrequent throughout the 35 year Project lifetime. Decommissioning works are assumed to be the same as those required during construction, in reverse.</p> <p>With respect to Stornoway Port, It is the Project's intention that the offshore construction workforce will be accommodated on vessels, with the exception of limited circumstances such as crew change over and leave, to reduce additional demand on tourist accommodation on Isle of Lewis/<i>Eilean Leòdhais</i>. Project vessel activity during the O&amp;M phase is expected to be less than that of construction and will be infrequent throughout the 35 year Project lifetime.</p> <p>With the application of appropriate embedded measures such as the housing of construction workers offshore (M041) and engagement with key stakeholders to identify and minimise pressure on existing services and port facilities on Lewis (M042), the magnitude of impact is considered to be Low for both small ports and Stornoway Port. As the sensitivity of Stornoway Port is considered to be Low, the effect is assessed as <b>Negligible (Not Significant)</b> in all phases. The sensitivity for small ports is High and therefore <b>Minor (Not Significant)</b> in all phases.</p>

Impact type	Residual effects			Lifetime combined effects assessment
	Construction	Operation and maintenance	Decommissioning	
				As the increase demand for port services is anticipated to be limited temporally to specific works in discrete phases, which reduce in frequency and extent for the majority of the Offshore Project lifetime (35 year O&M phase), it is therefore not anticipated that effects will not result in a combined effect which is of greater significance than is reported in each phase.
<b>Loss of access to boat tour routes and other recreational or tourism activities</b>	Minor (Not Significant)	Minor (Not Significant)	Minor (Not Significant)	<p>Across the construction, O&amp;M and decommissioning phases, loss of access is anticipated to be experienced by multiple receptor groups; boat tour operators, surfers and other sea users (including recreational users and tourists).</p> <p>Disruption to these receptors is considered to be limited during the construction to the duration of HDD activities and the temporal and spatial limitation of 500 m safety zones around applicable activities, such as WTG and cable installation. During the O&amp;M phase, 500 m safety zones will only be established around major maintenance works, which are anticipated to be short-term and periodic over the 35-year O&amp;M phase. Decommissioning works are assumed to be the same as those required during construction, in reverse.</p> <p>With the application of appropriate embedded measures such as timely and efficient distribution of NtMs (M012), the magnitude of impact is considered to be Low for all receptor groups, across the construction, O&amp;M and decommissioning phase. The sensitivity for all assessed receptor groups is High and therefore the effects are concluded to be <b>Minor (Not Significant)</b> in all phases.</p> <p>As the establishment of safety zones are limited spatially and temporally to specific works in discrete phases, which reduce in frequency and extent from the construction phase, for the majority of the Offshore Project lifetime (35 year O&amp;M phase), it is therefore not anticipated that effects associated with the loss of access to boat tour routes and other recreational or tourism activities will result in a combined effect which is of greater significance than is reported in each phase.</p>
<b>Loss of access to recreational sea anglers and specific angling tour operators</b>	Minor (Not Significant)	Minor (Not Significant)	Minor (Not Significant)	<p>Across the construction, O&amp;M and decommissioning phases, loss of access is anticipated to be experienced by 2 receptor groups; recreational sea anglers and angling tour operators.</p> <p>Disruption to these receptors is considered to be limited during the construction phase to associated with individual installation activities the temporal and spatial limitation of 500 m safety zones around applicable activities, such as WTG and cable installation. During the O&amp;M phase, 500 m safety zones will only be established around major maintenance works, which are anticipated to be short-term and periodic over the 35-year O&amp;M phase. Decommissioning works are assumed to be the same as those required during construction, in reverse.</p> <p>With the application of appropriate embedded measures such as timely and efficient distribution of NtMs (M012), the marking of all surface piercing infrastructure on Admiralty charts (M011) and the use of local tour operator vessels or fishing vessels that meet relevant safety requirements, where possible to assist future Project activities (M037), the magnitude of impact is considered to be Low for all receptor groups, across the construction, O&amp;M and decommissioning phase. The sensitivity for recreational sea anglers is Medium and for angling tour operators it is High. Therefore, the effects are concluded to be <b>Minor (Not Significant)</b> for both receptors in all phases.</p>

Impact type	Residual effects			Lifetime combined effects assessment
	Construction	Operation and maintenance	Decommissioning	
				As the establishment of safety zones are limited spatially and temporally to specific works in discrete phases, which reduce in frequency and extent from the construction phase, for the majority of the Offshore Project lifetime (35 year O&M phase), it is therefore not anticipated that effects associated with the loss of access to recreational sea anglers and specific angling tour operators will result in a combined effect which is of greater significance than is reported in each phase.
<b>Amenity effects</b>	Minor (Not Significant)	Minor (Not Significant)	Minor (Not Significant)	<p>Across the construction, O&amp;M and decommissioning phases, amenity (visual and noise) effects are anticipated to be experienced by other sea users and onshore tourism recreation assets.</p> <p>During the construction phase, users of popular tourist attractions and recreational activities on the west-coast of the Isle of Lewis/<i>Eilean Leòdhais</i> are anticipated to experience amenity impacts as a result of experiencing views of the Offshore Project construction and potentially hearing percussive piling activities during night-time hours.</p> <p>During the O&amp;M phase, visual effects from above sea infrastructure will be permanent for the duration of the O&amp;M of the Project, long-term (35 year lifecycle) and reversible as the Offshore Project would be decommissioned at the end of its operational life. Decommissioning works are assumed to be the same as those required during construction, in reverse.</p> <p>With the application of appropriate embedded measures such as the installation of above sea infrastructure being limited to the Turbine Area (M036), and the development and adherence to an Airborne Noise Piling Strategy (A007), the magnitude of impact is considered to be Low, across the construction, O&amp;M and decommissioning phase. The sensitivity for all assessed receptor groups is High and therefore the effects are concluded to be <b>Minor (Not Significant)</b> in all phases.</p> <p>As considered for SLVIA (<b>Table 23.14</b>), visual amenity impacts are experienced by a singular receptor, i.e., the people perceiving the effect. Therefore, these people will only perceive the effect one way (visually) at one point in time, and will not experience the construction, operation, and decommissioning phases simultaneously, or across multiple pathways. Noise amenity impacts to other sea users receptors are associated with percussive piling activities, which are limited to the construction phase. It is therefore not anticipated that amenity effects will result in a combined effect which is of greater significance than is reported in each phase. Table 23.14 SLVIA Project Lifetime Combined Effects Assessment</p>
<b>Changes to hydrodynamic regime due to presence of Offshore Project infrastructure</b>	N/A	Negligible (Not Significant)	N/A	This impact is limited to O&M phase and therefore does not have a pathway to generate a lifetime combined effect.

Table 23.16 Commercial Fisheries Project Lifetime Combined Effects Assessment

Impact type	Residual effects			Lifetime combined effects assessment
	Construction	Operation and maintenance	Decommissioning	
<b>Reduction in access to, or exclusion from established fishing grounds within the Array Area</b>	Minor (Not Significant)	Negligible to Minor (Not Significant)	Minor (Not Significant)	Loss or restricted access to fishing grounds is considered to be temporary during construction and decommissioning and long term during the O&M phase. Buoyed construction area around the entirety of the Array Area as it is constructed, will lead to loss of access up to the point of commissioning in the O&M phase when it is also assumed the entirety of the Array Area will not be accessed for fishing. The effects on commercial fisheries across the phases throughout a total duration of 45 years are not anticipated to interact in such a way as to result in combined effects of greater significance than the assessments presented for each individual phase.
<b>Reduction in access to, or exclusion from established fishing grounds within the OCAS</b>	Negligible to Minor (Not Significant)	Minor (Not Significant)	Negligible to Minor (Not Significant)	
<b>Displacement leading to gear conflict and increased fishing pressure on adjacent grounds</b>	Minor (Not Significant)	Minor (Not Significant)	Minor (Not Significant)	Fishing may be disrupted and displaced into other areas due to the loss of access during all phases of the project. Similar to loss of access in the Array Area, the level of displacement experienced is expected to dissipate as fishers adapt to the presence of the Offshore Project. Therefore, effects on commercial fisheries are not anticipated to interact in such a way as to result in combined effects of greater significance than the assessments presented for each individual phase.
<b>Disturbance of commercially important fish and shellfish resources leading to displacement or disruption of fishing activity</b>	Minor (Not Significant)	Minor (Not Significant)	Minor (Not Significant)	Project lifetime combined effects are unlikely as the nature of potential impact is different during construction (underwater noise), and O&M phases (EMF, loss of habitat and increased SSCs and suspended sediments). Temporary and long-term habitat loss which occurs across all phases is expected to be proportionally small in relation to habitat availability in the commercial fisheries regional study area. Across the project lifetime, the effects on commercial fisheries are not anticipated to interact in such a way as to result in combined effects of greater significance than the assessments presented for each individual phase.
<b>Increased vessel traffic associated with the Offshore Project within fishing grounds leading to interference with fishing activity</b>	Minor (Not Significant)	Minor (Not Significant)	Minor (Not Significant)	With the successful implementation of embedded measures (i.e. issue of NtMs – Commitment M012, preparation of a FMMCP – Commitment M026, close liaison with the local vessels), no significant effects are predicted for the construction, O&M, and decommissioning phases of the Offshore Project. The majority of vessel traffic (resulting in interference with fishing) is predicted to peak during construction and decommissioning with reduced potential for interference during the O&M phase. Therefore, across the project lifetime, the effects on commercial fisheries are not anticipated to interact in such a way as to result in combined effects of greater significance than the assessments presented for each individual phase.
<b>Additional steaming to alternative fishing grounds for vessels that would otherwise fish within the Offshore Project</b>	Minor (Not Significant)	Minor (Not Significant)	Minor (Not Significant)	Impacts on steaming and transit times are expected to be highest during construction and decommissioning when areas undergoing installation/decommissioning activities will be avoided. Vessels may also choose to avoid transiting through the Array Area during O&M phase. Therefore, across the project lifetime, the effects on commercial fisheries are not anticipated to interact in such a way as to result in combined effects of greater significance than the assessments presented for each individual phase.
<b>Increased snagging risk, which could result in loss or damage to fishing gear</b>	Minor (Not Significant)	Minor (Not Significant)	Minor (Not Significant)	Impacts due to gear snagging may occur during the construction and O&M phases due to the presence of Offshore Project infrastructure including surface laid cables and associated cable protection. At the end of the operational lifetime, it is expected that all structures above the seabed (with the exception of scour protection and cable protection) will be fully removed where feasible. Environmental conditions and sensitivities will also be considered since removal of structures may result in greater environmental impacts in comparison to leaving in situ. However, across the project lifetime, the effects on commercial fisheries are not anticipated to interact in such a way as to result in combined effects of greater significance than the assessments presented for each individual phase.

Table 23.17 Offshore Human Health Project Lifetime Combined Effects Assessment

Impact type	Residual effects			Lifetime combined effects assessment
	Construction	Operation and maintenance	Decommissioning	
<b>Noise effects to human health</b>	Minor (Not Significant)	Minor (Not Significant)	Minor (Not Significant)	<p>The assessment of noise effects as a result of the Offshore Project on human health receptors, defined as the residential population between Carloway/Càrlabhagh and Ness/Nis, and vulnerable populations, which are both considered to be of Medium sensitivity.</p> <p>The most intensive sources of noise will occur during the construction phase, as a result of the percussive piling activity, which has the potential to affect human health through susceptibility to annoyance, stress, and sleep disturbance, however the implementation of the Airborne Noise Piling Strategy (A007) ensures that the level of effect to human health receptors is <b>Minor (Not Significant)</b>. Noise impacts to human health during the O&amp;M phase are associated with operational WTG noise, and are considered to be reduced in comparison to those experienced during the construction phase. Noise impacts during the O&amp;M phase are unlikely to cause significant annoyance, stress, or sleep disturbance and all operational WTG noise levels comply with noise limits, and are considered to result in an effect to human health receptors which is <b>Minor (Not Significant)</b>. The potential for airborne noise effects during the decommissioning stage were scoped out of <b>Chapter 19, Volume 2a</b> as the decommissioning works will not involve percussive piling. The Offshore Human Health assessment has taken a pre-cautionary approach and concluded that any human effects arising from airborne noise associated with the decommissioning phase would be comparable to or less than the construction phase. Therefore, the decommissioning phase is considered to result in an effect to human health receptors that is <b>Minor (Not Significant)</b>.</p> <p>Noise effects to human health receptors are primarily associated with percussive piling activities, which are limited to the construction phase. During the O&amp;M phase, the potential for airborne noise is associated with the operation of the WTGs and it has been shown that the noise levels will comply with noise limits due to the distance between the Array Area and human receptors. Noise effects during decommissioning are expected to be the same or less than the construction phase, however this is highly pre-cautionary as the decommissioning works will not require percussive piling. It is therefore not anticipated that noise effects throughout the lifetime of the Offshore Project will result in a project lifetime combined effect which is of greater significance than is reported in each phase.</p>
<b>Visual changes</b>	Minor (Not Significant)	Moderate (Potentially Significant to Not Significant)	Minor (Not Significant)	<p>The assessment of visual effects as a result of the Offshore Project on human health receptors, defined as the residential population between Carloway/Càrlabhagh and Ness/Nis, and vulnerable populations within these settlements, concludes that both receptor groups are of Medium sensitivity to changes in coastal and seascape views.</p> <p>During the construction phase, visual impacts arise from the presence of large installation vessels, offshore accommodation vessels, and partially constructed turbine components. These activities introduce temporary, industrial-scale features into seaward views, reducing visual amenity and the restorative qualities associated with natural, uninterrupted coastal landscapes. While these changes have the potential to influence mental wellbeing via pathways such as reduced place attachment, increased stress, or annoyance, the effects are temporary and time-limited. Embedded mitigation has been incorporated into the project design, including community engagement mechanisms and design-led measures to minimise visual intrusion, to ensure that the level of effect on human health receptors is assessed as <b>Minor (Not Significant)</b>.</p>

Impact type	Residual effects			Lifetime combined effects assessment
	Construction	Operation and maintenance	Decommissioning	
				<p>During the O&amp;M phase, the WTGs, OSP and periodic maintenance vessel activity introduce long-term, large-scale features into the coastal landscape. These are visible primarily along the west coast of Lewis/Eilean Leòdhais, within the blade-tip Zone of Theoretical Visibility (ZTV). Visual change during operation is long-term in duration and may alter the sense of place, naturalness, and seascape character valued by local residents. For some communities within the most exposed areas, these changes could reduce the perceived restorative qualities of the landscape, with potential implications for mental wellbeing. The assessment concludes that visual impacts on the general residential population are <b>Moderate (potentially significant)</b> but, applying professional judgement, are Not Significant overall at the population level because effects relate predominantly to subjective wellbeing rather than measurable morbidity, and because impacts are geographically contained. For vulnerable groups, such as older adults or individuals with pre-existing mental health conditions, sensitivity is higher, and effects remain <b>Moderate (Potentially Significant)</b> at localised scales; however, no additional practicable mitigation is identified beyond embedded measures already committed to.</p> <p>The potential for visual impacts during the decommissioning phase is expected to be similar to, or less than, the construction phase. Decommissioning will remove operational turbines and associated structures, resulting in a progressive reinstatement of natural seascape qualities. As the nature and scale of decommissioning activity is comparable to installation works, any temporary visual disturbance is judged to result in effects of <b>Minor (Not Significant)</b> on human health receptors.</p> <p>Visual impacts on human health receptors occur through psychological pathways associated with landscape change, principally reduced amenity, loss of restorative value, and diminished place attachment. These pathways operate differently from the noise effects pathway, as they relate exclusively to visual perception and emotional response rather than physical exposure. Effects during construction are temporary; effects during O&amp;M are long-term but geographically limited. Visual impacts during decommissioning are expected to be the same or less than construction impacts. It is therefore not anticipated that visual impacts over the lifetime of the Offshore Project would result in a project-lifetime effect greater than those identified for each individual phase.</p>
<b>Incoming workforce who may require access to health services</b>	Negligible (Not Significant)	Minor (Not Significant)	Negligible (Not Significant)	<p>The assessment of effects resulting from the incoming workforce who may require access to health services on human health receptors, defined as the residential population and vulnerable populations, which are both considered to be of Medium sensitivity.</p> <p>During the construction phase, the offshore construction workforce will be accommodated on vessels (M041), with the exception of certain limited circumstances such as crew change over and leave and medical facilities to be provided on board vessels to treat minor injuries/illness and reduce additional pressure on existing services. Most offshore construction will occur between April and October, limiting the potential for the effect to a seven-month period outside of winter months. The phasing of the workforce will reduce pressure on services and will also reduce the number of workers who would be able to become registered at GP and dental practices. Therefore, the effect on human health receptors during construction is assessed as <b>Negligible (Not Significant)</b>.</p>

Impact type	Residual effects			Lifetime combined effects assessment
	Construction	Operation and maintenance	Decommissioning	
				<p>During the O&amp;M phase, a smaller more stable workforce will be required to operate the wind farm. This may lead to modest increases in the use of healthcare provisions on the Island, but this is likely to be more dispersed across the Island that will limit any concentrated demand or pressure. The effects on human health receptors during O&amp;M is assessed as <b>Minor (Not Significant)</b>. The Offshore Human Health assessment has taken a pre-cautionary approach and concluded that any human effects arising from incoming workforce associated with the decommissioning phase would be comparable to or less than the construction phase. Therefore, the decommissioning phase is considered to result in an effect to human health receptors that is <b>Negligible (Not Significant)</b>.</p> <p>The potential effects human health receptors access to healthcare services may occur due to the sequential workforce-related pressures across all project phases. While individually the assessment outcome is <b>Minor (Not Significant)</b>, the combined effect could create a perception of repeated strain on local services. Through the use of embedded mitigation to accommodate the construction workforce on vessels (M041), the potential effect will be greatly reduced. Healthcare sensitivity remains medium throughout the project lifetime due to existing structural pressures on healthcare provisions on the Island, however the potential impact to these provisions due to the Offshore Project will be reduced due to the limited changes in population levels during the O&amp;M phase. It is therefore not anticipated that incoming workforce effects throughout the lifetime of the Offshore Project will result in a project lifetime combined effect which is of greater significance than is reported in each phase.</p>

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## 23.5.2 SUMMARY

23.5.2.1 There are **No Significant** project-lifetime or receptor-led combined effects which are anticipated to result in an additive effect, and thus a change to the level of significance which has been concluded within a project phase or for a specific receptor or receptor groups, as a result of the Offshore Project.

## 23.6 ECOSYSTEM LEVEL ASSESSMENT

### 23.6.1 OVERVIEW

23.6.1.1 The Scoping Opinion provided by NatureScot in May 2024 requested that the EIAR assess impacts at an ecosystem level. It stated that

*"Increasingly, there is a need to understand potential impacts holistically at a wider ecosystem scale in addition to the standard set of discrete individual receptor assessments. This assessment should focus on potential impacts across predator prey interactions both on and offshore. This will enable a better understanding of the consequences (positive or negative) of any potential changes in prey distribution and abundance from the development of the wind farm on bird and mammal (and other top predator) interests and what influence this may have on population level impacts".*

23.6.1.2 This section of the Combined Effects Assessment has been provided to address this request from NatureScot. For the purposes of this ecosystem assessment, the term ecosystem means

*"A biological system composed of all the organisms found in a particular physical environment, interacting with it and with each other" (Oxford English Dictionary, 2026).*

23.6.1.3 This ecosystem assessment describes the approach that has been taken, defines and describes the fundamental components of the ecosystem in question, and provides a qualitative assessment of how the Offshore Project could influence ecosystem-level processes.

### 23.6.2 ECOSYSTEM TROPHIC LEVELS

23.6.2.1 Trophic levels define how energy is transferred from one organism to another within a food chain. It is typically illustrated as a pyramid showing hierarchical stages for each trophic level that are defined by an organism's position in a food chain.

23.6.2.2 In its basic form, a food chain has primary producers (i.e. organisms that convert solar energy into chemical or plant energy) at the bottom, followed by primary consumers (i.e. organisms that eat primary producers), secondary consumers (i.e. organisms that eat primary consumers and may also be eaten by other secondary consumers), and apex predators (i.e. organisms that eat secondary consumers but that have no natural predators themselves).

### 23.6.1 ECOSYSTEM BASELINE

- 23.6.1.1 In the marine environment of the northern Atlantic Ocean and its surrounding seas, primary producers are typically phytoplankton and marine algae or seaweeds. Examples identified in the baseline of **Chapter 11, Volume 2a** include foliose red seaweeds, intertidal green seaweeds *Enteromorpha spp.* and *Cladophora spp.*, and kelp *Laminaria hyperborea*.
- 23.6.1.2 These are consumed by primary consumers such as zooplankton, filter-feeders such as the cup coral *Caryophyllia smithii* and bryozoa *Flustra foliacea* and *Parasmittina trispinosa*, and grazing organisms such as edible sea urchin *Echinus esculentus* and common whelk *Buccinum undatum* (see **Chapter 11, Volume 2a** for detail on the abundance and distribution of these species and others in this trophic level).
- 23.6.1.3 Marine secondary consumers identified in the baseline of **Chapter 11, Volume 2a** and **Chapter 12, Volume 2a** include pink shrimp *Pandalus montagui*, Atlantic herring *Clupea harengus*, Atlantic mackerel *Scomber scombrus*, blue whiting *Micromesistius poutassou*, and European sprat *Sprattus Sprattus*. Diadromous secondary consumers identified in the baseline of **Chapter 12, Volume 2a** include Atlantic salmon *Salmo salar*, and sea trout *Salmo trutta*. There are highly complex and varied predatory interactions within this trophic level.
- 23.6.1.4 Many seabirds can also be categorised as secondary consumers as they feed on fish and small invertebrates, but they are also predated upon by larger birds, sharks, and marine mammals. Examples identified in the baseline of **Chapter 14, Volume 2a** include gannet, guillemot, razorbill, puffin, petrels, and shearwater.
- 23.6.1.5 Apex predators identified in the baseline of **Chapter 12, Volume 2a** and **Chapter 13, Volume 2a** include Atlantic bluefin tuna *Thunnus thynnus*, basking shark *Cetorhinus maximus*, blue shark *Prionace glauca*, harbour porpoise *Phocoena Phocoena*, white-beaked dolphin *Lagenorhynchus albirostris*, and common dolphin *Delphinus delphis*. Other dolphin species are identified in **Chapter 13, Volume 2a**, all of which are apex predators.
- 23.6.1.6 Some seabirds that have been identified in the baseline of **Chapter 14, Volume 2a** are also considered to be apex predators, including great black-backed gull, great skua, arctic skua, pomarine skua and long-tailed skua.

### 23.6.2 ECOSYSTEM FUTURE BASELINE

- 23.6.2.1 The interactions of species between the trophic levels throughout the ecosystem of the northern Atlantic Ocean and surrounding seas is a highly complex and dynamic. Populations of species are constantly changing as a result of natural variation and external factors such as climate and oceanic current variability including the influence of El Niño events, commercial fishing practices, major point-source pollution events, the constant diffuse chemical pollution and marine litter from urban centres into the ocean, and the spread of invasive non-native species.

- 23.6.2.2 Climate change is the most significant factor driving annual variations in marine population dynamics as it causes increases to seawater temperature, surface water acidification, and deoxygenation. These changes in water quality cause organisms to change their locations, distributions and behaviours, with secondary effects on other species at higher trophic levels. By influencing species distribution, the climate also influences the reproductive success of populations and food web dynamics at an ecosystem scale.
- 23.6.2.3 Predictions for the future ecosystem baseline carry significant level of uncertainty due to the complexity of the interplay between the many variables that drive trophic change. The adaptability of species is also variable, so some species may suffer significant losses while another species benefits from the same environmental change.
- 23.6.2.4 For example, highly mobile species that can vary their diet (such as Atlantic bluefin tuna) may be able to adapt to future sea temperature change by following favourable oceanic conditions and predating alternate prey species. Species that rely on prey from more specific species groups, such as humpback whale *Megaptera novaeangliae* may suffer a decline if the abundance of large zooplankton aggregations should change as a result of nutrient supplies or water temperature changes.
- 23.6.2.5 Birds such as puffin can be particularly vulnerable to change if a climatic change for example, causes a cascading effect by reducing the abundance and availability of plankton, which in turn reduces the abundance of sandeel. If this occurs during the breeding season for puffin, then the survival rate of juvenile puffins may significantly reduce, potentially causing a population level effect over time.

### 23.6.3 ECOSYSTEM LEVEL EFFECTS

- 23.6.3.1 The EIAR aspect chapters listed in Section 23.1.1.1 have considered and assessed the potential effects on species across all trophic levels. Through the application of embedded mitigation measures and further environmental mitigation where necessary, all relevant EIAR aspect chapters concluded that the potential impacts on the receptors identified would result in effects that are **Not Significant** in EIA terms.
- 23.6.3.2 In the context of this conclusion, it remains possible that slight changes to the abundance of specific species and the distribution of certain habitats may occur as a direct result of the Offshore Project, and that indirect effects may occur where small changes in the abundance of prey incrementally influences the hunting success of predators. Such localised changes could contribute to gradual changes in the dynamic wider ecosystem of the northern Atlantic Ocean and its surrounding seas, but this is likely to be at levels that cannot be readily quantified or readily attributed to the Offshore Project specifically.
- 23.6.3.3 The overall contribution of the Offshore Project as a driving force of ecosystem-level change is likely to be small in the context of the larger forces driving change to the future baseline noted in

section 23.6.2. With climate change being the most significant driver of ecosystem-level change in the marine environment, it is important to recognise the role of the Offshore Project as a renewable energy development that will contribute to the decarbonisation of Scotland's energy supply and a gradual reduced reliance on the fossil fuels that are actively contributing to climate change.

- 23.6.3.4 The overall ecosystem-level of the effect of the Offshore Project is therefore assessed as being negligible, particularly in the context of its positive role in mitigating climate change.
- 23.6.3.5 This conclusion considers the Offshore Project in isolation. In order to develop a robust scientific understanding of the ecological consequences of the offshore wind industry more widely, there is national and regional ecosystem-level research ongoing around the UK. This includes the Scottish Marine Energy Research (ScotMER) Programme (Scottish Government, 2026), ECOWind (2025), and PrePARED (2024). These research programmes are providing an in-depth analysis of complex ecosystem-level interactions including the connectivity between water column characteristics and plankton productivity, quantifying how changes to the seabed can influence biodiversity and ecosystem services, and the development of new models to better predict the impacts of changing foraging opportunities.
- 23.6.3.6 The findings of these research programmes will provide decision-makers with invaluable insight into the ecosystem-level effects of offshore wind developments and contribute a robust scientific evidence-base to support future management decisions for the marine environment.

## 23.7 IN-COMBINATION CLIMATE CHANGE IMPACT (ICCI) ASSESSMENT

- 23.7.1.1 The ICCI assessment considers the receptors identified in the environmental topic chapters (**Chapter 6 to Chapter 23 Volume 2a**) with the combined consideration of future climate change trends and impacts. The ICCI takes account of appropriate guidance '*EIA Guide to: Climate Change Resilience and Adaptation 2020*' (IEMA, 2020) and as such, the climate risks assessed for the potential to interact with and exacerbate other environmental impact pathways on relevant receptors are those reported in **Appendix 7.1: Climate Vulnerability Assessment, Volume 2c** and carried forward for assessment in **Chapter 7, Volume 2a**.
- 23.7.1.2 **Table 23.18** presents a screening matrix to identify where there is the potential for ICCI to occur.
- 23.7.1.3 **Table 23.19** carries through the environmental aspects chapters where there is potential for ICCI to occur, and provides a qualitative assessment of these interactions.
- 23.7.1.4 The assessment uses expert judgement to determine whether climate change would have a combined effect with the effects already identified by the technical aspects. Where a combined effect is identified, additional embedded mitigation measures are proposed.

Table 23.18 ICCI Screening

Reference	Climate Hazard	Socio-economics	Greenhouse Gases	Physical and Coastal Processes	Marine Sediment and Water Quality	Benthic and Intertidal Ecology	Fish Ecology	Marine Mammals	Marine and Nearshore Ornithology	Marine Archaeology	Shipping and Navigation	Military and Civil Aviation	SLVIA	Other Sea Users, Tourism and Recreation	Commercial Fisheries	Offshore Human Health
1	High Winds and Storms															
2	Ocean Acidification															
3	Sea Level Rise															

Green = no pathway to ICCI, not considered further / Orange = potential pathway for ICCI, considered in **Table 23.19**

Table 23.19 ICCI Assessment

Environmental Aspect	Relevant Climate Hazard	Potential Impact(s) arising from the Offshore Project	Potential ICCI	ICCI Assessment	Mitigation
<b>Physical and Coastal Processes</b>	1,3	Sediment disturbance and seabed change as a result of construction, maintenance and decommissioning activities.  Effects arising due to the presence of physical infrastructure within the Offshore Project Boundary.	Climatic trends such as increasing frequency and severity of storm events, ocean acidification and sea level rise have the potential to exacerbate physical and coastal processes impact pathways to result in an ICCI.	<b>Chapter 9, Volume 2a</b> inherently considers future climatic trends within assessment, informed by modelling outputs as presented in <b>Appendix 9.2, Volume 2c</b> . The assessment concludes that all impact pathways are <b>Negligible (Not Significant)</b> .	No additional mitigation is required.
<b>Marine Sediment and Water Quality</b>	1, 2	Sediment disturbance and seabed change resulting in changes to water and sediment quality as a result of construction, maintenance and decommissioning activities.	Climatic trends such as increasing frequency and severity of storm events and ocean acidification have the potential to exacerbate marine sediment and water quality impact pathways and result in an ICCI.	<b>Chapter 10, Volume 2a</b> assesses the secondary effects resulting from impact pathways identified and modelled in <b>Chapter 9, Volume 2a</b> which inherently captures climatic trends.	No additional mitigation is required.
<b>Benthic and Intertidal Ecology</b>	1, 2	Habitat loss and disturbance and increases in SSC and turbidity impacting on benthic and intertidal ecology receptors as a result of construction, maintenance and decommissioning activities.	Climatic trends such as increasing frequency and severity of storm events and ocean acidification have the potential to interact with benthic and intertidal ecology impact pathways, and result in an ICCI.	<b>Chapter 11, Volume 2a</b> assesses temporary habitat loss, habitat disturbance and effects associated with increases in SSC and turbidity across the project lifetime of the Offshore Project. The most intensive period is understood to be the construction phase, due to the installation of Offshore Project infrastructure. During this phase, habitat loss and habitat disturbance effects are assessed as up to <b>Minor (Not Significant)</b> , with adherence to appropriate embedded mitigation measures.	No additional mitigation is required.

Environmental Aspect	Relevant Climate Hazard	Potential Impact(s) arising from the Offshore Project	Potential ICCI	ICCI Assessment	Mitigation
				<p>Due to the incremental nature of the onset of climatic trends, there is not anticipated to be an ICCI during this phase (2028/2029 – 2033). Although maintenance and decommissioning activities are further into the future and therefore at greater risk of ICCI, the works required result in short-term interactions with benthic and intertidal habitat. Habitat loss, habitat disturbance and increased SSC effects are assessed as up to <b>Minor (Not Significant)</b> and as such any ICCI is considered to be not significant.</p>	
<b>Fish Ecology</b>	1,2	Habitat loss and disturbance and increases in SSC and turbidity impacting on fish ecology receptors as a result of construction, maintenance and decommissioning activities.	Climatic trends such as increasing frequency and severity of storm events and ocean acidification have the potential to interact with fish ecology impact pathways, and result in an ICCI.	<p><b>Chapter 12, Volume 2a</b> assesses habitat loss and habitat disturbance and effects associated with increases in SSC and turbidity across the project lifetime of the Offshore Project. The most intensive period is understood to be the construction phase, due to the installation of Offshore Project infrastructure. During this phase, habitat loss and habitat disturbance effects are assessed as up to <b>Minor (Not Significant)</b>, with adherence to appropriate embedded mitigation measures.</p> <p>Due to the incremental nature of the onset of climatic trends, there is not anticipated to be an ICCI during this phase (2028/2029 – 2033). Although maintenance and decommissioning activities are further into the future and therefore at greater risk of ICCI, the works required result in short-term interactions with marine fish receptors and habitats. Habitat loss, habitat disturbance and increased SSC effects are assessed as up to <b>Minor (Not Significant)</b> and as such any ICCI is considered to be not significant.</p>	No additional mitigation is required.
<b>Marine Mammals</b>	1,2	Habitat loss and disturbance and increases in SSC and turbidity impacting on marine mammals receptors as a result of construction, maintenance and decommissioning activities.	Climatic trends such as increasing frequency and severity of storm events and ocean acidification have the potential to interact with marine mammal impact pathways, and result in an ICCI.	<p><b>Chapter 13, Volume 2a</b> assesses habitat loss and habitat disturbance and effects associated with increases in SSC and turbidity across the project lifetime of the Offshore Project. The most intensive period is understood to be the construction phase, due to the installation of Offshore Project infrastructure. During this phase, habitat loss and habitat disturbance effects are assessed as <b>Negligible (Not Significant)</b>, with adherence to appropriate embedded mitigation measures.</p> <p>Due to the incremental nature of the onset of climatic trends, there is not anticipated to be an ICCI during this phase (2028/2029 – 2033). Although maintenance and decommissioning activities are further into the future and therefore at greater risk of ICCI, the works required result in short-term interactions with marine mammal receptors and habitats. Habitat loss and habitat disturbance effects are assessed as <b>Negligible (Not Significant)</b> and as such any ICCI is considered to be not significant.</p>	No additional mitigation is required.
<b>Marine and Nearshore Ornithology</b>	1	Habitat loss and disturbance impacting on marine and nearshore ornithology receptors as a result of construction, maintenance and decommissioning activities.	Climatic trends such as increasing frequency and severity of storm events, ocean acidification and rising sea levels have the potential to interact with marine and nearshore ornithology pathways, and result in an ICCI.	<b>Chapter 14, Volume 2a</b> assesses habitat loss and habitat disturbance across the project lifetime of the Offshore Project. Climate change is considered to be the likely primary cause of decline in seabird populations in the future. It is believed that the absence of the Offshore Project would further delay the transition of the UK from reliance on fossil fuels and therefore further contribute towards climate change impacts and declining seabird populations.	No additional mitigation is required.

Environmental Aspect	Relevant Climate Hazard	Potential Impact(s) arising from the Offshore Project	Potential ICCL	ICCL Assessment	Mitigation
				With the application of appropriate embedded mitigation measures, habitat loss and habitat disturbance are assessed as up to <b>Minor (Not Significant)</b> and as such, any ICCL is not anticipated to result in an additive significant effect.	
<b>Benthic and Intertidal Ecology, Fish Ecology, Marine Mammals and Marine and Nearshore Ornithology</b>	1,2,3	Indirect effect of impacts across trophic levels	Climatic trends such as increasing frequency and severity of storm events and ocean acidification have the potential to interact with whole ecosystems by acting as a pressure on marine species, across all trophic levels, resulting in changes to behaviour and abundance of predator and prey species.	The Ecosystem Level Assessment is provided in Section 23.6.	No additional mitigation is required.
<b>Marine Archaeology and Cultural Heritage</b>	1	Indirect Impacts: Sediment disturbance and seabed change impacting on marine archaeology and cultural heritage receptors as a result of construction, maintenance and decommissioning activities.	Climatic trends such as increasing frequency and severity of storm events have the potential to interact with buried archaeological and heritage assets, causing either burial or scour, resulting in potential damage.	<b>Chapter 15, Volume 2a</b> assess indirect impacts to heritage assets as a result of mobilisation of sediment from installation, maintenance and decommissioning activities, as well as scour/burial effects from the presence of infrastructure. It is understood that although coastal and offshore historic environment receptors occupy environments that have always been dynamic, the intensity of impacts have increased as a result of anthropogenic climate change.  With the application of appropriate embedded mitigation measures, indirect effects are assessed as up to <b>Minor (Not Significant)</b> and as such, any ICCL is not anticipated to result in an additive significant effect.	No additional mitigation is required.
<b>Shipping and Navigation</b>	1	Vessel to vessel collision risk, Reduced access to local ports, harbours and facilities across the Offshore Project lifespan	Climatic trends such as increasing frequency and severity of storm events have the potential to interact with shipping and navigation receptors, resulting in increased impact of adverse weather conditions on vessel operations, navigational safety and routing.	<b>Chapter 16, Volume 2a</b> assesses pathways such as third-party to third-party vessel collision, third-party to Project vessel collision, reduced access to local ports, harbours and facilities and vessel to structure collision risk, in the context of adverse weather impacts. Over the Offshore Project lifetime, there is the potential for increase in the severity and frequency of storm events and thus impacts to vessel operations and navigational safety, however with the application of appropriate mitigation, all Shipping and Navigation pathways are assessed as Tolerable with Mitigation ( <b>Not Significant</b> ) and as such, any ICCL is not anticipated to result in an additive significant effect.	No additional mitigation is required.
<b>Other Sea Users, Tourism and Recreation</b>	1,2	Loss of access to third-party vessels (aquaculture, support, boat tour and angling tour operators) and other sea users, and demand on port services.	Climatic trends such as increasing frequency and severity of storm events have the potential to interact with other sea users receptors, resulting in increased impact of adverse weather conditions on port demand, aquaculture and tourism vessel operations and navigational safety and routing, and for recreational activities. Also, ocean acidification may impact commercially important species.	<b>Chapter 20, Volume 2a</b> assesses the impact pathways to other sea users and recreation and tourism receptors, such as the loss of access as a result of the establishment of safety zones around construction, maintenance and decommissioning activities, as well as the physical presence of Offshore Project infrastructure during the O&M phase. Over the Offshore Project lifetime, there is the potential for increase in the severity and frequency of storm events and thus impacts to aquaculture and tourism vessel operations and navigational safety. Similarly, an increase in adverse weather may increase the time required for Offshore Project vessels to utilise port services. With respect to the loss of access for recreational angling and angling tour operators, ocean acidification may also impact commercially important species. However, with the application of	No additional mitigation is required.

Environmental Aspect	Relevant Climate Hazard	Potential Impact(s) arising from the Offshore Project	Potential ICCI	ICCI Assessment	Mitigation
				appropriate embedded mitigation, all relevant pathways are assessed as <b>Minor adverse (Not Significant)</b> and as such, any ICCI is not anticipated to result in an additive significant effect.	
<b>Commercial Fisheries</b>	1,2	Reduction in access to or exclusion from established fishing grounds and displacement effects	Climatic trends such as increasing frequency and severity of storm events have the potential to interact with commercial fisheries receptors, resulting in increased impact of adverse weather conditions on vessel operations, navigational safety and routing. Also, ocean acidification may impact commercially important species.	<b>Chapter 21, Volume 2a</b> assesses the impacts that the Offshore Project is anticipated to have on commercial fisheries receptors. However, whilst there is the potential for an increase in the severity and frequency of storm events which may impact commercial fishing operations and ocean acidification impacts to commercially important species, with the application of appropriate embedded and additional mitigation, all relevant pathways are assessed as <b>Minor adverse (Not Significant)</b> and as such, any ICCI is not anticipated to result in an additive significant effect.	No additional mitigation is required.

## 23.8 GLOSSARY OF TERMS AND ABBREVIATIONS

23.8.1.1 A list of key terms and acronyms used in this chapter are provided in **Table 23.20** and **Table 23.21**.

Table 23.20 Acronyms and abbreviations

Term	Definition
DGC	Defence Geographic Centre
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EMF	Electro-Magnetic Field
EQS	Environmental Quality Standards
FMMCP	Fisheries Mitigation Monitoring and Communication Plan
GAAC	General Aviation Awareness Council
GVA	Gross Value Added
HDD	Horizontal Directional Drilling
ICCI	In-Combination Climate Change Impact
IMO	International Maritime Organisation
INNS	Invasive Non-Native Species
LMP	Lighting and Marking Plan
MARPOL	International Convention for the Prevention of Pollution from Ships
MD-LOT	Marine Directorate - Licensing Operations Team
MHWS	Mean High Water Springs
MMMP	Marine Mammal Mitigation Protocol
NSVMP	Navigational Safety and Vessel Management Plan
NtM	Notice to Mariners
O&M	Operation and Maintenance
OCAS	Offshore Cable Area of Search
OEMP	Outline Environmental Management Plan
OSP	Offshore Substation Platform
OTW	Onshore Transmission Works
OWF	Offshore Wind Farm
PAC	Pre-Application Consultation
PAD	Protocol for Archaeological Discovery
PAN	Planning Advice Note
SAR	Search and Rescue
SLVIA	Seascape Landscape Visual Impact Assessment
SSC	Suspended Sediment Concentrations
UK	United Kingdom
WFD	Water Framework Directive
WSI	Written Scheme of Investigation
WTG	Wind Turbine Generators

Zol	Zone of Influence
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Table 23.21 Glossary

Term	Meaning
The Applicant	Sporad na Mara Limited (the Project owner)
Array Area	The offshore area within which the offshore wind turbine generators (WTGs), associated foundations, Offshore Cables, and Offshore Substation Platform (OSP) (if required), will be located. This area encompasses the Turbine Area that will contain all above water surface infrastructure (WTGs / OSP) and an additional area within which further below water infrastructure (foundations and cables) may also be located.
Array Cables	The offshore electrical and communication cables that connect infrastructure located within the Array Area, for: <ul style="list-style-type: none"> <li>Scenario 1: Array Cables will be used to connect Wind Turbine Generators (WTGs) to each other, and to connect WTGs to the OSP.</li> <li>Scenario 2: Array Cables will be used to connect WTGs to each other.</li> </ul>
Array Cables to Landfall	The offshore electrical and communication cables located in the Array Area and Offshore Cables Area of Search that connect the wind turbine generators (WTGs) directly to Landfall for Scenario 2.
Cumulative Effects	Considers the likely significant effects of multiple impacts and activities from several developments.
Effect	Term used to express the consequence of an impact. The significance of an effect is determined by correlating the magnitude of the impact with the importance, or sensitivity, of the receptor or resource in accordance with defined significance criteria
Environmental Impact Assessment Report (EIAR)	The Environmental Impact Assessment Report (EIAR) prepared to assess the likely significant effects of the Project on the environment. Do not use EIA Report within the EIAR.
Embedded or 'Designed-in' Mitigation	Mitigation measures to avoid or reduce environmental effects that are directly incorporated into the preferred design for the Project. This can include standard practice in accordance with or without guidance. Embedded mitigation is considered as part of the impact assessment, before effect significance is identified.
Export Cables	The offshore electrical and communication cables located in the Array Area and Offshore Cables Area of Search that connect the Offshore Substation Platform (OSP) (if required) to Landfall for Scenario 1.
Impact	Change that is caused by an action; for example, foundation installation (action) during construction which results in habitat loss (impact).
Landfall	This consists of works from offshore Horizontal Directional Drill (HDD) exit pits (located below MLWS) to onshore at the Transition Joint Bays (TJB) (located above MHWS). The infrastructure and installation methods associated with the Landfall involves both onshore and offshore components.
Landfall Exit Pit Area	The offshore area in which all HDD Exit Pits will be located within.

Term	Meaning
Maximum Design Scenario	The scenario within the Project Design Envelope with the potential to result in the greatest impact on a particular topic receptor, and therefore the one that should be assessed for that topic receptor. See <b>Chapter 3: Project Description, Volume 1a</b> for detailed description.
Offshore Cables	Electrical and communication cables located within the Array Area and Offshore Cable Area of Search. The Offshore Cables consist of Array Cables, Array Cables to Landfall, and Export Cables.
Offshore Cable Area of Search (OCAS)	The area within which the offshore cable infrastructure between the Array Area and Landfall up to Mean High Water Springs (MHWS) will be located.
Offshore Landfall Area	The area seaward of Mean High Water Springs (MHWS) within the Offshore Cable Area of Search (OCAS) that includes works associated with the Horizontal Directional Drill (HDD) installation, including HDD exit pit(s) (located below MLWS) and offshore cable connection to the onshore (TJB) (located above MHWS).
Offshore Project	Components of the Project seaward of Mean High Water Springs (MHWS) which includes Array Area and Offshore Cable Area of Search.
Offshore Project Boundary	The 'red line boundary' encompassing the Offshore Project.
Offshore Substation Platform (OSP)	The optional offshore substation located within the Turbine Area. Includes the platform and associated components which allows the voltage to be increased to meet onward transmission requirements.
Percussive Piling	<p>A method of installing piles and pile casings into the seabed using an impact hammer. This form of piling can be solely used if ground conditions are suitable. If pile depth cannot be achieved through percussive piling alone, a pile-drill-pile technique can be used to reach desired depths.</p> <p>The percussive piling technique can be used for the installation of the Wind Turbine Generators (WTGs) and the Offshore Substation Platform (OSP) (if required) located within the Percussive Piling Area.</p>
Project	The Sporad na Mara offshore wind farm development. This term describes the whole development, including all offshore and onshore components.
Project Design Envelope (PDE)	A description of the range of possible components that make up the Project design options under consideration when the exact engineering parameters are not yet known.
Scoping Opinion	A report presenting the written opinion of the Scottish Ministers, with input from Comhairle nan Eilean Siar (CnES) for the OTW, as to the scope and level of detail of information to be provided in the Environmental Impact Assessment (EIA) for the Project.
Study Areas	Study Areas are determined for each technical discipline and are described within each technical chapter.
Turbine Area	A reduced area within the Array Area where above water surface infrastructure would be located i.e. wind turbine generators (WTG) or Offshore Substation

Term	Meaning
	Platform (OSP) (if required). This area has been developed and refined through stakeholder consultation and environmental assessment.
Wind Turbine Generator (WTG)	The wind turbines that generate electricity consisting of tubular towers and blades attached to a nacelle housing mechanical and electrical generating equipment.

## 23.9 REFERENCES

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