

MachairWind Offshore Windfarm

Chapter 5 EIA Methodology



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GLOSSARY OF ACRONYMS

Term	Definition
CEA	Cumulative Effects Assessment
CES	Crown Estate Scotland
CIEEM	Chartered Institute for Ecology and Environmental Management
CPA	Coast Protection Act
ECC	Export Cable Corridor
EEA	European Economic Area
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
FEPA	Food and Environmental Protection Act
HND	Holistic Network Design
HRA	Habitats Regulations Appraisal
HVDC	High Voltage Direct Current
ICES	International Council for the Exploration of the Seas
IEMA	Institute of Environmental Management and Assessment
INTOG	Innovation and Targeted Oil & Gas
IP	Interested Parties
ISEP	Institute of Sustainability and Environmental Professionals
LSE	Likely Significant Effects
MARPOL	International Convention for the Prevention of Pollution from Ships
MD-LOT	Marine Directorate Licensing Operations Team
MPA	Marine Protection Areas
ncMPA	Nature Conservation Marine Protected Areas
O&M	Operation and Maintenance
OnTDA	Onshore Transmission Development Area
OSPAR	Oslo and Paris Conventions
PAC	Pre-Application Consultation
PAN	Planning Advice Note
SAC	Special Areas of Conservation
SNH	Scottish National Heritage
SSSI	Sites of Special Scientific Interest
TCE	The Crown Estate
UK	United Kingdom



Term	Definition
WDA	Windfarm Development Area



GLOSSARY OF TERMS

Term	Definition
Cable protection	Protective measure to minimise the effects of scour and hazards along the offshore cables (e.g. to prevent cable exposure or snagging of vessel anchors or fishing gear), as well as for protecting these cables at infrastructure crossing points.
Climate Change Impact	Climate Change Impact is defined as an impact from a climate hazard, such as asset damage or failure, which affects the ability of the receptor to maintain its function or purpose.
Development Area	Application boundary for consenting purposes which, for the Project, consists of a Windfarm Development Area, Offshore Export Cable Corridor, and Onshore Transmission Development Area. Separate consent and marine licence applications will be submitted for each Development Area where applicable.
Environmental Impact Assessment (EIA)	The process of evaluating the likely significant environmental effects of a proposed development over and above the existing circumstances (or 'baseline').
Environmental Impact Assessment (EIA) Regulations	A collective term referring to The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 and The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017.
Embedded mitigation measure	Mitigation measures, including industry good practice measures, that are directly incorporated into the design for the MachairWind Windfarm Development Area to avoid or reduce environmental effects.
Greenhouse gas	A gas in the Earth's atmosphere that traps heat by absorbing and emitting infrared radiation, a process known as the greenhouse effect. Also known by the collective shorthand "carbon".
Habitats Regulations	A collective term used to describe the Conservation of Habitats and Species Regulations 2017 and The Conservation (Natural Habitats, &c.) Regulations 1994.
Inter-array cables (IACs)	Armoured cable containing electrical and fibre optic cores which link the wind turbine generators to each other and to the offshore substation platform(s).
MachairWind Offshore Windfarm	An offshore windfarm capable of exporting around 2 GW of renewable energy to the National Electricity Transmission System. MachairWind Offshore Windfarm comprises three Development Areas: • The WDA – located on the west coast of Scotland to the northwest of Islay and west of Colonsay; • The Offshore Export Cable Corridor – a preliminary boundary extending from the WDA to mean high water springs at a landfall location near Girvan, South Ayrshire; and • The Onshore Transmission Development Area – a preliminary boundary which extends landward from mean low water springs and includes the land required for the landfall of the offshore export cable(s) and their route up to but not including the proposed high voltage direct current switching station which will be developed and constructed by Transmission Owner, ScottishPower Transmission. Separate consent and licence applications will be submitted for each Development Area.
National Electricity Transmission System	The high-voltage electricity power transmission network serving Great Britain which receives electricity from generators (such as offshore windfarms) and transmits that electricity to anywhere on the National Electricity Transmission System to satisfy demand.
Offshore export cable	Armoured cable containing electrical cores between the offshore substation platform(s) and landfall. Offshore export cable(s) will include bundled fibre optic cables. The offshore export cable(s) are subject to Marine Licence applications under the Marine (Scotland) Act 2010. The portion of the offshore export cable(s) located within the WDA is assessed as part of this MachairWind WDA EIA and a marine licence application to construct, alter or improve this portion has been submitted alongside the WDA application. A separate marine licence



Term	Definition
	application will be submitted for the portion of the offshore export cable(s) from the WDA boundary to mean high water Mean High Water Springs.
Offshore Export Cable Corridor (ECC)	The preliminary boundary extending from the WDA to mean high water springs near Girvan, South Ayrshire and within which the offshore export cable(s) will be located. A separate marine licence application will be submitted for the offshore export cable(s) located within the Offshore ECC.
Offshore Substation Platform (OSP)	An offshore platform with a fixed foundation located within the WDA which houses electrical equipment such as transformers, switchgear, protection and control systems, and enables the windfarm's renewable electricity to be collected via inter-array cables and exported to the National Electricity Transmission System via offshore export cable(s).
Offshore Substation Platform (OSP) link cables	Electrical cables which link OSPs (if more than one OSP is required). These cables will include fibre optic cores or bundled fibre optic cables. OSP link cables will be wholly located within the WDA.
Onshore Transmission Development Area (OnTDA)	The preliminary boundary which extends landward from mean low water springs and includes the land required for the landfall of the offshore export cable(s) and their route up to but not including the proposed high voltage direct current switching station which will be developed and constructed by Transmission Owner, ScottishPower Transmission. This Transmission Owner is responsible for consenting the high voltage direct current switching station. Onward connections to the National Electricity Transmission System will be consented by National Grid Electricity Transmission and ScottishPower Transmission. Where relevant, these are considered as part of cumulative effects assessment in the EIA.
Operational life	The operational life is the expected length of time from final commissioning of the WDA until the cessation of commercial operations. This is anticipated to be 35 years.
Option Agreement Area (OAA)	The seabed area awarded to ScottishPower Renewables in January 2022 through the ScotWind leasing round.
Scottish Marine Area	The area of Scotland's territorial sea limit (up to 12 nautical miles from baseline) as defined in the Marine (Scotland) Act 2010.
ScotWind	A Crown Estate Scotland seabed leasing round which enabled developers to propose offshore wind projects and apply for seabed rights to plan and build windfarms in Scottish waters.
The Applicant	The legal entity submitting consent applications for the MachairWind Offshore Windfarm, namely MachairWind Limited.
The Project	MachairWind Offshore Windfarm including all its Development Areas and associated infrastructure.
Windfarm Development Area (WDA)	The application boundary within the OAA where consent will be sought for the proposed WDA infrastructure. The WDA infrastructure is subject to Section 36 consent and marine licence applications (generation and transmission) which are being applied for separately from the Offshore ECC infrastructure and OnTDA infrastructure.
WDA infrastructure	The offshore generation and transmission infrastructure located within the WDA including but not limited to: WTGs, WTG fixed foundations (and associated scour protection), OSP(s), OSP fixed foundations (and associated scour protection), IACs, OSP link and offshore export cable(s) and their associated external cable protection (insofar as these are located within the WDA) and fibre optic cables.
Wind Turbine Generator (WTG)	A wind turbine generator which converts wind energy into electrical energy. Each wind turbine generator is a complex system composed of a high number of components. Typically, the main components include the rotor assembly (composed of three blades and a hub); the



Term	Definition
	nacelle (containing a generator, shaft and gearbox, power electronic converter and transformer); and the tower (containing lifting equipment and the switchgear).



5 ENVIRONMENTAL IMPACT ASSESSMENT METHODOLOGY

5.1 INTRODUCTION

1. This Environmental Impact Assessment (EIA) methodology chapter describes the principles of EIA and the approach taken to identify and evaluate likely significant effects (LSE) of the Windfarm Development Area (WDA) infrastructure on the physical, biological and human environment.
2. The EIA process involves understanding the proposed construction, operation and maintenance (O&M), and decommissioning activities in the WDA, and the environment within which the WDA will be located. The potential impacts of the WDA infrastructure and associated activities are then evaluated to determine the resulting effects upon the receiving environment/receptors and the significance of those (either positive or negative) effects. This enables the predicted effects of the development to be understood by statutory consultees, and other Interested Parties (IP) such as members of the public, and the relevant determining authorities to inform a consenting decision.
3. Schedule 3 of the Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (hereafter termed the 'EIA Regulations') states that the description of the LSE 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 development. For receptors which are scoped in, these factors are assessed in full in the EIA Report (EIAR) technical chapters.
4. This chapter details the methodology for the assessment of LSE. It also describes the methodology for assessment of cumulative and inter-related effects. This chapter details the stakeholder consultation and engagement relevant to EIA methodology that has been undertaken as part of the EIA process.

5.2 GUIDANCE AND BEST PRACTICE

5. Current best practice guidelines for methodologies to establish baseline conditions at offshore windfarm sites have been developed from experience gained through various offshore windfarm developments throughout the United Kingdom (UK). Statutory bodies, conservation advisors, trade associations and Collaborative Offshore Wind Research into the Environment have all published a range of best practice and guidance documents and these have been used to facilitate the development of Scottish-specific best practice methodologies. Accordingly, NatureScot has held best practice and 'sharing good practice' seminars, involving stakeholders and offshore windfarm developers, with the aim to facilitate development of best practice within Scottish Waters and review applicable lessons learnt from elsewhere.
6. The following policy, guidance and best practice documents have been developed to assist the EIA process:
 - Marine Scotland (2018). Marine Scotland Consenting and Licensing Guidance: For Offshore Wind, Wave and Tidal Energy Applications;
 - Scottish Government (2013). Planning Advice Note (PAN) 1/2013 EIA Regulations;
 - Scottish Government (2017). Planning Circular 1/2017: Environmental Impact Assessment Regulations;
 - Scottish National Heritage (SNH) (2018). Handbook on Environmental Impact Assessment - Version 5;
 - Marine Scotland (2022). Guidance for Applicants on using the Design Envelope for Applications under Section 36 of the Electricity Act 1989;
 - Scottish Government (2023). National Planning Framework 4 (NPF4);



- Chartered Institute for Ecology and Environmental Management (CIEEM, 2018). Guidelines for Ecological Impact Assessment in the UK and Ireland. Terrestrial, Freshwater, Coastal and Marine;
- Institute of Environmental Management and Assessment (IEMA) (2015) (now Institute of Sustainability and Environmental Professionals (ISEP)). IEMA Environmental Impact Assessment Guide to Shaping Quality Development;
- IEMA (2017). Delivering Proportionate EIA. A Collaborative Strategy for Enhancing UK EIA Practice;
- Centre for Environment, Fisheries and Aquaculture Science (Cefas) (2004). Offshore Wind Farms: Guidance Note for EIA in Respect of Food and Environmental Protection Act (FEPA) and Coast Protection Act (CPA) Requirements;
- Cefas (2012). Guidelines for Data Acquisition to Support Marine Environmental Assessments of Offshore Renewable Energy Projects;
- Renewable UK (2013). Guiding Principles for Cumulative Impacts Assessment in Offshore Wind Farms;
- Oslo and Paris Conventions (OSPAR) Commission (Convention for the Protection of the Marine Environment of the North-East Atlantic) (2009). Assessment of the Environmental Impacts of Cables;
- European Commission (1999). Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions;
- European Commission (2017). EIA of Projects - Guidance on the preparation of the EIAR;
- Maclean et al. (2009). A Review of Assessment Methodologies for offshore windfarms;
- Planning Inspectorate (2019). Advice Note Seventeen: Cumulative Effects Assessment (CEA) relevant to nationally significant infrastructure projects;
- Planning Inspectorate (2024). Nationally Significant Infrastructure Projects: Advice on Cumulative Effects Assessment; and
- The Cumulative Effects Framework, which is under development by Marine Directorate Licensing Operations Team (MD-LOT) and NatureScot will be considered for use in the EIA (for relevant receptors) when available.

5.3 THE ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

7. The overall EIA process is delivered through several clearly defined stages, namely scoping, consultation, environmental assessment and reporting, determination and post-consent monitoring (if required):

- **Scoping:** the applicant requests a Scoping Opinion from the Scottish Ministers through the submission of a Scoping Report to confirm the EIA methodology and the LSE to be considered.
- **Consultation:** in line with Marine Licensing (Pre-application Consultation) (Scotland) Regulations 2013, the Applicant has undertaken Pre-application Consultation (PAC) to inform the design and assessment in line with good practice for EIA and consenting processes (see **Chapter 6 Consultation and Stakeholder Engagement**).
- **EIAR preparation and submission:** this constitutes the majority of the EIA process and draws together the outcomes of the assessment of LSE from the Project on the environment during the construction, O&M, and decommissioning stages whilst taking account of stakeholder feedback and guidance. The approach to this stage is detailed in **Section 5.9**.
- **Determination:** following submission, the Scottish Ministers will examine all the documentation provided during the application process and reach a reasoned conclusion on the LSE of the project on the environment. The environmental information, and the conclusions reached, alongside feedback received from stakeholders and the public, must be considered by the



Scottish Ministers in deciding whether to give consent for the project. The Scottish Ministers must also consider whether any proposed mitigation and monitoring measures are appropriate.

- **Decision notice:** the decision reached by the Scottish Ministers during the determination process must be published, through the form of a 'decision notice' that is made available to the public and consultation bodies. The decision notice incorporates the Scottish Ministers reasoned conclusions on the likely significance of effects of the project on the environment.
- **Monitoring:** may be undertaken during the site preparation works, construction works, O&M works, or decommissioning works associated with the WDA. This may be a requirement as part of the decision notice.

8. The stages of the licensing and consenting process in Scottish waters are illustrated in **Plate 5.1**.



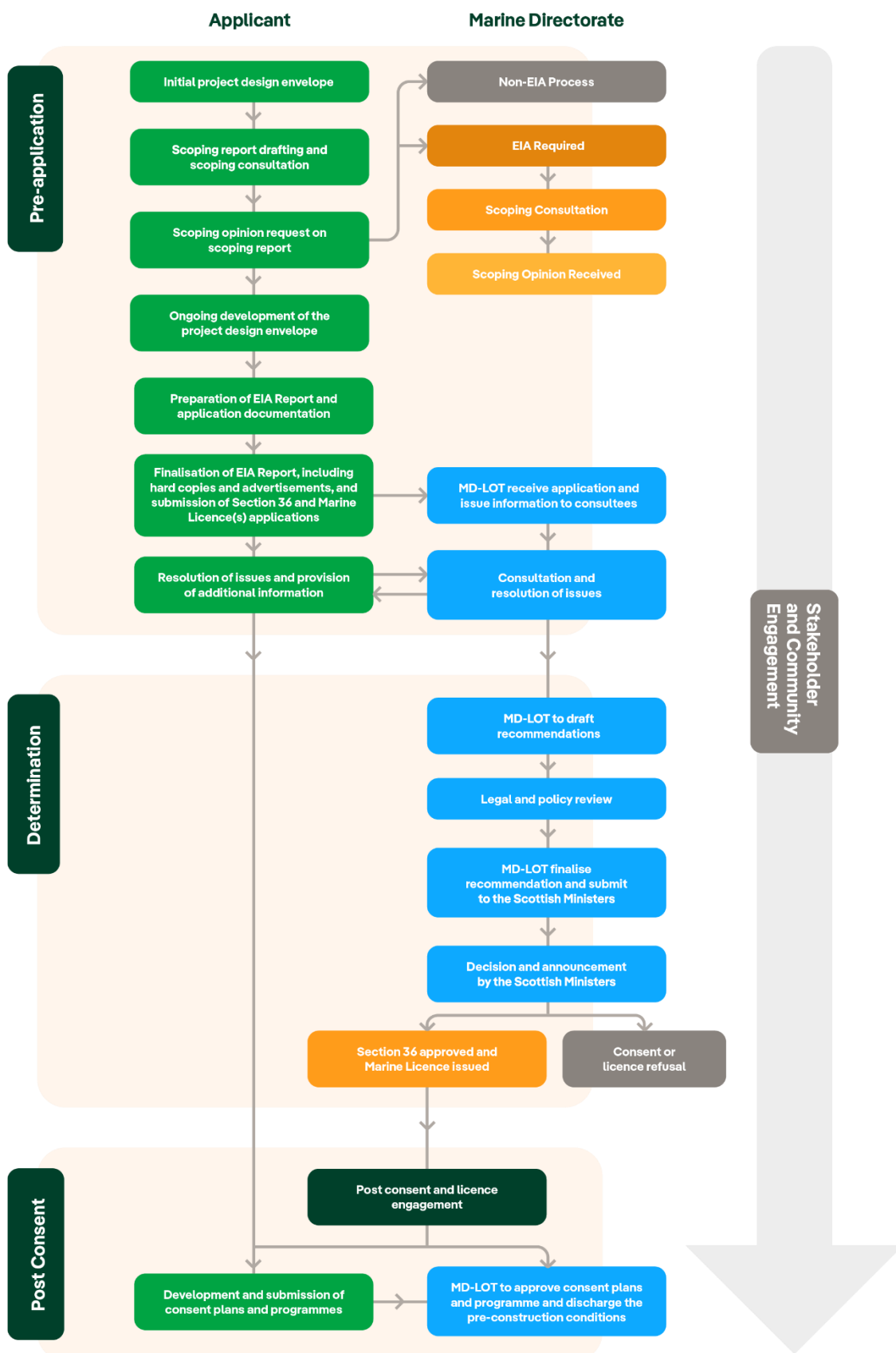


Plate 5.1 Stages of the licensing and consenting process in Scottish waters

5.4 ENVIRONMENTAL IMPACT ASSESSMENT SCOPING

9. Scoping is intended to inform a proportional and robust approach to assessment through early-stage evaluation and reporting of identified LSE in the EIAR. This proactive process allows for a robust EIA whilst focusing on environmental impacts which could give rise to LSE.
10. On 11 October 2024, the MachairWind WDA Scoping Report (**Appendix 1 WDA Scoping Report**) was submitted to MD-LOT.
11. The MachairWind WDA Scoping Report provided information on:
 - Infrastructure within the WDA;
 - The proposed EIA methodology to characterise baseline conditions and address environmental impacts;
 - The proposed CEA methodology;
 - Topics and impacts proposed to be scoped into this WDA EIAR, where there is potential for significant effects on receptors; and
 - Topics and impacts proposed to be scoped out of this WDA EIAR.
12. A Scoping Opinion (**Appendix 2 WDA Scoping Opinion**) was received from MD-LOT on 9 January 2025.
13. The Scoping Opinion for the Project states *“In the event that the Developer does not submit applications for a s.36 consent under the 1989 Act and marine licence under the 2010 Act for the Proposed Development within 12 months of the date of this Scoping Opinion, the Scottish Ministers strongly recommend that the Developer seeks further advice from them regarding the validity of the Scoping Opinion.”*
14. The MachairWind WDA Scoping Opinion was published on the 09 January 2025 and the Applicant is submitting the consent and Marine Licence applications for the WDA more than 12 months after receipt of the Scoping Opinion. Therefore, a **WDA Scoping Validation Report (Appendix 3)** has been submitted together with the application.

5.4.1 Topics Scoped Out of the Environmental Impact Assessment

15. A guiding principle of EIA is to undertake a proportionate level of assessment to the risk posed. EIA scoping aims to determine which environmental technical chapters could give rise to significant effects as a result of the WDA and therefore require further assessment, as well as which topics are unlikely to conclude significant effects and therefore do not need to be considered further.
16. **Appendix 1 WDA Scoping Report** proposed that offshore air quality should be scoped out from further assessment on the basis that significant environmental effects are not anticipated (**Table 5.1**). **Appendix 2 WDA Scoping Opinion** agreed to this technical chapter being scoped out. Only potentially significant impacts have been ‘scoped in’ to the WDA EIA and are assessed in the technical chapters (**Chapters 7 to 21**).

Table 5.1 Topics scoped out of the EIA

Chapter / Topic	Justification
Offshore Air Quality	Vessels utilised during the construction, O&M, and decommissioning phases of the WDA may contribute to emissions offshore. However, the closest human receptors (e.g., residential areas) and ecological receptors (e.g., Special Areas of Conservation (SAC) and Sites of Special Scientific Interest (SSSIs)) are located at least 12.4 km from the WDA at its closest point and all vessel activities will be undertaken within the WDA, except for transit to and from ports which would be within existing vessel transit routes. Additionally, the International Convention for the Prevention of Pollution from Ships (MARPOL) emissions



Chapter / Topic	Justification
	regulations will be applied. Due to the distance from receptors, it is considered that there would be no impact on onshore human or ecological receptors.

17. Human health considerations are included where appropriate in the technical chapters, but no standalone chapter is provided. Human health impacts are considered in the following chapters:

- **Chapter 12 Commercial Fisheries;**
- **Chapter 13 Shipping and Navigation;**
- **Chapter 14 Offshore Archaeology and Cultural Heritage;**
- **Chapter 15 Military and Civil Aviation;**
- **Chapter 16 Seascape, Landscape and Visual Impact;**
- **Chapter 17 Infrastructure and Other Marine Users;**
- **Chapter 18 Socio-economics;**
- **Chapter 19 Greenhouse Gas Assessment;**
- **Chapter 20 Climate Change Risk Assessment; and**
- **Chapter 21 Major Accidents and Disasters.**

5.5 CONSULTATION AND STAKEHOLDER ENGAGEMENT

18. Regular engagement with stakeholders has been key to the delivery of this WDA EIAR. In advance of the formal application, consultation and engagement has been carried out to allow stakeholders and local communities the opportunity to provide feedback on all aspects of the Project, and inform the scope of studies, surveys and assessments being undertaken, and influence the project design. This is in accordance with best practice and guidance and builds on Scoping Opinion feedback provided by MD-LOT's consultees.

19. **Chapter 6 Consultation and Stakeholder Engagement** sets out the extensive stakeholder consultation and stakeholders engaged with during the pre-application stage of the Project which has informed this EIAR. Each technical chapter also provides an overview of consultation relevant to the chapter and sets out how this is considered.

5.5.1 Consultation Relevant to Environmental Impact Assessment Methodology

20. Consultation relevant to EIA methodology is provided in **Table 5.2**. This considers feedback from **Appendix 2 WDA Scoping Opinion**.

21. The Applicant held a Scoping Workshop on 01 May 2024 on Microsoft Teams with a range of technical stakeholders. This was arranged following advice from MD-LOT to capture and address stakeholder feedback on key receptors and the key impact assessment methodologies to be adopted prior to the submission of the Scoping Report. Further workshops were held on 14 May 2024 and 03 June 2024 covering Marine Physical Environment and Commercial Fisheries respectively.



Table 5.2 Summary of consultation relevant to EIA methodology

I.D.	Consultee	Stakeholder Comment	Applicant Response
Scoping Opinion (09 January 2025)			
1.	Marine Directorate Licensing Operations Team (MD-LOT)	The Scottish Ministers direct the Developer to the NatureScot representation on the need to understand potential impacts holistically at a wider ecosystem scale, rather than just as discrete individual receptor assessments. The Scottish Ministers therefore advise that potential impacts should be given consideration across key trophic levels, particularly in relation to the availability of prey species. Detailed advice on assessment of across trophic levels is provided in the receptor chapters in Section 5 of the Scoping Opinion.	Chapter 22 Interrelated Effects and Ecosystem Assessment considers how potential impacts could act holistically on a wider scale. The potential for multiple effects on a receptor group, as presented within topic-specific chapters, to interact to create inter-related effects is considered alongside the inter-related effects across different trophic levels of the ecosystem, affecting the environment.
2.	NatureScot	The proposed approach for the assessment methodology is set out in Section 4.4, which includes high level detail on the scoring criteria to be used, with some further information provided in the receptor chapters – noting that for most receptors this is not particularly prescriptive. Although we acknowledge that expert judgement is required when determining sensitivity of receptors and (in some instances) magnitude of impact - in terms of biodiversity, the magnitude of change should generally be expressed in absolute terms and relatively in terms of percentage change to habitat area or species population. Therefore, at this stage we reserve judgement on the scoring criteria to be used in the Environmental Impact Assessment (EIA) Report.	Noted. Additional details on the specific criteria considered in defining sensitivity, value (where relevant), magnitude of impact and significance of effect is included within topic-specific chapters. General example criteria are provided in Section 5.1.
3.	NatureScot	The proposed approach to the cumulative effects assessment (CEA) is outlined in Section 4.4.3 of the Scoping Report. Paragraph 201 indicates that where likely significant effects (LSE) for the proposed development alone are assessed as negligible, these will not be considered within the CEA. However, we advise that proposal alone impacts could be deemed negligible, but when combined with others the overall magnitude could be greater and therefore result in a cumulative effect. As such we advise that further consideration should be given to negligible proposal alone impacts in the CEA.	Where the potential significant effect for the whole-Project alone is assessed as negligible, or where an impact is predicted to be highly localised, these will not generally be considered within the CEA, as there is not considered to be a potential for cumulative effects with other plans, projects or activities; however, under certain circumstances negligible effects may be taken forward based on expert judgement (Section 5.9.3).

I.D.	Consultee	Stakeholder Comment	Applicant Response
4.	NatureScot	We welcome the identification of embedded mitigation measures in each of the relevant chapters of the EIA Scoping Report and summarised in Appendix A (Mitigation Register). However, we note that much of the embedded mitigation measures includes the development and adherence to post-consent plans and programmes. Plans and programmes themselves do not strictly constitute mitigation – it is the measures contained within the plan that will mitigate impacts, for which no detail has yet been provided. Mitigation measures can often be most successful when they are considered from the outset of the proposal rather than as a late-stage solution. Therefore, in some cases, mitigation can be incorporated as designed in measures that are truly embedded to avoid / reduce impacts. We advise that the EIA Report must clearly articulate those mitigation measures that are informed by the EIA (or Habitats Regulations Appraisal (HRA)) and are necessary to avoid or reduce predicted significant adverse environmental effects of the proposal. We recommend that the full range of mitigation and monitoring measures as well as published guidance are considered and discussed in the EIA Report.	Noted. Additional detail on the embedded mitigation measures considered to avoid, prevent or reduce predicted significant adverse environmental effects is included within topic-specific chapters and, where relevant, is informed by the following management plans: • Appendix 6 Outline Environmental Management Plan • Appendix 7 Marine Pollution Contingency Plan • Appendix 8 Invasive Non-Native Species Mitigation Plan • Appendix 9 Draft Marine Mammal Mitigation Protocol • Appendix 10 Fisheries Mitigation, Monitoring and Communication Plan • Appendix 11 Offshore Written Scheme of Investigation and Protocol for Archaeological Discoveries • Appendix 12 Outline Lighting and Marking Plan • Appendix 13 Outline Vessel Management Plan and Navigational Safety Plan • Appendix 14 Carbon Management Plan • Nature Positive Plan Where 'additional' mitigation measures are required to avoid, prevent or reduce predicted significant adverse environmental effects, these are described within individual topic-specific chapters and a subsequent residual significance of effect conclusions evaluated. The general approach to mitigation and monitoring is provided in Section 5.9.2.8.



5.6 DESIGN EVOLUTION PROCESS

22. The EIA process provides opportunities to incorporate environmental considerations into the design of the Project. Multiple design iterations are typically undertaken before the final detailed design is carried out, allowing for adjustments based on environmental constraints and feedback from stakeholder engagement. This iterative approach is a core component of the EIA.
23. The iterative design process is guided by input from environmental specialists who conducted the scoping and impact assessments for the WDA EIAR. These experts work closely with the Applicant's development team to ensure that design decisions reflect a comprehensive understanding of environmental sensitivities. This collaboration involved workshops attended by EIA specialists and engineers ensuring that design evolution is informed by a project-wide understanding of environmental sensitivities such that the mitigation hierarchy, including consideration of the avoidance of key receptors, is adhered to throughout the development of the WDA and the wider Project.
24. Environmental and social factors have played a central role in shaping the WDA design to date. This evolution has been informed by extensive stakeholder engagement, EIA surveys, and technical studies. The design evolution process undertaken to date, including refinements in the project design since scoping, is evidenced in **Chapter 3 Project Description** and **Chapter 4 Site Selection and Alternatives**.

5.7 DESIGN ENVELOPE APPROACH

25. A parameter-based design envelope approach has been adopted for this WDA EIAR. This approach defines a range of minimum and maximum values for each design parameter, allowing for the identification of a reasonable worst-case scenario for each potential impact. The design envelope encompasses all relevant technical, spatial, and temporal aspects of the Project including proposed methodology to be employed for construction, O&M, and decommissioning. This framework enables technical specialists to assess LSE with accuracy, while maintaining the flexibility needed for further design refinement following consent during the detailed design phase.
26. The design envelope approach allows the WDA to be assessed on a reasonable receptor-specific worst-case scenario basis. The reasonable worst-case scenario defined for any given parameter may vary by technical aspect, depending on how the parameter can be expected to interact with the receptor being considered. This method is widely accepted by regulators and stakeholders and is considered standard practice, particularly at this early stage of project development where design flexibility is essential.
27. Flexibility within the consent is a critical aspect of large-scale developments, and especially important for offshore wind projects due to ongoing technological advancements. The design envelope must provide sufficient flexibility to enable the Applicant and their supply chain to use the most up to date, efficient and economical technology and techniques in the construction, O&M, and decommissioning of the infrastructure and activities associated with the WDA, without affecting the surrounding environment to a greater extent than the worst-case scenarios presented in this WDA EIAR.
28. The information presented in **Chapter 3 Project Description** outlines the options and flexibility required by the Applicant and the range of potential design, location and activity parameters upon which this WDA EIAR is based. The final detailed design will lie within the parameters of the design envelope described in this WDA EIAR. Pre-construction detailed design work will be undertaken post-consent whilst retaining the validity of the WDA EIAR. Guidance has been prepared by the Marine Directorate and the Energy Consents Unit on using the design envelope approach for



applications under s.36 of the Electricity Act 1989 where flexibility is required in applications (Scottish Government, 2022).

29. Each chapter in this WDA EIAR assesses a 'realistic worst-case' scenario for each of the identified potential impacts, ensuring a robust and precautionary approach.

5.8 ASSESSMENT SCOPE

30. The scope of this WDA EIAR complies with the legislative requirements set out **Section 5.2** and in **Chapter 2 Policy and Legislation**. **Table 5.3** sets out the specific scope requirements under the EIA Regulations, and details where these are addressed in this WDA EIAR.

Table 5.3 Where requirements of the EIA regulations are addressed in this WDA EIAR

Requirement	Document
Population and human health*	Chapter 12 Commercial Fisheries; Chapter 13 Shipping and Navigation; Chapter 14 Offshore Archaeology and Cultural Heritage; Chapter 15 Military and Civil Aviation; Chapter 16 Seascape, Landscape and Visual Impact; Chapter 17 Infrastructure and Other Marine Users; Chapter 18 Socio-economics; Chapter 19 Greenhouse Gas Assessment; Chapter 20 Climate Change Risk Assessment; and Chapter 21 Major Accidents and Disasters.
Biodiversity, and in particular species and habitats protected under the Habitats Regulations*	Chapter 8 Benthic Ecology; Chapter 9 Fish (including Basking Shark) and Shellfish; Chapter 10 Marine Mammals and Leatherback Turtle; and Chapter 11 Offshore Ornithology.
Land, soil, water, air and climate*	Chapter 7 Marine Physical Environment; Chapter 8 Benthic Ecology; Chapter 19 Greenhouse Gas Assessment; and Chapter 20 Climate Change Risk Assessment. <i>Please note that offshore air quality is scoped out (Table 5.1)</i>
Material assets, cultural heritage and the landscape*	Chapter 14 Offshore Archaeology and Cultural Heritage; Chapter 15 Military and Civil Aviation; Chapter 16 Seascape, Landscape and Visual Impact; Chapter 17 Infrastructure and Other Marine Users; and



Requirement	Document
	Chapter 18 Socio-economics.
The effects to be identified, described and assessed under paragraph (2) include the expected effects deriving from the vulnerability of the development to risks, so far as relevant to the development, of major accidents and disasters.*	Chapter 19 Greenhouse Gas Assessment; Chapter 20 Climate Change Risk Assessment; and Chapter 21 Major Accidents and Disasters.
A description of the development, including in particular: (a) a description of the location of the development; (b) a description of the physical characteristics of the whole development, including, where relevant, requisite demolition works, and the land-use requirements during the construction and operational phases; (c) a description of the main characteristics of the operational phase of the development (in particular any production process), for instance, energy demand and energy used, nature and quantity of the materials and natural resources (including water, land, soil and biodiversity) used; (d) an estimate, by type and quantity, of expected residues and emissions (such as water, air, soil and subsoil pollution, noise, vibration, light, heat, [radiation]) and quantities and types of waste produced during the construction and operation phases.**	Chapter 3 Project Description
A description of the reasonable alternatives (for example in terms of project design, technology, location, size and scale) studied by the developer, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects.**	Chapter 4 Site Selection and Alternatives
A description of the relevant aspects of the current state of the environment (the “baseline scenario”) and an outline of the likely evolution thereof without implementation of the project as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of relevant information and scientific knowledge.**	Chapter 7 Marine Physical Environment through to Chapter 20 Climate Change Risk Assessment
A description of the factors specified in regulation 4(3) likely to be significantly affected by the development: population, human health, biodiversity (for example fauna and flora), land (for example land take), soil (for example organic matter, erosion, compaction, sealing), water (for example hydromorphological changes, quantity and quality), air, climate (for example greenhouse gas emissions, impacts relevant to adaptation), material assets, cultural heritage, including architectural and archaeological aspects, and landscape.**	Chapter 7 Marine Physical Environment through to Chapter 20 Climate Change Risk Assessment



Requirement	Document
A description of the LSE of the development on the environment resulting from, inter alia: (a) the construction and existence of the development, including, where relevant, demolition works; (b) the use of natural resources, in particular land, soil, water and biodiversity, considering as far as possible the sustainable availability of these resources; (c) the emission of pollutants, noise, vibration, light, heat and radiation, the creation of nuisances, and the disposal and recovery of waste; (d) the risks to human health, cultural heritage or the environment (for example due to accidents or disasters); (e) the cumulation of effects with other existing and/or approved development, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources; (f) the impact of the development on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the development to climate change; (g) the technologies and the substances used.** The description of the likely significant effect on the factors specified in regulation 4(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 development. This description should take into account the environmental protection objectives established at Union level (as they had effect immediately before IP completion day) or United Kingdom level which are relevant to the development including in particular those established under the law of any part of the United Kingdom that implemented Council Directive 92/43/EEC and Directive 2009/147/EC.**	Chapter 7 Marine Physical Environment through to Chapter 20 Climate Change Risk Assessment
A description of the forecasting methods or evidence, used to identify and assess the significant effects on the environment, including details of difficulties (for example technical deficiencies or lack of knowledge) encountered compiling the required information and the main uncertainties involved.**	Chapter 7 Marine Physical Environment through to Chapter 20 Climate Change Risk Assessment
A description of the measures envisaged to avoid, prevent, reduce or, if possible, offset any identified significant adverse effects on the environment and, where appropriate, of any proposed monitoring arrangements (for example the preparation of a post-project analysis). That description should explain the extent, to which significant adverse effects on the	Chapter 7 Marine Physical Environment through to Chapter 20 Climate Change Risk Assessment



Requirement	Document
environment are avoided, prevented, reduced or offset, and should cover both the construction and operational phases.**	
A description of the expected significant adverse effects of the development on the environment deriving from the vulnerability of the development to risks of major accidents and/or disasters which are relevant to the project concerned. Relevant information available and obtained through risk assessments pursuant to assimilated law such as any law that implemented] Directive 2012/18/EU of the European Parliament and of the Council or Council Directive 2009/71/Euratom or relevant assessments may be used for this purpose provided that the requirements of any law that implemented the Directive are met. Where appropriate, this description should include measures envisaged to prevent or mitigate the significant adverse effects of such events on the environment and details of the preparedness for and proposed response to such emergencies.**	Chapter 7 Marine Physical Environment through to Chapter 20 Climate Change Risk Assessment
A non-technical summary of the information provided under paragraphs 1 to 8.**	Non-Technical Summary
A reference list detailing the sources used for the descriptions and assessments included in the Environmental Impact Assessment (EIA) report.**	Chapter 7 Marine Physical Environment through to Chapter 20 Climate Change Risk Assessment
* As detailed in 4(3) – 4(4) of the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017. The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017 contain similar provisions and wording which is covered by the above.	
** As detailed in Schedule 4 of the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017. The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017 contain similar provisions and wording which is covered by the above.	



5.9 ENVIRONMENTAL IMPACT ASSESSMENT METHODOLOGY

31. This section outlines the assessment methodology for identification, evaluation and assessment of LSE and cumulative effects. It also considers the methodology for inter-related effects across different receptor groups and any transboundary effects (i.e., effects on European Economic Area (EEA) states).

32. An overview of the approach to assessment methodology is illustrated in **Plate 5.2**.

Within this EIAR, the assessment of each receptor topic is included in separate chapters. Within each of the topic chapters, the following matters have been considered:

- Applicable legislation, policy, and guidance context;
- Summary of consultation activity, including comments received in the Scoping Opinion and PAC;
- Identification of the Study Area and existing data sources;
- Description of the environmental baseline conditions, including future baseline;
- Topic-specific methodology and limitations;
- Assessment of LSE, which includes:
 - Identification of the realistic worst-case scenario for each impact;
 - A description of the embedded mitigation measures adopted via Project design and good industry practice which avoid, prevent, reduce, or offset environmental effects; and
 - Identification of potential impacts and the assessment of LSE.
- Identification of any additional mitigation measures required in respect of LSE, together with consideration of any residual effects;
- Identification of any future monitoring required;
- Assessment of any cumulative effects with other developments, including those that are proposed, consented and under construction (including, where applicable, those projects, plans or activities that are currently operational that were not operational when baseline data was collected);
- Assessment of any transboundary effects; and
- Reference list.



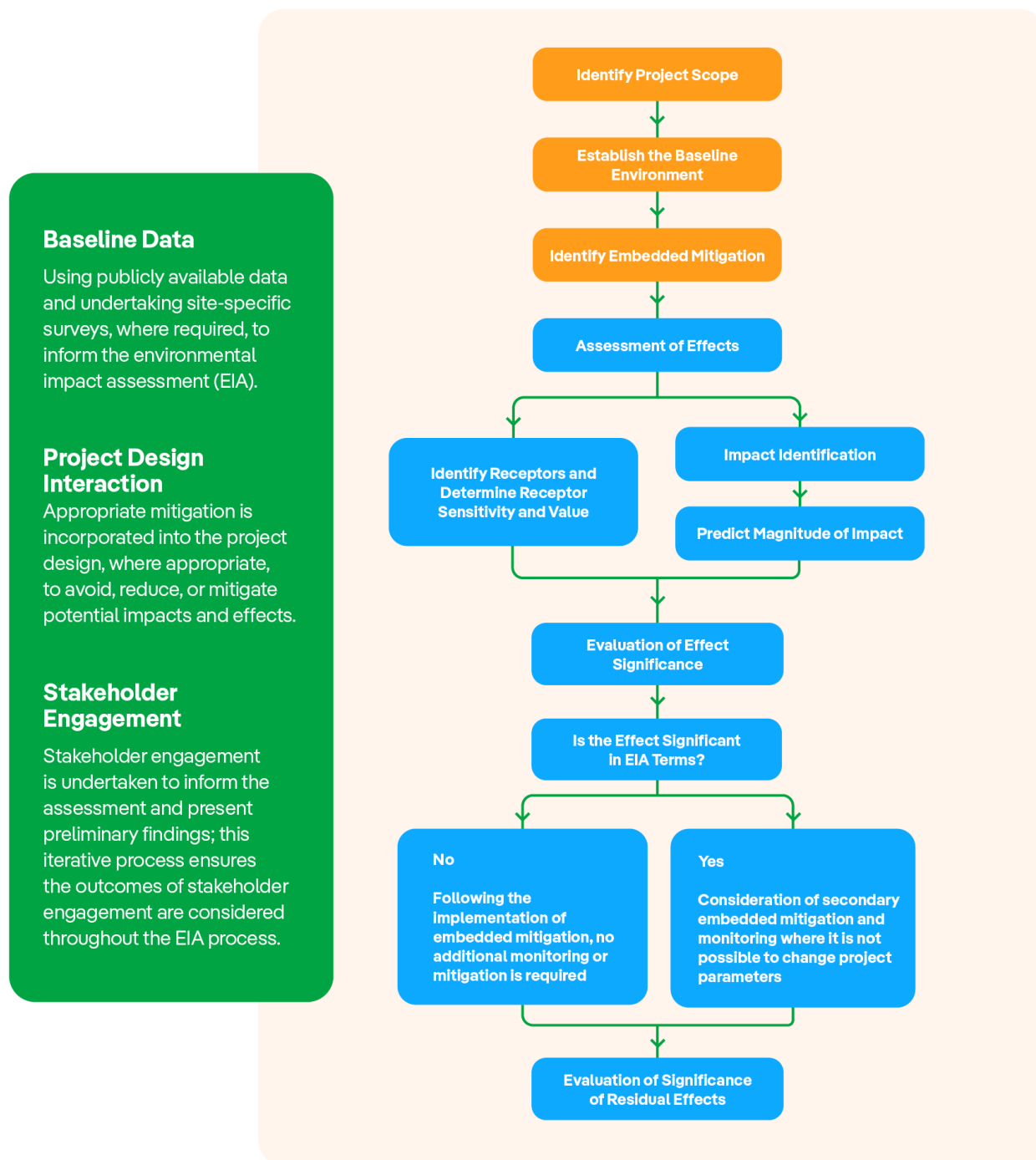


Plate 5.2 Overview of EIA methodology

5.9.1 Baseline Environment

5.9.1.1 Study Area / Zone of Influence

33. Study areas / zone of influence have been defined for each topic at the relevant scale and are stated within the topic chapters. These have been determined by factors such as the distribution of receptors, footprint of potential impact and administrative / management boundaries (e.g., territorial waters, International Council for the Exploration of the Seas (ICES) rectangles) and have been discussed/agreed with stakeholders.

5.9.1.2 Characterisation of the Existing Environment

34. To undertake an assessment of LSE, an understanding of the baseline is required for each topic in its corresponding Study Area.
35. Characterisation of the existing environment for each topic will follow the steps listed below:
- Desk-based review of existing data sources;
 - Site-specific survey data gathering to supplement existing data, address any key data gaps and increase confidence levels of the assessment; and
 - Identification of relevant topic-specific receptors.
36. The specific approach to establishing the characteristics of the existing environment is presented in each technical chapter within this EIAR. The approach considers feedback provided in the Scoping Opinion alongside consultation with a range of statutory and non-statutory stakeholders (see **Chapter 6 Consultation and Stakeholder Engagement**).

5.9.1.3 Evolution of the Baseline

37. The EIA Regulations require an outline of the expected evolution of the baseline, in the absence of the Project being developed (as far as this can be assessed 'with reasonable effort' based on available information and scientific knowledge). Each respective topic chapter presents the anticipated trend of the existing environment over the anticipated timescales of the Project's construction and operational lifespan. Such trends reflect natural changes in the baseline environment that may be expected to occur without development.

5.9.2 Assessment of Likely Significant Effects

38. Assessment of LSE during the construction, O&M and decommissioning phases of the WDA infrastructure have been undertaken by practitioners and technical specialists using existing and project specific datasets. To provide a consistent framework and system of common tools and terms, where appropriate, a matrix approach has been used to frame and present the judgements made.
39. For each receptor topic, the latest guidance and good practice has been used. Therefore, criteria for sensitivity of receptor (see **Section 5.9.2.3**) and magnitude of impact (see **Section 5.9.2.4**) have been tailored to suit each receptor. As required by the EIA Regulations, only effects that are likely to be significant (see **Section 5.9.2.5**) require detailed assessment. Impact assessment is conducted taking embedded mitigation into account (see **Section 5.9.2.8**).
40. Potential for impacts and LSE from the WDA infrastructure, Offshore Export Cable Corridor infrastructure (ECC) and Onshore Transmission Development Area (OnTDA) infrastructure have also been assessed, (commensurate with the level of detail that is available at the time of carrying out the assessment).



5.9.2.1 Impact Identification

41. Potential impacts have been classified as follows:

- **Direct impacts:** these may arise from impacts associated with the construction, O&M, or decommissioning of the Project;
- **Indirect impacts:** these may be experienced by a receptor that is removed (e.g., in space or time) from the direct impact (e.g., noise impacts upon fish which are a prey resource for fish or mammals);
- **Inter-relationships between impacts:** whereby the same receptor or receptor group is affected by multiple impacts acting together (see **Section 5.9.2.6**); or
- **Cumulative impacts:** these may occur as a result of the Project in conjunction with other existing or planned projects within the Study Area for each receptor (see **Section 5.9.3**).

5.9.2.2 Impact Pathway

42. This EIAR uses the conceptual ‘source-pathway-receptor’ model. This model identifies potential impacts resulting from the proposed activities on the environment and sensitive receptors within it. This process provides an easy-to-follow assessment route between impact sources and potentially sensitive receptors ensuring a transparent impact assessment. The aspects of this model are defined as follows:

- **Source** – the origin of a potential impact (i.e. an activity such as piling and a resultant effect e.g. noise resulting from the piling works);
- **Pathway** – the means by which the effect of the activity could impact a receptor (e.g. for the example above, disturbance/injury to nearby species); and
- **Receptor** – the element of the receiving environment that is impacted (this could either be a component of the physical, ecological, or human environment, e.g. for the example above, species susceptible to noise impacts).

43. Where a different approach has been necessary to reflect the specific assessment requirements of a particular receptor, this is described in the relevant technical chapter of this EIAR.

44. As described in **Section 5.9.2**, this EIAR assesses the LSE in two steps by considering the source, pathway and receptors for:

1. The WDA alone; and
2. The WDA, Offshore ECC and OnTDA combined assessment.

45. This approach will enable potential interactions between each Development Area to be identified and assessed in a meaningful and proportionate manner. For example, LSE may arise on offshore ornithology receptors as a result of the long-term presence of the WDA infrastructure in a WDA alone assessment, but no interactions or additive LSE may arise as a result of the long-term presence of WDA, Offshore ECC and OnTDA infrastructure given the export cable will be buried (where practicable) in the seabed while offshore and below ground onshore.

46. Following lengthy delays stemming from the National Electricity System Operator’s 2022 Holistic Network Design (HND) process, the grid connection location for the Project was confirmed in August 2025 to be in the vicinity of Girvan, South Ayrshire (see **Chapter 1 Introduction** for further information). Consequently, separate consent / marine licence applications will be sought for the Offshore ECC and OnTDA. It is anticipated that the Project will connect to a new High Voltage Direct Current (HVDC) switching station to be built by the Transmission System Operator (TSO) near Girvan. Due to the novel HVDC technology that will be used to transmit power generated from the Project to the grid network, the configuration and design of this infrastructure is in the early stages of development and will require refinement informed by discussions with the relevant Transmission



Owners. The qualitative assessment of both the Offshore ECC and OnTDA is commensurate with the level of detail available at the time of writing. A set of assumptions were developed which includes a preliminary boundary for the Offshore ECC and OnTDA to a landfall location near Girvan, anticipated project components and associated construction methods and timelines. These are set out in **Chapter 3 Project Description**, Sections 3.7 and 3.8. Offshore engineering and environmental surveys enabling Offshore ECC refinement are anticipated to take place after the WDA EIAR has been submitted to the consenting authorities.

47. Within the upcoming Offshore ECC and OnTDA consent / marine licence applications, their respective scoping and EIARs will include the LSE assessment outcomes of this WDA EIA (**Section 5.9.2.9**) and present updated combined assessment using the latest available information covering all aspects of the Project.

5.9.2.3 Determining Receptor Sensitivity and Value

48. The characterisation of the existing environment helps to determine the receptor sensitivity to assess the potential impacts upon it.
49. The sensitivity of a receptor is determined through its ability to accommodate change and to recover from that change if it is affected. Receptor sensitivity has been assigned based on receptor-specific adaptability, tolerance, and recoverability, when exposed to a potential impact. This is achieved through applying known research and information on the status and sensitivity of the feature under consideration coupled with professional judgement and past experience. The following parameters have been considered:
 - Timing of the impact: whether impacts overlap with critical periods of the receptor, e.g. life-stages or seasons for ecological receptors; and
 - Probability of the receptor-effect interaction occurring (e.g. vulnerability).
50. Example definitions of the different sensitivity levels for a generic receptor are given in **Table 5.4**. It should be noted that the definitions of sensitivity are not constant across all topic areas, and specific reference to the definitions of sensitivity for the topic-relevant receptors are provided within each respective topic chapter.

Table 5.4 Example definition of different sensitivity levels for a generic receptor

Sensitivity	Definition
High	Individual receptor has very limited or no capacity to avoid, adapt to, accommodate, or recover from the anticipated impact.
Medium	Individual receptor has limited capacity to avoid, adapt to, accommodate, or recover from the anticipated impact.
Low	Individual receptor has some tolerance to accommodate, adapt or recover from the anticipated impact.
Negligible	Individual receptor is generally tolerant to and can accommodate or recover from the anticipated impact.

51. In addition, for some assessments the 'value' of the receptor forms an important element within the assessment, for instance, if the receptor is a protected species or habitat, or has economic value.
52. Receptor value considers whether, for example, the receptor is rare, has protected or threatened status, importance at local, regional, national, or international scale, and in the case of biological



receptors whether the receptor has a key role in the ecosystem function. Example definitions of the value levels for a generic receptor are given in **Table 5.5**.

53. Each technical chapter of this WDA EIAR provides a chapter-specific definition of the value levels for the relevant receptors.

Table 5.5 Example definitions of the value levels for a generic receptor

Value	Definition
High	Internationally/nationally important (for example internationally or nationally protected site).
Medium	Regionally important/regionally protected site.
Low	Locally important/rare.
Negligible	Not considered to be important (for example common or widespread).

54. The terms 'high value' and 'high sensitivity' are not necessarily linked within a particular impact, and it is important not to inflate effect significance specifically because a feature is valued.
55. Expert judgement is particularly important when determining the sensitivity of receptors. For example, an Annex II species (under the Habitats Regulations) would have a high inherent value but may be tolerant to an impact or have high recoverability. In this case, sensitivity should reflect the ecological robustness of the species and not necessarily default to its protected status.

5.9.2.4 Predicting Magnitude of Impact

56. The magnitude of change affecting a receptor that would result from the WDA infrastructure / activities has been identified on a scale from minor alterations or change, up to major changes or the total or substantial loss of the receptor. For certain environmental effects, the magnitude of change is related to guidance on levels of acceptability (for example, marine mammals) and is therefore based on numerical parameters. For others it is a matter of professional judgement to determine the magnitude of change, using descriptive terminology. The relevant guidance for each receptor is discussed in the technical chapters of this EIAR.
57. The magnitude and probability of an impact occurring has been established through consideration of:
- Scale or spatial extent (small scale to large scale or a few individuals to most of the population);
 - Duration (short term to long term, temporary or permanent);
 - Likelihood of impact occurring;
 - Frequency; and
 - Nature of change relative to the baseline.
58. The categorisation of magnitude of impact varies for specific pathways, receptors, and technical assessments. Example definitions of the magnitude levels for a generic receptor are given in **Table 5.6**.

Table 5.6 Example definitions of the magnitude levels for a generic receptor

Magnitude	Definition
High	Fundamental, permanent/irreversible changes, over the whole receptor, and/or fundamental alteration to key characteristics or features of the receptor's character or distinctiveness.



Magnitude	Definition
Medium	Considerable, permanent/irreversible changes, over the majority of the receptor, and/or discernible alteration to key characteristics or features of the particular receptor's character or distinctiveness.
Low	Discernible, temporary (throughout project duration) change, over a minority of the receptor, and/or limited but discernible alteration to key characteristics or features of the receptor's character or distinctiveness.
Negligible	Discernible, temporary (for part of the project duration) change, or barely discernible change for any length of time, over a small area of the receptor, and/or slight alteration to key characteristics or features of the receptor's character or distinctiveness.

5.9.2.5 Evaluation of Effect Significance

59. The significance of effects has been defined by considering receptor sensitivity and the magnitude of a given impact. Where there is a lack of suitable data to quantitatively assess impacts for the species under consideration, the assessment is informed by expert judgement.
60. Following establishment of receptor sensitivity and magnitude of impact, the significance of effect has been predicted by using quantitative or qualitative criteria, as appropriate, to ensure a robust assessment. Where possible, a matrix such as the one presented in **Table 5.7** has been used to aid assessment of effect significance based on expert judgement, latest guidance, and any specific input from consultation. The matrix is seen as a framework to aid understanding of how a judgement has been reached from the narrative of each effect assessment and it is not a prescriptive formulaic method. To some extent, defining effect significance is qualitative and reliant on professional experience, interpretation and judgement.
61. A description of the approach to effect assessment and the interpretation of significance levels has been provided within each section of this EIAR. This approach ensures that the definition of impacts and effects is transparent and relevant to each topic under consideration.
62. In general, effects which are of major or moderate significance are considered to be significant in EIA terms, although it is also possible that a conclusion of moderate effect significance may not be considered significant. In these cases, a justification and rationale is provided in this EIAR. Whilst minor effects are not significant, these may contribute to significant effects cumulatively or through interactions.

Table 5.7 Matrix for evaluating the significance of an effect

Sensitivity	Adverse Magnitude				Beneficial Magnitude			
	High	Medium	Low	Negligible	Negligible	Low	Medium	High
High	Major	Major	Moderate	Minor	Minor	Moderate	Major	Major
Medium	Major	Moderate	Minor	Minor	Negligible	Minor	Moderate	Major
Low	Moderate	Minor	Minor	Negligible	Negligible	Minor	Minor	Moderate
Negligible	Minor	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Minor

63. Through use of this matrix, an assessment of the significance of an effect has been made in accordance with the definitions in **Table 5.8**.



Table 5.8 Definitions of effect significance

Effect Significance	Definition
Major	Very large or large change in receptor condition, both adverse or beneficial, which are likely to be important considerations at a national, regional or district level because they contribute to achieving national objectives or could result in exceedance of statutory objectives and / or breaches of legislation.
Moderate	Intermediate change in receptor condition, which are likely to be important considerations at a local level.
Minor	Small change in receptor condition, which may be raised as local issues.
Negligible	No discernible change in receptor condition.
No impact or effect	No change in receptor condition; therefore, no effect.

5.9.2.6 Inter-Related Effects

64. Inter-related effects refer to the inter-relationships between EIA topics and interactions between impacts which may lead to different or greater environmental effects than if considered solely in isolation and presents an understanding of potential impacts holistically at a wider ecosystem scale.
65. The technical chapters of the WDA EIAR consider the potential for:
 - Inter-relationships between impacts from different chapters – where different impacts from different chapters interact to affect a single receptor. Offshore assessments are largely receptor based (e.g., marine mammals, fish ecology) and as such inter-relationships are covered as an integral part of the assessment. There is the potential for these separate impacts to interact, spatially and temporally, to create inter-related effects on a receptor and where this is the case this is identified and assessed. For example, impacts on fish and shellfish ecology can lead to changes in prey resource for marine mammals and birds, and can also affect commercial fisheries through the disturbance of commercially important fish and shellfish resources and subsequent displacement or disruption of fishing activity.
 - Interactions between impacts – the impacts identified and assessed for each EIA topic have the potential to interact with each other, which could give rise to synergistic effects as a result of that interaction. Where impacts assessed in each chapter have the potential to interact with one another, impacts will be assessed relative to each development phase (a ‘phase assessment’ i.e., construction, O&M or decommissioning) to see if (for example) multiple construction impacts affecting the same receptor could increase the level of effect upon that receptor. Following this, a ‘lifetime assessment’ will be undertaken where necessary which will consider the potential for impacts to affect receptors across all development phases. For example, increased suspended sediment concentrations and the subsequent seabed deposition impact interacts with the physical disturbance to seabed habitat impacts, as receptors would experience both impacts.
66. Further detail is described in **Chapter 22 Inter-Related Effects and Ecosystem Assessment**. It should be noted that the inter-related effects assessment considers the effects from the WDA only, with effects from other projects considered within the CEA (**Section 5.9.3**).

5.9.2.7 Confidence

67. Once an assessment of a potential impact has been made, in some cases, it is appropriate to assign a confidence value to the assessment to assist in the understanding of the judgment. A precautionary / worst-case approach to assessment ensures consideration of maximum LSE. A simple scale of



high-medium-low confidence scale is utilised where high confidence assessments are made based on robust evidence. Lower confidence assessments may be achieved, for example, through extrapolation and use of proxies. Addressing lower confidence assessments may be achieved through continued consultation with stakeholders and / or further survey efforts where appropriate and proportionate.

5.9.2.8 Mitigation and Monitoring

68. Embedded mitigation, referring to measures that are integrated into the design of the Project from its outset and which avoid, prevent or reduce significant environmental effects, is considered, where relevant, in each EIAR chapter. Effects have been assessed with this mitigation in place.
69. Where an impact assessment identifies that an aspect of the WDA is likely to give rise to significant effects, 'additional' mitigation measures will be considered where appropriate to avoid, prevent, reduce or offset effects. Where 'additional' mitigation is identified, impacts have been reassessed and the post-mitigation or 'residual effect' identified. If the impact and effect does not require mitigation (or none is practicable) the residual effect will remain the same. It should be noted that IEMA (2024) guidance describes the use of primary, tertiary and secondary mitigation. In this EIAR, 'embedded' mitigation is the equivalent of 'primary' and 'tertiary' and 'secondary' mitigation is the equivalent of 'additional' mitigation.
70. Mitigation will take place in the following hierarchy. Where the first measure is not practicable due to constraints including engineering or technology, the next measure will be considered.
 1. The Project design will aim to avoid placing permanent infrastructure within protected sites, where practicable.
 2. If avoidance of protected sites is not practicable, the Project will aim to avoid direct impact on the specified features of interest within protected sites via specific construction, O&M and decommissioning methods, where practicable.
 3. Where the feature is not static, the design of the infrastructure of the Project must, where practicable, reduce impact on mobile species, therefore reducing the interaction and harm.
 4. Where avoidance of features of interest is not practicable, mitigation measures will be developed for construction, O&M and decommissioning to reduce effects as far as practicable, such as work schedule, techniques and working areas, and reinstatement of temporary works.
 5. Where impacts are not avoidable, the Project will aim to offset impacts where practicable and/or implement relevant enhancement measures.
71. It is important to note that the mitigation measures applied should be proportionate to the scale of the impact and effect predicted. Appropriate mitigation measures will be discussed with the relevant regulatory authorities and stakeholders.
72. The following management plans are submitted alongside this WDA EIAR and consents / Marine Licence applications, in line with MD-LOT guidance (2025) or where the Applicant has considered it prudent to submit plans in outline form which will be used to inform the development of final plans post-consent:
 - **Appendix 6 Outline Environmental Management Plan;**
 - **Appendix 7 Marine Pollution Contingency Plan;**
 - **Appendix 8 Invasive Non-Native Species Mitigation Plan;**
 - **Appendix 9 Draft Marine Mammal Mitigation Protocol;**
 - **Appendix 10 Fisheries Mitigation, Monitoring and Communication Plan;**
 - **Appendix 11 Offshore Written Scheme of Investigation and Protocol for Archaeological Discoveries;**



- **Appendix 12 Outline Lighting and Marking Plan;**
- **Appendix 13 Outline Vessel Management Plan and Navigational Safety Plan;**
- **Appendix 14 Carbon Management Plan;**
- **Nature Positive Plan.**

73. In addition, the following management plans are proposed to be developed post-consent (if required):

- Development Specification and Layout Plan;
- Cable Plan;
- Seabed Obstruction Mitigation Plan;
- Emergency Response Cooperation Plan;
- Radar Mitigation Plan;
- Vessel Management Plan;
- Project Environmental Monitoring Plan;
- Construction Method Statement;
- Piling Noise Mitigation Plan;
- O&M Plan; and
- Decommissioning Programme.

74. In some cases, to ensure that the mitigation measures are successful or where there is significant uncertainty with respect to important receptors, monitoring may be appropriate. Monitoring programmes are most commonly required prior to, during and shortly after construction but can also be used during O&M. The nature of any monitoring will be dependent on the effect or mitigation measure under inspection.

5.9.2.9 Combined Assessment: Windfarm Development Area, Offshore Export Cable Corridor and Onshore Transmission Development Area

75. This section presents how the Applicant proposes to present the combined impact assessment of interactions between the WDA, Offshore ECC and OnTDA (i.e. considering impact interactions and additive effects to determine if any effects would be materially elevated from those assessed for the WDA alone assessment). This is referred to as the combined assessment.

76. In this context, interactions are considered where there may be spatial overlap of effects and additive effects are considered where there may be incremental effects on the same receptor, including increased temporal effects.

77. The combined assessment has been set out in each technical topic of this WDA EIAR (commensurate with the level of detail available at the time of carrying out that assessment). This approach ensures a whole Project assessment is undertaken in a meaningful and proportionate manner.

78. As stated in **Section 5.9.2.2**, due to the novel HVDC technology that will be used to transmit power generated from the Project to the grid network, the configuration and design of the Offshore ECC and OnTDA infrastructure is in the early stages of development and will require refinement informed by discussions with the relevant TSO. The qualitative assessment of both the Offshore ECC and OnTDA is commensurate with the level of detail available at the time of writing. This impact assessment will be based on a preliminary Offshore ECC that transits from the WDA to a landfall location near Girvan, South Ayrshire. Offshore engineering and environmental surveys enabling Offshore ECC refinement are anticipated to take place after the WDA EIAR has been submitted to the consenting authorities.



79. Within the upcoming Offshore ECC and OnTDA consent applications, their respective scoping and EIARs (where required) will take account of all likely effects predicted within the WDA EIA and present updated combined assessments using the latest available information covering all aspects of the Project.
80. To inform the combined assessment, a set of assumptions were developed which includes a preliminary boundary for the Offshore ECC and OnTDA, anticipated project components and associated construction methods and timelines. These are set out in **Chapter 3 Project Description** Sections 3.7 and 3.8.
81. Each topic specific chapter includes a qualitative discussion where potential interactions and additive effects between the WDA and the Offshore ECC and OnTDA have been considered with the aim of identifying whether effects could result in those of greater significance than assessed for the WDA alone assessment. To accompany the description, a combined assessment summary table has been set out and **Table 5.9** presents an example of such a table. Some topics will have no potential for combined effects across Development Areas due to a lack of spatial or temporal overlap or source, pathway, receptor linkage. Only residual effects are taken forward for consideration in the combined assessment.

Table 5.9 Example combined assessment summary (topic specific tables to be set out in each topic chapter in the WDA EIAR)

Receptor/Topic	WDA Residual Effect	Offshore ECC Assessment of Effects	OnTDA Assessment of Effects	Combined Assessment
Marine Physical Environment				
C and D* Impact 1: Impacts on Suspended Sediment Concentrations (SSCs) and transport.	Not Significant (Negligible Adverse).	Not Significant (Negligible to Minor Adverse).	N/A – no pathway to receptors.	No significant residual effects likely, despite some interaction expected between sediment plumes and additive effects.
Marine Mammals				
C and O&M *Impact 1: Underwater noise associated with other construction and maintenance activities: auditory injury.	Not Significant (Minor adverse).	Not Significant (Negligible to Minor Adverse).	N/A – no pathway to receptors.	No significant residual effects likely given the reduced number of construction and maintenance vessel requirements for the Offshore ECC compared to the WDA.
Offshore Ornithology				
C and D* Impact 1: Temporary disturbance and displacement.	Not Significant (Minor Adverse).	Not Significant (Negligible to Minor Adverse).	N/A – no pathway to receptors.	No significant residual effects likely, despite some additive effects in relation to temporary disturbance during construction.



Receptor/Topic	WDA Residual Effect	Offshore ECC Assessment of Effects	OnTDA Assessment of Effects	Combined Assessment
O&M* Impact 1: Barrier effects from the physical presence of the WDA infrastructure.	Not Significant (Negligible to Minor Adverse).	Not Significant (No change).	N/A – no pathway to receptors.	No significant residual effects likely, given the limited operational impact of the Offshore ECC.
Commercial Fisheries				
C, O&M and D Impact 1: Reduction in access to, or exclusion from established fishing grounds.	Not Significant (Minor adverse).	Not Significant (Negligible to Minor Adverse).	N/A – no pathway to receptors.	No significant residual effects likely despite some additive effects across the region.
Marine Archaeology				
C, O&M and D Impact 1: Direct impacts to heritage assets.	Not Significant (Negligible to Minor Adverse).	Not Significant (Negligible to Minor Adverse).	N/A – no pathway to receptors.	No significant residual effects likely, given the mitigations relevant for each Development Area.
Ornithology				
C, O&M and D Impact 1: Temporary disturbance and displacement.	N/A – no pathway to receptors.	Not Significant (Negligible Adverse).	Not Significant (Negligible to Minor Adverse).	No combined effects as no overlap in receptors.
* C = Construction, O&M = Operation and Maintenance, D = Decommissioning				

5.9.3 Assessment of Cumulative Effects

82. The CEA considers the impacts arising from the activities and infrastructure associated with the whole-Project (i.e. the WDA, Offshore ECC and OnTDA) as well as cumulatively with other relevant plans, projects and activities. The general approach to the CEA includes identifying potential cumulative effects, identifying a short list of plans and projects for consideration and evaluating the significance of cumulative effects. Schedule 4 of the Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017 and Schedule 4 of the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 require that cumulative effects of the development be described in the EIAR. Planning Circular 1/2017 (Scottish Government, 2017) and Planning Advice Note 1/2013 (Scottish Government, 2013) also sets out this requirement. Marine Scotland Consenting and Licensing Guidance for Offshore Wind, Wave and Tidal Energy Applications (Scottish Government, 2018), provides some guidance on the types and status of projects to be considered in the CEA. NatureScot guidance on assessing cumulative impacts on ornithology receptors will be followed as described in **Chapter 11 Offshore Ornithology**.



5.9.3.1 Stage 1a: Screening of Potential Cumulative Impacts

83. Stage 1a involves the screening / identification of which whole-Project impacts could have a cumulative effect with other plans, projects and activities (described as 'impact screening'). Where the potential significant effect for the WDA alone is assessed as negligible, or where an impact is predicted to be highly localised, these will not generally be considered within the CEA, as there is not considered to be a potential for cumulative effects with other plans, projects or activities however under certain circumstances negligible effects may be taken forward based on expert judgement.

5.9.3.2 Stage 1b: Screening of Other Plans, Projects and Activities

84. In accordance with guidance documents discussed in **Section 5.2**, other plans or projects that are deemed likely to go ahead or are going ahead, and for which sufficient information is available, have been taken forward for consideration in **Appendix 5.1 Cumulative Projects Long and Short Lists**. The CEA long list has been developed using datasets from MD-LOT, Crown Estate Scotland, The Crown Estate (TCE) and others to identify projects and plans in the vicinity of the WDA.
85. For the purposes of the CEA Long-List, the criteria of other plans or projects for consideration include those:
- Which have become operational since baseline data was collected;
 - Under construction;
 - Permitted application(s), but not yet implemented;
 - Submitted application(s) not yet determined; and
 - Plans and projects for which details are available in the public domain (i.e. 'reasonably foreseeable'), including:
 - Projects in Scottish waters;
 - Projects in English, Welsh and Northern Irish waters, or other non-UK waters if considered to be relevant, have connectivity, or the potential for a cumulative effect;
 - Any potential project that has submitted a Scoping Report up to six months prior to submission of the WDA application date;
 - Offshore wind projects granted an option or Agreement for Lease; and
 - Non-wind projects.
86. The CEA Long-List has been developed based on the above criteria, and has been further screened for each potential impact-receptor pathway using the following process:
- **Conceptual overlap:** an impact-receptor pathway describes an impact which has the potential to directly or indirectly affect the receptor(s) in question;
 - **Physical overlap:** ability for impacts arising from the WDA, Offshore ECC and OnTDA infrastructure to overlap with those from other plans or projects on a receptor basis. An overlap of the Zone of Influences (Zols) arising from the two (or more) projects/plans must be established for a cumulative effect to arise. There are exceptions to this for certain mobile receptors that are potentially subject to impacts from multiple plans or projects; and
 - **Temporal overlap:** for a cumulative effect to arise from two or more plans or projects, a temporal overlap of impacts arising from each must be established. Some impacts are active only during certain phases of the Project (e.g. piling noise during construction). However, the absence of a strict overlap may not necessarily mean there is no potential for cumulative effect, as receptors may become further affected by additional, non-temporally overlapping projects.



5.9.3.3 Stage 2: CEA

87. For the assessment stage, information has been gathered based on **Appendix 5.1 Cumulative Projects Long and Short Lists** which describes plans or projects taken forward from the screening stage.
88. A tiered approach has been used when undertaking the CEA. This will provide a framework for placing relative weight on the potential for each plan or project to be included in the CEA, based on the plans or project's current stage of maturity, certainty in the design or effects and overall availability of detail on which to carry out an assessment. Projects or plans that will be assessed in Stage 2 will use the following tiers:
- **Tier 1 assessment:** projects which are operational (but not part of the baseline), under construction, those with consent and submitted but not yet determined;
 - **Tier 2 assessment:** all plans/projects assessed under Tier 1, plus those projects with a Scoping Report and/or Scoping Opinion; and
 - **Tier 3 assessment:** all plans/projects assessed under Tier 1 and Tier 2, plus those projects likely to come forward where a Crown Estate Scotland (CES) Option to Lease Agreement or equivalent has been granted (i.e., other ScotWind and Innovation and Targeted Oil & Gas (INTOG) projects).

5.9.4 Transboundary Effects

89. Transboundary effects arise when impacts from a Project within one EEA state's¹ territory affects the environment of another EEA state(s). The EIA Directive, and thus the relevant EIA Regulations, requires the assessment of transboundary effects. The need to consider such transboundary effects has been embodied by the United Nations Economic Commission for Europe Convention on EIA in a Transboundary Context (commonly referred to as the 'Espoo Convention'). The Convention requires that assessments are extended across borders between Parties of the Convention when a planned activity may cause significant adverse transboundary effects. The Espoo Convention has been transposed into Scottish EIA law by way of Regulation 29 of the Electricity Works (EIA) (Scotland) Regulations 2017, and Regulation 30 of the Marine Works (EIA) (Scotland) Regulations 2017). These Regulations set out the processes for consultation and notification. If a project is considered to cause significant transboundary effects, the EIA Regulations 2017 require Scottish Ministers to engage with the affected EEA State and invite them to participate in consultation.
90. The procedures involve providing information to the Member State and for the Scottish Ministers to consult with that State regarding the significant effects of the Project and the associated mitigation measures.
91. Transboundary effects, like cumulative effects, are assessed on a topic-by-topic basis for offshore topics. In terms of the WDA, Offshore ECC and OnTDA, transboundary impacts relate primarily to projects that may affect mobile species, and to projects that are located close to the national boundaries, or to areas administered by other relevant authorities.
92. As detailed in the technical chapters, the following receptors may experience transboundary impacts from the WDA, Offshore ECC and OnTDA:
- **Chapter 10 Marine Mammals and Leatherback Turtle;**
 - **Chapter 11 Offshore Ornithology;**

¹ Following the exit of the UK from the EU in December 2020, the UK is no longer an EEA state. However, for the purposes of assessing potential transboundary effects, the approach outlined above has been followed for the Project.



- **Chapter 12 Commercial Fisheries;**
- **Chapter 13 Shipping and Navigation;**
- **Chapter 18 Socio-economics;**
- **Chapter 19 Greenhouse Gas Assessment;** and
- **Chapter 20 Climate Change Risk Assessment.**

93. Where applicable, consideration of transboundary effects follows the standard approach to EIA with regards to sensitivity, magnitude, and significance. The assessment is presented within each technical chapter of the EIAR where relevant.

5.10 OTHER ASSESSMENTS

5.10.1 Habitats Regulations Appraisal

94. Closely linked to the EIA process but subject to different regulatory tests is Habitats Regulations Appraisal (HRA), which is the process used to determine impacts on internationally important designated sites and species. While the HRA is often undertaken alongside the EIA process, these are two distinct requirements and the HRA does not form part of the WDA EIAR.

95. The Habitats Regulations require a HRA to be undertaken where a project could affect a designated site (Special Protection Area, Special Area of Conservation, proposed or candidate Special Protection Area and Special Area of Conservation or Ramsar site), either individually or in combination with other plans or projects, in view of the site's conservation objectives.

96. In accordance with the above-mentioned Habitats Regulations, the Applicant has submitted a **Report to Inform Appropriate Assessment** with the WDA application which will be used by the Marine Directorate on behalf of the Scottish Ministers to conduct an Appropriate Assessment during the determination period.

5.10.2 Nature Conservation Marine Protected Area Assessment

97. Nature Conservation Marine Protected Areas (ncMPAs) in Scotland are designated under the Marine (Scotland) Act 2010 within 12 nm, and Marine Protected Areas (MPA) under the Marine and Coastal Access Act 2009 in offshore waters between 12 nm to 200 nm. ncMPA/MPAs are designated to protect biodiversity and heritage, with specific focus on protected features (species, habitats, large scale features or geomorphological features).

98. Where a project may have a significant risk of hindering the achievement of an ncMPA/MPA's conservation objectives, an ncMPA/ Marine Protection Areas (MPA) assessment is required. A **Report to Inform MPA Assessment** has been submitted alongside this WDA EIAR.



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