Arklow Bank Wind Park 2

Environmental Impact Assessment Report

Volume II, Chapter 5: EIA Methodology (Revised March 2026)

sse Renewables

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1.0	08/05/2024	Final (External)	GoBe Consultants	GoBe Consultants	Sure Partners Limited
2.0	02/03/2026	Final (External)	GoBe Consultants	GoBe Consultants	Sure Partners Limited

Statement of Authority

Expert	Qualifications	Experience
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Dr Lauren Kirkland	BSc (Hons), PhD	Associate Director with a doctorate in shellfish ecology and commercial fisheries. She has 12 years' experience in the offshore wind sector and during this time, she has served as project manager and project director for offshore wind projects throughout the UK, managing environmental and consents requirements. Experience managing the pre-application, examination and post-application phases of both the offshore and onshore elements of large offshore wind farm projects.

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Glossary

Defined Term	Definition
Arklow Bank Wind Park 1 (ABWP1)	Arklow Bank Wind Park 1 consists of seven wind turbines, offshore export cable and inter-array cables. Arklow Bank Wind Park 1 has a capacity of 25.2 MW. Arklow Bank Wind Park 1 was constructed in 2003/04 and is owned and operated by Arklow Energy Limited. It remains the first and only operational offshore ~~windfarm~~wind farm in Ireland.
Arklow Bank Wind Park 2 – Offshore Infrastructure	"The Proposed Development", Arklow Bank Wind Park 2 Offshore Infrastructure: This includes all elements under the existing Maritime Area Consent.
Arklow Bank Wind Park 2 (ABWP2) (The Project)	Arklow Bank Wind Park 2 (ABWP2) (The Project) is the onshore and offshore infrastructure. This EIAR is being prepared for the Offshore Infrastructure. Consents for the Onshore Grid Infrastructure (Planning Reference 310090) and Operations Maintenance Facility (Planning Reference 211316) has been granted on 26th May 2022 and 20th July 2022, respectively. • Arklow Bank Wind Park 2 Offshore Infrastructure: This includes all elements to be consented in accordance with the Maritime Area Consent. This is the subject of this EIAR and will be referred to as 'the Proposed Development' in the EIAR. • Arklow Bank Wind Park 2 Onshore Grid Infrastructure: This relates to the onshore grid infrastructure for which planning permission has been granted. • Arklow Bank Wind Park 2 ~~Operations~~Operational and Maintenance Facility (OMF): This includes the onshore and nearshore infrastructure at the OMF, for which planning permission has been granted. • Arklow Bank Wind Park 2 EirGrid Upgrade Works: any non-contestable grid upgrade works, consent to be sought and works to be completed by EirGrid.
Array Area	The Array Area is the area within which the Wind Turbine Generators (WTGs), the Offshore Substation Platforms (OSPs), and associated cables (export, inter- array and interconnector cabling) and foundations will be installed.
Benthic ecology	Benthic ecology encompasses the study of the organisms living in and on the sea floor, the interactions between them and impacts on the surrounding environment.
Cable Corridor and Working Area	The Cable Corridor and Working Area is the area within which export, inter-array and interconnector cabling will be installed This area will also facilitate vessel jacking operations associated with installation of WTG structures and associated foundations within the Array Area.
Competent Authority (CA)	The authority designated as responsible for performing the duties arising from the EIA Directive as amended. For this application, the Competent Authority is An Bord Pleanála (ABP)~~.~~
Cumulative Impacts	'The addition of many minor or significant effects, including effects of other Projects, to create larger, more significant effects' (EPA, 2022).

Defined Term	Definition
Designated Landscape	Areas of landscape identified as being of importance at international, national or local levels, either defined by statute or identified in development plans.
Environmental Impact Assessment (EIA)	An Environmental Impact Assessment (EIA) is a statutory process by which certain planned projects must be assessed before a formal decision to proceed can be made. It involves the collection and consideration of environmental information, which fulfils the assessment requirements of the Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment as amended by Directive 2014/52/EU of the European Parliament and of the Council (EIA Directive).
EirGrid	State-owned electric power transmission system operator (TSO) in Ireland and Transmission Asset Owner (TAO) for the Project's transmission assets.
Foreshore	The bed and shore, below the line of high water of ordinary or medium tides, of the sea and of every tidal river and tidal estuary and of every channel, creek, and bay of the sea or of any such river or estuary including the subsoil below, and the water column above the bed and shore and extending to the 12 nautical mile limit.
Habitats Directive	Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora.
Indirect Impact	'Impacts on the environment, which are not a direct result of the Project, often produced away from (the site) or as a result of a complex pathway' (EPA, 2022).
Land Use	The use and management of the natural, semi-natural and built environment.
Landfall	The area in which the offshore export cables make landfall and is the transitional area between the offshore cabling and the onshore cabling.
Maritime Area Consent (MAC)	A consent to occupy a specific part of the maritime area on a non-exclusive basis for the purpose of carrying out a Permitted Maritime Usage strictly in accordance with the conditions attached to the MAC granted on 22nd December 2022 with reference number 2022-MAC-002.
Magnitude	Size, extent and duration of an impact.
Mitigation Measure	Measure which would avoid, reduce, or offset an impact.
Permitted Maritime Usage	The construction and operation of an offshore ~~windfarm~~wind farm and associated infrastructure (including decommissioning and other works required on foot of any permission for such offshore ~~windfarm~~wind farm).
Profound Impact	An impact which obliterates sensitive characteristics.
Sensitive Receptor	Physical or natural resource, special interest or viewer group that may experience an impact.
Sensitivity	Vulnerability of a sensitive receptor to change.

Defined Term	Definition
The Application	The full set of documents that will be submitted to An Bord Pleanála in support of the consent.
The Developer	Sure Partners Ltd.
Transboundary impact	An impact on the environment, the physical origin of which is situated wholly or in part within an area under the jurisdiction of another country.
Zone of Influence	Areas within which environmental impact may occur – to be defined for each receptor by technical specialists

Acronyms

Term	Meaning
~~AA~~	~~Appropriate Assessment~~
~~ABP~~	~~An Bord Pleanála~~
ABWP1	Arklow Bank Wind Park 1
ABWP2	Arklow Bank Wind Park 2
~~CEM~~ABP	~~Community Engagement Manager~~An Bord Pleanála
CFE	Controlled Flow Excavation
CIA	Cumulative Impact Assessment
CIEEM	Chartered Institute of Ecology and Environmental Management
CPS	Cable Protection System
DCCAE	Department of Communications, Climate Action and Environment
DHLGH	Department of Housing Local Government and Heritage
DMRB	Design Manual for Roads and Bridges
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
EU	European Union
HDPE	High Density Polyethylene
IPCC	Intergovernmental Panel on Climate Change
~~MAC~~IWEA	~~Maritime Consent Area~~Irish Wind Energy Agency
~~NIS~~MAC	~~Natural Impact Statement~~ Maritime Area Consent
~~NPWS~~NIS	~~National Parks and Wildlife Service~~Natura Impact Statement
OGI	Onshore Grid Infrastructure
OMF	~~Operations~~Operational and Maintenance Facility
OSP	Offshore Substation Platform

PINS	The Planning Inspectorate
PLGR	Pre-Lay Grapnel Run
RFI	Request For Information
SEAI	Sustainable Energy Authority of Ireland
SLVIA	Seascape Landscape and Visual Impact Assessment
TAO	Transmission Asset Owner
TSO	Transmission System Operator
UK	United Kingdom
UNECE	United Nations Economic Commission for Europe
WTG	Wind Turbine Generator

Units

Unit	Description
km	Kilometre
~~MW~~	~~Mega Watt~~

5 Environmental Impact Assessment Report Methodology

Summary of Changes

This Chapter has been updated to reflect changes since submission of the planning application to An Bord Pleanála (ABP) (now An Coimisiún Pleanála (ACP)) in June 2024. All references to ABP, should be considered ACP throughout the document.

The changes that have been made are in response to the Request for Information (RFI) that was received by the Developer and matters that have been raised therein. It is confirmed that the information in this Chapter is relevant and appropriate at the point of submission (i.e. March 2026).

In summary, the following amendments have been made to this Chapter (please note that this is non-exhaustive):

- This chapter have been adjusted to ensure consideration of the latest information as appropriate to ensure consistency and accuracy including Sections 5.3 and 5.9.
- Associated cross-references and paragraph numbering have been updated, as appropriate, to reflect the changes listed above.

5.1 Introduction

5.1.1.1 This Chapter of the Environmental Impact Assessment Report (EIAR) presents the methodology adopted in preparing this EIAR. This EIAR will be used to support the assessment of the potential impacts of the Arklow Bank Wind Park 2 (~~ABWP 2~~ABWP2) Offshore Infrastructure (hereafter referred to as 'the Proposed Development') on physical, biological and human environment receptors.

5.1.1.2 The EIAR has been prepared in accordance with the requirements of the Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment as amended by Directive 2014/52/EU of the European Parliament and of the Council (EIA Directive) and the regulations transposing the EIA Directive (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296 of 2018)) (EIA Regulations). Volume II, Chapter 2: Policy and Legislation (Revised March 2026) provides further information on the EIA legislative requirements.

5.1.1.3 This Chapter describes the principles of the EIA process and the approach that has been taken to identify and evaluate the likely impacts and assess the significance of effects associated with the Proposed Development as part of the preparation of this EIAR.

5.1.1.4 In particular, this EIAR Chapter:

- Presents the assessment methodology used to determine potential impacts on physical, biological and human environment receptors including the approach for assessing magnitude of impact, sensitivity of receptors and the significance of effect;
- Presents the methodology used for the Cumulative Impact Assessment (CIA); and
- Presents the methodology used for assessing interactions and transboundary effects.

5.1.1.5 Further details on topic-specific methodologies are provided in the relevant EIAR topic Chapters.

5.2 Regulatory background

5.2.1.1 The impact assessment methodology employed in this EIAR complies with legislation and guidance, including but not limited to:

- Council Directive 2011/92/EU of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment, as amended by Council Directive 2014/52/EU (the EIA Directive);
- European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. 296 of 2018);
- Maritime Area Planning Act 2021;
- Planning and Development Act 2000 (as amended);
- European Commission (2020) Notice C (2020) 7730 'Guidance document on wind energy developments and European Union (EU) nature legislation';
- Environmental Protection Agency (EPA) Guidelines including: Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA, 2022);
- Guidance on Environmental Impact Statement (EIS) and Natura Impact Statement (NIS) Preparation for Offshore Renewable Energy Projects (Department of Communications, Climate Action and Environment (DCCAE), 2017);
- Guidance on Marine Baseline Ecological Assessments and Monitoring Activities for Offshore Renewable Energy Projects (Part 1 and 2, DCCAE, 2018);
- Best-Practice Guidelines for the Irish Wind Energy ~~Industry~~Agency/Sustainable Energy Authority of Ireland (IWEA/SEAI, 2012);
- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (Department of Housing, Planning and Local Government, August 2018);
- Department of Housing, Planning and Local Government (2018) Circular PL 05/2018 - Transposition into Planning Law of Directive 2014/52/EU amending Directive 2011/92/EU on the effects of certain public and private projects on the environment (the EIA Directive) and Revised Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment;
- Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report, (European Commission, 2017);
- Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine (Chartered Institute of Ecology and Environmental Management (CIEEM), 2019);
- The Design Manual for Roads and Bridges (DMRB) Volume 11: Environmental Assessment (and updates) (Highways Agency *et al.*, 2008);
- UK Planning Inspectorate Advice Note Nine: Rochdale Envelope (PINS, 2018a); Advice Note Twelve: Transboundary Impacts and Process (PINS, 2018b); and Advice Note Seventeen: Cumulative Effects Assessment (PINS, 2019);
- A Review of Assessment Methodologies for Offshore ~~Windfarms~~Wind Farms (COWRIE METH-08-08) (Maclean *et al.*, 2009);
- Cumulative Impact Assessment Guidelines - Guiding Principles for Cumulative Impact Assessment in Offshore ~~Windfarms~~Wind Farms (RenewableUK, 2013); and
- Guidelines for data acquisition to support marine environmental assessments of offshore renewable energy projects (Cefas, 2012).

5.2.1.2 Where relevant topic-specific guidance and legislation exists, this is discussed within the relevant EIAR Chapters.

5.3 Scope of the EIAR

5.3.1.1 The content of the EIAR has been prepared in accordance with the provisions of the Directive 2014/52/EU (the EIA Directive) including but not limited to Article 5(1) and Annex IV.

5.3.1.2 Article 3 of the EIA Directive prescribes the range of environmental factors to be considered in an EIA:

5.3.1.3 "*The environmental impact assessment shall identify, describe and assess in an appropriate manner, in the light of each individual case, the direct and indirect significant effects of a project on the following factors:*

a) population and human health;
b) biodiversity, with particular attention to species and habitats protected under Directive 92/43/EEC and Directive 2009/147/EC;
c) land, soil, water, air and climate;
d) material assets, cultural heritage and the landscape;
e) the interaction between the factors referred to in points (a) to (d).
f) *The effects referred to in paragraph 1 on the factors set out therein shall include the expected effects deriving from the vulnerability of the project to risks of major accidents and/or disasters that are relevant to the project concerned".*

5.3.1.4 Taking into account the nature, size and location of the Proposed Development (see Volume II, Chapter 4: Description of Development (Revised March 2026)), the information provided from EIA scoping and other consultation responses, the topics outlined in Table 5.1 have been identified as requiring consideration within this EIAR.

5.3.1.5 The topics have been aligned to refer to the factors outlined by Article 3 (1 and 2) of the EIA Directive as well as having consideration to marine EIA topics outlined in the DCCAE 'Guidance on EIS and NIS Preparation for Offshore Renewable Energy Projects' (2017).

Table 5.1: Topics requiring consideration within the EIAR

EIA Directive – Environmental Factors	Where addressed in the EIAR
1(a): Population and human health	Volume II, Chapter 21: Population and Human Health (Revised March 2026)
1(b): Biodiversity, with particular attention to species and habitats protected under Directive 92/43/EEC and Directive 2009/147/EC	Volume II, Chapter 9: Benthic Subtidal and Intertidal Ecology (Revised March 2026) Volume II, Chapter 10: Fish, Shellfish and Sea Turtle Ecology (Revised March 2026) Volume II, Chapter 11: Marine Mammals (Revised March 2026) Volume II, Chapter 12: Offshore Ornithology (Revised March 2026) Volume II, Chapter 13: Offshore Bats (Revised March 2026)
1(c): land, soil, water, air and climate	Volume II, Chapter 6: Coastal Processes (Revised March 2026) Volume II, Chapter 8: Airborne Noise (Revised March 2026) Volume II, Chapter 7: Marine Water and Sediment Quality (Revised March 2026)

EIA Directive – Environmental Factors	Where addressed in the EIAR
	Volume II, Chapter 20: Air Quality and Climate (Revised March 2026)
1(d): material assets, cultural heritage and the landscape	Volume II, Chapter 14: Commercial Fisheries and Aquaculture (Revised March 2026) Volume II, Chapter 15: Shipping and Navigation (Revised March 2026) Volume II, Chapter 16: Civil and Military Aviation (Revised March 2026) Volume II, Chapter 17: Seascape Landscape and Visual Amenity (Revised March 2026) Volume II, Chapter 18: Marine Archaeology and Cultural Heritage (Revised March 2026) Volume II, Chapter 19: Infrastructure and Other Users (Revised March 2026)
1(e): the interaction between the factors referred to in points (a) to (d).	Volume II, Chapter 23: Interactions (Revised March 2026)
2: The effects referred to in paragraph 1 on the factors set out therein shall include the expected effects deriving from the vulnerability of the project to risks of major accidents and/or disasters that are relevant to the project concerned.	Volume II, Chapter 22: Major Accidents and Natural Disasters (Revised March 2026)

5.3.1.6 A number of impacts have been scoped out of the EIAR based on the baseline information that has been collected and the description of the development outlined in Volume II, Chapter 4: Description of Development (Revised March 2026). Impacts which have been scoped out are outlined in each of the topic Chapters.

5.4 EIA Methodology Consultation

5.4.1 EIA Scoping consultation

5.4.1.1 Over the course of the ~~ABWP2~~Proposed Development application to date, the Developer has actively engaged with numerous stakeholders. The Developer publicly consulted on the first EIAR Scoping Report in 2020. In July 2023 the Developer reissued a revised EIAR Scoping Report for public consultation.

5.4.1.2 Consultation on EIA methodology was undertaken with stakeholders at the EIA scoping stage (2020 and 2023). This included issuing the EIA Scoping Report with a request for feedback on the proposed content of the EIAR and on the proposed assessment methodologies.

5.4.1.3 A Consultation Report explaining how the Proposed Development has had regard to all consultation responses received during the EIA Scoping public consultation is presented in Volume III: Appendix 3.1: Consultation Report. The Consultation Report sets out the comments and feedback that has been received. Each Chapter of the EIAR describes how the comments raised during consultation have been taken into account.

5.5 Key principles of the assessment

5.5.1 Overview

5.5.1.1 The assessment of each topic (e.g. coastal processes, marine mammals, shipping and navigation etc.) forms a separate Chapter of this EIAR. For each topic Chapter, the following are included:

- Identification of the study area for the topic-specific assessments;
- Description of the planning policy and guidance context relevant to that topic;
- Summary of consultation activity carried out for the Proposed Development in relation to that topic, including comments received during the EIA scoping consultation;
- Description of the environmental baseline conditions including the ~~do nothing~~do-nothing scenario;
- Topic specific assessment methodology; and
- Presentation of the impact assessment, including:
  - Details of the two project design options that have been assessed including their respective parameters;
  - Demonstration that the EIAR Chapters have fully assessed both project design options (and any ranges between a limited number of parameters where these exist);
  - Description of the factored-in measures identified in Volume II, Chapter 4: Description of Development (Revised March 2026), relevant to the topic and which are committed to by the Developer and will be implemented in full;
  - Identification of likely impacts and assessment of the significance of identified effects for both project design options;
  - Identification of any further mitigation measures which will be required that are committed to by the Developer and will be implemented in full in respect of likely significant effects, together with consideration of any residual effects;
  - Identification of any future monitoring required;
  - Assessment of any cumulative effects arising from both project design options alongside other elements of the Project and other developments, including existing and approved projects (including, where applicable, those projects, plans or activities that are currently operational that were not operational when baseline data was collected or that have an ongoing effect) and insofar as is possible, proposed projects; and
  - Assessment of any transboundary effects (i.e. effects on other states); and
  - Summary of the predicted interactions between other EIAR topics.

5.5.2 Assessment Approach

5.5.2.1 The assessment approach is designed to fully assess both project design options and the range of parameters (where they exist on a limited basis, see section 5.5.2.5). For each topic, the assessment of potential impacts will be derived from the two discrete wind turbine generator (WTG) options, two Offshore Substation Platforms (OSPs) and associated cable options. A limit of deviation of up to 100 m will be applied for the WTGs, ~~OSP's~~OSPs and associated foundations. This is in order to adapt to site constraints during construction (e.g. ground conditions) and/or to avoid areas of sensitive habitat.

5.5.2.2 This approach ensures that a comprehensive assessment has been prepared and that the EIAR assessment methodology will enable consent (in the event that consent is granted) for either WTG option, two OSPs and associated cable options. The preferred option for the Proposed Development can then be confirmed, in accordance with condition of the permission post-consent during the project delivery phase.

5.5.2.3 Volume II, Chapter 4: Description of Development (Revised March 2026) describes the two discrete WTG options and three WTG models, one of which (subject to permission being granted) will be constructed, in addition to the two OSPs, cable options and details on construction, operational and maintenance and decommissioning methodologies. The overall ABWP2 Project includes the previously consented elements of the ~~ABWP2~~Proposed Development including the Onshore Grid Infrastructure (OGI) and the ~~Operations~~Operational and Maintenance Facility (OMF) and EirGrid Upgrade Works which will be assessed cumulatively with the Proposed Development in the relevant topic-specific assessments.

5.5.2.4 Where required, modelling has been used as a tool to support the assessment of both project design options. However, it is important to note that the purpose of modelling was not to model every possible permutation of ranges. Therefore, where a number of limited ranges exist (see section 5.5.2.5) a combination of qualitative and quantitative methods have been used to assess the potential effects.

5.5.2.5 The total lengths, burial depths and routing of inter array, export and interconnector cabling required will depend upon the final WTG and OSP locations (within the WTG and OSP limits of deviation) as well as site constraints such as wrecks, sensitive habitats and difficult ground conditions such as stiff clays and shallow rock.

5.5.2.6 It is important to note that the dimensions of some elements of the 'below water' project elements will vary due to the conditions at the time of construction. Flexibility is not being sought for these elements nor are they dictated by a particular design option or technology choice rather they will necessarily be variable due to the conditions encountered at the time of construction as a consequence of the dynamic nature of the seabed and maritime environment. These parameters include:

- Cable installation / seabed preparation techniques:
  - Backhoe Dredging / Grab or Clamshell Dredging;
  - Mass Flow Excavation / Water Injection Dredging;
  - Suction Hopper;
  - Pre-lay Plough;
  - Boulder clearance – picking;
  - Boulder clearance – ploughing;
  - ~~Pre-Lay~~Pre-Lay Grapnel Run (PLGR);
  - Jetting;
  - Ploughing;
  - Mechanical trenching;
  - Simultaneous lay and burial;
  - Controlled Flow Excavation (CFE);
  - Pre-trenching and post lay backfill (offshore export cable – landfall installation);
  - Cable protection: Cable Protection system (CPS) or Ducting; (polyurethane, steel, High Density Polyethylene (HDPE), cast iron or plastic), Concrete mattresses, Rock Installation; (berms or bags)
- Scour protection:
  - Concrete mattresses;
  - Rock;
  - Artificial fronds;
  - Rockbags;
  - Geotextile sane containers.
- WTG installation:

  - Piling; and
  - Drilling.

- Inter-array cable length (between 110 – 122 km);
- Export cable length (between 35-40 km);
- Interconnector cable length (between 25-28 km);
- WTG pile penetration depth (between 20-37 m);
- WTG pile diameter (between 7 m – 11 m);
- OSP pile penetration depth (between 20-45 m); and
- OSP pile diameter (between 7m – 14 m).

5.5.3 Factored-in measures

5.5.3.1 The Project design options set out in Volume II, Chapter 4: Description of Development (Revised March 2026) include a number of factored-in measures and management measures (or controls) which have been factored into the Proposed Development and are committed to be delivered by the Developer as part of the Proposed Development. These factored-in measures are standard measures applied to offshore wind development, including lighting and marking of the Proposed Development, use of 'soft-starts' for piling operations etc, to reduce the potential for impacts. Factored-in measures are presented in Volume II, Chapter 25: Summary of Factored in Measures, Mitigation and Monitoring. (Revised March 2026). These measures are integrated into the description of development and have therefore been considered in the assessments presented in each topic Chapter, where applicable. These measures are considered standard industry practice for this type of development. This approach is in line with EPA guidance which states that *'in an EIAR it may be useful to describe avoidance measures that have been integrated into the project proposal'* (EPA, 2022).

5.5.3.2 The factored-in measures include a commitment by the Developer to preparing a number of consent management plans. These consent management plans translate the commitments made in the EIAR into practical management plans relevant to the options to be constructed if consent is granted. At the planning application stage, the consent management plans are intended to capture the requirements of the EIAR to ensure that the associated measures are built into these plans, procedures and strategies from an early stage. These documents will continuously evolve and will be reviewed at regular intervals throughout the Proposed Development, including the operational and maintenance phase. However, the commitments made in the EIAR, and any associated conditions of consent or requirements agreed with the relevant authorities, will always form the basis of these documents. These consents management plans are set out in Volume II, Chapter 4: Description of Development (Revised March 2026).

5.6 Mitigation measures

5.6.1 Overview

5.6.1.1 Article 5(1) of the EIA Directive requires that "*a description of the features of the project and/or measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment*" should be included in the EIAR.

5.6.1.2 The iterative approach to the impact assessment process for the Proposed Development involves a feedback loop. A specific impact, and the significance of the resulting effect, is initially assessed and, if this is deemed to be a significant adverse effect in EIA terms, changes are made (where practicable) to relevant project parameters or design in order to avoid,

reduce or offset the magnitude of that impact. The assessment is then repeated, and the process continues, until:

- The effect has been reduced to a level that is not significant in EIA terms; or
- Having regard to other constraints, no further changes can be made to project design parameters in order to reduce the magnitude of impact (and hence significance of effect). In such cases, an overall effect that is still significant in EIA terms may be presented in the EIAR.

5.6.1.3 Volume II, Chapter: 25 Summary of Factored in Measures, Mitigation and Monitoring (Revised March 2026) provides a summary of the factored-in measures, mitigation and monitoring commitments detailed within the topic specific Chapters of the EIAR. The justification for each measure and mechanism for implementation ~~are~~is also specified for each of the commitments.

5.7 Identification of impacts and the assessment of significance of effects

5.7.1 Definitions of impact and effect

5.7.1.1 The Proposed Development has the potential to create a range of 'impacts' and 'effects' with regard to the physical, biological and human environment. For the purposes of the EIAR, 'impact' is used to define a change that is caused by an action. For example, the piling of turbine foundations (action) will result in increased levels of underwater noise (impact). Impacts can be defined as direct, indirect, secondary, cumulative and interactive. They can also be either positive or negative, although the relationship between them is not always straightforward. In addition, for certain impacts, the reversibility of an impact is relevant to its overall effect. An irreversible (permanent) impact may occur when recovery is not possible, or not possible within a reasonable timescale. In contrast, a reversible (temporary) impact is one where natural recovery is possible over a short time period, or where mitigation measures can be effective at reducing the impact.

5.7.1.2 The term 'effect' is used in the EIAR to express the consequence of an impact. Using the foundation piling example again, the piling of turbine foundations (action) results in increased levels of subsea noise (impact), with the potential to disturb marine mammals (effect). Definitions for each of these terms are provided in Table 5.2.

Table 5.2: Definitions of effect and direct, indirect, cumulative, interactive, neutral or negative impacts

Term	Definition
Effect	The term 'effect' is used in this assessment to express the consequence of an impact. For example, in the offshore environment the piling of turbine foundations (activity) results in increased levels of subsea noise (impact), with the potential to disturb marine mammals (effect).
Direct impact	Occurs as a straightforward consequence of activities undertaken in direct connection to the project (derived from Highways Agency *et al.*, 2008).
Indirect impact (also known as 'secondary' impacts (EPA, 2022)	"Impacts on the environment, which are not a direct result of the project, often produced away from the project site or because of a complex pathway" (EPA, 2022). Occurs as a consequence of a direct impact and may arise via a complex pathway and be experienced at a point in space or time that is removed from the direct impact (Highways Agency *et al.*, 2008).

Term	Definition
Cumulative impact	"The addition of many minor or significant effects, including effects of other projects, to create larger, more significant effects" (EPA, 2022). Impacts that result from incremental changes caused by other reasonably foreseeable actions alongside the project in question. This includes the impact of all other developments that were not present at the time of data collection (surveys etc.) (derived from Highways Agency *et al.*, 2008).
Interactions	"The interactions between impacts on different environmental factors" (EPA, 2022). Consideration of how the accumulation of, and inter-relationship between effects might affect the environment, economy or community as a whole (DECC, 2011).
Positive, neutral or negative effects	A positive effect is a "change which improves the quality of the environment"; a neutral effect is where there are "no effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error"; and a negative/adverse effect is "a change which reduces the quality of the environment" (EPA, 2022).

5.8 Defining magnitude of impact and sensitivity of the receptor

5.8.1 Magnitude of impact

5.8.1.1 For each of the impacts assessed in this EIAR, a magnitude has been assigned. In assigning magnitude, the spatial extent, duration, frequency and reversibility of the impact from the construction, operational and maintenance, or decommissioning phases of the Proposed Development have been considered, where applicable. Each of these terms is defined in Table 5.3 and is based on guidance from the EPA (2022), Highways Agency *et al.*, (2008) or CIEEM (2018).

Table 5.3: Definition of spatial extent, duration, frequency and reversibility when defining the magnitude of an impact

Term	Definition
Spatial extent of the impact	Geographical area over which the impact may occur under a suitable representative range of conditions (CIEEM, 2018).
Duration of the impact	The time over which an impact occurs. An impact may be described as short, medium or long-term*** and permanent or temporary (EPA, 2022).
Reversible/irreversible effect	Reversible effects are "effects that can be undone, for example through remediation or restoration" (EPA, 2022). Irreversible effects are "when the character, distinctiveness, diversity or reproductive capacity of an environment is permanently lost" (EPA, 2022).
Frequency of the impact	The number of times/how often an impact occurs across the relevant phase/lifetime of a project (EPA, 2022; Highways Agency *et al.*, 2008).

*Note: ***Topic-specific definitions for these categories are provided in each of the topic Chapters.*

5.8.1.2 The magnitude of the impact is defined within each topic Chapter according to the following scale:

- Negligible;
- Low;
- Medium; and
- High.

5.8.1.3 The general approach for defining each of these magnitude categories is set out in Table 5.4. The table describes both positive and negative magnitudes of change. These definitions have been adapted from Highways Agency *et al.*, (2008). Topic-specific definitions for each of these categories are provided in each of the topic Chapters. The design of these topic-specific scales draws upon relevant external policy, guidance, standards and other material, including specialist knowledge, which is relevant to that topic.

5.8.1.4 Scales of magnitude will be defined for each subject area within the EIAR that are relevant to the particular receptor being assessed. Design of such topic-specific scales will draw upon relevant external guidance and specialist knowledge relevant to each topic.

Table 5.4: Definition of terms relating to the magnitude of impacts

Magnitude of impact	Description (Highways Agency *et al*., 2008)
High	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements (negative).
	Large scale or major improvement of resource quality; extensive restoration or enhancement; major improvement of attribute quality (positive).
Medium	Loss of resource~~,~~ but not adversely affecting integrity of resource; partial loss of/damage to key characteristics, features or elements (negative).
	Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality (positive).
Low	Some measurable change in attributes, quality or vulnerability, minor loss of, or alteration to, one (maybe more) key characteristics, features or elements (negative).
	Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of adverse impact occurring (positive).
Negligible	Very minor loss or detrimental alteration to one or more characteristics, features or elements (negative).
	Very minor benefit to, or positive addition of one or more characteristics, features or elements (positive).

5.8.2 Sensitivity of the receptor

5.8.2.1 For the purpose of this EIAR, receptors are defined as the physical or biological resource or human user group that would be affected by the impacts of the Proposed Development. Identification of receptors was informed by available data and baseline studies that have been completed in the preparation of this EIAR.

5.8.2.2 Sensitivity refers to the potential of a receptor to be significantly affected (EPA, 2022). In defining the sensitivity for each receptor, the vulnerability, recoverability and value/importance of that resource or user group has been taken into consideration. Each of these terms is defined in Table 5.5 and is used on a basis appropriate to each topic Chapter. Where these considerations are not included in the assessment, the reason for this is explained within the relevant topic Chapter.

Table 5.5: Definition of terms relating to the sensitivity of receptors

Term	Definition
Vulnerability of the receptor	The degree to which a receptor is susceptible to injury, damage, or harm from an activity (Intergovernmental Panel on Climate Change (IPCC), 2007).
Recoverability of the receptor	The ability of a receptor to be able to return to a state close to that which existed before an activity or event caused damage (Tyler-Walters *et al*., 2018).

Term	Definition
Value/importance of the receptor	The importance of the receptor in terms of ecological, social/community and/or economic value (IEEM, 2010).

5.8.2.3 Sensitivity is defined within each topic Chapter according to the following scale:

- Negligible;
- Low;
- Medium; and
- High.

5.8.2.4 An example of the definitions for each of these categories is set out in Table 5.6. These definitions have been adapted from Highways Agency *et al.*, (2008). Topic-specific definitions for each of these categories are provided in each of the topic Chapters. The value of a receptor for each topic draws upon relevant designations, legislative context and external guidance and other material, including specialist knowledge, which is relevant to that topic.

Table 5.6: Definition of terms relating to the environmental value (sensitivity of the receptor)

Value (sensitivity of the receptor)	Description (Highways Agency *et al.,* 2008)
High	High importance and rarity, national and international scale and limited potential for substitution.
Medium	High or medium importance and rarity, regional scale, limited potential for substitution.
Low	Low or medium importance and rarity, local scale.
Negligible	Very low importance and rarity, local scale.

5.8.3 Evaluation of significance of effect

5.8.3.1 The overall significance of an effect is determined by correlating the magnitude of the impact alongside the sensitivity of the receptor. In order to ensure a consistent and transparent approach throughout the EIAR, a matrix approach has been adopted to guide topic-specific assessments. There is, however, scope for professional judgement, where deemed appropriate in the application of the matrix. Where the matrix offers a choice of significance levels, professional judgement is used to determine the assessment outcome. An example of the matrix used to inform the topic-specific methodologies in each topic Chapter is set out in Table 5.7. This matrix has been adapted from Figure 3.4 in the EPA guidelines (EPA, 2022).

Table 5.7: Significance of effect matrix

			Baseline Environment - Sensitivity			
			High	Medium	Low	Negligible
Description of Impact - Magnitude	Adverse Impact	High	Profound or Very Significant (significant)	Significant	Moderate*	Imperceptible
		Medium	Significant	Moderate*	Slight	Imperceptible
		Low	Moderate*	Slight	Slight	Imperceptible
	Neutral Impact	Negligible	Not Significant	Not Significant	Not Significant	Imperceptible
	Positive Impact	Low	Moderate*	Slight	Slight	Imperceptible
		Medium	Significant	Moderate*	Slight	Imperceptible
		High	Profound or Very Significant (significant)	Significant	Moderate*	Imperceptible

**Moderate levels of effect have the potential, subject to the assessor's professional judgement to be significant or not significant. Where the outcome of using the matrix results in a Moderate effect, suitable professional scrutiny has been applied to determine the final significance outcome with appropriate justification provided.*

5.8.3.2 By cross-referring the magnitude of impact with the sensitivity of the receptor, the degree of significance of an effect may be assigned for all potential impacts. The degree of significance may be one, or a range of, Imperceptible, Slight, Moderate, Significant, Profound or Very Significant. For the purpose of the EIAR, Moderate will be considered as Significant or Not Significant in EIA terms, subject to the assessor's professional judgement. Where the outcome of using the matrix results in a Moderate effect, suitable professional scrutiny has been applied to determine the final significance outcome with appropriate justification provided. For each topic Chapter, what is considered 'Significant' will be clearly defined.

5.8.3.3 In cases where a range is suggested for the significance of effect, there remains the possibility that this may span the significance threshold (Moderate or Profound / Very Significant). In such cases, the final significance is concluded based on the experts' professional judgment. In these instances, an explanation as to why the final significance has been concluded is set out.

5.8.3.4 The Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA, 2022) provide useful guidance on the typical classifications for significance of effect levels, although it recognises that more specific definitions will exist for some topics.

5.8.3.5 The definitions for the quality and significance of effect levels (EPA, 2022) are described as follows:

- Quality of effects:

  - Positive effects: A change which improves the quality of the environment (for example, by increasing species diversity, or improving the reproductive capacity of an ecosystem, or by removing nuisances or improving amenities);
  - Neutral Effects: No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error; and
  - Negative / Adverse Effects: A change which reduces the quality of the environment (for example, lessening species diversity or diminishing the reproductive capacity of an ecosystem, or damaging health or property or by causing nuisance).

- Degree of Significance:

  - Profound: An effect which obliterates sensitive characteristics;
  - Very significant: An effect which, by its character, magnitude, duration or intensity; significantly alters most of a sensitive aspect of the environment;
  - Significant: An effect which, by its character, magnitude, duration or intensity, alters a sensitive aspect of the environment;
  - Moderate: An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends;
  - Slight: An effect which causes noticeable changes in the character of the environment without affecting its sensitivities;
  - Not Significant: An effect which causes noticeable changes in the character of the environment but without significant consequences; and
  - Imperceptible: An effect capable of measurement but without significant consequences.

5.8.4 Further mitigation measures

5.8.4.1 As required, further mitigation measures have been outlined after the assessment of significance within the topic Chapters.

5.8.5 Residual effects

5.8.5.1 Residual effects are defined as the degree of environmental change that will occur after the proposed mitigation measures have taken effect (EPA, 2022). Following the identification of further mitigation measures as described above, the assessment re-evaluates the significance of effect utilising the methodology outlined above to determine the significance of the residual effect.

5.8.6 Competent experts

5.8.6.1 Article 5(3)(a) of the EIA Directive requires that "*the Developer shall ensure that the environmental impact assessment report is prepared by competent experts*" to ensure the completeness and quality of the EIAR. In this regard, the EIAR has been prepared by a team of competent technical experts who have the knowledge and understanding of best science to assess the potential impacts associated with the Proposed Development and where required develop mitigation measures (including monitoring where required). Information on the technical experts who have prepared this EIAR including their qualifications is set out via a statement of authority table at the beginning of each Chapter.

5.9 Cumulative Impact Assessment

5.9.1 Overview

5.9.1.1 The ~~Cumulative Impact Assessment (~~CIA~~)~~ has specifically considered whether any of the identified projects in the local or wider area have the potential to exacerbate (i.e. alter the significance of) effects associated with the Proposed Development.

5.9.1.2 The assessment of cumulative effects has considered likely significant effects that may arise during construction, operational and maintenance, and decommissioning of the Proposed Development. Cumulative effects were assessed to a level of detail commensurate with the information that was available at the time of assessment.

5.9.1.3 The CIA was undertaken using a ~~three-stage~~four-stage approach as illustrated in Figure 5.1Figure 5.1, in accordance with the PINS Nationally Significant Infrastructure Projects: Advice on Cumulative Effects Assessment (PINS, 2024). Volume III, Appendix 3.2 Cumulative Impact Assessment Screening (Revised March 2026) presents the methodology associated with Stages 1, 2~~ and~~, 3 and 4. The results of Stage ~~3~~4 are presented in each of the topic-specific EIAR chapters and summarised in Volume II, Chapter 24, Summary of Cumulative Effects (Revised March 2026).

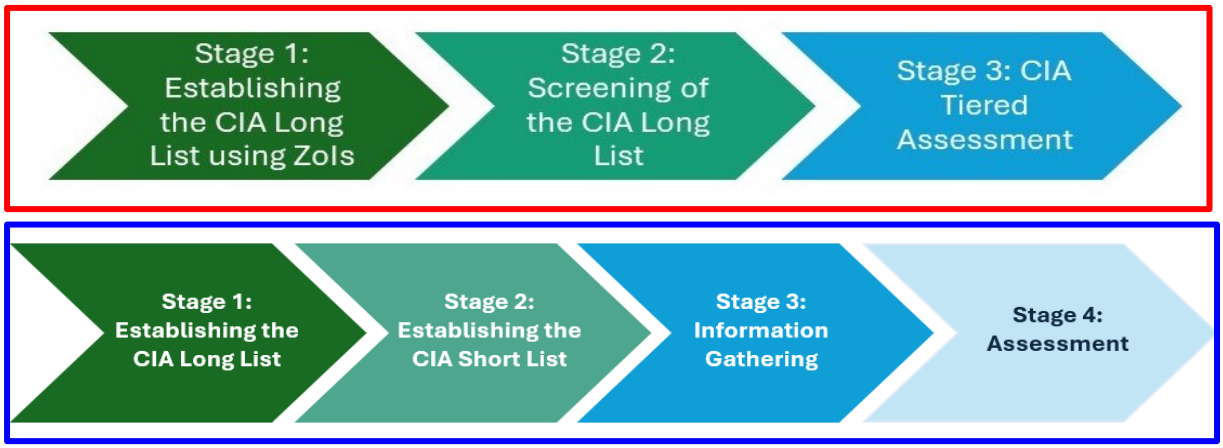

Figure 5.1: Cumulative Impact Assessment Methodology

5.10 Transboundary impact assessment methodology

5.10.1 Legislation and guidance

5.10.1.1 The need to consider transboundary impacts has been embodied by the United Nations Economic Commission for Europe (UNECE) 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 impacts. The Espoo Convention has been ratified by the European Union, Ireland and the United Kingdom (the UK ratified on behalf of the Bailiwick of Jersey, the Bailiwick of Guernsey, the Isle of Man and Gibraltar). It is aimed at preventing, mitigating and monitoring environmental damage by ensuring that explicit consideration is given to transboundary environmental factors before a final decision is made as to whether to approve a project. The Espoo Convention requires that the Party of origin notifies affected Parties about activities listed in Appendix I of the Convention (which includes 'major installations for the harnessing of wind power for energy production (~~windfarms~~wind farms)') and likely to cause a significant adverse transboundary impact.

5.10.1.2 Article 7 of the EIA Directive introduces similar requirements concerning projects carried out in one Member State but likely to have significant effects on the environment of another. The principal obligation is in respect of information and consultation and is imposed by Article 7(4) of the EIA Directive:

5.10.1.3 "*The Member States concerned shall enter into consultations regarding, inter alia, the potential transboundary effects of the project and the measures envisaged to reduce or eliminate such effects and shall agree on a reasonable timeframe for the duration of the consultation period*."

5.10.1.4 The EPA Guidelines (2022) also outline that, in the case of an EIAR, for any project that is likely to cause significant transboundary effects, contact with the relevant authorities in other Member States should be made. This will establish a consultation framework to consider and address these effects.

5.10.1.5 Potential transboundary effects are identified in each topic Chapter of the EIAR.

5.10.2 Methodology

Transboundary screening

5.10.2.1 The Developer has notified An Bord Pleanála (ABP) of the potential for transboundary impacts arising from the Proposed Development as part of the pre-application consultation. The identification and screening of transboundary impacts is presented in Volume III, Appendix 3.3: Transboundary Impacts Screening.

5.10.2.2 The Developer has also consulted directly with the relevant agencies in Northern Ireland, England, Wales and Scotland, the Isle of Man and France as part of the EIA scoping consultation process and their feedback is outlined in Volume III, Appendix 3.3: Transboundary Impacts Screening.

5.10.2.3 Transboundary screening has identified that the following receptors may experience transboundary impacts from the Proposed Development:

- Air quality and climate;
- Fish, shellfish and sea turtle ecology;
- Marine mammals;
- Offshore ornithology;
- Commercial fisheries;
- Shipping and navigation;
- Seascape, landscape and visual amenity; and
- Population and human health.

5.10.2.4 The assessment of transboundary effects for each receptor group is included in the relevant topic Chapters of the EIAR.

5.10.3 Transboundary consultation

5.10.3.1 Consultation on potential for transboundary impacts was undertaken as part of EIA scoping consultation, as described in Volume III, Appendix 3.3: Transboundary Impacts Screening.

5.10.3.2 A summary of the key points raised in relation to potential transboundary impacts is presented in Volume III, Appendix 3.3: Transboundary Impacts Screening.

5.11 Interactions

5.11.1 Legislation and guidance

5.11.1.1 Article 3(1) of the EIA Directive requires that the interaction between the environmental factors (population and human health, biodiversity, land, soil, water, air and climate, material assets, cultural heritage and the landscape) is identified, described and assessed in the EIAR.

5.11.1.2 The interactions assessment has been carried out with regard to the following guidelines:

- The Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions (EC, 1999);
- EPA Guidelines on the information to be contained in Environmental Impact Assessment Reports (2022); and
- Advice Note Seventeen: Cumulative Effects Assessment. Approach to Cumulative Impact Assessment methodology UK Planning Inspectorate (2019).

5.11.2 Methodology

5.11.2.1 The assessment of potential interactive effects has been carried out concurrently considering two levels of potential effect:

- Project lifetime effects: effects that occur throughout more than one phase of the Proposed Development (construction, operational and maintenance and decommissioning) interacting to potentially create a more significant effect upon a receptor than if just assessed in isolation in a single phase; and
- Receptor-led effects: effects that interact spatially and/or temporally resulting in interactive effects upon a single receptor. Receptor-led effects might be short term, temporary or transient effects, or incorporate longer term effects. For example, the effect on benthic ecology receptors may be greater when multiple sources of impact interact or combine to produce a different or greater effect upon this receptor than when single sources of impact are considered in isolation. Receptor-led effects might be short term, temporary or transient effects, or incorporate longer term effects.

5.11.2.2 The assessment of interactions within the EIAR has been undertaken with specific reference to the potential for such effects to arise in relation to key receptors or receptor groups. Chapter 23: Interactions provides a descriptive assessment outlining the potential for individual effects to combine, incorporating qualitative and, where reasonably possible, quantitative assessments, to potentially create additional effects that may be of greater significance than the individual effects acting in isolation.

5.11.2.3 The approach for assessing the potential interactive effects on each receptor or receptor group follows the key steps below:

- Review of the topic Chapters of the EIAR to identify receptors or receptor groups requiring assessment and the likely effects on each receptor or receptor group; and
- Assessment of how individual effects may combine to create interactive effects on each receptor or receptor group for project lifetime effects and receptor-led effects.

5.11.2.4 It is important to note that the interactions assessment considers only effects produced by the Proposed Development, and not those from other projects (which are considered within the CIA).

5.11.2.5 Further detail on the approach and methodology for the assessment of interactions is provided in Volume II, Chapter 23: Interactions.

5.12 References

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