Morven North Offshore Wind Array Project

Environmental Impact Assessment Report

Non-Technical Summary

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TTRPSEL	**Morven Offshore Wind Limited**

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1 Introduction

1.1 Context

1.1.1.1 Morven Offshore Wind Limited (MvOWL), a joint venture between JERA Nex bp Limited (JNBP) and EnBW Energie Baden-Württemberg AG (EnBW) (hereafter referred to as 'Applicant'), has been awarded a seabed option under the 2021/22 ScotWind Leasing Round for the Morven Option Lease Agreement Site (hereafter referred to as 'Morven Site'), located within the Plan Option (PO) Area E1, which was identified in the Scottish Government's Sectoral Marine Plan for Offshore Wind Energy (the Sectoral Marine Plan (SMP)) (Scottish Government, 2020a).

1.1.1.2 The Applicant submitted the Environmental Impact Assessment (EIA) Scoping Report for the Morven Option Lease Agreement Site (hereafter, 'the Morven Site Scoping Report') to the Marine Directorate – Licensing and Operations Team (MD-LOT) in July 2023, requesting a formal Scoping Opinion from Scottish Ministers (MD-LOT, 2023). Following this, the Applicant received the Morven Site Scoping Opinion from Scottish Ministers in November 2023 (MvOWL, 2023). Since, the Applicant has continued to develop and evolve the Morven Site and made the decision to split the site into two distinct projects, the Morven North Offshore Wind Array Project (hereafter referred to as 'Morven North') and the Morven South Offshore Wind Array Project (hereafter referred to as 'Morven South'), (Figure 1.1).

1.1.1.3 The Morven Site will be progressed as two separate developments: Morven North and Morven South. This separation is primarily driven by the identification of two distinct grid connection Points of Connection (POC), Branxton in East Lothian and Hawthorn Pit in County Durham. This EIA Report has been developed for Morven North only.

1.1.1.4 Morven North is a proposed fixed foundation Offshore Wind Farm located approximately 61km from the Aberdeenshire coast with the boundary covering an area of 511.1km^2 Morven North includes the required infrastructure to generate electricity and consists of wind turbines and their fixed bottom foundations, Offshore Substation Platform (OSPs), cable protection, inter-array and interconnector cables and scour protection.

1.1.1.5 To align with the respective grid connection arrangements, the Morven Hawthorn Pit Grid Connection Project (hereafter referred to as 'MHPGC Project') in County Durham will be consented through a marine licence and a Development Consent Order, while the Morven Branxton Area Grid Connection Project (hereafter referred to as 'MBAGC Project') in East Lothian will proceed via both marine licence and planning application (under the Town and Country Planning (Scotland) Act 1997 for the onshore works) with a separate EIA Report to be produced for each application. The Applicant is seeking consent for the offshore generation and grid connection projects as part of separate consent applications, which together comprise the Morven Programme (Morven North being one of the applications).The Morven Programme is discussed in Section 4.2.5 and an overview of consents, licences and permissions the Applicant will seek for Morven North, is discussed in Section 2.1.7.

1.1.2 The Applicant

1.1.2.1 The Applicant, whom the Morven North EIA Report has been developed on behalf of, is a 50:50 joint venture between JNBP and EnBW.

1.1.2.2 EnBW is one of the largest energy supply companies in Germany and Europe, with aims of 80% of its electricity generating portfolio to consist of renewable energies by 2030.

1.1.2.3 JNBP is a purpose-built offshore wind company committed to unlocking the power of offshore wind by developing high-quality, competitive projects. A 50:50 joint venture between JERA Co. and bp, JERA Nex bp is an end-to-end developer, owner and operator with more than fifteen years of experience in operating offshore wind projects.

1.1.3 The need for Morven North

1.1.3.1 Scotland and the wider UK are working towards ambitious climate-targets, including legally binding commitments to reach net zero greenhouse gas emissions by 2045 in Scotland and 2050 across the UK. Renewable electricity is one of the main steps towards achieving this goal, building up the capacity of clean energy to replace fossil fuels and make the shift to the electrification of transport, heating and energy uses, and to increase energy security via UK-based sources. This has been reinforced through the Scottish Government's updated Offshore Wind Policy Statement (Scotland's Offshore Wind Ambition (Scottish Government, 2026)) which raises Scotland's ambition to deliver up to 40GW of offshore wind capacity by 2040 and the Clean Power 2030 Action Plan, which establishes the UK Government's Clean Power target to make the electricity system clean by 2030 and keep it clean thereafter (Department for Energy Security and Net Zero, 2024).

1.1.3.2 Offshore wind is central to achieving this transition and national planning and energy strategies identify the need for significant new offshore wind capacity to help deliver a low-carbon, secure and affordable energy system. By providing large-scale, secure and renewable electricity, Morven North support the Scottish Government commitment to up to 40GW of new offshore wind capacity by 2040. Further, once operational, Morven North would support delivery of the UK Government's Clean Power target.

1.1.3.3 Additionally, Morven North will also support the Scottish Government's ambitions for economic growth through the offshore wind sector, including opportunities for supply-chain investment, local employment, community benefit and wider industry development.

1.1.3.4 Alongside climate commitments and economic aims, the Clean Power 2030 Action Plan highlights that recent instability in global energy markets has shown that relying on imported fossil fuels can make energy prices and supply more vulnerable to geopolitical tensions. Expanding offshore wind helps reduce this reliance by generating more domestic, low-carbon power. This supports a more stable and secure energy system (Department for Energy Security and Net Zero, 2024).

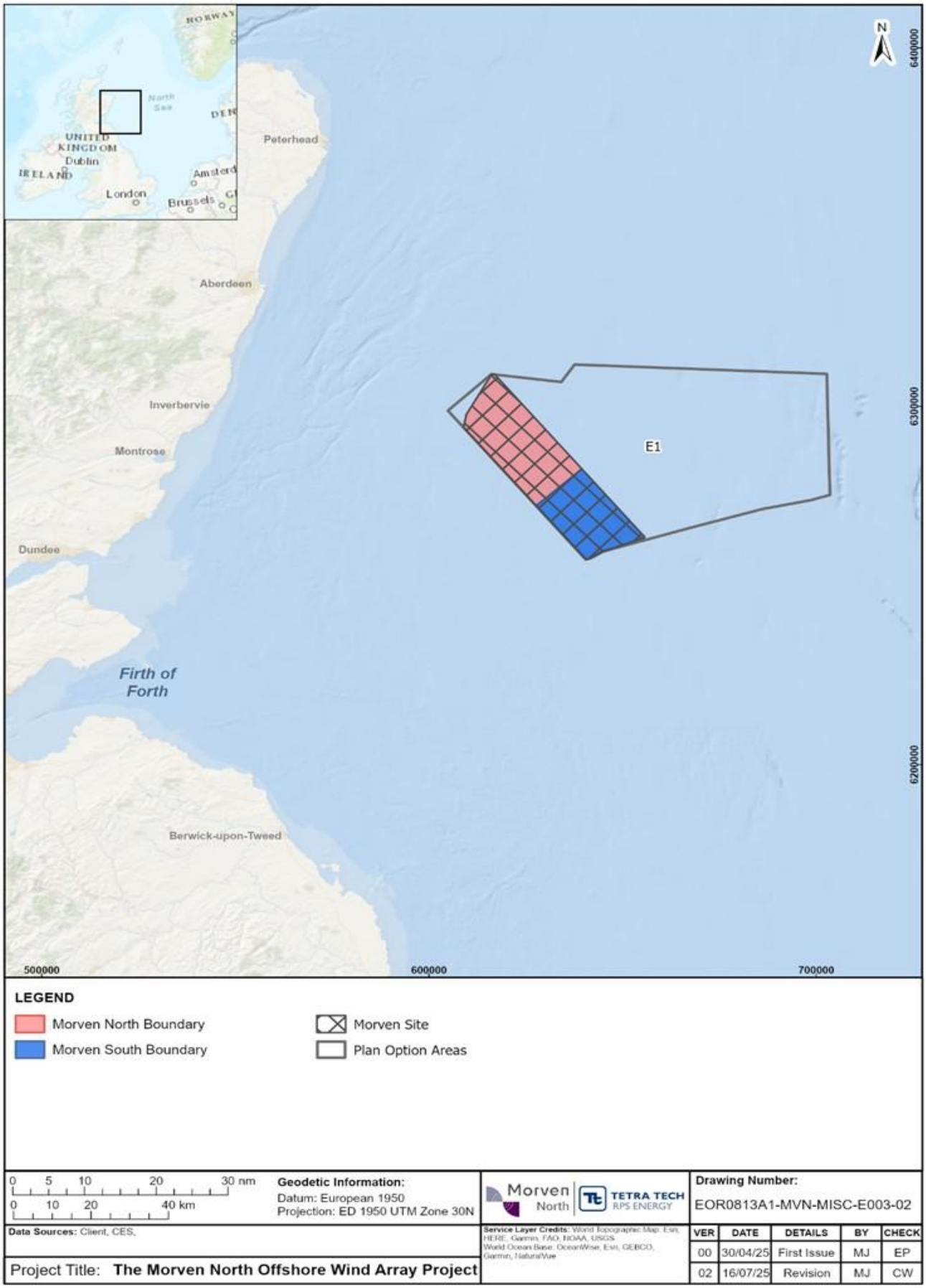

Figure 1.1: Location of the Morven North and Morven South Boundaries within the E1 Plan Option Area

1.2 The purpose of this Non-Technical Summary

1.2.1.1 This document is a Non-Technical Summary (NTS) of the Morven North EIA Report, which outlines the notable environmental information which has been obtained and assessed as to carry out the assessment of Likely Significant Effects (LSE[1]) (as defined by the EIA Regulations) that may occur from the construction, operations and maintenance (O&M) and decommissioning phases of Morven North.

1.2.1.2 The NTS has been developed as a standalone document from individual chapters and annexes (Volumes 1 to 4) and provides an overview of the environmental information discussed in the EIA Report, relevant to Morven North, in a non-technical language. For more detailed information, please see the full EIA Report (Volumes 1 to 4).

1.2.2 The purpose of an Environmental Impact Assessment Report

1.2.2.1 The Morven North EIA Report describes the Morven North Offshore Wind Array Project and presents the environmental information used to assess its LSE[1] on the surrounding and receiving environment.

1.2.2.2 Specifically, the report does the following:

- provides technical information to support statutory and non-statutory consultees in understanding Morven North;
- provides evidence for site selection and outlines the reasonable alternatives considered for Morven North;
- sets out the current environmental baseline information, informed by desktop studies, site specific surveys, consultation or all;
- explains the EIA methodology applied in the assessments;
- identifies potential environmental impacts of Morven North, considering baseline conditions, collected data and the analysis undertaken as part of the EIA process;
- assesses LSE[1] and considers appropriate mitigation measures;
- states the level of confidence in the data used, highlighting any limitations, gaps or shortfalls;
- details embedded mitigation measures designed to avoid, prevent, reduce or, where possible, offset significant adverse effects and, where relevant, proposes monitoring arrangements to validate findings. Where secondary mitigation is identified, the residual significance of effects is also presented.

1.2.2.3 The Morven North EIA Report is divided into four volumes:

- Volume 1 – Morven North EIA: Introductory Chapters;
- Volume 2 – Morven North EIA Report: Topic Assessment Chapters;
- Volume 3 – EIA Report Annexes;
- Volume 4 – Management and Mitigation Plans.

1.2.2.4 The scope of topics considered in the Morven North EIA Report based on the Morven Site Scoping Opinion is outlined in Section 6 and discussed in Section 7.

1.2.2.5 Throughout the preparation of the Morven North EIA Report, the Applicant has carried out extensive consultation with both statutory and non-statutory stakeholders and engaged the public in October 2025 through a Public Information Day at Stonehaven Town Hall, accompanied by a virtual consultation event. Consultation that has been carried out relating to the topics is included within the relevant chapter (see Volume 2, Chapters 7 to 21). A summary of the overall consultation process is presented in Section 5.

2 Policy and legislation

2.1 Context

2.1.1.1 The following section lists and summarises the policy and legislation outlined in Volume 1, Chapter 2: Policy and Legislation, of the North EIA Report, which discusses the relevant policy and legislative context for Morven North.

2.1.2 International commitments

- Paris Agreement (2016) – Commits countries, including the UK, to limit global temperature rise to well below 2°C and pursue efforts to limit warming to 1.5°C.
- COP28 Renewable Energy Pledge (2023) – The UK joined 133 nations in committing to triple global renewable energy capacity by 2030, supported by faster permitting, grid upgrades and cleaner technologies.
- Climate Change Act 2008 – Sets legally binding UK-wide emissions reduction targets aligned with these international commitments.

2.1.3 European policy and legislation (including European Union Exit)

- European Union (Withdrawal) Act 2018 – Retains EU-derived environmental law in UK legislation unless formally replaced.
- Continuity (Scotland) Act 2021 – Allows Scotland to keep environmental policy aligned with relevant EU standards where appropriate (Scottish Government, 2022a).

2.1.4 UK policy and legislation

2.1.4.1 The following UK legislation and policy informs the Morven North EIA Report:

- UK Offshore Wind Sector Deal (2019): Commits the offshore wind sector to increasing UK-based supply chain content to 60% by 2030, while providing greater clarity on future Contracts for Difference (CfD) rounds.
- British Energy Security Strategy (2022): Sets ambition for 50GW of offshore wind by 2030, with measures to speed up development and deployment.
- Offshore Wind Net Zero Investment Roadmap (2023): Reinforces 50GW target and focuses on streamlining planning, supporting sustainability and building enabling infrastructure.
- Powering Up Britain Policy Papers (2023): Includes Energy Security Plan and Net Zero Growth Plan; highlights offshore wind as central to energy security and net zero.
- Clean Power 2030 Action Plan (2024): Aims for a sustainable, resilient energy system by 2030, setting out capacity ranges for offshore wind of 43GW to 50GW by 2030.

2.1.5 Scottish policy and legislation

2.1.5.1 The following Scottish legislation and policy informs the Morven North EIA Report:

- The Climate Change (Scotland) Act 2009 and Climate Change (Emissions Reduction Targets) (Scotland) Act 2019: Introduces legally binding targets to commit Scotland to net-zero emissions by 2045.
- Scottish Energy Strategy: The Future of Energy in Scotland (2017): Target for 50% of heat, transport and electricity demand to come from renewables by 2030.
- Offshore Wind Policy Statement (OWPS) (Scottish Government, 2020b): Details expectations for offshore wind development and its role in meeting Scotland's emissions reduction targets under the Climate Change Acts.
- Energy Strategy and Just Transition Plan (Draft, 2023): Outlines actions to 2030 and vision for a climate-friendly energy system by 2045; final version expected late 2024.

- UK Industrial Strategy & Clean Energy Industries Sector Plan (2025): Sets a long-term framework to grow future industries, identifying clean energy as a key sector with an ambition to double annual investment to over £30 billion by 2035.
- Scotland's Offshore Wind Ambition (2026): Provides an update to the 2020 OWPS listed above and sets an increased national ambition of up to 40GW of new offshore wind capacity by 2040. It also reaffirms commitment to delivering the ScotWind and INTOG pipeline and commits to further actions to maximise the economic and supply-chain potential of Scotland's offshore wind sector.

2.1.6 Scottish marine planning policy

- Scottish National Marine Plan (NMP) 2015: sets out strategic policies for the sustainable development of Scotland's marine resources, covering both territorial and offshore waters (Marine Scotland,2022).
- SMP for Offshore Wind Energy (Scottish Government, 2020a): Provides a strategy to guide the use of Scottish marine space for renewable energy development.
- The Draft Updated Sectoral Marine Plan for Offshore Wind Energy (SMP-OWE): Proposes the revised spatial guidance for future offshore wind development and expects to finalise and adopt the updated SMP-OWE in 2026.
- National Planning Framework 4 (NPF4) (2023): Adopted in February 2023 as Scotland's national spatial strategy, setting out spatial principles, national developments and planning policy to support a net-zero Scotland by 2045.

2.1.7 Morven North specific consenting requirements

2.1.7.1 The below is a summary of the processes and legislation required for the development and implementation of Morven North:

- Section 36 Consent (Electricity Act 1989)
  - This is required for generating stations over 50MW in generating capacity, located in Scottish offshore waters (12nm to 200nm).
  - Morven North exceeds this threshold and therefore requires Section 36 consent.
- Marine Licensing (Marine and Coastal Access Act 2009)
  - The MCAA 2009 applies to all UK offshore waters out to 200nm, except Scottish Territorial Seas which are covered by the Marine (Scotland) Act 2010.
  - A marine licence is required for offshore construction, seabed works and infrastructure such as turbines, foundations, cables and OSPs (under the MCAA 2009). Scottish Ministers issue licences with advice from MD-LOT.

2.1.8 Environmental Impact Assessment Regulations

2.1.8.1 Together, the Electricity Works (EIA) (Scotland) Regulations 2017 (for Section 36 consent) and Marine Works (EIA) Regulations 2007 (for marine licence application) are referred to as the EIA Regulations.

2.1.8.2 Under the EIA Regulations, an EIA Report must be prepared and submitted to support applications for Section 36 consent and a marine licence (paragraph 2.1.7.1) for offshore renewable energy developments where the proposed activities are likely to have significant effects on the environment due to their nature, size or location.

2.1.8.3 Morven North meets these criteria; the EIA has been prepared to fulfil the requirements for both Section 36 consent and marine licensing. to ensure that the LSE[1] of a project on the environment are properly identified, assessed and taken into account before determining the application for consent.

2.1.9 The Energy Act 2004 (as amended)

2.1.9.1 The Energy Act 2004 sets out how offshore renewable energy installations are managed, including rules on safety zones and decommissioning. The power for these functions in Scottish waters were transferred to Scottish Ministers by the UK Government.

Safety Zones

2.1.9.2 Under the Energy Act 2004, Scottish Ministers may establish Safety Zones around areas of renewable energy installations to ensure safety. These zones restrict vessels within and around these zones for certain lengths of time.

Decommissioning

2.1.9.3 The Energy Act sets out statutory requirements for the decommissioning of operational Offshore Renewable Energy Installations and their associated electricity lines. Developers must submit priced decommissioning programmes, at the stage of applying for consent and full programmes at least six months before the construction, for approval by Scottish Ministers.

3 Project Description

3.1.1.1 The below section provides an overview of Morven North's infrastructure and the activities associated with its construction, O&M and decommissioning phases.

3.1.1.2 The Applicant has followed the Project Design Envelope (PDE) approach, meaning that within topic-specific assessments, the parameters for North's design, represent the Maximum Design Scenario (MDS) (i.e. the design which may have the potential biggest environmental effects in order to assess the LSE[1] of Morven North, while retaining flexibility in the project design).

3.2 Overview of the Morven North infrastructure and design

3.2.1.1 The main infrastructure associated with Morven North includes the following:

- up to 96 wind turbines (each comprising a tower section, nacelle, hub and three rotor blades) and associated support structures and foundations (Figure 3.2);
- up to five OSPs and associated support structures and foundations, including:
  - up to four High Voltage Alternating Current (HVAC) collector substation platforms;
  - up to one HVDC convertor substation (this could be a single platform or two platforms linked by a bridge);
- scour protection for wind turbine and OSP foundations;
- a network of inter-array cabling linking the individual wind turbines to each other and to the OSPs, plus interconnector cables connecting OSPs to each other (approximately 424km of inter-array cabling and 484km of interconnector cabling).

3.2.1.2 Figure 3.1 shows the indicative project overview.

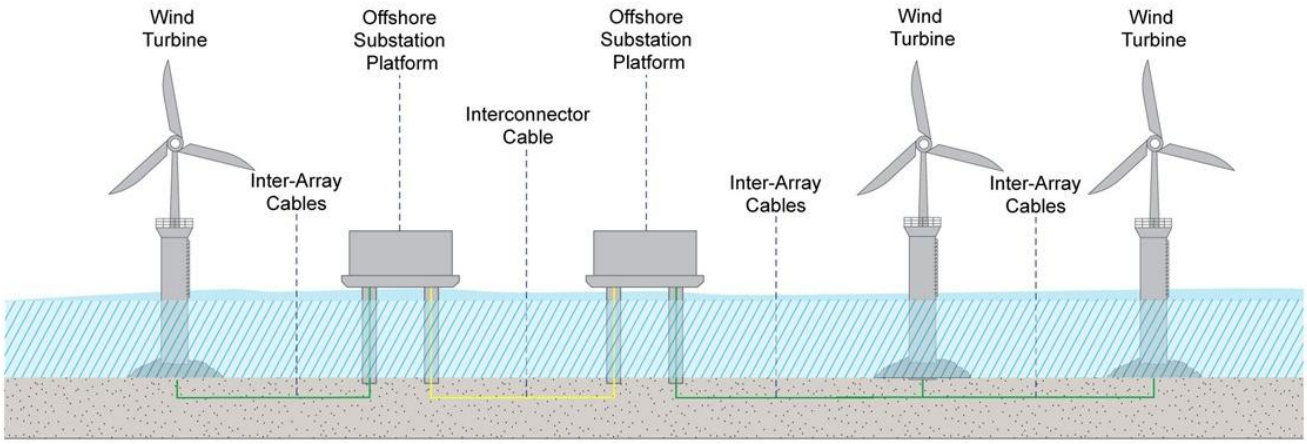

Figure 3.1: An overview of the Morven North infrastructure

3.2.1.3 The wind turbines will follow the traditional wind turbine design (Figure 3.2). The maximum blade tip height is expected to be no greater than 363 metres (m) above Lowest Astronomical Tide (LAT)), with a maximum rotor diameter of 320m and a minimum blade tip clearance (m above LAT) of 34m. The Morven North layout will be designed to best use the available wind resources and suitable seabed conditions, while reducing environmental effects and potential impacts on other marine

users. The final layout will be confirmed following detailed design (post-consent) in consultation with relevant stakeholders and submitted to MD-LOT for approval.

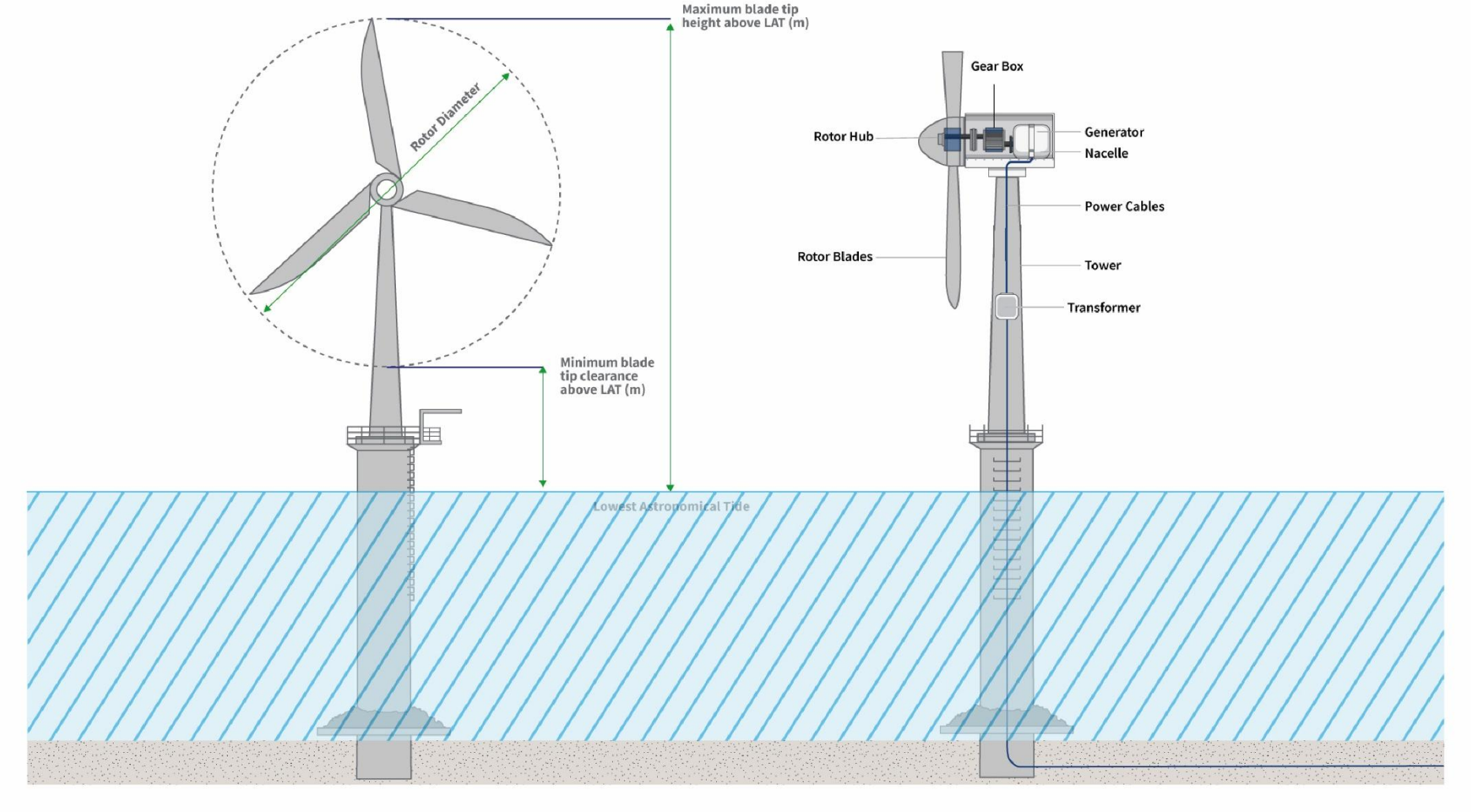

Figure 3.2: Traditional wind turbine design and components

3.2.2 Offshore Substation Platform topsides

3.2.2.1 The OSPs will convert electricity generated by the wind turbines to a higher voltage, direct current or both, for efficient transmission to shore or an offshore grid network. This ensures power can be transmitted efficiently to shore or integrated into a wider offshore grid network.

3.2.2.2 The maximum design parameters for OSPs considered for Morven North is the following:

- OSP Option 1: up to five OSPs, comprising:
  - up to four HVAC collector substation platforms;
  - up to one HVDC convertor substation.
- OSP Option 2: up to five OSPs, comprising:
  - up to four HVAC collector substation platforms;
  - up to one bridge-linked HVDC converter substation, which consists of two HVDC converter substation platforms (including foundations) linked via a steel bridge to accommodate cabling between the platforms (Figure 3.5). [1]

3.2.2.3 The exact locations of the OSPs will be determined following the detailed design phase ahead of construction.

3.2.3 Foundations and support structures

3.2.3.1 The wind turbines and OSPs will be attached to the seabed by foundation structures. With only preliminary geophysical and geotechnical surveys undertaken at this point, the Applicant requires the ability to have a range of choices in foundation to accommodate unexpected seafloor conditions within the Morven North Boundary.

3.2.3.2 To allow for flexibility in final foundation design, four foundation types have been considered for Morven North, of which three are proposed for both wind turbines and OSPs and one is considered for OSPs only.

3.2.3.3 The foundation type will be selected during detailed design and following detailed pre-construction site investigation surveys. This section provides an overview of the different foundation types for both wind turbines and OSPs. Figure 3.3 and Figure 3.4 provide a visual overview of the different types of foundation options for OSPs and wind turbines:

- Foundation Option 1: monopile foundations (wind turbine and HVAC OSPs):
  - Monopile foundations consist of a single steel tubular section with or without a Transition Piece (TP).
- Foundation Option 2: piled jacket foundations (wind turbines and HVAC/HVDC OSPs):
  - Piled jacket foundations are strong steel frameworks that support wind turbines or offshore platforms. They are fixed to the seabed using long steel piles, which are narrower than monopiles. For wind turbines, foundations will have three or four legs per jacket; for OSPs, up to six legs per jacket.
- Foundation Option 3: suction bucket jacket foundations (wind turbines and HVAC/HVDC OSPs):

[1] For the purposes of assessment in the Morven North and Morven South EIA Reports, the bridge-linked HVDC OSP has been treated as a single structure. Only one bridge-linked HVDC OSP will be required across the two projects: if it is included within the Morven North design, it will not be required for Morven South, and vice versa.

- Jacket foundations with suction buckets are steel lattice structures composed of tubular steel members and welded joints. They are secured to the seabed using suction buckets positioned beneath each leg of the jacket. Like piled jacket foundations, wind turbine foundations will have three or four legs per jacket; for OSPs, up to six legs per jacket.

- Foundation Option 4: gravity base foundations (HVAC/HVDC OSPs):
  - Gravity base foundations are typically constructed from concrete with steel reinforcement or entirely from steel. Gravity base foundations may be ballast-weighted (additional heavy material to increase weight and prevent movement).

3.2.3.4 Prior to installation, the seabed is dredged and prepared with bedding material (e.g. crushed rock) to stabilise the foundation. Excavated material will be disposed of on the seabed within the Morven North Boundary.

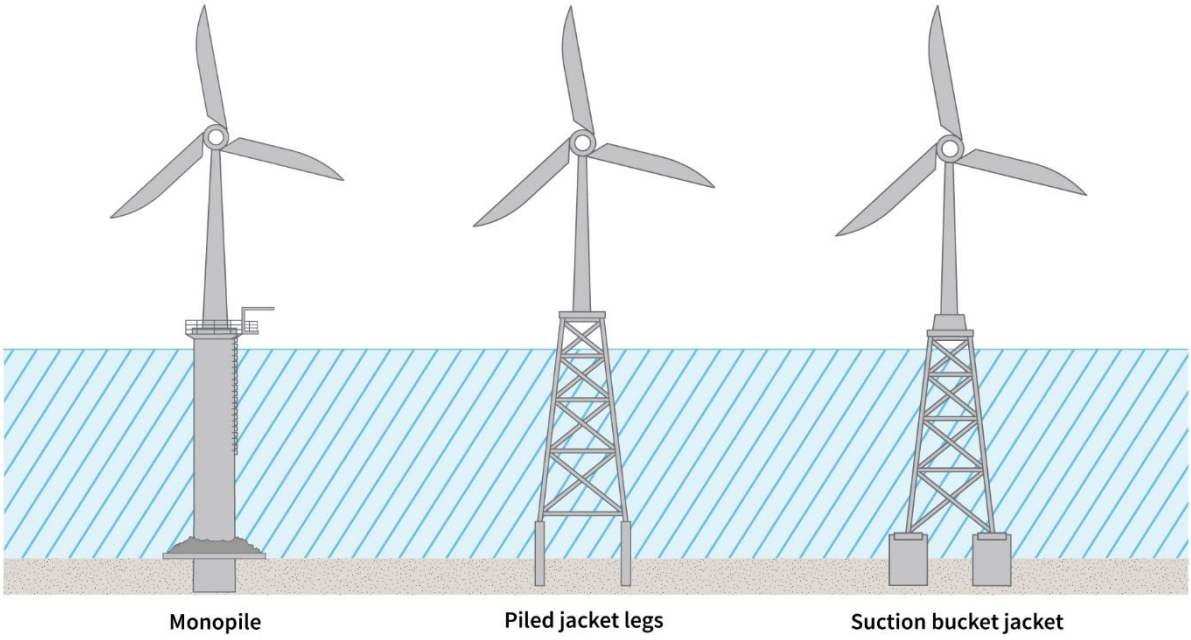

Figure 3.3: Illustration of the different foundation options considered for the Morven North wind turbine design (not to scale)

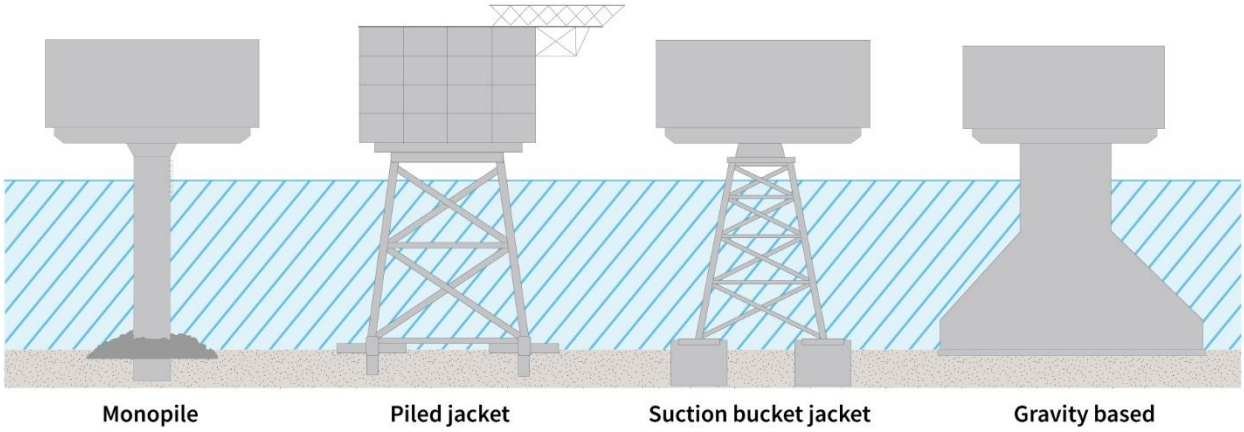

Figure 3.4: Illustration of the different foundation options considered for the Morven North Offshore Substation Platform design[2] (not to scale)

[2] The gravity based foundation depicted in Figure 3.4 shows the configuration of the gravity based foundation to be considered for HVAC OSPs only. HVDC OSPs may employ a gravity based foundation with a different configuration, operating on the same principle as described in paragraph 3.2.3.3. This figure is therefore illustrative and not exhaustive.

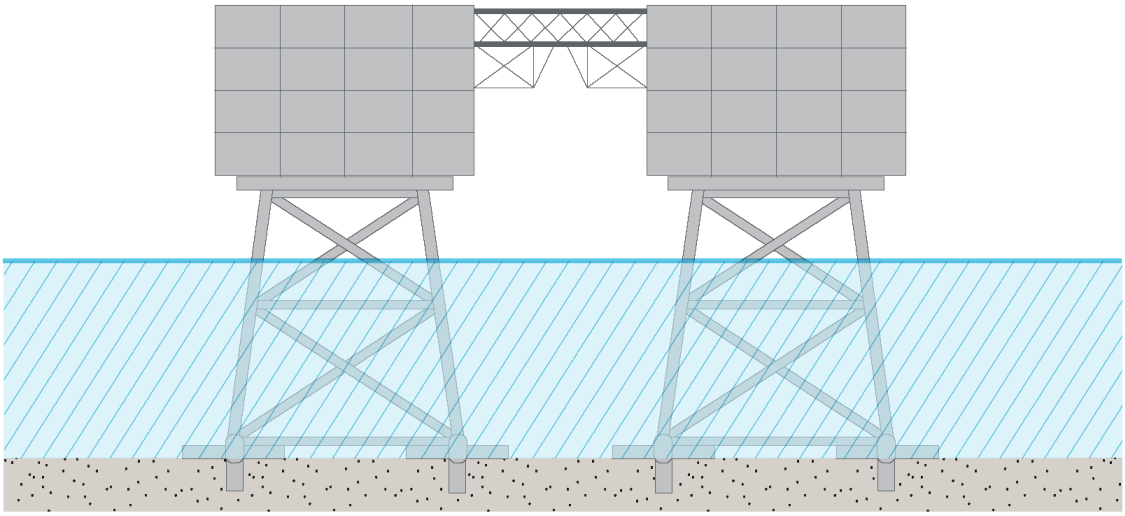

Figure 3.5: Illustration of typical Offshore Substation Platforms on piled jacket foundations connected by a bridge link (referred to as a bridge linked High Voltage Direct Current Offshore Substation Platform) (singular structure) (not to scale)

3.2.4 Scour protection for foundations

3.2.4.1 When foundations for wind turbines and OSPs are placed on the seabed, water movement and sediment shifts can cause erosion, creating holes called scour pits. To prevent this, scour protection is installed around the foundations. Common methods include placing concrete mattresses, layers of rock, pre-filled rock bags, or frond mats that trap sediment. The type and amount of protection will depend on the foundation design, seabed conditions, water depth and site specific factors such as waves and currents. Final decisions will be made once detailed design and environmental data are confirmed.

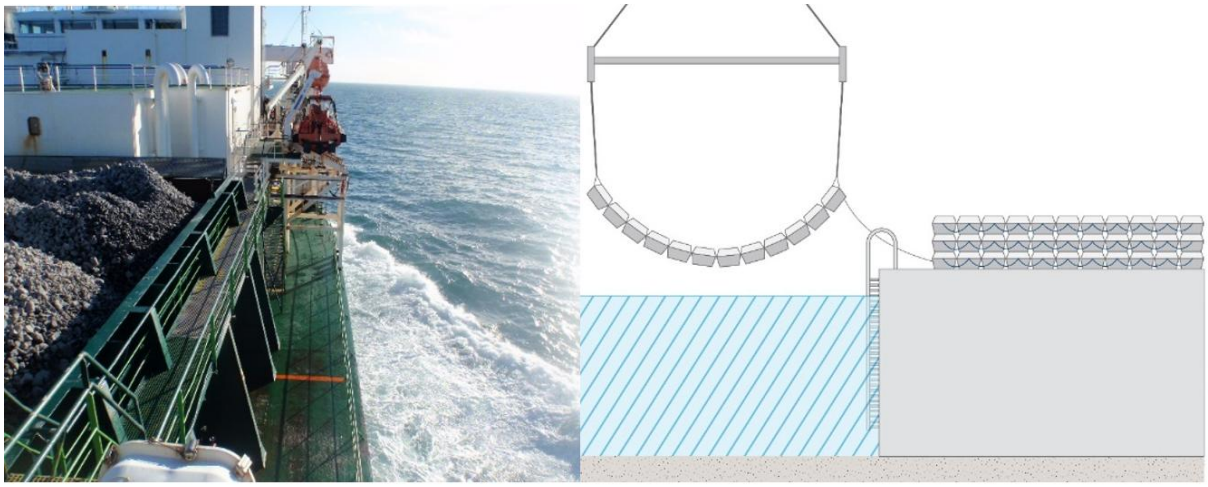

Figure 3.6: Illustrative scour protection types (Left: delivery of rock to EnBW's Hohe See Offshore Wind Farm; Right: concrete mattresses)

3.2.5 Subsea cables

Inter-array cables

3.2.5.1 Inter-array cables will carry electrical current produced by the wind turbines to the OSPs. Several wind turbines are typically grouped on the same cable 'string' to connect the wind turbines to an OSP, with multiple cable 'strings' connecting back to each OSP.

3.2.5.2 Up to 424km of 132kV cables will be used for Morven North. Installation methods include (pre-lay) plough, trenching, cutting and jetting. Cables will be buried under the seabed using additional methods of installation such as various forms of trenching, excavation and other burial techniques. Subject to the findings of a Cable Burial Risk Assessment, cables will be buried to a target burial depth of 1m. Where it is not possible to achieve a minimum cable burial depth of 0.5m, for example where crossing pre-existing cables, pipelines or exposed bedrock, external cable protection will be used (such as concrete mattresses, rock placement, sandbags etc.) providing a hard protective layer to restrict movement and prevent exposure of cables over the lifetime of Morven North.

Interconnector cables

3.2.5.3 Interconnector cables will be required to connect the OSPs to each other in the case of failures within the electrical transmission system, ensuring that electricity from the wind turbines can still be routed if part of the system fails.

3.2.5.4 Up to 484km of 132kV of interconnector cables will be installed for Morven North. Interconnector cables will be buried at a target cable burial depth of 1m using the same methods as inter-array cables. Where it is not possible to achieve the minimum cable burial depth of 0.5m, external cable protection will also be utilised for interconnector cables.

Cable crossings

3.2.5.5 A maximum of five cable crossings for both inter-array and interconnector cables have been considered in the design of Morven North. If required, standard cable crossing designs will be installed, likely to be methods such as concrete mattresses, rock placement, or other methods.

3.2.6 Site preparation activities

3.2.6.1 Several site preparation activities will be required in the Morven North Boundary, and are described in the following paragraphs, below. Site preparatory works are assumed to begin prior to the first activities within the Morven North Boundary and continue as required throughout the construction phase.

Pre-construction site investigation surveys

3.2.6.2 A number of pre-construction site investigation surveys may be undertaken to inform detailed project design work and to identify in detail:

- seabed conditions and shape (morphology);
- presence or absence of any potential obstructions or hazards.

3.2.6.3 Pre-construction site investigation surveys are likely to include geophysical and geotechnical surveys which would be conducted within the Morven North North Boundary.

3.2.6.4 Geophysical survey works will be carried out to provide more detail on potential for the presence of UXO and associated requirements for clearance, bedform and boulder mapping, water depth (bathymetry), overview of the seabed formation and features (topography) and an indication of subsoil-layers. Geotechnical surveys would be conducted at specific locations within the Morven North Boundary.

3.2.6.5 Geophysical surveys would be undertaken using non-intrusive techniques that map the seabed and the layers beneath it without physically interacting with the seabed. These may include tools such as sonars, echo-sounders and magnetometers, which help identify seabed features, buried objects and geological conditions.

3.2.6.6 Geotechnical investigations would use direct techniques that take physical samples or measurements from the seabed to understand soil strength, composition and structure. These may include boreholes, coring and in-situ (done at the site) testing, which provide detailed information needed to inform project infrastructure such as turbine options (Section 3.2.3).

3.2.6.7 Seabed trials may also be conducted to test how the different foundation types discussed in (Section 3.2.3) perform in real conditions, to guide final design choice.

Unexploded ordnance clearance

3.2.6.8 UXO refers to old military explosives, such as bombs, mines, or shells, which were dropped or placed during past conflicts but never detonated. These can remain buried on the seabed for decades and pose a health and safety risk during offshore construction. It is possible that UXO may be encountered during the construction or installation of offshore infrastructure and therefore it is necessary to survey for and carefully manage clearance of UXO.

3.2.6.9 Given the health and safety risks posed by UXO, the Applicant aims to avoid these hazards by adjusting the exact location of foundations and cables (a process called micrositing) or by relocating UXOs where possible. If avoidance is not feasible, a specialist contractor will clear the UXOs before any site preparation or construction begins. The preferred clearance method uses a controlled technique called a “low-order” approach, which ensures the UXO is rendered safe without a large detonation.

3.2.6.10 Should low-order techniques not be feasible, a “high-order” technique may be utilised, such as detonation of the UXO with associated mitigation measures to reduce the impact on the surrounding environment. It is estimated that up to 15 UXOs may require high-order or low-order clearance within the Morven North Boundary.

Sandwave and boulder clearance

3.2.6.11 Boulder clearance is commonly required during site preparation. Boulder clearance may be required along the inter-array cable and interconnector cable routes but may also be required in the vicinity of the wind turbine and OSP foundations. Boulder clearance is required to reduce the risk of shallow cable burial of subsea cables which reduces the need for further cable burial works, while also minimising damage to cables during installation. Boulders may be moved to the side of the construction area or to other areas within the Morven North Boundary. Boulders may be cleared using a boulder grab, plough or both.

3.2.6.12 Sandwaves are underwater formations, similar to sand dunes on land. They can move over time, which poses challenges for laying cables and foundations. In some areas of the Morven North Boundary, these sandwaves may need to be levelled before installation to ensure cables can be buried at the correct depth and remain covered throughout the wind farm’s lifetime. Clearance involves smoothing the seabed by redistributing sand from the crests into troughs using methods such as ploughing, controlled flow excavation, or jet trenching. The extent of sandwave clearance needed will depend on seabed surveys completed before construction.

3.3 Construction phase

3.3.1.1 The construction of Morven North is estimated to occur over a duration of up to five years. Within the topic-specific assessments within the EIA Report, where required, a date of 2033 has been assumed as an indicative date for the commencement of construction, with the construction window being up to five years, to allow for a robust assessment. The final construction start date and

construction length will become clearer as the project continues to mature, with confirmation of key factors such as agreement of grid connection dates, project financing, route to market etc.

3.3.1.2 Table 3.1 provides an indication of the expected major construction activities in a step-by-step process in order of when they will occur.

3.3.1.3 It should be noted that these activities may not run consecutively one after another throughout the construction phase of Morven North, rather, different activities may occur at the same time in different areas of the Morven North Boundary (e.g. foundation installation (step 3) may begin in the western portion of the Morven North Boundary, while OSP installation (Step 4) is ongoing in the eastern portion of the Morven North Boundary).

Table 3.1: Indicative construction activities for Morven North

Activity	Description
Step 1 - Pre-construction surveys	Geotechnical and geophysical surveys, boulder and UXO surveys.
Step 2- Seabed preparation activities	Seabed preparation activities (e.g. rock picking, sandwave levelling and clearance (pre-lay plough/dredging), Pre-Lay Grapnel Run (PLGR), UXO clearance and removal of third party or out of service cables) to aid installation of wind turbine and OSP foundations, inter-array cables and interconnector cables.
Step 3 -Foundations installation	Installation of wind turbine and OSP foundations.
Step 4 - OSP installation and	Installation of OSPs and associated equipment required for this infrastructure, including commissioning.
Step 5 - Interconnector cables installation)	Installation of interconnector cables, connecting OSPs.
Step 6 - Inter-array cables installation	Installation of inter-array cables, connecting wind turbines to other wind turbines or to OSPs.
Step 7 - Wind turbine installation and commissioning	Installation of the wind turbines onto the previously installed wind turbine foundations, including commissioning.
Step 8 - Post-construction as-built surveys	Surveys to document what has been constructed.

3.3.1.4 Vessels will be employed to facilitate the construction activities outlined in Table 3.1. A number of vessel types will be used during the construction phase including heavy lift vessels, cable lay vessels, jack-up vessels and support vessels. Support vessels are typically smaller than the main installation vessels and may comprise tugs, guard vessels, anchor handling vessels, or similar. These vessels will primarily shadow the same movements as the installation vessels they are supporting. Helicopters may also be used for crew transfers.

3.4 Operations and maintenance phase

3.4.1.1 The overall O&M strategy will be confirmed once the final project design of Morven North are known. For the purposes of EIA assessment, where it is needed, an indicative start date for O&M activities has been assumed as 2038. This is consistent with current assumptions around construction starting in 2033 with a length of up to five years. This is considered a realistic assumption at this

point in time, however depending on the final construction dates, duration and sequencing of the Morven Programme (Section 1.1), this date may differ.

3.4.1.2 The general O&M strategy may use crew transfer vessels, service operation vessels, supply vessels, cable and remedial protection vessels, and helicopters for the operations and maintenance services that will be performed at Morven North. Examples of activities are:

- routine inspections;
- geophysical surveys;
- repairs and replacements (including wind turbines, navigational equipment, j-tubes, and consumables);
- cleaning and painting activities;
- removal of marine growth build up;
- minor repairs.

3.5 Decommissioning phase

3.5.1.1 At the end of the operational lifetime of Morven North, the Applicant will be required to submit a detailed plan outlining the decommissioning works, including expected costs and financial securities. The decommissioning plan will be consulted on by relevant stakeholders, such as MD-LOT and will be made publicly available. The decommissioning plan and programme will be updated during Morven North lifespan to take account of changing practice and new technologies.

3.5.1.2 At the end of Morven North's operational life, all structures above seabed or ground level will be removed where practical. Should monopile or piled jacket foundation options be employed, these foundations may instead be cut below the seabed surface to reduce disturbance to the surrounding environment. Scour protection and cable protection, may also remain partly or fully in place, depending on the legislation, best practice and environmental conditions at the time.

3.5.1.3 Decommissioning will generally reverse the construction sequence using similar vessels and equipment. The Crown Estate Scotland Option Lease Agreement for Morven North requires a full decommissioning programme for approval by Scottish Ministers, at the end of its lifetime.

4 Site Selection and Consideration of Alternatives

4.1.1.1 The following section provides a summary of Volume 1, Chapter 4: Site Selection and Consideration of Alternatives, which presents a description of the site selection process and the alternatives considered by the Applicant, to develop and refine the design of Morven North, prior to award during the ScotWind Leasing Round in 2021/22 through to design freeze of the project design to inform the EIA.

4.2 Selection process

4.2.1.1 The approach taken with regard to site selection and the definition and refinement of Morven North involved five steps which are outlined in turn in the following sections.

4.2.2 Step 1 - Identification of Option Areas within the Sectoral Marine Plan for Offshore Wind Energy

4.2.2.1 In November 2017, Crown Estate Scotland announced a new leasing round for offshore wind projects in Scottish waters. At the same time, MD-LOT developed the SMP to identify PO Areas for large-scale commercial offshore wind energy development in Scottish waters (Scottish Government, 2020a).

4.2.2.2 The SMP sets out a spatial strategy for offshore wind seabed leasing and originally identified Areas of Search, which were refined through Opportunity and Constraint analysis to 15 final PO Areas across four areas (West (W), North (N), North East (NE) and East (E)).

4.2.3 Step 2 – Sectoral Marine Plan Option Area assessment

4.2.3.1 In initial site selection and the consideration of alternatives, the Applicant undertook assessment of potential Draft Plan Option (DPO) and final POs, considering a range of factors, such as foundation, technical and financial aspects, to inform their site selection process. The four phases were:

- Phase 1 Site identification and high-level evaluation.
- Phase 2: Down selection and boundary refinement.
- Phase 3: Detailed Levelised Cost of Energy assessment and shortlisting.
- Phase 4: Final selection and project concept.

4.2.3.2 Each phase progressively refined potential locations, which reduced the wider areas to those with the strongest balance of technical, environmental and commercial feasibility, ultimately identifying the preferred development area.

4.2.3.3 Following this, in October 2020, the final PO Areas were released by Crown Estate Scotland and the Applicant submitted their ScotWind Leasing Round application for the E1 West site within the E1 PO Area Figure 1.1.

4.2.3.4 In January 2022, the Applicant was awarded an Option to Lease Agreement for E1 West within the SMP which was renamed the Morven Lease Option Agreement Site (Morven Site). The Scoping Boundary (as presented in the Morven Site Scoping Report) is the same as the Morven Site. The Morven Site within the E1 Plan Option Area is presented in Figure 1.1.

4.2.4 Step 3 – Environmental Impact Assessment Scoping – identification of the Scoping Boundary

4.2.4.1 Following the ScotWind Leasing Round and subsequent award, the Applicant proceeded to EIA Scoping, building on the initial assessment completed during the project concept work.

4.2.4.2 The Applicant carried out surveys and undertook engineering studies to refine project design.

4.2.4.3 EIA Scoping workshops took place before submission of the Morven Site Scoping Report and Habitats Regulations Appraisal Screening Report on 18 and 19 April 2023 and consisted of a series of topic specific sessions targeted to relevant stakeholders.

4.2.4.4 The Morven Site Scoping Report PDE, as presented in the Morven Site Scoping Report, was submitted to Scottish Ministers in July 2023.

4.2.5 Step 4 - Splitting of the Morven Site into Morven North and Morven South

4.2.5.1 Given the uncertainty that persisted around the grid connection for the Morven Site at the time, a decision was taken in 2024 to modify the consenting strategy and split the Morven Site into Morven North and Morven South (Figure 1.1). A similar assessment to that undertaken in Phase 2 was undertaken to define the boundaries of Morven North and Morven South within the Morven Site.

4.2.6 Step 5 - EIA and application – refinement of application boundary and identification of application Project Design Envelope

4.2.6.1 Following the receipt of the Morven Site Scoping Opinion in November 2023, the Applicant refined the PDE which would be considered within the EIA based on feedback from the Morven Site Scoping Opinion, early engineering works, consultation with stakeholders and internal workshops. Key refinements included reducing the maximum blade tip height, lowering the number of OSPs, splitting the Morven Site, removing one of the turbine options, and updating the approach to decommissioning and repowering.

5 Consultation

5.1.1.1 This section presents a summary of Volume 1, Chapter 5: Consultation, which holds information regarding the consultation and stakeholder engagement undertaken during the pre-application phase for Morven North by the Applicant.

5.1.1.2 More specifically, the chapter summarises:

- the background on specific policy and legislative requirements for consultation relevant to Morven North, undertaken during the pre-application phase;
- the principles of consultation and stakeholder engagement that were followed during the pre-application phase;
- the stakeholders consulted and key feedback received during the pre-application phase.

5.2 Consultation-specific legislative and policy context

5.2.1.1 The background to specific policy and legislative requirements which informs this section is outlined in Section 2 and discussed further in Volume 1, Chapter 2: Policy and Legislation.

5.2.1.2 Policy and legislation specific to stakeholder consultation is contained in the Aarhus[3] Convention (United Nations Economic Commission for Europe (UNECE)) documents and the EIA Regulations. These legal instruments represent best practice for consultation with members of the public on major projects (UNECE, 2025).

5.2.1.3 Volume 1, Chapter 5: Consultation, summarises provisions within both the Aarhus convention and the EIA Regulations, relating to consultation and how and where the Applicant has addressed it within the Morven North EIA Report. These are summarised below:

- Access to information (Aarhus: Articles 4–5; EIA Regulations: requirements to make environmental information available)
  - The full EIA Report is available online at https.www.morven-north-eia.com; electronic copies will also be placed in multiple public locations.
- Public participation in decision-making (Aarhus: Article 6; EIA Regulations: public consultation for projects with significant environmental effects):
  - Consultation opportunities were provided in the pre-application phase in a range of accessible formats; the Applicant is committed to allowing further opportunities for engagement after application.
  - Consultation activity and summary of how participation was enabled are described in the Consultation chapter.
- Consideration of consultation responses and transparency of final decisions (Aarhus: Article 6 — views must be taken into account; reasons for decisions must be published; EIA Regulations: requirement to record and consider consultees' responses):
  - Pre-application comments were considered in preparing the EIA; decision-making has considered consultation feedback.
- Encouraging early engagement (Aarhus: Article 6(5)):
  - The Applicant carried out pre-application engagement, provided information in multiple formats to reach different audiences, and followed up on consultees' input.

[3] The Aarhus Convention sets down basic rules to promote the participation of the public in environmental matters and to improve the enforcement of environmental law (UNECE, 2025). It entered into force in October 2001.

- Access to justice (Aarhus: Article 9; EIA Regulations: judicial and statutory challenge routes):
  - Members of the public have the right to challenge decisions through Judicial Review and other statutory challenge procedures available in Scotland.

5.3 Environmental Impact Assessment stakeholder engagement

5.3.1.1 The Applicant has undertaken statutory and non-statutory consultation with respect to the Morven North EIA Report following the principles and good practice set out in the guidance below:

- the Aarhus Convention (UNECE, 2025);
- the EIA Regulations (HM Government, 2007; 2017);
- Marine licensing and consenting guidance (MD-LOT, 2025);
- the Gunning Principles (Hodgson, 1985).

5.3.1.2 The purpose of this was to develop a representative EIA Report by gathering stakeholder advice, understanding concerns and developing appropriate mitigation measures where required. Stakeholder engagement was undertaken throughout the pre-Scoping and pre-application phases via virtual and face-to-face meetings, email correspondence and provision of meeting minutes, advice notes and other digital documentation to stakeholders.

5.3.1.3 Although Morven North is located in Scottish offshore waters and the Pre-Application Consultation (PAC) Regulations[4] do not apply to Morven North's application, they are considered good practice for undertaking public engagement. Therefore, the Applicant has considered the principles of these regulations when planning events for public engagement.

5.3.1.4 The list of stakeholders which have been engaged and consulted with, is available in Volume 1, Chapter 5: Consultation.

5.3.2 Community engagement

5.3.2.1 The Applicant has hosted both online feedback forms and in-person consultation, including a Public Information Day held at Stonehaven Town Hall in October 2025. In parallel, the Applicant hosted a virtual exhibition hall for those who could not attend in person. This allowed statutory and non-statutory stakeholders, as well as members of the public to meet the Applicant, ask questions and provide feedback on Morven North. Each written response was reviewed and responded to by the Applicant. Individual responses and analysis of feedback are available within Volume 3, Annex 5.3: Community Engagement Statement.

[4] The Marine Licensing (Pre-application Consultation) (Scotland) Regulations 2013

6 Environmental Impact Assessment methodology

6.1 Introduction

6.1.1.1 The following section summarises the EIA methodology used for the assessment of LSE[1] associated with Morven North on the environment (physical, biological and human) receptors.

6.1.1.2 The Morven North EIA Report has been developed in line with the EIA Regulations. Additionally, the Applicant engaged with stakeholders regarding the approach, particularly following the split of the Morven Site into Morven North and Morven South.

6.2 Principles of an Environmental Impact Assessment

6.2.1.1 Within the Morven North EIA Report each topic specific chapter includes the following elements related to EIA methodology:

- Study areas for topic assessment.
- Overview of topic specific policy, legislation and guidance.
- Overview of consultation activities and comments received related to that topic.
- Baseline characterisation.
- Assessment of LSE[1].
- Whole project and Cumulative Effects Assessment (CEA) – including screening of other projects, identification of likely significant cumulative effects, and the stage at which overlap with the project is likely to occur.
- An overview of transboundary effects.
- An overview of topic-specific inter-related effects.

6.2.2 Evidence based approach

6.2.2.1 The Morven North EIA Report has been informed by the existing, extensive evidence base for the surrounding environment. Additionally, the Applicant has further contributed to this evidence base through site specific surveys, such as:

- Digital Aerial Surveys (DAS);
- vessel traffic surveys;
- geotechnical surveys;
- geophysical surveys.

6.2.2.2 The Applicant, where possible, has used the data obtained and existing data to characterise the baseline, identify specific aspects of the environment that may be data poor and provide evidence for impacts which have been scoped out where there is clear evidence of lack of a receptor-impact pathway.

6.2.3 Designed-in measures and mitigation measures

6.2.3.1 Where LSE[1] are identified, the EIA Regulations require “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” to be included in the EIA Report. This follows the mitigation hierarchy, which requires developers to consider measures in a structured order: first avoiding impacts where possible, then minimising or reducing them as far as practicable, and finally offsetting or compensating for any residual effects that cannot be prevented.

6.2.3.2 There are three possible forms of mitigation measures, as described by Institute of Sustainability and Environmental Professionals (ISEP) (formerly IEMA) (ISEP, 2024).

- **Primary mitigation (inherent) -** "Modifications to the location or design of the development made during the pre-application phase that are an inherent part of the project, and do not require additional action to be taken."
- **Secondary mitigation (additional) -** "Actions that will require further activity in order to achieve the anticipated outcome. These may be imposed as part of the planning consent, or through inclusion in the Environmental Statement."
- **Tertiary mitigation (inexorable) -** "Actions that would occur with or without input from the EIA feeding into the design process. These include actions that will be undertaken to meet other existing legislative requirements, or actions that are considered to be standard practices used to manage commonly occurring environmental effects."

6.2.3.3 Both primary and tertiary mitigation are referred to as "designed-in measures" within the Morven North EIA Report. Secondary mitigation refers to additional measures to prevent, reduce and offset LSE[1] which could not be avoided through designed-in measures, in order to reduce residual impact significance.

6.2.4 Identification of impacts and significance of effect

Scope of assessment

6.2.4.1 The scope of the EIA Report has followed the guidance and requirements outlined in the EIA Regulations and advice received following the Morven Site Scoping Opinion. Due to the nature, location and size of Morven North, (and as discussed in paragraph 1.2.2.4), the EIA Report presents an assessment for the topics within Section 7.

6.2.4.2 Following advice from the Morven Site Scoping Opinion and engagement with stakeholders and consultees, the following topic areas have been scoped out of the EIA Report:

- seascape, landscape and visual resources and onshore historic environment;
- offshore water quality;
- air quality;
- waste;
- airborne noise.

6.2.4.3 As summarised within the Morven Site Scoping Report, the topics listed above were scoped out on the basis of no predicted LSE[1] upon these receptors. This is primarily due to the distance of Morven North from shore, in which impacts upon these specific receptors were expected to be localised or of negligible significance. For topics such as offshore water quality and airborne noise, any relevant impacts have been assessed within other topic-specific chapters, or the associated risks are managed and mitigated through measures set out in standard post-consent plans (e.g. the Environmental Management Plan (EMP)). These impacts were therefore not considered further within the Morven North EIA Report.

Impacts and effects

6.2.4.4 Morven North has the potential to result in a range of impacts and effects in relation to the physical, biological and human environment. For the purposes of the Morven North EIA Report, following terms have been adopted:

- **Impact**: A change as a result of an action.
- **Effect**: Defined as the consequence of an impact.

6.2.4.5 This process is visualised in Figure 6.1.

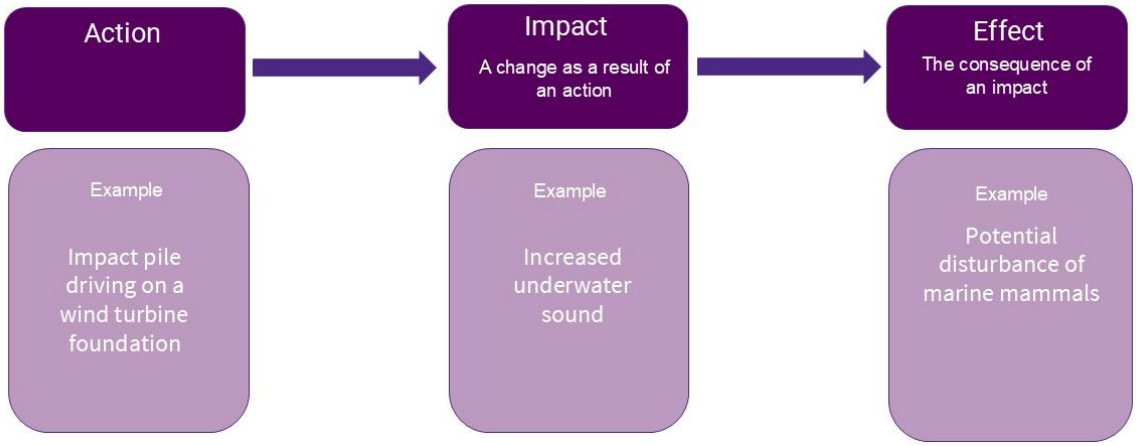

Figure 6.1: An iterative example of the terms 'impact' and 'effect' and how they arise and interact

6.2.4.6 The overall significance of an effect is determined through the correlation of the potential magnitude of impact and the sensitivity of the receptor. To ensure consistency in defining the significance of an effect, a matrix approach has been adopted, and is presented in Table 6.1. Where the matrix indicates a range of significance, the final significance is based upon the technical specialist's professional judgement as to which is the most likely effect, with an explanation as to why this is the case.

Table 6.1: Matrix used for the assessment of the significance of the effect

		Magnitude of impact			
		Negligible	Low	Medium	High
Sensitivity of receptor	Negligible	Negligible	Negligible to minor	Negligible to minor	Minor
	Low	Negligible to minor	Negligible to minor	Minor	Minor to moderate
	Medium	Negligible to minor	Minor	Moderate	Moderate to major
	High	Minor	Minor to moderate	Moderate to major	Major
	Very high	Minor	Moderate to major	Major	Major

6.2.4.7 To determine whether an effect is significant, the following approach has been used:

- a level of significance of moderate or above will be considered a 'significant' effect in terms of the EIA Regulations;
- a level of significance of minor or below will be considered 'not significant' in terms of the EIA Regulations.

6.2.4.8 There are some topic-specific assessments that deviate from the methodology outlined within this section. The technical chapters which have applied a different EIA methodology from what is described above, are listed below:

- Volume 2, Chapter 11: Offshore Ornithology;
- Volume 2, Chapter 13: Shipping and Navigation;
- Volume 2, Chapter 17: Socio-Economics;
- Volume 2, Chapter 18: Climate Change;
- Volume 2, Chapter 19: Major Accidents and Disasters.

6.2.4.9 These topics have drawn upon best practice, stakeholder feedback or relevant industry guidance when assessing LSE[1]. The topic specific EIA methodology used is described within the respective topic chapters.

6.2.5 Cumulative Effects Assessment and whole project assessment

Background to Cumulative Effects Assessment and whole project assessment

6.2.5.1 The CEA is required under the EIA Regulations and assesses the combined effects of Morven North together with the effects from other plans, projects and activities on the same receptor group or resource.

6.2.5.2 Consent for each element of the Morven Programme will be sought through separate applications. However, a whole project assessment has also been undertaken to evaluate the LSE[1] on the environment arising from the project together with grid connection infrastructure, which is not part of the Morven North application but, together with Morven North, constitutes the "whole project." It is presently unknown which grid project (MHPGC Project and MBAGC project) will be used to export electricity generated by either Morven North or Morven South. Therefore, potential combinations of Morven North with the two potential grid connection options are considered.

Cumulative Effects Assessment and whole project assessment methodology

6.2.5.3 The Applicant has used a scenario-based approach to the Morven North CEA and whole project assessment to take into account the division of the Morven Site into Morven North and Morven South. An overview of the scenarios is available in Table 6.2. The Morven Programme assessment (Scenario 3), has only been undertaken in the assessment of LSE[1] on offshore ornithology and shipping and navigation receptors. This was agreed in consultation with MD-LOT, NatureScot and shipping and navigation stakeholders, in order to provide further context and to support the conclusions of the CEA scenario for both shipping and navigation and offshore ornithology receptors, however the assessment does not form the basis of the CEA.

Table 6.2: Morven North whole project assessment, Morven Programme assessment and Cumulative Effects Assessment scenarios

Whole project assessments		Morven Programme assessment (Offshore Ornithology and Shipping and Navigation chapters only)	Cumulative Effects Assessment
Scenario 1	**Scenario 2**	**Scenario 3**	**Scenario 4**
Morven North + MHPGC Project	Morven North + MBAGC Project	Morven North + Morven South + MHPGC Project + MBAGC Project (Morven Programme)	Morven North and Tier 1, Tier 2 and Tier 3 Projects.

6.2.5.4 Where possible, the methodology used in Morven North alone impact assessment has been applied. Where this was not possible due to factors such as the nature of the topic assessment, the nature

of other projects and limitations in data available, the findings are based on a mix of quantitative assessments and professional judgement, or on qualitative assessment alone.

Approach to cumulative project screening

6.2.5.5 When undertaking a CEA, it is necessary to identify and screen developments or activities (that are likely to go ahead) with which Morven North may interact with to produce a cumulative effect. This is done via a three step process, outlined below:

- Stage 1 - compiling the CEA long list of projects;
- Stage 2 - refining the CEA long list of projects;
- Stage 3 - screening of the CEA long list.

6.2.5.6 A tiered approach has been adopted to place relative weight on the likelihood of each CEA long list entry to be developed and interact with Morven North. Specific criteria was developed for each tier and is outlined below:

- **Tier 1:** Specific existing developments that are built (operational) or under construction; developments that have the appropriate planning consents and are awaiting implementation; and permitted/submitted application(s) that have not yet been determined.
- **Tier 2:** All projects, plans and activities assessed under Tier 1, and projects, plans and activities that have a scoping report submitted and is available to view in the public domain.
- **Tier 3**: All projects, plans and activities assessed under Tier 1 and 2, plus projects, plans and activities that are reasonably foreseeable (e.g., projects identified in development plans, projects in other plans and programmes, offshore renewable energy projects that have a Crown Estate Scotland Lease Option Agreement) and have enough information available in the public domain to undertake a thorough assessment.

6.2.6 Inter-related effects

6.2.6.1 The EIA Regulations require consideration of the inter-relationships between EIA topics that may lead to environmental effects. Inter-related effects are considered within each topic-specific chapter, and also within a separate chapter. The inter-related effects assessment methodology is discussed in Section 7.15.

6.2.7 Transboundary effects

6.2.7.1 A transboundary effect may arise as an is a result of an impact from Morven North from the construction, O&M and decommissioning phases upon European Economic Area (EEA) states.

6.2.7.2 A screening exercise for potential transboundary impacts was undertaken and presented within the Morven Site Scoping Report (MvOWL, 2023). Volume 3, Annex 6.3: Transboundary Screening, presents an update to the transboundary screening undertaken at the scoping stage, while also considering the split of the Morven Site into Morven North, as well as more recent project information.

6.2.7.3 Topic-specific assessments that have identified the possibility for a transboundary effect to occur on EEA states, and the effects identified, are discussed in Section 7.

7 Technical topic chapters

7.1 Physical processes

7.1.1 Introduction

7.1.1.1 Physical processes are the natural movements and behaviours of the sea and seabed - such as tides, waves, sediment movement, and how the seabed changes over time. The physical processes of the Morven North Boundary were assessed to see the impact of Morven North upon physical processes receptors during construction, O&M and decommissioning.

7.1.1.2 The assessment investigated on understanding the effects of Morven North on the following aspects:

- Water movement (such as tidal, wave and current movements).
- Seabed conditions (sediment types and its stability).
- Natural sediment transport (movement of seabed sands, gravels and mud).

7.1.2 Methodology

7.1.2.1 The study area adopted to investigate the interaction between Morven North on physical processes receptors is the Morven North Physical Processes Study Area. This study area includes the Morven North Boundary plus one spring tidal excursion from the Morven North Boundary. A spring tidal excursion is defined as the maximum distance that seafloor material (sediment) suspended in the water travels. It is approximately 14km in the north and south direction and approximately 5km in the east and west direction. Modelling was used to inform the spring tidal excursion.

7.1.2.2 The physical processes of the Morven North Physical Processes Study Area were assessed using:

- desk studies reviewing existing studies and national datasets, the studies used are outlined in Volume 2, Chapter 7: Physical Processes;
- site specific surveys;
- numerical modelling to predict changes in waves, tides, and sediment behaviour;
- consultation with regulatory bodies.

7.1.3 Characterisation of the Morven North baseline

7.1.3.1 The Morven North Boundary exhibits water depths ranging from 64m to a maximum of 75m relative to LAT, as shown by the survey data captured in 2022. The central region of the Morven North Boundary is characterised by the presence of megaripples, which are large ripple-like seabed features indicative of sediment movement.

7.1.3.2 The mean tidal range near the Morven North Boundary is between approximately 2.5m and 2.8m, according to the Atlas of UK Marine Renewable Energy Resources (ABPmer, 2017). Site specific metocean data collected during 2023 showed that maximum current speeds within the Morven North Boundary reached up to 1.0m/s, with mean current speeds around 0.26m/s. Towards the sea surface, current speeds of 0.99m/s at their fastest, while toward the seabed, current speeds reached 0.63m/s. Currents present within the Morven North Boundary mainly travelled in a north north-east to south south-west orientation.

7.1.3.3 Annual mean significant wave heights across the Morven North Boundary range from approximately 1.75m to 1.91m. Dominant wave directions at the site were from the north north-east and north.

7.1.3.4 The main seabed sediment across the Morven North Physical Processes Study Area is sand with some slightly gravelly sand and small pockets of gravelly sand, sandy gravel, and gravelly mud. This is relatively similar across the whole study area.

7.1.4 Designed-in measures

7.1.4.1 Morven North will apply a Scour Protection Management Plan (SPMP), which will reduce the interaction of offshore structures and wave and tidal regimes.

7.1.5 Physical processes impact assessment

7.1.5.1 The following impacts upon physical processes from Morven North were identified throughout the relevant phases:

- impacts to sediment transport and sediment transport pathways due to the presence of infrastructure;
- impacts to seasonal stratification due to the presence of infrastructure;
- impacts to the tidal regime due to the presence of infrastructure;
- impacts to the wave regime due to the presence of infrastructure;
- increased SSCs and associated deposition.

7.1.5.2 As a result of the assessment, there is not expected to be any LSE[1] as a result of Morven North upon physical processes receptors. Each of these impacts result in effects of negligible or minor adverse significance.

7.1.5.3 Cumulative effects arising from Morven North together with third party plans, projects and activities were assessed and estimated to result in a significance of effects of negligible or minor adverse significance (not significant in EIA terms) on the physical processes receptors. No physical processes mitigation is considered necessary because the predicted impacts with the existing designed-in measures are not significant in EIA terms.

7.1.5.4 Across the lifetime of Morven North, potential inter-related effects include short-term increases in SSCs and localised seabed deposition during construction, maintenance and decommissioning. These effects are temporary, small in extent, and do not overlap between phases. Overall, combined inter-related effects are not predicted to exceed negligible adverse significance, which is not significant in EIA terms.

7.1.5.5 No likely significant transboundary effects relating to physical processes from Morven North on the interests of European Economic Area (EEA) states were predicted.

7.2 Benthic subtidal ecology

7.2.1 Introduction

7.2.1.1 Benthic subtidal ecology refers to the communities of organisms and habitats that live on or within the seabed. These include species such as worms, shellfish, crustaceans, and other invertebrates, along with the sediments and structures they inhabit.

7.2.2 Methodology

7.2.2.1 For the assessment of Morven North, the composition, abundance, and distribution of these benthic species was considered, as well as the physical characteristics of the seabed within the following study areas:

- the Morven North Benthic Subtidal Ecology Study Area;
- the Morven North and Morven South Regional Benthic Subtidal Ecology Study Area.

7.2.2.2 As outlined in the relevant guidance, Important Ecological Features (IEFs) have been identified within the assessment of benthic subtidal ecology.

7.2.2.3 With regards to benthic subtidal ecology, the Morven North baseline was characterised using:

- site specific surveys including:
  - grab sampling;
  - Drop Down Video (DDV) of the seabed;
  - seabed mapping with sonar and acoustic equipment;
- desktop studies and reviews of existing datasets;
- analysis of benthic communities using software such as Primer6.

7.2.2.4 Further information on the methods used to characterise the baseline is available in Volume 3, Annex 8.1: Benthic Subtidal Ecology Shared Technical Report.

7.2.3 Characterisation of the Morven North baseline

7.2.3.1 Site specific surveys show that the seabed in the Morven North Benthic Subtidal Ecology Study Area is mainly made up of fine to medium sand, with differing amounts of gravel and shell fragments. Coarser sediments occur in the northwest, while the southeast contains more mud.

7.2.3.2 Tests for seabed sediment contamination found that levels of organotins[5] chemicals were below the levels needed for detection at all stations. Concentrations of chemicals (such as PCBs, PAHs, and metals) were generally below thresholds set by regulators, except for one northern station (ENV054), which showed slightly elevated levels of arsenic and higher organic matter.

7.2.3.3 The infaunal communities (species living within the seabed) were dominated by segmented worms and crustaceans, such as crabs were also heavily present. The most common species was *S. bombyx,* a polychaete (or bristleworm), with nearly 6,000 individuals recorded. Other frequent species included other polychaete species, cnidarians, and bryozoans. Biomass (the total mass of living organisms) varied between sampling sites, with heart urchins making up almost half of the total biomass.

7.2.3.4 Footage and photographs of the seabed showed animals that are tube-dwelling as the most numbered epifaunal (organisms located on the seabed or other substrate) group. In total, 109 epifaunal group of animals were recorded, with bryozoans and molluscs (Scaphopoda) found at the most stations.

7.2.3.5 Species richness (how many species present) and diversity (how even the number of species present is) were similar across most stations, likely due to little variation in sediment type. Statistical analysis identified 16 different areas groups, characterised by defining animals, which were classified into four main biotopes. Most stations were predominantly associated with fine sand habitats, with the exception of one specific station.

7.2.3.6 IEFs identified within the Morven North Benthic Subtidal Ecology Study Area included:

- offshore subtidal sands and gravels;
- ocean quahog.

7.2.4 Designed-in measures

7.2.4.1 The Applicant has adopted a range of measures to reduce potential impacts on benthic habitats and communities. These include incorporating mitigation within the project design, such as minimum cable burial depth (paragraph 3.2.5.2), and the implementation of project-wide environmental management processes and development of topic-specific plans such as the SPMP, Cable Plan and

[5] Organotins are man-made chemicals that combine tin with carbon-based groups. They've been used in things like ship paints and plastics, but some types are highly toxic to marine life and can build up in the environment

Invasive Non-Native Species Management and Biosecurity Plans. Further controls will be provided through the EMP and Marine Pollution Contingency Plan (MPCP).

7.2.5 Benthic subtidal ecology impact assessment

7.2.5.1 The following impacts upon benthic and subtidal ecology receptors as a result of Morven North, across the relevant phases were:

- temporary habitat loss/disturbance;
- increases in SSCs and associated deposition;
- long-term habitat loss;
- increased risk of introduction and spread of Invasive Non-Native Species (INNS);
- colonisation of hard structures;
- changes in physical processes;
- impacts to benthic invertebrates due to Electromagnetic Fields (EMF);
- removal of hard substrate.

7.2.5.2 With the existing designed-in measures included as part of the Morven North design process relevant to benthic subtidal ecology, it is anticipated that all impacts upon receptors and IEFs, will be of minor or negligible adverse significance, which is not significant in EIA terms.

7.2.5.3 Cumulative effects arising from Morven North together with third party plans, projects and activities were assessed and estimated to result in a significance of effects of negligible or minor adverse significance (not significant in EIA terms) on the benthic subtidal ecology receptors. No further benthic subtidal ecology mitigation is considered necessary because the predicted impacts with the existing designed-in measures is not significant in EIA terms.

7.2.5.4 Across the lifetime of Morven North, potential inter-related effects include temporary and long-term habitat loss, increased SSC and deposition, and the risk of introducing INNS, alongside receptor-led effects such as colonisation of hard structures and EMF impacts. Impacts are not expected to result in a significance above minor adverse, which is not significant in EIA terms.

7.2.5.5 No likely significant transboundary effects relating to benthic subtidal ecology from Morven North on the interests of EEA states were predicted.

7.3 Fish and shellfish ecology

7.3.1 Introduction

7.3.1.1 Fish and shellfish ecology refers to the species and habitats that support marine life in the water column and on the seabed. These include commercially and ecologically important species such as herring, cod, whiting, plaice, sandeel, crabs, and lobsters, which use the area for feeding, spawning, and shelter.

7.3.2 Methodology

7.3.2.1 For the assessment of Morven North, the composition, abundance, and distribution of fish and shellfish communities and features was assessed, as well as the physical characteristics of the seabed within the following study areas:

- the Morven North Fish and Shellfish Ecology Study Area;
- the Morven North and Morven South Regional Fish and Shellfish Ecology Study Area.

7.3.2.2 As outlined in the relevant guidance, IEFs have been identified within the assessment of fish and shellfish ecology. IEFs have been assessed in the same manner as other fish and shellfish specific receptors.

7.3.2.3 The surrounding fish and shellfish ecology in regards to Morven North was characterised using:

- site specific survey data from:
  - grab sampling;
  - DDV;
  - eDNA sampling.
- desktop studies such as;
  - reviews of existing datasets;
  - literature reviews.

7.3.2.4 Further information on the methods used to characterise the baseline is available in Volume 3, Annex 9.1: Fish and Shellfish Ecology Shared Technical Report.

7.3.3 Characterisation of the Morven North baseline

7.3.3.1 The Morven North fish and shellfish ecology baseline reflects typical northern North Sea communities, including marine fish, diadromous species (species that will migrate between both freshwater and marine environments) and shellfish. Marine fish comprise demersal species (fish that inhabit the sea close to the sea floor) such as cod, haddock, whiting, plaice, and sandeel. Pelagic species (species that inhabit the open ocean away from the seafloor) like herring, sprat, and mackerel, and elasmobranchs which are a separate group of fish that including rays and sharks. Key shellfish species include edible crab, European lobster, Norway lobster, scallops, and other commercially important species such as whelks, razor clams, and cephalopods (octopuses, squid, and cuttlefish). There were also a number of species such as cod, herring and sandeel that used the surrounding marine environment around the Morven North Boundary as spawning grounds to release eggs.

7.3.3.2 Numerous IEFs were also identified within the characterisation of Morven North, including various species of:

- teleost fish (ray finned fish);
- diadromous fish;
- elasmobranchs (sharks, rays, skates and sawfish etc);
- shellfish.

7.3.4 Designed-in measures

7.3.4.1 The Applicant has adopted a suite of measures to reduce potential impacts on fish and shellfish receptors. These include design-embedded measures such as soft-start piling procedures and the use of low-order UXO clearance techniques where feasible, supported by the development and implementation of project-wide environmental controls. These controls will be delivered through the Cable Plan (including a CBRA and operational monitoring), the EMP, MPCP, and the INNSMP and Biosecurity Plans. Operational requirements will also be managed through the Operations and Maintenance Programme, including adherence to industry standards for any re-installation of cable rock protection.

7.3.5 Fish and shellfish impact assessment

7.3.5.1 The following impacts of Morven North upon fish and shellfish receptors, were identified.

- temporary habitat loss and disturbance;
- underwater sound impacting fish and shellfish receptors;
- increased SSCs and associated deposition;
- long-term habitat loss;
- colonisation of hard structures and associated fish aggregation;
- EMF from subsea electrical cables.

7.3.5.2 With the existing designed-in measures included as part of the Morven North design process, it is anticipated that all impacts upon fish and shellfish ecology receptors and identified IEFs, will be of minor or negligible adverse significance, which is not significant in EIA terms. No further fish and shellfish ecology receptors mitigation is considered necessary because the predicted effects in the absence of mitigation is not significant in EIA terms.

7.3.5.3 Cumulative effects arising from Morven North together with third party plans, projects and activities were assessed and estimated to result in a significance of effects of negligible or minor adverse significance (not significant in EIA terms) on the fish and shellfish ecology receptors.

7.3.5.4 Across the lifetime of Morven North, potential inter-related effects include temporary habitat loss and disturbance, increased SSC and deposition, underwater sound during construction and decommissioning, long-term habitat loss, colonisation of hard structures, and EMF from subsea cables. Impacts are not expected to result in a significance above minor adverse effect, which is not significant in EIA terms.

7.3.5.5 No likely significant transboundary effects relating to fish and shellfish ecology from Morven North on the interests of EEA states were predicted.

7.4 Marine mammals

7.4.1 Introduction

7.4.1.1 The marine mammal assessment refers to the marine mammal populations within the surrounding marine environment of Morven North. The North Sea is home to numerous marine mammal communities including cetaceans (whales, porpoises and dolphins) as well as pinnipeds (in this context; harbour seals and grey seals). Marine mammal distribution and abundance is primarily influenced by their prey and is difficult to estimate due to their mobile tendencies.

7.4.2 Methodology

7.4.2.1 For the assessment of Morven North, the distribution, occurrence and abundance of marine mammals was assessed, as well as the physical characteristics of the seabed within the following study areas:

- the Morven North Marine Mammal Study Area;
- the Morven Site Marine Mammal Study Area;
- the Morven North and Morven South Regional Marine Mammal Study Area.

7.4.2.2 As outlined in the relevant guidance, key species have been identified within the assessment of marine mammals. All marine mammal species which have been taken forward to assessment are considered IEFs.

7.4.2.3 The marine mammal baseline in the surrounding marine environment in regards to Morven North was characterised using:

- site specific survey data from monthly DAS (undertaken from January 2021 to September 2023);
- desktop studies such as reviews of regional datasets (SCANS-IV, seal telemetry, population assessments);
- consultation with NatureScot, MD-LOT and Natural England.

7.4.3 Characterisation of the Morven North baseline

7.4.3.1 During the DAS, the most commonly recorded species were harbour porpoise and white-beaked dolphin, with occasional sightings of common dolphin, grey seal, minke whale, and humpback whale. Other species such as bottlenose dolphin and harbour seal were not observed but may occur in the

region. These species use the area mainly for feeding and migration, and their presence varies seasonally depending on prey availability.

7.4.4 Designed-in measures

7.4.4.1 The Applicant has adopted a suite of measures to reduce potential effects on marine mammals. These include implementation of project-wide environmental and operational management processes, supported by topic-specific plans and protocols such as marine pollution response, invasive species control and the Marine Mammal Mitigation Protocol. Further design-embedded measures, including soft-start piling procedures and the use of low-order UXO clearance techniques where feasible, further limit the potential for disturbance.

7.4.5 Marine mammals impact assessment

7.4.5.1 The following impacts upon marine mammal receptors, were identified:

- injury and disturbance from underwater sound generated from piling;
- injury and disturbance from underwater sound generation from UXO clearance;
- injury and disturbance to marine mammals from pre-construction site investigation surveys;
- injury and disturbance to marine mammals from vessel use and other non-piling sound-producing activities;
- injury to marine mammals due to collision with vessels;
- effects on marine mammals due to changes in prey availability.

7.4.5.2 With the existing designed-in measures included as part of the Morven North design process, it is anticipated that all effects upon marine mammal receptors and identified IEFs, will be of minor or negligible adverse significance, which is not significant in EIA terms. No further marine mammal mitigation is considered necessary because the predicted effects with the existing designed-in measures is not significant in EIA terms.

7.4.5.3 Cumulative effects arising from Morven North together with third party plans, projects and activities were assessed and resulted in a significance of effects of negligible or minor adverse significance (not significant in EIA terms) on the marine mammal receptors

7.4.5.4 Across the lifetime of Morven North, the same marine mammal receptor pathways as outlined in paragraph 7.4.5.1 were also assessed for potential inter-related effects. The impacts assessed are not expected to result in a significance above minor adverse effect, which is not significant in EIA terms.

7.4.5.5 No likely significant transboundary effects have been identified in regard to effects of Morven North on marine mammal receptors.

7.5 Offshore ornithology

7.5.1 Introduction

7.5.1.1 Offshore ornithology refers to the birds that may interact with Morven North. This includes seabirds that spend much of their time at sea, as well as other species that may pass through or near the site during migration.

7.5.2 Methodology

7.5.2.1 For the assessment of Morven North, the distribution, occurrence and abundance of birds was assessed within the following study areas:

- the Morven North Offshore Ornithology Study Area;

- the Morven North and Morven South Regional Offshore Ornithology Study Area.

7.5.2.2 As outlined in the relevant guidance, IEFs have been identified within the assessment of offshore ornithology. For offshore ornithology, IEFs are termed Valued Ornithological Receptors (VORs).

7.5.2.3 The presence of birds in the surrounding environment likely to interact with Morven North was characterised using:

- site specific survey data from monthly DAS (June 2021 to Sep 2023);
- desktop studies such as reviews of regional and national datasets;
- consultation with NatureScot, MD-LOT and Natural England.

7.5.2.4 Further detail on datasets and reports used are covered in more detail within Volume 3, Annex 11.1: Offshore Ornithology Baseline Characterisation Report.

7.5.3 Characterisation of the Morven North baseline

7.5.3.1 The following bird species were identified as VORs and are carried through to assessment:

- kittiwake;
- little gull;
- great black-backed gull;
- herring gull;
- Sandwich tern;
- little tern;
- roseate tern;
- common tern;
- Arctic tern;
- great skua;
- Arctic skua;
- common guillemot;
- razorbill;
- puffin;
- European storm petrel;
- Leach's petrel;
- fulmar;
- Manx shearwater;
- gannet.

7.5.4 Designed-in measures

7.5.4.1 The Applicant has adopted a range of measures to reduce potential impacts on offshore ornithological receptors. These include implementation of project-wide environmental and operational management processes, supported by topic-specific plans such as the EMP, INNSMP and Biosecurity Plans, and the MPCP. Further design measures, including turbine lighting and marking requirements set out in the LMP and adherence to the NSPVMP, alongside the minimum lower blade tip clearance of 34m LAT, further reduce the potential for ornithological disturbance or collision risk.

7.5.5 Offshore ornithology impact assessment

7.5.5.1 The following impacts upon the VORs, listed above, were identified:

- direct temporary habitat loss/disturbance;
- changes in prey availability due to temporary habitat loss/disturbance;
- attraction to lights;
- collision with rotating blades;
- displacement;
- combined collision and displacement;
- barrier effects.

7.5.5.2 With the existing designed-in measures included as part of the Morven North design process, it is anticipated that all impacts upon VORs will be of negligible or minor adverse significance of effect (not significant in EIA terms) on the VORs. No further offshore ornithology receptors mitigation is considered necessary because the predicted impacts with the existing designed-in measures is not significant in EIA terms.

7.5.5.3 Cumulative effects arising from Morven North together with Morven North, MHPGC Project and MBAGC Project (Scenario 3), and together with third party plans, projects and activities (Scenario 4) were assessed and estimated to result in a significance of effects of negligible or minor adverse significance (not significant in EIA terms) on the offshore ornithology receptors.

7.5.5.4 Across the lifetime of Morven North, potential inter-related effects include direct temporary habitat loss/disturbance, changes in prey availability due to temporary habitat loss/disturbance and attraction to light. Effects are expected to result in a significance of negligible adverse, which is not significant in EIA terms.

7.5.5.5 No likely significant transboundary effects have been identified with regard to the effects of Morven North on offshore ornithology receptors.

7.6 Commercial fisheries

7.6.1 Introduction

7.6.1.1 Commercial fishing relates to any type of fishing activity that is undertaken legally in a commercial sense (caught and sold for a taxable profit).

7.6.2 Methodology

7.6.2.1 For the assessment of Morven North, the distribution, impediment or spatial reduction in commercial fishing activity was assessed within the following study areas:

- the Morven North Local Commercial Fisheries Study Area comprised of ICES rectangles 42E8 and 42E9;
- the Morven North Regional Commercial Fisheries Study Area comprised of the Morven North Local Commercial Fisheries Study Area and adjacent ICES rectangles 41E7 to 41F0, 42E7, 42F0, and 43E7 to 43F0 (i.e. 12 ICES rectangles in total).

7.6.2.2 The commercial fishing fleets and activity in the surrounding marine environment with regards to Morven North was characterised by publicly available and privately requested datasets such as:

- landing statistics;
- mapping of fishing grounds;
- vessel monitoring data (Vessel Monitoring System and Automatic Identification System (AIS));
- consultation with representatives within the fishing industry.

7.6.2.3 The Applicant, in conjunction with other East Region developers, have formed the East Region Commercial Fisheries Working Group to engage with the fishing industry and inform baseline characterisation and assessment approaches.

7.6.2.4 Further information on the methods used to characterise the baseline are available within Volume 3, Annex 12.1: Commercial Fisheries Shared Technical Report.

7.6.3 Characterisation of the Morven North baseline

7.6.3.1 An overview of fishing fleets active in the study areas and identified as commercial fisheries EIA receptors are:

- Scottish and English scallop dredgers;
- primarily Scottish, English and some Northern Irish demersal otter trawlers targeting mainly Norwegian lobsters but also haddock and other whitefish species;
- Scottish vessels undertaking potting fishing targeting lobster, brown crab and velvet crabs;
- Scottish vessels undertaking demersal seine fishing, targeting haddock;
- mainly Scottish and Northern Irish, with some instances of French, Danish, Dutch, German and Norwegian pelagic trawlers targeting Herring.

7.6.4 Designed-in measures

7.6.4.1 The Applicant has ensured that relevant fisheries, navigational, and safety requirements have been addressed through the development of the Fisheries Mitigation, Monitoring and Communication Plan, which has been developed to reduce commercial fisheries effects. Further plans such Navigation Safety Plan and Vessel Management Plan and the Lighting and Marking Plan have also been developed and are relevant to reducing effects on commercial fisheries receptors. These plans set out the measures adopted to manage vessel activity, maintain safe navigation and reduce potential interactions with commercial fisheries. The Applicant will also ensure compliance with established procedures through timely distribution of notice to mariners, appropriate marking and buoyage agreed with the Northern Lighthouse Board, and the use of Safety Zones and guard vessels where required. In addition, engagement with the fishing industry, adherence to HSE procedures, and implementation of reporting and decommissioning processes will be undertaken in line with agreed management plans post-consent.

7.6.5 Commercial fisheries impact assessment

7.6.5.1 The following impacts upon the commercial fishing fleets above throughout construction, O&M and decommissioning are as follows:

- reduction in access to, or exclusion from established fishing grounds within Morven North;
- displacement leading to gear conflict and increased fishing pressure on adjacent grounds;
- disturbance of commercially important fish and shellfish resources leading to displacement or disruption of fishing activity;
- increased vessel traffic associated with Morven North within fishing grounds leading to interference with fishing activity;
- additional steaming to alternative fishing grounds for vessels that would otherwise fish within Morven North;
- increased snagging risk, which could result in loss or damage to fishing gear.

7.6.5.2 Regarding a reduction in access or exclusion to fishing grounds, the assessment assumes that fishing will otherwise be possible within Morven North, during the O&M phase, where wind turbine spacing and wind turbine layout allow productive grounds to be targeted.

7.6.5.3 With the existing designed-in measures included as part of the Morven North design process, it is anticipated that all effects upon commercial fishing fleets will be of minor adverse significance (not significant in EIA terms). No further commercial fisheries mitigation in relation to Morven North alone is considered necessary because the predicted impacts with the existing designed-in measures are not significant in EIA terms.

7.6.5.4 Morven North together with other third party plans, projects and activities (including new management measures within MPAs) were assessed.

7.6.5.5 Cumulative effects of reduction in access to, or exclusion from established fishing grounds, displacement leading to gear conflict and increased fishing pressure on adjacent grounds and disturbance of commercially important fish and shellfish resources leading to displacement or disruption of fishing activity were found to have minor adverse significance, which is not significant in EIA terms.

7.6.5.6 No significant cumulative effects are concluded in relation to disturbance of commercially important fish and shellfish resources leading to displacement or disruption of fishing activity.

7.6.5.7 Cumulative effects of reduced access and associated displacement were found to have minor adverse significance (not significant in EIA terms) for fishing fleets with the exception of UK demersal otter trawl/seine and scallop dredge fisheries where moderate adverse effects were concluded (which is significant in EIA terms). Secondary mitigation in the form of strategic regional scale monitoring of fisheries activity is proposed and will be agreed in consultation with the East Region Commercial Fisheries Working Group, as detailed in the Fisheries Mitigation, Monitoring and

Communication Plan. Overall, these measures lower the residual cumulative effect of reduced access and associated displacement to minor adverse significance, which is not significant in EIA terms.

7.6.5.8 The same impact pathways listed in paragraph 7.6.5.1 were assessed for potential inter-related effects across the lifetime of Morven North. Overall, these effects are not anticipated to combine in a way that increases their significance, and inter-related effects are not predicted to exceed minor adverse significance, which is not significant in EIA terms.

7.6.5.9 No likely significant transboundary effects have been identified with regard to the effects of Morven North on commercial fisheries receptors.

7.7 Shipping and navigation

7.7.1 Introduction

7.7.1.1 Shipping and navigation relates to the activity and distribution of sea surface vessels, including commercial ships, fishing vessels, oil and gas support vessels, and recreational craft, as well as associated navigational features such as Aids to Navigation (AtoN), shipping routes, and Safety Zones.

7.7.2 Methodology

7.7.2.1 For the assessment of Morven North, the displacement, interference and collision/allision risk to shipping and navigation receptors was assessed within the following study areas:

- the Morven North Shipping and Navigation Study Area;
- the Morven North and Morven South Regional Shipping and Navigation Study Area.

7.7.2.2 The shipping and navigation baseline in the surrounding environment to Morven North has been characterised by:

- admiralty charts;
- desktop studies;
- site specific surveys, including:
  - 14 day winter vessel survey (undertaken in November/December 2024);
  - 14 day summer vessel survey (undertaken in June/July 2024).

7.7.2.3 Further information on the methods used to characterise the baseline are available within Volume 3, Annex 13.1: Shipping and Navigation Shared Navigational Risk Assessment.

7.7.3 Characterisation of the Morven North baseline

7.7.3.1 The shipping and navigation baseline surrounding Morven North showed no key AtoN within the Morven North Boundary, although a cluster of MetOcean buoys lies about 6.8nm to the northwest, with the nearest port being Aberdeen, around 34nm away. Nearby features include military Practice And Exercise Areas, several charted wrecks, and operational Offshore Wind Farms such as Seagreen, with no International Maritime Organisation routeing measures close to the site. Vessel traffic surveys recorded varying number of vessels throughout the surveys, with more vessels observed in summer than winter. The main vessels observed were cargo, oil and gas, and fishing vessels, along with 16 main commercial routes and occasional recreational activity in summer. Safety records show very low incident rates: one Search and Rescue (SAR) helicopter tasking in nine years, seven Royal National Lifeboat Institution responses to five incidents (mostly machinery failure), and three Marine Accident Investigation Branch cases, all outside the Morven North Boundary, but within the Morven North study area. Ships ranged from small craft to large cruise liners, with an average length of 102m and draught of 4.9m.

7.7.4 Designed-in measures

7.7.4.1 The Applicant has ensured that navigational safety requirements will be met through the development and implementation of the NSPVMP, Development Specification and Layout Plan, Lighting and Marking Plan, and Cable Plan (including CBRA and associated monitoring). These plans will ensure compliance with international marine regulations, required safety zones, agreed buoyage, charting updates, guard vessel deployment and minimum clearance standards, as well as adherence to guidance such as MGN 654. Timely navigational notifications and marine pollution contingency procedures will also be undertaken, with further refinements made post-consent as detailed design is finalised.

7.7.5 Shipping and navigation impact assessment

7.7.5.1 The following impacts upon shipping and navigation receptors as a result of Morven North identified were:

- vessel displacement and increased third-party vessel to vessel collision risk;
- increased third-party vessel to project vessel collision risk;
- vessel to structure allision risk;
- reduced access to local ports and harbours;
- increased vessel to vessel to vessel collision risk resulting from displacement (third-party to third-party);
- increased vessel to vessel collision risk resulting from displacement (third-party to project vessel);
- reduction of under keel clearance as a result of subsea infrastructure;
- anchor and fishing gear interaction with subsea cables;
- reduction of SAR capability.

7.7.5.2 Shipping and navigation is a specific topic that deviates from the methodology outlined in Section 6.2.4 in its process of identifying significance of effects, informed by various guidance documents. Within MGN 654 and international marine risk assessment standards, the following impact terms are used to determine significance:

- broadly acceptable;
- tolerable with mitigation;
- unacceptable.

7.7.5.3 Within the context of the Morven North EIA, effects determined to be 'broadly acceptable' or 'tolerable with mitigation' are not significant in EIA terms.

7.7.5.4 With the existing embedded mitigation measures[6] included as part of the Morven North design process, it is anticipated that all effects upon shipping and navigation receptors will be broadly acceptable or tolerable with mitigation (not significant in EIA terms). No further shipping and navigation mitigation is considered necessary because the predicted effects with the existing designed-in measures is not significant in EIA terms.

7.7.5.5 Cumulative effects arising from Morven North together with Morven South/North, MHPGC Project and MBAGC Project together with third party plans, projects and activities were assessed and estimated to result in a maximum significance of effects of tolerable with mitigation (not significant in EIA terms) on shipping and navigation receptors. No further shipping and navigation mitigation is considered necessary because the predicted effects with the existing designed-in measures are not significant in EIA terms.

[6] Embedded mitigation is what designed-in measures are referred to in the context of a shipping and navigation EIA, as agreed with stakeholders.

7.7.5.6 Across the lifetime of Morven North, potential inter-related effects include increased vessel to vessel collision risk resulting from displacement (third-party to third-party). Overall, inter-related effects are not predicted to exceed minor adverse, which is not significant in EIA terms.

7.7.5.7 No likely significant transboundary effects have been identified in regard to effects of Morven North.

7.8 Marine archaeology

7.8.1 Introduction

7.8.1.1 Marine archaeology looks at historic remains and aspects of protected heritage found beneath the sea surface, such as shipwrecks, aircraft debris, and traces of ancient landscapes.

7.8.2 Methodology

7.8.2.1 For the assessment of Morven North, the impacts to marine archaeology receptors were assessed within the Morven North Marine Archaeology Study Area.

7.8.2.2 The marine archaeology baseline environment has been characterised through site specific geophysical and geotechnical data analysis, and a review of key desktop datasets and reports such as:

- desktop reviews, of existing datasets and reports;
- site specific surveys, such as:
  - offshore geophysical surveys;
  - offshore geotechnical surveys (borehole samples).

7.8.3 Characterisation of the Morven North baseline

7.8.3.1 The Morven North marine archaeology baseline indicates the potential for submerged prehistoric archaeology within the Morven North Marine Archaeology Study Area is very low. Geological analysis shows the seabed has remained underwater since shortly after the last Ice Age, making it unlikely that prehistoric material survived. There are no known aviation archaeology sites, but seven known maritime records exist, mostly wreck sites confirmed by surveys. Additional geophysical surveys identified five anomalies with high archaeological potential (likely wrecks), nine with medium potential (possible man-made debris or structures), and 86 with low potential (modern debris such as ropes or chains). While most features are unlikely to be significant, there remains a small chance of unknown maritime or aviation archaeology being present.

7.8.4 Designed-in measures

7.8.4.1 The Applicant has ensured that potential impacts on marine archaeological receptors are appropriately managed through the establishment of Archaeological Exclusion Zones (AEZs) and measures to avoid anomalies during final design and micrositing. Archaeological input will be incorporated into any further pre-construction surveys, supported by the Offshore Written Scheme of Investigation and Protocol for Archaeological Discoveries, which will be further developed, agreed and implemented post-consent. Where direct impacts cannot be avoided, mitigation will be undertaken on a case-by-case basis in consultation with MD-LOT, as set out in the Project Archaeological Documentation.

7.8.5 Marine archaeology impact assessment

7.8.5.1 The following impacts upon marine archaeology receptors as a result of Morven North across the relevant phases were:

- increased SSC and sediment deposition leading to indirect impacts on marine archaeology receptors;

- direct damage to marine archaeology receptors;
- direct damage to deeply buried marine archaeology receptors;
- alteration of sediment transport regimes leading to indirect impacts on marine archaeology receptors.

7.8.5.2 With the existing designed-in measures included as part of the Morven North design process, it is anticipated that all effects upon marine archaeology receptors will be of minor adverse significance (not significant in EIA terms). No further marine archaeology mitigation is considered necessary because the predicted effects with the existing designed-in measures are not significant in EIA terms.

7.8.5.3 Cumulative effects of increased SSC and sediment deposition leading to indirect impacts on marine archaeology receptors and direct damage to marine archaeology receptors arising from Morven North together with other projects and plans were assessed and predicted to result in effects of minor adverse significance (not significant in EIA terms). No further marine archaeology monitoring to test the assumptions made in this assessment is considered necessary because the predicted effects with the existing designed-in measures are not significant in EIA terms. However, monitoring of AEZs should be carried out post-construction and post-decommissioning to confirm that no impact has occurred to the archaeological receptors within AEZs.

7.8.5.4 Across the lifetime of Morven North, potential inter-related effects include:

- increased SSC and sediment deposition leading to indirect impacts on marine archaeology receptors;
- alteration of sediment transport regimes leading to indirect impacts on marine archaeology receptors.

7.8.5.5 Impacts are expected to result in a effects of minor adverse or beneficial significance in the construction phase and negligible significance in the O&M and decommissioning phase, which is not significant in EIA terms. Suspended sediments cover archaeological properties, which preserves them better, resulting in a beneficial effect.

7.8.5.6 No likely significant transboundary effects have been identified in regard to effects of Morven North upon marine archaeology receptors.

7.9 Aviation (military and civil)

7.9.1 Introduction

7.9.1.1 Aviation refers to airspace users, stakeholders and receptors, both military and civil. This also includes airports, radar systems, other airspace users and communications which may be impacted by Morven North.

7.9.2 Methodology

7.9.2.1 For the assessment of Morven North, the interference to aviation receptors was assessed within the following study area:

- The Morven North and Morven South Regional Aviation (Military and Civil) Study Area (hereafter referred to as the “Regional Aviation (Military and Civil) Study Area”).

7.9.2.2 The aviation baseline in the surrounding environment to Morven North has been characterised by desktop studies, informed by:

- datasets, such as charts and data from sources such as the Ministry of Defence (MOD) and National Air Traffic Services (NATS);
- data from Aeronautical Information Systems transposed to charts;
- radar line of sight analysis;

- Instrument Flight Procedures assessment;
- consultation responses.

7.9.3 Characterisation of the Morven North baseline

7.9.3.1 The Morven North Boundary lies within the Scottish Flight Information Region in Class G uncontrolled airspace, with controlled airspace above, and is monitored by radar systems operated by NATS En Route (NERL) and the MOD. The nearest civil UK airport and the only one that may be impacted is Aberdeen airport located approximately 40nm northwest of the Morven North Boundary.

7.9.3.2 Civil radar systems operated by NERL, including Perwinnes Primary Surveillance Radar (PSR) and Allanshill PSR, may detect wind turbines at maximum blade tip height. Military radar systems may also detect wind turbines at maximum blade tip height, including Air Defence Radar (ADR) at Remote Radar Head (RRH) Buchan (50nm northwest) and RRH Brizlee Wood (71nm southwest).

7.9.3.3 Offshore helicopter operations, including SAR and oil and gas support flights, are common in the region, and aviation obstruction lighting will be fitted to wind turbines in line with Civil Aviation Authority guidance to ensure safety noting MOD requests for lighting under CAP 393 and CAP 764 due to military low flying.

7.9.4 Designed-in measures

7.9.4.1 The Applicant has ensured that aviation safety requirements are addressed through the development and implementation of the LMP and by providing the necessary information to the MOD and UK Hydrographic Office for inclusion on aviation charts prior to construction. Appropriate marking, lighting and aids to navigation will be employed to ensure offshore structures remain visible for SAR, Emergency Response and other airspace users. Notification procedures, including Notification to Aviators (NOTAMs) and engagement with the Defence Infrastructure Organisation, will be followed to ensure any lighting failures, temporary hazards, infrastructure locations or relevant changes are communicated promptly. Further refinements to these measures will be undertaken post-consent as detailed design progresses.

7.9.5 Aviation impact assessment

7.9.5.1 The following impacts upon aviation receptors as a result of Morven North across the relevant phases, were:

- creation of physical obstacle to aircraft operations during all stages (throughout construction, O&M and decommissioning);
- wind turbines causing interference to aviation radar during operation (O&M phase only).

7.9.5.2 With the existing designed-in measures included as part of the Morven North design process, it is anticipated that the creation of physical obstacle to aircraft operations will be of minor adverse significance (not significant in EIA terms).

7.9.5.3 Wind turbines can interfere with radar systems by creating false signals, reducing radar accuracy, blocking areas behind the wind turbines, and causing clutter that makes it harder to detect real aircraft. Therefore, the assessment of the impact of wind turbines causing interference to aviation radars identified a major adverse significance of effect, which is significant in EIA terms. Operational wind turbines in the Morven North Boundary would be theoretically detectable by the NERL Perwinnes PSR; Allanshill PSR, MOD RRH Buchan ADR and MOD RRH Brizlee Wood ADR (.

7.9.5.4 Secondary mitigation for military radar in the form of the deployment of ADR mitigation provided via the Joint Air Defence and Offshore Wind Task Force and programme NJORD will be agreed. The Applicant understands new ADRs, designed to maintain operational radar capabilities in the presence of operational wind turbines, will be installed from early 2029. Such mitigation will enable the MOD to maintain operational radar capability and reduce the residual effect significance to a level that is not considered significant (in EIA terms).

7.9.5.5 In parallel, secondary mitigation for civil radar will be secured through a radar-blanking agreement between the Applicant and NERL. The Applicant will apply to the Civil Aviation Authority for the creation of a formal volume of airspace known as Transponder Mandatory Zone. Within this zone, aircraft must carry and operate a pressure-altitude transponder, allowing aircraft to be detectable by a Secondary Surveillance Radar. The residual effect of the creation of physical obstacle to aircraft operations once this mitigation is implemented is of minor adverse significance, which is not significant in EIA terms.

7.9.5.6 Across the lifetime of Morven North, potential inter-related effects include creation of a physical obstacle to aircraft operations and wind turbines causing interference to aviation radar systems. The individual project alone impacts were assigned residual significance of effect of no greater than minor adverse once secondary mitigation is applied, therefore inter-related effects are not predicted to exceed minor adverse significance, which is not significant in EIA terms.

7.9.5.7 No likely significant transboundary effects have been identified in regard to effects of Morven North.

7.10 Other sea users and communications

7.10.1 Introduction

7.10.1.1 Other sea users, marine infrastructure and communications considers how Morven North may interact with a wide range of activities and assets, including coastal recreation, designated bathing waters, wave and tidal developments, seabed resources such as gas storage and coal deposits, subsea telecommunication cables, marine disposal sites, and areas used for marine aggregate extraction.

7.10.2 Methodology

7.10.2.1 For the assessment of Morven North, the impacts to other sea users and communications receptors were assessed within the following study area:

- the Morven North Local Other Sea Users, Marine Infrastructure and Communications Study Area;
- the Morven North Regional Other Sea Users, Marine Infrastructure and Communications Study Area.

7.10.2.2 The other sea users, marine infrastructure and communications baseline environment has been characterised through site specific data and a literature review of key desktop datasets.

7.10.3 Characterisation of the Morven North baseline

7.10.3.1 The area around Morven North is used by a wide range of marine activities, although most take place close to shore rather than far offshore where the wind farm is located. Nearby ports - Aberdeen, Peterhead and Montrose - support commercial shipping, fishing, tourism and marine leisure, but recreational boating, cruising and sea angling occur mainly in coastal waters and rarely extend into the Morven North area. Recreational fishing is popular along the east coast at locations such as Peterhead, Aberdeen, Gourdon and Arbroath, although boat-based angling activity remains predominantly nearshore with only occasional charter trips reaching the wider study area.

7.10.3.2 The baseline also includes offshore infrastructure such as subsea telecommunication cables, energy cables and nearby Offshore Wind Farms. No active subsea cables cross the Morven North Boundary, though the Eastern Green Link 2 (EGL2) power cable route passes near its western corner and will be operational by the time Morven North is expected to begin construction. Other planned power links (EGL3, EGL4 and EGL5) lie further afield. There are no active pipelines or oil and gas installations within the local area, and the closest hydrocarbon licence blocks and wells lie well outside the site.

7.10.3.3 Carbon Capture and Storage (CCS) activity also occurs in the wider region, with the nearest licensed CCS area at St Fergus, around 119km to the north. St Fergus is a major hub for future hydrogen and carbon dioxide (CO_2) storage projects, but no CCS infrastructure intersects with the Morven North Boundary. Additional marine uses, such as wave and tidal projects, marine disposal sites, aggregate extraction, recreational diving, and microwave communication links, are either too distant or absent from the area to interact with Morven North.

7.10.4 Designed-in measures

7.10.4.1 The Applicant has ensured that potential impacts on other sea users and communications are appropriately managed through established communication procedures, including timely distribution of notice to mariners, Kingfisher notifications and other navigational warnings. Engagement with oil and gas and other energy infrastructure operators will be undertaken as required, supported by appropriate charting updates and marking on UKHO Admiralty Charts. If required, installation of infrastructure in proximity to existing cables will be subject to agreed crossing or proximity arrangements prior to construction, ensuring that interactions with other marine users are reduced.

7.10.5 Other sea users and communication impact assessment

7.10.5.1 The following impacts upon other sea users and communications receptors as a result of Morven North identified throughout all phases were:

- displacement of recreational activities (including recreational sailing, motor cruising and recreational fishing);
- physical impact or restriction of access to cables and pipelines.

7.10.5.2 With the existing designed-in measures included as part of the Morven North design process, it is anticipated that all effects upon other sea users and communications receptors will be of negligible to minor adverse significance (not significant in EIA terms). No further mitigation is considered necessary because the predicted effects with the existing designed-in measures are not significant in EIA terms.

7.10.5.3 The impacts identified from the assessment of Morven North, were also identified as potentially resulting in cumulative effects with third party, plans and projects. It was found that cumulative effects upon other sea users and communications receptors will be of negligible and minor adverse significance (not significant in EIA terms).

7.10.5.4 No likely significant transboundary effects have been identified in regard to effects of Morven North.

7.11 Socio-economics

7.11.1 Introduction

7.11.1.1 The socio-economic assessment examines how Morven North could benefit the Scottish and UK social and economic community through the contracts, purchases and employment generated during the lifetime of Morven North.

7.11.2 Methodology

7.11.2.1 Although the specific ports to be used for Morven North (throughout all phases) have not yet been confirmed, the assessment considers the potential for impacts on nearby communities, such as changes in population and housing demand and local services. It is based on the MDS that is expected to deliver the lowest beneficial economic impacts, to present the worst case for the sake of assessment.

7.11.2.2 For the assessment of Morven North, the impacts to socio-economic receptors were assessed within the following study areas, from largest to smallest:

- United Kingdom;
- Scotland;
- Local Socio-Economic Study Areas:
  - the construction port (i.e. the area around the construction port);
  - the O&M port, (i.e. the area around the O&M port).

7.11.2.3 The socio-economic baseline environment has been characterised through a literature review of key desktop datasets and reports.

7.11.3 Characterisation of the Morven North baseline

7.11.3.1 Scotland has a population of around 5.5 million, and overall population levels are stable. The working-age share is broadly similar to the UK average, with slightly higher proportions of older residents. Employment levels are strong, supported by high economic activity rates and low unemployment, although economic activity is marginally lower in Scotland compared with UK-wide figures. Median incomes in Scotland remain slightly above the UK figure. Scotland supports around 2.7 million jobs, with significant employment in health, retail, education, professional services, manufacturing, and construction - sectors relevant to Morven North's supply chain and workforce. The industrial structure shows that professional, scientific and technical activities, as well as manufacturing and construction, are important to the Scottish economy, though their relative strength is slightly lower than UK-wide.

7.11.3.2 Over the past decade, overall employment in Scotland has grown steadily; however, the rate of employment growth has been lower than in other parts of the UK, indicating more modest economic expansion. The main port regions relevant to Morven North show varied socio-economic profiles: areas such as Leith have larger and more diverse labour markets, Aberdeen retains the strongest offshore-related workforce, and smaller ports such as Scapa have more limited labour capacity. These variations help identify the ability of different locations to support construction and long-term O&M activities associated with the Morven North.

7.11.4 Designed-in measures

7.11.4.1 The Applicant has ensured that potential socio-economic effects are appropriately managed through the development of a Supply Chain Development Statement and will commit to a Community Engagement Plan once construction and O&M ports are confirmed. Engagement with local authorities around these ports will also be undertaken to ensure they have sufficient information to understand and plan for potential pressures on housing, services and local infrastructure, helping to reduce residual socio-economic effects.

7.11.5 Socio-economic impact assessment

7.11.5.1 The following impacts upon socio-economic receptors as a result of Morven North across the relevant phases, were:

- demographic changes and demand for housing and other services;
- employment and Gross Value Added (GVA) impacts – UK;
- employment and GVA impacts – Scotland;
- employment and GVA impacts - Local Socio-Economic Study Area.

7.11.5.2 Impacts are expected to result in effects of negligible to moderate beneficial significance upon socio-economic receptors, meaning in EIA terms, there will be no significant adverse effects to employment and GVA, and in some instances, particularly in the Morven North Local Socio-Economic Study Area, these effects may be beneficial.

7.11.5.3 Cumulative effects from Morven North, together with other projects and plans were assessed and predicted to result in effects of negligible to moderate beneficial significance, or minor adverse significance.

7.11.5.4 Inter-related effects of moderate beneficial and temporary economic effects in the Local Socio-Economic Study Area during the construction phase from Morven North were of minor beneficial significance.

7.11.5.5 Transboundary screening has identified that the only potential transboundary socio-economic effects from Morven North relates to spending outside the UK, which may generate economic activity and support employment overseas. However, given the scale of EU and global economies, these effects are expected to be negligible beneficial significance and therefore not significant in EIA terms.

7.11.5.6 Monitoring is proposed through the Supply Chain Development Statement to track how project spending supports jobs and businesses, ensuring supply-chain commitments are delivered. It will also work with ports and local communities to understand any social or housing pressures during the construction and operations and maintenance phases. Specific monitoring actions will be agreed after consent and are expected to include community engagement activities.

7.12 Climate change

7.12.1 Introduction

7.12.1.1 The term climate change refers to shifts in temperature, environmental conditions and weather patterns that are influenced by human activities, mainly driven by increased GHG emissions in the atmosphere, resulting in a warming effect, which drives climate shifts.

7.12.2 Methodology

7.12.2.1 In the context of the Morven North EIA Report, climate change assessments relate to two aspects:

- the effect of GHG emissions associated with the construction, O&M and decommissioning activities of Morven North, which may contribute to climate change;
- the potential impacts of the changing climate on Morven North.

7.12.2.2 For the assessment of Morven North, the impacts of and to climate change were assessed within the Morven North Climate Change Study Area.

7.12.2.3 Information on climate change within the Morven North Climate Change Study Area was collected through a detailed desktop review of existing studies and datasets.

7.12.3 Characterisation of the Morven North baseline

7.12.3.1 The current baseline for the UK electricity grid, before Morven North operates, is around 223kg CO_2e/MWh (223kg of carbon dioxide produced to generate one megawatt hour), meaning Morven North is expected to help reduce reliance on fossil-fuel generation once operational.

7.12.3.2 The seabed within the Morven North area is made up mainly of sands and muddy sands that store small amounts of “blue carbon” (carbon naturally held in marine sediments). These habitats are considered low-importance carbon stores compared to richer marine habitats such as saltmarsh and seagrass.

7.12.3.3 For climate risks, offshore conditions in the central North Sea are generally cool with a temperate (mild temperature) climate and seasonal variations in rainfall. The surrounding area experiences moderate to high waves and prevailing winds from the southwest and northeast. The surrounding

sea level is gradually rising, consistent with global trends, which is relevant when considering future storm surges and the long-term resilience of offshore infrastructure to climate change.

7.12.4 Designed-in measures

7.12.4.1 Morven North incorporates a range of built-in design measures to ensure resilience to future climate conditions including: design standards for structural safety in line with international requirements and allowing for extreme weather; scour protection to maintain seabed stability; use of durable materials in line with appropriate design standards; construction methods suited to increased wear from sea level rise and extreme weather; and wind turbine shutdown systems for high-wind events. Key electrical equipment will be housed internally with cooling systems designed for a range of temperature conditions. Application of anti-corrosion coatings and regular inspections will ensure Morven North remains resilient to future climate change, including increased sea temperatures, ocean acidification, sea level rise and extreme weather events.

7.12.4.2 The Applicant has committed to reducing construction- and manufacture-related emissions for Morven North through a GHG Reduction Strategy, which includes consideration of low-carbon design options, sustainable and low-carbon procurement practices, collaboration with the supply chain to incorporate low-carbon solutions, and efficiency improvements. Additionally, the Applicant has committed to consider recycling as the preferred solution when disposing of wind turbines during the decommissioning phase.

7.12.5 Climate change impact assessment

7.12.5.1 The following impacts upon climate change receptors as a result of Morven North across the relevant phases were assessed:

- the impact of GHG emissions arising from seabed change;
- the impact of GHG emissions arising from the manufacturing and installation of Morven North including vessel movements;
- the impact of GHG emissions arising from the consumption of materials and activities required to facilitate the O&M phase and the impact of estimated abatement of UK Grid emissions during the O&M phase;
- the net whole lifetime GHG impacts of Morven North;
- the vulnerability of Morven North to climate change during the O&M phase;
- the impact of GHG emissions arising from decommissioning works (e.g. plant, fuel and vessel use) and the recovery (or disposal) of materials.

7.12.5.2 With the existing designed-in measures adopted as part of Morven North, all effects upon climate change receptors are concluded to be of negligible or minor adverse significance (which are not significant in EIA terms), with the exception of the impact of GHG emissions arising from the consumptions of materials and activities required to facilitate the O&M phase and estimated abatement of UK grid emissions, and the net whole lifetime GHG impacts of Morven North, which were considered beneficial and significant in EIA terms.

7.12.5.3 Cumulative effects from Morven North, together with other projects were assessed and predicted to result in beneficial effects (significant in EIA terms), or negligible to minor adverse significant effects (not significant in EIA terms).

7.12.5.4 No likely significant transboundary effects have been identified in regard to effects of Morven North.

7.12.5.5 The In-combination Climate Change Impact (ICCI) assessment evaluated how anticipated future climate conditions may interact with and potentially exacerbate the environmental effects of Morven North. The was undertaken by considering the anticipated effects associated with future climate change (i.e. climate risks) in relation to each environmental receptor considered within the specialist topic chapters of the Morven North EIA Report. The ICCI assessment concluded that the potential ICCI were assessed as not being significant or do not result in any greater LSE[1] than assessed in the relevant topic chapters of the Morven North EIA Reports.

7.13 Major accidents and disasters

7.13.1 Introduction

7.13.1.1 The major accidents and disasters assessment evaluates the risk of Morven North to cause, or its susceptibility to being involved in, a major accident or disasters. A major accident is an event that could cause serious immediate or long-term harm to people, property, or the environment, and requires emergency resources beyond those of the developer or its contractors to manage. A disaster refers to an external or natural hazard - such as terrorism or an extreme weather event that has the potential to trigger a major accident. In short, a disaster can lead to a major accident, but not all major accidents originate from disasters.

7.13.1.2 Major accidents or disasters may arise from either;

- project-related hazards, such as vessel or aircraft collision, UXO encounters, fires or explosions at turbines or OSPs, pollution incidents, or snagging hazards associated with fishing gear;
- external hazards, including severe weather events, shipping or aviation incidents, commercial fishing interactions, failures or strikes involving nearby marine infrastructure, and wider climatic conditions.

7.13.2 Methodology

7.13.2.1 For the assessment, the Morven North Major Accidents and Disasters Study Area includes potential hazards that may be relevant to:

- the Morven North Boundary;
- baseline information drawn from specific technical topics included within the Morven North EIA Report.

7.13.2.2 Information on major accidents and disasters within the Morven North Major Accidents and Disasters Study Area was collected through a detailed desktop review of existing studies and datasets from the commercial fisheries, shipping and navigation, aviation (military and civil), other sea users, marine infrastructure and communications and climate change Morven North EIA chapters.

7.13.2.3 The major accidents and disasters assessment has followed the guidance that instructs this assessment to focus on potential major events of low likelihood but high consequence such as a major spill, explosion, or fire (IEMA, 2020).

7.13.3 Characterisation of the Morven North baseline

7.13.3.1 The major accidents and disasters baseline relevant to Morven North outlines the presence of UXO, nearby commercial fishing activity, vessel traffic and shipping routes, aviation use of the surrounding airspace, and other marine users such as offshore energy infrastructure and subsea cables. UXO may be encountered during seabed works, and commercial fishing and vessel movements are present in the wider area but occur at relatively low levels within the site itself. The airspace above Morven North includes civil and military aircraft movements, supported by radar systems, helicopter operations and low-flying activity. Wider considerations also include nearby Offshore Wind Farms, intersecting subsea power cables, such as EGL2 crossing the western boundary, and general offshore climatic conditions such as waves, wind and sea-level rise.

7.13.4 Designed-in measures

7.13.4.1 An EMP will be implemented to manage environmental and social impacts and mitigation during construction and O&M, which will include preventative and reactive control measures in the instance of accidents, should they occur. Relevant designed-in measures adopted by the topics listed in paragraph 7.13.2.2 will reduce the likelihood and consequences of major accidents and disasters.

7.13.5 Major accidents and disasters impact assessment

7.13.5.1 The assessment considered Morven North's vulnerability to existing external hazards, including collision risks from shipping and aviation, snagging risks affecting commercial fisheries, and the potential for accidents involving nearby cables and pipelines. It also assessed the potential for Morven North to give rise to a major accident or disaster, including collision or allision involving vessels or aircraft, risks associated with UXO, pollution from vessels, fires at wind turbines or OSPs, and snagging hazards for fishing gear.

7.13.5.2 The assessment of major accidents and disasters takes into account the designed-in measures adopted by the topics listed in paragraph 7.13.2.2. Considering these designed-in measures, no LSE[1] were identified, and none of the assessed hazards are predicted to result in, or be caused by, a major accident or disaster associated with Morven North. As it has been concluded that Morven North will not reasonably lead to any major accidents and disasters after consideration of the designed-in measures and mitigation adopted, no assessment of cumulative, inter-related or transboundary effects has been undertaken.

7.14 Human health

7.14.1 Introduction

7.14.1.1 The human health assessment considers whether the construction, O&M and decommissioning of Morven North could affect the health and wellbeing of people who live in, work in, or use the coastal and marine environment. It examines potential pathways such as noise, air quality, water quality, health and safety risks, access to outdoor recreation and any wider community or socio-economic effects that could influence wellbeing.

7.14.2 Methodology

7.14.2.1 For the assessment of human health, the following three study areas were considered:

- the Morven North Regional Human Health Study Area;
- the Morven North National Human Health Study Area;
- the Morven North Global Human Health Study Area.

7.14.2.2 The study areas were defined by the following:

- Regional Population: The 'regional' population is defined using the local authorities of: Aberdeenshire; Angus; City of Aberdeen; City of Edinburgh; Dundee City; East Lothian; Fife; Highland; Moray; Perth and Kinross; and the Scottish Borders.
- National Population: The 'national' population is defined using Scotland and the United Kingdom.
- Global Population: The 'global population', particularly low- and middle income countries.

7.14.2.3 The information used to characterise the human health baseline has been gathered through a combination of site specific data and a desktop study of literature and reports.

7.14.3 Characterisation of the Morven North baseline

7.14.3.1 The human health baseline outlines the general health and demographic characteristics of communities around the wider region where construction and O&M port activity for Morven North may occur. Overall, these areas have broadly typical age and gender profiles compared to Scotland as a whole, with most residents reporting good or very good health. However, there are notable differences between local authorities: places such as Aberdeenshire, Edinburgh and the Scottish Borders show comparatively strong health outcomes, while Dundee City and to a lesser extent Fife have higher levels of long-term illness, poorer healthy life expectancy, greater hospital admissions, and higher premature mortality.

7.14.3.2 These variations reflect wider socio-economic patterns and help identify where communities may be more sensitive to changes in health determinants such as noise, air quality, access to services, or changes in employment opportunities. Understanding these differences provides important context for assessing whether the project could influence health and wellbeing in the areas most likely to host construction or operational activity.

7.14.4 Human health impact assessment

7.14.4.1 The impacts assessed on human health receptors across the relevant phases of Morven North included:

- impact of changes to employment and income on human health (all phases of Morven North);
- impact of changes to climate change and adaptation on human health;
- impact of changes to wider societal infrastructure and resources on human health.

7.14.4.2 Overall, during the construction, O&M or decommissioning phases effects arising from Morven North were assessed as being of either minor adverse or minor beneficial significance, which is not significant in EIA terms.

7.14.4.3 Cumulative effects arising from Morven North, together with other projects and plans were assessed and identified effects of minor adverse or minor beneficial significance, which is not significant in EIA terms.

7.14.4.4 The inter-related effect resulting from combined economic effects to employment across project phases and combined national population benefits relating to climate change and wider societal resources were assessed. It was found that the significance of these inter-related effects would not be greater than the effects in isolation, therefore there are no significant inter-related effects from Morven North.

7.14.4.5 No likely significant transboundary effects have been identified in regard to effects of Morven North on human health.

7.15 Inter-related and ecosystem effects assessment

7.15.1 Introduction

7.15.1.1 The EIA Regulations require consideration of the inter-relationships between EIA topics that may lead to environmental effects. For example, the separate impacts of temporary habitat loss and seabed disturbance upon a single receptor group such as fish and shellfish ecology.

7.15.1.2 This assessment considered how different impacts may overlap or interact, and whether these combined effects could influence receptors more than any single effect on its own. Ecosystem effects were also considered, recognising that species, habitats, and physical processes are interconnected, and that changes to one part of the marine environment, such as seabed habitats, water quality, prey availability or underwater noise can influence others.

7.15.2 Methodology

7.15.2.1 Within the inter-related effects assessment undertaken for Morven North, two types of inter-related effects are considered:

- Lifetime effects: Effects that may occur throughout more than one phase of Morven North, which interact to potentially create a more significant effect on a receptor than if just assessed in isolation of one of the single phases of Morven North.
- Receptor-led effects: Defined as multiple impacts which interact to create inter-related effects on a receptor.

7.15.2.2 The assessment follows a four-stage approach:

- Stage 1: Topic specific assessment.
  - This is the assessment of effects undertaken for individual Morven North EIA Report topic areas within Volume 2, Chapters 7 to 20.
- Stage 2: Identification of receptors:
  - The second stage involved a review of the assessments undertaken in the topic specific chapters to identify the 'receptor groups' requiring further assessment.
- Stage 3: Identification of potential inter-related impacts on receptor groups:
  - Once receptor groups have been identified, the potential inter-related impacts on those receptor groups were collated via a review of the assessment sections for each relevant topic chapter.
- Stage 4: Assessment of inter-related effects on each receptor group.

7.15.3 Inter-related and ecosystem effects assessment

7.15.3.1 It has been concluded that inter-related effects for all topics across the lifetime of Morven North will not result in inter-related effects of greater significance than the assessments presented for each of the individual phases of the project. Also, multiple effects will not interact in a way that produces an effect with greater significance than the effects alone.

7.15.3.2 The ecosystem assessment showed that some changes could happen if marine species begin to grow on, or attach to, the new structures placed in the sea for Morven North. This could slightly change which fish species are found in the area and, in turn, the types of prey available for other animals. However, these changes would be small and limited to the immediate area around the structures. They are not expected to be widespread or cause any significant negative effects on predatory marine species.

7.15.3.3 It is therefore concluded that there will be no significant inter-related or ecosystem effects as a result of the construction, O&M or decommissioning of Morven North.

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