ossian

sse Renewables Marubeni CIP Copenhagen Infrastructure Partners

Non-Technical Summary

Array EIA Report

2024

Version	Purpose of Document	Authored by	Reviewed by	Approved by
FINAL	Final	RPS	RPS	RPS

Approval for Issue		
On and on behalf of Ossian OWFL	Rich Morris	28 June 2024

Prepared by:	**RPS**
Prepared for:	**Ossian Offshore Wind Farm Limited (OWFL)**
Checked by:	**Ed Maxwell**
Accepted by:	**Paul Darnbrough**
Approved by:	**Rich Morris**

CONTENTS

TABLES

FIGURES

1. NON-TECHNICAL SUMMARY

1.1. INTRODUCTION

1.1.1. OVERVIEW

1. In January 2022, Ossian Offshore Wind Farm Limited (Ossian OWFL) (hereafter referred to as "the Applicant") was awarded an Option to Lease agreement to develop Ossian, an offshore wind farm within the E1 East Plan Option (PO) Area as part of the ScotWind Leasing Round. This project (hereafter referred to as "the Array") is a joint venture between SSE Renewables (SSER), Copenhagen Infrastructure Partners (CIP) and Marubeni Corporation.

2. Ossian is a proposed offshore wind farm located off the east coast of Scotland, approximately 80 km south-east from the nearest point of Aberdeen (see Figure 1.1). The Array is located within the site boundary and includes the offshore infrastructure required to generate electricity including the wind turbines (including their floating substructures, as well as the mooring and anchoring systems), the fixed bottom Offshore Substation Platforms (OSPs) and inter-array and interconnector cables. The Array is the subject of this Array Environmental Impact Assessment (EIA) Report.

3. In March 2024, as part of the ongoing Holistic Network Design Follow Up Exercise (HND FUE), National Grid Electricity System Operator (ESO) published their Transitional Centralised Strategic Network Plan (TCSNP) in the 'Beyond 2030' report (National Grid, 2024). Beyond 2030 sets out National Grid ESO's recommendations to achieve a decarbonised electricity network. The proposed grid design aims to facilitate transmission of a number of offshore wind farm projects. Within this publication it was confirmed that Ossian will be offered two grid connection locations in Lincolnshire, one at Weston Marsh and one at the Lincolnshire Connection Node. Onshore and offshore route optioneering work has now commenced to determine appropriate offshore and onshore export cable corridors, and locations for the proposed onshore convertor station(s). As part of this, the Applicant has initiated engagement with key stakeholders in Lincolnshire to inform early design and site selection considerations.

4. Due to the ongoing nature of the HNDFUE, and the uncertainty associated with landfall locations, and grid connection dates, the Applicant is currently progressing separate consenting applications for the Proposed offshore export cable corridor(s) and Proposed onshore transmission infrastructure. Cumulative effects of the other Ossian elements have been considered insofar as practicable on the basis of available information in the Cumulative Effects Assessment (CEA) forming part of the Array EIA Report.

1.1.2. PURPOSE OF THE DOCUMENT

5. This document is a Non-Technical Summary (NTS) of the Array EIA Report, which provides the environmental information which has been gathered in order to carry out an assessment of the likely significant environmental effects of the Array.

6. This NTS is intended to act as a stand-alone document, providing an overview of the environmental effects discussed within the Array EIA Report in non-technical language. For more detailed information, the full Array EIA Report should be referred to (see volumes 1 to 4 of the Array EIA Report).

1.1.3. PURPOSE OF THE ARRAY EIA REPORT

7. The Array EIA Report provides a description of the Array and details the environmental information gathered to carry out an assessment of the likely significant effects (LSE[1]) of the Array on the receiving environment.

8. The Array EIA Report specifically:

- details technical information to help statutory and non-statutory consultees with their understanding of the Array;
- provides the current environmental baseline information, derived from desktop studies, site-specific surveys and/or consultation;
- describes the EIA methodology used in the assessments;
- describes the potential environmental impacts arising from the Array, when considering the baseline information and gathered data, and the analysis and impact assessments completed as part of the EIA process;
- carries out an assessment of LSE[1] and considers mitigating actions for these;
- outlines the level of confidence in the data used in the assessment along with any data limitations, including where any data gaps or shortfalls exist;
- describes designed in mitigation measures to avoid, prevent, limit or, wherever possible, offset any significant adverse effects on the environment identified as part of the assessment, and, where appropriate, proposes monitoring arrangements to corroborate findings within the Array EIA Report. Where additional mitigation measures have been identified, the residual significance of effect has also been presented; and
- provides evidence of the main reasons for site selection and a description of the reasonable alternatives considered for the Array.

9. The Array EIA Report is divided into four volumes:

- volume 1 – Introductory Chapters;
- volume 2 – Array EIA Report Specialist Assessments;
- volume 3 – Array EIA Technical Reports; and
- volume 4 – Outline Management Plans.

10. Based on the Scoping Opinion received and discussions with stakeholders, the Array EIA Report focuses on the following topic areas:

- Physical Processes;
- Benthic Subtidal Ecology;
- Fish and Shellfish Ecology;
- Underwater Noise;
- Marine Mammals;
- Offshore Ornithology;
- Commercial Fisheries;
- Shipping and Navigation;
- Aviation, Military and Communications;
- Infrastructure and Other Users;
- Major Accidents and Disasters;
- Climatic Effects;
- Socio-Economics;
- Marine Archaeology; and
- Inter-Related Effects.

11. Based on the Scoping Opinion received and discussions with stakeholders the following topic areas were scoped out of the assessment:

- Seascape, Landscape, and Visual Resources;
- Cultural Heritage;
- Air Quality;
- Water Quality; and
- Airborne Noise.

12. Throughout the Array EIA Report process, the Applicant has undertaken extensive consultation with statutory and non-statutory stakeholders, and actively engaged with the public at a virtual public consultation event. Details of the consultation with statutory and non-statutory stakeholders and the public

is presented in volume 1, chapter 5, together with a full list of stakeholders who were consulted. Topic specific consultation is also provided in each topic chapter (see volume 2, chapters 7 to 20). A summary of the consultation is presented in section 1.5.

1.1.4. THE APPLICANT

13. The Applicant holds vast experience in the renewables sector and an ever-growing portfolio in the offshore wind sector as detailed below.

14. SSER is investing around £7bn to 2027, or almost £4m a day on average, to support the delivery of SSE's Net Zero Acceleration Programme to address climate change head on. This includes plans to increase installed renewable energy capacity to around 9 GW by 2027, including the delivery of the world's largest offshore wind farm in construction.

15. SSER is a leading developer, owner and operator of renewable energy across the United Kingdom (UK) and Ireland, with a portfolio of around 4 GW of onshore wind, offshore wind and hydro SSER is part of the Financial Times Stock Exchange (FTSE)-listed SSE plc, with a strategy to drive the transition towards net zero through world class development, construction, and operation of renewable energy assets.

16. SSER boasts the world's largest offshore wind energy project in Dogger Bank Wind Farm, located in the North Sea, which when complete will have a generating capacity of 3.6 GW. A planning application has also been submitted in their name for Berwick Bank Offshore Wind Farm, which when complete will be one of the largest offshore wind developments in the world, with a generating capacity of 4.1 GW.

17. Founded in 2012, CIP today is the world's largest dedicated fund manager within greenfield renewable energy investments and a global leader in offshore wind. The funds managed by CIP focus on investments in offshore and onshore wind, solar PV, biomass and energy-from-waste, transmission and distribution, reserve capacity, storage, advanced bioenergy, and Power-to-X. CIP manages 12 funds and has to date raised approximately EUR 26 billion for investments in energy and associated infrastructure from more than 150 international institutional investors.

18. Marubeni Corporation is a Japanese conglomerate with extensive interests in power generation and renewable energy. The company has built considerable offshore wind experience since its first investment into offshore wind in 2011 as the first Japanese Independent Power Producer (IPP) to enter the UK offshore wind market. Part of their ever-growing portfolio is their involvement in the development and operation of over 2 GW of onshore and offshore wind farms (Marubeni Offshore Wind Development, 2023). Marubeni played a key role, in conjunction with Akita Offshore Wind Corporation, in delivering the first large scale fixed bottom offshore wind farm in Japan with their projects at Akiko Port and Noshiro Port in the Akita Prefecture.

1.1.5. ARRAY OVERVIEW

19. The Array (i.e. offshore components of Ossian, including infrastructure such as wind turbines and associated foundations, mooring and anchors, OSPs, and inter-array/interconnector cables) is located within the site boundary, approximately 80 km south-east of Aberdeen (east coast of Scotland) from the nearest point, comprising an area of approximately 859 km^2 (Figure 1.1).

20. A maximum of 265 floating wind turbines will be installed, with associated floating foundations, mooring and anchoring systems and associated infrastructure. There will also be up to six large OSPs, or up to three large and twelve small OSPs which will be installed on piled jackets or suction caisson jackets foundations. The wind turbines will connect to each other and to the OSPs via inter-array cables, and the OSPs will be connected to each other via interconnector cables.

21. Prior to the construction phase of the Array, a number of site preparation activities will be required to be undertaken. It is assumed that site preparation works will continue throughout the construction phase as required, therefore, these works may be undertaken at any point within the construction programme. These site-preparation activities include pre-construction surveys, sand wave and boulder clearance and clearance of unexploded ordnance (UXO) present.

22. The construction phase associated with the Array is anticipated to commence in 2031 and is expected to last for up to 96 months. The decommissioning phase is likely to follow a similar programme to the construction, in a reverse manner. The Applicant is seeking a 35 year consent period to operate the Array. Further description of the Array is presented in section 1.3.

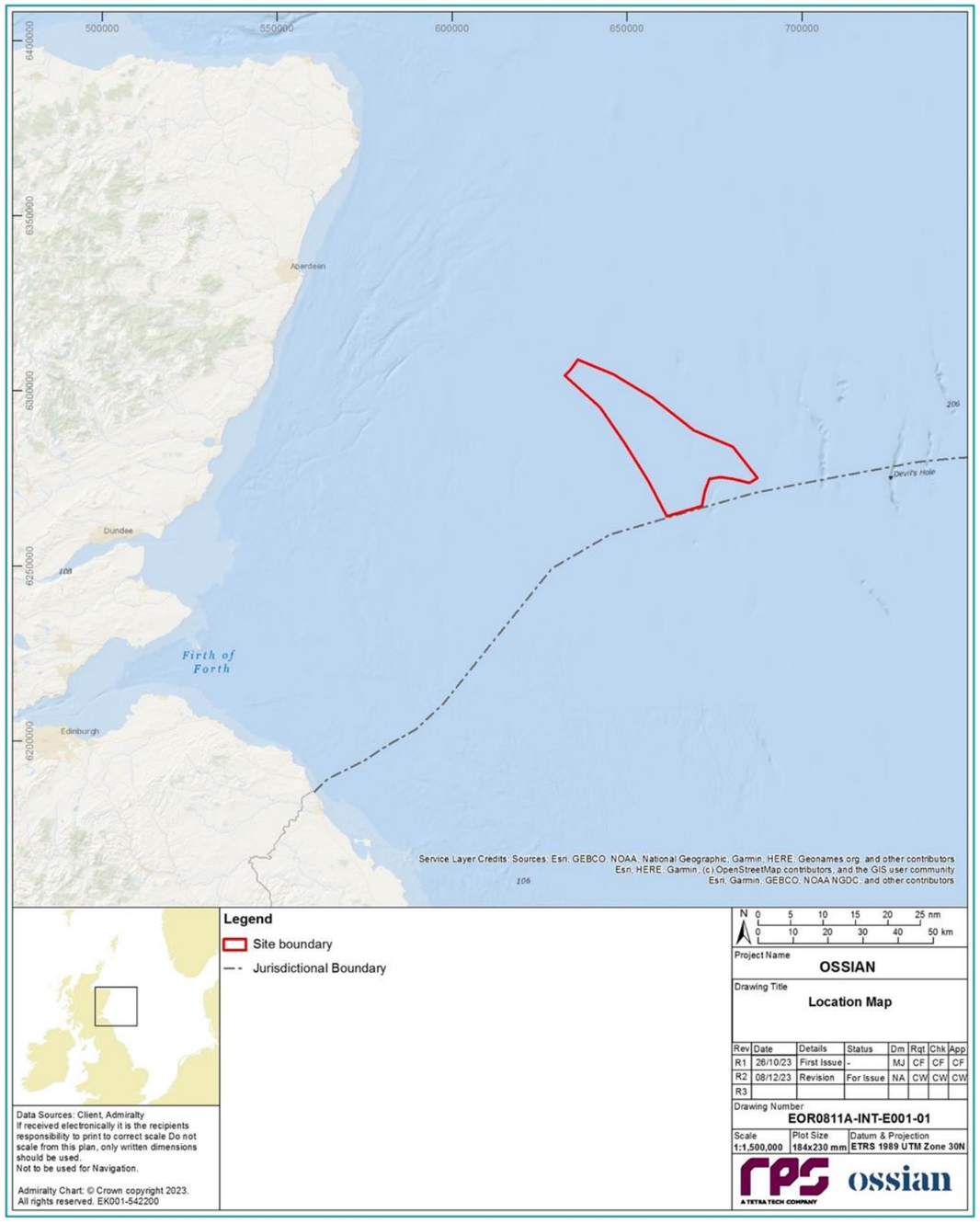

Figure 1.1: Location of the Array

1.2. POLICY AND LEGISLATION

1.2.1. OVERVIEW

23. This section presents a summary of the information detailed in volume 1, chapter 2 which contains the relevant policy and legislation context for the Array specifically in relation to:

- international commitments and strategy in relation to climate change, the reduction of Greenhouse Gas (GHG) emissions and the role that renewable energy can play in reducing said emissions, including policy taken from European legislation;
- legislation and policy relating to climate change, energy and marine planning relevant to both the UK and Scotland;
- consenting legislation relating to Scottish offshore wind generation, including the consent applications required for the construction, operation and maintenance, and decommissioning of the Array; and
- other relevant legislation to the Array.

1.2.2. CLIMATE CHANGE POLICY AND THE NEED FOR THE DEVELOPMENT

International commitments

24. During the 21st Conference of the Parties (COP21) in December 2015, the first ever legally binding global climate deal was adopted by 195 countries. A global action plan was set out in the Paris Agreement (2016) with the aim of limiting global warming to 1.5 °C and halting the increase in global average temperature to below 2 °C above pre-industrial levels, as well as moving globally towards net zero.

European legislation and energy legislation

<u>EU Exit</u>

25. After triggering Article 50 of the Lisbon Treaty on 31 January 2020, the UK officially left the European Union (EU) (hereafter referred as 'EU Exit'). Since then, the UK Government has committed, as a minimum, to abide by international obligations in line with the EU (Withdrawal) Act 2018 and to maintain environmental commitments made, and legislation enacted following the departure of the UK from the EU (HM Government, 2018).

26. Where specific EU Exit legislation has been implemented to ensure legislative instruments continue to operate in a similar way after EU Exit Day, these are discussed in this section.

UK climate change and energy legislation

27. The following UK legislation and policy is applicable to the Array application. These instruments are summarised briefly below.

- The Climate Change Act: the UK committed to a net reduction in GHG emissions by 2050 of 80% against the 1990 baseline for carbon dioxide (CO_2) and other GHGs (HM Government, 2008a) with secondary legislation passed in 2019 which extended that target to at least 100% against 1990 baseline by 2050, and Scotland committing to a net zero by 2045. This Act also established the Committee on Climate Change (CCC) which advises the UK government on emissions targets, and reports to Parliament on progress made in reducing GHG emissions.
- UK Nationally Determined Contributions (NDCs): submitted In September 2022 to the United Nations Framework Convention on Climate Change (UNFCCC), covering England, Scotland, Wales and Northern Ireland which includes a commitment for a reduction of at least 68% of UK GHG emissions by 2030 compared to 1990 levels (HM Government, 2022).

- Energy White Paper: published by the UK Government in 2020, this Paper provided a credible case for tackling the climate issue, with a substantial increase in offshore wind capacity as part of the ten point plan (HM Government, 2020a).
- Scotland's Climate Change Plan 2018–2032: published by the Scottish Government in 2020, this Plan listed policies and proposals to contribute to the achievement of net zero targets, and introduced interim targets of at least 56% reduction of GHG by 2020 with Scotland becoming net zero (100% reduction) by 2045 (Scottish Government, 2021).
- Draft Energy Strategy and Just Transition Plan: published by the Scottish Government in 2023, this Plan is currently under consultation but due to be formally published in summer 2024, and will detail how Scotland will harness offshore wind, and other renewable generation techniques, to become a "*renewable powerhouse*" (Scottish Government, 2023a).
- The Energy Act 2013: makes provisions to incentivise investment in low carbon electricity generation, ensure security of supply, and help the UK meet its emission reduction and renewables targets.
- UK Marine Policy Statement: provides a framework for marine spatial planning, specifically for the preparation of Marine Plans and to ensure that marine resources are used in a sustainable way (HM Government, 2011).
- UK Offshore Wind Sector Deal: published by the UK Government in 2019, this report sets out the key commitments and actions from the UK Government to support offshore wind energy development (HM Government, 2019).

Scottish policy and legislation

28. The following policy and legislation documents relate specifically to Scotland and are listed below to provide a brief guide to further legislation at a Scottish Level

- The Climate Change (Scotland) Act 2009 and Climate Change (Emissions Reduction Targets) (Scotland) Act 2019: introduces binding targets on the Scottish Government to reduce net Scottish GHG emissions by at least 100% by 2045 from 1990 levels;
- The Scottish Energy Strategy: The Future of Energy in Scotland (Scottish Government, 2017): sets out the Scottish Government's vision for the future energy system in Scotland and outlines six priorities around Scotland's 2050 vision which includes renewable and low carbon energy solutions.
- National Planning Framework (NPF) 4 (Scottish Government, 2023b): sets out national plans and strategies, such as Just Transition, to provide a vision of how Scotland should evolve in the future. This includes policy on a series of topics, including renewable energy, green belts and climate mitigation, acknowledging Scotland's offshore renewable energy sources stating that "*The interplay between land and sea will be critical, given the scale of offshore renewable energy resources*" (Scottish Government, 2023b).
- Scotland's Offshore Wind Route Map (Offshore Wind Industry Group (OWIG), 2010): OWIG (consisting of industry, government, and public sector bodies) published Scotland's Offshore Wind Route Map in 2010 to illustrate the opportunities, challenges and recommendations including those to support offshore wind making a significant contribution to the now superseded target of achieving 80% of Scotland's electricity consumption coming from renewable sources by 2020.
- Offshore Wind Policy Statement (Scottish Government, 2022a): set out ambitions to capitalise on offshore wind development and the role this technology could play in meeting commitments of net zero by 2045, as required by The Climate Change (Emissions Reduction Targets) (Scotland) Act 2019.

Scottish marine planning policy

29. The Scottish Government has introduced a system of marine planning that covers Scottish offshore waters (12 nm to 200 nm) waters under the MCAA 2009 and territorial waters (within 12 nm) under the Marine (Scotland) Act 2010. Decisions are made based on these Acts and in accordance with the appropriate Marine Plans, which are summarised below.

- Scottish National Marine Plan:
- the Scottish National Marine Plan (NMP) was adopted in 2015, covering the management of both Scottish inshore waters (within 12 nm) and offshore waters (12 nm to 200 nm); and "*sets out strategic policies for the sustainable development of Scotland's marine resources and is compatible with the UK MPS and existing Marine Plans across the* UK" (Marine Scotland, 2022).
- Sectoral Marine Plan (SMP) for Offshore Wind Energy (Scottish Government, 2022b): seeks to contribute to the achievement of Scottish and UK energy and climate change policy objectives and targets, through the provision of a spatial strategy to inform the seabed leasing process for commercial offshore wind energy in Scottish waters.

Consenting process and associated legislation

30. This section provides a summary of the consenting process and associated legislative requirements being followed for the Array.

31. As the Array is a generating station with a capacity over 50 MW and located in the Scottish offshore waters (12 nm to 200 nm) within the Scottish Renewable Energy Zone (REZ), it will require the following consents, licenses and permissions:

- a Section 36 consent under the Electricity Act 1989; and
- a marine licence(s) under the MCAA 2009.

32. Should additional pre-construction licences be required, these will be discussed and agreed with the relevant consent authority during the pre-construction phase of the Array.

Section 36 Consent

33. Section 36 consent will allow for the installation, operation and maintenance of the following:

- wind turbines and their supporting structures;
- wind turbine anchors and mooring systems;
- OSPs; and
- subsea cabling including inter-array and interconnector cables.

34. A comprehensive description of the Array components is provided in volume 1, chapter 3.

Marine licensing

35. The MCAA 2009 applies within the REZ in UK offshore waters (12 nm to 200 nm). Under the MCAA 2009 there is the requirement for a marine licence to be obtained prior to the construction, alteration or improvement of any works or deposit of any object in or over the sea, or on or under the seabed (HM Government, 2009).

36. Infrastructure forming part of the Array, including the wind turbines and blades, along with the cables and all necessary scour and cable protection, which are located within the REZ, will require a Marine Licence under the MCAA 2009. The OSPs within offshore waters also require a Marine Licence under the MCAA 2009.

EIA regulations

37. Under the EIA process, an EIA Report is required to be prepared and submitted to support applications for a Section 36 consent as part of the EIA process, together with a marine licence or planning permission relating to offshore renewable energy developments if the proposed activities are likely to have a significant effect on the environment due to factors such as the size, nature or location of the proposal. The aim of the EIA Directive is to ensure that any consenting authority gives due consideration to LSE[1] on the environment when giving consideration to or giving consent for a proposed project. Under the Electricity Works (EIA)

(Scotland) Regulations 2017, an EIA is required for the undertaking of any development to provide a generating station which is likely to have significant effects on the environment. The Array meets these criteria and therefore requires an EIA to be completed.

38. The Array EIA Report has been undertaken in accordance with the following regulations and therefore, fulfils their requirements:

- in relation to the Scottish 36 Consent application: the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017; and
- in relation to the Marine Licence application: The Marine Works (Environmental Impact Assessment) Regulations 2007.

Other Consents and Legislation

The Habitats and Birds Directives

39. The Council Directive (92/43/EEC) (the Habitats Directive) was adopted in 1992, offering a means for the EU to meet its obligations under the Bern Convention. The Habitats Directive provides for the conservation of natural habitats and of wild flora and fauna, including offshore waters. This protection is granted through the designation of European sites and European Protected Species (EPS).

40. The European Directive (2009/147/EC) on the conservation of wild birds (The Birds Directive) provides a framework for the conservation and management of wild birds in Europe, including their eggs, nests and habitats.

41. Under the Habitats Regulations, a network of protected sites for birds and certain habitats and species have been established in the UK. Following EU Exit, the network of sites is collectively known as the Natura 2000 network (where the sites are located within Member State countries) and the National Site Network (or UK Site Network[1]) where the sites are located within the UK. These sites are hereafter collectively (whether located in the UK or the EU) referred to as 'European sites' and include:

- Special Areas of Conservation (SACs), candidate SACs or proposed SACs (pSACs);
- Special Protection Areas (SPAs) or proposed SPAs (pSPAs);
- Sites of Community Importance (SCIs); and
- Ramsar sites (where also designated as one of the above).[2]

Habitats Regulations Appraisal

42. In situations where a plan or project is likely to have a significant effect on a European site, the competent authority (Marine Directorate) is required, under the Habitats Regulations, to carry out an 'appropriate assessment'. Further information on the Habitats Regulations is provided by the Applicant in the Ossian Array Report to Inform Appropriate Assessment (RIAA) (Ossian OWFL, 2024) which accompanies this Array EIA Report and has not been re-iterated here.

European Protected Species licence

43. EPS are animals and plants (species listed in Annex IV of the Habitats Directive and referred to in the schedules of the Habitats Regulations) that are provided protection under the Habitats Regulations. All cetacean species (whales, dolphins and porpoises) are EPSs. If an activity is likely to cause disturbance or injury to an EPS, a licence is required to legally undertake the activity.

Energy Act 2004

- Safety Zones:
  - safety zones are intended to assure the safety of renewable energy installations, or other installations in the vicinity, during the different phases of a project. As a result, they may exclude non-project vessels from navigating through a designated area for a designated period.
- Decommissioning:
  - sections 105 to 114 of the Energy Act (as amended by the Energy Act 2008 and the Scotland Act 2016) contain statutory requirements relating to the decommissioning of OREIs and their respective electricity lines; and
  - under the terms of the Energy Act, Scottish Ministers may require a person who is responsible for these installations or lines in Scottish waters or in a Scottish part of a REZ to prepare (and carry out) a costed decommissioning programme for submission to, and approval by, Scottish Ministers (Scottish Government, 2022c).

Marine Strategy Framework Directive

44. The Marine Strategy Framework Directive (MSFD) requires Member States to prepare national strategies to manage their seas to achieve Good Environmental Status (GES) by 2020.

Marine Protected Areas (MPAs)

45. The Marine (Scotland) Act 2010 and the MCAA 2009 introduced arrangements to aid the management of Nature Conservation (NC) MPAs. Under section 126 of the MCAA 2009 and section 83 of the Marine (Scotland) Act 2010, Marine Directorate - Licensing Operations Team (MD-LOT), as the public authority, are obligated to consider if an activity is capable of affecting (other than insignificantly) a protected feature of a NC MPA, or any ecological or geomorphological process, on which the conservation of any protected feature of a NC MPA is dependent.

Pre-Application Consultation (PAC)

46. Where an activity is planned within the Scottish territorial waters, the Marine Licensing (Pre-application Consultation (PAC)) (Scotland) Regulations 2013 apply. There is no provision for PAC in the MCAA 2009, so these requirements are not applicable in respect of relevant applications in the Scottish Offshore Region. Consultation during the pre-application stage for Section 36 consent applications is not a statutory requirement, however, the principles of the PAC Regulations will be followed for all offshore components of the Array. The stakeholder engagement and public consultation carried out in relation to the Array is detailed in volume 1, chapter 5.

[1] The term "national site network" is used in the Conservation of Habitats and Species Regulations 2017 and the Conservation of Offshore Marine Habitats and Species Regulations 2017. The two terms refer to the same network of sites (Scottish Government, 2020d).

[2] Whilst not defined as 'European sites' under the Habitats Regulations, Policies 4(b) and (c) of NPF4 extend the same protection to pSPAs, pSACs and Ramsar sites as a matter of policy.

1.3. PROJECT DESCRIPTION

1.3.1. INTRODUCTION

47. This section provides a summary of the infrastructure and the construction, operation and maintenance, and decommissioning activities associated with the Array, which is further detailed in volume 1, chapter 3.

48. The Array EIA Report has followed the Project Design Envelope (PDE) approach meaning that parameters for the Array included in this section present the maximum extents of the design in order to assess the likely significant most adverse effects of the Array. It should be noted that for some technical topics the most adverse case might be a combination of parameters, not just the maximum parameter, as explained and assessed in volume 2, chapters 7 to 20.

1.3.1. ARRAY INFRASTRUCTURE

49. The Array will be located within the site boundary (shown in Figure 1.1), located off the east coast of Scotland, approximately 80 km south-east of Aberdeen from the nearest point, and comprising an area of approximately 859 km^2 (Figure 1.1).

50. The main components of the Array will include:

- up to 265 floating wind turbines each comprising a tower section, nacelle, hub and three rotor blades, and associated floating foundations which will support the wind turbines;
- mooring and anchoring systems for each floating foundation which will connect the floating foundation to the seabed;
- connectors and ancillaries for mooring and anchoring systems, including buoyancy elements and clump weights;
- up to six large OSPs, or up to three large OSPs and up to 12 small OSPs with fixed jacket foundations;
- scour protection for wind turbine anchoring systems;
- scour protection for small and large OSP fixed foundations as required;
- a network of dynamic/static inter-array cabling linking the individual floating wind turbines to OSPs, and interconnector cables between OSPs (approximately 1,261 km of inter-array cabling and 236 km of interconnector cabling); and
- discrete condition monitoring equipment (such as sensors, cameras, dataloggers etc.), as required for safe and efficient operation of the Array infrastructure.

51. Floating wind turbines will comprise a tower section, nacelle, hub and three rotor blades, and will be attached to a floating foundation. The maximum rotor blade diameter will be no greater than 350 m, with a maximum blade tip height of up to 399 m above Lowest Astronomical Tide (LAT) and minimum blade clearance of 36 m above LAT. The hub height will be no greater than 224 m above LAT (Figure 1.2). The Applicant will develop and agree a scheme for wind turbine lighting and navigation marking with the relevant consultees post-consent decision, for approval by Scottish Ministers after consultation with appropriate consultees.

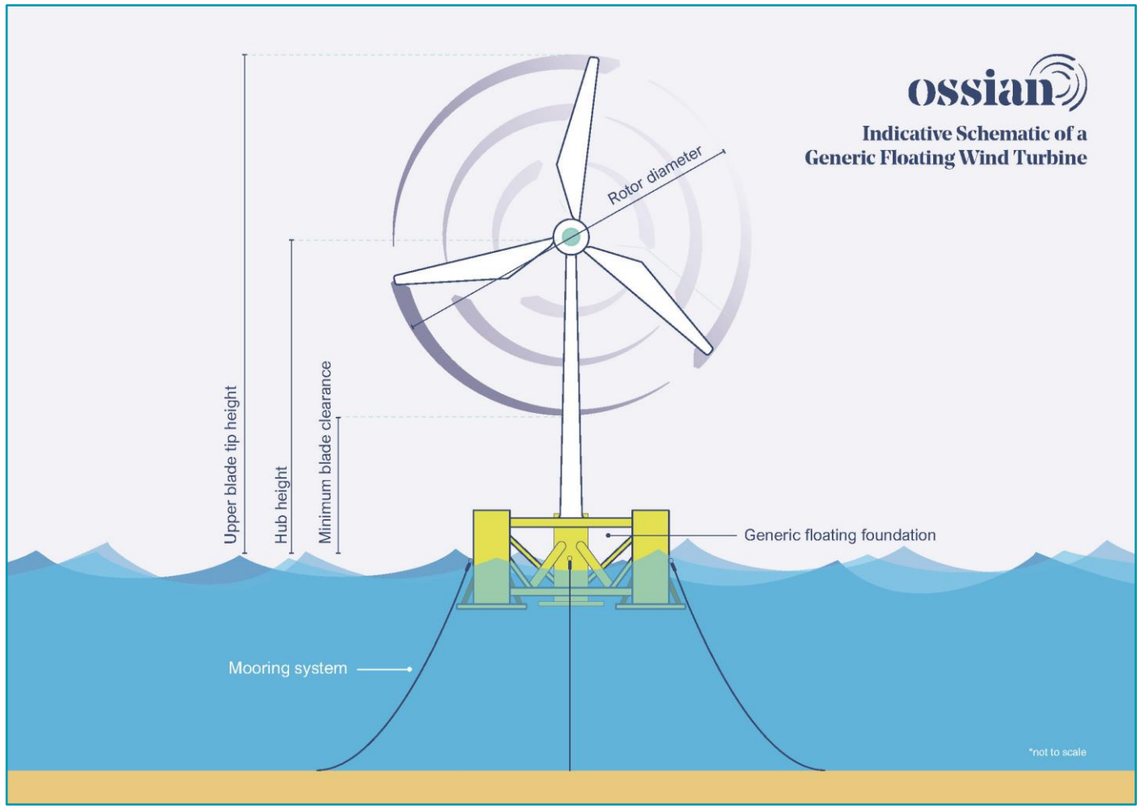

Figure 1.2: Indicative Schematic of a Semi-Submersible Floating Wind Turbine

52. The wind turbine layout will be developed to effectively make use of the available wind resource and suitability of seabed conditions, whilst ensuring that the environmental effects and potential impacts on other marine users (e.g. fisheries and shipping routes) are reduced. If required by consent conditions, confirmation of the final layout of the wind turbines will occur at the final design stage (post-consent) in consultation with relevant stakeholders and submitted to the MD-LOT for approval.

53. The floating foundations will be connected to the seabed via mooring and anchoring systems. Mooring lines run from the floating foundations, through the water column, to an anchoring system which maintains station (i.e. position) of the floating foundation. The mooring line will connect to the floating foundation at a connection point which is located just below the sea surface.

54. Anchoring systems fix the mooring lines to the seabed and may include various solutions, such as driven piles (i.e. foundations which are driven into the seabed using a pile-driving hammer), or embedded anchor types such as suction anchors (installed by pumping water out of a capped steel cylinder, resulting in this being sucked into the seabed) and Drag Embedment Anchors (DEA) (dragged across the seabed until required depth and holding capacity is reached). The Applicant is considering installation of up to nine anchors per floating foundation. The final anchoring solution selected may vary across the Array and will take account of the seabed conditions, detailed analysis of geotechnical data to inform engineering design, and environmental impacts. Five specific scenarios are outlined for the anchoring systems, details of which can be found in volume 1, chapter 3.

55. The use of a number of different connectors and ancillaries may be required for the mooring and anchoring systems which alter the mooring system behaviour, for example, to secure different sections of mooring lines to each other and to the anchoring system, to suspend and/or provide tension in sections of the mooring line, and to weigh down sections of the mooring line which reduces mooring line radius and limits movement of the floating foundation.

56. The OSPs will transform the electricity generated by the wind turbines to a higher voltage and/or to direct current allowing the power to be efficiently transmitted directly to shore or to a wider offshore grid network. OSPs are comprised of a topside, which sits above sea level, attached to a jacket foundation which will be fixed to the seabed using driven piles. The Applicant has defined two options for OSP arrangements to be considered within the Array EIA Report. The exact number and size of OSPs will be subject to National Grid ESO final design recommendations and detailed design, however, the overall size, footprint, piling parameters and key design features will remain within the representative OSP design scenarios considered within the Array EIA Report. Further details can be found in volume 1, chapter 3.

57. Natural processes at sea, such as waves, currents, and storms, can lead to seabed erosion and 'scour hole' formation around anchor and mooring systems, and foundation structures. Scour protection in the form of concrete mattresses (large articulated concrete blocks, linked by a rope lattice and placed on and/or around structures) or rock (either layers of graded stones placed on and/or around structures, or rock filled mesh fibre bags) will be used to mitigate scour around foundations. The type and volume of scour protection required for the Array will vary depending on the various wind turbine anchoring options and offshore platform options considered, and the final parameters will be decided once the design of these is finalised.

58. Up to 1,261 km of inter-array cables carry the electrical current produced by wind turbines to an OSP. As the floating foundations will move with waves and currents, it is proposed that dynamic inter-array cables will be used. There are several cable designs which may be used, however, the most likely to be used for the Array is a 'lazy-S' configuration which allows extension of the cables in response to the floating foundation movements. Where the inter-array cable meets the seabed, this portion is termed 'static' and will be protected either through burial methods at a minimum target burial depth of 0.4 m, or via external cable protection such as use of rock or concrete mattresses (Figure 1.3).

59. Up to 236 km of interconnector cables will be installed within the Array. It is anticipated that cables will be protected via burial methods at a minimum target depth of 0.4 m. External cable protection will be used in areas where minimum target burial depth cannot be achieved to restrict movement and prevent exposure over the lifetime of the Array. This will protect cables from activities such as fishing, anchor placement or dropped objects, and limit effect of heat and/or electromagnetic fields.

60. Up to 12 inter-array cable crossings and up to 12 interconnector cable crossings may be installed across the Array. This will be facilitated by the installation of standard cable crossing designs, likely to be comprised of concrete mattresses, rock placement, or other methods as noted in volume 1, chapter 3.

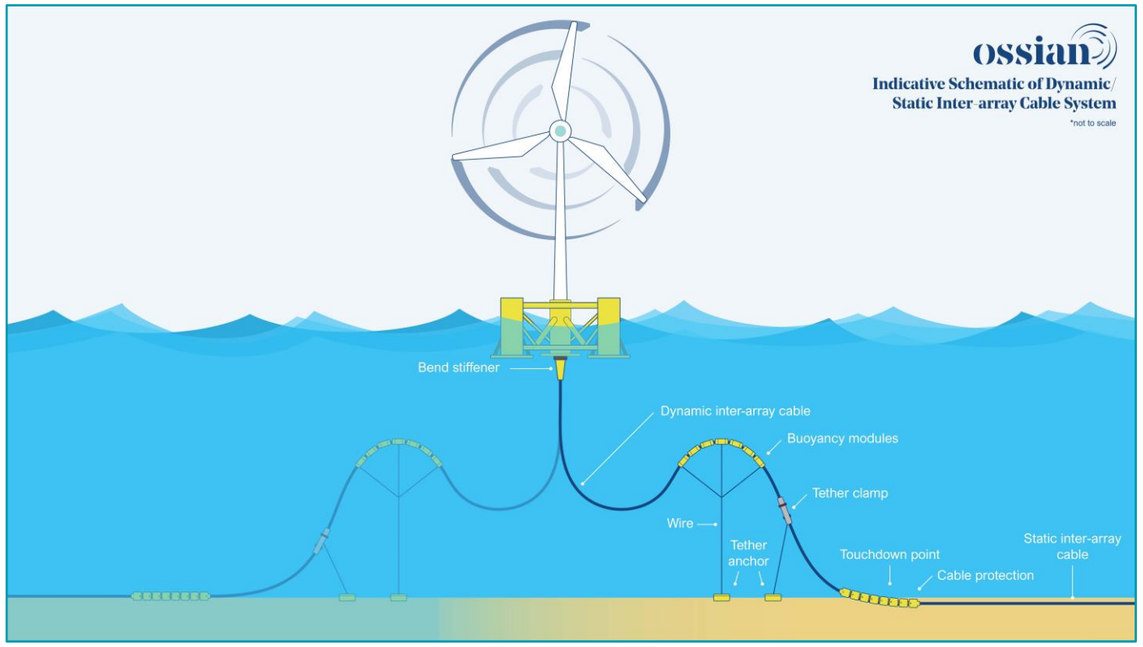

Figure 1.3: Indicative Schematic of Dynamic/Static Inter-Array Cable System

1.3.2. SITE PREPARATION ACTIVITIES

Pre-construction surveys

61. Pre-construction surveys, including geophysical and geotechnical surveys, may be carried out to provide further information of:

- seabed conditions and morphology;
- soil conditions and properties;
- presence or absence of any potential obstructions or hazards; and
- to inform detailed design for the Array.

Clearance of unexploded ordnance

62. UXOs are explosive weapons, from World War I and II for example, that did not explode when they were employed and still pose a risk of detonation. The presence of UXO poses a health and safety risk where it coincides with the planned location of infrastructure and associated vessel activity, and therefore it is necessary to survey for and carefully manage UXOs.

63. Where it is not possible to avoid or relocate a UXO, the preferred method for UXO clearance is for a low order technique called deflagration which causes the UXO to burn out without detonating, therefore reducing impacts to marine fauna and health and safety risks. The Applicant assumed that up to 15 UXOs may require clearance based upon the desk-based study (Ordtek, 2022) and experience from other offshore wind farms in the region. As a risk remains that unintended high order detonation may occur, 10% of

clearance events have been assumed to have the potential to result in high order detonation (see volume 1, chapter 3 and volume 2, chapter 10).

Sand wave and boulder clearance

64. Sand waves are a low ridge of sand formed through the action of the wind or water (through waves or tidal currents). Existing sand waves may need to be cleared in some areas of the Array to provide a relatively flat surface for installation of inter-array and interconnector cables and ensure they can be buried at target burial depth and remain buried for the lifetime of the Array. Sand wave clearance may be undertaken in specific areas of the Array (e.g. along inter-array and interconnector cables), as required, and may occur throughout the construction phase.

65. A boulder is defined as a rock fragment which is over 256 mm (Wentworth Scale) in diameter and/or length. Boulder clearance may be required in some areas of the Array prior to installation of offshore infrastructure, in particular, along inter-array cables and interconnector cables, to increase the success rate for achieving minimum target burial depth during cable burial, and reduce the risk of cable damage during installation and subsequent burial. It may also be required in the vicinity of the OSP jacket foundation locations (including within the jack-up vessel zone around the OSP foundation locations), to avoid disruption to installation activities and to ensure stability where the jack-up vessel legs touchdown on the seabed. A Dynamic Positioning (DP[1]) vessel (one which uses a computer control system to automatically maintain the vessels own position and heading) is likely to be used to undertake the boulder clearance campaign. Boulders may be cleared using a plough or boulder grab, however, the geophysical and pre-construction surveys, and the parameters of any boulders present (e.g. size, density and location of boulders), will inform the methodology to be used.

1.3.3. CONSTRUCTION PHASE

66. Construction of the Array is expected to occur over a period of eight years cumulatively (including site preparation works) aligning with the following indicative construction series:

- step 1 –anchoring and mooring installation;
- step 2 – OSP topsides and fixed jacket foundations installation/commissioning;
- step 3 – inter-array and interconnector cables installation, including cable burial and/or protection, where required; and
- step 4 – floating wind turbine and floating foundation installation/commissioning.

67. A number of installation vessels will be used during the construction phase including main installation vessels, support vessels, tugs and anchor handlers, cable installation vessels, guard vessels, survey vessels, Crew Transfer Vessels (CTVs) and scour/cable protection installation vessels. Helicopters may also be used for crew transfers.

1.3.4. OPERATION AND MAINTENANCE PHASE

68. The operational life of the Array is expected to be 35 years. The overall operation and maintenance strategy will be finalised once the operation and maintenance base location and technical specification of the Array are known, including wind turbine type, electrical export option and final project layout. Volume 1, chapter 3 provides a description of the foreseeable planned and unplanned maintenance activities.

69. Routine operation and maintenance works will be conducted using support vessels, CTVs, and/or Remotely Operated Vehicles (ROVs). Divers and Dive Support Vessels (DSVs) may be utilised if required, although it is anticipated that diverless operations will be utilised as far as practicable. For infrequent major operation and maintenance works, including major component replacements, the floating wind turbines and associated floating foundations will be detached from their mooring and anchoring systems and towed to a suitable port facility. Jack-up vessels will be used for infrequent major maintenance campaigns associated with the OSPs. ROVs will be used to inspect foundations, mooring and anchoring systems, and cabling.

1.3.5. DECOMMISSIONING PHASE METHODOLOGY

70. At the end of the Array's operational lifetime, it is expected that all structures above the seabed (with the exception of driven piles and DEAs (depending upon anchor system used), scour protection and cable protection) will be fully removed where feasible. Driven piles and/or DEAs installed as part of the wind turbine anchoring system, static portions of inter-array cables, interconnector cables, scour protection and cable protection are either expected to remain *in situ* or method of decommissioning is yet to be determined. Legislation, guidance and good practice will be kept under review throughout the lifetime of the Array and will be followed at the time of decommissioning. Environmental conditions and sensitivities will also be considered since removal of structures may result in greater environmental impacts in comparison to leaving *in situ*.

71. The sequence of decommissioning is likely to be the reverse of the construction sequence, and similar types and numbers of vessels and equipment are expected to be involved.

1.3.6. REPOWERING

72. 'Repowering' of the Array, which involves replacing old wind turbines with more efficient and powerful ones, at or near the end of its design life may be considered suitable, for example, where new technology becomes available. In this example, wind turbines and/or foundations may be reconstructed and replaced with those of a different specification or design. If the decision was taken to repower the Array at or near the end of its design life, this may be subject to further consent(s) (and potentially an EIA Report), depending on specifications and designs of the new wind turbines and/or foundations required to repower the Array.

1.4. SITE SELECTION AND CONSIDERATION OF ALTERNATIVES

1.4.1. THE ARRAY

73. This section presents a summary of volume 1, chapter 4 which outlines the site selection process undertaken prior to award during the ScotWind Leasing Round in January 2022 through to design freeze of the PDE to inform the Array EIA Report. Further detailed design will be undertaken post-consent.

74. The approach taken with regard to site selection and the definition and refinement of the Array involved the following steps:

- stage 1: identification of Sectoral Marine PO Areas and ScotWind Leasing Round;
- stage 2: Sectoral Marine Plan (SMP) Plan Option Area (PO Area): site assessment and selection of preferred PO area;
- stage 3: ScotWind Leasing Award and Array site boundary;
- stage 4: Array and PDE - EIA Scoping; and
- stage 5: Array and PDE – EIA and Application.

75. A summary of these stages is provided below, with full details included in volume 1, chapter 4.

Stage 1: Identification of SMP PO Areas and ScotWind Leasing Round

76. The SMP for Offshore Wind Energy was published by the Scottish Government in October 2020, which outlines a spatial strategy for commercial scale offshore wind development in Scotland and provides a strategic framework for the ScotWind Leasing Round (Scottish Government, 2020a) through the identification of 15 final PO Areas across four regions (West (W), North (N), North East (NE) and East (E)) for renewable energy generation.

77. The first ScotWind Leasing Round was launched by Crown Estate Scotland (CES) in June 2020. In the ScotWind Leasing Round, developers were able to apply for the rights to build offshore wind farms in Scottish waters within the PO Areas. The final PO Areas were published in October 2020. In November

2020, the Applicant announced that they were in the process of preparing bids for PO Areas offered as part of the ScotWind Leasing Round (SSER, 2020).

Stage 2: SMP PO Areas: site assessment and selection of preferred PO area

78. The Applicant completed a site assessment to understand risk and constraints of all 15 of the final PO Areas included in the ScotWind Leasing Round. The assessment considered alternative technology options at a preliminary level, with a specific focus on floating foundations whilst also considering sites suitable for fixed and 'hybrid' (mixed floating and fixed technology) solutions.

79. Following review of the DPOs and selected sites, further work was undertaken by the Applicant to narrow their site selection further using the guidelines set out in the CES ScotWind Leasing documents (CES, 2021). Four sites were identified within three DPOs which included the E1 DPO. Two specific sites were defined within the E1 DPO taking in to account a detailed environmental constraints analysis within the wider Eastern region (E1) PO Area.

80. The Applicant proceeded to bid for one of these specified sites within the E1 PO Area, referred to as 'E1 East'.

Stage 3: ScotWind Leasing Award and Array site boundary

81. The Applicant undertook a detailed review of a number of parameters and constraints within the E1 PO Area (SSER, Marubeni and CIP, 2021). Baseline data from Berwick Bank and Seagreen 1 (formerly known as Seagreen Alpha and Seagreen Bravo) Offshore Wind Farm projects, and Seagreen 1A Project including metocean, climatic and ornithology baseline data, were considered in the assessment process. Specifically, within the E1 PO Area, key environmental concerns included minor socio-economic impacts to commercial shipping, commercial fishing, power interconnector sectors, and Ministry of Defence (MOD) radar interference, as well as impacts to ecological receptors (Scottish Government, 2020a). To further understand the potential constraints associated with the E1 PO Area, the Applicant carried out several studies and analyses to inform the bid for the ScotWind Leasing Round.

82. The constraints analysis also led to the selection of the Preferred Project Concept (PPC) put forward by the Applicant at the bid stage of the ScotWind Leasing Round. The PPC was a floating offshore wind farm located within the E1 PO Area with a proposed capacity of 2.6 GW (SSER, Marubeni and CIP, 2021). Preliminary wind turbine selection and foundation types were also put forward as part of the ScotWind Leasing Round bid for the E1 PO Area.

83. In January 2022, the Applicant was awarded an Option to Lease Agreement for the E1 East site boundary. This area was derived following the aforementioned constraints assessments which balanced technology, consenting and commercial feasibility factors. At this stage, a degree of flexibility was maintained for the site design once detailed site work, such as geotechnical surveys and ornithological studies, have been completed.

84. In August 2022, the Applicant announced that the E1 East floating offshore wind farm was to be renamed 'Ossian'; the site boundary remained unchanged.

Stage 4: Array and PDE - EIA Scoping

85. Following award of the Option to Lease Agreement, the Applicant developed the PDE for the Array EIA Scoping Report. The PDE built upon the PPC put forward within the ScotWind Leasing Round bid, and further studies and analyses to refine project parameters were undertaken. Due to previous site condition assessments, the PDE parameters were based upon deployment of floating turbine technology and fixed bottom OSPs due to the depth range across the Array.

86. In November 2022, the Applicant engaged with statutory consultees prior to submission of the Array EIA Scoping Report and LSE Screening Report to provide a project update and the initial conclusions drawn for key biological and human topics, and to seek feedback and agreement on impacts to be scoped in and out of the topic assessments. Statutory consultees engaged at these pre-Scoping Workshops included MD-LOT, Marine Directorate – Science Evidence, Data and Digital (MD-SEDD), NatureScot, Royal Society for the Protection of Birds (RSPB), Maritime and Coastguard Agency (MCA), Northern Lighthouse Board (NLB), Scottish Fishermen's Federation (SFF), Scottish White Fish Producers Association (SWFPA) and North and East Coast Regional Inshore Fisheries Group (NECRIFG).

87. The Scoping Report and LSE Screening Report for the Array were submitted by the Applicant to the Scottish Ministers in March 2023 (Ossian OWFL, 2023).

Stage 5: Array and PDE – EIA and Application

88. Following submission of the EIA Scoping Report for the Array in March 2023, the Applicant refined the PDE to identify sufficient detail to undertake a robust EIA. The key refinements made to the PDE from the Array EIA Scoping Report to this Array EIA Report were informed by early engineering works and consultation with stakeholders. In addition to stakeholder consultation, the Applicant held internal workshops to develop and inform the EIA PDE with representatives from the engineering and consenting teams to ensure proportionate and realistic parameters have been set whilst considering environmental, consenting and engineering constraints.

1.5. STAKEHOLDER ENGAGEMENT AND CONSULTATION

1.5.1. INTRODUCTION

89. This section presents a summary of volume 1, chapter 5 which contains information regarding stakeholder engagement and consultation undertaken by the Applicant during the pre-application phase of the Array.

90. In particular, the stakeholder engagement and consultation Array EIA Report chapter summarises:

- the policy and legislative context of consultation adhered to during the pre-Application phase for the Array;
- the stakeholder engagement principles applied to the pre-Application phase.
- a list of stakeholders consulted/approached for feedback; and
- an overview of the stakeholder engagement undertaken.

1.5.2. GOOD PRACTICE IN CONSULTATION

91. The Applicant has sought to engage with stakeholders throughout the pre-Application phase, following advice from MD-LOT. The Applicant has reviewed and considered all feedback provided as part of stakeholder consultation in the pre-Application phase, and this is documented in the relevant chapters of the Array EIA Report.

92. The Applicant is committed to stakeholder engagement at all phases of the Array, consulting on proposals at key stages throughout the development process. This engagement, including with statutory and non-statutory stakeholders, and the public, has occurred throughout the development of the Array.

1.5.3. STAKEHOLDER ENGAGEMENT

93. A thorough statutory and non-statutory stakeholder engagement process has been undertaken by the Applicant. The Applicant aimed to develop a proportionate Array EIA Report, and the key to achieving this is engagement with stakeholders to incorporate advice, address concerns and develop appropriate mitigation required. This has included meetings, correspondence, meeting minutes and provision of digital documentation.

94. The full list of stakeholders that were approached/consulted during the pre-Application process (including Scoping and LSE[2] Screening) for the Array can be found in volume 1, chapter 5.

1.5.4. PUBLIC ENGAGEMENT

95. Key groups of public stakeholders have been engaged throughout the pre-application phase of the Array, as follows:

- Strategic Engagement: Engagement focussed on local and national government bodies including local authority councillors;
- National Engagement: Engagement focussed on statutory stakeholders and non-statutory bodies with particular interest in offshore activity; and
- Local Engagement: Engagement focussed on local organisations, local communities and members of the public.

96. A Fisheries Liaison Officer (FLO) has been engaged on Ossian since September 2023 to act as a liaison between the Applicant and the fishing industry. The FLO has the delegated authority to fully represent the Applicant on fisheries related issues, such as attending necessary Commercial Fisheries Working Groups (CFWGs), when in place, and seeking agreement on any necessary works relating to the Array. The Applicant has appointed Natural Power to act as FLO on the Array and Proposed offshore export cable(s) application. Ossian are also supported by dedicated in-house Commercial Fisheries Manager to lead on the Applicant's representation on strategic fisheries work.

1.6. ENVIRONMENTAL IMPACT ASSESSMENT METHODOLOGY

97. This section outlines the EIA methodology used for the assessment of LSE[1] associated with the Array on physical, biological and human environment receptors.

98. This Array EIA Report has been prepared in accordance with the EIA Regulations and relevant policy and legislation as described in section 1.2.

1.6.1. KEY PRINCIPLES OF THE ASSESSMENT

Overview

99. The EIA methodology used in this Array EIA Report has been included as a separate chapter (volume 1, chapter 6). In addition, the following is included in each topic chapter:

- identification of the study area for the topic specific assessments;
- description of topic specific policy, guidance and legislation;
- summary of topic specific consultation activity, including comments received from MD-LOT and stakeholder representation as part of the Ossian Array Scoping Opinion (MD-LOT, 2023);
- description of the methodology to inform the baseline conditions, including detail on desktop study sources and site-specific surveys where relevant;
- description of the environmental baseline conditions, including future baseline scenario;
- presentation of the assessment of LSE[1] (further details of what this includes are listed in volume 1, chapter 6);
- presentation of the CEA;
- presentation of the transboundary effects; and
- presentation of the inter-related effects.

100. The following sections describe the approach taken as part of the offshore EIA process in more detail.

Evidence-based approach

101. The area of the North Sea in the vicinity of the Array has an existing base of data/knowledge acquired through surveys and assessments undertaken for existing and proposed offshore wind farms including Berwick Bank, Seagreen Alpha/Bravo (referred to as Seagreen 1 Offshore Wind Farm and Seagreen 1A Project when considered as part of the CEA for the Array), Inch Cape and Neart na Gaoithe (NnG). The Applicant has further commissioned site-specific surveys carried out as part of the Array baseline studies. Where possible in this Array EIA Report, the Applicant has made use of these data to:

- characterise the baseline environment to inform the EIA where data are sufficient and appropriate;
- identify data gaps;
- draw upon the pre-existing evidence base in addition to site-specific and recent data as appropriate; and
- support scoping out of impacts where there is clear evidence of lack of a receptor-impact pathway.

102. Where possible, additional data to inform the Array assessment of effects have been identified and described within the relevant topic chapter of this Array EIA Report (volume 2, chapters 7 to 20).

Maximum design scenario

103. The PDE approach (also known as the Rochdale Envelope approach) has been adopted for the assessment of the Array, in accordance with current best practice and the "Rochdale Envelope Principle[3]" (volume 1, chapter 3) (PINS, 2018). This approach follows the assessment of LSE[1] of the realistic 'maximum design scenario' parameters of the Array.

104. Volume 1, chapter 3 presents the project design parameters for relevant components of the Array. For each of the topic chapters within this Array EIA Report (volume 2, chapters 7 to 20) and for each of the effects assessed, the project design parameters considered constitute the scenario which would give rise to the greatest potential effect (i.e. a 'most adverse' scenario; hereafter referred to as the 'maximum design scenario' or 'MDS').

105. Through identifying and assessing the MDS for any given potential impact, it can be assumed that the potential impact (and therefore the effect) will be no greater for any other design scenario. This approach enables the Applicant to retain necessary flexibility in design of the Array, within the maximum scenarios which are fully assessed in the Array EIA Report.

Designed in measures and mitigation measures

106. There are three different forms of mitigation including:

- Primary mitigation (inherent): "*Modification 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*" (IEMA, 2016).
- Secondary mitigation (foreseeable): "*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 ES*" (IEMA, 2016).
- 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 requirement, or actions that are considered to be standard practices used to manage commonly occurring environmental effects*" (IEMA, 2016).

107. Both primary (inherent) mitigation and tertiary (inexorable) mitigation are considered as "designed in measures" within this Array EIA Report. The iterative approach to the assessment process has been utilised to inform the design of the Array (through the identification of LSE[1] and development of designed in

[3] Case law (i.e. R v Rochdale MBC ex parte Milne (No1.) [1999] 5 WLUK 67 and R v Rochdale MBC ex parte Milne (No.2) [2000] 7 WLUK 955).

measures to address these). Commitment to implementing the identified measures is demonstrated through incorporation of such measures within the design as “designed in measures”.

108. This approach ensures that the significance of effect presented in the Array EIA Report is considered representative of the maximum effect of the Array should the application for consent be approved and the Array be developed.

109. Secondary (foreseeable) mitigation is an additional measure which is implemented after the assessment process has been completed. The aim of a secondary mitigation measure is to prevent, reduce and offset LSE[1] which could not be avoided through designed in measures. Secondary mitigation proposed to reduce significance of impact are detailed within the topic chapters of the Array EIA Report and summarised in volume 2, chapters 7 to 20.

Identification of impacts and significance of effect

110. The Array has the potential to create a range of impacts and effects with regards to the physical, biological and human environment, for both coastal and marine receptors.

111. For the purposes of the Array EIA Report, the term ‘impact’ is defined as a change as a result of an action. For example, the laying of an inter-array cable (action) is likely to result in seabed disturbance (impact). Impacts can be defined as direct, indirect, temporary, irreversible, secondary, cumulative and inter-related. They can also be either beneficial or adverse, although the relationship between them is not always straightforward and relies on available evidence and professional judgement.

112. The term ‘effect’ is defined as the consequence of an impact. For example, the laying of an inter-array cable (action) results in seabed disturbance (impact), with the potential to disturb benthic habitats and species (effect).

113. 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 1.1. In cases where a range of significance is possible for an effect, there remains the possibility that this may span the significance threshold (i.e. the range is given as minor to moderate). In such cases the final significance is based upon the technical specialist’s professional judgement as to which outcome is the most likely effect, with an explanation as to why this is the case.

Table 1.1: Matrix Typically Used for the Assessment of the Significance of the Effect

Sensitivity of Receptor	Magnitude of Impact: Negligible	Low	Medium	High
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

114. The standard approach for the purposes of this assessment:

- a level of significance of effect of moderate or more will be considered a ‘significant’ effect in terms of the EIA Regulations; and
- a level of significance of effect of minor or less will be considered ‘not significant’ in terms of the EIA Regulations.

115. Certain topic chapters have applied an EIA methodology which deviates from the one described in volume 1, chapter 6; these are listed in volume 1, chapter and explained in the relevant topic chapters (volume 2, chapters 7 to 19).

116. As part of the topic assessment, further mitigation measures have been identified after the assessment of significance as required. Following this, the assessment re-evaluates the significance of effect using the methodology previously described.

Cumulative Effects Assessment

117. The CEA considers the impacts arising from the Array cumulatively with other relevant plans, projects and activities, such as other offshore wind farms, oil and gas projects, cables, and ports and harbours projects. Cumulative effects are therefore the combined effect of the Array with the effects from a number of different plans, projects and activities, on the same receptor group or resource.

118. A process has been followed for the screening of plans, projects and activities that may be considered in the CEA alongside the Array (volume 3, appendix 6.4). This process involved a screening stage, which identified those foreseeable developments or activities with which the Array may interact to result in cumulative effects.

119. After the screening, a list of all projects, plans and activities screened in for assessment was produced for each topic and a tiered approach was adopted to complete the CEA. The tiers are described in volume 3, appendix 6.4.

120. The CEA follows the Array assessment of effects methodology, as described in volume 1, chapter 6, as far as practicable. This approach however differs between topic chapters according to several factors, such as the nature of the topic, the cumulative projects, plans and activities included for that topic, the data available for each project, plan and activity, and the specific practicalities around undertaking CEA for that discipline. Where quantitative assessment has not been practicable, a mix of qualitative and quantitative or wholly qualitative assessment has been undertaken.

Transboundary effects

121. Transboundary effects may have the potential to arise if an impact from the Array has the potential to significantly affect the environment on the interests of European Economic Area (EEA) states. A full description of how the transboundary effects assessment has been carried out is found in volume 3, appendix 6.6.

122. The following topic has been identified as having a potential for transboundary impacts associated with the Array:

- shipping and navigation (volume 2, chapter 13).

1.7. PHYSICAL PROCESSES

123. Physical processes refer to the marine processes and the relationship with the physical environment including tidal currents, wave climate, water column characteristics, suspended sediments and sediment transport. The physical processes of the Array were assessed using datasets collected from a series of site-specific surveys, along with a detailed desktop review of existing studies and datasets.

124. The geophysical survey carried out by Ocean Infinity in 2022 (volume 3, appendix 8.1, annex A) indicated that water depths range between 59 m and 154 m relative to Lowest Astronomical Tide (LAT) over the Array, with an average depth of 74.5 m. Seafloor gradients are gentle within the site boundary, with some localised steeper ripple areas. Megaripples and sand waves across the site boundary are indicative of mobile sediments which are comprised mainly of sand, with some poorly mixed sediments and gravel deposits. Offshore marine bedrock data provided by the British Geological Survey illustrates that the physical processes study area is dominated by chalk, mudstone, sandstone and lignite (Marine Directorate, 2017).

125. The site-specific metocean survey undertaken (2023) recorded maximum significant wave heights up to 8.96 m and high energy periods of up to 20 s within the site boundary during November 2022, with dominant wave directions from the north and north-north-east. The dominant wind direction within the physical processes study area is from the south-west, with wind speeds likely up to 31.5 m/s. Currents typically flow in a south-south-westerly direction near the seabed and a southerly direction near the surface, with a mean spring tidal range of 2.34 m to 2.41 m. Mean current speeds up to 0.27 m/s were recorded during the site-specific metocean survey, with a maximum speed of 0.91 m/s. The average Suspended Particulate Matter (SPM) levels have to be between 0 mg/l and 1 mg/l across the physical processes study area (Cefas, 2016), with evidence of low sediment transport rates due to low current speeds in the physical processes study area.

126. Salinity differences between the surface and seabed within the physical processes study area was found to be limited to 0.1 PSU throughout the year, with the greatest differences evident in the month of August (Berx and Hughes, 2009). The physical processes study area was considered to be subject to weak stratification (formation of distinct and stable water layers by density), with evidence of relatively thorough mixing, even in the summer months. Maximum nearbed temperatures recorded in the month of October, when the water column layers are considered to be fully mixed, following a warming period of the surface waters over the summer months (volume 3, appendix 7.1, annex A). Further data extracted from the Scottish Shelf Waters Reanalysis Service (Barton *et al*., 2022) confirmed that the effects of wind on seasonal stratification are very low within the physical processes study area.

127. Three potential impacts of physical processes on receptors due to the construction, operation and maintenance, and decommissioning phases of the Array, were identified. These were noted as:

- increased suspended sediment concentrations (SSCs) and associated deposition and sediment transport due to operation and maintenance activities;
- impacts to the wind field due to the presence of infrastructure; and
- impacts to seasonal stratification due to the presence of infrastructure.

128. With the proposed designed in measures in place, each of these impacts result in effects of negligible or minor adverse significance, which is not significant in EIA terms.

129. Cumulative impacts arising from the Array together with other projects and plans were assessed and predicted to result in 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 in the absence of mitigation is not significant in EIA terms.

130. No likely significant transboundary effects with regard to physical processes from the Array on the interests of EEA states were predicted.

1.8. BENTHIC SUBTIDAL ECOLOGY

131. Benthic ecology refers to the communities of animals and plants which live on or in the seabed and the relationships that they have with each other and with the physical environment. The subtidal benthic ecology of the Array was characterised via a series of site-specific surveys using grab sampling, underwater video and benthic trawls.

132. The site-specific surveys indicated that seabed within the site boundary supports a benthic assemblage typical of this area of the North Sea. Offshore subtidal sands and gravels and subtidal sands and gravels represented the main seabed habitats, supporting a range of species such as sea urchins, bivalves, polychaetes (a class of segmented worms often known as bristleworms) and brittle stars. For the purposes of this assessment, Important Ecological Features (IEFs) were defined based on the results of the site-specific survey and the baseline collated through desktop data sources. These IEFs were:

- Offshore subtidal sands and gravels;
- Subtidal sands and gravels;
- ocean quahog;
- phosphorescent sea pen;
- sea tamarisk; and
- dead man's fingers.

133. A number of potential impacts on benthic subtidal ecology associated with all phases of the Array were identified. These included:

- temporary and long term habitat loss and disturbance in all phases;
- increased risk of Invasive Non-Native Species (INNS) in all phases;
- increased SSCs and associated deposition in all phases;
- potential effects of Electromagnetic Fields (EMFs) in the operation and maintenance phase;
- colonisation of hard structures in the operation and maintenance phase; and
- removal of hard structures in the decommissioning phase.

134. With the proposed designed in measures in place, all of these impacts result in effects of minor significance, which is not significant in EIA terms.

135. Cumulative impacts arising from the Array together with other projects and plans were assessed and predicted to result in effects of minor significance upon benthic subtidal ecology, which is not significant in EIA terms.

136. No likely significant transboundary effects with regard to benthic subtidal ecology from the Array on the interests of EEA states were predicted.

1.9. FISH AND SHELLFISH ECOLOGY

137. Fish and shellfish ecology refers to the study of fish and shellfish, and how they behave and interact with their environment, such as some species moving between freshwater and marine environments. The fish and shellfish ecology of the Array was characterised through a detailed desktop review of existing studies and datasets supplemented by data collected as part of a site-specific benthic survey. The survey and reports indicated that the Array supports a variety of fish and shellfish species that are typical of this area. Key fish included herring and cod, which use the area within the Array and surrounding areas to release eggs, along with fish such as sea lamprey which might pass through or near to the Array during their movement from sea to fresh water.

138. A number of potential impacts on fish and shellfish species, associated with the construction, operation and maintenance, and decommissioning phases of the Array, were identified. These included:

- temporary habitat loss and disturbance during all phases;
- long term habitat loss and disturbance during all phases;
- colonisation of hard structures during the operation and maintenance phase;

- noise impacting fish and shellfish ecology receptors during the construction and operation and maintenance phases;
- increased suspended sediment concentrations and associated deposition during all phases; and
- effects to fish and shellfish ecology due to EMFs from subsea electrical cabling during the operation and maintenance phase.

139. With the proposed designed in measures in place, all of these impacts result in effects of either negligible or minor adverse significance, which is not significant in EIA terms.

140. Cumulative impacts arising from the Array together with other projects and plans were assessed and predicted to result in effects of negligible or minor significance (not significant in EIA terms) on fish and shellfish ecology.

141. No likely significant transboundary effects regarding fish and shellfish ecology from the Array on the interests of EEA states were predicted.

1.10. MARINE MAMMALS

142. The marine mammal assessment focuses on the marine mammal communities within the vicinity of the Array. The northern North Sea is an important area for marine mammals, supporting many species of cetaceans (dolphins, whales and porpoises) and two species of seal. The distribution of marine mammals is strongly influenced by the distribution of their prey (i.e. mostly fish) and their occurrence is often unpredictable due to their highly mobile nature.

143. The marine mammal ecology in the vicinity of the marine mammal study area was characterised through a detailed desktop review of existing studies and datasets, alongside site-specific data. Data from the Digital Aerial Survey (DAS), undertaken by using digital cameras on aircraft flying over the site, demonstrated that four of the five key marine mammal species were sighted within the marine mammal study area, and these included: harbour porpoise, white-beaked dolphin, minke whale and grey seal. Of the cetaceans, harbour porpoise was the most frequently recorded species and, during site-specific aerial surveys, was sighted in every month of the year (across two years of surveys). Minke whale and white-beaked dolphin were found to be seasonal visitors to the region (summer months). Bottlenose dolphins, which primarily move along inshore areas, are part of an east coast of Scotland resident population and were not sighted in the DAS throughout the survey. Grey seals haul-out on shore in coastal areas and make foraging trips out to sea. Seals were recorded regularly during site-specific aerial surveys, with most species identified as grey seal.

144. A number of potential impacts on marine mammal receptors, associated with the construction, operation and maintenance, and decommissioning phases of the Array, were identified:

- injury and disturbance from underwater noise generated during piling, UXO clearance and site-investigation surveys (including geotechnical surveys);
- injury and disturbance from underwater noise generated during vessel use and other noise producing activities;
- injury due to collision with vessels;
- effects on marine mammals due to EMFs from subsea electrical cabling in the water column;
- injury and disturbance from underwater noise generated during the operation of floating wind turbines and anchor mooring lines;
- effects on marine mammals due to entanglement associated with the Array; and
- effects on marine mammals due to altered prey availability.

145. With the proposed designed in measures in place, most of these impacts result in effects of minor adverse significance, which is not significant in EIA terms.

146. The assessment did, however, identify the potential effect of moderate adverse significance (significant in EIA terms) on harbour porpoise (injury) as a result of clearance of UXOs by full detonation of the munition (injury), therefore, secondary mitigation was proposed. For UXOs, the proposed approach is to clear the munitions using small, shaped donor charges that would neutralise the explosive material and therefore not lead to full detonation. Since there is a small, inherent risk of an accidental full detonation could occur, additional mitigation was proposed via use of an Acoustic Deterrent Device (ADD) and soft start charges (very small scare charges) and although there remains some residual effect (i.e. potential risk of injury to harbour porpoise), the numbers are likely to be very small in the context of the North Sea reference population and therefore the residual impact was determined to be of minor adverse significance, which is not significant in EIA terms. Whilst the proposed approach is to avoid the use of full detonation, a European Protected Species (EPS) licence will be applied for on the basis that such detonation could occur.

147. Cumulative impacts arising from the Array together with other projects and plans were assessed and predicted to result in effects of minor adverse significance (not significant in EIA terms) upon marine mammals within the regional marine mammal study area for most impacts. As per the Array alone assessment, the assessment of cumulative effects identified the potential effect of moderate adverse significance (significant in EIA terms) on harbour porpoise (injury) as a result of clearance of UXOs by full detonation of the munition (injury), therefore, secondary mitigation was proposed as noted in paragraph 146 which reduced the residual significance to minor adverse significance (not significant in EIA terms).

148. No transboundary effects with regard to marine mammals from the Array on the interests of other EEA states were predicted.

1.11. OFFSHORE ORNITHOLOGY

149. Offshore ornithology refers to the birds that may interact with the Array. This includes seabirds (birds that spend a lot of their time at sea) and also other birds that may pass through or near the array on migration.

150. The birds likely to interact with the Array were characterised by both a desk-based review of available information, and site-specific surveys that were undertaken by using digital cameras on aircraft flying over the site to capture videos. Birds were counted and identified from the videos.

151. It was found that the key bird species to consider were:

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

152. A number of potential impacts on offshore ornithology were identified, associated with the construction, operation and maintenance, and/or decommissioning phases of the Array. These included:

- temporary habitat loss and disturbance during the construction and decommissioning phases;
- indirect impacts from construction/decommissioning noise during the construction and decommissioning phases;
- indirect impacts from UXO clearance during the construction phase;
- disturbance and displacement from the physical presence of wind turbines and maintenance activities during the operation and maintenance phase;
- barrier to movement during the operation and maintenance phase;
- collision with wind turbines during the operation and maintenance phase;

- changes to prey availability during the construction and decommissioning phases; and
- entanglement during the operation and maintenance phase.

153. With the proposed designed in measures in place, all of these impacts result in effects of negligible or minor adverse significance in EIA terms from the Array for all key bird species.

154. Cumulative impacts arising from the Array together with other projects and plans were assessed and predicted to result in effects of minor adverse significance (not significant in EIA terms) for all impacts (except for the combined impact – collision and displacement on kittiwake populations during the operation and maintenance phase when including Berwick Bank Offshore Wind Farm) .

155. No likely significant transboundary effects with regard to offshore ornithology from the Array on the interests of EEA states were predicted.

1.12. COMMERCIAL FISHERIES

156. Commercial fisheries refers to any form of fishing activity legally undertaken and sold for taxable profit. The commercial fisheries active across the Array and wider regional area were characterised via analysis of landing statistics and mapping of fishing grounds, including vessel monitoring system data, aerial surveillance, vessel plotter data and consultation with the industry.

157. The commercial fishing fleets operating across the wider regional area include:

- UK, Norwegian, Danish, Dutch and German pelagic trawlers targeting herring;
- UK demersal otter trawlers targeting *Nephrops*, haddock and mixed demersal species;
- UK demersal seine targeting haddock and mixed demersal species;
- UK scallop dredgers targeting king scallop; and
- UK potting vessels targeting brown crab and lobster.

158. The characterisation of commercial fisheries found that in comparison to the wider regional area, the Array is not heavily fished or targeted by UK vessels, with relatively low value of catches in recent years. Historically the area overlapping the Array has been more important for catches of haddock (notably from 2011 to 2014).

159. A number of potential impacts on commercial fisheries, associated with the construction, operation and maintenance, and decommissioning of the Array were identified. These included:

- temporary loss or restricted access to fishing grounds;
- long term loss or restricted access to fishing grounds;
- displacement of fishing activity into other areas;
- interference with fishing activity;
- increased snagging risk, which could result in loss or damage to fishing gear;
- increased steaming/vessel transit times and
- impacts to commercial exploited species populations.

160. For reduced access or loss of fishing grounds it was assumed that fishing would not resume within the Array due to the moorings and anchoring systems deployed as part of the floating wind turbine infrastructure.

161. With the proposed mitigation measures in place,, all of these impacts result in effects of minor adverse significance (not significant in EIA terms).

162. Cumulative impacts arising from the Array together with other projects and plans (including fisheries management measures implemented as part of the UK's Marine Protected Area network) were assessed and predicted to result in effects of minor adverse significance (not significant in EIA terms) for most impacts.

163. However, effects of moderate adverse cumulative significance (significant in EIA terms) were identified across all phases in relation to temporary and long term loss or restricted access to fishing grounds for the demersal otter trawl and demersal seine haddock fishery. There is a level of uncertainty attached to this level of significance and this uncertainty leads to a potential overstatement of the effects, rather than understatement. As a result of this precautionary assessment, additional monitoring has been proposed to examine patterns of fishing activity in the local area surrounding the Array.

164. No likely significant transboundary effects with regard to commercial fisheries from the Array on the interests of EEA states were predicted.

1.13. SHIPPING AND NAVIGATION

165. Shipping and navigation refers to the regular activity and behaviour of surface based vessels. The shipping and navigation baseline in vicinity to the site boundary was characterised by Admiralty charts (which provided the navigational features of the area), maritime incident data (which provided an indication of incident rates) and vessel traffic data which captured local vessel traffic patterns.

166. The review of Admiralty charts indicated the presence of aids to navigation within, and in vicinity to, the site boundary as well as charted wrecks/obstructions inshore (more common) and offshore of the site boundary. Oil and gas infrastructure was also identified to the east of the site boundary and the Seagreen 1 Offshore Wind Farm to its west. Maritime incident data indicated that incident rates are low, which is as expected due to the distance of the site boundary offshore. The vessel traffic data indicated that cargo vessels and oil and gas vessels are the most common types of vessels in the area. Fishing vessel and recreational vessel levels are low due to the distance offshore of the site boundary.

167. A number of potential impacts on shipping and navigation, associated with the construction, operation and maintenance, and decommissioning phases of the Array, were identified. These included:

- increased risk of collision/allision;
- displacement from adverse weather routeing;
- reduced access to local ports and harbours;
- loss of station;
- reduction of underkeel clearance;
- anchor interaction with subsea cables or mooring lines; and
- reduction in SAR capability.

168. With the proposed designed in measures in place, all these impacts result in effects that are not significant in EIA terms and at most tolerable with mitigation.

169. Cumulative impacts arising from the Array together with other projects and plans were assessed and predicted to result in effects that are not significant in EIA terms and at most tolerable with mitigation.

170. Transboundary impacts in terms of vessel routeing (including to international ports) have been assessed within the Array alone and cumulative assessments. Individual vessel transits may have the potential to be associated with vessels that are internationally owned or located, however, any such transits have been captured within the baseline assessment of vessel traffic.

1.14. AVIATION, MILITARY AND COMMUNICATIONS

171. Aviation, military and communications refers to the stakeholders/receptors that operate in the airspace, interacting with each other, the air traffic management provided and the relationship/effects of the physical environment. The aviation, military and communications receptors around the Array were characterised via a desktop review utilising UK and international aviation, military and communications guidance material and from establishment of the aviation, military and communications study area of regional aviation, military and communications constructs.

172. The Array will be located within a layered area of lower, Class G uncontrolled airspace and higher, Class C Controlled Airspace (CAS). Above and surrounding the Array, the Class G airspace is used by both military and civil registered aircraft. The desktop review indicated that several discrete operators utilise the airspace surrounding the Array. Key receptors noted from the desktop review were NATS Perwinnes

Primary Surveillance Radar (PSR), Aberdeen International Airport, and regional low-level airspace flight operators (Ministry of Defence (MOD), Search and Rescue (SAR) helicopters and operators supporting the offshore oil and gas industry).

173. The information on aviation, military and communications within the aviation, military and communications study area was collected through detailed review of existing guidance and datasets to define a regional aviation, military and communications baseline encompassing the airspace structure above the aviation, military and communications study area including the following:

- military Practice and Exercise Areas (PEXAs);
- aerodromes, including flight procedures;
- Communication, Navigation and Surveillance (CNS) infrastructure;
- Helicopter Main Route Indicators (HMRI) supporting offshore oil and gas; and
- low flying operations including MOD and helicopter SAR activities.

174. The potential impacts on aviation, military and communications, associated with the construction, operation and maintenance, and decommissioning phases include:

- the creation of physical obstacle to aircraft operations (including airborne search and rescue operations and low flying aircraft) during all phases; and
- wind turbines causing interference on aviation radar systems (including Primary Surveillance Radar and Air Defence Radar) during the operation and maintenance phase.

175. With the proposed mitigation measures in place, the impact ‘creation of physical obstacles to aircraft operations' result in effects of minor adverse significance, which is not significant in EIA terms.

176. However, the assessment identified the potential effect of major adverse significance (significant in EIA terms) as a result of wind turbines causing interference on aviation radar systems. Operational floating wind turbines within the Array would be theoretically detectable by the NATS Perwinnes PSR, MOD Buchan and Brizlee Wood Air Defence Radar (ADR) systems. Wind turbines detectable by a PSR system might degrade the system by creating false targets, reduce system sensitivity, create radar shadowing behind the wind turbines and saturate the radar receiver leading to clutter potentially concealing real aircraft targets. Following application of secondary mitigation, the significance of the effect is considered to be minor adverse and (not significant in EIA terms).

177. Cumulative impacts arising from the Array together with other projects and plans were assessed and predicted to result in effects of minor adverse significance (not significant in EIA terms) for the impact ‘creation of physical obstacles to aircraft operations’. The cumulative assessment identified the potential effect of major adverse cumulative significance (significant in EIA terms) as a result of wind turbines causing interference on aviation radar systems, however, following application of secondary mitigation, the significance of the effect will be reduced to be minor adverse (not significant in EIA terms).

178. No transboundary impacts have been identified in regard to effects of the Array on the interests of EEA states.

1.15. INFRASTRUCTURE AND OTHER USERS

179. The infrastructure and other users Array EIA chapter considers the impact of the Array on the following:

- displacement of coastal recreational activities (e.g. surfing) due to safety zones and advisory safe passing distances within the Array resulting in a loss of recreational resource;
- bathing waters;
- wave and tidal projects;
- natural gas storage, underground gasification and coal deposits;
- subsea telecommunication cables;
- marine disposal sites; and
- marine aggregate extraction sites.

180. Information on infrastructure and other users was collected through a detailed desktop review of existing studies and datasets through consultation. Due to the distance offshore from the east coast of Scotland (approximately 80 km), the level of recreational activity with the Array is low, and recreational fishing is likely to be limited.

181. The closest active/in operation offshore wind farm projects to the Array are the Seagreen 1, Kincardine and Hywind Offshore Wind Farms. There are three active hydrocarbon licence blocks that overlap with the infrastructure and other users study area – inner area. There are no wave and tidal projects, no active or disused subsea telecommunication cables, currently no active licences for marine aggregate extraction in the Firth of Forth and Firth of Tay marine region or carbon capture and storage sites and natural gas storage sites.

182. The potential impacts on infrastructure and other users, associated with the construction, operation and maintenance, and decommissioning phases of the Array, included:

- displacement of recreational sailing and motor cruising, recreational fishing (boat angling) and other recreational activities (diving vessels); and
- restricted access to active licence blocks by oil and gas operators either temporarily or long term.

183. With the proposed designed in measures in place, all these impacts result in effects of minor adverse significance (not significant in EIA terms).

184. Cumulative impacts arising from the Array together with other projects and plans were assessed and predicted to result in effects of minor adverse significance (not significant in EIA terms).

185. No transboundary effects with regard to infrastructure and other users from the Array on the interests of EEA states were predicted.

1.16. MAJOR ACCIDENTS AND DISASTERS

186. The major accidents and disasters Array EIA chapter considers the potential for the Array to cause, and the vulnerability of the Array to, major accidents and/or disasters. A major accident is defined as an event that threatens immediate or delayed serious environmental effects to human health, welfare and/or the environment and requires the use of resources beyond those that of the client or its appointed representatives (i.e. contractors) to manage. A disaster is a man-made/external hazard (such as an act of terrorism) or a natural hazard (such as an earthquake) with the potential to cause an event or situation that meets the definition of a major accident. A major accident may be caused by a disaster.

187. The baseline presented for major accidents and disasters is based on a summary of the information collected through a detailed desktop review of existing studies and datasets for the marine mammals, commercial fisheries, shipping and navigation, aviation,military and communications, infrastructure and other users, and climatic effects Array EIA chapters.

188. The major accidents and disasters assessment of effects has followed the methodology that directs the assessment to focus on the likelihood but potentially high consequence events such as major spill, explosion, fire etc. (IEMA, 2020).

189. The following potential impacts were assessed:

- collision and allision (to and from vessels and aircraft);
- unexploded ordnance (unplanned detonation);
- pollution of the marine environment from vessels;
- fire at wind turbines/OSPs; and
- snagging (to and from fishing vessels).

190. The assessment of effects established that for all risks identified, designed in measures would be sufficient to suitably manage the risk.

191. There is a requirement to tow floating substructures during the construction phase and potentially during the operation and maintenance phase for major component replacement purposes. In terms of the

cumulative effects of towing substructure, it is predicted that standard mitigation will be in place across all other offshore wind farms within the vicinity of the Array.

192. As there are no LSE[1] relating to major accidents and disasters after consideration of the designed in measures, no assessment of inter-related or transboundary effects has been undertaken.

1.17. CLIMATIC EFFECTS

193. Climate change refers to the long term shifts in temperatures and weather patterns that are fundamentally driven by human activities.

194. Climate change in the context of the Array assessment can be considered in two parts:

- the effect of greenhouse gas emissions arising from the construction, operation and maintenance and decommissioning of the Array, which may contribute to climate change; and
- the potential effects of the future climate on the Array.

195. The greenhouse gas emissions arising from, and avoided by, the Array were characterised via a series of desk-based assessments and articles using published data to determine the impact of the Array on climate change. The potential risks of the Array from a changing climate have also been assessed and reported in a risk assessment format, with the future climate conditions characterised using Met Office modelling.

196. The current baseline with regards to the assessment of greenhouse gases arising from the Array is defined as areas that would be occupied by the Array, thereby changing the seabed use. The current baseline largely comprises sandy sediments with no areas with high levels of 'blue carbon' (i.e organic carbon that has been captured and stored through biological processes in the coastal and marine environment, for example, seagrass habitat) anticipated to be disturbed. Nevertheless, the sandy sediments do contain stores of blue carbon, which have been assessed. The future baseline for existing seabed use without the Array is expected to remain similar to the current baseline.

197. The current baseline with regards to the assessment of climate on the Array are current climate observations within the area local to the Array. Air temperatures in the local area (central North Sea) range from 1°C to 16°C. Precipitation rates follow a seasonal trend with April to June tending to be the driest months, and October to January being wetter. Wind speeds have been recorded up to 31.5 m/s. Average wave heights are in the region of 1.87 m to 2.05 m, but in storms wave heights can reach 8.96 m. Global sea level rose by 0.2 m between 1901 and 2018. The future baseline has been informed by climate projections, showing worst case predictions of climate (including temperature, precipitation and wave height) over the Array's lifetime. It is expected that sea surface temperatures will continue to increase in the 21st century, with sea surface temperatures in Northern Europe predicted to increase by approximately 3.4°C by 2100 as a worst case. The east coast of Scotland can expect to see an average sea level rise of approximately 0.5 m to 0.6 m by 2100.

198. A number of potential impacts on and from climate change, associated with the construction, operation and maintenance, and decommissioning phases of the Array, were identified. The impacts assessed include:

- greenhouse gas emissions arising from disturbance to blue carbon stocks during the construction, operation and maintenance and decommissioning of the Array;
- greenhouse gas emissions arising from the manufacturing and installation of the Array;
- greenhouse gas emissions arising from the consumption of materials and activities required to facilitate the operation and maintenance of the Array and estimated abatement of UK Grid emissions;
- greenhouse gas emissions arising from decommissioning works of the Array;
- effects of climate change on the Array; and
- net greenhouse gas impacts of the Array.

199. With the proposed designed in measures in place, all of these impacts result in either negligible or minor adverse or beneficial significance, which are not significant in EIA terms.

200. Cumulative effects as a result of the Array and the Proposed offshore export cable corridor(s), and Proposed onshore transmission infrastructure have been assessed and are expected to result in a beneficial net effect owing to the contribution toward the UK and Scotland achieving their net zero goals and policy, and the high sensitivity of the climate as a receptor.

1.18. SOCIO-ECONOMICS

201. The socio-economic assessment considers the impacts on the Scottish and UK economies associated with contracts required for construction, operation and maintenance, and decommissioning of the Array. While construction and operation and maintenance ports are not yet known, this includes a discussion of the impacts in the areas immediately surrounding ports, such as demographic and housing effects. It has been based on the PDE Option with the lowest expected beneficial economic impacts, which is considered as a 'most adverse scenario'.

202. The strategic priorities of Scotland and the UK were characterised using desk-based surveys. As part of the transition to a net zero economy, renewables sources of electricity such as offshore wind are key to reducing reliance on fossil fuels. Offshore wind is also seen as a potential economic opportunity, supporting new, well-paid jobs as part of the just transition to more sustainable economy.

203. Both Scotland and the UK are expected to have declining working age populations in the medium term, as their population structures include a higher proportion of older people. The Scottish economy is well-placed to support offshore employment, given its legacy of offshore oil and gas exploration. It also stands to benefit from an increase in manufacturing employment, which is relatively under-represented compared to its share of the population.

204. The potential impacts on socio-economics, associated with the construction, operation and maintenance, and decommissioning phases include:

- employment and Gross Value Added (GVA) impacts during all phases;
- demographic changes and demand for housing and other services during all phases;
- changes to visitor behaviour during all phases;
- changes to commercial fisheries during all phases; and
- changes to shipping and marine recreation during all phases.

205. With the proposed designed in measures in place, all these impacts result in effects of negligible to major beneficial significance.

206. Cumulative impacts arising from the Array together with other projects and plans were assessed and predicted to result in effects of negligible to moderate beneficial significance, or minor adverse significance.

207. No secondary mitigation was proposed for the Array alone or cumulative impacts resulting in moderate or major beneficial significance (which is considered significant in EIA terms) as the Applicant has committed to enhancement of beneficial effects as per their proposed designed in measures.

1.19. MARINE ARCHAEOLOGY

208. Marine archaeology refers to the physical remains of the human past that survive within the marine environment. This includes submerged prehistoric archaeology, maritime archaeology (such as shipwrecks and associated debris or cargo), and aviation archaeology which occurs on the seabed.

209. The existing marine archaeology baseline has been characterised through an assessment of site-specific geophysical surveys alongside a review of existing data and relevant studies.

210. The site-specific geophysical survey data corroborates existing data and relevant studies surrounding the process and pattern of marine transgression (i.e. rising sea levels which causes the coastline to shift inland) of the north-western North Sea. The data indicate that the marine archaeology study area would have been a marine environment relatively shortly after the Last Glacial Maximum (i.e. the most recent time during the last glacial period where ice sheets were at their greatest extent circa 18,000 years Before Present (BP)). This environment, changing from glacial to marine would have been hostile to human occupation and therefore the potential for submerged prehistoric archaeology is low.

211. The area of the North Sea off the eastern coast of Scotland was an area of historically high maritime traffic, with 324 anomalies of potential archaeological interest identified during the geophysical survey of the Array. Anomalies are classified as low potential which may potentially be of anthropogenic origin but are unlikely to be of archaeological significance, examples include discarded modern debris such as rope, cable, chain, or fishing gear; medium potential, those which are believed to be of anthropogenic origin but would require further investigation to establish archaeological significance, examples may include larger unidentifiable debris or clusters of debris, unidentifiable structures, or significant magnetic anomalies; and high potential which are almost certainly of anthropogenic origin and with a high potential of being of archaeological significance with examples including remains of wrecks, the suspected remains of wrecks, or known structures of archaeological significance. Of these 324 anomalies, three have been assessed to be high potential, and 14 of medium potential. While all of the high potential anomalies relate to wrecked vessels or potential wreck sites, none of these can be positively identified as one of the four recorded losses thought to occur in the marine archaeology study area. The remaining 307 anomalies have been classified as low potential.

212. These impacts on marine archaeology associated with the construction, operation and maintenance, and decommissioning phases of the Array include:

- sediment disturbance and deposition leading to indirect impacts on marine archaeology;
- direct damage to marine archaeology receptors;
- direct damage to deeply buried marine archaeology receptors (palaeolandscapes and submerged prehistoric archaeology receptors); and
- alteration of sediment transport regimes leading to indirect impacts to marine archaeology.

213. With the designed in measures in place, all impacts will result in effects of minor adverse significance, which is not significant in EIA terms.

214. Measures adopted as part of the project include the provision of an outline Written Scheme of Investigation (WSI) and Protocol for Archaeological Discoveries (PAD) (volume 3, appendix 19.2) that will ensure both the operational awareness of project personnel to the presence of all known marine archaeology receptors and that provisions are place in the event of the discover of as yet unknown marine archaeology during the lifetime of the Array.

215. Cumulative impacts arising from the Array together with other projects and plans were assessed and predicted to result in effects of minor adverse significance (not significant in EIA terms).

216. No transboundary effects with regard to marine archaeology from the Array on the interests of EEA states were predicted.

1.20. INTER-RELATED EFFECTS

217. Inter-related effects relate to inter-relationships between EIA topics that may lead to environmental effects. The inter-related effects for all topics have been considered. It has been possible to conclude that inter-related effects across phases of the Array will not result in combined effects of greater significance than the assessments presented for each of the individual phases. It has also been concluded that multiple effects will not interact in a way that are likely to result in greater significance than those assessments presented for individual receptors.

1.21. REFERENCES

BEIS (Department for Business, Energy and Industrial Strategy) (2023). *Contracts for Difference Policy Paper*. Available at: Contracts for Difference - GOV.UK (www.gov.uk). Accessed on: 11 April 2024.

ESO (2024). *Beyond 2030: a national blueprint for a decarbonised electricity system in Great Britain.* Available at: https://www.nationalgrideso.com/document/315516/download. Accessed on: 15 May 2024.

HM Government (2008a). *Climate Change Act 2008*. Available at: https://www.legislation.gov.uk/ukpga/2008/27/part/1/crossheading/the-target-for-2050. Accessed on: 11 April 2024.

HM Government (2009). *Marine and Coastal Access Act 2009.* Available at: https://www.legislation.gov.uk/ukpga/2009/23/data.pdf. Accessed on: 12 April 2024.

HM Government (2011). *UK Marine Policy Statement.* Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69322/pb3654-marine-policy-statement-110316.pdf. Accessed on: 11 April 2024.

HM Government (2018). *The Future Relationships Between the United Kingdom and the European Union*. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/786626/The_Future_Relationship_between_the_United_Kingdom_and_the_European_Union_120319.pdf. Accessed on: 11 April 2024.

HM Government (2019a). *The Climate Change Act 2008 (2050 Target Amendment) Order 2019.* Available at: https://www.legislation.gov.uk/uksi/2019/1056/article/2/made. Accessed on: 11 April 2024.

HM Government (2019b). *Industry Strategy. Offshore Wind Sector Deal*. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/790950/BEIS_Offshore_Wind_Single_Pages_web_optimised.pdf. Accessed on: 11 April 2024.

HM Government (2020a). *Energy White Paper. Powering our Net Zero Future.* Available at: Energy White Paper (publishing.service.gov.uk). Accessed on: 11 April 2024.

HM Government (2020b). *Offshore wind Sector Deal – one year on.* Available at: https://www.gov.uk/government/publications/offshore-wind-sector-deal/offshore-wind-sector-deal-one-year-on. Accessed on: 11 April 2024.

HM Government (2022). *United Kingdom of Great Britain and Norther Ireland's Nationally Determined Contribution.*

IPCC (2023). *Climate Change 2023: Synthesis Report*. Available at: https://www.ipcc.ch/site/assets/uploads/2023/03/IPCC_AR6_SYR_PressRelease_en.pdf. Accessed on: 11 April 2024.

Marine Scotland (2022). *Scotland's National Marine Plan 2. Stakeholder Engagement Strategy and Statement of Public Participation.* Available at: scotlands-national-marine-plan-2-stakeholder-engagement-strategy-statement-public-participation.pdf (www.gov.scot). Accessed on: 11 April 2024.

Marubeni Offshore Wind Development (2023). *Home Page*. Available at: https://mowd.jp/en/. Accessed on: 15 April 2024.

Ordtek (2022). *Project UXO Hazard Assessment*: *E1 East Offshore Wind Farm*. Ordtek report reference: JM7048_UXO_DTS_HA_V1.0.

Ossian OWFL (2024). Array Report to Inform Appropriate Assessment.

OWIG (2010). *Scotland's Offshore Wind Route Map. Developing Scotland's Offshore Wind Industry to 2020.* Available at: https://www.gov.scot/binaries/content/documents/govscot/publications/strategy-plan/2010/09/scotlands-offshore-wind-route-map-developing-scotlands-offshore-wind-industry/documents/0105071-pdf/0105071-pdf/govscot%3Adocument/0105071.pdf. Accessed on: 11 April 2024.

Scottish Government (2021). *Scotland's contribution to the Paris Agreement – an indicative NDC. July 2021.*

Scottish Government (2022a). *Energy Statistics for Scotland – Q3 2022.* Available at: Energy Statistics for Scotland - Q3 2022 - gov.scot (www.gov.scot). Accessed on: 12 April 2024.

Scottish Government (2022b). *Sectoral Marine Plan – Roadmap of Actions.* Available at: Sectoral Marine Plan – Roadmap of actions (www.gov.scot). Accessed on: 12 April 2024.

Scottish Government (2022c). *Offshore renewable energy: decommissioning guidance for Scottish Waters.* Available at: Offshore renewable energy: decommissioning guidance for Scottish waters - gov.scot (www.gov.scot). Accessed on: 12 April 2024.

Scottish Government (2023a). *Draft Energy Strategy and Just Transition Plan*. Available at: Draft Energy Strategy and Just Transition Plan - gov.scot (www.gov.scot). Accessed on: 11 April 2024.

Scottish Government (2023b). National Planning Framework 4. Available at: National Planning Framework 4 - gov.scot (www.gov.scot). Accessed on: 11 April 2024.

SSER (2020). *New ScotWind partnership will provide local experience and global expertise*. Available at: New ScotWind partnership will provide local experience and global expertise | SSE Renewables. Accessed on: 11 June 2024.

SSER, Marubeni and CIP (2021). *ScotWind Leasing Application. Part B1 – Desktop Preliminary Feasibility Study E1 East Floating Offshore Wind Farm*. Technical Report.

ossian

sse Renewables · Marubeni · CIP Copenhagen Infrastructure Partners

Ossian Offshore Wind Farm Limited
Inveralmond House
200 Dunkeld Road
Perth
PH1 3AQ

Project Office
Fourth Floor
10 Bothwell Street
Glasgow
G2 6NT

ossianwindfarm.com