BERWICK BANK WIND FARM
OFFSHORE SCOPING REPORT

October 2021

Approval for issue			
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GLOSSARY

Term	Definition
Anthropogenic	Man-made
Berwick Bank	Berwick Bank Wind Farm (encompasses the revised project boundaries of Berwick Bank and Marr Bank wind farms). (Figure 1.1)
Bryozoan	Aquatic invertebrate
Covid-19	Pandemic caused by the coronavirus (SARS-CoV-2)
Cumulative Effects	Changes to the environment caused by a combination of present and future projects, plans or activities
Designed In Measures	Measures included in the design of a proposed development that help to reduce the impact of the Proposed Development.
Digital Aerial Surveys	Digital surveys carried out by aeroplane
Echolocation	The location of objects by reflected sound
EIA Regulations	Collectively the term used to refer to The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017; The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017; The Marine Works (Environmental Impact Assessment) Regulations 2007; The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017.
Ensonification	To fill an area with sound
Environmental Impact Assessment	Assessment of the consequences to the environment of a plan, project or activity
Epibenthic	Flora or fauna that live on the seabed
Epifaunal	Animals living on the seabed
EUSeaMap	Broadscale habitat maps produced by EMODnet for Europe
Former Firth of Forth Zone	Suitable areas for the development of offshore wind assessed through a statutory process of Strategic Environmental Assessment (SEA) undertaken by Department of Energy and Climate Change (DECC), now Department for Business, Energy and Industrial Strategy (BEIS).
Geodiversity	Geological materials, forms and processes that shape the Earth
Grab sample	A technique used to sample benthic flora and fauna
Important Ecological Feature	Ecologically important features that require further consideration within the EIA process
Initial Berwick Bank Wind Farm Proposal	The original proposal for Berwick Bank Wind Farm in respect of which a Scoping Opinion was received from the Scottish Ministers in March 2021
Infaunal	Animals that live in the sediments occurring on the sea floor
Macrobenthic	Animals that inhabit the bottom of the water column
Marine Licence	Licence granted under either the Marine and Coastal Access Act 2009 or the Marine (Scotland) Act 2010
Marine Scotland	Organisation who's purpose is to manage Scotland's seas
Marine Strategy Framework	The European Union Directive (2008/56/EC) seeking to achieve good environmental status (GES) in Europe's seas by 2020.
MARPOL	International Convention for the Prevention of Pollution from Ships
Marr Bank	Marr Bank Wind Farm (formerly Seagreen 3 Offshore Wind Farm)
Moraine	Accumulation of glacial debris
MRSea	Statistical modelling of Bird and Cetacea Distributions in Offshore Renewables Development Areas
Natura 2000	A network of core breeding and resting sites for rare and threatened species and habitats
Nursery Ground	An area that is suitable for young fish to grow and live
Offshore EIA Scoping Report	Scoping Report assessing all of the offshore infrastructure of the Proposed Development, seaward of MHWS

Term	Definition
Onshore EIA Scoping Report	Scoping Report assessing all onshore infrastructure of the Project landward of MLWS
OSPAR Convention	The Convention for the Protection of the Marine Environment of the North-East Atlantic
Permanent Threshold Shift (PTS)	Irreversible loss of hearing
Phase 1	Development of two offshore wind farms: Seagreen Alpha and Seagreen Bravo
Planning Permission	Permission granted under the Town and Country Planning (Scotland) Act 1997 for all Project infrastructure located landward of MLWS
Project	Berwick Bank Wind Farm
Project Design Envelope	Project Parameters that are assessed as part of the EcIA process for a proposed development
Proposed Development	Offshore components of the Project which are the subject of this EIA Scoping request
Scottish Ministers	The devolved government of Scotland
SeaBORD	A tool to estimate the fate of birds displaced by offshore renewable development
Seagreen Alpha/Bravo	Seagreen Alpha and Seagreen Bravo Offshore Wind Farms
Section 36 consent	Consent which can be granted under section 36 of the Electricity Act 1989 for the construction or extension, and operation, of an electricity generating stations
SOLAS	International Convention for the Safety of Life at Sea
Spawning Ground	Area where a fish leaves their eggs for fertilization and development
Temporary Threshold Shift (TTS)	Reversible and temporary hearing loss
Zone of Theoretical Visibility	Tool to identify the likely extent of visibility of a proposed development

ACRONYMS

Acronym	Description
AA	Appropriate Assessment
AD	Air defence
ADD	Acoustic Deterrent Device
ADR	Air Defence Radar
AEZ	Archaeological Exclusion Zone
AfL	Agreement for Lease
ANO	Air Navigation Order
AQS	Air Quality Standards
ASA	Acoustic Society of America
ATC	Air Traffic Control
ATS	Air Traffic Services
BDMPS	Biologically Defined Minimum Population Scales
BEIS	Business, Energy and Industrial Strategy
BIS	British Ice Sheet
BODC	British Oceanographic Data Centre
BPM	Best Practicable Means
BSI	British Standards Institute
BVGA	BVG Associates
CAA	Civil Aviation Authority
CAFS	Cleaner Air for Scotland
CaP	Cable Plan
CAP	Civil Aviation Publication
CAPEX	Capital Expenditure

Acronym	Description
CCC	Committee on Climate Change
CCS	Carbon Capture Storage
CD	Chart Datum
CEA	Cumulative Effect Assessment
Cefas	Centre for Environment, Fisheries and Aquaculture Science
CEH	Centre for Ecology and Hydrology
CEMP	Construction Environmental Management Plan
CES	Crown Estate Scotland
CfD	Contract for Difference
CHIA	Cultural Heritage Impact Assessment
CHIA	Cultural Heritage Impact Assessment
CIEEM	Chartered Institute of Ecology and Environmental Management
CMS	Construction Method Statement
CO	carbon monoxide
CoCP	Code of Construction Practice
CoS	Chamber of Shipping
CRM	Collision Risk Modelling
CSIP	Cable Specification and Installation Plan
CTV	Crew Transfer Vessel
DDV	Drop Down Video
DECC	Department of Energy and Climate Change
Defra	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
DGC	Defence Geographic Centre

Acronym	Description
DMRB	Design Manual for Roads and Bridges
DOENI	Department of the Environment Northern Ireland
EC	European Commission
ECC	Export Cable Corridor
ECML	East Coast Main Line
ECMWF	European Centre for Medium-range Weather Forecast
EEA	European Economic Area
EGPS	Electricity Generation Policy Statement
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
ELC	East Lothian Council
EMEC	European Marine Energy Centre
EMFs	Electromagnetic fields
EMR	Electricity Market Reform
EPS	European Protected Species
ESCA	European Subsea Cables Association
EUNIS	European University Information Systems
FAME	Future of the Atlantic Marine Environment
FEAST	Feature Activity Sensitivity Tool
FIRs	Fisheries Industry Representatives
FL	Flight level
FLO	Fisheries Liaison Officer
fm	Flexible Mesh
FMMS	Fisheries Management and Mitigation Strategy

Acronym	Description
FSA	Formal Safety Assessment
FTCFWG	Forth and Tay Commercial Fisheries Working Group
GES	Good environmental status
GHG	Greenhouse Gas
GPS	Global Positioning System
GT	Gross tonnage
GVA	Gross Value Added
HDD	Horizontal Directional Drilling
HE	Historic England
HES	Historic Environment Scotland
HLV	Heavy Lift Vessels
HMRs	Helicopter Main Routes
HPDI	Highest Posterior Density Intervals
HRA	Habitats Regulation Appraisal
HVAC	High Voltage Alternating Current
HVDC	High Voltage Direct Current
HW	High water
IALA	International Association of Marine Aids to Navigation and Lighthouse Authorities
IAMMWG	Inter Agency Marine Mammal Working Group
IAQM	Institute of Air Quality Management
ICAO	International Civil Aviation Organization
ICES	International Council for the Exploration of the Sea
ICPC	International Cable Protection Committee
IEFs	Important ecological features

Acronym	Description
IEMA	Institute of Environmental Management and Assessment
IEP	Industry Evidence Programme
IMO	International Maritime Organisation
INCA	Industry Nature Conservation Agency
INNS	Invasive Non-Native Species.
ITPE	ITPEnergised
JNCC	Joint Nature Conservation Committee
KP	Kilometre point
LAT	Lowest Astronomical Tide
LCCC	Low Carbon Contracts Company
LMP	Lighting and Marking Plan
LSE	Likely Significant Effect
MAIB	Marine Accident Investigation
MBES	Multibeam Echo Sounder
MCA	Maritime Coastal Agency
MCAA	Marine and Coastal Access Act
MCZs	Marine Conservation Zones
MEDIN	Marine Environmental Data Information Network
MGN	Marine Guidance Note
MHWS	Mean High Water Springs
MLWS	Mean Low Water Springs
mm	Millimetre
MMMP	Marine Mammal Mitigation Protocol
MMO	Marine Management Organisation

Acronym	Description
MMOs	Marine Mammal Observers
MNCR	Marine Nature Conservation Review
MoD	Ministry of Defence
MPA	Marine Protected Area
MPS	Marine Policy Statement
MS	Marine Scotland
MSS	Marine Scotland Science
MU	Management Unit
MW	Mega watt
NBN	National Biodiversity Network
ncMPA	Nature Conservation Marine Protected Area
NE	Natural England
NECD	National Emission Ceilings Directive
NERL	National Air Traffic Services En-Route PLC
NH3	Ammonia
NLB	Northern Lighthouse Board
nm	Nautical mile
NMP	National Marine Plan
NMPi	National Marine Plan Interactive
NMVOC	Non-methane volatile organic compounds
NnG	Neart Na Gaoithe
NO	Nitrous Oxide
NOx	Nitrogen
NPF	National Planning Framework

Acronym	Description
NPS	National Policy Statement
NRA	Navigational Risk Assessment
NRG	National Grid Reference
NRHE	National Record of the Historic Environment
NS	NatureScot
NSP	Navigational Safety Plan
NtM	Notice to Mariners
OEL	Ocean Ecology Ltd
OFLOs	Offshore Fisheries Liaison Officers
OGA	Oil and Gas Authority
OPEX	Operational Expenditure
OREI	Offshore renewable energy installations
OSP	Offshore Substation Platform
OWIG	Offshore Wind Industry Group
PAD	Protocol for Archaeological Discoveries
PAH	Polycyclic aromatic hydrocarbons
PCB	Polychlorinated biphenyl
PDE	Project Design Envelope
PEL	Probable Effect Levels
PM	Particulate matter
PMF	Priority Marine Feature
POs	Plan Options
PS	Piling strategy
PSA	Particle Size Analysis

Acronym	Description
pSPA	proposed Special Protection Area
PSRs	Primary Surveillance Radars
PVA	Population Viability Analysis
RAP	Renewables Action Plan
RES	Renewable Energy Strategy
REZ	Renewable Energy Zone
RIAA	Report to Inform Appropriate Assessment
RLOS	Radar-line-of-sight
RMNC	Review of Marine Nature Conservation
RMPs	Regional Marine Plans
RNLI	Royal National Lifeboat Institution
ROCs	Renewables Obligation Certificates
ROV	Remotely Operated Vehicle
ROV	Remotely Operated underwater Vehicle
RRED	Revised Renewable Energy Directive
RSMP	Regional Seabed Monitoring Programme
RSPB	Royal Society for the Protection of Birds
RYA	Royal Yachting Association
SAC	Special Area of Conservation
SAR	Search and Rescue
SAS	Surfers Against Sewage
SBP	Sub-Bottom Profiler
SCANS	Small Cetaceans in the European Atlantic and North Seas
sCRM	Stochastic Collision Risk Modelling

Acronym	Description
SEA	Strategic Environmental Assessment
SEL	Sound Exposure Level
SEPA	Scottish Environment Protection Agency
SFF	Scottish Fishermen's Federation
SMP	Sectoral Marine Plans
SMR	Scottish Marine Region
SMRU	Sea Mammal Research Unit
SNCBs	Statutory Nature Conservation Bodies
SNH	Scottish National Heritage (now NatureScot)
SOLAS	Safety of Life at Sea
SOV	Service Operations Vessel
SPM	Suspended Particulate Matter
SPP	Scottish Planning Policy
SPT	Scottish Power Transmission
SSC	Suspended Sediment Concentration
SSER	SSE Renewables
SSS	Sidescan Sonar
SSSI	Site of Special Scientific Interest
T&CP	Town and Country Planning (Scotland) Act 1997
TCA	Trade and Cooperation Agreement
TCE	The Crown Estate
TEL	Threshold Effect Level
THC	Total Hydrogen Content
TOC	Total organic Carbon

Acronym	Description
TP	Transition Piece
TSS	Total suspended solids
UHRS	Ultra-high resolution seismic
UK	United Kingdom
UKAS	United Kingdom Accreditation Service
UKCS	United Kingdom continental shelf
UKHO	United Kingdom Hydrographic Office
UXO	Unexploded ordnance
VMP	Vessel Management Plan
WSI	Written Scheme of Investigation
WTG	Wind turbine generators
WWT	Wildfowl and Wetlands Trust
ZAP	Zone Appraisal and Planning
ZDA	Zone Development Agreement

UNITS

Unit	Description
%	Percentage
£	Pound Sterling
GT	Gross Tonnage (Volume)
GW	Gigawatt (power)
Hrs	Hours
kHz	KiloHertz
kJ	Kilojoule
km	Kilometres (distance)
km^2	Square kilometres
LAT (m)	Lowest Astronomical Tide (metres)
L	Litre
M	Metre (distance)
m^2	Square metres
m^3	Cubic metres
Mg	Milligram
Mm	Millimetre (length)
m/m	Percent by mass
MW	Mega Watt (power)
nm	Nautical mile (distance)
nT	Nanotesal (magnetic flux density)
Rms	Root-mean-square
S	second
Tonnes	non-SI metric unit of mass equal to 1,000 kilograms

Unit	Description
µg/m^3	Micrograms per Cubic Meter of Air.

EXECUTIVE SUMMARY

1. SSE Renewables Developments (UK) Limited (“SSE Renewables” (SSER) is developing the Berwick Bank Wind Farm Project. In August 2020, SSER (via its project company Berwick Bank Wind Limited) consulted on an Offshore Environmental Impact Assessment (EIA) Scoping Report for an initial Berwick Bank Wind Farm Proposal. The offshore EIA Scoping Opinion was received from the Scottish Minsters in March 2021. The initial Berwick Bank Wind Farm Proposal comprised one of two projects to be developed in Phase 2 of the former Firth of Forth Zone which included the initial Berwick Bank Wind Farm Proposal and the Marr Bank Wind Farm. The Marr Bank Wind Farm boundary was to be located to the west of the initial Berwick Bank Wind Farm Proposal.

2. Through subsequent progress made in the detailed review of Berwick Bank and Marr Bank Wind Farm sites’ environmental constraints, SSER has combined large proportions of the Agreement for Lease (AfL) area for Berwick Bank Wind Farm and Marr Bank Wind Farm, including the proposed offshore cable corridors This combined proposal has made material changes to reduce environmental impacts. Specifically, these changes have focused on:

   - reducing predicted ornithology impacts by increasing minimum blade tip to sea clearance from 22m to 37m;
   - increasing the minimum and maximum turbine sizes from 10-20 MW up to 14-24 MW in order to minimise the number of turbines on site and reduce associated impacts;
   - amending the site boundary and combining Berwick Bank Wind Farm and Marr Bank Wind Farm AfLs, whilst reducing the overall project footprint by approximately 9% and avoiding areas of significant ornithological interest;
   - introducing increased corridors between the proposed site boundary and other neighbouring wind farms to alleviate navigation concerns;
   - climate change assessment included as a standalone assessment
   - foundation types refined to two options – Jacket Foundation with Pin Piles and Suction Caisson Jacket. Floating foundation and monopile foundations are no longer within the Project Design
   - minimum turbine spacing of 1,000 m
   - use of low order deflagration for clearance of UXO that can not be removed or avoided
   - minimum air gap of 37 m above LAT will be applied
   - a cable burial risk assessment will be undertaken
   - maximum number of wind turbines is 307
   - maximum hammer energy is 4,000 kJ
   - maximum number of export cables is 12.

3. SSER is now seeking consent for one Wind Farm Project: Berwick Bank Wind Farm (hereafter referred to as the Project). The offshore components of the Project which are the subject of this Scoping request are hereafter referred to as the Proposed Development. This revised Offshore EIA Scoping Report has been developed for the Proposed Development and considers the new Proposed Development boundaries and updated Project Design Envelope.

4. SSER is seeking consent to develop the Proposed Development in the outer Firth of Forth and Firth of Tay, 33.5 km east of the Scottish Borders coastline (St Abb’s Head) and 43 km to the East Lothian coastline. The export cables which form part of the Proposed Development will make landfall on the East Lothian coast, specifically at Thorntonloch or at Skateraw. From here, the export cables will connect to a Scottish Power Transmission (SPT) 400kV Grid Substation located at Branxton, which is located southeast of Torness Power station. SSER is also considering an additional offshore export cable corridor (ECC), which is under development. The additional ECC does not form part of the Proposed Development for which this Scoping request has been made. However, it will be considered within the Cumulative Effects Assessment (CEA) for the Offshore EIA Report (and the Onshore EIA Report) as appropriate, to ensure compliance with the requirements of the EIA Regulations.

5. SSER intends to submit separate consents, licences and permissions for the offshore (seaward of mean high water springs (MHWS)) and onshore (landward of mean low water springs (MLWS)) infrastructure of the Project. This Offshore EIA Scoping Report considers all of the offshore infrastructure of the Project, seaward of MHWS, which is hereafter referred to as the Proposed Development. A separate Onshore Scoping report relating to impacts of onshore infrastructure on onshore receptors has previously been developed and submitted to support the onshore Proposed Development consent Application (Berwick Bank Wind Limited, 2020). As there have been no adjustments to the onshore aspects of the Proposed Development, the Onshore Scoping Report and Scoping Opinion remains valid.

6. The consents, licences and permissions which will be sought by SSER for the Proposed Development include:

   - a Section 36 consent under the Electricity Act 1989;
   - a marine licence under the Marine and Coastal Access Act (MCAA) 2009; and
   - a marine licence under the Marine (Scotland) Act 2010 for the part of the export cable which is within 12 nm of the coast; and
   - planning permission under the Town and Country Planning (Scotland) Act 1997 (T&CP) for all Project infrastructure located landward of MLWS

7. In applying for these consents, licences and permissions, an Environmental Impact Assessment (EIA) Report is required to be prepared and submitted to support these applications. The EIA is required to fulfil the requirements of the following regulations:

   - The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017;
   - The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017;
   - The Marine Works (Environmental Impact Assessment) Regulations 2007; and
   - The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017.

8. This Offshore EIA Scoping Report has been prepared to support a request for a formal Scoping Opinion in relation to the Proposed Development from Scottish Ministers. This Offshore EIA Scoping Report has been informed by the Scoping Opinion provided by Scottish Ministers on the initial Berwick Bank Wind Farm Proposal Offshore EIA Scoping Report. An EIA Change Report has been developed and presents an overview of the key difference between the initial Berwick Bank Wind Farm Offshore EIA Scoping Report and the Proposed Development Offshore EIA Scoping Report (this document). The EIA Change Report will be made available by SSER (via https://www.berwickbank.com/).

9. This Offshore EIA Scoping Report provides an overview of the existing physical, human and biological environment, identified by known and accessible data sources, and outlines surveys undertaken to acquire additional data where required. An overview of both the Proposed Development specific and cumulative potential effects associated with the construction, operation and maintenance, and decommissioning phases of the Proposed Development are provided. This Offshore EIA Scoping Report also outlines the proposed methods to be employed to assess the significance of effect for the technical topics. For the purpose of this Offshore EIA Scoping Report, the following technical topics have been considered:

   - offshore physical environment
     - physical processes;
     - subsea noise;
     - airborne noise;
     - air quality;
     - climate effects assessment.
   - offshore biological environment
     - benthic subtidal and intertidal ecology;
     - fish and shellfish ecology;
     - marine mammals; and
     - offshore and intertidal ornithology.

- offshore human and socio-economic environment
  - commercial fisheries;
  - shipping and navigation;
  - aviation, military and communications;
  - marine archaeology;
  - seascape, landscape and visual resources;
  - cultural heritage;
  - infrastructure and other users; and
  - offshore socio-economic and tourism.

10. SSER invites consultees to respond to this Offshore EIA Scoping Report by providing a response to the topic specific questions which are included in each technical section, and through the road map process. by providing a formal opinion on the key areas identified, the data sources, and the methodology proposed. The purpose of this scoping exercise is to seek formal consultation from stakeholders on the Proposed Development.

1. INTRODUCTION

1.1. BACKGROUND

11. The Project includes both the offshore and onshore infrastructure required to generate and transmit electricity from the Proposed Development Array Area to a Scottish Power Transmission (SPT) 400kV Grid Substation located at Branxton, southeast of Torness Power station. The Proposed Development Array Area is located in the outer Firth of Forth and Firth of Tay, 33.5 km east of the Scottish Borders coastline (St Abb's Head) and 43 km to the East Lothian coastline from the nearest boundary and is the second project to be developed in the former Firth of Forth Zone (see Figure 1.1). SSER is also considering options for an additional offshore export cable corridor, which are under development. This export cable corridor does not form part of the Proposed Development for which this Scoping request has been made. However, it will be considered within the Cumulative Effects Assessment (CEA) for the Offshore EIA Report (and the Onshore EIA Report) as appropriate, to ensure compliance with the requirements of the EIA Regulations.

12. The initial Berwick Bank Wind Farm Proposal was one of two projects to be developed via Phase 2 of the former Firth of Forth Zone which included the initial Berwick Bank Wind Farm and Marr Bank Wind Farm. Marr Bank Wind Farm was to be located to the west of the initial Berwick Bank Wind Farm Proposal.

13. In August 2020, SSER consulted on an Offshore EIA Scoping Report for the initial Berwick Bank Wind Farm project with a Scoping Opinion received from the Scottish Minsters in March 2021. The Offshore EIA Scoping Report provided information for the initial Berwick Bank Wind Farm Proposal, which was to be located approximately 39.2 km east of the East Lothian and the Scottish Borders coastline from the nearest boundary with an Proposed Development Array Area of approximately 775 km^2.

14. Subsequently, SSER undertook a detailed review of both the initial Berwick Bank Wind Farm and Marr Bank Wind Farm site environmental constraints and SSER has adjusted the consenting approach for the two proposals. SSER is now seeking consent for one Wind Farm Project: Berwick Bank Wind Farm (hereafter referred to as the Project). The offshore components of the Project are hereafter referred to as the Proposed Development. The boundaries of the Proposed Development now encompass a large proportion of the Agreement for Lease (AfL) area of Berwick Bank Wind Farm and a large proportion of the Marr Bank AfL area plus one of two proposed offshore cable corridors. This revised Offshore EIA Scoping Report has been developed for the Proposed Development and considers the new Proposed Development boundaries and updated Project Design Envelope.

15. SSER proposes the development of the Proposed Development in the outer Firth of Forth and Firth of Tay, 33.5 km east of the East Lothian and the Scottish Borders coastline. The export cable will landfall on the East Lothian coast, at Thorntonloch or at Skateraw. From here, the export cables will connect to a SPT 400kV Grid Substation located at Branxton, southeast of Torness Power station.

16. SSER will submit separate consents, licences and permissions for the offshore (seaward of Mean High Water Springs (MHWS) and onshore (landward of Mean Low Water Springs (MLWS)) infrastructure. This Offshore EIA Scoping Report considers all of the offshore infrastructure of the Project, seaward of MHWS.

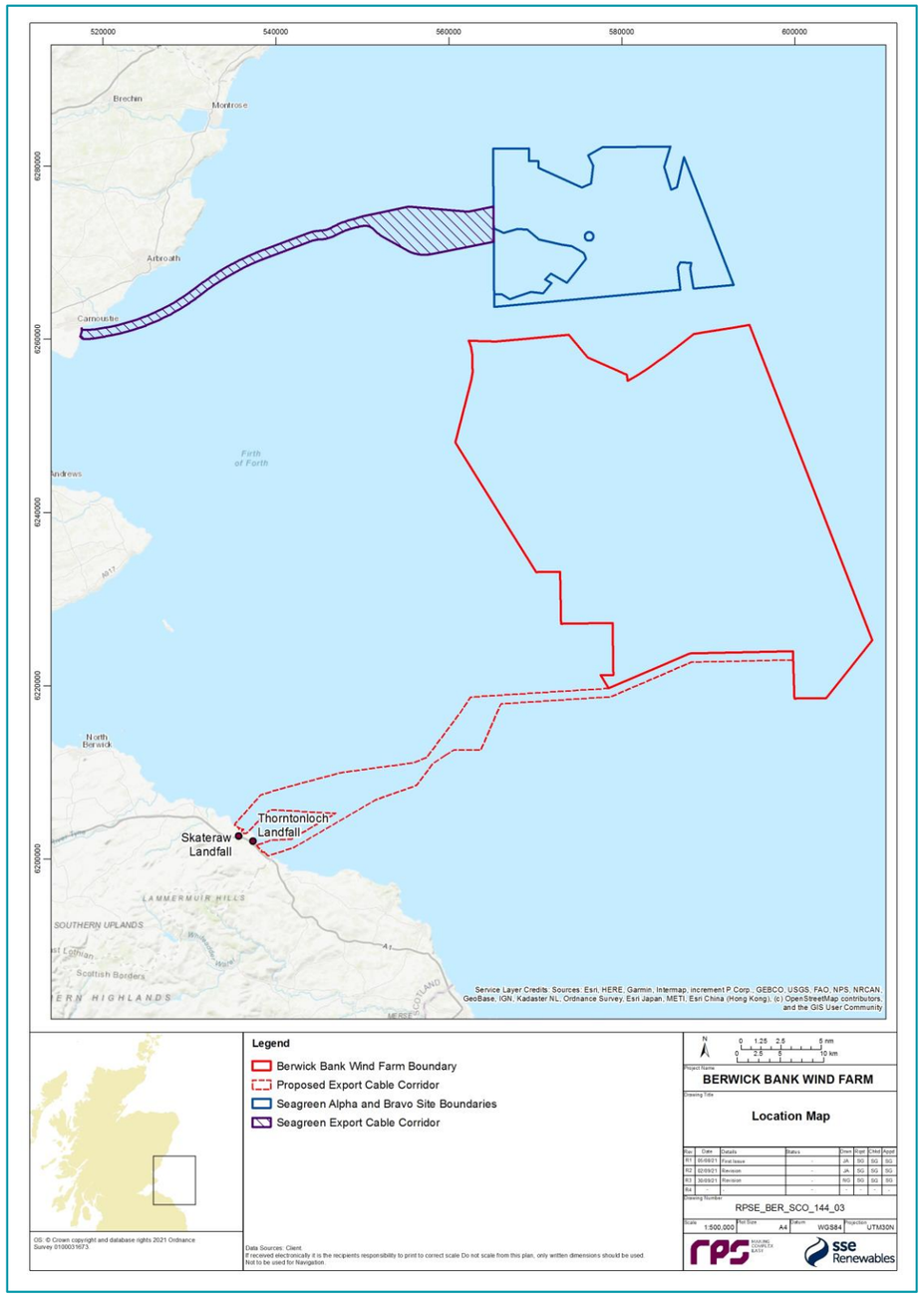


Figure 1.1: Location of the Proposed Development Array Area, within the Former Firth of Forth Zone, and Proposed Offshore and Onshore ECC

17. Consents, licences and permissions to be sought by SSER for the Proposed Development include:

- a Section 36 consent under the Electricity Act 1989;
- a marine licence under the Marine and Coastal Access Act (MCAA) 2009; and
- a marine licence under the Marine (Scotland) Act 2010 for the part of the export cable which is within 12 nm of the coast.

18. A separate Onshore EIA Scoping report relating to impacts of onshore infrastructure on onshore receptors has previously been developed and submitted to support the onshore Proposed Development consent Application (Berwick Bank Wind Limited, 2020). Likewise, a separate Onshore EIA Report will be developed which assesses all impacts from infrastructure landwards of MLWS. SSE will apply for planning permission under the T&CP Act for all Project infrastructure in Scotland located landward of MLWS. As noted above, SSER is also considering an additional offshore ECC, which is under development. This ECC does not form part of the Proposed Development for which this Scoping request has been made or for which the Onshore EIA Scoping relates.

19. Consents and licences required for some pre-construction site investigation surveys and activities have been included within this Offshore EIA Scoping Report. These are:

- removal of unexploded ordnance (UXO);
- pre-construction geophysical survey; and
- pre-construction geotechnical survey.

20. An Environmental Impact Assessment (EIA) Report is required to be prepared and submitted to support applications for necessary offshore consents, licences and permissions (see section 1.5 and Appendix 5 for further detail) for the Proposed Development (including those pre-construction activities listed under paragraph 19 above. The EIA is required to fulfil the requirements of the following regulations:

- in respect to a Section 36 consent application: The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017;
- in respect to a marine licence application: The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017 and the Marine Works (Environmental Impact Assessment) Regulations 2007; and
- planning permission under the Town and Country Planning (Scotland) Act 1997 for all Project infrastructure located landward of MLWS.

21. Hereafter, these regulations have collectively been referred to as the EIA Regulations.

22. The Offshore EIA Report (Offshore EIAR) will detail, and will be informed by, stakeholder consultation on this Offshore EIA Scoping Report. Details of the proposed approach to Stakeholder Consultation is outlined in section 4.3.4. The Offshore EIAR will be submitted to Scottish Ministers in 2022.

23. SSER is seeking a 35-year consent period to allow the Proposed Development to continue operating should the lifespan of the wind turbines allow. If, in the future, SSER sought to repower the wind farm then they would do so through the submission of a separate application to cover any proposed new development.

1.2. PROJECT OVERVIEW

1.2.1. FIRTH OF FORTH ZONE

24. The Round 3 offshore wind development programme was instigated by The Crown Estate (TCE) in 2008. Suitable areas for the development of offshore wind were assessed through a statutory process of Strategic Environmental Assessment (SEA) undertaken by Department of Energy and Climate Change (DECC), now Department for Business, Energy and Industrial Strategy (BEIS). As part of a competitive tender, Seagreen Wind Energy Limited (SWEL) was awarded the exclusive rights to the development of the Firth of Forth Zone by TCE in 2010. The subsequent Zone Development Agreement (ZDA) between Seagreen Wind Energy Ltd and TCE provides the potential for the development of several offshore wind farms. Subsequently in 2019, the Firth of Forth ZDA was terminated, with Agreement for Leases (AfLs) now agreed with Crown Estate Scotland (CES) for Seagreen (consisting of Seagreen Alpha and Seagreen Bravo), the initial Berwick Bank Wind Farm Proposal and the Marr Bank Wind Farm AfL boundary.

25. Further detail on the Firth of Forth Zone is presented within section 3.2.1.

1.2.2. PHASE 1

26. Phase 1 within the former Firth of Forth Zone included the development of two offshore wind farms: Seagreen Alpha and Seagreen Bravo (hereafter collectively referred to as Seagreen Alpha/Bravo), located around 27 km from the Angus coastline (Figure 1.1), which have the potential combined capacity of up to 1,500 MWs. The export cable for Seagreen Alpha/Bravo will make landfall at Carnoustie and connects to a substation at Tealing.

27. Offshore consent for Seagreen Alpha/Bravo was received in October 2014 from Scottish Ministers and was confirmed in November 2017 following a legal challenge by the Royal Society for the Protection of Birds (RSPB). A 15-year Contract for Difference (CfD) was awarded in September 2019 for 42% of the total project capacity (454 MW) and Seagreen Alpha/Bravo reached financial close in June 2020.

28. Pre-campaign surveys of the Seagreen offshore site took place from March to September 2021 and seabed preparation activities commenced in August 2021. Construction works at the export cable landfall commenced in May 2021 and construction at the offshore wind farm site commenced in September 2021. Construction will occur in two stages. Stage 1 will cover installation of up to 114 wind turbines on suction bucket caisson foundations and installation of the first offshore substation platform (OSP), and Stage 2 will cover installation of up to 36 wind turbines and installation of the second OSP.

1.2.3. PHASE 2

29. Phase 2 of the former Firth of Forth Zone included the initial Berwick Bank Wind Farm Proposal and the Marr Bank Wind Farm AfL boundary. The initial Berwick Bank Wind Farm Proposal was previously named ‘Seagreen 2’ and Marr Bank Wind Farm Proposal was previously named ‘Seagreen 3’.

1.2.4. BERWICK BANK REVISED BOUNDARY

30. Revised Berwick Bank Wind Farm boundaries were established through consideration of environmental constraints including ornithological, shipping and navigation, commercial fisheries, marine mammal and benthic ecology constraint analysis and modelling. Further details on the site selection and consideration of alternatives to the Proposed Development are provided in section 3.

31. A detailed project description for the Proposed Development is presented in section 2, and the following section provides a brief overview of the main aspects of the Proposed Development.

32. Key components of the Proposed Development include:

- wind turbines;
- wind turbine foundations;
- inter-turbine array cables;
- interconnection cables;
- offshore substation(s) platform(s); and
- offshore export cable(s).

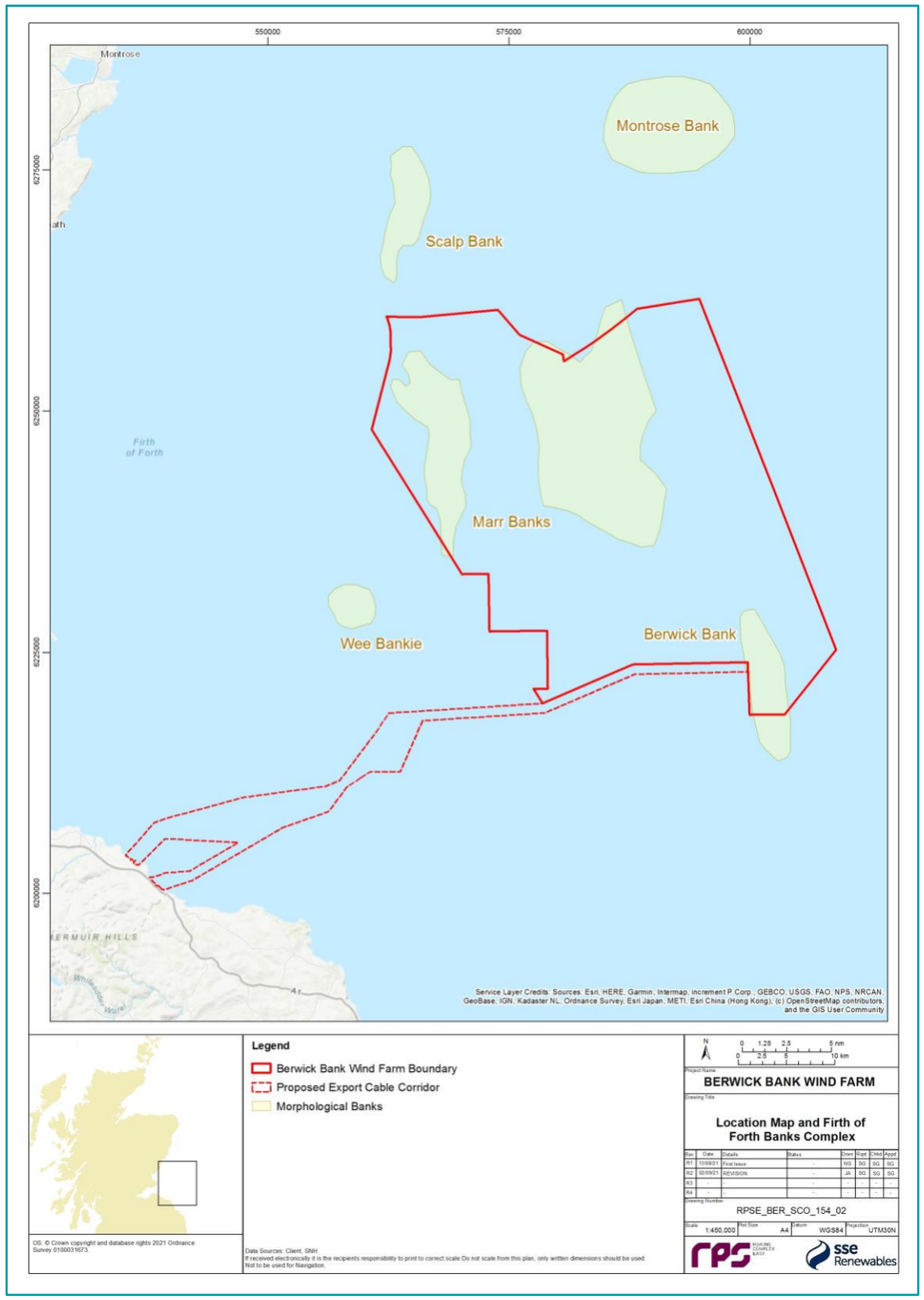


Figure 1.2: Firth of Forth Morphological Banks and the Proposed Development

33. The Proposed Development Array Area (i.e. the area in which the wind turbines will be located) is approximately 1,314 km^2 and is located approximately 33.5 km east of the East Lothian and the Scottish Borders coastline from the nearest boundary (Figure 1.1). The Proposed Development Array Area is situated to the east of the large-scale morphological banks 'Marr Bank' and overlapping the 'Berwick Bank' in the south (Figure 1.2).

34. A maximum of 307 wind turbines will be installed in the Proposed Development Array Area, with either suction caisson jacket or piled jacket foundations proposed for the wind turbine foundations. There will be up to ten OSPs installed with piled jackets for the platform foundations. The wind turbines will connect to each other and to the OSP(s) via subsea inter-array cables, and the OSP(s) will be connected to other OSP(s) via interconnector cables.

35. Up to twelve offshore export cables will connect the OSP(s) to landfall at one selected landfall location on the East Lothian. Two are being considered, one at Thorntonloch (hereafter referred to as 'Thorntonloch Landfall') and one at Skateraw Harbour (hereafter referred to as the 'Skateraw Landfall')'. Once the cables make landfall, they will connect to the grid connection point at a new 400 kV Branxton substation, southwest of Torness Power station under an existing grid connection agreement. SSER is also considering an additional offshore ECC, which is under development. This ECC does not form part of the Proposed Development for which this Scoping request has been made or for which the Onshore EIA Scoping relates.

36. The decommissioning process is likely to follow a similar programme to construction, in a reverse manner. SSER has a 50-year AfL with Crown Estate Scotland and therefore, SSER is seeking a 35-year consent period to allow the wind farm to continue operating should the lifespan of the wind turbines allow.

1.3. OFFSHORE EIA SCOPING REPORT

1.3.1. PURPOSE

37. This Offshore EIA Scoping Report has been prepared in order to support a request for a formal Scoping Opinion in relation to the Proposed Development from Scottish Ministers. It is anticipated that the Scoping Opinion will be based on responses to this Offshore EIA Scoping Report from key statutory and non-statutory consultees, which will help guide SSER in progressing the Offshore EIAR.

38. The purpose of this Offshore EIA Scoping Report is to provide stakeholders with information on the Proposed Development and allow for engagement with stakeholders on the key topics to be addressed in the Offshore EIAR, as well as the baseline data sources and assessment methodologies to be used to inform the Offshore EIAR. Table 1.1 summarises the information requirements set out in the EIA Regulations and where these can be found in this Offshore EIA Scoping Report.

39. Within this Offshore EIA Scoping Report, a number of potential environmental impacts are considered. These include impacts which are proposed to be scoped out of the EIA Report due to no likely significant effect (in EIA terms) or no effect-receptor pathways identified. Agreement with key stakeholders will be sought to determine final impacts to be scoped in and scoped out of the Offshore EIAR (see section 4.3.4).

40. SSER welcomes the opportunity for engagement with stakeholders and feedback on the Proposed Development and the scope (proposed content) of the Offshore EIAR.

Table 1.1 Scoping Requirements of the EIA Regulations and Where the Information is Included in the Offshore EIA Scoping Report

EIA Regulation Topic Requirement	Summary Content
A description of the location of the Proposed Development, including a plan sufficient to identify the land	Section 2 includes a description of the Proposed Development including a plan.
A brief description of the nature and purpose of the Proposed Development and of its likely significant effects (LSE) on the environment	Section 2 includes a description of the nature and purpose of the Proposed Development, and sections 5.1 to 7.8 and 0 includes a description of the LSE on the environment from the Proposed Development.
Information on the Proposed Development and the associated environmental impacts in order to sufficiently define the potential effects and therefore extent of the EIA	Sections 5.1 to 7.8 and 0 includes a description of the potential effects on the environment and therefore the extent of the EIA.

1.3.2. APPROACH

41. This section sets out the approach to scoping that has been taken in the preparation of this Offshore EIA Scoping Report with the aim of achieving the following objectives:

- providing an overview of the baseline environment and the data collection that will be implemented and survey methodologies that have been implemented to inform the EIA baseline characterisation for each technical assessment;
- proposing impacts to be scoped out of the Proposed Development EIA where there is clear justification for doing so; and
- proposing impacts to scope into the Proposed Development EIA, draw upon the existing evidence base where appropriate.

42. This approach will allow the Offshore EIAR to focus on those potential impacts which either have the potential to lead to a significant effect, or where significant uncertainty exists on potential effect, thereby supporting the development of a proportionate Offshore EIAR.

43. Each of the topic specific sections of this Offshore EIA Scoping Report provides:

- an overview of the survey area and baseline characterisation;
- identifies potential routes to impact in the absence of designed in measures;
- a list of identified designed in measures;
- impacts to be scoped in and scoped out the Proposed Development EIA following consideration of designed in measures;
- an overview of the proposed approach to the EIA;
- identifies potential cumulative effects;
- presents a screening assessment of potential transboundary impacts;
- sets out questions to the stakeholders associated with each technical section; and
- provides a summary of suggested topic-specific next steps.

44. Further information on the approach to the Offshore EIA Scoping Report is set out in section 4.

1.3.3. STRUCTURE

45. This Offshore EIA Scoping Report and the subsequent Offshore EIAR relate to those impacts and receptors associated with the offshore environment, including potential impacts of offshore infrastructure on onshore and offshore receptors. A separate Onshore EIA Scoping report relating to impacts of onshore infrastructure on onshore receptors has previously been developed and submitted to support the onshore Proposed Development consent Application (Berwick Bank Wind Limited, 2020). Likewise, a separate Onshore EIA Report will be developed which assesses all impacts from infrastructure landwards of MLWS.

46. There is an overlap of jurisdiction in the intertidal area between MHWS and MLWS of the offshore and onshore consenting and regulatory regimes. Therefore, both EIA Reports will include the relevant technical assessments of the intertidal area (between MHWS and MLWS) (as shown in Figure 1.3).

47. The structure of this Offshore EIA Scoping Report is set out in Table 1.2. It should be noted that consideration of human health in the Offshore EIA Scoping Report is given in the airborne noise and air quality sections (section 5.3 and section 5.4).

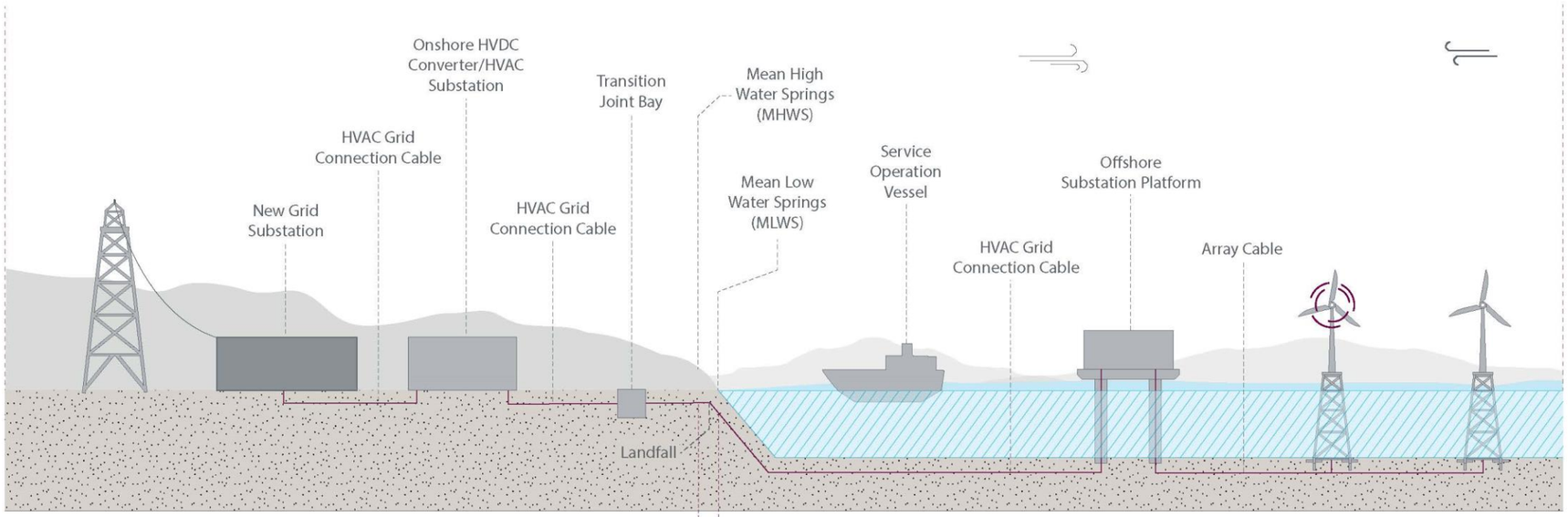
48. Water quality is assessed through topic specific assessments including consideration of INNS settlement and distribution, risk from operational cleaning and paints and accidental release of lubricants or chemicals.

49. Within the Offshore EIA Report, individual topic sections will contain an assessment of the potential effects arising from major accidental scenarios and disaster, and the associated control measures which will be employed to address these.

Table 1.2 Topics Within the Offshore EIA Scoping Report

Topic	Summary of content	Section	Author
Introductory Sections			
Introduction	Background to the Proposed Development and outlines the purpose and approach of the Offshore EIA Scoping Report.	Section 1	RPS
Proposed Development Description	Description of the design for the Proposed Development, based on preliminary conceptual design information and current understanding of the environment from initial site investigation studies.	Section 2	SSE Renewables and RPS
Site Selection Methodology and Consideration of Alternatives	Description of the site selection process and the approach undertaken by SSER to identify the siting of the Proposed Development and reasonable alternatives considered to date.	Section 3	RPS
Environmental Impact Assessment Methodology	Description of the proposed principles of the EIA process and the approach that will be applied in the Offshore EIAR to identify and evaluate the likely impacts and, subsequently, evaluate the significance of effects, associated with the Proposed Development.	Section 4	RPS
Offshore Physical Environment			
Physical Processes	Overview of the offshore physical environment (tidal elevations, current, waves, bathymetry, geology, seabed sediments, suspended sediments and sediment transport) within the Proposed Development. Supports assessment of potential impacts to the offshore physical environment from construction, operation and maintenance and decommissioning.	Section 5.1	RPS
Subsea Noise	Overview of ambient subsea noise within the Proposed Development. Required for understanding of potential impact to subsea noise sensitive receptors such as marine mammals and fish from construction, operation and maintenance and decommissioning.	Section 5.2	RPS
Airborne Noise	Overview of ambient airborne noise within the Proposed Development. Required for understanding of potential impact to airborne noise sensitive receptors such as fishing vessels, offshore oil and gas platforms and commercial shipping from construction, operation and maintenance and decommissioning.	Section 5.3	RPS
Offshore Air Quality	Overview of the offshore air quality within the vicinity of the Proposed Development. Required for understanding of potential impact to offshore air quality from construction, operation and maintenance and decommissioning.	Section 5.4	RPS
Climatic Effects	Required for understanding of potential impact to climatic effects from construction, operation and maintenance and decommissioning.	Section 5.5	SSER
Offshore Biological Environment			
Benthic Subtidal and Intertidal Ecology	Overview of the ecology of the seabed within the Proposed Development. Required for understanding of potential impacts to seabed ecology from construction, operation and maintenance and decommissioning.	Section 6.1	RPS
Fish and Shellfish Ecology	Overview of the fish and shellfish ecology of the seabed within the Proposed Development. Required for understanding of potential impact to fish and shellfish ecology from construction, operation and maintenance and decommissioning.	Section 6.2	RPS
Marine Mammals	Overview of the marine mammals within the vicinity of the Proposed Development. Required for understanding of potential impacts to marine mammals from construction, operation and maintenance and decommissioning.	Section 6.3	SMRU Consulting Ltd
Offshore and Intertidal Ornithology	Overview of the ornithology features within the vicinity of the Proposed Development. Required for understanding of potential impacts to ornithology from construction, operation and maintenance and decommissioning.	Section 6.4	Cork Ecology and Philip Bloor
Offshore Human and Socio-economic Environment			
Commercial Fisheries	Overview of commercial fisheries within the vicinity of the Proposed Development. Required for understanding of potential impacts to commercial fisheries from construction, operation and maintenance and decommissioning.	Section 7.1	Brown and May Marine
Shipping and Navigation	Overview of the baseline shipping and navigation within the vicinity of the Proposed Development. Required for understanding of potential impacts to shipping and navigation from construction, operation and maintenance and decommissioning.	Section 7.2	Anatec
Aviation, Military and Communications	Overview of aviation, military and communications within the vicinity of the Proposed Development. Required for understanding of potential impacts to aviation, military and communications from construction, operation and maintenance and decommissioning.	Section 7.3	Coleman Aviation
Marine Archaeology and Ordnance	Overview of marine archaeology within the vicinity of the Proposed Development. Supports understanding of impact to marine archaeology from construction, operation and maintenance and decommissioning.	Section 7.4	RPS
Seascape, Visual Resources	Overview of the seascape and visual resources within the vicinity of the Proposed Development. Required for understanding of potential impacts to seascape, visual resources and cultural heritage setting from construction, operation and maintenance and decommissioning.	Section 7.5	OP-EN
Cultural Heritage Setting	Overview of the cultural heritage within the vicinity of the Proposed Development. Required for understanding of potential impacts to cultural heritage setting from construction, operation and maintenance and decommissioning.	Section 7.6	RPS
Infrastructure and Other Users	Overview of aviation, military and communications within the vicinity of the Proposed Development. Required for understanding of potential impacts to aviation, military and communications from construction, operation and maintenance and decommissioning.	Section 7.7	RPS
Offshore Socio-economics and Tourism	Overview of the baseline offshore socio-economics and tourism within the vicinity of the Proposed Development. Required for understanding of potential impacts to baseline	Section 7.8	Hardisty Jones Associates

Topic	Summary of content	Section	Author
	offshore socio-economics and tourism from construction, operation and maintenance and decommissioning.		
Concluding Sections			
Summary	Presents a summary of those impacts that are proposed to be scoped in and out of the Offshore EIAR.	Section 8	RPS
Appendices			
Scoping Road Maps	For each technical topic, it summarises the expected receptors, sensitivity and evidence, baseline data sources, mitigation and approach to the EIA.	Appendix 1	RPS
Mitigation and Monitoring	Includes all mitigation and monitoring commitments that have been committed to within the Offshore EIA Scoping Report.	Appendix 2	RPS
Transboundary Screening	Includes a screening assessment of potential transboundary impacts arising from the Proposed Development.	Appendix 3	RPS
Policy and Legislation	Overview of international obligations, and national legislation and policy applicable to the Proposed Development.	Appendix 4	RPS
Physical Processes Baseline Environment	Baseline environment in relation to Physical Processes.	Appendix 5	RPS
Benthic Ecology Baseline Environment	Baseline environment in relation to Benthic Ecology.	Appendix 7	RPS
Fish and Shellfish Baseline Environment	Baseline environment in relation to Fish and Shellfish.	Appendix 8	RPS
Marine Mammals Baseline Environment	Baseline environment in relation to Marine Mammals.	Appendix 9	RPS
Ornithology Baseline Environment	Baseline environment in relation to Ornithology.	Appendix 10	Cork Ecology
Commerical Fisheries Baseline Environment	Baseline environment in relation to Commercial Fisheries.	Appendix 11	Brown and May Marine
Shipping and Navigation Baseline Environment	Baseline environment in relation to Shipping and Navigation.	Appendix 12	Anatec
Marine Archaeology Baseline Environment	Baseline environment in relation to Marine Archaeology.	Appendix 13	RPS
Seascape, Landscape, Visual Resources and Cultural Heritage Baseline Environment	Baseline environment in relation to Seascape, Landscape, Visual Resources and Cultural Heritage.	Appendix 14	RPS Consulting
Infrastructure and Other Users Baseline Environment	Baseline environment in relation to Infrastructure and Other Users.	Appendix 15	RPS
Offshore Socio-economics and Tourism Baseline Environment	Baseline environment in relation to Offshore Socio-economics and Tourism.	Appendix 16	Hardisty Jones Associates
Marine Protected Area (MPA) Screening	Preliminary initial screening of designated MPAs which it is proposed are carried forward for consideration in the MPA Main Assessment in the EIAR.	Appendix 17	RPS
References	Includes a list of all references included in the Offshore EIA Scoping Report.	Appendix 18	RPS



Onshore EIA Report		Offshore EIA Report
Physical Environment	Geology, Hydrology, Soils and Flood Risk	Subsea Noise
		Airborne Noise
		Air Quality
	Climatic Effects (Project level assessment)	Climatic Effects (Project level assessment)
Biological Environment	Ecology and Ornithology	Benthic Subtidal and Intertidal Ecology
		Fish and Shellfish Ecology
		Marine Mammals
		Ornithology
Human Environment	Traffic and Transport	Commercial Fisheries
		Shipping and Navigation
		Aviation, Military and Communications
	Cultural Heritage	Marine Archaeology and Ordnance
		Cultural Heritage Settings
	Landscape and Visual	Seascape and Visual Resources
	Land Use, Tourism and Recreation	Infrastructure and Other Users
	Socio-economics	Socio-economics and Tourism
	Noise	Addressed in offshore physical environment topics

Figure 1.3: Extent of the Offshore EIA Scoping Report and the Onshore EIA Scoping Report and Associated Onshore and Offshore EIARs

1.4. SSE RENEWABLES AND THE PROJECT EIA TEAM

1.4.1. SSE RENEWABLES

50. SSER is a leading developer, owner and operator of renewable energy across the UK and Ireland, with a portfolio of around 4 GW of onshore wind, offshore wind and hydro.

51. SSE Renewables owns nearly 2 GW of operational onshore wind capacity with over 1 GW under development. Its operational offshore wind portfolio consists of 580 MW across three offshore sites, two of which it operates on behalf of its joint venture partners. SSE Renewables has the largest offshore wind development pipeline in the UK and Ireland at over 6 GW.

1.4.2. THE PROJECT EIA TEAM

52. RPS has been instructed by SSER to lead the offshore EIA for the Proposed Development and ITPEnergised Group (ITPE) to lead the onshore EIA. This includes the initial review of the key environmental issues associated with the construction, operation and maintenance, and decommissioning of the Project as part of the Offshore and Onshore EIA Scoping Reports respectively.

1.5. POLICY AND LEGISLATION

53. An overview of the policy and legislation of relevance to the Proposed Development is provided here, with a detailed review presented within Appendix 4.

1.5.2. NEED FOR THE DEVELOPMENT

International Commitments

54. The UK is a signatory to the Kyoto Protocol which commits state parties to reduce greenhouse gas (GHG) emissions by setting internationally binding emission reduction targets. The protocol came into effect in 2005 and its commitments were transposed into UK law by the Climate Change Act 2008, which initially required the net UK greenhouse gas emissions for the year 2050 to be 80% lower than the 1990 baseline. This was revised to a "net zero target" of greenhouse gas emissions for the year 2050 to be 100% lower than the 1990 levels by The Climate Change Act 2008 (2050 Target Amendment) Order 2019. In Scotland, the net zero target must be delivered by 2045 (the Climate Change (Scotland) Act 2009).

55. In December 2015, 195 countries adopted the first-ever universal, legally binding global climate deal at the Paris climate conference (COP21). The Paris Agreement (2016) sets out a global action plan towards climate neutrality with the aims of stopping the increase in global average temperature to below 2°C above pre-industrial levels, and to pursue efforts to limit global warming to 1.5°C.

UK and Scotland Climate Change and Energy Legislation

56. As well as international legislation, the UK and Scotland are committed to various other targets within legislation including those listed below (further detail presented within Appendix 4):

- 2020 "20-20-20" targets;
- 2030 Targets including European Union Renewables Energy Directive;
- 2050 Low Carbon Economy;
- The Climate Change Act 2008;
- The Energy Act 2013;
- The Climate Change (Scotland) Act 2009; and
- The Scottish Energy Strategy.

1.5.3. PLANNING LEGISLATION

57. The Proposed Development requires the following consents, licences and permissions:

- a Section 36 consent under the Electricity Act 1989;
- a marine licence under the MCAA 2009; and
- a marine licence under the Marine (Scotland) Act 2010 for the part of the export cable which is within 12 nm of the coast.

58. Should additional pre-construction licences be required, these will be discussed and agreed with the relevant consenting authority during the pre-construction phase of the Proposed Development.

Section 36 Consent

59. The Proposed Development is an offshore generating station with a capacity of greater than 50 MW which is located in Scottish Offshore Waters (between 12 nm and up to 200 nm offshore) within the Scottish Renewable Energy Zone (REZ). Therefore, there is a requirement for consent under Section 36 of the Electricity Act 1989. Section 36 consent will allow for the construction and operation of wind turbines and inter-array cables forming part of the Proposed Development.

Marine Licence

60. Within the UK offshore waters (between 12 nm and up to 200 nm offshore), REZ, the MCAA 2009 applies. Under the MCAA 2009 (as amended) there is the requirement for a marine licence to be obtained prior to the construction, alteration or improvement of any works or deposit any object in or over the sea, or on or under the seabed. Similarly, under the Marine (Scotland) Act 2010 which applies to Scottish Territorial Waters (between 0 and 12 nm from MHWS) there is also the requirement for a marine licence prior to the construction, alteration or improvement of any works or deposit any object in or over the sea, or on or under the seabed.

61. Where applications for both a marine licence under the MCAA 2009 and consent under Section 36 of the Electricity Act 1989 are made and where the Scottish Ministers are the determining authority, they may issue a note to the applicant stating that both applications will be subject to the same administrative procedure. Where that is the case then that will ensure that the two related applications may be considered at the same time.

1.5.4. ENVIRONMENTAL IMPACT ASSESSMENT REGULATIONS

62. The EIA Directive (2011/92/EU, as amended by Directive 2014/52/EU) has traditionally directed the assessment of effects on certain public and private project on the environment in Scotland. Following the United Kingdom's departure from the European Union, Scotland has no direct obligations under this Directive. However, through The Marine Environment (EU Exit) (Scotland) (Amendment) Regulations 2019 which came into force on Exit day (31 January 2020) the requirements established under the Directive (as transposed into UK law) continue to apply, subject to only minor changes. As such, the Directive has continued relevance to any application in Scottish waters for a Section 36 consent, a marine licence or planning permission and continues to set the framework for the EIA process in Scotland.

63. The EIA Directive was implemented into Scottish law through various statutory instruments:

- in respect to a Section 36 consent application: The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017; and

- in respect to a marine licence application: The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017 and the Marine Works (Environmental Impact Assessment) Regulations 2007.
- The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 for all Project infrastructure located landward of MLWS.

64. In compliance with these Regulations, when applying for Section 36 consent or a marine licence, an EIA Report is required to be prepared and submitted to support these applications if the development applied for is likely to have a significant effect on the environment due to factors such as its size nature or location. An EIA is specifically required (Schedule 2) for installations for the harnessing of wind power for energy production (wind farms) if:

- the development involves the installation of more than two wind turbines; or
- the hub height of any wind turbine or height of any other structure exceeds 15 m.

65. The Proposed Development will consist of more than two wind turbines, with a hub height over 15 m, and therefore requires an EIA to be undertaken.

Pre-Application Consultation

66. Where activity is planned within the Scottish Territorial Waters, the Marine Licensing (Pre-application Consultation) (Scotland) Regulations 2013 (hereafter referred to as the PAC Regulations) apply. Public consultation will be carried out for the onshore and offshore elements of the Project at the same events to give third parties a full understanding of the proposals. A PAC report will be submitted alongside the marine licence application.

1.5.5. THE HABITATS DIRECTIVE, BIRD DIRECTIVE AND ASSOCIATED REGULATIONS

67. The Council Directive 92/43/EEC (the Habitats Directive) was adopted in 1992 and provided a means for the EU to meet its obligations under the Bern Convention. The aim of the Directive is to maintain or restore natural habitats and wild species listed on the Annexes at a favourable conservation status. This protection was granted through the designation of European Sites (Special Areas of Conservation (SAC) and measures to protect European Protected Species (EPS). European Directive (2009/147/EC) on the conservation of wild birds (The Birds Directive) affords rare and vulnerable species listed under Annex I of the Directive, and regularly occurring migratory species, protection through the identification and designation of Special Protection Areas (SPAs). Following the UK's Exit from the EU, the UK has no direct obligations under the Habitats Directive. However, The Conservation (Natural Habitats, &c.) (EU Exit) (Scotland) (Amendment) Regulations 2019 (effective from 1 January 2021) ensure that Scotland is legally obliged to continue to maintain the standards required by the EU Habitats and Wild Birds Directives, subject to only minor (non-material) changes. As such, the Habitats and Birds Directive continue to provide the framework for the conservation and management of rare and vulnerable habitats and species and wild birds within Europe and the UK.

68. The Directives were traditionally transposed into Scottish Law by various regulations, those of relevance to the Proposed Development include:

- the Conservation (Natural Habitats &c.) Regulations 1994 (as amended);
- the Conservation of Habitats and Species Regulations 2017; and
- the Conservation of Offshore Marine Habitats and Species Regulations 2017 (which apply to marine licences and Section 36 applications within the Scottish Offshore region).

69. These are hereafter referred to as the Habitats Regulations 2017 (as amended) to reflect the amendments effected by The Conservation (Natural Habitats, &c.) (EU Exit) (Scotland) (Amendment) Regulations.

70. The Habitat Regulations 2017 (as amended) require that where a plan or project is likely to have a significant effect on a designated site, either individually or in combination with other plans or projects, it shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives. Marine Scotland must therefore consider whether the Proposed Development is likely to have significant effects on the conservation objectives of the sites considered in the Habitats Regulations Appraisal (HRA), and, where LSE cannot be excluded at the screening stage, and in the absence of mitigation measures, an 'Appropriate Assessment' of the implication of the plan or project must be undertaken by the competent authority before consent may be given for the proposed project.

71. Further details of the HRA process are presented in Appendix 4.

1.5.6. EUROPEAN PROTECTED SPECIES (EPS) LICENSING

72. EPS are animals and plants (species listed in Annex IV of the Habitats Directive) that are afforded protection under The Habitats Regulations 2017 (as amended). All cetacean species (whales, dolphins and porpoise) are EPSs. If any activity is likely to cause disturbance or injury to an EPS a licence is required to undertake the activity legally.

73. Activities which can be licenced under EPS licences include those such as subsea noise disturbance to marine mammals due to piling construction activities. EPS licences are obtained from NatureScot or the Scottish Ministers, depending on the species subject to the licence application. Although the grant of EPS licences is separate to the Section 36 and marine licence application process, it can be considered in parallel by Marine Scotland.

1.5.7. DECOMMISSIONING

74. Sections 105 to 114 of the Energy Act 2004 (as amended by the Energy Act 2008 and the Scotland Act 2016) (hereafter referred to as the Energy Act) contain statutory requirements in relation to the decommissioning of offshore renewable energy installations (OREI) and their related electricity lines. 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 (Marine Scotland, 2020).

75. The scope of decommissioning requirements in Scotland is between the MLWS mark and the seaward limits of the territorial waters, including coastal water and the Scottish part of the REZ. The Energy Act does not cover the intertidal zone, however decommissioning of infrastructure within the intertidal zone should be carried out under any conditions attached to a Marine Licence (under the Marine Scotland Act 2010).

76. Further detail on decommissioning is presented within Appendix 4.

2. PROPOSED DEVELOPMENT DESCRIPTION

2.1. INTRODUCTION

77. This section of the Offshore EIA Scoping Report provides an outline description of the Proposed Development and describes activities associated with the construction, operation and maintenance, and decommissioning of the Proposed Development. It summarises the design and components for the Proposed Development infrastructure, based on conceptual design information and refinement of the Proposed Development parameters following receipt of the Offshore EIA Scoping Opinion for the initial Berwick Bank Wind Farm proposal, and understanding of the environment from survey work and desk-top analysis.

2.2. DESIGN ENVELOPE APPROACH

78. The Project Design Envelope (PDE) approach (also known as the Rochdale Envelope approach) will be adopted for the assessment of the Proposed Development, in accordance with current good practice and the "Rochdale Envelope Principle"[1]. The PDE concept allows for some flexibility in project design options, particularly for foundations and wind turbine type, where the full details of a project are not known at application submission.

79. The use of the Design Envelope approach has also been recognised in the UK Overarching National Policy Statement (NPS) for Energy (NPS EN-1) (DECC, 2011a) and the NPS for Renewable Energy Infrastructure (NPS EN-3) (DECC, 2011b). This approach has been used in the majority of offshore wind farm applications in the UK to date. NPS states that '*although the IPC (infra planning committee) will not examine projects in Scottish waters - energy policy is generally a matter reserved to UK Ministers and this NPS may therefore be a relevant consideration in planning decisions in Scotland*.'

80. In the case of offshore wind farms, NPS EN-3 (paragraph 2.6.42) recognises that: "*Owing to the complex nature of offshore wind farm development, many of the details of a proposed scheme may be unknown to the applicant at the time of the application, possibly including*:

- *precise location and configuration of wind turbines and associated development;*
- *foundation type;*
- *exact wind turbine tip height;*
- *cable type and cable route; and*
- *exact locations of offshore and/or onshore substations*."

81. An example of the Design Envelope approach would be where several types of wind turbine foundation are being considered, then the assessment is based on the foundation known to have the greatest impact (the maximum adverse impact). In this instance, the Design Envelope for the foundation with the greatest seabed disturbance potential would be the foundation with the largest footprint and the greatest number of wind turbines. If, after undertaking the impact assessment, it is shown that no significant effect is anticipated, it can be assumed that any project parameters equal to or less than those assessed in the PDE will have environmental effects of the same level or less and will therefore also have no significant effect upon the receptors for the topic under consideration.

82. Throughout this Offshore EIA Scoping Report (and subsequent Offshore EIAR), the Design Envelope approach has been undertaken to allow meaningful assessments of the Proposed Development to proceed, whilst still allowing reasonable flexibility for future project design decisions.

[1] Case law (i.e. R v Rochdale MBC ex parte Tew (1999) and R v Rochdale MBC ex parte Milne (2000)). In respect of S36 consent, whichever scheme is ultimately built must have been covered by the scope of the EIA.

2.3. PROPOSED DEVELOPMENT SUMMARY

83. The Proposed Development Array Area is located 33.5 km offshore of the East Lothian and the Scottish Borders coastline (closest point is St Abb's Head) in Scotland and located within the former Firth of Forth Zone (Figure 1.1). The Proposed Development Array Area comprises an area of approximately 1,314 km^2 overlapping the large-scale morphological banks 'Marr Bank' and 'Berwick Bank'.

84. SSER is currently assessing the feasibility of two landfall locations on the East Lothian, Thorntonloch Landfall and Skateraw Landfall (Figure 3.2). One will be selected. A grid connection point has been confirmed at a new 400 kV Branxton substation, south west of Torness Power station under an existing grid connection agreement. A potential ECC has been identified (Figure 3.2). As noted earlier, SSER is also considering an additional offshore ECC, which is under development. This ECC does not form part of the Proposed Development for which this Scoping request has been made. However, it will be considered within the Cumulative Effects Assessment (CEA) for the Offshore EIA Report (and the Onshore EIA Report) as appropriate, to ensure compliance with the requirements of the EIA Regulations

85. The following sections provide the design parameters, which constitute the realistic maximum adverse design scenario for each technical assessment. The design of the Proposed Development has been developed and refined through stakeholder engagement on the initial Berwick Bank Wind Farm Proposal, and analysis of engineering, technical and environmental constraints. This Offshore EIA Scoping Report therefore presents an accurate summary of the Offshore EIAR project description for which necessary consent applications (section 36 consent and marine licences) will be sought.

86. A 35-year consent life under s.36 of the Electricity Act will be applied for.

2.3.2. PROPOSED DEVELOPMENT BOUNDARY

87. An agreement for lease (AfL) grants rights to the respective AfL holders SSER (via its wholly owned subsidiary project companies) to carry out investigations, such as survey activities, to identify the potential design of the offshore array within the AfL areas for the wind farm by understanding environmental and technical constraints. The Proposed Development Array Area includes the majority of previous Marr Bank Wind Farm and initial Berwick Bank Wind Farm AfL areas. Site selection and consideration of Alternatives is discussed in section 3.

88. The Proposed Development covers and area of 1,314 km^2. This is where the offshore infrastructure, such as the wind turbines, offshore substation(s), array cables, and the start of the proposed ECC will be located and is hereafter referred to as the 'Proposed Development Array Area' throughout the Offshore EIA Scoping Report. The proposed ECC has been identified and will connect the Proposed Development Array Area to Thorntonloch Landfall or Skateraw Landfall.

89. The Proposed Development boundary is illustrated within Figure 1.1. This area encompasses the:

- Proposed Development Array Area: This is where the offshore wind farm will be located, which will include the wind turbines, wind turbine foundations, array cables, and a range of offshore substations and offshore interconnector cables; and
- ECC: This is where the offshore electrical infrastructure such as the offshore export cable(s) will be located.

2.3.3. WATER DEPTHS AND SEABED WITHIN THE AGREEMENT FOR LEASE AREA

90. A geophysical survey was undertaken across the Proposed Development Array Area in 2019, providing geophysical and bathymetric data. The bathymetry of the Proposed Development Array Area is influenced by the presence of large-scale morphological bank features of the Marr Bank and Berwick Bank. These

two bank features are defined as Shelf Banks and Mounds and are part of the Firth of Forth Banks Complex.

91. The maximum recorded seabed depth is recorded at two locations where deep channels cut into the seabed east and west of the central point of the Proposed Development Array Area (68.5 m Lowest Astronomical Tide (LAT)). The shallowest area is observed in the west of Proposed Development Offshore Wind Farm Proposed Development Array Areas (32.8 m LAT). The average seabed depth across the Proposed Development Array Area is 51 m below LAT.

92. The seafloor morphology is very varied and can be classified into four types of morphological features:

- two large scale banks;
- arcuate ridges;
- incised valleys, relic glacial lakes and channels; and
- bedforms.

93. Seabed sediments within the Proposed Development Array Area are classified into several groups including coarse shelly cobbly gravel or shelly gravelly sand, gravelly sand, mixed sediment, including clay and sand. Further details of the bathymetry and seabed composition are presented within Appendix 5.

2.3.4. OFFSHORE PROPOSED DEVELOPMENT INFRASTRUCTURE OVERVIEW

The key offshore components of the Proposed Development are likely to include:

- up to 307 wind turbines (each comprising a tower section, nacelle and three rotor blades) and associated support structures and foundations;
- up to ten OSPs and associated support structures and foundations;
- estimated scour protection of 2 km^2;
- network of inter-array cabling linking the individual wind turbines to OSPs, end links plus inter-connections between substations (approximately 1,225 km of array cabling and 94 km of interconnector cabling); and
- up to twelve offshore export cables connecting the offshore substation(s) to the onshore substation.

2.3.5. WIND TURBINES

94. The Proposed Development will be comprised of up to 307 wind turbines, and the final number of wind turbines will be dependent on the capacity of individual wind turbines used and also environmental and engineering survey results. There is the potential for a reduced number of wind turbines to be used if an increased rated output of wind turbine model is chosen when the final project design is developed.

95. The maximum rotor blade diameter is expected to be no greater than 310 m, with a maximum blade tip height of 355 m above LAT and a minimum blade tip height of 37 m above LAT. The top of the wind turbine (the nacelle) will be maximum of 200 m above LAT. A scheme for wind turbine lighting and navigation marking will be agreed with consultees post-Application.

96. The layout of the wind turbines will be developed to best utilise both the available wind resource and suitability of seabed conditions, while ensuring environmental effects and impacts on other marine users (such as fisheries and shipping routes) are minimised. The final layout of the wind turbines will be confirmed at the final design stage (post-application).

97. A schematic of a typical offshore wind turbine is illustrated within Figure 2.1, and the design envelope for wind turbines is presented in Table 2.1.

Table 2.1: Design Envelope: Wind Turbines

Parameter	Maximum Design Envelope
Maximum number of wind turbines	307
Range of wind turbines capacity (MW)	14 - 24
Maximum rotor blade diameter (m)	310
Maximum nacelle height above LAT (m)	200
Minimum blade tip height above LAT (m)	37
Maximum blade tip height above LAT (m)	355

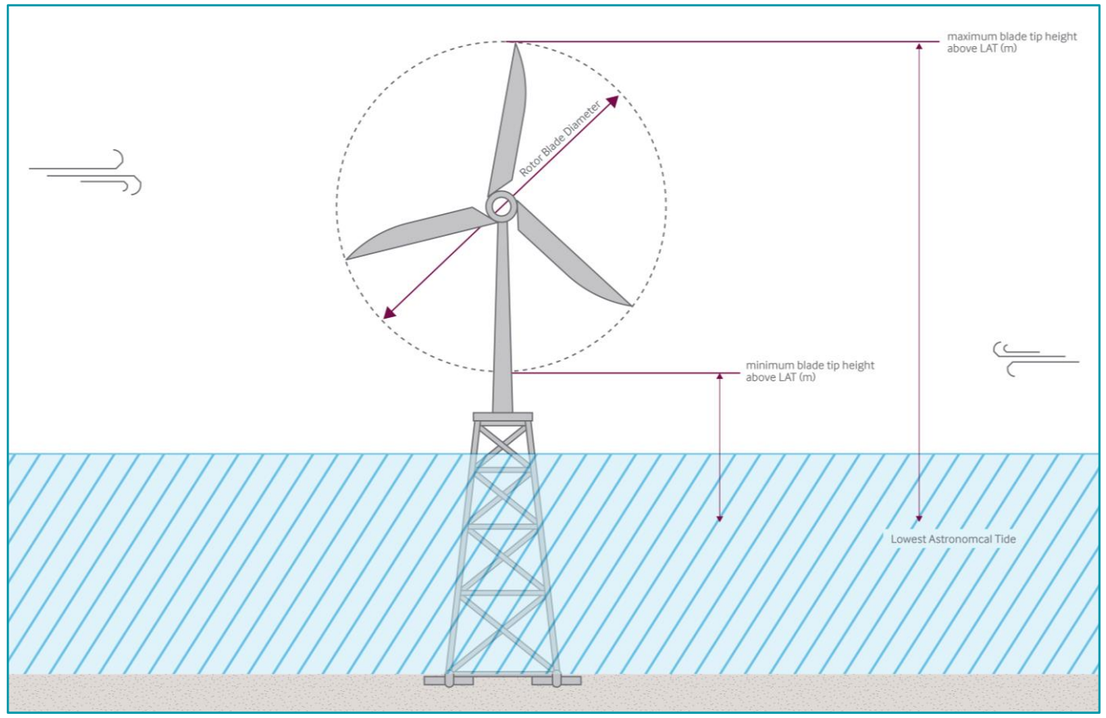


Figure 2.1: Schematic of an Offshore Wind Turbine

2.3.6. WIND TURBINE FOUNDATIONS AND SUPPORT STRUCTURES

98. To allow for flexibility in foundation choice, two wind turbine support structures and foundations are being considered for the Proposed Development – piled jacket and suction caisson jacket.

99. There is the potential for seabed preparation to be required for each foundation type, which may include seabed levelling and removing surface and subsurface debris such as (for example) boulders, fishing nets, unexploded ordnance, or lost anchors. Excavation may be required to access and remove any debris which is present below the seabed surface.

100. Foundations will be fabricated offsite, stored at a suitable port facility (if required) and transported to site as needed. Specialist vessels will transport and install foundations. Scour protection (typically rock) may be required on the seabed and will be installed either before and/or after foundation installation. The following section provides an overview of the foundation types which are being considered for wind turbines - foundation structures for OSPs are discussed in section 2.3.8.

Piled Jacket Foundation

101. Piled jacket foundations are formed of a steel lattice construction (comprising tubular steel members and welded joints) secured to the seabed by driven and/or drilled pin piles attached to the jacket feet (as illustrated in Figure 2.2). The hollow steel pin piles are typically driven, drilled or vibrated into the seabed relying on the frictional and end bearing properties of the seabed for support. The jacket structure is installed prior to the installation of the tower. There is no separate transition piece (TP), the TP and ancillary structure are fabricated as an integrated part of the jacket structure and is not installed separately offshore. The design envelope for jacket foundations with pin piles is provided in Table 2.2.

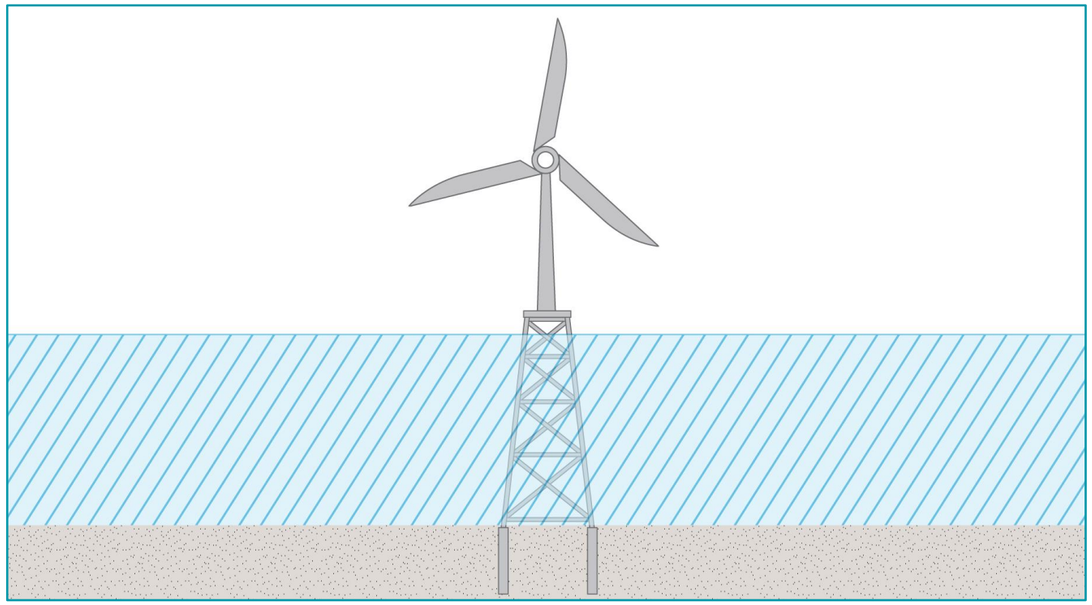


Figure 2.2: Schematic of a Jacket Foundation with Pin Piles

Table 2.2: Design Envelope: Jacket Foundation with Pin Piles

Parameter	Maximum Design Envelope
Number of jackets	307
Maximum number of legs per jacket	4
Maximum Leg diameter (m)	5
Number of pin piles per leg (max)	2
Diameter foundation footprint (per jacket) (m^2) including scour protection	15,241
Maximum hammer energy (kJ)	4,000
Realistic average hammer energy (kJ)	3,000
Jacket leg spacing (at seabed) (assumed three leg) (m)	60
Diameter of pin piles (m)	5.5

Suction Caisson Jacket Foundations

102. Suction caisson jacket foundations are formed with a steel lattice construction (comprising tubular steel members and welded joints) fixed to the seabed by suction caissons installed below each leg of the jacket (as per Figure 2.3). The suction caissons are typically hollow steel cylinders, capped at the upper end, which are fitted underneath the legs of the jacket structure. They do not require a hammer or drill for installation. As with the piled jacket foundations, there is no separate TP. The jacket structure is installed prior to the installation of the tower.

103. The foundations will be transported to site via sea. Once at site, the jacket foundation will be lifted by the installation vessel using a crane and lowered towards the seabed in a controlled manner. When the steel caisson reaches the seabed, a pipe running up through the stem above each caisson will begin to suck water out of each bucket. The buckets are pressed down into the seabed by the resulting suction force. When the bucket has penetrated the seabed to the desired depth, the pump is turned off. A thin layer of grout is then injected under the bucket to fill the air gap and ensure contact between the soil within the bucket, and the top of the bucket itself. The design envelope for jacket foundations with suction caissons is provided in Table 2.3.

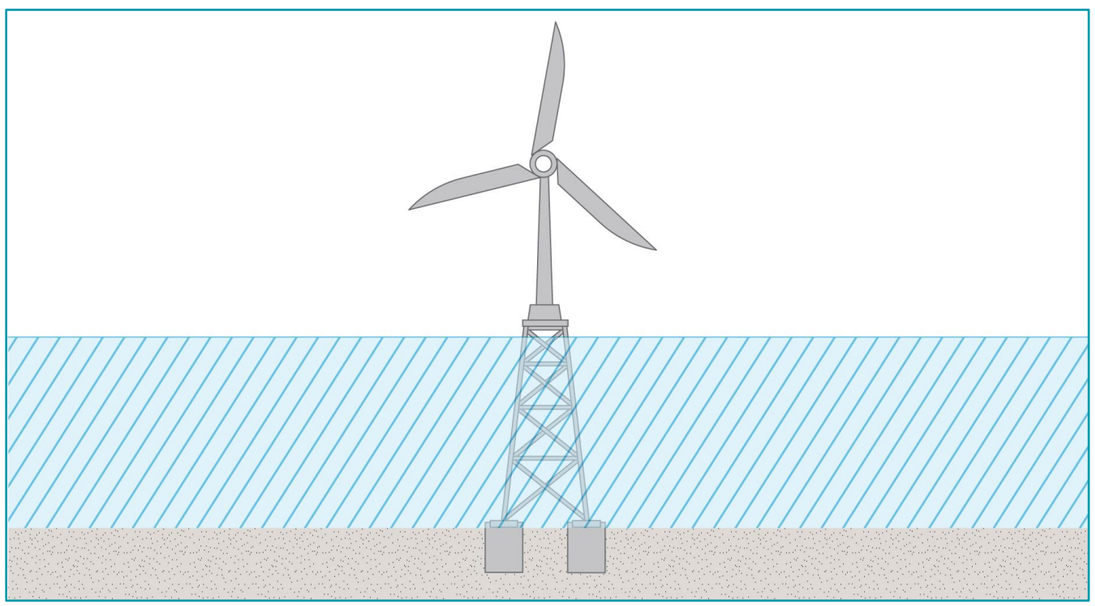


Figure 2.3: Schematic of a Jacket Foundation with Suction caissons

Table 2.3: Design Envelope: Suction caisson Jacket Foundations

Parameter	Maximum Design Envelope
Number of jackets with suction caissons	307
Maximum number of legs per jacket with suction caisson	4
Diameter of foundation footprint (m^2) including scour protection	31,416
Suction caisson diameter (m)	20
Expected penetration depth (m)	20
Jacket leg spacing (at seabed) (assumed three leg) (m)	60
Diameter of jacket leg (m)	5

2.3.7. SCOUR PROTECTION FOR FOUNDATIONS

104. Foundation structures for wind turbines and substations are at risk of seabed erosion and 'scour hole' formation due to natural hydrodynamic and sedimentary processes. The development of scour holes is influenced by the shape of the foundation structure, seabed sedimentology and site-specific metocean conditions such as waves, currents and storms. Scour protection may be employed to mitigate scour around foundations. There are several commonly used scour protection types, such as:

- concrete mattresses: several metres wide and long, cast of articulated concrete blocks which are linked by a polypropylene rope lattice which are placed on and/or around structures to stabilise the seabed and inhibit erosion;
- rock: either layers of graded stones placed on and/or around structures to inhibit erosion or rock filled mesh fibre bags which adopt the shape of the seabed/structure as they are lowered on to it; or
- artificial fronds: mats typically several metres wide and long, composed of continuous lines of overlapping buoyant polypropylene fronds that create a drag barrier which prevents sediment in their vicinity being transported away. The frond lines are secured to a polyester webbing mesh base that is itself secured to the seabed by a weighted perimeter or anchors pre-attached to the mesh base.

105. The most frequently used scour protection method is 'rock placement', which entails the placement of crushed rock around the base of the foundation structure.

106. The amount of scour protection required will vary for the different foundation types being considered for the Proposed Development. The final choice of scour protection will be made after design of the foundation structure, taking into account a range of aspects including geotechnical data, meteorological and oceanographical data, water depth, foundation type, maintenance strategy and cost.

2.3.8. OFFSHORE PLATFORMS

107. The Proposed Development may require up to a total of ten offshore platforms. These offshore platforms will be utilised as OSPs which transform electricity generated by the wind turbines to a higher voltage and thereby allowing the power to be efficiently transmitted to shore. The platform topsides size will depend on the final electrical set up for the wind farm but could range between approximately 35 – 100 m (length) by 27 – 80 m (width), and approximately 45 – 80 m in height (above LAT), excluding the helideck or lightning protection (Table 2.4). The Project Description in the Offshore EIAR will provide further detail on the design of offshore platform and topside specification.

Table 2.4: Design Envelope: Offshore Platforms

Parameter	Maximum Design Envelope
Maximum number of platforms	10
Length of topside (m)	35 - 100
Width of topside (m)	27 - 80
Height (excluding helideck or lightning protection) (LAT) (m)	45 - 80

108. The platforms locations have not yet been selected and will be identified through detailed design consideration. The offshore platforms will be installed with piled jacket foundations, as described in section 2.3.6. The design envelope for jacket foundations with pin piles is shown in Table 2.5.

Table 2.5: Design Envelope: Jacket Foundation with Pin Piles for Offshore Platforms

Parameter	Maximum Design Envelope
Number of piled jacket platforms	10
Maximum number of legs per jacket	8
Maximum leg diameter (m)	5
Maximum number of piles per structure	32
Maximum pin pile diameter (m)	4
Maximum hammer energy (kJ)	4000

2.3.9. INTER-ARRAY CABLES

109. Inter-array cables carry the electrical current produced by the wind turbines to an offshore substation. A small number of wind turbines will typically be grouped together on the same cable 'string' connecting those wind turbines to the substation, and multiple cable 'strings' will connect back to each offshore substation.

110. The inter-array cables will be buried where possible and protected with a hard-protective layer (such as rock or concrete mattresses) where burial is not achievable, for example where crossing pre-existing cables, pipelines or exposed bedrock. If cable protection is required, the protection measure will be dependent on several factors such as seabed conditions, seabed sedimentology and the physical processes. The cable installation methodology and potential cable protection measures will be finalised at the final design stage (post-application). The design envelope for inter-array cables is presented in Table 2.6.

Table 2.6: Design Envelope: Inter-Array Cables

Parameter	Maximum Design Envelope
Total cable length (km)	1,225
Cable diameter (mm)	250
Cable installation methodology	Jet trencher / mechanic trencher / cable plough
Minimum cable burial depth (m)	0.5 - 3
Maximum width of cable trench (m)	2
Maximum width of seabed affected by installation per cable (m)	15
Maximum area of seabed disturbance (km^2)	18.4

2.3.10. OFFSHORE TRANSMISSION INFRASTRUCTURE

111. Offshore export cables are used for the transfer of power from the offshore substations to the point of landfall. The offshore export cables will have a maximum total length of 1,072 km, comprised of up to twelve cables. Each of these export cables will be installed in a trench up to 2 m wide with a burial depth of between 0.5 m and 3 m per cable. There is the potential for seabed preparation to be required prior to cable installation, with methods such as jet trencher, mechanic trencher or grapnel currently being considered.

112. Although an ECC has been identified, the exact locations of the offshore export cables are yet to be determined and will be based upon geophysical and geotechnical survey information. This information will also support the decision on requirements for any additional cable protection. Flexibility is required in the location, depth of burial and protection measures for the export cables to ensure physical and technical constraints, changes in available technology and project economics can be accommodated within the final design.

113. Likewise, SSER is currently considering the feasibility of two landlfall locations as part of the Proposed Development: Skateraw and Thorntonloch. One will be selected. The installation of the export cables through the intertidal zone at the Skateraw or Thorntonloch landfalls will depend on pre-construction confirmation of ground conditions however one of the following methods of installation will be implemented and the EIA Report will consider either:

- trenchless installation: installation of the offshore export cable via trenchless installation methods such as Horizontal Directional Drilling (HDD) or Direct Pipe®; or
- open cut trench: this method involves the excavation of a trench on the shore via earth moving equipment. The cable is then pulled ashore into the trench and the trench is backfilled and then re-instated.

114. If the cables at landfall are installed using a trenchless technique, designed in measures will avoid exposure.

115. The design envelope for the offshore transmission infrastructure forming part of the Proposed Development is described in Table 2.7.

Table 2.7: Design Envelope: Offshore Transmission Infrastructure

Parameter	Maximum Design Envelope
Number of cables	12
Maximum total cable length (km)	1,072
Maximum cable diameter (mm)	260
Cable installation methodologies – seaward of MLWS	Jet trencher / mechanic trencher / cable plough
Cable installation methodologies – landward of MLWS	trenchless installation or open cut trench
Minimum cable burial depth (m)	0.5 - 3
Maximum width of cable trench (m)	2
Maximum width of seabed disturbed by cable installation (per cable (m))	15
Maximum area of seabed disturbed (km^2)	16

2.4. OFFSHORE CONSTRUCTION PHASE

116. The Proposed Development is likely to be constructed over a period of four years in line with the general construction series outlined below:

1. pre-construction surveys and activities (including UXO clearance, geophysical and geotechnical surveys);
2. foundation installation;
3. OSP installation/commissioning;
4. inter-array cable installation;
5. offshore export cable; and
6. wind turbine installation/commissioning.

117. The offshore construction phase will be supported by various vessels including jack-up or floating Heavy Lift vessels (HLV), support vessels, cable lay vessels, pre-lay survey vessels, Remotely Operated underwater Vehicle (ROV) deployment vessel, rock installation vessel, service and commissioning support vessels, and guard vessels.

118. Wind turbines, foundation structures and offshore platform structures will be transported from the pre-assembly harbour where sub-assemblies (nacelle, rotor blades and towers) will be loaded onto an installation vessel or support vessel. At the installation location, the wind turbine tower will be erected first, followed by the nacelle and blades. The blades may be installed one at a time or may be pre-assembled. Following installation of the wind turbine and connection to the necessary cabling, a process of testing and commissioning will be undertaken.

2.5. OPERATION AND MAINTENANCE PHASE

119. Operations and maintenance works will be conducted from either a Service Operations Vessel (SOV), helicopter, drones or Crew Transfer Vessel (CTV) for routine operations and maintenance works, as well as heavy lift vessels and/or jack-up vessels for infrequent major maintenance campaigns. The details of estimated annual and total operations and maintenance activities will be detailed within the Design Envelope of the Offshore EIAR.

2.6. DECOMMISSIONING PHASE

120. Under Section 105 of the Energy Act 2004 (as amended), developers of offshore renewable energy projects are required to prepare a decommissioning programme for approval by Scottish Ministers. A Section 105 notice is issued to developers by the regulator after consent or marine licence has been issued for the given development. Developers are then required to submit a detailed plan for the decommissioning works, including anticipated costs and financial securities. The plan will consider good industry practice, guidance and legislation relating to decommissioning at that time. The plan will be consulted on by an approved set of stakeholders and will be publicly available. Marine Scotland Licensing Operations Team (MS-LOT) will further consult on the plan, the costs and financial securities prior to seeking ministerial approval.

121. The Offshore EIAR will provide an overview of the anticipated decommissioning events and an assessment of the potential significant effects of this phase on receptors.

122. The initial Berwick Bank Wind Farm Proposal Offshore EIA Scoping Opinion (Scottish Government, 2021) requested an assessment of decommissioning which is "*as close to full removal at decommissioning as possible*". SSER intend to assess a decommissioning scenario close to full removal that will ensure that a good practice approach is followed at the time of decommissioning.

2.7. DESIGNED IN MEASURES

123. The following designed in measures will be included within the Proposed Development project design, and will be considered in assessment in the Offshore EIAR. These are summarised in Appendix 2:

- scour protection: The use of scour protection around offshore structures and foundations will be employed,

- suitable implementation and monitoring of cable protection through the Operation and Maintenance phase of the Proposed Development;
- development and adherence to a Cable Plan (CaP).;
- core working hours for the construction of the onshore elements of the Proposed Development will be Monday to Sunday 07.00 to 19.00 hour. Activities carried out during mobilisation and maintenance will not generate significant noise levels (such as piling, or other such noisy activities). In certain circumstances, specific works may have to be undertaken outside the normal working hours;
- where airborne noise has the potential to cause disturbance the use of mufflers, acoustic barriers and screening will be considered. The construction and decommissioning works would use Best Practicable Means (BPM) to limit the impacts of noise at sensitive receptors. Those measures would be set out in the Construction Environmental Management Plan (CEMP). Monitoring of noise related complaints should also be undertaken.
- development of, and adherence to, an appropriate Code of Construction Practice (CoCP);
- the dust and air quality management plan within the CoCP will include good practice measures in accordance with the Institute of Air Quality Management (IAQM);
- the development of, and adherence to, an Environmental Management Plan, including Marine Pollution Contingency Plan and Invasive Non-Native Species (INNS) Management Plan;
- development of, and adherence to, a Decommissioning Plan;
- implementation of piling soft-start and ramp-up measures;
- the development of, and adherence to, a Piling Strategy (PS);
- development of, and adherence to, a Vessel Management Plan (VMP);
- use of deflagration to clear all UXOs;
- increased minimum turbine tip height (air gap) to a minimum of 37m;
- development of, and adherence to, a Marine Mammal Mitigation Protocol (MMMP - geophysical survey specific and piling specific);
- ongoing consultation with the fishing industry and appointment of a Fisheries Liaison Officer (FLO);
- development of a Fisheries Management and Mitigation Strategy (FMMS);
- adherence to good practice guidance with regards to fisheries liaison (e.g. FLOWW, 2014;2015);
- timely and efficient distribution of Notice to Mariners (NtM), Kingfisher notifications and other navigational warnings of the position and nature of works associated with the Proposed Development;
- use of guard vessels and Offshore Fisheries Liaison Officers (OFLOs), as appropriate;
- implementation Navigational Safety Plan (NSP);
- notification to the UK Hydrographic Office (UKHO) of the proposed works to facilitate the promulgation of maritime safety information and updating of nautical charts and publications;
- undertaking of post-lay and cable burial inspection surveys and monitoring,
- participation in the Forth and Tay Commercial Fisheries Working Group (FTCFWG) and liaison with Fisheries Industry Representatives (FIRs), as appropriate.
- compliance with MGN 654 and its annexes (in particular Search and Rescue (SAR) annex 5 (MCA, 2021) and completion of a SAR checklist) where applicable;
- buoyed construction area in agreement with NLB;
- application for safety zones of up to 500 m during construction and periods of major maintenance;
- marine coordination and communication to manage project vessel movements;
- suitable implementation and monitoring of cable protection (via burial, or external protection where adequate burial depth as identified via risk assessment is not feasible);
- marking and lighting of the site in agreement with NLB and in line with IALA Recommendation O-139 (IALA, 2013);
- compliance of all vessels with international marine regulations as adopted by the Flag State, notably the International Regulations for Preventing Collisions at Sea (COLREGs) (IMO, 1974) and the International Convention for the Safety of Life at Sea (SOLAS) (IMO, 1974);
- blade clearance of at least 37 m above MHWS (in line with RYA policy (RYA, 2015));
- Adherence Civil Aviation Publication (CAP) 393 Article 223 (Civil Aviation Authority (CAA), 2018
- Implementation of a Lighting and Marking Plan (LMP) which will set out specific requirements in terms of aviation lighting to be installed on the wind turbines.
- all structures > 91.4 m in height will be charted on aeronautical charts and reported to the Defence Geographic Centre (DGC) which maintains the UKs database of tall structures (Digital Vertical Obstruction File) at least ten weeks prior to construction.
- use of advisory safety distances around vessels undertaking construction, major maintenance and decommissioning activities;
- crossing or laying of cables over or adjacent to known or future cables will be subject to crossing and/or proximity agreements.
- the use of locally manufactured content where possible and appropriate.
- the use of local contractors (where possible) during construction for onshore infrastructure and potential offshore construction work where possible and appropriate.
- employment and training possibilities for local people on the operation and maintenance of a wind farm where feasible; and
- supporting the community through sponsorship of local groups and teams.

3. SITE SELECTION METHODOLOGY AND CONSIDERATION OF ALTERNATIVES

3.1. INTRODUCTION

124. A summary of the considerations for site selection and alternatives of the Proposed Development is outlined in this section. The Offshore EIAR will outline the stages of site selection and Project Description refinement that have been carried out in order to establish the Proposed Development Array Area, proposed ECC and landfall, and key parameters. Furthermore, the Offshore EIAR will set out any refinements to the Proposed Development that have taken place as a result of the EIA process and in response to consultation and stakeholder feedback and will describe the main alternatives that have been considered as part of this process.

125. Sections 3.2 and 3.3 outline the process behind the identification of the Proposed Development Array Area and the point of landfall.

3.2. SITE SELECTION AND CONSIDERATION OF ALTERNATIVES

3.2.1. FIRTH OF FORTH ROUND 3 ZONE

126. The Proposed Development is located within the former Firth of Forth Zone (the Zone). Site selection for the Proposed Development has comprised the following stages:

- initial zone selection in 2008, undertaken by TCE following their SEA and Round 3 zone identification process;
- followed by the subsequent stages undertaken by SSER:
  - identification of three development phases within the Firth of Forth Zone (Seagreen Alpha/Bravo, Berwick Bank Wind Farm, Marr Bank Wind Farm;
  - Zone Appraisal and Planning (ZAP): a discretionary, non-statutory process to aid developers in managing development risks within their zones;
  - identification of the initial Berwick Bank Wind Farm and Marr Bank Wind Farm proposals within the former Firth of Forth Zone;
  - identification of the Proposed Development within the former Firth of Forth Zone following analysis of environmental, technical and engineering constraints.

127. The Round 3 offshore wind development programme instigated by TCE in 2008 was designed to facilitate delivery of a larger scale offshore wind farm development than had previously occurred in the UK. Suitable areas for the development of offshore wind were assessed through a statutory process of SEA undertaken by DECC, now BEIS.

128. In 2009, Seagreen Wind Energy Limited was awarded development rights to Round 3 Zone 2 (named 'Firth of Forth Zone'), and subsequently Seagreen and TCE entered into a Zone Development Agreement (ZDA) with a target Zone generation capacity of circa 3.5 GW.

129. The ZDA granted Seagreen certain seabed rights within the Firth of Forth Zone, such as to identify specific areas for the development of offshore wind farms. Although the boundary of the Firth of Forth Zone was fixed, development phase and project boundaries remained flexible. The key considerations for the selection of the preferred offshore wind farm sites within the Firth of Forth Zone related to the environmental, engineering and economic constraints. For example, avoiding areas which are not economically viable due to insufficient wind resource, or unsuitable areas due to seabed geology.

130. Seagreen opted for a phased approach to the delivery of the projects within the Firth of Forth Zone to achieve the target capacity. This approach involved prioritising areas considered to have the least potential constraints and considering the practicalities of resourcing delivery of the target capacity for the Firth of Forth Zone. To support the definition of phases and project boundaries rationally and strategically, Seagreen adopted the ZAP approach.

131. ZAP was a term advocated by TCE to describe the non-statutory strategic approach to zone design, project identification and consent. The ZAP process allowed developers to have greater control over the way a zone is developed and encourages a high-level strategic approach to planning and stakeholder engagement of the zone in terms of environmental, social and economic effects (particularly cumulative effects). The Seagreen ZAP followed an iterative process throughout the projects within the Firth of Forth Zone.

132. The initial ZAP report (Seagreen, 2010a) informed the Zone Consenting Strategy (Seagreen, 2010b) and ranked the sites on the level of constraint and ability to construct. The strategy was to construct seven offshore wind farms within three phases (Seagreen, 2011). An updated ZAP report in 2011 provided recommendations for the Phase 1 (Seagreen Alpha/Bravo) project boundaries and indicative Phase 2 (initial Berwick Bank Wind Farm Proposal and the Marr Bank Wind Farm Proposal) and Phase 3 project boundaries, aided by identification of environmental constraint within the Zone (Seagreen, 2011). The Phase 1 project, consisting of Project Alpha and Project Bravo, were awarded consent in November 2017, and a 15-year CfD was awarded in September 2019 for 42% of the total project capacity (1.075 GW).

133. A second update of the ZAP report in 2014 provided further refined boundaries for Phase 2 projects, building on from increased understanding of constraints from the Seagreen Alpha/Bravo EIA (Seagreen, 2014). Phase 2 of the Firth of Forth Zone was proposed with two projects: the initial Berwick Bank Wind Farm (previous project) and Marr Bank Wind Farm. Subsequently in 2019, the Firth of Forth ZDA was terminated, with AfLs now agreed with CES for Seagreen Alpha/Bravo (consisting of Seagreen Alpha and Seagreen Bravo), initial Berwick Bank Wind Farm proposal and initial Marr Bank Wind Farm (which is now included within the current Berwick Bank Wind Farm Proposed Development). The AfLs for the initial Berwick Bank Wind Farm (previous project) and Marr Bank Wind Farm are shown in Figure 3.1.

134. In August 2020, SSER (via its subsidiary Berwick Bank Wind Limited) consulted on the initial Berwick Bank Wind Farm Offshore EIA Scoping Report and received a Scoping Opinion from the Scottish Ministers in March 2021 (Scottish Government, 2021). The initial Berwick Bank Wind Farm Offshore EIA Scoping Opinion has been used to inform this Proposed Development Offshore EIA Scoping Report Amendments to layout, flow and content of this Offshore EIA Scoping report have been made following stakeholder feedback.

3.2.2. BERWICK BANK WIND FARM REVISED BOUNDARY

135. Following a detailed consideration of the initial Berwick Bank Wind Farm and Marr Bank Wind Farm Proposed Development Array Area boundaries, SSER has revised their approach to the consent application and the proposed boundaries for both projects and amalgamated the two projects into one project - Berwick Bank Wind Farm. To inform this boundary review exercise, a holistic analysis of both environmental and engineering constraints was undertaken (including the analysis of available survey data), which aimed to balance maximising the generation of renewable energy, minimising potential environmental impacts and minimising engineering constraints. The Proposed Development Array Area has been reduced by 9% when compared to the previous Berwick Bank Wind Farm and Marr Bank Wind Farm Proposed Development Array Area boundaries. The reduction in area has the benefit of avoiding key ornithological areas as well as mitigating potential navigation issues and reducing overlap with the Firth of Forth Banks Complex MPA. Benefits are also anticipated across other environmental topics as a result in the reduction in the overall Proposed Development Array Area. No significant changes have been made to the ECC or landfall.

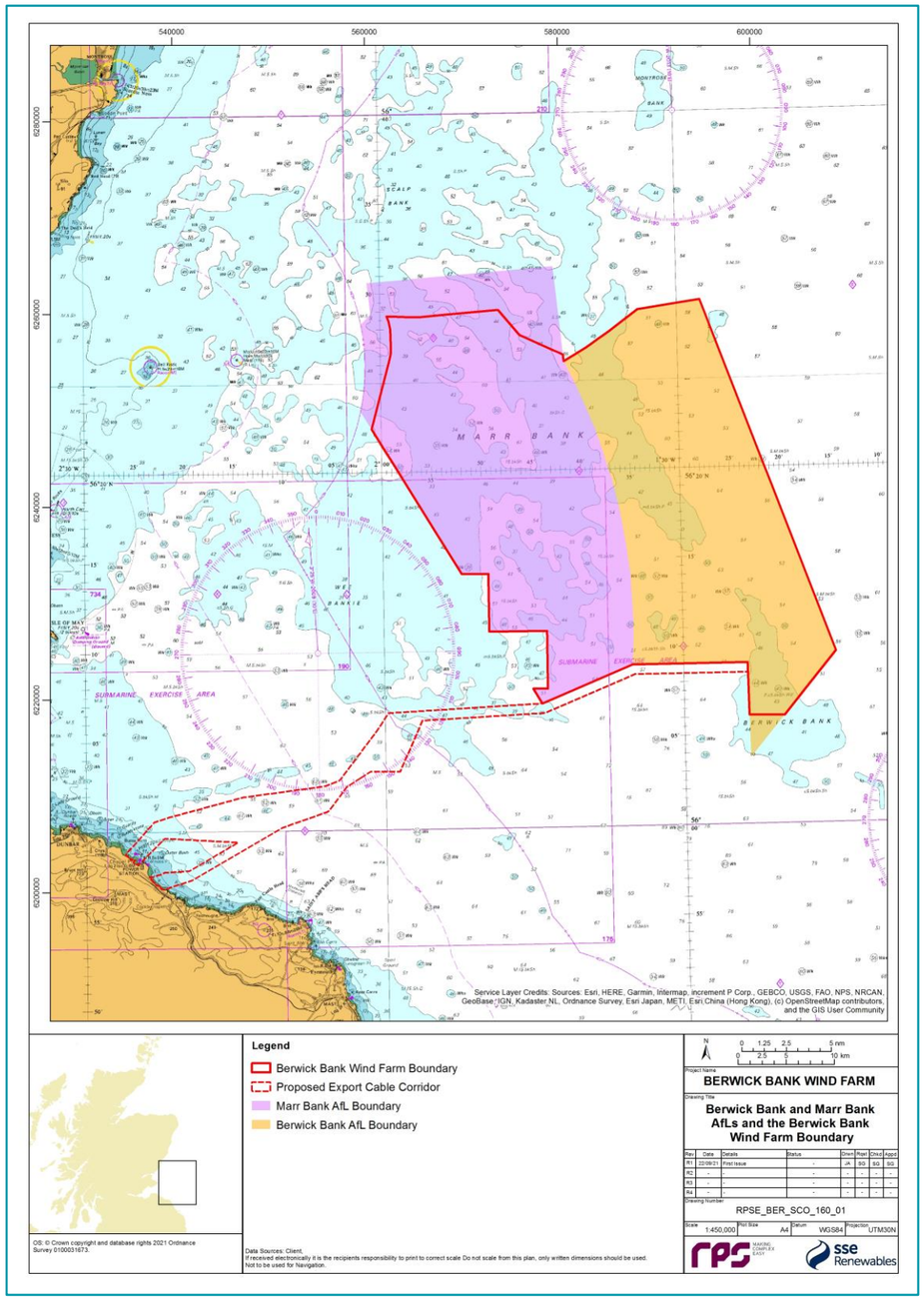


Figure 3.1: Berwick Bank AfL and Marr Bank AfL, and the Berwick Bank Wind Farm Boundary

136. The AfLs for the initial Berwick Bank Wind Farm (previous project) and Marr Bank Wind Farm are shown in Figure 3.1 with the revised Proposed Development Array Area boundary overlaid.

137. The Offshore EIAR will further describe the background to the former Firth of Forth Zone and the evolution of the Proposed Development. In addition, the Offshore EIAR will outline the process that SSER has followed to identify potential wind turbine layouts within the Proposed Development Array Area, the main alternatives that were considered and the rationale for the selection of the layout considering any modifications identified during consultation. The final layout of the wind turbines will be confirmed at the final design stage (post-application).

3.2.3. TRANSMISSION CABLES AND ASSOCIATED INFRASTRUCTURE

138. To allow for connection between the Proposed Development Array Area and the onshore substation, SSER will install export cables between the Proposed Development Array Area and the onshore grid connection point. The generated electricity from the wind turbines will be transmitted onshore via buried high-voltage cables. These cables will be either High Voltage Alternating Current (HVAC) or High Voltage Direct Current (HVDC). The parameters of the export cable will be confirmed prior to EIA Report submission, and final design will be dependent on final wind turbine and electrical design, as well as a detailed analysis of the costs, technical aspects and available technology of the various options.

139. The proposed ECC (ECC) has been identified between the Proposed Development Array Area and the two landfall locations on the East Lothian coast are being considered, Thorntonloch Landfall and Skateraw Landfall. Only one of the cable landfalls will be selected. A grid connection point has been confirmed at Branxton, south west of Torness Power station with an existing grid connection agreement.

140. The initial selection of the proposed ECC was conducted by desktop and site-based study using the current best available information on constraints and publicly available information on the proximal Neart Na Gaoithe (NnG) offshore wind farm, including site boundary, indicative proposed ECC, and onshore cable route red line boundary. Geophysical surveys have been carried out on the part of the cable corridor from the Proposed Development Array Area to the proposed Thorntonloch Landfall at Thorntonloch Beach. The two proposed landfalls shown in Figure 3.2 were selected from an original selection of seven landfalls.

141. The indicative cable corridor shown in Figure 3.2 is a direct route from the onshore grid connection to the Proposed Development Array Area. The proposed ECC then allows options in the nearshore area to route to the two potential landfall sites. SSER intends to refine this to only one landfall option by the submission of the application.

3.3. LANDFALL LOCATIONS

142. The Project has a grid connection agreement with National Grid Electricity System Operator at a point close to the existing Branxton substation compound, approximately 8 km south of Dunbar.

143. SSER considered a number of landfall options within the vicinity of Branxton, which were evaluated from an engineering, consents (planning and environment), land use and cost perspective. Two preferred landfall locations have been identified on the East Lothian coast, one at Thorntonloch and one at Skateraw (Figure 3.2). SSER intends to refine this to only one landfall option by the submission of the application.

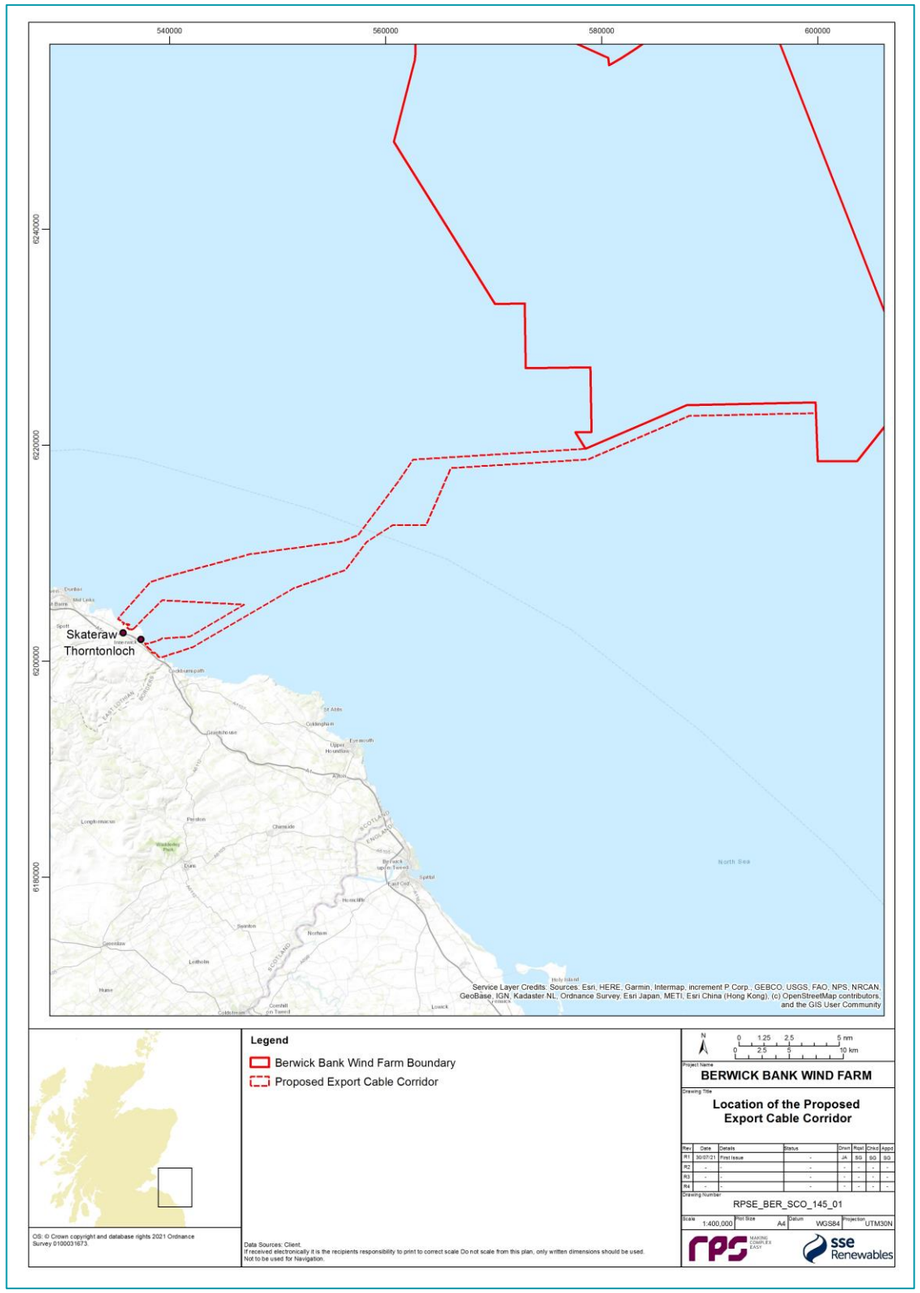


Figure 3.2: Location of the Proposed ECC

4. ENVIRONMENTAL IMPACT ASSESSMENT METHODOLOGY

4.1. INTRODUCTION

144. This section describes the methodology that will be applied to the Proposed Development EIA. It outlines the methodology for the identification and evaluation of potential likely significant environmental effects (as defined in the EIA Regulations (see Appendix 4), and presents the proposed methodology for the identification and evaluation of potential cumulative and inter-related impacts, which includes due consideration of potential transboundary effects. A systematic and auditable evidence-based approach will be followed to evaluate and interpret the potential effects on physical, biological and human receptors.

4.2. BASIS OF ASSESSMENT

4.2.1. EIA LEGISLATIVE BASIS AND GUIDANCE DOCUMENTS

145. As discussed within section 1.5.3, in compliance with the EIA Directive (2011/92/EU, as amended by Directive 2014/52/EU) in applying for Section 36 consent and marine licences for the Proposed Development, an EIA Report is required. EIA will also be carried out for the planning permission application(s) for onshore infrastructure (above MLWS).

146. In addition to the EIA Regulations described in section 1.5.3, the following Regulations will also be considered in the production of the Offshore EIAR:

- the Conservation (Natural Habitats &c.) Regulations 1994 (as amended);
- the Conservation of Habitats and Species Regulations 2017;
- the Conservation of Offshore Marine Habitats and Species Regulations 2017 (which apply to marine licences and Section 36 applications within the Scottish Offshore region; and
- the Wildlife and Countryside Act (1981)

147. In addition to the legislative requirements, guidance and good practice documents have been developed to assist with the production of a 'fit for purpose' EIA. These include:

- Marine Scotland Consenting and Licensing Guidance: For Offshore Wind, Wave and Tidal Energy Applications (Marine Scotland, 2018a);
- Guidelines for Ecological Impact Assessment (EcIA) in the UK and Ireland – Terrestrial, Freshwater, Coastal and Marine (CIEEM, 2019);
- Environmental impact assessment for offshore renewable energy projects (British Standards Institute (BSI), 2015);
- Guidelines for data acquisition to support marine environmental assessments of offshore renewable energy projects (Centre for Environment, Fisheries and Aquaculture Science (Cefas), 2012);
- A Review of Assessment Methodologies for Offshore Wind Farms (Collaborative Offshore Wind Research Into The Environment (COWRIE) METH-08-08) (Maclean *et al.,* 2009);
- IEMA Environmental Impact Assessment Guide to Shaping Quality Development (IEMA, 2015);
- Planning Advice Note (PAN) 1/2013 Environmental Impact Assessment (Scottish Government, 2017);
- A Handbook on Environmental Impact Assessment (SNH, 2018); and
- Advice Note Seventeen: Cumulative effects assessment relevant to nationally significant infrastructure projects (The Planning Inspectorate, 2019).

4.2.2. THE ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

148. The EIA process can be broadly summarised as consisting of:

- Scoping: SSER produces an Offshore EIA Scoping Report (this document) and requests a formal Scoping Opinion from Scottish Ministers;
- Consultation: SSER is required to undertake pre-application consultation;
- EIA Report Preparation: The Offshore EIAR will be prepared, considering the responses to the consultation process and outcomes of the assessment of the likely significant effects (as defined in EIA Regulations) of the Proposed Development during the construction, operation and maintenance, and decommissioning stages of the project lifecycle;
- EIA Report Consultation: The Offshore EIAR (and the application to which it relates) must be publicised, and the consultation bodies and the public must be given an opportunity to give their views about the Proposed Development and the Offshore EIAR;
- Determination: The competent authority must examine all the environmental information, including the Offshore EIAR and any comments and representations received, and must reach their reasoned conclusion on the significant effects of the development on the environment. The environmental information, and the conclusions reached, must be taken into account by the competent authority in deciding whether or not to give consent for the development. The competent authority must also consider whether any monitoring measures are appropriate; and
- Decision notice: The competent authority must inform the public and the consultation bodies of the decision and must publish a 'decision notice' which incorporates the authority's reasoned conclusion on the significant effects of the development on the environment.

149. An overview of the EIA process is presented within Figure 4.1, illustrating how the EIA scoping stage fits within this process.

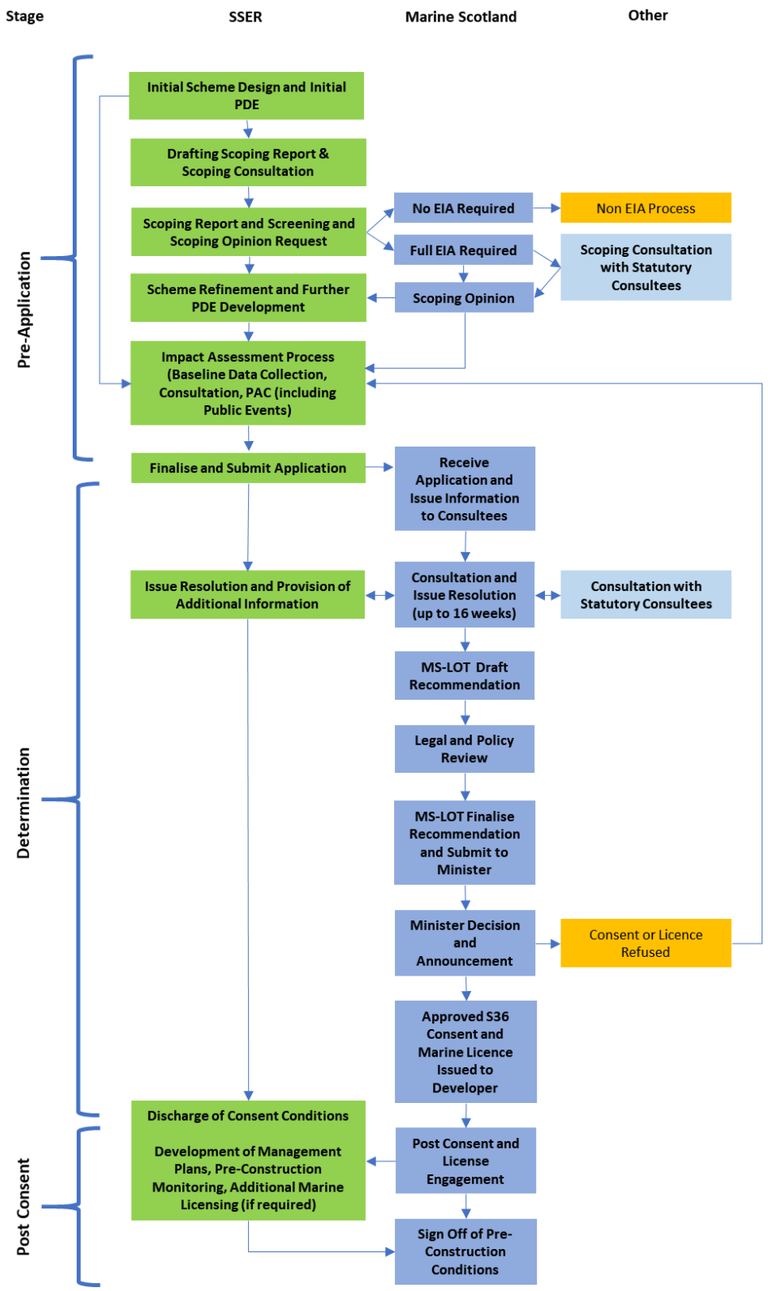


Figure 4.1: Stages of the Licensing Process in Scottish Waters

4.3. KEY PRINCIPALS OF THE EIA

4.3.1. OVERVIEW

150. Within the Offshore EIAR, each topic will consider the following:

- identification of the study area for the topic-specific assessments;
- description of the planning policy and guidance context;
- summary of consultation activity, including comments received in the Scoping Opinion and PAC;
- description of the environmental baseline conditions; and
- presentation of impact assessment, which includes:
  - identification of the maximum design scenario for each impact assessment;
  - a description of the measures adopted as part of the Proposed Development, including mitigation and design measures which seek to prevent, reduce or offset environmental effects;
  - identification of likely impacts and assessment of the significance of identified effects, taking into account any mitigation measures adopted as part of the Proposed Development;
  - identification of any further mitigation measures required in respect of likely significant effects (as defined by the EIA Regulations and in addition to those measures adopted as part of the Proposed Development), together with consideration of any residual effects;
  - identification of any future monitoring required;
  - assessment of any cumulative effects with other major developments, including those that are proposed, consented and under construction (including, where applicable, those projects, plans or activities that are currently operational that were not operational when baseline data was collected); and
  - assessment of any transboundary effects (i.e. effects on other European Economic Area (EEA) states).

151. Inter-related effects (i.e. inter-relationships between environmental topic areas) will be assessed in a separate standalone section which will consider the impacts of the Proposed Development on each of the identified receptor groups.

152. Within each topic section a number of key principles will be applied, and these are detailed in sections 4.3.2 to 4.3.8.

4.3.2. PROPORTIONATE EIA

153. The aim of producing a proportionate EIA (as per IEMA, 2017, and the Industry Evidence Programme (IEP) (Crown Estate *et al.,* 2018)) has been a key consideration in the development of this Offshore EIA Scoping Report. A number of tools and processes have been used to aid the proportionality of the Proposed Development EIA, both within this Offshore EIA Scoping Report, and that will be subsequently considered in the Offshore EIAR. This includes:

- development of an Scoping Road Maps;
- application of the existing evidence basis; and
- commitment to designed in measures.

Offshore Scoping Road Map

154. The Offshore Scoping Road Map (see Appendix 1) will be used as a tool to facilitate early engagement with stakeholders and subsequent engagement throughout the pre-application phase of the Proposed Development, including consultation on the developing baseline characterisation and development of the final application documentation. The Offshore Scoping Road Map is 'live' document which will be used to reach and record further points of agreement on scoping impacts out of the assessments, and/or agreeing

the level of assessment which will be presented for impacts, so that the focus in the EIA submission documents is on likely significant effects (as defined by the EIA Regulations).

155. For each topic section of the Offshore EIA Scoping Report, the Offshore EIA Scoping Road Map (Appendix 1) considers:

- expected receptors: Receptors expected to occur within the zone of influence (ZoI), based on an initial desktop review;
- sensitivity and evidence: Review of the sensitivity of the relevant receptors and evidence available on potential effects;
- baseline data sources: Description of data and information to be used to inform the baseline characterisation. See further information below;
- mitigation and monitoring: Potential measures which could be applied to remove significant effects; and
- approach to EIA: Briefly describes whether impacts are scoped into the EIA, scoped out (with the relevant justification) or whether the impact has the potential to be scoped out at a later date.

Existing Evidence Basis

156. The Proposed Development is located in the outer Firth of Forth, for which there exists significant data and knowledge regarding the baseline environment. This data/knowledge has been acquired through the former Firth of Forth zonal studies, from the surveys and assessments undertaken for Seagreen Alpha/Bravo, Inch Cape and Neart na Gaoithe offshore wind farms. In addition, site-specific survey data for the Proposed Development have also been analysed and considered. Where possible in this Offshore EIA Scoping Report, SSER has made use of these data to:

- provide an initial high-level overview of the baseline environment and the availability of existing data to support the Offshore EIAR;
- support scoping out of impacts where there is clear evidence of lack of a receptor-impact pathway; and
- where impacts are proposed to be scoped in to further assessment in the Offshore EIAR, to draw upon the pre-existing evidence base where appropriate.

157. Further, an extensive desktop data review has been undertaken for each section.

Designed in Measures and Mitigation Measures

158. There are three distinct forms of mitigation which include:

- 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); and
- 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).

Primary Mitigation (Designed in Measures)

159. Primary mitigation has been referred to as "Designed in Measures" within this report. The iterative approach to the impact assessment process has been utilised to inform the design of the Proposed Development (through the identification of likely significant effects and development of designed in measures to address these). The incorporation of such measures within the design demonstrates commitment to implementing the identified measures. These measures have been referred to throughout the Offshore EIA Report as 'designed in measures'.

160. By employing this approach, the significance of effect presented in the Offshore EIA Report is considered representative of the maximum residual effect that the Proposed Development will have, should the application for consent be approved and the Proposed Development be constructed.

161. Both primary and tertiary measures can be 'designed in' into the project design. The basis of the EIA can therefore be undertaken on the basis that these measures will definitely be delivered and therefore any effects which might arise without these mitigation measures do not need to be identified as potential effects as there is no potential for them to arise (IEMA, 2016).

162. Throughout this Offshore EIA Scoping Report, a range of 'designed-in' measures have been applied and are detailed in the technical assessments. All mitigation measures considered in the Offshore EIA Scoping Report are collated and presented in section 2.7. Mitigation measures will evolve whilst the EIA progresses and in response to stakeholder engagement. Any additional measures will be fed iteratively into the assessment process and updated in the Offshore Scoping Road Map (Appendix 1).

4.3.3. DESIGN ENVELOPE APPROACH AND MAXIMUM DESIGN SCENARIO

163. The Design Envelope approach (also known as the Rochdale Envelope approach) will be adopted for the assessment of the Proposed Development, in accordance with current good practice and the "Rochdale Envelope Principle[2]". The Design Envelope concept allows for some flexibility in project design options, particularly for foundations and wind turbine type, where the full details of a project are not necessarily known at time of application submission.

164. Section 2 sets out the Design Envelope parameters and identifies the range of potential project design values for relevant components of the Proposed Development. For each of the topic sections within the Offshore EIAR and for each of the impacts assessed, the Design Envelope considered will be the scenario which would give rise to the greatest potential impact (hereafter referred to as the maximum design scenario).

165. SSER has undergone a process of Design Envelope refinement prior to Offshore EIA Scoping Report submission, therefore the assessment presented in the final application will be based on as refined and focussed Design Envelope as is practical whilst still retaining flexibility for new technology or design solutions in the post-consent phase.

4.3.4. CONSULTATION AND STAKEHOLDER ENGAGEMENT

Background

166. The legislative basis for undertaking pre-application consultation is described in Appendix 4.

167. Appendix 5 provides an overview of consultation undertaken to date and paragraphs 173 to 177 outline the proposed approach to stakeholder engagement that SSER proposes to follow during the pre-application period.

[2] Case law (i.e. R v Rochdale MBC ex parte Tew (1999) and R v Rochdale MBC ex parte Milne (2000)). In respect of S36 consent, whichever scheme is ultimately built must have been covered by the scope of the EIA.

Engagement to Date

168. To support the development of this Offshore EIA Scoping Report, pre-scoping stakeholder engagement has been undertaken. An overview of this consultation is presented in Appendix 5. Consultation undertaken to date has focused on the initial Berwick Bank Wind Farm Proposal and to a lesser extent the Marr Bank Wind Farm Proposal. Consultation has included general project introductions to key stakeholders and regulators; discussions on proposed survey methodologies; pre-scoping engagement on the initial Berwick Bank Wind Farm Proposal; presentation of landfall options and proposed intertidal assessment approach; interim updates with key Statutory Nature Conservation Bodies (SNCBs) and stakeholders and updates on interim data results for topics such as marine mammals, ornithology and shipping and navigation.

169. An overview of this stakeholders engaged with thus far is provided below:

- NatureScot;
- Marine Scotland Licensing Operations Team (MS-LOT);
- Marine Scotland Science (MSS);
- Maritime Coastal Agency;
- Northern Lighthouse Board (NLB);
- Forth Ports;
- Royal Society for the Protection of Birds (RSPB);
- Historic Environment Scotland (HES);
- Chamber of Shipping;
- Cruising Association;
- Royal National Lifeboat Institution (RNLI);
- RYA Scotland;
- Scottish Fishermen's Federation (SFF); and
- East Lothian Council (ELC).

Lessons Learned from the initial Berwick Bank Proposal Stakeholder Engagement

170. This section provides a summary of lessons learned during the initial Berwick Bank proposal stakeholder engagement which can be applied to the Berwick Bank Proposed Development. This section considers consultees' responses to the Berwick Bank proposal 2020 scoping and LSE screening. It also reflects the final decision from SSE on what topics will be covered and to what extent.

171. Feedback received on the initial Berwick Bank proposal was extensive. In the region of 1,400 comments have been isolated from the Scoping Opinion on the initial Berwick Bank wind farm proposal (received March 2021) and the Opinion on LSE Screening (received July 2021). The Applicant has considered this feedback and produced two 'Change Reports' where each of these comments is addressed in full by the Applicant. Material changes to the Project to account for this feedback include:

- climate change assessment included as a standalone assessment;
- foundation types refined to two options – Jacket Foundation with Pin Piles and Suction Caisson Jacket. Floating foundation and monopile foundations are no longer within the Project Design;
- minimum turbine spacing of 1,000 m;
- use of low order deflagration for clearance of UXO that can not be removed or avoided;
- minimum air gap of 37 m above LAT will be applied;
- a cable burial risk assessment will be undertaken;
- maximum number of wind turbines is 307;
- maximum hammer energy is 4,000 kJ;
- maximum number of export cables is 12; and
- turbine capacity between 14-24 MW.

172. In August 2021 and September 2021, NatureScot provided feedback on its expectations for the Berwick Bank Scoping Report and provided explicit feedback on the Road Map process to date. A key tenet of this advice, was that the Applicant should build upon prior advice received in the Scoping Opinion for the initial Berwick Bank wind farm proposal to focus consultation on areas requiring further discussion. Further comments were made on the expected structure of the document and the need to reduce repetition, make the document easier to navigate and provide more detailed methodologies. The Scoping Report has been restructured accordingly and changes to the Road Map process were enacted. The programme for LSE Screening has also been brought forward in response to stakeholder feedback to more closely align with the Scoping Report.

Future Engagement

Scoping

173. In receipt of the Offshore Scoping Opinion request, the Scottish Ministers, in accordance with the EIA Regulations, will consult with statutory consultees. The purpose of the consultation is to obtain advice and guidance from each consultee or advisor as to which potential effects should be scoped in or out of the EIA. The Offshore EIA Scoping Opinion will be a template for a gap analysis, which is to be used to record the environmental concerns identified during the scoping process and is to be completed and used to inform the preparation of the Offshore EIAR.

Pre-Application Consultation Event

174. Where activity is planned within Scottish Territorial Waters, the PAC Regulations apply. The PAC Regulations require Applicants for a 'prescribed class' of activity to notify the Maritime Coastal Agency, NLB, SNH (now NatureScot), SEPA, and any delegate for a relevant marine region.

175. Applicants must hold at least one pre-application event at which these bodies are notified, and members of the public may provide comments to SSER. The PAC events for the Proposed Development are envisaged to be held in Q4 2021 and Q1 2022. Further details on this PAC event will be published in the Edinburgh Gazette and other local press.

176. Section 24(1) of the Marine (Scotland) Act 2010 requires that a PAC report must be prepared and submitted with the Marine Licence application.

Additional Stakeholder Engagement

177. SSER, along with their EIA consultants, intends to consult with key statutory and non-statutory stakeholders throughout the pre-application process. SSER will refine the Proposed Development Application, based upon the consultation undertaken during the pre-application phase. A summary of key consultation undertaken will be presented in the Offshore EIAR.

Next Steps

178. This section provides next steps for engagement following two general rules for engagement:

- for those topics where there is a topic-specific road map, an outline of the next steps in terms of meetings/engagement on key issues such as agreeing the baseline, assessment approach for key impacts, etc, and how this fits within the EIA process/programme will be presented to key stakeholders via a Road Map. The topics for which SSER has prepared Road Maps are
  - Benthic Ecology, Fish and Shellfish Ecology and Physical Processes;
  - Marine Mammal Ecology;
  - Ornithology; and

– Shipping and Navigation.

- for those topics where there is not a proposed road map, an outline of the consultation strategy that will be implemented, and how this fits within the EIA process/programme is presented.

4.3.5. IMPACTS AND EFFECTS

179. The Proposed Development has the potential to create a range of impacts and effects with regard to the physical, biological and human environment, for both terrestrial and marine receptors. For the purposes of the offshore EIA, the term 'impact' is defined as a change that is caused by 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 positive or negative, although the relationship between them is not always straightforward.

180. The term 'effect' is defined as the consequence of an impact. Using the inter-array cable laying example, the laying of an inter-array cable (action) results in seabed disturbance (impact), with the potential to disturb benthic habitats and species (effect). The significance of effects is determined by consideration of the magnitude of impact alongside the sensitivity of each receptor/receptor group.

181. The magnitude of an impact is the consideration of the extent, duration, frequency and reversibility of an impact. Receptors can be defined as the physical or biological resource or user group that could be affected by the potential impacts. In defining the sensitivity for each receptor/receptor group, the vulnerability, recoverability and value/importance of that receptor will be taken into consideration.

182. In order to ensure consistency in defining the significance of an effect, a matrix approach will be adopted in the Offshore EIAR as presented in Table 4.1. In cases where a range is suggested for the significance of 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 expert's professional judgement as to which outcome delineates the most likely effect, with an explanation as to why this is the case.

Table 4.1: Matrix 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

Approach to Assessment of Significance

183. A level of effect of moderate or more will be considered a 'significant' effect for the purposes of the EIA. A level of effect of minor or less will be considered 'not significant'. Effects of moderate significance or above are therefore considered important in the decision-making process, whilst effects of minor significance or less warrant little, if any, weight in the decision-making process.

184. The matrix approach is consistent with the general approach described in the Design Manual for Roads and Bridges (DMRB) (Highways England *et al.,* 2019) and Environmental Impact Assessment for Offshore Renewable Energy Projects – Guide (BSI, 2015). A number of modifications have however been made in the interest of proportionality, including:

- a magnitude of impact of 'no change' will not be assessed since it will always lead to a non-significant effect;
- a negligible magnitude impact will not be considered further because it will always lead to a non-significant effect; and
- receptors of negligible importance, value or sensitivity will not be considered further because it will always lead to a non-significant effect.

185. Where significant effects are initially identified, the EIA will follow a "feedback loop" methodology, as illustrated within Figure 4.2. Through this process, an impact is initially assessed to determine the significance of the potential environmental effect. If the effect of an impact presents a major significant adverse outcome, changes are typically made to the Proposed Development design (primary mitigation) in order to reduce or offset the magnitude of impact. If the effect of an impact presents a moderately significant adverse outcome, mitigation such as engineering controls or construction methods (secondary and tertiary mitigation) are employed in order to reduce or offset the magnitude of the impact.

186. This process is repeated, as illustrated within Figure 4.2 until the EIA practitioner is satisfied that:

- the effect is reduced to a level that is not significant in EIA terms; or
- no further changes can be made to the Proposed Development design to reduce the magnitude of impact and therefore the significance of the effect. In these cases, an overall effect that is still significant in EIA terms may be presented.

187. Following this iterative approach ensures that the significance of effect presented for each identified impact may be presumed to be representative of the maximum residual adverse effect the Proposed Development may have on the receiving environment.

188. All mitigation measures presented within the Offshore EIA Scoping Report are collated and presented in Appendix 2. Mitigation measures will evolve whilst the EIA progresses and in response to stakeholder engagement, as described above and 0 will be updated and included as part of the Offshore EIAR.

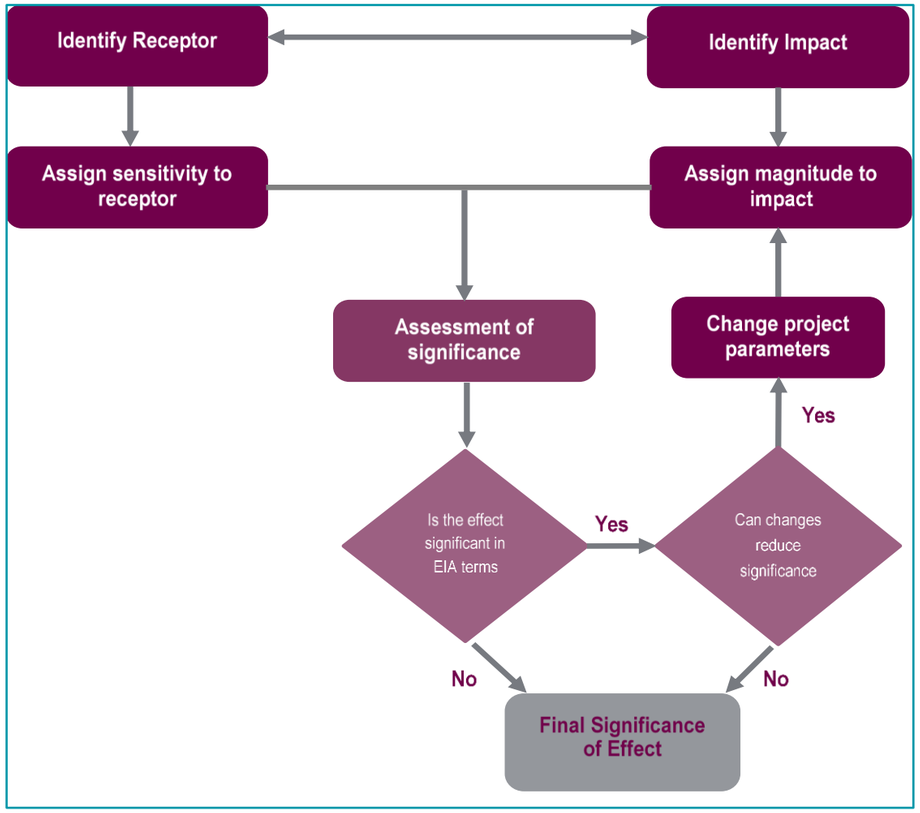


Figure 4.2: Proposed Iterative Approach to Mitigation Within the Proposed Development EIA

4.3.6. INTER-RELATED EFFECTS

189. Inter-related effects refer to the inter-relationships between EIA topics that may lead to environmental effects. There are two categories of inter-related effects:

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

190. Within the EIA, assessment of inter-related effects will be undertaken with specific reference to the potential for such effects to arise in relation to receptor groups. The term 'receptor group' is used to highlight the fact that the proposed approach to inter-relationships assessment will, in the main, not assess every individual receptor assessed at the EIA stage, but rather, potentially sensitive groups of receptors.

4.3.7. CUMULATIVE EFFECT ASSESSMENT

Overview

191. A Cumulative Effect Assessment (CEA) is a legal requirement under the EIA Regulations. A CEA provides consideration of the impacts arising from the Proposed Development alone and cumulatively with other relevant plans, projects and activities. Cumulative effects are therefore the combined effect of the Proposed Development in combination with the effects from a number of different projects, on the same receptor or resource.

192. A fundamental requirement of undertaking the CEA is to identify those foreseeable developments or activities with which the Project may interact to have the potential to result in a cumulative impact. All phases (construction, operation and maintenance, and decommissioning) of the Proposed Development may have the potential to lead to cumulative impact.

193. The Marine Scotland (2018) Consenting and Licensing Guidance: For Offshore Wind, Wave and Tidal energy Applications states that 'Engagement with MS-LOT is required to identify which plans/projects/on-going activities should be included in the in-combination element of the cumulative effects assessment (CEA)'. The offshore wind projects in the Firth of Forth and Tay region will be considered, alongside other developments including those which are:

- already constructed;
- under construction;
- permitted application(s) not yet determined; and
- plans and projects which are "reasonably foreseeable" (i.e. developments that are being planned, including, for example, offshore renewable energy project which have a Crown Estate AfL, offshore renewable energy project that have been scoped).

194. The CEA will consider all other relevant plans, projects and activities that are publicly available three months prior to the Proposed Development application. The CEA will also adhere to the ScotMER Cumulative Effects Framework.

195. SSER is also considering an additional offshore ECC, which is under development. This ECC does not form part of the Proposed Development for which this Scoping request has been made however it will be considered within the CEA for the Offshore EIA Report (and the Onshore EIA Report) as appropriate, to ensure compliance with the requirements of the EIA Regulations.

Screening Stage

196. To ensure a thorough and comprehensive approach to identification of potential projects to be considered in the CEA, an initial 'long list' of projects within a defined ZOI will be developed based on the above listed criteria. The ZOI will be large enough to encompass all technical assessment regional study areas.

197. The initial long list will then be reduced following a consideration of potential for cumulative effects for each potential impact-receptor pathway staged process as set-out below:

- conceptual overlap – an impact has the potential to directly or indirectly affect the receptor(s) in question. In EIA terms this is described as an impact-receptor pathway and is defined here as a conceptual overlap;
- physical overlap – ability for impacts arising from the Proposed Development to overlap with those from other projects/plans on a receptor basis. This means that an overlap of the physical extents of the impacts arising from the two (or more) projects/plans must be established for a cumulative effect to arise. Exceptions to this exist for certain mobile receptors that may move between, and subject to, two or more separate physical extents of impact from two or more projects; and
- temporal overlap – in order for a cumulative effect to arise from two or more projects, a temporal overlap of impacts arising from each must be established. It should be noted that some impacts are active only during certain phases of development, such as piling noise during construction. The absence of a strict overlap however may not necessarily preclude a cumulative effect, as receptors may become further affected by additional, non-temporally overlapping projects.

198. This screening stage will be based on the experience and knowledge of technical specialists, and the current guidance and regulations. The projects or plans that remain after review of the long list are taken forwards to the assessment stage.

Assessment Stage

199. Following the screening stage outlined above, information is gathered on the projects, plans or activities to be taken forwards into the CEA. Where the potential significant effect for the proposed development alone is assessed as negligible, or where an impact is predicted to be highly localised, these will not be considered within the Proposed Project CEA, as there is not considered to be a potential for cumulative effects with other plans, projects or activities.

200. When undertaking the CEA of the Proposed Development, a tiered approach will be adopted. This provides a framework for placing relative weight upon the potential for each project/plan to be included in the CEA to ultimately be realised, based upon the project/plan's current stage of maturity and certainty in the projects' parameters. The tiered approach which will be utilised within the Proposed Development CEA employs the following tiers:

- tier 1 assessment – Proposed Development (Berwick Bank Wind Farm offshore) with Berwick Bank Wind Farm onshore;
- tier 2 assessment – All plans/projects assessed under Tier 1, plus projects which are operational, under construction, those with consent and submitted but not yet determined;
- tier 3 assessment – All plans/projects assessed under Tier 2, plus those projects with a Scoping Report; and
- tier 4 assessment – All plans/projects assessed under Tier 3, plus those projects likely to come forward where an Agreement for Lease (AfL) has been granted.

201. All projects/plans that have been screened into the CEA via the screening process will be allocated into one of the above Tiers and assessed in the CEA. The CEA will consider all other relevant plans, projects and activities that are publicly available three months prior to the Proposed Development application.

202. Where practicable, the CEA methodology then follows the outline of the stand-alone assessment methodology as described in section 4.3.5. This approach allows consistency throughout the EIA.

203. An overview of the projects or activities which will be considered for cumulative effects include:

- other offshore wind farms and associated cabling and infrastructure;
- oil and gas infrastructure/development (cables and pipelines);
- other forms of cabling (i.e. telecommunications and interlinks);
- beach replenishment schemes;
- navigation and shipping; and
- aggregate extraction and disposal of dredging spoil.

4.3.8. TRANSBOUNDARY EFFECTS

204. Transboundary effects may arise when impacts from the Proposed Development within one EEA state affects the environment of another EEA state(s). The need to consider such transboundary effects has been embodied by the United Nations Economic Commission for Europe Convention on EIA in a Transboundary Context (commonly referred to as the 'Espoo Convention'). The Convention requires that assessments are extended across borders between Parties of the Convention when a planned activity may cause significant adverse transboundary impacts.

205. For any project that is likely to cause significant transboundary effects, the EIA Regulations require the Scottish Ministers to send information about the development to the government of the affected country and invite them to participate in the consultation procedures. To assist with this process, a screening exercise for potential transboundary impacts has been undertaken and is presented in Appendix 3. The transboundary screening exercise has identified that the following receptors may experience transboundary impacts from the Proposed Development:

- fish and shellfish ecology;
- commercial fisheries; and
- shipping and navigation.

5. OFFSHORE PHYSICAL ENVIRONMENT

5.1. PHYSICAL PROCESSES

5.1.1. INTRODUCTION

206. This section of the Offshore EIA Scoping Report identifies the elements of the physical processes of relevance to the Proposed Development and considers the potential impacts from the construction, operation and maintenance, and decommissioning of the offshore and intertidal components (seaward of the MHWS mark) of the Proposed Development on physical processes.

207. Physical processes were included in the initial Offshore EIA Scoping Report. Although the change in project scope applied to this Offshore EIA Scoping Report, which is combining the offshore Proposed Development Array Areas, the impacts are anticipated to generally be the same as identified in the initial Scoping Report. The initial Berwick Bank Wind Farm Proposal Scoping Opinion response has been considered for the development of this section. Additional impacts have been scoped in including coastal recession and scour protection. The assessment will also consider potential impacts (direct and indirect) on the Firth of Forth Banks Complex nature conservation Marine Protected Area (ncMPA).

208. For the purposes of this Offshore EIA Scoping Report and subsequent Offshore EIAR, physical processes are defined as encompassing the following elements:

- tidal elevations and currents;
- waves;
- bathymetry;
- geology and seabed sediments;
- suspended sediments; and
- sediment transport.

209. The parameters listed above are collectively referred to as ‘physical processes’ through the remainder of this Offshore EIA Scoping Report.

5.1.2. STUDY AREA

210. The physical processes study area for the Proposed Development is illustrated in Figure 5.1 and defined as the:

- Proposed Development Array Area;
- proposed ECC;
- landfall area; and
- seabed and coastal areas that may be influenced by changes to physical processes due to the Proposed Development, based on the outputs of the physical processes modelling which will encompass a wider domain including the Firth of Forth Banks Nature Conservation MPA (ncMPA).

5.1.3. BASELINE ENVIRONMENT

211. This section provides a concise summary of the baseline environment of the Proposed Development, reference should be made to Appendix 5 where a more detailed description is provided. This baseline is based on a review of bathymetry, tidal regime, meteorological information, wave climate and seabed sediments from both desktop study/reports and site survey data (as per Appendix 5), including:

- bathymetric data in order to determine site topography, gradients and a baseline for a seabed mobility study that may influence foundation design and cable installation using multibeam echo sounder (MBES);
- high-resolution sidescan sonar (SSS) data to determine seabed features and the presence of boulders, seabed sediments and debris;
- high-resolution sub-bottom profiler (SBP) data to determine the shallow sub-surface soil conditions that may influence foundation design and cable installation such as boulders and shallow geology features;
- multichannel 2D ultra-high resolution seismic (UHRS) data to foundation depth to determine the deeper sub-surface soil conditions; and
- magnetometer data across the site (along the planned survey lines) to support unexploded ordnance (UXO) risk reduction.

Bathymetry

212. The bathymetry of the Proposed Development Array Area is influenced by the presence of large-scale morphological bank features, including the Marr Bank and the northern extent of the Berwick Bank. Geophysical data collected in August to October 2019 suggests the water depth within the Proposed Development Array Area varies between 32.8 m and 68.5 m relative to LAT, and average depths of generally 51 m below LAT. Minimum water depths of approximately 38 m below LAT are found on top of the western central part of the Proposed Development Array Area and maximum depth around 68 m below LAT in the east of the banks.

213. The bathymetry of the proposed ECC is relatively variable, between 20 m and 69 m below LAT at the time of geophysical investigation, as shown in Apx. Figure 6. 1 and Apx. Figure 6. 2.

Wind And Waves

214. Metocean surveys conducted across the former Firth of Forth Zone to characterise the zone provide an overview of the wave regime within the physical processes study area. During the stormiest event over the 18-month wave buoy deployment, a significant wave height of 6.7 m was recorded in January 2012, which correlated with a 1 in 1-year sea wave climate return period event (Fugro, 2012).

215. Within the Offshore EIAR physical processes baseline assessment, a detailed baseline will be presented which provides an overview of the wind and wave regime within the region and specific to the Proposed Development, utilising data collected from deployed wave buoys.

Tidal Currents And Elevation

216. Metocean surveys conducted across the former Firth of Forth provided an overview of the tidal current flows. The strongest current flows during the survey period were recorded at the two most northerly sites which correlate to the location of Seagreen Alpha/Bravo. At these sites, a maximum current of 0.91 metres per second (m/s) was recorded in April 2011 during a period of spring tides that correlated with the maximum water level at most sites. Current speeds decreased slightly at the other sites with maxima ranging from 0.68 m/s to 0.77 m/s (Fugro, 2012). Further detail is provided in Apx. Table 6. 2.

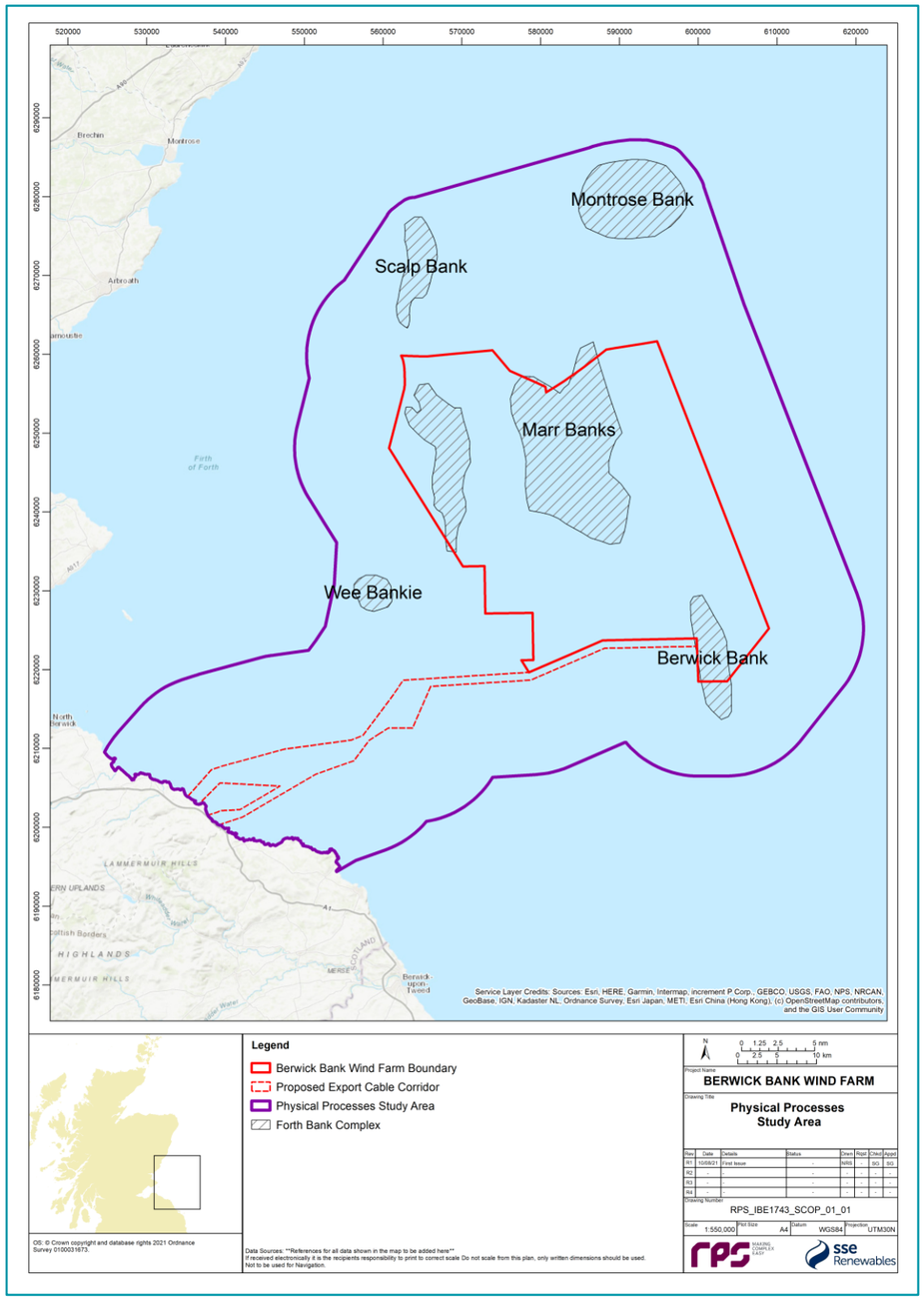


Figure 5.1: Physical Processes Study Area

Geology

Proposed Development Array Area

217. The Proposed Development Array Area is part of a dynamic landscape where quaternary and pre-quaternary formations have been shaped as erosional surfaces by different geomorphic factors and continue to be shaped and modelled by the present day offshore marine conditions (Fugro, 2020a). The morphology features are present due to advances and rapid retreats consistent with an oscillating and dynamic ice margin during British Ice Sheet (BIS) deglaciation (Graham *et al.,* 2009).

218. Subsequent sea level rise without new sediments led to the deepening and eroding of the sea mounds and banks present in the area. Seabed bottom currents have been actively mobilising and redistributing surficial sediments, developing bedforms and filling up both depressions and channels.

219. The seafloor morphology within the Proposed Development Array Area is very varied and can be classified into four types of morphological features (Figure 5.2):

- large scale banks (the Marr Bank and the Berwick Bank);
- arcuate ridges;
- incised valleys, relic glacial lakes and channels; and
- bedforms.

220. The majority of the Proposed Development Array Area seabed is ‘featureless’ however the southern and north-western extent of the Proposed Development Array Area are dominated by megaripples, sandwaves, ribbons and bars. Boulders are also prevalent across the area and are either represented as isolated boulders or as clusters.

Proposed ECC

221. The seabed within the proposed ECC is variable, with morphological features which are framed by relic pre-Holocenic landscape, and secondary morphological features characterised by bedforms and boulder fields formed by reworked and redeposition of available material in present-day shallow marine conditions.

222. The geophysical surveys observed that the bedforms in the proposed ECC are comprised of principally flow-transverse structures (subaqueous dunes: ripples, megaripples); locally the bedforms can be linear, braided and lobe-shaped (bars and ribbons). The seabed within the proposed ECC can be classified into several types of morphological features (Figure 5.2), which include:

- primary morphological features:
- outcrops and erosional surfaces and platforms;
- ridges; and
- high topographic mounds and incised valleys and channels.
- secondary morphological features:
- subaqueous dunes;
- irregularity of the seafloor;
- features related to anthropogenic activity; and
- boulder fields.

Seabed Substrate

223. A summary of the surficial sediment geology and the seabed features is presented in this section, based on interpretation undertaken of the SSS data collected during site-specific geophysical surveys. **Figure 5.3** illustrates the sediment interpretation from Side Scan Sonar (SSS) data collected across the Proposed Development.

Proposed Development Array Area

224. The geophysical survey (August to October 2019) of the Proposed Development Array Area identified that it is comprised of several distinctive features:

- boulders and boulder fields;
- areas of ripples;
- areas of megaripples and sand waves; and
- areas of trawl marks.

225. The majority of the Proposed Development Array Area seabed is 'featureless' however the southern and north-western extent of the Proposed Development Array Area are dominated by megaripples, sandwaves, ribbons and bars. Boulders are also prevalent across the area and are either represented as isolated boulders or as clusters.

226. Seabed sediments present in the Proposed Development Array Area can be classified into several groups (as perFigure 5.3):

- coarse gravel, shelly gravelly sand with boulders;
- mixed sediment;
- mixed sediments with patchy coarse material or boulders; and
- muddy sand.

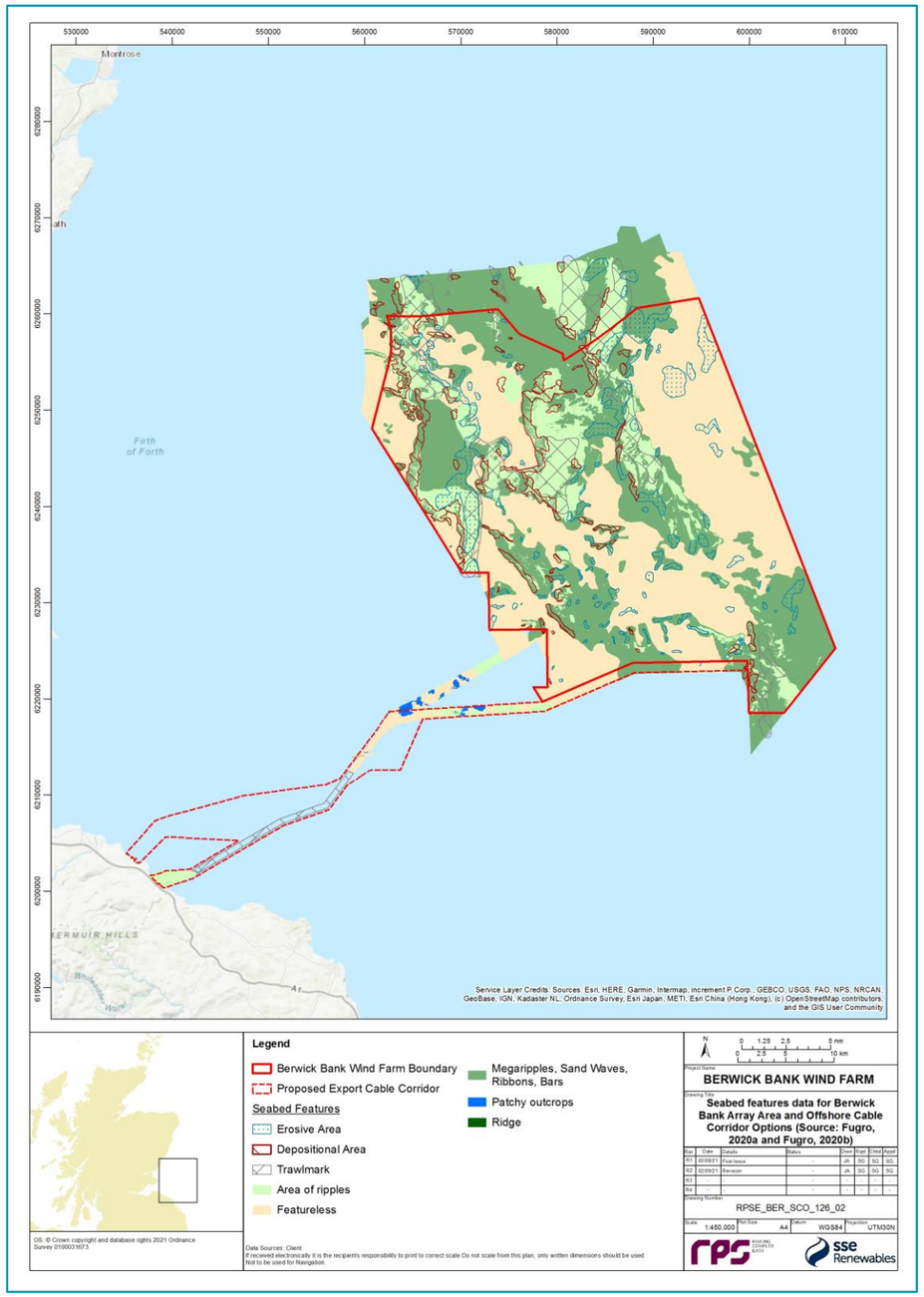


Figure 5.2: Proposed Development Array Area and Proposed ECC Seabed Features Data

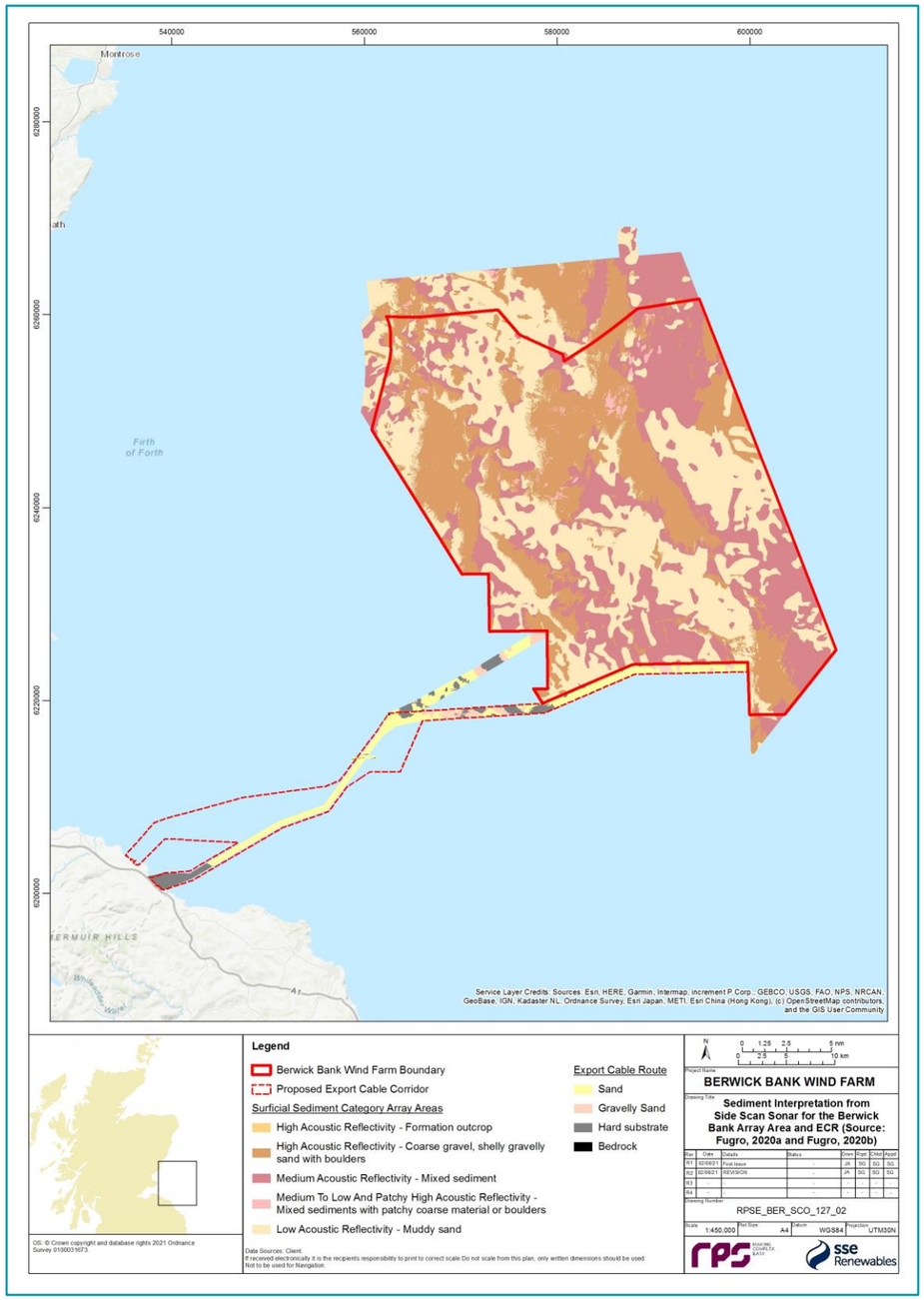


Figure 5.3: Sediment Interpretation from Side Scan Sonar (SSS) Data for the Proposed Development Array Area and Proposed ECC

Proposed ECC

227. The proposed ECC is comprised of several distinctive features (Figure 5.2):

- boulders and boulder fields;
- area of ripples;
- area of megaripples and sand waves; and
- area of trawl marks.

228. The seabed within the proposed ECC was recorded as smooth with very few observed primary morphological features (such as high reliefs or ridges), while secondary morphological features such as ripples and megaripples, sand bars and ribbons characterise the seabed morphology.

229. Seabed sediments present in the proposed ECC can be classified into several groups:

- hard substrate: coarse sediment with cobbles, boulders and rock outcropping or sub outcropping characterised by high reflectivity signature in the sidescan data;
- gravelly sand and coarse sediments with medium reflectivity; and
- sandy sediments including fine sand and muddy sand with low reflectivity.

230. The nearshore area where the proposed ECC makes landfall contains seabed features such as an area of ripples in the nearshore and a generally featureless seabed with intense fishing trawl marks in the area of the proposed ECC and seaward of this area.

Landfall

231. SSER is currently assessing the feasibility of both landfall locations on the East Lothian coast, Thorntonloch Landfall and Skateraw Landfall (as shown in Figure 1.1), one will be selected. The geophysical surveys provided an overview of the Thorntonloch landfall area, identifying a band of approximately 2 km along the shore to be defined as the coastal area. This coastal area is comprised of a sandy beach to the north, a rocky platform in the middle and a pebble and rocky beach in the south. The nearshore area of the proposed ECC consists of a submerged beach and the rocky platform from the lowest tide until around 30 metres depth, approximately 2 miles from the shore.

Suspended Sediment

232. As discussed further within Appendix 5, sampling was conducted at an offshore station within Seagreen Alpha/Bravo in March and June 2011, suggesting total suspended solids (TSS) to be low. The samples collected illustrated a TSS of < 5 mg/l with a maximum reading of 10 mg/l during March 2011 (Fugro, 2012). Although all values are low, a slight increase in TSS was observed in March.

233. The Cefas Climatology Report 2016 (Cefas, 2016) provides the spatial distribution of average non-algal Suspended Particulate Matter (SPM) for the UK continental shelf (UKCS). This study suggests the SPM in the vicinity of the Proposed Development is estimated as approximately 0 mg/l to 1 mg/l over the 1998 to 2005 period. Higher levels of SPM are experienced in the winter months; however, due to the tidal influence, even during summer months the levels remain elevated.

5.1.4. POTENTIAL PROPOSED DEVELOPMENT IMPACTS

234. A range of potential impacts on physical processes have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Proposed Development in the absence of designed in measures:

- Construction
  - Increase in suspended sediments and the potential impact to physical features within the Proposed Development Array Area. Increase in suspended sediments due construction related activities such as possible seabed preparation activities if required, wind turbine foundation installation or array cable installation and the potential impact to physical features within the Proposed Development Array Area;
  - Impacts to hydrodynamics, sediment transport and beach morphology due to cable installation activities and potential impact to physical features at landfall.
- Operation and Maintenance
  - Impacts to the wave regime and the associated potential impacts along adjacent shorelines;
  - Impacts to tidal regime and associated potential impacts to physical features and morphology (e.g. bank morphology).
  - Impacts to sediment transport and sediment transport pathways due to presence of infrastructure in the physical processes study area and associated potential impacts to physical features and morphology (e.g. bank morphology);
  - Impacts to beach morphology, hydrodynamics and sediment transport (littoral drift) due to operation and maintenance activities and potential impact to physical features at landfall;
  - Increase in suspended sediments due to operation and maintenance related activities such as cable repairs, and the potential impact to physical features within the Proposed Development Array Area;
  - Increase in suspended sediments due to operation and maintenance related activities such as cable repairs, and the potential impact to physical features within the proposed ECC; and
  - Scour of seabed sediments.
- Decommissioning
  - Increase in suspended sediments due to decommissioning related activities such as cable repairs, and the potential impact to physical features within the Proposed Development Array Area;
  - Increase in suspended sediments due to decommissioning related activities such as cable repairs, and the potential impact to physical features within the proposed ECC; and
  - Impacts to hydrodynamics, sediment transport and beach morphology due to decommissioning activities and potential impact to physical features at landfall.

5.1.5. DESIGNED IN MEASURES

235. The following designed in measures, and how these can reduce potential for impact have been considered in the identification of potential impacts that have been scoped into (and out) of further assessment for the Proposed Development assessment (section 5.1.6, Table 5.1):

- scour protection: The use of scour protection around offshore structures and foundations will be employed, as described in section 2; and
- suitable implementation of monitoring of cable protection through the Operation and Maintenance phase of the Proposed Development; and
- adherence to a Cable Plan (CaP).

236. Any further mitigation requirements to be adopt for physical processes will be dependent on the significance of the effects and will be consulted upon with statutory consultees throughout the EIA process.

5.1.6. POTENTIAL IMPACTS AFTER THE IMPLEMENTATION OF DESIGNED IN MEASURES

237. A range of potential impacts on physical processes have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Proposed Development. The impacts that have been scoped into the Proposed Development assessment are outlined in Table 5.1 together with a description of any additional data collection (e.g. site-specific surveys) and/or supporting analyses (e.g. modelling) that will be required to enable a full assessment of the impacts.

238. At this stage, no potential impacts have been scoped out of the assessment.

Table 5.1: Impacts Proposed to be Scoped In to the Proposed Development Assessment for Physical Processes. Project phase refers to construction (C), operation and maintenance (O) and decommissioning (D) phase of the Proposed Development

Impact	Project Phase			Justification (including consideration of designed in measures)	Data Collection and Analysis Required to Characterise the Baseline Environment for the EIA	Summary of Proposed Approach to Assessment
	C	O	D			
Increase in suspended sediments due to construction, operation and maintenance and / or decommissioning related activities, and the potential impact to physical features and the potential impact to physical features within the Proposed Development Array Area.	✓	✓	✓	There is potential for increased SSCs and associated deposition associated with seabed preparation activities, foundation installation and cable installation activities, from maintenance activities such as array cable repairs within the Proposed Development Array Area and associated deposition associated with decommissioning activities. This assessment will consider the potential impacts arisings due to changes in SSC and deposition, to physical coastal features and marine morphology. Elevations in SSC and subsequent deposition of disturbed sediments also have the potential to result in adverse and indirect impacts on a variety of receptor groups which lie in other Offshore EIAR topics, such as benthic subtidal and intertidal ecology, fish and shellfish ecology, marine mammals, marine archaeology and infrastructure and other users. For these receptor groups, a significance of effect will not be assigned within the physical processes assessment. The designed in measures discussed within section 5.1.5 will reduce the potential impact arising from this impact pathway.	Data collected during the 2019 geophysical survey campaign and to be collected during the 2020 geotechnical survey campaign will provide data to support the development of the physical processes numerical modelling. Data collected from previous metocean surveys may also be utilised. Further, a detailed desktop data review has been undertaken to gather other relevant data which will support the assessment. An overview of this is presented within Appendix 5.	Numerical modelling (see details in section 5.1.7) will be undertaken to provide an overview of the potential impacts to physical processes relating to the various activities of the Proposed Development. Further details of this modelling are presented in section 5.1.7 below. The decommissioning assessment will consider the outputs of the modelling undertaken, and also a qualitative assessment. The potential for impacts relating to the decommissioning of cables at the landfall will be assessed as part of the cable landfall desktop analysis described in relation to the construction and operation phases.
Increase in suspended sediments due to construction, operation and maintenance and / or decommissioning related activities, and the potential impact to physical features within the proposed ECC.	✓	✓	✓	Sediment disturbance may arise from export cable installation, from maintenance activities such as export cable repairs and associated deposition associated with decommissioning activities. This assessment will consider the potential impacts arisings due to changes in SSC and deposition, to physical coastal features and marine morphology. Elevations in SSC and subsequent deposition of disturbed sediments have the potential to result in adverse and indirect impacts on a variety of receptor groups, which are listed above.		
Impacts to hydrodynamics, sediment transport and beach morphology due to cable installation activities and potential impact to physical features at landfall.	✓		✓	Cable installation activities at the landfall have the potential to impact on the physical environment at the shoreline. Decommissioning activities at the landfall have the potential to impact on the physical environment at the shoreline.		
Impacts to the wave regime due to presence of infrastructure in the physical processes study area, and the associated potential impacts along adjacent shorelines. This will include designated sites with physical features or geodiversity features within the Physical Processes study area.		✓		The interaction of the wind turbine foundations and associated infrastructure and the wave regime will result in a reduction to wave energy. This in turn has the potential to impact upon adjacent physical coastal features and marine morphology.	As for construction phase.	The potential impact of the Proposed Development on coastal features and marine morphology will be informed by the Physical Processes numerical modelling outlined above. A qualitative assessment of impact on key coastal features will be presented within the Physical Processes section.
Impacts to tidal regime due to presence of infrastructure in the physical processes study area and associated		✓		The interaction of the wind turbine foundations and associated infrastructure and the tidal regime will result in a change to sediment transport regimes. This in turn	As for construction phase.	The potential impact of the Proposed Development on coastal features and marine morphology will be informed by the Physical

Impact	Project Phase			Justification (including consideration of designed in measures)	Data Collection and Analysis Required to Characterise the Baseline Environment for the EIA	Summary of Proposed Approach to Assessment
	C	O	D			
potential impacts to physical features and morphology (e.g. bank morphology). This will include designated sites with physical features or geodiversity features within the Physical Processes study area.				has the potential to impact upon adjacent physical coastal features and marine morphology.		Processes numerical modelling outlined above. A qualitative assessment of impact on key coastal features will be presented within the Physical Processes section.
Impacts to sediment transport and sediment transport pathways due to presence of infrastructure in the physical processes study area and associated potential impacts to physical features and morphology (e.g. bank morphology). This will include designated sites with physical features or geodiversity features within the Physical Processes study area.		✓		Foundations within the array may interrupt sediment transport pathways. In addition, cable protection may result in localised secondary scour or pose an obstacle to sediment transport pathways.	As for construction phase.	The potential impact of the Proposed Development on sediment transport and sediment transport pathways will be informed by the Physical Processes numerical modelling outlined above. This assessment will be presented within the Physical Processes section.
Impacts to beach morphology, hydrodynamics and sediment transport (littoral drift) due to operation and maintenance activities and potential impact to physical features at landfall. This will include designated sites with physical features or geodiversity features within the Physical Processes study area.		✓		Should the cable become exposed at the landfall, there is potential for impact on local coastal processes.		The potential impact of coastal recession will be considered within the assessment of beach morphology, hydrodynamics and sediment transport. A cable burial engineering study will take into account the potential for changes in beach morphology and coastal recession, including potential for beach lowering, to influence cable burial depth, and this will be used to inform the Coastal Processes assessment.
Scour of seabed sediments.		✓		There is the potential for scouring of seabed sediments to occur due to interactions between metocean regime (wave, sand and currents) and foundations or other seabed structures. This scouring can develop into depressions around the structure the use of scour protection around offshore structures and foundations will be employed, as described in detail in section 2.	As for construction phase.	The potential impact of scour protection from the Proposed Development will be informed by the Physical Processes numerical modelling outlined above. An assessment of impact on key marine features will be presented within the Benthic Subtidal and Intertidal Ecology section,

5.1.7. PROPOSED APPROACH TO THE ENVIRONMENTAL IMPACT ASSESSMENT

2. The physical processes EIA will follow the methodology set out in section 4. Specific to the physical processes EIA, the following guidance documents will also be considered:

   - Coastal Process Modelling for Offshore Wind farm Environmental Impact Assessment: Best Practice Guide. (COWRIE, 2009); and
   - Guidelines in the use of metocean data through the lifecycle of a marine renewables development (ABPmer *et al.,* 2008).

3. To support the development of the physical processes EIA, a numerical modelling study is planned. This model will be used to assess the magnitude and significance of changes to several processes, including:

   - tidal currents;
   - wave climate;
   - littoral currents;
   - sediment transport; and
   - SSCs.

4. This study will be undertaken using the MIKE software developed by DHI (www.dhigroup.com), which contains a suite of coastal and environmental modelling modules of global standard. The key to the MIKE suite of computational models is that each module may be applied to a single model mesh and then the modelling of combined (coupled) parameters may be undertaken.

5. The MIKE 21 Flexible Mesh (fm) coupled modules would be used to model baseline wave climate, tidal flows and sediment transport, using a model which, whilst providing sufficient detail to simulate the necessary parameters, is also computationally efficient by utilising a flexible mesh comprised of the most up-to-date bathymetric data. The computational model applied in the baseline study will be amended to include the impact of the wind turbine and offshore platform structures with associated scour and cable protection to quantify the change in sediment transport and wave climate. Similarly, sediment will be released into the water column to replicate the construction phase works during the installation of the inter-array and offshore export cabling and the sediment dispersion and fate will be gauged. This also extends to the material released into the water column from the cable laying. There will be three plume models developed for the foundation installation, three plume models associated with cable installation (one for inter-array & two for offshore/landfall options). Modelling will be validated using all available data sources, including SS sampling undertaken at Seagreen Alpha/Bravo – extending to include wave climate and tidal currents for which monitoring has been undertaken.

6. The computational modelling will quantify the potential impacts of the installation (including seabed preparation activities) and ongoing operational effects on the tide, wave and sediment transport processes. It will also provide the transport and fate of any material released into the water column as part of the installation works.

7. The results of this numerical modelling will be used to support the impact assessments within the below topics:

   - benthic subtidal and intertidal ecology (section 6.1);
   - fish and shellfish ecology (section 6.2);
   - marine mammals (section 6.3);
   - marine archaeology and ordnance (section 7.4); and
   - infrastructure and other users (section 7.6).

Potential Cumulative Effects

8. Although the predicted effects from the Proposed Development on benthic subtidal and intertidal ecology are considered to be localised to within the footprint of the Proposed Development, there is potential for the predicted impacts to interact with impacts from other projects and activities in the regional benthic subtidal and intertidal ecology study area and lead to a cumulative effect on receptors. The cumulative effects assessment will follow the approach outlined in section 4.3.7.

Potential Transboundary Impacts

9. A screening of transboundary impacts has been carried out and is presented in Appendix 3. No potential transboundary effects have been identified for physical processes and therefore this will not be considered within the EIAR.

5.1.8. SCOPING QUESTIONS TO CONSULTEES

- Do you agree with the data sources which are suggested for the assessment of physical processes?
- Do you agree that all receptors and impacts have been identified for physical processes?
- Do you agree with the suggested designed in measures and is this mitigation appropriate?
- Do you agree with the proposed approach assessment?
- Do you agree that transboundary impacts of marine physical processes receptors should be scoped out of the Proposed Development EIA?
- Do you agreement with approach to transboundary assessment?

5.1.9. NEXT STEPS

10. This section provides a summary of proposed topic specific next steps as summarised below:

    - Define the baseline environment and assessment approach:
      - Present evidence base, baseline characterisation (including coastal processes) to stakeholders and agree on impacts and receptors to be scoped in/out of EIA Report.
    - Assessment of Physical Processes potential impacts through the EIA Report process:
      - Present Maximum Design Scenarios and impact assessment approach including sensitivity of receptors, method of quantifying impacts and approach to hydrodynamic and hydro-sedimentary modelling to stakeholders; and
      - Discuss initial findings of impact assessment, appropriate mitigation and monitoring with stakeholders.

11. The above steps will be undertaken through the Benthic Ecology, Fish and Shellfish and Physical Processes Road Map.

5.2. SUBSEA NOISE

5.2.1. INTRODUCTION

12. This section of the Offshore EIA Scoping Report identifies the elements of subsea noise of relevance to the Proposed Development and considers the potential impacts from the construction, operation and maintenance, and decommissioning of the offshore and intertidal components (seaward of the MHWS) of the Proposed Development with respect to subsea noise.

13. Subsea noise was included in the initial Offshore EIA Scoping Report. Although the change in project scope applied to this Offshore EIA Scoping Report, which is combining the offshore Proposed Development Array Areas, the impacts are anticipated to generally be the same as identified in the initial Scoping Report. The initial Berwick Bank Proposal Scoping Opinion response has been considered for the development of this section.

14. The subsea noise study will provide an assessment of the level of subsea noise generated from the Proposed Development and will be provided as a technical appendix to the Offshore EIAR.

15. It will be used to inform impact assessment for the following receptor groups:

- Fish and Shellfish Ecology;
- Marine Mammals;
- Commercial Fisheries; and
- Infrastructure and Other Users.

5.2.2. STUDY AREA

16. No separate study area has been outlined for subsea noise as this is defined by the receptors and discussed within relevant sections listed above.

5.2.3. BASELINE ENVIRONMENT

Desktop Study

17. An initial desk-based review of literature and data sources to support this Offshore EIA Scoping Report has identified a number of baseline datasets in the form of both pre-existing specific datasets. A subsea noise assessment was completed for the application of Seagreen Alpha/Bravo, and these assessments shall be reviewed and used, where applicable, to inform the subsea noise assessment and modelling strategy for the Proposed Development. Key desktop data reports are summarised in Table 5.2.

Table 5.2: Summary of Key Desktop Reports

Title	Source	Year	Author
Underwater Noise Modelling – Seagreen Offshore Wind Farm	Seagreen	2018	Cefas
Seagreen EIA Coordination - Underwater Noise Modelling Plan	Seagreen	2018	NIRAS
Appendix 10e Piling Noise Impact Assessment Using A 1% Acoustic Energy Conversion Factor and Use of ADD (Acoustic Deterrent Device)	Seagreen	2018	Seagreen

Baseline Characterisation

18. Background or “ambient” subsea noise is created by several natural sources, such as rain, breaking waves, wind at the surface, seismic noise, biological noise and thermal noise. Biological sources include marine mammals (using sound to communicate, build up an image of their environment and detect prey and predators) as well as certain fish and shrimp. Anthropogenic sources of noise in the marine environment include fishing boats, ships, industrial noise, seismic surveys and leisure activities, all of which add to ambient background noise. Anthropogenic noise within the vicinity of the Proposed Development will arise primarily from shipping and to a lesser extent, the oil and gas industry. Shipping routes and shipping traffic is discussed in section 7.2.

19. Research relating to both physiological effects and behavioural disturbance of noise on marine receptors is typically based on determining the absolute noise level for the onset of that effect. Consequently, the criteria for assessing the effects of noise on marine mammals, fish and shellfish, tend to be based on the absolute noise criteria, rather than the difference between the baseline noise level and the noise being assessed (Southall *et al.,* 2007). However, the value of establishing the precise baseline noise level is somewhat diminished due to the lack of evidence-based studies on the effects of noise relative to background on marine receptors.

20. It is important to understand that baseline noise levels will vary significantly depending on multiple factors, such as seasonal variations and different sea states. Therefore, there is very limited value in establishing such values. However, when undertaking an appraisal of underwater noise, it can be helpful to understand the range of noise levels likely to be prevailing within an area so any noise predictions can be placed in the context of the baseline.

21. Further, it is important to note the lack of scientific understanding with regard to how various species distinguish anthropogenic sound relative to masking noise. Therefore, it is necessary to exercise considerable caution if attempting any comparison between subsea noise from the Proposed Development and the baseline noise level.

22. Consequently, no site-specific surveys have been undertaken to inform this Offshore EIA Scoping Report for subsea noise and, at this stage, new or additional baseline surveys are unlikely to be required and are not proposed for the Offshore EIAR.

5.2.4. POTENTIAL PROPOSED DEVELOPMENT IMPACTS

23. A range of potential impacts on subsea noise have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Proposed Development in the absence of designed in measures:

- Construction
  - Effects of subsea noise on marine life due to use of geophysical survey equipment;
  - Effects of subsea noise on marine life due to construction, operation and maintenance and decommissioning vessels and rigs; and
  - Effects of subsea noise on marine life due to impact driven and drilled pile installation for the WTG and OSP foundations.

- Operation and Maintenance
  - Effects of subsea noise on marine life due to construction, operation and maintenance and decommissioning vessels and rigs; and
  - Effects of subsea noise on marine life due to operational noise from the wind turbines.
- Decommissioning
  - Effects of subsea noise on marine life due to construction, operation and maintenance and decommissioning vessels and rigs; and
  - Effects of subsea noise on marine life due to jacket cutting and removal.

5.2.5. DESIGNED IN MEASURES

24. Measures adopted as part of the Proposed Development will be discussed within each of the relevant sections of the Offshore EIA Scoping Report for which subsea noise is considered relevant. Each of the proposed mitigation measures relating to reducing potential impacts on receptors from subsea noise will be modelled to assess their efficacy in a quantitative way. The requirement and feasibility of additional measures will be dependent on the significance of the effects of subsea noise on the receptors associated with each topic and will be consulted upon with statutory consultees throughout the EIA process. Any approach to noise mitigation will be informed by best available evidence, including any outputs from work undertaken during construction of the Moray Firth and Forth and Tay area Wind Farms, or any available evidence from Wind Farm Projects in English waters.

5.2.6. POTENTIAL IMPACTS AFTER THE IMPLEMENTATION OF DESIGNED IN MEASURES

25. Throughout the construction, operation and maintenance and decommissioning phases of the Proposed Development, there is the potential for subsea noise to impact sensitive ecological receptors. The potential effects on these receptors will be assessed within the relevant technical sections of the Offshore EIAR (marine mammals, fish and shellfish, commercial fisheries and infrastructure and other users).

26. Impacts that have been scoped into the Proposed Development assessment are outlined in Table 5.3 together with a description of any additional data collection (e.g. site-specific surveys) and/or supporting analyses (e.g. modelling) that will be required to enable a full assessment of the impacts. No potential impacts relating to subsea noise have been scoped out of the assessment.

Table 5.3: Impacts Proposed to be Scoped In to the Proposed Development Assessment for Subsea Noise. Project phase refers to construction (C), operation and maintenance (O) and decommissioning (D) phase of the Proposed Development

Impact	Project Phase			Justification (including consideration of designed in measures)	Data Collection and Analysis Required to Characterise the Baseline Environment for the EIA	Summary of Proposed Approach to Assessment
	C	O	D			
Effects of subsea noise on marine life due to use of geophysical survey equipment	✓			The use of soft start procedures, combined with Marine Mammal Observers (MMOs) and Acoustic Deterrent Device (ADD) as appropriate, will reduce the potential for injury to marine life due to survey activities. Nevertheless, due to the potentially high source levels involved, it will be important to carry out modelling and assessment of the proposed activities in order to determine the most appropriate mitigation strategy.	N/A	The approach used for assessing subsea noise is detailed in section 5.2.7. The results of the noise modelling will be presented in a Subsea Noise Technical Report, which will inform the Fish and Shellfish Ecology, Marine Mammal, Commercial Fisheries and Infrastructure and Other Users EIA Report sections.
Effects of subsea noise on marine life due to construction, operation and maintenance and decommissioning vessels and rigs	✓	✓	✓	Although noise from these sources will be relatively low in magnitude (e.g. compared to impact piling and continuous in nature (rather than impulsive) there is still some residual potential for disturbance due to increased traffic and use of rigs etc.	N/A	
Effects of subsea noise on marine life due to impact driven and drilled pile installation for the WTG and OSP foundations	✓			The combination of slow and soft start will provide additional time for animals to leave the area prior to commencement of full speed and full power impact piling. Nevertheless, due to the potentially high source levels involved and impulsive nature of the sound, it will be important to carry out modelling and assessment of the proposed piling activities in order to determine the most appropriate mitigation strategy.	N/A	
Effects of subsea noise on marine life due to operational noise from the wind turbines		✓		Although operational noise from the wind turbines will be relatively low in magnitude (e.g. compared to impact piling and UXO, or vessels) and continuous in nature (rather than impulsive) there may be some potential for disturbance. Given that the wind turbines will operate more or less continuously over the life of the project (operational phase), it will be important to consider their potential effect on marine life.	N/A	
Effects of subsea noise on marine life due to jacket cutting and removal			✓	There is potential for disturbance or possibly injury from decommissioning activities, depending on the techniques utilised. It is therefore proposed to include these activities in the assessment.	N/A	

5.2.7. PROPOSED APPROACH TO THE ENVIRONMENTAL IMPACT ASSESSMENT

27. The subsea noise EIA will follow the methodology set out in section 4. Specific to the subsea noise assessment, the following guidance documents will also be considered:

- good practice guide to underwater noise measurement (NPL, 2014);
- NOAA technical guidance for assessing the effects of anthropogenic sound on marine mammal hearing: Underwater acoustic thresholds for onset of permanent and temporary threshold shifts (NMFS, 2018);
- Marine mammal noise exposure criteria: Updated scientific recommendations for residual hearing effects (Southall *et al.,* 2019);
- Sound exposure guidelines for Fishes and Sea Turtles (Popper *et al.,* 2014);
- The European Union (EU) Marine Strategy Framework Directive (Directive 2008/56/EC). This seeks to achieve good environmental status (GES) in Europe's seas by 2020. The qualitative descriptors for determining GES include "Introduction of energy, including underwater noise, is at levels that do not adversely affect the marine environment." This Directive was transposed into UK law by the Marine Strategy Regulations 2010; and
- NPS EN-1 Section 5.11, noise and vibration (DECC, 2011).

28. The impact criteria will be based on the most recent and up-to-date scientific research and guidance, while utilising a precautionary approach. Potential impacts arising from subsea noise on marine mammals and fish will be assessed with respect to the potential for injury and behavioural disturbance. Where possible, noise source data will be based on measured data from similar wind turbine devices. Source noise levels will be based on a combination of theoretical and empirical predictions and scaling of existing data where applicable. The associated source levels of other types of subsea noise associated with the Proposed Development will be based on published data and established prediction methodologies.

29. Subsea noise modelling is planned to assess the impact of construction and operational noise using a robust, peer reviewed model. In accordance with National Physical Laboratory guidance (NPL, 2014), the choice of model will depend upon many factors which will be determined during the consultation period and will depend on site-specific circumstances (such as bathymetry etc.). However, the chosen model will be appropriate and peer reviewed, such as the energy flux model (Weston, 1976). Such models have been successfully benchmarked against other sound propagation models (e.g. Etter, 2018; Toso *et al.,* 2014; Schulkin and Mercer, 1985) and have been used previously in underwater noise assessments for offshore wind and tidal energy developments as well as for oil and gas and port developments.

30. The exact scope, specification and methodology of the noise propagation modelling will be discussed and agreed with SNCBs. However, on the basis of previous subsea noise modelling completed for Seagreen Project Alpha and Bravo, the assessment will consider the bathymetry and other characteristics of the area, including the geo-acoustic properties of the seabed. The model will also estimate the unweighted and hearing group weighted Sound Exposure Level (SEL), rms (T90) sound pressure level and peak / peak-to-peak pressure level parameters as recommended by Southall *et al.,* 2019, NMFS 2018, Southall *et al.,* 2007, Acoustic Society of America (ASA) Sound Exposure Guidelines for Fishes and Sea Turtles (Popper *et al.,* 2014) and other guidance. The model will also incorporate swim speeds of marine mammals and fish to calculate cumulative sound exposure levels (SELs).

31. The cumulative effect of multiple events/operations will also be assessed/modelled and will consider the likely exposure times of species, allowing for safe distances and reaction ranges to be determined. Modelling scenarios will be undertaken for concurrent piling scenarios, and will model piling at up to two locations (for two concurrent piling events) including both typical (most likely) and maximum piling parameters within the PDE. Further, modelling will be undertaking with the consideration of ADDs and also without ADD to provide an overview of both scenarios.

32. The potential effects of particle motion on marine life will also be considered. This will include a review of the most recent research and published literature and a qualitative or empirical assessment of the potential effects will be undertaken. This assessment will be used to inform the fish and shellfish ecology assessment (including benthic invertebrates).

33. The results of the noise modelling will be presented in a Subsea Noise Technical Report.

Potential Cumulative Effects

34. Consideration shall be given to cumulative effects from subsea noise in particular during construction related piling activities. The potential for cumulative impacts with other offshore wind farm developments will be considered in the relevant topic receptors sections of the EIA Report. A detailed assessment of the wind farm developments within the area and their construction windows will be required for the Offshore EIAR, to identify which other wind farm developments will be considered in terms of the cumulative underwater noise assessment.

Potential Transboundary Impacts

35. A screening of transboundary impacts has been carried out and is presented in Appendix 3. No potential transboundary effects have been identified for subsea noise and therefore this will not be considered within the EIAR.

5.2.8. SCOPING QUESTIONS TO CONSULTEES

- Do you consider any particular sources or receptors should be included within the noise modelling assessment which have otherwise not been considered?

5.2.9. NEXT STEPS

36. The over-arching next steps are outlined in section 4.3.4. The approach to subsea noise modelling will be discussed as part of the Marine Mammal Road Map process.

5.3. AIRBORNE NOISE

5.3.1. INTRODUCTION

37. This section of the Offshore EIA Scoping Report identifies the elements of offshore airborne noise (seaward of MHWS) of relevance to the Proposed Development and considers the potential impacts from the construction, operation and maintenance, and decommissioning of the offshore and intertidal components (seaward of MHWS) of the Proposed Development on airborne noise on all receptors, onshore and offshore.

38. Airborne noise was included in the initial Offshore EIA Scoping Report. Although the change in project scope applied to this Offshore EIA Scoping Report, which is combining the offshore Proposed Development Array Areas, the impacts are anticipated to generally be the same as identified in the initial Scoping Report. The initial Berwick Bank Proposal Scoping Opinion response has been considered for the development of this section. SSER intends to scope out airborne noise as per agreement on the initial Berwick Bank Wind Farm Scoping Opinion.

5.3.2. STUDY AREA

39. The airborne noise study area associated with the potential effects resulting from construction and decommissioning activities on onshore receptors is a 2 km buffer around the landfall locations and 4 km buffer around the proposed offshore ECC. Significant noise and vibration effects are not expected beyond this distance. For construction-related vibration, the study area is a buffer of up to 100 m from any vibration-generating construction activity.

40. The airborne noise study areas have been developed to reflect receptors' increased sensitivity to noise at night, where night-time noise effects from construction and operation are possible.

41. The proposed airborne noise study areas are shown in Figure 5.4. The airborne noise study area will be reviewed and amended as the proposed offshore ECC is refined through the EIA process.

5.3.3. BASELINE ENVIRONMENT

Desktop Study

42. An initial desk-based review of literature and data sources to support this Offshore EIA Scoping Report has identified a desktop report which is summarised in Table 5.4 below.

Table 5.4: Summary of Key Desktop Reports to inform Offshore Airborne Noise Scoping Assessment

Title	Source	Year	Author
Appendix 5.2 Construction Noise and Vibration Technical Note	Neart na Gaoithe Wind Farm	2017	ITP Energised Ltd

Site-specific Survey Data

43. No site-specific surveys have been undertaken to inform the Offshore EIA Scoping Report for ambient noise seaward of MLWS. This is because there is sufficient information on the baseline environment to support the decision of scoping out offshore airborne noise from the EIA.

44. Landward of MLWS, baseline survey measurements will be conducted in accordance with current guidance including BS 4142:2014+A1:2019 Method for rating and assessing industrial and commercial sound, and BS 7445-2:1991 Description and measurement of environmental noise (BSI, 2003).

Baseline Characterisation

<u>Seaward of MLWS</u>

45. The Proposed Development Array Area is located approximately 33.5 km offshore, with proposed landfall locations at Thorntonloch and Skateraw near Torness, on the East Lothian coast. The sensitive receptors to offshore airborne noise are likely to be:

- closest offshore oil and gas accommodation, and manned working platforms (32 km from the Proposed Development (Booster Platform 36/22A Norpipe A.S);
- commercial shipping routes;
- fishing vessels (50 m operation / 500 m construction from each wind turbine); and
- nearshore leisure and recreational users including recreational fishing; motor cruising; water sports and scuba diving.

<u>Landward of MLWS</u>

46. The baseline environment within the airborne noise study area is mainly rural with occasional residential properties and industrial sites. Noise in this area is likely to be dominated by road traffic on the A1, rail traffic on the East Coast Main Line (ECML) with some noise from nearby industrial sites including Torness Nuclear Power Station, Dunbar Cement Works and the landfill site and opencast mine to the northwest of Skateraw.

47. A desk-based review and consultation will be undertaken to identify potentially sensitive receptors. Background noise monitoring will be undertaken at residential properties where the potential for significant noise effects from offshore activities is identified, and where needed to inform the construction assessment. Any surveys will be agreed in consultation with East Lothian Council (ELC) throughout the EIA process and will be carried out for a sufficient period to allow typical sound levels to be established, taking account of different types of noise sources and weather conditions that occur. Noise surveys may be accompanied by the acquisition of supplementary non-acoustic data (rainfall and wind records), as required.

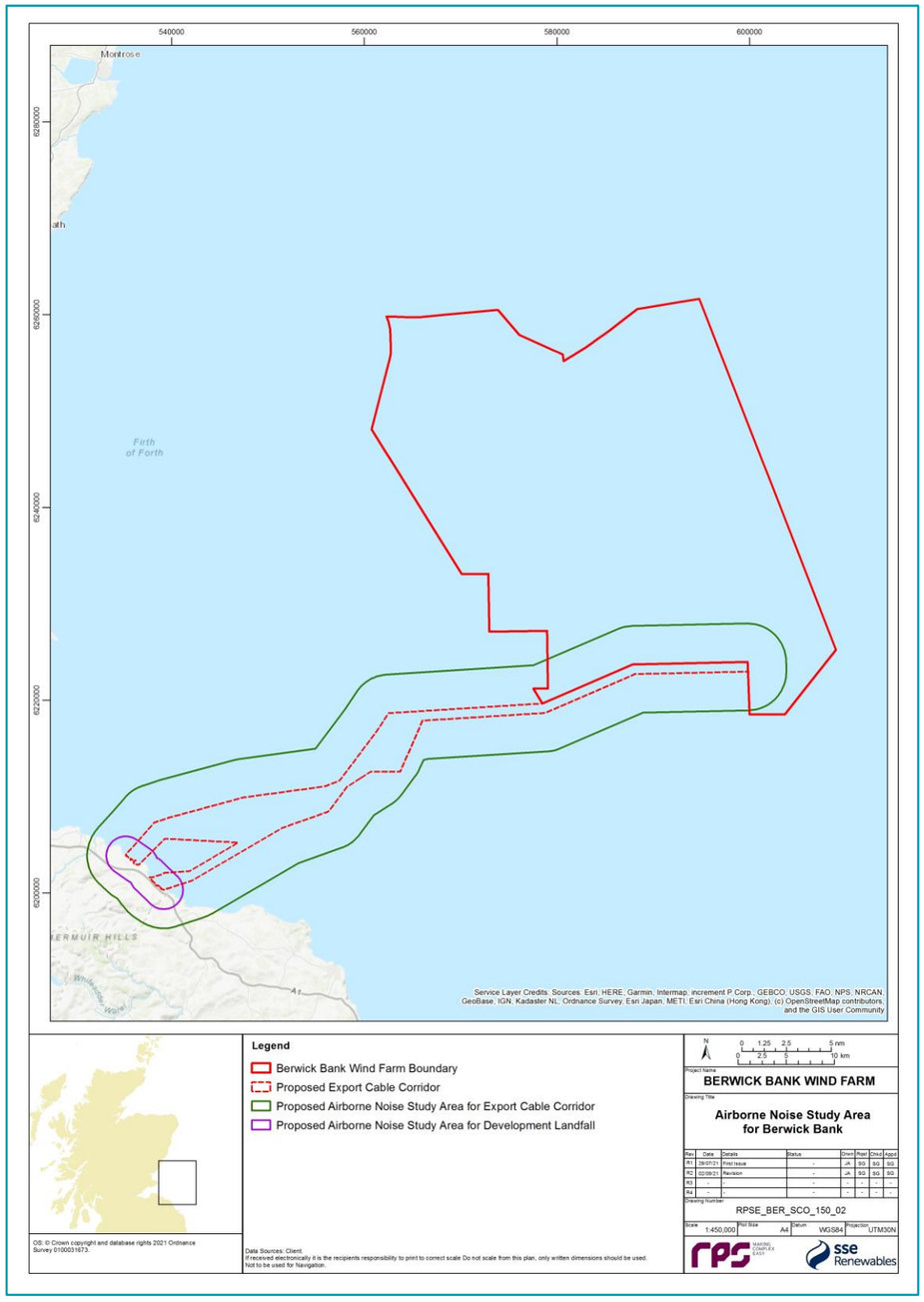


Figure 5.4: Airborne Noise Study Area

5.3.4. POTENTIAL PROPOSED DEVELOPMENT IMPACTS

48. A range of potential impacts on airborne noise have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Proposed Development in the absence of designed in measures:

- Construction
  - Piling activities will generate construction noise that may impact recreational and leisure receptors in the nearshore environment;
  - Change in noise levels causing disturbance to human receptors landward of MLWS;
  - Construction vibration causing disturbance to residents landward of MLWS; and
  - Noise and vibration impacts to ecological/geological receptors landward of MLWS.
- Operation and Maintenance
  - Airborne noise associated with the operation and maintenance of the Proposed Development may impact recreational and leisure receptors in the nearshore environment impact recreational and leisure receptors in the nearshore environment;
  - Airborne noise may exceed guideline levels for commercial fishing vessels and commercial shipping traffic;
  - Airborne noise may exceed guideline values for offshore accommodation platforms; and
  - Impacts on Receptors Landward of MLWS.
- Decommissioning
  - Piling activities will generate decommissioning noise that may impact recreational and leisure receptors in the nearshore environment;
  - Airborne noise may exceed guideline levels for commercial fishing vessels and commercial shipping traffic;
  - Change in noise levels causing disturbance to human receptors landward of MLWS; and
  - Noise and vibration impacts to ecological/geological receptors landward of MLWS.

5.3.5. DESIGNED IN MEASURES

49. The following designed in measures, and how these can reduce potential for impact have been considered in identification of impacts that have been scoped into the Proposed Development assessment. The designed in measures will evolve over the development process as the EIA progresses and in response to consultation.

Construction and Decommissioning Phases Mitigation

- Core working hours for the construction of the onshore elements of the Proposed Development will be Monday to Sunday 07.00 to 19.00 hour. Activities carried out during mobilisation and maintenance will not generate significant noise levels (such as piling, or other such noisy activities). In certain circumstances, specific works may have to be undertaken outside the normal working hours, such as:
  - HDD or other trenchless construction technology which may require 24-hour machinery operation, dependent on the ground conditions;
  - remedial works, for example in the event of severe weather;
  - delivery of electrical infrastructure;
  - jointing operations along the cable route; and
  - security of sites and protection of open assets.
- Based on noise modelling results, where noise has the potential to cause disturbance the use of mufflers, acoustic barriers and screening will be considered. The construction and decommissioning works would

use Best Practicable Means (BPM) to limit the impacts of noise at sensitive receptors. Those measures would be set out in the CEMP. Monitoring of noise related complaints should also be undertaken.

Operation Phase Mitigation

50. Operational measures to be considered as part of the Proposed Development would involve:

- selection of quieter equipment where reasonably practicable;
- installation of acoustic enclosures;
- installation of acoustic barriers;
- silencing of exhausts/outlets for air handling/cooling units; and
- monitoring of noise related complaints and appropriate remedial action.

5.3.6. POTENTIAL IMPACTS AFTER THE IMPLEMENTATION OF DESIGNED IN MEASURES

51. Based on the baseline characterisation and the project description outlined in section 2, all potential offshore airborne noise impacts seaward of MLWS are proposed to be scoped out of further assessment. These impacts are outlined, together with a justification for scoping them out, in Table 5.5.

Table 5.5: Impacts Proposed to be Scoped Out of the Proposed Development Assessment for Airborne Noise (Landward of MLWS)

Impact	Designed in Measure	Justification
Construction		
Change in Noise Level - Human Receptors	N/A	Activities associated with the construction of the Proposed Development may temporarily increase the noise levels experienced at identified human receptors throughout the airborne noise study area during offshore and nearshore construction activities. This includes potential helicopter related airborne noise throughout the construction phase. However, it is considered highly unlikely that flight activity relating to the construction of the Proposed Development with affect human receptors. This has been agreed with East Lothian Council via consultation undertaken at the pre-scoping stage in September 2021.
Piling activities will generate construction noise that may impact recreational and leisure receptors in the nearshore environment	N/A	Nearshore construction activities will include cable laying, which will be conducted via a cable lay vessel with support via a ROV. Therefore, it is unlikely that the construction activities associated with the Proposed Development will significantly affect these receptors. Construction activities within the offshore area are not predicted to affect these activities due to the offshore location of the Proposed Development As per agreement on the scoping out of this impact pathway from the initial Berwick Bank Wind Farm Scoping Opinion, SSER intends to scope this impact out.
Piling activities will generate construction noise that may exceed guideline levels for commercial fishing vessels and commercial shipping traffic.	N/A	The maximum scenario distance of the receptors from the nearest wind turbine/project boundary is proposed as 500 m for commercial fishing vessel and 1 nm for commercial shipping traffic, based on navigational safety guidelines. The effect of airborne noise from piling on receptors onboard commercial fishing vessels and commercial ships is therefore expected to be negligible. As per agreement on the scoping out of this impact pathway from the initial Berwick Bank Wind Farm Scoping Opinion, SSER intends to scope this impact out.
Piling activities will generate construction noise that may exceed guideline levels for manned gas platforms.	N/A	The nearest gas platform with accommodation, to the Proposed Development, is located 32 km away. As per agreement on the scoping out of this impact pathway from the initial Berwick Bank Wind Farm Scoping Opinion, SSER intends to scope this impact out.
Operation and Maintenance		
Airborne noise associated with the operation and maintenance of the Proposed Development may impact recreational and leisure receptors in the nearshore environment	N/A	It is unlikely that there will be airborne noise effects from the operational wind turbines on nearshore recreational and leisure noise sensitive receptors due to the low level of noise associated within this phase of the Proposed Development. Any maintenance activities (e.g. cable inspection, repair or reburial) will be expected to be of low frequency along the intertidal sections of the Proposed Development ECC. The noise associated with these activities will not exceed those of the construction phase. As per agreement on the scoping out of this impact pathway from the initial Berwick Bank Wind Farm Scoping Opinion, SSER intends to scope this impact out.
Airborne noise may exceed guideline levels for commercial fishing vessels and commercial shipping traffic.	N/A	The maximum scenario distance of the receptors from the nearest wind turbine/project boundary is proposed as 500 m for commercial fishing vessel and 1 nm for commercial shipping traffic based on navigational safety guidelines. The effect of airborne noise from operation and maintenance activities receptors onboard commercial fishing vessels and commercial ships is therefore expected to be negligible. As per agreement on the scoping out of this impact pathway from the initial Berwick Bank Wind Farm Scoping Opinion, SSER intends to scope this impact out.
Airborne noise may exceed guideline values for offshore accommodation platforms.	N/A	The nearest gas platform with accommodation, to the Proposed Development, is located greater than 65 km away. Given this distance, the effect of operational noise for receptors onboard gas accommodation platforms is likely to be negligible. As per agreement on the scoping out of this impact pathway from the initial Berwick Bank Wind Farm Scoping Opinion, SSER intends to scope this impact out.
Impacts on Receptors Landward of MLWS	N/A	There are unlikely to be any noise and vibration impacts relating to the operational phase of the wind turbines due to the very large distance between the nearest wind turbines and the shore (approximately 33.5 km). As per agreement on the scoping out of this impact pathway

Impact	Designed in Measure	Justification
		from the initial Berwick Bank Wind Farm Scoping Opinion, SSER intends to scope this impact out.
Decommissioning		
Piling activities will generate decommissioning noise that may impact recreational and leisure receptors in the nearshore environment	N/A	Nearshore decommissioning activities are unlikely to affect recreational and leisure receptors as non-high-level noise emitting activities are required in the near shore area. As per agreement on the scoping out of this impact pathway from the initial Berwick Bank Wind Farm Scoping Opinion, SSER intends to scope this impact out.
Airborne noise may exceed guideline levels for commercial fishing vessels and commercial shipping traffic.	N/A	The maximum distance of the receptors from the nearest wind turbine/project boundary is proposed as 500 m for commercial fishing vessel and 1 nm for commercial shipping traffic based on navigational safety guidelines. As per agreement on the scoping out of this impact pathway from the initial Berwick Bank Wind Farm Scoping Opinion, SSER intends to scope this impact out.
Airborne noise may exceed guideline values for offshore accommodation platforms.	N/A	Decommissioning activities will be similar to construction activities with the exception that piling operations will not be required. As per agreement on the scoping out of this impact pathway from the initial Berwick Bank Wind Farm Scoping Opinion, SSER intends to scope this impact out.
Impacts on Receptors Landward of MLWS	N/A	No decision has been made regarding the final decommissioning policy for the offshore project infrastructure, as it is recognised that industry good practice, rules and legislation change over time. The detail and scope of the decommissioning works would be determined by the relevant legislation and guidance at the time of decommissioning and agreed with the regulator. A decommissioning plan will be provided. It is anticipated that the decommissioning impacts would be similar in nature to those of construction but would be more limited in geographical extent and timescale. As per agreement on the scoping out of this impact pathway from the initial Berwick Bank Wind Farm Scoping Opinion, SSER intends to scope this impact out.

5.3.7. PROPOSED APPROACH TO THE ENVIRONMENTAL IMPACT ASSESSMENT

52. Airborne noise is proposed to be scoped out therefore no further detail is presented on proposed assessment methodology.

Potential Cumulative Effects

53. Although there are several other offshore wind farm projects in development in the wider areas of the Proposed Development (including Neart na Gaoithe, Inch Cape and Seagreen Alpha and Bravo), all have been scoped out the assessment of airborne noise from their Environmental Statement (now termed EIA Report) therefore it is proposed that no cumulative assessment is required for the Proposed Development.

Potential Transboundary Impacts

54. A screening of transboundary impacts has been carried out and is presented in Appendix 3. No potential transboundary effects have been identified for airborne noise receptors and therefore this will not be considered within the EIAR.

5.3.8. SCOPING QUESTIONS TO CONSULTEES

- Do you agree that the assessment of airborne noise receptors should be scoped out of the Proposed Development EIA including cumulative and transboundary effects?

5.3.9. NEXT STEPS

55. The over-arching next steps are outlined in section 4.3.4. In terms of topic specific steps for airborne noise, the next step is to seek agreement on scoping out the assessment of airborne noise from the EIA Report as per agreement on the scoping out through the initial Berwick Bank Wind Farm Scoping Opinion.

5.4. OFFSHORE AIR QUALITY

5.4.1. INTRODUCTION

56. This section of the Offshore EIA Scoping Report considers the potential impacts from the construction, operation and maintenance, and decommissioning of the offshore and intertidal components (seaward of the MHWS mark) of the Proposed Development on offshore air quality.

57. Offshore air quality was included in the initial Offshore EIA Scoping Report. Although the change in project scope applied to this Offshore EIA Scoping Report, which is combining the offshore Proposed Development Array Areas, the impacts are anticipated to generally be the same as identified in the initial Scoping Report. The initial Berwick Bank Proposal Scoping Opinion response has been considered for the development of this section. SSER intends to scope out offshore air quality as per agreement on the initial Berwick Bank Wind Farm Scoping Opinion.

5.4.2. STUDY AREA

58. The onshore air quality study area includes the following in accordance with the Institute of Air Quality Management (IAQM) guidance:

- Designated ecological receptors within 50 m of potential landfall construction activities (Barns Ness SSSI); and
- Human Receptors (Residential Properties and public amenity areas) within 350 m of potential landfall construction activities.

5.4.3. BASELINE ENVIRONMENT

Desktop Study

59. An initial desk-based review of literature and data sources to support this Offshore EIA Scoping Report has identified a number of baseline datasets. These are summarised at Table 5.6 below.

Table 5.6: Summary of Key Desktop Reports to inform Offshore Air Quality Scoping Assessment

Title	Source	Year	Author
Cleaner Air for Scotland (CAFS) The Road to a Healthier Future, 2018/2019 Progress Report	Scottish Government	2020	Scottish Government
Offshore Energy SEA 3, Appendix 1E: Air Quality	DECC	2016	DECC
Air Pollutant Inventories for England, Scotland, Wales, and Northern Ireland: 1990-2017	Department for Environment, Food and Rural Affairs (Defra), The Scottish Government, The Welsh Government and The Northern Ireland Department for Agriculture, Environment and Rural Affairs	2019	National Atmospheric Emissions Inventory
Scottish Government and Defra background concentrations maps for nitrogen dioxide (NO_2) and particulate matter (PM_{10}) and ($PM_{2.5}$).	Scottish Government and Department for Environment Food and Rural Affairs	2017	Scottish Government and Department for Environment Food and Rural Affairs
Institute of Air Quality Management (IAQM) Guidance on the assessment of dust from demolition and construction V1.1	Institute of Air Quality Management	2014	Holman *et al*.

60. Due to industrialisation of the coast and inshore area adjacent to the central North Sea there has been an increase in the levels of pollutants which decrease further offshore, though oil and gas platforms provide numerous point sources of atmospheric pollution (DECC, 2016).

61. The UK agreed to set emission ceilings through the National Emission Ceilings Directive (NECD), which was revised in 2016 (NECD 2016/2284/EU) to set emission reduction commitments for total emissions of NO_x, SO_x, non-methane volatile organic compounds (NMVOC), Ammonia (NH_3) and particulate matter ($PM_{2.5}$) in 2020 and 2030. The UK has met these reduction targets for all of these pollutants for each year since 2010 inclusive with the exception for NO_x for the year 2010 (NECD, 2020).

62. The Scottish Government suggest there have been long-term reductions in emissions for all pollutants due to various policies and strategies implemented within Scotland such as the CAFS – The Road to a Healthier Future (Scottish Government, 2015a and Scottish Government, 2020a), Climate Change (Emissions Reduction Targets) (Scotland) Act (2019) setting a 2045 target for net zero emissions and establishment of Low Emission Zones (The Transport (Scotland) Act 2019).

63. In 2017, the National Atmospheric Emissions Inventory undertook a review of the emissions in Scotland for the eight priority air pollutants: ammonia (NH_3), carbon monoxide (CO), NO_x, NMVOCs, PM_{10}, $PM_{2.5}$, SO_2, lead (Pb) and dioxins (PCDD/F) and benzo(a)pyrene B[a]p. PM_{10} describes inhalable particles, with diameters that are generally 10 micrometers and smaller. Between 1990 and 2016, there were decreases of 12% for ammonia, 64% per cent for PM_{10}, 65% for NMVOCs, 72% for nitrogen oxides (NO_x), 84% for carbon monoxide, 94% for SO_2 and 98% for lead (National Atmospheric Emissions Inventory, 2019).

64. The annual mean concentrations in the vicinity of the potential landfall areas for 2020 are shown in Table 5.7. The baseline concentration of total oxides of nitrogen (NO_x) is relevant for sensitive ecological receptors. The baseline annual mean NO_x concentration at the Barns Ness SSSI is 5.1 micrograms per cubic meter of air ($\mu g/m^3$). The maximum baseline annual mean concentrations within the onshore air quality study area for NO_2, PM_{10} and for $PM_{2.5}$ are 4.4 $\mu g/m^3$, 10.6 $\mu g/m^3$ and 5.6 $\mu g/m^3$ respectively. All background concentrations within the onshore air quality study area are significantly below the annual mean Air Quality Standards (AQSs) of 30 $\mu g/m^3$ for NO_x, 40 $\mu g/m^3$ for NO_2, 18 $\mu g/m^3$ for PM_{10} and 10 $\mu g/m^3$, for $PM_{2.5}$ which are applicable in Scotland.

Table 5.7: Baseline NO_2, PM_{10} and $PM_{2.5}$ Concentrations in the Onshore Air Quality Study Area 2020

Centre of 1 km x 1 km OS Grid Square		Annual Mean Concentration (µg/m3)		
Easting	**Northing**	**NO_2**	**PM_{10}**	**$PM_{2.5}$**
373500	676500	3.5	8.5	5.1
374500	675500	3.7	8.8	5.1
375500	674500	4.4	8.9	5.2
375500	673500	3.8	10.6	5.6
376500	673500	3.3	8.3	5.0
Average		**3.7**	**9.0**	**5.2**

5.4.4. POTENTIAL PROPOSED DEVELOPMENT IMPACTS

65. A range of potential impacts on offshore air quality have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Proposed Development in the absence of designed in measures:

- Construction, Operation and Maintenance, and Decommissioning
  - atmospheric emissions from vessel and helicopter movements;
  - generation of dust and particulates at landfall (e.g. from earth moving, directional drilling, open cut trenches)) have the potential to have an adverse (smothering) impact on ecological receptors;
  - generation of dust and particulates at the selected landfall site have the potential to affect human health and cause nuisance as a result of dust soiling of surfaces at residential properties; and
  - exhaust emissions from offshore vessels used in the construction phase having the potential to increase local ambient concentrations of Sulphur Dioxide (SO_2), NO_2, PM10 and PM2.5 and impact human health.

5.4.5. DESIGNED IN MEASURES

66. The following designed in measures, and how these can reduce potential for impact have been considered in identification of impacts that are proposed to be scoped into and out of the Proposed Development Offshore EIAR (section 5.4.6, Table 5.8).

- A bespoke CoCP will be prepared for the construction phase of the Proposed Development. This will be customised depending on the choice of landfall and will include:
  - a detailed project description with figures illustrating location of proposed construction and operational activities, and main ports used for vessels to and from the offshore construction site;
  - adherence to all legislative requirements;
  - a proposed programme of work;
  - a summary of Environmental Management Procedures including roles and responsibilities, sub-contractors and evidence of training, awareness and competence of on-site personnel;
  - procedures for communication; and
  - details of environmental management plans, including an air quality management plan to minimise the generation and potential impacts of dust emissions on receptors relevant for human health, amenity and ecology.
- Dust and air quality management plan within the CoCP will include good practice measures in accordance with the Institute of Air Quality Management (IAQM) guidance (Scottish Government and Defra, 2017; IAQM, 2018), proportionate to the potential impacts which notes that, even close to well-managed mineral extraction sites in the UK, impacts from release of dust on habitats, are rare. If effects are rare close to large-scale, long-term mineral extraction sites then impacts from smaller-scale, well-managed temporary construction, operation and decommissioning activity can be concluded to be negligible and therefore scoped out of further assessment.

5.4.6. POTENTIAL IMPACTS AFTER THE IMPLEMENTATION OF DESIGNED IN MEASURES

67. Atmospheric emissions from Proposed Development may arise from the combustion of fuel used to power both vessels and helicopters used in the construction, operation and maintenance, and decommissioning of the offshore wind farm. The pollutants from vessels and helicopters include sulphur dioxide (SO_2) and carbon dioxide (CO_2), oxides of nitrogen (NO_X) which represents the sum of nitrogen dioxide (NO_2) and nitrogen oxide (NO), and particulate matter (PM_{10} and $PM_{2.5}$).

68. Based on the baseline characterisation and the project description outlined in section 2, all potential offshore air quality impacts are proposed to be scoped out of further assessment. These impacts are outlined, together with a justification for scoping them out, in Table 5.8.

69. It should be noted that a separate ‘Climatic Effects’ section will be included within the Proposed Development Offshore EIAR.

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Table 5.8: Impacts Proposed to be Scoped Out of the Proposed Development Assessment for Offshore Air Quality

Impact	Designed in Measures	Justification
Construction, Operation and Maintenance, and Decommissioning		
Atmospheric emissions from vessel and helicopter movements.	• CoCP • dust and air quality management plan within the CoCP	Atmospheric emissions from the Proposed Development are likely to arise from fuel used to power vessels and helicopters used throughout the construction, operation and maintenance and decommissioning phase. Taking into account the dispersive nature of the offshore environment, the distance of Proposed Development from static sources of potential pollutants and the relatively small potential contribution to emissions when compared with the total vessel and helicopter movements in the northern North Sea, it is considered highly unlikely that concentrations of potential atmospheric pollutants associated with the Proposed Development, will be at levels of environmental concern. Therefore, SSER intends to scope this impact out of further consideration within the Offshore EIAR, subject to consultation with the relevant stakeholders.
The generation of dust and particulates at the selected landfall site (e.g. from earth moving, directional drilling, open cut trenches)) have the potential to have an adverse (smothering) impact on ecological receptors	• CoCP • dust and air quality management plan within the CoCP	The only relevant designated ecological receptor within 50 m of potential landfall construction, operation and maintenance and decommissioning activities is the Barns Ness SSSI. The SSSI is designated for saltmarsh, sand dunes and shingle. It is considered unlikely that areas of these habitats below MHWS where landfall connections could occur will be sensitive to dust deposition. The area of potential landfall construction activity within 50 m of the SSSI is small and the proposed construction methods are unlikely to generate significant amounts of airborne dust. Likewise, operation and decommissioning activities are unlikely to generate significant airborne dust. In accordance with the IAQM guidance, the low sensitivity, and low magnitude of impact is likely to result in a low risk of impacts associated with dust generation. It is considered that the good-practice measures included in the dust and air quality management plan within the CoCP will provide the necessary prevention and mitigation of potential impacts such that the effects will be negligible. It is therefore proposed that further assessment of dust impacts on onshore ecological receptors due to construction in the intertidal area (seaward of MHWS) is scoped out of the Offshore EIAR.
The generation of dust and particulates at the selected landfall site have the potential to affect human health and cause nuisance as a result of dust soiling of surfaces at residential properties	• CoCP • dust and air quality management plan within the CoCP	All residential properties are considered to have a high sensitivity to dust deposition. The number of residential properties within 350 m of the proposed landfall options is less than 10, resulting in an overall low sensitivity. In accordance with the IAQM guidance the low sensitivity and low magnitude of dust emissions during the offshore construction, operation and maintenance and decommissioning phases are likely to result in a negligible risk of dust soiling impacts as a result of dust generation. The annual mean PM_{10} concentration at any onshore receptor is significantly below the IAQM guidance threshold for Scotland of 14 µg/m^3. With less than 10 properties within 350 m of landfall options, the overall sensitivity to human health impacts is considered to be low. The low sensitivity with the low magnitude of dust emissions during the offshore construction phase results in a negligible risk of dust impacts on human health. It is therefore proposed that further assessment of dust soiling impacts on human health at residential receptors due to activities in the intertidal area (seaward of MHWS) is scoped out of the Offshore EIAR.
Exhaust emissions from offshore vessels used in the construction phase having the potential to increase local ambient concentrations of Sulphur Dioxide (SO_2), NO_2, PM10 and PM2.5 and impact human health	• CoCP • dust and air quality management plan within the CoCP	The specific port locations where vessels will travel to and from to support offshore construction, operation and maintenance and decommissioning activities has not yet been identified, however it is likely to be an established commercial/industrial port in the on the east coast of Scotland. Engine exhausts from offshore vessels associated with the construction, operation and maintenance, and decommissioning phases would contribute, at a small scale, to atmospheric emissions from existing shipping traffic in the area. It is considered that associated atmospheric emissions of infrequent vessel movements associated with the Proposed Development would be negligible in comparison to the total shipping activity in the area. Marine exhaust emissions are limited in line with the provisions of International Convention for the Prevention of Pollution from Ships (MARPOL) Annex VI (MARPOL, 2017) and International Maritime Organisation (IMO) global sulphur limit on vessel fuel of 0.50% percent by mass (m/m or mass/mass) (IMO, 2016). The potential effects of increased emissions on onshore receptors are therefore considered to be negligible. It is therefore proposed that further assessment of the effects of emissions from offshore vessels during the construction, operation and maintenance, and decommissioning phases on onshore receptors is scoped out of the Offshore EIAR.

5.4.7. PROPOSED APPROACH TO THE ENVIRONMENTAL IMPACT ASSESSMENT

70. Offshore air quality is proposed to be scoped out therefore no further detail is presented on proposed assessment methodology.

Potential Cumulative Effects

71. Although there are several other offshore wind farm projects in development (including Neart na Gaoithe, Inch Cape and Seagreen Alpha and Bravo) in the wider areas of the Proposed Development, all have been scoped out of further assessment of air quality from their Environmental Statements due to lack of receptor-impact pathway. SSER therefore proposes that there is no cumulative effect in relation to Air Quality and this pathway is scoped out of further assessment of cumulative effects.

Potential Transboundary Impacts

72. A screening of transboundary impacts has been carried out and is presented in Appendix 3. No potential transboundary effects have been identified for offshore air quality and therefore this will not be considered within the EIAR.

5.4.8. SCOPING QUESTIONS TO CONSULTEES

- Do you agree that the assessment of air quality receptors should be scoped out of the Proposed Development EIA including cumulative and transboundary effects?

5.4.9. NEXT STEPS

73. The over-arching next steps are outlined in section 4.3.4. In terms of topic specific steps for air quality, the next step is to seek agreement on scoping out the assessment of offshore air quality from the EIA Report. In addition, a Climate Effect Assessment is included (section 5.5.1) and will be assessed presented within the offshore EIA report.

5.5. CLIMATIC EFFECTS ASSESSMENT

5.5.1. INTRODUCTION

74. This section of the Offshore EIA Scoping Report outlined the assessment of potential impacts from the construction, operation and maintenance, and decommissioning of the Proposed Development as a whole (onshore and offshore infrastructure) on climate, including consideration of GHG. The GHG assessment would be undertaken as part of a Life Cycle Assessment (LCA) approach; this is considered as a component of the overarching *Climate Impact Assessment*. The assessment will also consider the resilience of the Proposed Development to climate change and reports on the impacts of climate on the Proposed Development.

75. The Climate Impact Assessment will be provided in the form of a standalone report, appended to the onshore and offshore EIA Reports.

76. The proposed development will be based off the coast of East Lothian in an area that is 40km offshore, with a total area of 1,142 square kilometres. It would be a large array of wind turbines to produce low-carbon energy, to support the Scottish Government in fulfilling its commitment to meeting its carbon reduction goals under the Climate Change (Scotland) Act of 2008, as amended in 2019 (Climate Change (Emission Reductions Targets) (Scotland) Act 2019). This is supporting the UK-wide Climate Change Act of 2008, also as amended in 2019.

77. The UK has so far outperformed on its carbon budget targets as set out in the above legislation, but progress is slowing, and the UK is not on track to meet its future budgets or the overall reduction target, according to the most recent Progress Report to Parliament by the Committee on Climate Change. Renewable energy Proposed Developments, such as Berwick Bank, are an important part in aiding the whole of the UK to meet its future budgets. The proposed development is intended to have the production capacity of 4.1GW at optimal running.

5.5.2. STUDY AREA

78. The study area for the assessment will be Scotland. The primary recipients will be Marine Scotland, acting on behalf of Scottish Minsiters, and East Lothian Council, who are the council in closest proximity to the site and where Berwick Bank onshore and landfall infrastructure will be located.

79. The Climate Impact Assessment requires overview across assets onshore and offshore, which are each required to produce electricity and route it efficiently to the grid. Figure 1.3 sets out visually how the assets will be arranged onshore and offshore.

Legislative Overview

80. The Town and Country Planning (Environmental Impact Assessment) Regulations 2017 (SI 2015/517) states that a climate change risk assessment should consider both:

- Impact of the scheme on climate: the potential effects of the scheme on climate, in particular, the magnitude of GHG emissions emitted during both construction and operation;
- Impact of climate on the scheme: the vulnerability of the scheme to climate change, in particular, the impacts of extreme weather (caused by climate change) during operation and construction and adaptation to mitigate the effects of these impacts; and
- The assessment will include the above. The Marine (Scotland) Act of 2010 is also relevant, as this legislation sets the context for marine licensing around Scotland.

81. The policy context will be further elaborated in the assessment.

5.5.3. BASELINE ENVIRONMENT

82. The assessment will elaborate briefly on the current context for Scotland and the UK in terms of their current GHG emissions, as well as their respective carbon reduction targets (the 'carbon budgets' set out in relevant legislation).

83. To further characterise the baseline and assessment criteria, SSER and our consultants would welcome the opportunity to implement stakeholder engagement to help inform the assessment being carried out.

5.5.4. ASSESSMENT METHODOLOGY

Impact of the Proposed Development on Climate

84. A GHG assessment that takes into account the IEMA Environmental Impact Assessment Guide 'Assessing Greenhouse Gas Emissions and Evaluating Their Significance' (IEMA, 2017), will be undertaken, which will capture whole-lifecycle analysis of GHG emissions.

85. To assess the Proposed Development's effects on climate, the magnitude of GHG emissions from construction and operation are calculated and considered in the context of local and national policy, and Scottish and UK carbon budgets.

86. Emissions will be presented in the context of the reduction in GHG emissions to be replaced by the energy produced by the Proposed Development. The overall lifecycle emissions or emissions reductions will be expressed as a percentage of the carbon budgets for the Scottish and UK Governments with respect to the relevant carbon budgetary periods (currently CB3). A measure of significance will be assigned based on the extent to which the Proposed Development would impact on Scotland's and the UK's ability to meet its carbon budgets.

87. The assessment will calculate the GHG emissions associated with the construction, operation and decommissioning of the Proposed Development, with reference to the framework set out in PAS 2080:2016 (Carbon Management in Infrastructure).

88. Emissions will be calculated using Atkin's Carbon Knowledgebase tool, which contains a detailed library of calculation formulae and over 1,000 emissions factors from authoritative sources such as the Inventory of Carbon and Energy (ICE, versions 1.6(a), 2.0 and 3.0), the Defra Greenhouse Gas Reporting Conversion Factors, and the EMEP/ CORINAIR Emission Inventory Guidebook.

89. Emissions will be presented in the context of the reduction in GHG emissions which will be enabled by the production of zero carbon electricity, from the Proposed Development, as a replacement of electricity from fossil fuels.

90. A level of significance will be assigned based on the extent to which the Proposed Development would impact the UK's ability to meet their carbon budgets. To do so we will be assessing the positive and negative adverse effects to determine a carbon balance. To express this, the overall lifecycle emissions or emission reductions will be expressed as a percentage of the UK's carbon budgets[3].

[3] 'The electricity output will be exported to the National Grid and its ultimate usage will be UK-wide. Therefore the emissions savings will contribute to the UK carbon budgets overall and cannot be delimited to any carbon budgets solely for Scotland.

Impacts of Climate on the Proposed Development

91. The assessment will examine the resilience of the Proposed Development to climate change and report on the impacts of climate on the Proposed Development. The assessment will provide the following:

- An examination of the current climate in the study area using the Met Office's latest regional dataset of 30-year averages and data from nearby long running meteorological stations;
- A review of observed climate vulnerability effects in the study area;
- Consideration of the Proposed Development future climate in the study area. This uses climate Projections from UKCP18 (United Kingdom Climate Projections 2018). These Projections have been developed by the Met Office Hadley Centre Climate Programme which is supported by the Department of Business, Energy and Industrial Strategy (BEIS) and the Department for Environment, Food and Rural Affairs (Defra). They provide the most up-to-date assessment of how the climate of the UK may change over the 21st century, and that information can be utilised to consider what may happen in this study area;
- Evaluation of how the Proposed Development may be vulnerable to the impacts of climate change during its construction, operation and decommissioning;
- The climate vulnerability assessment would consist of the following:
  - Scoping phase
  - Climate sensitivity assessment
  - Climate exposure assessment
  - Assessment phase
- Identification of specific mitigation to adapt the design, operation and maintenance processes to reduce the Proposed Development's vulnerability to climate change factors; and
- An assessment of the residual climate change vulnerability of the Proposed Development that, in accordance with appropriate Guidance, e.g. From the DMRB or IEMA, considers the likelihood and consequence of each potential vulnerability.

Data Sources

92. The baseline conditions will be identified through a detailed desktop review. Emissions will be calculated using an approach aligned with the Publicly Available Specification (PAS) 2080:2016 Carbon Management in Infrastructure, the technical standard for calculating and managing GHG emissions associated with infrastructure. Other data and information sources may be identified during the review as part of the EIAR.

93. Details on materials for the assessment of GHG emissions from construction of the Proposed Development will be sought from the design team during the assessment. The climate vulnerability assessment (assessment phase) will adopt UKCP18 climate Projections.

5.5.5. LIKELY SIGNIFICANT EFFECTS

Construction and Decommissioning

94. During construction, GHG would be generated by:

- production of construction materials, including primary raw material extraction, manufacturing and intra-manufacturing transportation
- transportation of materials and workforce to the construction site
- combustion of fuel to generate energy for use during construction
- treatment and transport of water for use during construction
- transport, treatment and/or disposal of waste generated during construction

95. During decommissioning, emissions would be generated by on-site deconstruction processes, the transport of waste materials, and processing for re-use, recycling, recovery or disposal. If material were to be reused or recycled at decommissioning, this would generate an emissions reduction outside the infrastructure boundary as virgin materials would be replaced in future Proposed Developments.

Operation and Maintenance

96. The Proposed Development aim is to produce 4100 MW of electricity (at optimal running) over the 35-year lifetime of the Proposed Development. This will provide the National Grid with an alternative low-carbon energy source and displace the need for energy to be produced via high carbon methods (i.e. fossil fuels). In each 5-year national budgetary period, carbon savings generated could be in the region of 3MtCO2e. It is considered that this would materially aid the UK's ability to meet its carbon reduction targets.

Summary of Elements to be Assessed

97. Table 5.9 summarises the proposed Scope of the Assessment for Effects on Climate.

Table 5.9: Proposed scope of Assessment for Effects on Climate

Substage of Lifecyle	Potential Sources of GHG Emission
Construction	
Embodied carbon in materials used for construction	• Emissions from production, manufacture and intra-manufacturing transport would contribute to the carbon footprint of the Proposed Development.
Operation and Maintenance	
Operational energy and water consumption	• The energy and water consumed during operation would contribute to the carbon footprint of the Proposed Development.
Emissions from operational processes	• The operation of the Proposed Development would result in the direct emission of CO2, and also emissions from the supply of materials to enable operation and maintenance (i.e. lubricants), the transport of site workers and materials, and transport and treatment of operational and maintenance wastes.
Decommissioning	
Emissions from construction and decommissioning activities	• Emissions from transportation of materials and workers to the Site, energy and water consumed during construction and decommissioning, and waste generated, would contribute to the carbon footprint of the Proposed Development.
Benefits and loads outside the study area: Reduction in emissions	• The electricity produced by the Proposed Development would displace the requirement for electricity to be produced via fossil fuels resulting in a reduction in GHG emissions within Scotland and the UK.

5.5.6. SCOPING QUESTIONS TO CONSULTEES

- Do you agree that appropriate methods are proposed based on potential for the development's impact on the climate?
- Do you agree that appropriate methods are proposed based on potential climatic impacts on the development?

6. OFFSHORE BIOLOGICAL ENVIRONMENT

6.1. BENTHIC SUBTIDAL AND INTERTIDAL ECOLOGY

6.1.1. INTRODUCTION

98. This section of the Offshore EIA Scoping Report identifies the elements of the benthic subtidal and intertidal ecology receptors of relevance to the Proposed Development and considers the potential impacts from the construction, operation and maintenance, and decommissioning of the offshore and intertidal components (seaward of the MHWS mark) of the Proposed Development on benthic subtidal and intertidal ecology.

99. Benthic subtidal and intertidal ecology was included in the initial Offshore EIA Scoping Report. Although the change in project scope applied to this Offshore EIA Scoping Report, which is combining the offshore Proposed Development Array Areas, the impacts are anticipated to generally be the same as identified in the initial Scoping Report. The initial Berwick Bank Wind Farm Proposal Scoping Opinion response has been considered for the development of this section.

6.1.2. STUDY AREA

100. To support the development of the benthic subtidal and intertidal ecology EIA section, two study areas are defined:

- Proposed Development benthic subtidal and intertidal ecology study area: this is defined as the area encompassing the Proposed Development (see Figure 6.1). This is the area within which site-specific benthic surveys will be undertaken, the results of which will inform the baseline characterisation and identification of benthic receptors against which potential impacts associated with the Proposed Development will be assessed; and
- regional benthic subtidal and intertidal ecology study area: this is defined as the area encompassing the wider northern North Sea habitats and includes the neighbouring consented offshore wind farms and designated sites (see Figure 6.1). It will be characterised by desktop data and will provide a wider context to the site-specific data collected within the Proposed Development benthic subtidal and intertidal ecology study area.

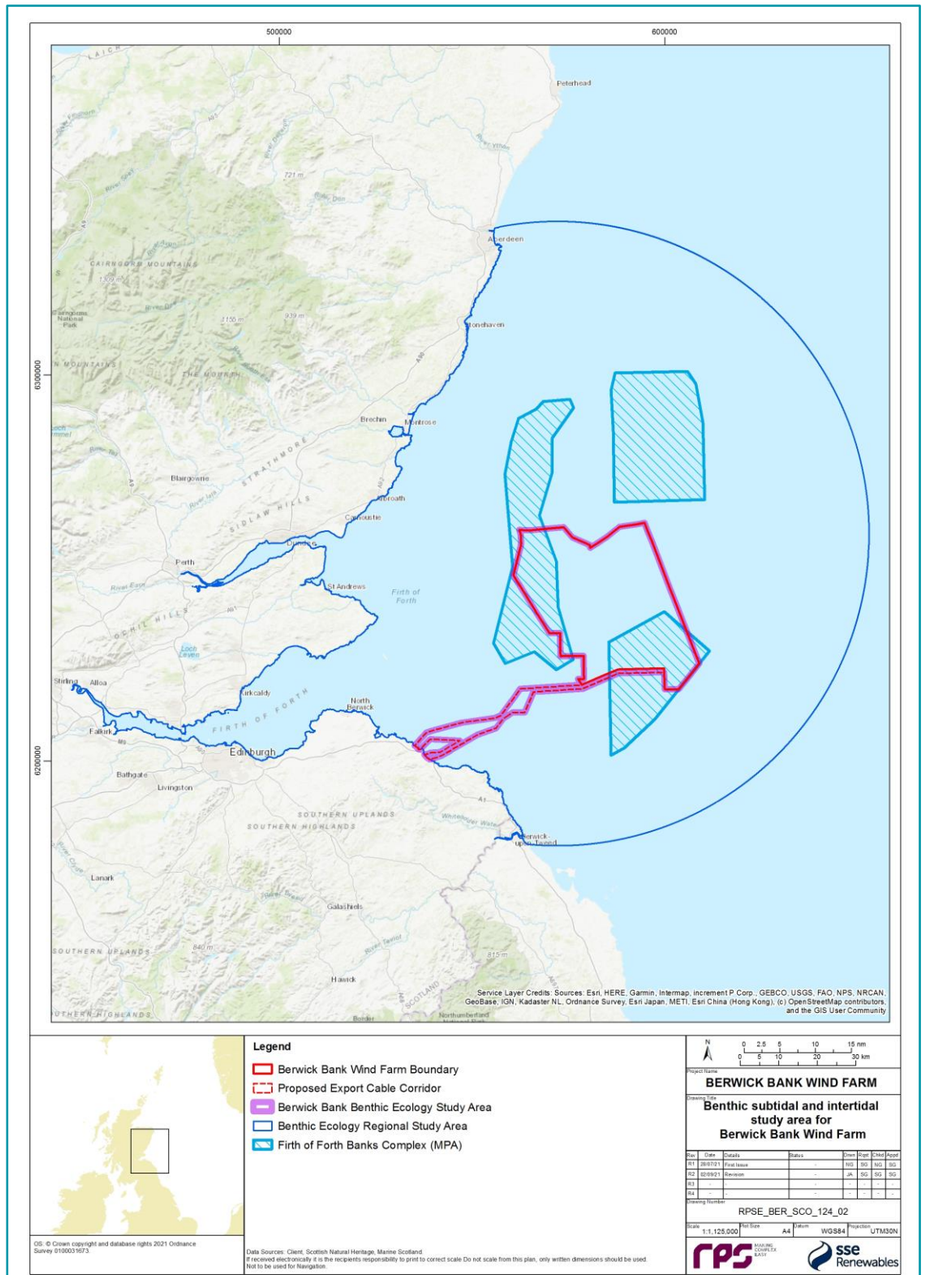

Figure 6.1: Benthic Subtidal and Intertidal Ecology Study Areas

6.1.3. BASELINE ENVIRONMENT

101. This section provides a concise summary of the benthic ecology baseline environment of the Proposed Development, reference should be made to Appendix 7 where a detailed description is provided. In 2020, a subtidal survey was undertaken to provide up to date data for baseline characterisation. The survey combined DDV and 0.1 m^2 Hamon grab sampling with epibenthic trawls. The survey design was discussed and agreed with NatureScot and Marine Scotland in July 2020. This site-specific data along with the comprehensive desktop information and data sources available will aid the characterisation of the benthic subtidal and intertidal ecology baseline.

Subtidal Sediments

102. Based on the EUSeaMap data, regions of higher topography and those associated with the Banks complexes within the Proposed Development Array Area are dominated by deep circalittoral coarse sediments whereas those in deeper water and in the flanks of the banks are dominated by deep circalittoral sands (Figure 6.2). These two broad habitat types are also predicted across most of the proposed ECC, with discrete areas of faunal communities on deep low energy circalittoral rock. As the proposed ECC moves into shallower waters and approaches landfall, sandy sediments grade into deep circalittoral muds, deep circalittoral mixed sediments and deep circalittoral coarse sediments.

103. Side scan sonar (SSS) data collected during the site-specific geophysical surveys (Fugro, 2020a and Fugro 2020b) was correlated to the European University Information Systems (EUNIS) Classification data available from EMODnet. The data indicates a heterogenous sediment across the Proposed Development Array Area with coarse and cobbly sediments on topographic highs, and sand to gravelly sand in the topographic lows and on the flanks of the banks. There are also extensive boulder fields present across the broad topographic highs and the banks. Hard substrates are present in the nearshore area of the proposed ECC for the Thortonloch landfall, with sand sediments in the central section grading into more gravelly sands and areas of hard substrate.

Sediment Contamination

104. As part of the subtidal survey, sediment samples were taken for the purpose of sediment chemistry analysis. Samples were transferred to an appropriate sample container, labelled and sent to a suitable qualified laboratory for analysis. The RPS laboratory has United Kingdom Accreditation Service (UKAS) accreditation to carry out the tests for all the contaminants listed. Samples were analysed for the following contaminants:

- Metals;
- Polychlorinated biphenyl (PCB) congeners;
- Total Hydrogen Content (THC) by fluorescence spectrometry;
- Total organic Carbon (TOC);
- Organotins;
- Polycyclic aromatic hydrocarbons (PAH);Physical parameters; and
- Particle size analysis.

105. No contaminants were found to exceed AL1/AL2 or the Canadian Probable Effect Levels (PEL) with only arsenic at five sample stations within the north of the Proposed Development Array Area exceeding Canadian Threshold Effect Level (TEL).

Subtidal Benthic Communities

106. The site-specific surveys across the Proposed Development benthic subtidal and intertidal ecology study area reported the benthic subtidal biotopes (as shown in Figure 6.3). The west of the Proposed Development Array Area was dominated by mixed sediment, fine sand and sandy mud biotopes (SS.SMu.CSaMu.AfilMysAnit in the south, SS.SSa.CFiSa.EpusOborApri in the north and SS.SMx.OMx.PoVen and SS.SSa.CFiSa.ApriBatPo). The east of the Proposed Development Array Area was dominated by sandy mud and find sand biotopes (SS.SMu.CSaMu.AfilMysAnit and SS.SSa.CFiSa.EpusOborApri). The Proposed Development ECC was dominated by the seapen and burrowing megafauna OSPAR habitat SS.SMu.CFiMu.SpnMeg with areas of SS.SMx.OMx and CR.MCR.EcCr in the nearshore environment.

107. The *S.spinulosa* Annex I reef assessment assigned all sample stations analysed 'Not a Reef'. The nearshore area of the Proposed Development ECC recorded medium and low potential Annex I cobble reef. The Proposed Development Array Area recorded areas classified as 'Not a Reef' and two sample stations which were low potential reef. One sample station in the nearshore area of the Proposed Development ECC was classified as medium potential rock reef.

108. The marine ecology surveys conducted for Seagreen Alpha/Bravo found that the benthic habitats were characterised by patchy communities of polychaete worms and shellfish (Seagreen, 2012a). The distribution of the epifauna from these surveys was related to the sediment type with the sandy gravels and gravelly sands supporting a rich epifauna, while the slightly gravelly sands were generally low in epifauna. The majority of species recorded were opportunistic species, with bryozoans / hydroid turfs, tube worm *Hydroides norvegica*, pea urchin *Echinocyamus pusillus* and sea squirt *Ascidiella scabra*. High species richness was recorded in association with areas of the *Sabellaria* habitat, although no evidence from the DDV surveys suggests extensive or well-developed aggregations of *Sabellaria* in the Seagreen Alpha/Bravo Proposed Development Array Area. The benthic communities present were considered typical of the outer Firth of Forth and northwest North Sea (Seagreen, 2012a).

109. An overview of the benthic communities observed within Seagreen Alpha/Bravo benthic surveys is presented in Table 6.1.

Table 6.1: Benthic Ecology Community Overview from Seagreen Project Alpha and Seagreen Project Bravo Survey Data (Seagreen, 2012a)

Project	Community Overview
Seagreen Project Alpha	• Western area: '*Sabellaria*', 'sparse polychaetes and bivalves' and 'faunal turf'; • Central and eastern areas: dominated by the sabellid polychaete classes 'dense Chone' and 'sparse Chone'.
Seagreen Project Beta	• Western area: '*Sabellaria*', 'rich polychaetes and bivalves' and 'epifauna with polychaetes'; • Eastern area: 'dense Chone' and 'rich polychaetes'

Intertidal Ecology

110. The proposed landfall locations are located at Thortonloch and Skateraw near to Torness, on the East Lothian coast. The following sections presents a summary of the site-specific survey data collected during intertidal surveys of each landfall. The methodology for intertidal surveys was approved by both MS-LOT and NS.

Thortonloch Landfall

111. The Thorntonloch Landfall rock platform is predominantly covered by sediments. A sandy bay is present at Thorntonloch beach which was mainly composed of fine and medium grained sand which becomes

muddier at the lower shore. A small proportion of gravel was also present within the lower shore sands. Occasional strips of shingle (cobbles and pebbles) were present at the beach head. High cliffs occurred to the south of Thorntonloch beach abutting a sedimentary rock platform with overlying large mobile sediments (pebbles, cobbles and boulders). Large areas of the bedrock remained exposed and contained a mosaic of deep pools cut into the rock platform by wave action. Rockpools also occurred frequently in other rocky areas between and under seaweeds and stones.

112. Cobbles dominated the mixed sediments in the upper fucoid zone with a typical percentage coverage of cobbles of around 75%. Boulders were distributed throughout the rocky vertical shore profile and generally ranged from 10-75% cover in fucoid dominated habitats where bedrock was not extensively outcropping. Boulders accounted for approximately 80% or more of the upper substrate layer in lower shore kelp beds, except where kelp was directly attached to bedrock. Pebbles and cobbles were also abundant throughout the rocky areas of the site and occasionally formed patches of shingle at the beach head. Coarse sand was occasionally present at the head of the beach in small patches in and around shingle.

Skateraw Landfall

113. The Skateraw Landfall rock platform is predominantly covered by sediments. A sandy bay is present at Skateraw beach which was mainly composed of fine and medium grained sand which becomes muddier at the lower shore. A small proportion of gravel was also present within the lower shore sands. Larger mobile sediments (pebbles, cobbles and boulders) covered the rest of the rock platform with exposed areas of bedrock occurring in places. Rockpools frequently occurred in the rocky zone. Boulders were distributed throughout the rocky vertical shore profile and generally ranged from 10-75% cover in fucoid dominated habitats where bedrock was not extensively outcropping. Boulders accounted for approximately 75% or more of the upper substrate layer in lower shore kelp beds, except where kelp was directly attached to bedrock. Cobbles dominated mixed sediments in the upper fucoid zone with typical percentage coverage of around 75%.

114. Pebbles and cobbles were present throughout the rocky areas of the landfall, and were abundant where they formed an extensive shingle bank at the beach head in the northern section of the landfall. Coarser sand was occasionally present at the head of the beach in small patches at the foot of the shingle bank. Freshwater flowed into the intertidal zone from the Dry Burn at National Grid Reference (NGR) NT 73461 75928.

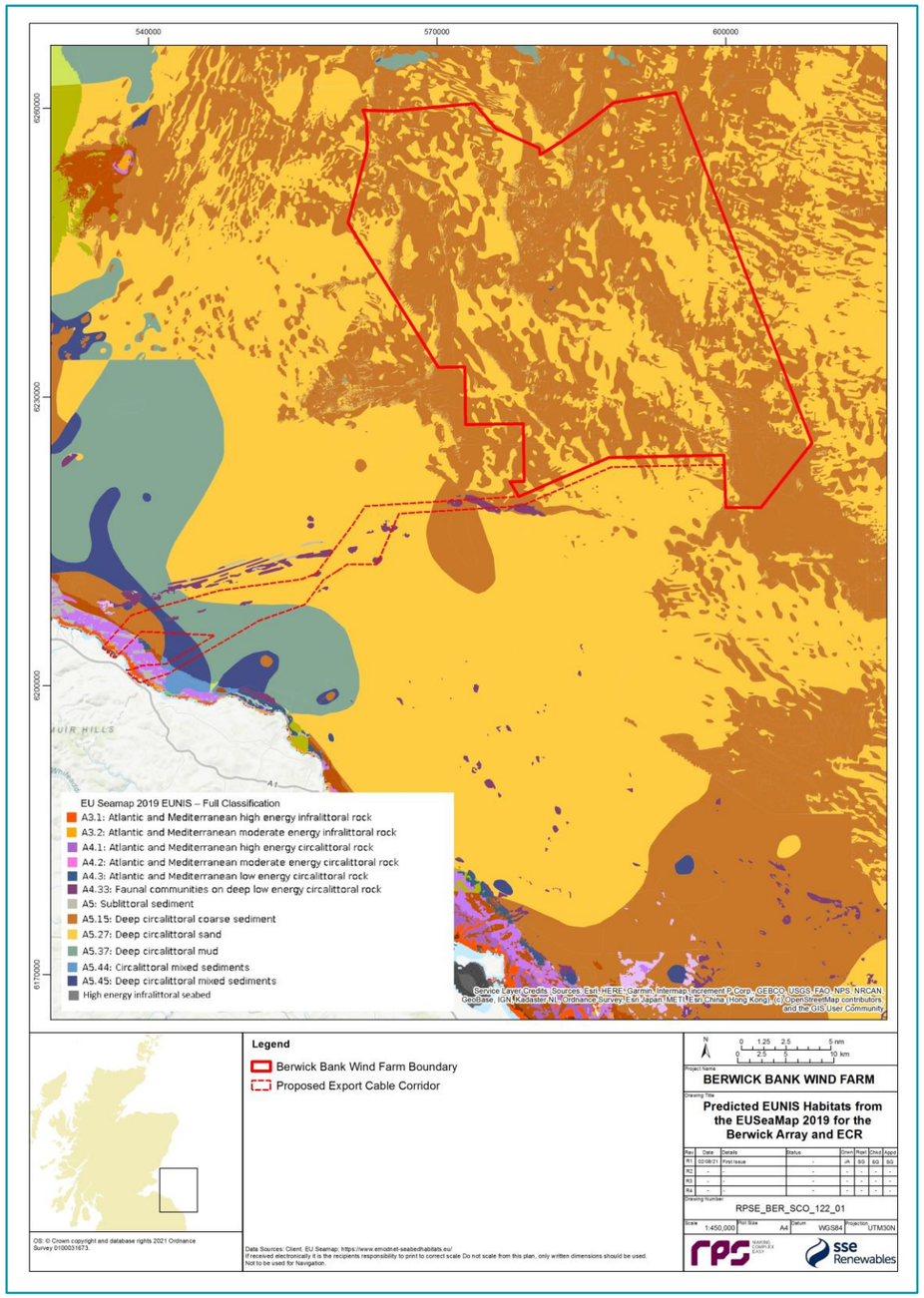

Figure 6.2: Predicted EUNIS Habitats from the EUSeaMap for the Proposed Development Array Area and Proposed ECC (Source: EMODnet, 2014)

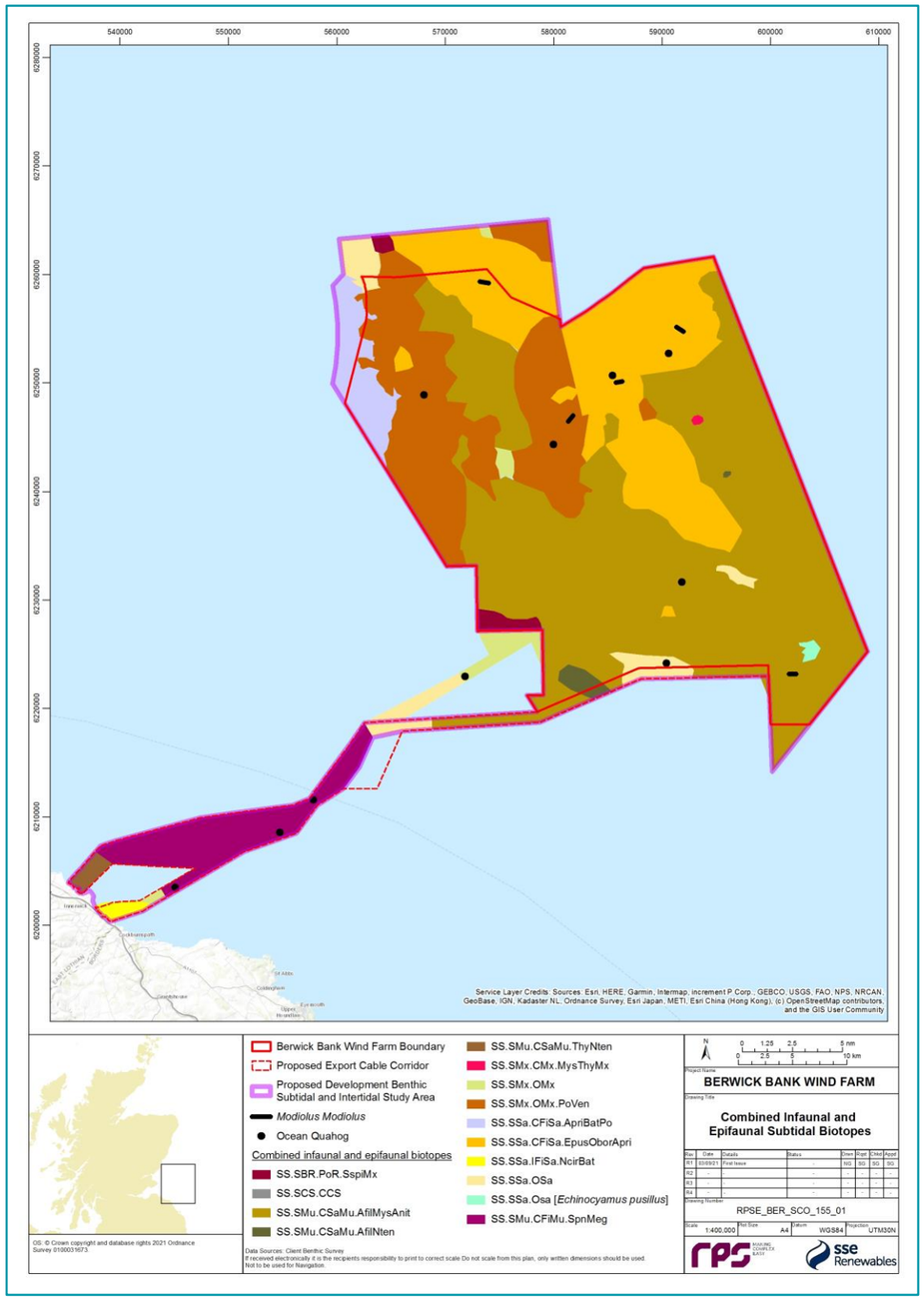

Figure 6.3: Combined Infaunal and Epifaunal Biotope Map of the Proposed Development Benthic Subtidal and Intertidal Ecology Study Area

Designated Sites

115. A number of sites of nature conservation importance, which are designated for benthic subtidal and/or intertidal features, have been identified as overlapping with, or occurring in close proximity to, the Proposed Development (Table 6.2). Further information is presented in Appendix 7.

Table 6.2: Summary of Designated Sites with Relevant Benthic Ecology Features in Proximity to the Proposed Development

Designated Site	Distance to Proposed Development Array Area (km)	Distance to Proposed ECC (km)	Features
Firth of Forth Banks Complex MPA	0.0	0.0	• Ocean quahog (*Arctica islandica*); • Offshore subtidal sands and gravels; • Shelf Banks and Mounds; and • Moraines representative of the Wee Bankie Key Geodiversity Area.
Barns Ness Coast SSSI	43.4	0.0	• Lower Carboniferous [Dinantian-Namurian (part)]; • Saltmarsh; • Shingle; and • Sand dune.
Pease Bay Coast SSSI	42.3	0.2	• Maritime cliff.
Berwickshire and North Northumberland Coast Special Area of Conservation (SAC)	30.1	3	• Mudflats and sandflats not covered by seawater at low tide (1140); • Large shallow inlets and bays (1160); • Reefs (1170); and • Submerged or partially submerged sea caves (8330).
Isle of May SAC	38.6	21	• Reefs (1170).
Firth of Tay and Eden Estuary SAC	42.5	45.3	• Estuaries (1130); • Sandbanks which are slightly covered by sea water all the time (1110); and • Mudflats and sandflats not covered by seawater at low tide (1140).
Montrose Basin Ramsar site and SSSI	39	72.1	• Intertidal mudflats and sandflats
Tayport Tentsmuir Coast SSSI	43.2	50.7	• Mudflats
Firth of Forth SSSI	37.6	5.9	• Mudflats; and • Saline lagoon.
Berwickshire coast (intertidal) SSSI	33.3	4.7	• Rocky Shore; and • Sea caves

116. Information to support a full screening of European sites[4] with qualifying benthic subtidal and/or intertidal interest features will be provided in the LSE Screening Report. Relevant features screened in will be fully considered and assessed in the benthic subtidal and/or intertidal ecology Offshore EIAR section, with the information to support the assessment on European sites and features provided in the Report to Inform Appropriate Assessment (RIAA).

6.1.4. POTENTIAL PROPOSED DEVELOPMENT IMPACTS

117. A range of potential impacts on benthic subtidal and intertidal ecology have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Proposed Development in the absence of designed in measures:

- Construction
  - Temporary habitat loss / disturbance;
  - Increase in suspended sediments due to construction related activities such as possible seabed preparation activities if required, wind turbine foundation installation, cable installation and the potential impact to physical features within the Proposed Development Array Area;
  - Accidental pollution during construction; and
  - Impacts from release of sediment bound contaminants.
- Operation and Maintenance
  - Long-term subtidal habitat loss;
  - Temporary subtidal habitat loss / disturbance;
  - Colonisation of hard structures;
  - Accidental pollution during operation and maintenance;
  - Impact to benthic invertebrates due to electromagnetic fields (EMF); and
  - Changes in physical processes.
- Decommissioning
  - Temporary habitat loss / disturbance;
  - Removal of hard substrates;
  - Accidental pollution during the decommissioning phase;
  - Impacts from release of sediment bound contaminants; and
  - Increased suspended sediment concentrations and associated deposition.

6.1.5. DESIGNED IN MEASURES

118. The following designed in measures, and how these can reduce potential for impact have been considered in identification of impacts that have been scoped into (Table 6.3) or out of (Table 6.4) the Proposed Development assessment:

- the development of, and adherence to, an appropriate CoCP;
- the development of, and adherence to, an Environmental Management Plan, including Marine Pollution Contingency Plan and Invasive Non-Native Species (INNS) Management Plan; and
- development of, and adherence to, a Decommissioning Plan.

119. The requirement and feasibility of additional measures will be dependent on the significance of the effects on benthic subtidal and intertidal ecology and will be consulted upon with statutory consultees throughout the offshore EIA process.

6.1.6. POTENTIAL IMPACTS AFTER THE IMPLEMENTATION OF DESIGNED IN MEASURES

120. Potential impacts on benthic subtidal and intertidal ecology receptors have been identified, following consideration of Designed In Measures. The impacts that have been scoped into the Proposed Development assessment are outlined in Table 6.3 together with a description of supporting site-specific survey data and other analyses (e.g. modelling) that will be required to enable a full assessment of the impacts. On the basis of the baseline benthic subtidal and intertidal ecology information currently available and the Proposed Development description outlined in section 2, several impacts are proposed to be scoped out, as described in Table 6.4.

[4] European sites considered within the LSE screening are defined as Special Areas of Conservation (SACs), possible SACs (pSACs), candidate SACs (cSACs), Sites of Community Importance (SCI), Special Protection Areas (SPAs) and potential SPAs (pSPAs) and Ramsar Sites

Table 6.3: Impacts Proposed to be Scoped In to the Proposed Development Assessment for Benthic Ecology. Project Phase Refers to Construction (C), Operation and Maintenance (O) and Decommissioning (D) Phase of the Proposed Development

Impact	Project Phase			Designed In Measures	Justification (including consideration of designed in measures)	Data Collection and Analysis Required to Characterise the Baseline Environment for the EIA	Summary of Proposed Approach to Assessment
	C	O	D				
Temporary habitat loss / disturbance	✓	✓	✓	Not Applicable (N/A)	There is potential for temporary, direct habitat loss and disturbance as a result of site preparation activities in advance of installation activities, cable installation activities (including pre-cabling seabed clearance and anchor placements), and placement of spud-can legs from jack-up operations. Temporary habitat loss / disturbance may occur during the operation and maintenance phase as a result of operations (e.g. cable repair/reburial, use of jack-up vessels to facilitate wind turbine component repairs etc.). The impacts associated with these operations are likely to be similar in nature to those associated with the construction phase although of reduced magnitude. There is potential for temporary, direct habitat loss and disturbance due to decommissioning activities to remove array and export cables, and jack-up operations to remove foundations, resulting in potential effects on benthic ecology.	Benthic subtidal and intertidal surveys have been undertaken to collect site-specific data to allow for characterisation of the benthic subtidal and intertidal ecology study area.	No specific modelling is required to inform this impact assessment therefore a qualitative assessment will be undertaken and presented in the EIA Report. This assessment will be based on information derived from the Project Design Envelope (PDE). The significance of effects upon benthic receptors will be determined by correlating the magnitude of the impact and the sensitivity of the receptor. Where possible, the magnitude of the impact will be quantified for the maximum design scenario. For example, the MDS for habitat loss/disturbance will be quantified and the assessment will present the areas of habitat potentially affected in the context of the size of the project study area and also the ncMPA. The sensitivity of benthic receptors will be determined using a combination of the MarESA and the FEAST tools.
Increased suspended sediment concentrations and associated deposition	✓	✓	✓	Adherence to an appropriate CoCP.	Sediment disturbance arising from construction activities (e.g. foundation and cable installation – including drilling and any deposits arising, and seabed preparation); maintenance operations (e.g. cable repair / reburial, use of jack-up vessels to facilitate wind turbine component repairs etc.); and decommissioning activities (e.g. cable and foundation removal may result in indirect impacts on benthic communities due to temporary increases in SSCs and associated sediment deposition (i.e. smothering effects). Changes in SSCs can impact benthic receptors through changes in water clarity and reduced feeding due to increases in suspended solids and smothering and siltation rate changes.	As per temporary habitat loss / disturbance.	The outputs of numerical modelling undertaken for the physical processes assessment will inform this impact assessment. Further details of this modelling are presented within section 5.1.7, however the assessment of impact will be presented within the Benthic Subtidal and Intertidal Ecology section of the Offshore EIAR. Specifically, primary productivity and the corresponding effects on benthic receptors will be considered. For the operation and maintenance phase, the magnitude is assumed to be no greater than for the construction phase therefore modelling carried out for the construction phase is used to quantify the magnitude of effect. The significance of effects upon benthic receptors will be determined by correlating the magnitude of the impact and the sensitivity of the receptor. The sensitivity of benthic receptors will be determined using a combination of the MarESA and the Feature Activity Sensitivity Tool (FEAST) tools.
Long term habitat loss	✓	✓		Adherence to an appropriate CoCP.	There is the potential for long-term habitat loss to occur directly under all foundation structures and associated scour protection, and under any cable protection required along the inter-array and offshore export cables. As foundations are installed throughout the construction phase this impact is also relevant to the construction phase as well as the operational and maintenance phase.	As per temporary habitat loss / disturbance.	The significance of effects upon benthic receptors will be determined by correlating the magnitude of the impact and the sensitivity of the receptor. Where possible, the magnitude of the impact will be quantified for the maximum design scenario. For example, the MDS for habitat loss/disturbance will be quantified and the assessment will present the areas of habitat potentially

Impact	Project Phase			Designed In Measures	Justification (including consideration of designed in measures)	Data Collection and Analysis Required to Characterise the Baseline Environment for the EIA	Summary of Proposed Approach to Assessment
	C	O	D				
Increased risk of introduction and spread of invasive and invasive non-native species (INNS).	✓		✓	Designed-in measures including an Invasive Non-Native Species Management Plan, which will include measures to ensure that the risk of potential introduction and spread of INNS are minimised.	There is potential for an increased risk of introduction and spread of invasive non-native species through the vessel movements required during the construction phase and decommissioning phase.	As per temporary habitat loss / disturbance.	affected in the context of the size of the project study area and also the ncMPA. The sensitivity of benthic receptors will be determined using a combination of the MarESA and the Feature Activity Sensitivity Tool (FEAST) tools.
Colonisation of hard structures		✓		Designed-in measures including an INNS Management Plan, which will include measures to ensure that the risk of potential introduction and spread of INNS are minimised.	Artificial structures placed on the seabed (i.e. foundations and scour / cable protection) in the offshore environment are expected to be colonised by a range of marine organisms leading to localised increases in biodiversity. These structures may also facilitate the spread of marine invasive and non-indigenous species.	As per temporary habitat loss / disturbance.	No specific modelling is required to inform this impact assessment therefore a qualitative assessment will be undertaken and presented in the EIA Report. This assessment will be based on information derived from the Project Design Envelope (PDE). Invasive non-native species (INNS) will be considered, particularly in relation to colonisation of hard structures. The significance of effects upon benthic receptors will be determined by correlating the magnitude of the impact and the sensitivity of the receptor. Where possible, the magnitude of the impact will be quantified for the maximum design scenario. For example, the MDS for habitat loss / disturbance will be quantified and the assessment will present the areas of habitat potentially affected in the context of the size of the project study area and also the ncMPA. The sensitivity of benthic receptors will be determined using a combination of the MarESA and the FEAST tools.
Changes in physical processes		✓		N/A	The presence of foundation structures, associated scour protection and cable protection may introduce localised changes to the tidal flow and wave climate, resulting in potential changes to the sediment transport pathways and associated effects on benthic ecology.	As per temporary habitat loss / disturbance.	Outputs of numerical modelling (as per section 5.1.7) undertaken for the physical processes assessment will inform this impact assessment, however the assessment of impact will be presented within the Benthic Subtidal and Intertidal Ecology section of the Offshore EIAR.
Impact to benthic invertebrates due to electromagnetic fields (EMF)		✓		N/A	EMF generated through the subsea electrical cabling may affect benthic subtidal and intertidal ecology by inhibiting / interfering with behaviours of the relevant benthic receptors.	As per temporary habitat loss / disturbance.	No specific modelling is required to inform this impact assessment therefore a qualitative assessment will be undertaken and presented in the EIA Report. This will be supported by available guidance and an approach to assessment agreed through the Road Map process.
Removal of hard substrates			✓	Adherence to a Decommissioning Plan.	The removal of foundations and any scour / cable protection during decommissioning has the potential to lead to loss of species/habitats colonising these structures.	As per temporary habitat loss / disturbance.	No specific modelling is required to inform this impact assessment therefore a qualitative assessment will be undertaken and presented in the EIA Report. This assessment will be based on information derived from the Project Design Envelope (PDE).

Table 6.4: Impacts Proposed to be Scoped Out of the Proposed Development Assessment for Benthic Ecology

Impact	Designed in Measure	Justification
Construction / Operation and Maintenance / Decommissioning		
Accidental pollution during construction, operation and maintenance and decommissioning	• the development of, and adherence to, an appropriate CoCP; • the development of, and adherence to, an Environmental Management Plan, including Marine Pollution Contingency; and • development of, and adherence to, a Decommissioning Plan	There is a risk of pollution being accidentally released during the construction, operation and maintenance and decommissioning phases from sources including vessels / vehicles and equipment / machinery. However, the risk of such events is managed by the implementation of measures set out in standard post consent plans (e.g. Environmental Management Plans, including Marine Pollution Contingency Plans). These plans include planning for accidental spills, address all potential contaminant releases and include key emergency contact details. It will also set out industry good practice and OSPAR (Oslo-Paris), IMO and MARPOL (International Convention for the Prevention of Pollution from Ships) guidelines for preventing pollution at sea. Therefore, the likelihood of an accidental spill occurring is very low and in the unlikely event that such events occur, the magnitude of these will be minimised through measures such as marine pollution contingency planning. As such, it is intended that this impact is scoped out of further consideration within the Benthic Subtidal and Intertidal Ecology Offshore EIAR section. This position is supported by stakeholder advice on the initial Berwick Bank proposal Offshore EIA Scoping Report.
Impacts from the release of sediment bound contaminants	• the development of, and adherence to, an appropriate CoCP; • the development of, and adherence to, an Environmental Management Plan, including Marine Pollution Contingency; and • development of, and adherence to, a Decommissioning Plan	Seabed disturbance associated with construction, maintenance and decommissioning activities (e.g. foundation and cable installation) could lead to the remobilisation of sediment-bound contaminants that may result in harmful and adverse effects on benthic communities. Due to the limited historic oil and gas activities in the vicinity of the Proposed Development, the nature of the sediments present (i.e. low levels of fines) and the large distance from shore which suggests a limited input from terrestrial sources, the risk of sediment bound contaminants being present in concentrations likely to be harmful to benthic receptors is considered to be low. Site-specific sediment chemistry sampling has been undertaken across the Proposed Development Array Area and ECC during subtidal sampling. No contaminants were found to exceed AL1/AL2 or the Canadian Probable Effect Levels (PEL) with only arsenic at five sample stations within the north of the Proposed Development Array Area exceeding Canadian Threshold Effect Level (TEL). Subject to consultation with the SNCBs via the Road Map process, it is intended that this impact is scoped out of further consideration within the Benthic Subtidal and Intertidal Ecology Offshore EIAR chapter.

6.1.7. PROPOSED APPROACH TO THE ENVIRONMENTAL IMPACT ASSESSMENT

121. The benthic subtidal and intertidal ecology EIA will follow the methodology set out in section 4. Specific to the benthic subtidal and intertidal ecology EIA, the following guidance documents will also be considered:

- Guidelines for EcIA in the UK and Ireland. Terrestrial, Freshwater and Coastal (CIEEM, 2019);
- Guidance on Environmental Considerations for Offshore Wind Farm Development (OSPAR, 2008);
- Best methods for identifying and evaluating *Sabellaria spinulosa* and cobble reef (Limpenny *et al.,* 2010);
- Defining and Managing *Sabellaria spinulosa* Reefs (Gubbay, 2007);
- Identification of the Main Characteristics of Stony Reef Habitats under the Habitats Directive (Irving, 2009);
- SNH (now NatureScot) guidance: Guidance on Survey and Monitoring in Relation to Marine Renewables Deployments in Scotland – Volume 5: Benthic Habitats (SNH, 2011); and

- Guidelines for data acquisition to support marine environmental assessments of offshore renewable energy projects (Judd, 2012).

122. In addition, and specific to marine ecology topics, important ecological features (IEFs) will be identified, in accordance with CIEEM (2019) guidelines, and assessments will be presented for appropriate ecological receptor groups in the baseline characterisation of each relevant technical section. Criteria defining the value of each IEF will be defined to reflect topic-specific interests, with reference to the CIEEM (2019) guidelines and will include specific consideration of Priority Marine Features (PMFs)[5] within the benthic subtidal and intertidal ecology study area. With specific reference to benthic subtidal and intertidal ecology, in particular the characterisation of the baseline environment, the Feature Activity Sensitivity Tool (FeAST), will be drawn upon to inform the assessments of sensitivity in the impact assessment section of the Benthic Ecology ES section.

123. Additionally, a staged Marine Protected Area (MPA) assessment will be undertaken to assess the potential for the activities associated with the construction, operation and maintenance and decommissioning of the Proposed Development to hinder site conservation objectives. This MPA assessment will consider Marine Protected Areas within or near the Proposed Development based on the outputs of a Stage 1 Screening Exercise, including the Firth of Forth Banks Complex ncMPA.

124. A Benthic Subtidal and Intertidal Ecology Technical Report will present a detailed baseline characterisation for the Proposed Development using specific survey data and the most recent desktop data. This report will inform the Benthic Ecology ES section.

Potential Cumulative Effects

125. Although the predicted effects from the Proposed Development on benthic subtidal and intertidal ecology are considered to be localised to within the footprint of the Proposed Development, there is potential for the predicted impacts to interact with impacts from other projects and activities in the regional benthic subtidal and intertidal ecology study area and lead to a cumulative effect on receptors. The cumulative effects assessment will follow the approach outlined in section 4.3.7.

Potential Transboundary Impacts

126. A screening of transboundary impacts has been carried out and is presented in Appendix 3. No potential transboundary effects have been identified for benthic subtidal and intertidal ecology and therefore this will not be considered within the EIAR.

6.1.8. SCOPING QUESTIONS TO CONSULTEES

- Do you agree with the study areas defined for benthic subtidal and intertidal ecology?
- Do you agree that all potential impacts (Table 6.3) have been identified for benthic subtidal and intertidal ecology?
- Do you agree with the sites screened into the MPA Assessment (as presented in Appendix 17)?
- Do you agree that the impacts described in Table 6.4 can be scoped out of the benthic subtidal and intertidal ecology EIA section?

6.1.9. NEXT STEPS

127. The following topic specific next steps are summarised below and will be undertaken through the Benthic Ecology, Fish and Shellfish and Physical Processes Road Map process:

- define the baseline environment and assessment approach and seek agreement on this with key stakeholders:
  - present evidence base (including site-specific subtidal and intertidal surveys), baseline characterisation (including key habitats and coastal processes) to stakeholders and agree on impacts and receptors to be scoped in/out of Offshore EIAR; and
- Agree assessment approach for benthic ecology and the potential impacts to be assessed through the EIA Report process:
  - present Maximum Design Scenarios and impact assessment approach including sensitivity of receptors, method of quantifying impacts to stakeholders; and
  - discuss initial findings of impact assessment, appropriate mitigation and monitoring with stakeholders.

128. Any impacts that cannot be quantitatively assessed will be discussed with key stakeholders as part of the Benthic Ecology, Fish and Shellfish and Physical Processes Road Map process.

129. Any potential need for strategic monitoring regarding hard structure colonisation and change in community structure / species will be detailed in the Benthic Subtidal and Intertidal Ecology section of the Offshore EIAR.

[5] Priority marine features (PMFs) are habitats and species that are considered to be marine nature conservation priorities in Scottish waters by Scottish Nature Conservation Body NatureScot.

Important Ecological Features (IEFS) are ecological features (habitats, species, ecosystem and their functions/processes)) which are considered to be important and should be subject to detailed assessment as they may potentially be affected by the project. (as per CIEEM 2019 guidance).

6.2. FISH AND SHELLFISH ECOLOGY

6.2.1. INTRODUCTION

130. This section of the Offshore EIA Scoping Report identifies the fish and shellfish receptors of relevance to the Proposed Development and considers the potential impacts from the construction, operation and maintenance, and decommissioning of the offshore and intertidal components (seaward of the MHWS) of the Proposed Development.

131. Fish and shellfish ecology was reported on in the initial Scoping Report. Although the change in project scope applied to this Scoping Report, which is combining the offshore Proposed Development Array Areas, the impacts are anticipated to generally be the same as identified in the initial Scoping Report. The SOR requested additional impacts were scoped in, such as the colonisation of hard substrates and the assessment of diadromous fish separately from marine fish. The initial Berwick Bank Wind Farm Proposal Scoping Opinion response has been considered for the development of this section.

6.2.2. STUDY AREA

132. Fish and shellfish are spatially and temporally variable, therefore for the purposes of the fish and shellfish ecology characterisation, two study areas are defined. These are shown in Figure 6.4 and described below:

- Proposed Development fish and shellfish study area encompasses the Proposed Development Proposed Development Array Area, proposed ECC and intertidal zone seaward of MHWS; and
- northern North Sea fish and shellfish study area encompasses the Proposed Development fish and shellfish study area and a surrounding area defined by the boundary of the northern North Sea as defined by the biogeographic region identified as part of the Review of Marine Nature Conservation (RMNC) (2004). This is the regional study area and also encompasses waters of the Forth and Tay Scottish Marine Region (SMR). The northern North Sea fish and shellfish study area provides a wider context for the fish species and populations identified within the Proposed Development fish and shellfish study area and will inform assessments of those impacts affecting fish and shellfish receptors over a larger scale (e.g. underwater noise).

6.2.3. BASELINE ENVIRONMENT

133. This section provides a concise summary of the fish and shellfish baseline environment of the Proposed Development, reference should be made to Appendix 8 where a detailed description is provided. In 2020, epibenthic 2 m beam trawling at 15 sampling locations distributed across representative sediment types was undertaken and this will inform the fish and shellfish baseline. The survey design was discussed and agreed with NatureScot and Marine Scotland in July 2020. This site-specific data along with the comprehensive desktop information and data sources available will aid the characterisation of the fish and shellfish baseline.

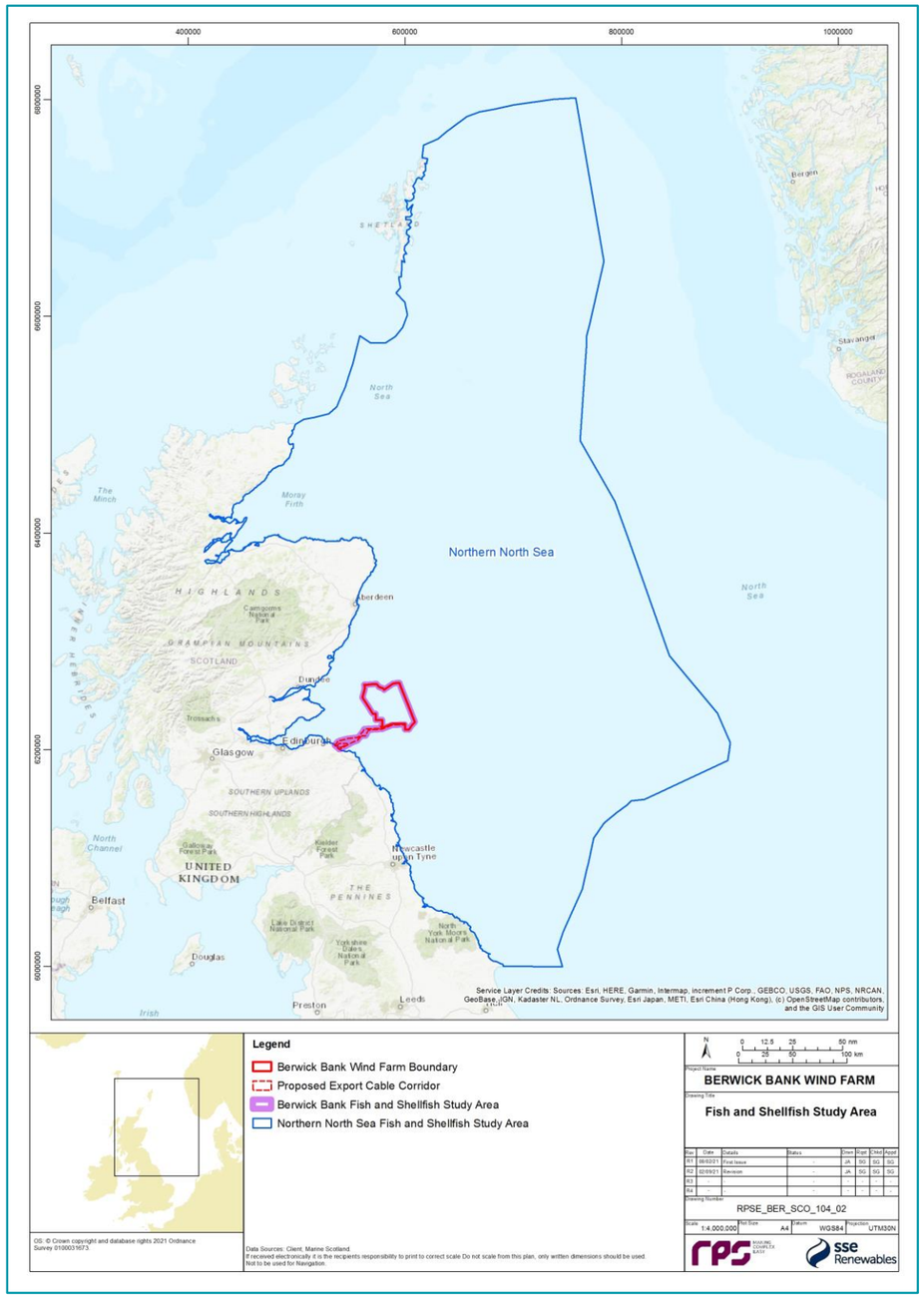

Figure 6.4: Fish and Shellfish Study Area

Designated Sites

134. Although the Proposed Development does not overlap with any European sites, there are several protected areas for fish in East Scotland, within the northern North Sea fish and shellfish study area. Apx. Table 8. 2 provides an early indication of the designated sites (international and national) that may be considered within the EIA and /or HRA. Information to support a full screening of European sites with qualifying fish and shellfish interest features will be provided in the LSE Screening Report. Relevant fish and shellfish interest features screened in will be fully considered and assessed in the fish and shellfish ecology Offshore EIAR section, with information to support the assessment of European sites and features provided in the Report to Inform Appropriate Assessment (RIAA).

Fish Assemblage

135. The fish assemblage of the northern North Sea fish and shellfish study area includes demersal, pelagic, migratory and elasmobranchs fish species. Demersal species include sandeel *Ammodytidae*, whiting *Merlangius merlangus*, lemon sole *Microstomus kitt*, ling *Molva molva*, plaice *Pleuronectes platessa*, with pelagic species including herring *Clupea harengus*, sprat *Sprattus sprattus* and saithe *Pollachius virens* likely to be found in the vicinity of the Proposed Development.

136. In August 2020, 15 epibenthic beam trawls were collected across the distributed across Proposed Development Array Area and ECC options. A total of 21 bony fish taxa representing 553 individuals were recorded from these epibenthic trawls undertaken across the Proposed Development benthic subtidal and intertidal ecology study area. The most abundant fish recorded in the trawls were common dab *Limanda limanda* (167 individuals), Long rough dab *Hippoglossoides platessoides*, lesser sandeel and gobies *Pomatoschistus* sp. This was consistent with the infaunal data collected which also recorded lesser sandeels. Lesser sandeel, common dab and long rough dab were recorded in trawls across the Proposed Development benthic subtidal and intertidal ecology study area, while *Pomatoschistus* sp. was only recorded in trawls within the Proposed Development ECC. Two four-bearded rockling *Enchelyopus cimbrius* and angler fish *Lophius piscatorius* were recorded across all trawls.

137. Further, to inform the fish and shellfish baseline characterisation for the Seagreen Alpha/Bravo EIA (Seagreen, 2012b), a total of 53 epibenthic trawls were conducted during the benthic surveys in 2011. Several species were observed including pogge *Agonus cataphractus*, dab *Limanda limanda*, goby *Pomatoschistus norvegicus/lozanoi*, lesser sandeel *Ammodytes marinus*, butterfish *Pholis gunnellus*, plaice, whiting and cod. Of these species, dab, goby, and lesser sandeel were generally the most abundant and with up to 588 individuals recorded in a single trawl. Commercial species such as plaice, whiting and cod were also observed. In addition, elasmobranchs (sharks and rays) have been found distributed throughout the east coast of Scotland (Coull *et al.,* 1998; Ellis *et al.,* 2012; Baxter *et al.,* 2011).

Diadromous Fish Species

138. There is the potential for diadromous fish species to migrate to and from Scottish rivers in the vicinity of the Proposed Development and, therefore, they may migrate through the Proposed Development fish and shellfish study area to rivers during certain periods of the year (SNH, 2017a and National Biodiversity Network (NBN) Atlas, 2019).

139. The fish and shellfish ecology assessment for Seagreen Alpha/Bravo (Seagreen, 2018) observed seven migratory species of relevance: Atlantic salmon *Salmo salar*, sea trout *Salmo trutta*, sea lamprey *Petromyzon marinus*, river lamprey *Lampetra fluviatilis*, European eel *Anguilla anguilla*, Allis and twaite shad *Allosa fallax* and *Allosa allosa* and sparling (European smelt) *Osmerus eperlanus*. The species which were considered as having the greatest potential to be present within the vicinity of the Seagreen Alpha/Bravo were Atlantic salmon, sea trout, eels and the lampreys.

140. No site-specific surveys are proposed to inform the impact assessment on migratory fish species. For the purposes of the impact assessment, it will be assumed that the aforementioned species are likely to be present within the Proposed Development Array Area and/or proposed ECC, during key migration periods (e.g., adult migration to spawning rivers and smolt migration from natal rivers in the vicinity of the development).

141. With respect to migratory fish species, the aim of the impact assessment will be to determine whether construction, operation and maintenance or decommissioning activities have the potential to lead to disruption to migration, e.g., construction noise potentially creating an effective barrier to fish migration. The timing of fish migration will therefore be an important element of the baseline characterisation and this will be collected through desktop data sources, including rod catch data from rivers on the east coast of Scotland (e.g. Tweed, Forth, Tay, Esk and Dee), recent papers (e.g. Newton *et al.,* 2017; Gardiner *et al.,* 2018, Godfrey *et al.,* 2015; Malcolm *et al.,* 2015) and Marine Scotland smolt survey data from the east coast of Scotland (Marine Scotland, 2018c).

Shellfish Assemblage

142. Commercial landing data provides an overview of species present within the northern North Sea fish and shellfish study area. Species most caught include the brown crab *Cancer pagarus*, European lobster *Homarus gammarus*, great scallop *Pecten maximus*, velvet swimming crab *Necora puber* and squid *Loligo* spp. Other species caught in the area include green crab *Carcinus maenas* and whelks *Buccinum undatum* (ICES, 2018).

143. The River South Esk, River Dee and River Spey SACs have primarily been designated as SACs due to the presence of the freshwater pearl mussel *Margaritifera margaritifera*. The freshwater pearl mussel is dependent on the Atlantic salmon smolting population and therefore should the Atlantic salmon population be adversely affected by the Proposed Development; this may have an indirect effect on freshwater pearl mussel populations.

144. During the epibenthic trawls conducted for Seagreen Alpha/Bravo, several shellfish species were observed including great scallop and queen scallop *Aequipecten opercularis* (Seagreen, 2012b). *Nephrops* was also recorded during site-specific surveys for the Berwick Bank Wind Farm (including epibenthic beam trawls and seabed imagery). Underwater video survey data provided by Marine Scotland also showed that *Nephrops* abundance was high in the inshore waters of the southern parts of the spawning and nursery grounds (Seagreen, 2012b). Other species such as brown crab, lobster, velvet swimming crab, whelk and squid were either recorded in very low abundances or not observed at all in the in the benthic surveys but are all recognised as important commercial shellfish species within the northern North Sea fish and shellfish study area (Seagreen, 2018).

145. The Offshore EIAR will provide further discussion of the shellfish assemblage observed within the site-specific subtidal survey.

Spawning and/or Nursery Grounds

146. Potential nursery and spawning areas in the North Sea for a range of species were identified by Coull *et al.*(1998), based on larvae, egg and benthic habitat survey data. Ellis *et al.*(2012) reviewed this data for several fin fish species in the North Sea, including herring, providing an updated understanding of areas of low and high intensity nursery and spawning grounds. Herring and sandeel known spawning and nursery grounds identified within the Proposed Development fish and shellfish study area are illustrated in Figure 6.5.

147. 349. Species with known spawning periods and nursery habitats identified within the Proposed Development fish and shellfish study area have been summarised in Apx. Table 8. 3.

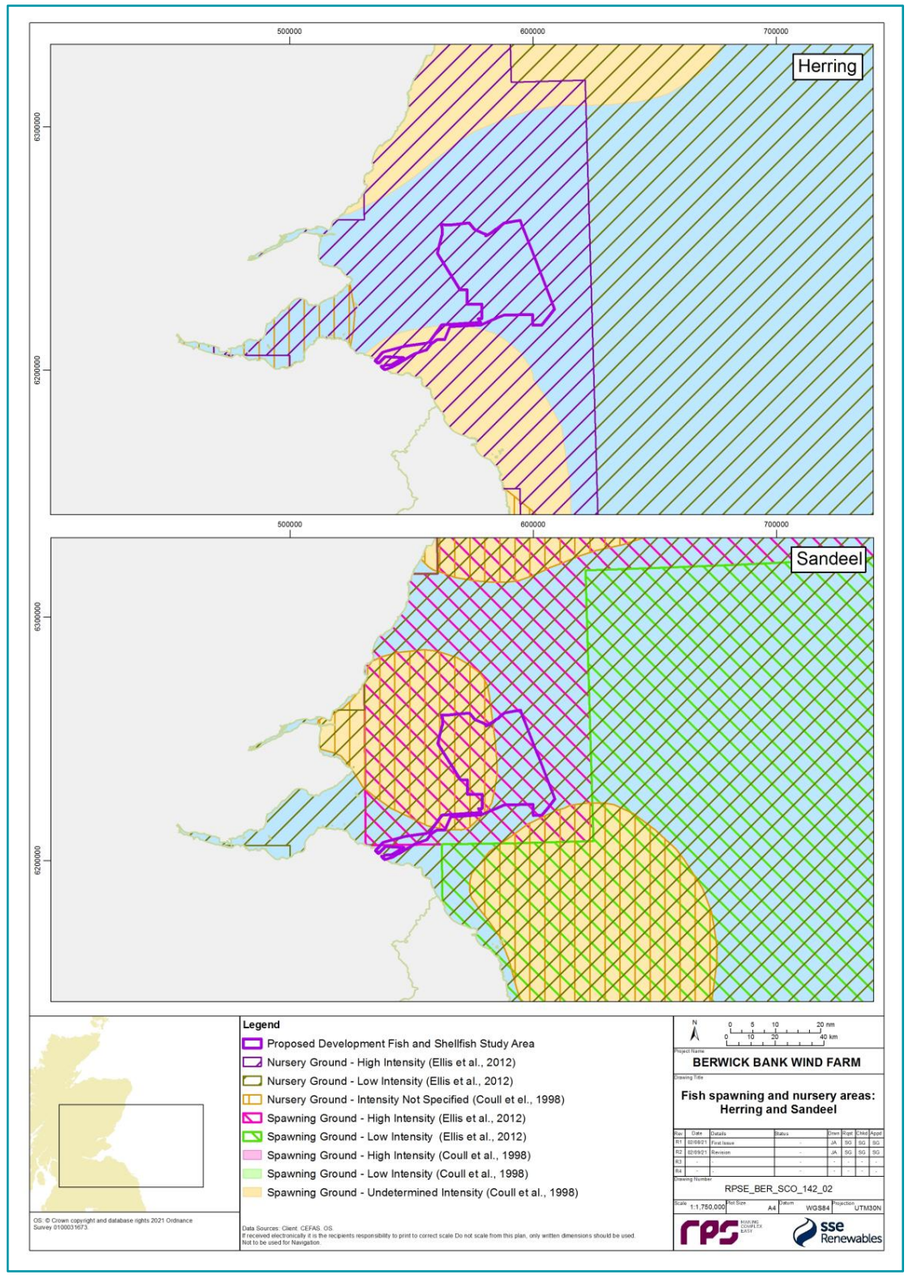

Figure 6.5: Herring and Sandeel Spawning and Nursery Grounds that Overlap with the Proposed Development

6.2.4. POTENTIAL PROPOSED DEVELOPMENT IMPACTS

148. A range of potential impacts on fish and shellfish ecology have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Proposed Development in the absence of designed in measures:

- Construction
  - Temporary habitat loss and disturbance;
  - Underwater noise impacting fish and shellfish receptors;
  - Increased suspended sediment concentrations and associated sediment deposition; and
  - Accidental release of pollutants.
- Operation and Maintenance
  - Long-term habitat loss;
  - Temporary habitat loss;
  - Electromagnetic Fields (EMF) from subsea electrical cabling;
  - Accidental release of pollutants;
  - Underwater noise from wind turbine operation and vessels; and
  - Colonisation of hard structures.
- Decommissioning
  - Temporary habitat loss and disturbance;
  - Underwater noise impacting fish and shellfish receptors;
  - Increased suspended sediment concentrations and associated sediment deposition; and
  - Accidental release of pollutants.

6.2.5. DESIGNED IN MEASURES

149. Designed in measures, and how these can reduce potential for impact have been considered in identification of impacts that have been scoped into the Proposed Development assessment (Table 6.5) and scoped out (Table 6.6) from further assessment. Measures adopted as part of the Proposed Development will follow good practice and may include:

- implementation of piling soft-start and ramp-up measures;
- development of, and adherence to, an appropriate CoCP;
- development of, and adherence to, an Environmental Management Plan, including Marine Pollution Contingency Plans; and
- development of, and adherence to, a Decommissioning Plan.

150. The requirement for additional mitigation measures will be dependent on the significance of the effects on fish and shellfish ecology and will be consulted upon with statutory consultees throughout the EIA process and Road Map process – in particular potential mitigation required for marine fish such as herring (as a species particularly sensitivity to underwater noise). Likewise, potential for monitoring will be discussed via the Benthic, Fish and Shellfish, and Physical Processes Road Map.

6.2.6. POTENTIAL IMPACTS AFTER THE IMPLEMENTATION OF DESIGNED IN MEASURES

151. The impacts that have been scoped into the Proposed Development assessment are outlined in Table 6.5 together with a description of any additional data collection (e.g. site-specific surveys) and/or supporting analyses (e.g. modelling) that will be required to enable a full assessment of the impacts.

152. At this stage, a number of impacts are proposed to be scoped out of the assessment for fish and shellfish, described in Table 6.6.

Table 6.5: Impacts Proposed to be Scoped In to the Proposed Development Assessment for Fish (Marine Fish and Diadromous Fish) and Shellfish. Project Phase Refers to Construction (C), Operation and Maintenance (O) and Decommissioning (D) Phase of the Proposed Development

Impact	Project Phase			Justification (including consideration of designed in measures)	Data Collection and Analysis Required to Characterise the Baseline Environment for the EIA	Summary of Proposed Approach to Assessment
	C	O	D			
Temporary habitat loss and disturbance	✓	✓	✓	There is potential for temporary, direct habitat loss and disturbance during construction due to cable laying operations (including anchor placements), spud-can leg impacts from jack-up operations and seabed preparation works; operational and maintenance phase as a result of maintenance operations (e.g. cable repair/reburial, use of jack-up vessels to facilitate wind turbine component repairs etc.); and decommissioning activities. The impacts associated with operational and maintenance phase are likely to be similar in nature to those associated with the construction phase although of reduced magnitude.	The epibenthic beam trawl survey, undertaken to characterise the benthic subtidal baseline, will be used to enhance the existing data for fish and shellfish. There is also wide-ranging and comprehensive desktop information and data sources available to characterise the fish and shellfish baseline.	No specific modelling is required to inform this impact, and impacts will be assessed quantitatively wherever possible. In particular for habitat loss effects, this will largely focus on the footprint of the impacts on the seabed from all activities during pre-construction, construction and operation and maintenance phases. This will be based on information derived from the Project Design Envelope (PDE). Impacts during the decommissioning phase are anticipated to be less than or equal to the construction phase.
Underwater noise impacting fish and shellfish receptors	✓		✓	There is potential for mortality, injury and/or disturbance to sensitive fish and shellfish species as a result of construction activities such as pile-driving and vessel noise and similar and decommissioning activities. Designed in measures such as piling soft-start and ramp-up measures will be implemented to reduce the potential impact arising from this impact pathway.		Modelling undertaken for section 5.2 will be used to inform the assessment of underwater noise impacts to fish and shellfish. This will include consideration of the potential for disturbance to migration of diadromous fish species, with a particular focus on potential barriers to migration. In particular, the hearing ability of fish species will be considered, and both sound pressure and particle motion will be considered. Impacts during the decommissioning phase are anticipated to be less than or equal to the construction phase.
Increased suspended sediment concentrations and associated sediment deposition	✓		✓	There is potential for an increase in suspended sediments and associated deposition during construction activities such as cable installation and seabed preparation. Adherence to an appropriate CoCP will reduce the potential impact arising from this impact pathway.		The outputs of numerical modelling undertaken for the physical processes assessment (section 5.1) will inform this impact assessment. This will include consideration of the potential for disturbance to migration of diadromous fish species, with a particular focus on potential barriers to migration and will consider differing sensitivities of the identified receptors to this impact. The impact on spawning grounds will also be considered. Impacts during the decommissioning phase are anticipated to be less than or equal to the construction phase.
Long-term habitat loss		✓		The presence of wind turbines and scour/cable protection will result in the loss of habitat.		No modelling is required for this impact. Impacts will be assessed quantitatively wherever possible. In particular for habitat loss effects, this will largely focus on the footprint of the impacts on the seabed from all activities during pre-construction, construction and operation and maintenance phases.
Electromagnetic Fields (EMF) from subsea electrical cabling		✓		EMF generated through the subsea electrical cabling may affect fish and shellfish prey/predator relationship by inhibiting/interfering with fish and shellfish behaviours due to changes in background EMFs.		No modelling is required for this impact. This will include consideration of the potential for disturbance or disruption to migration of diadromous fish species.
Colonisation of hard structures		✓		Artificial structures placed on the seabed (i.e. foundations and scour/cable protection) in the offshore environment are expected to		No specific modelling is required to inform this impact assessment.

Impact	Project Phase			Justification (including consideration of designed in measures)	Data Collection and Analysis Required to Characterise the Baseline Environment for the EIA	Summary of Proposed Approach to Assessment
	C	O	D			
				be colonised by a range of marine organisms leading to localised increases in biodiversity and potential changes in prey-predator interactions. These structures may also facilitate the spread of marine invasive non-native species. Designed-in measures including an INNS Management Plan, which will include measures to ensure that the risk of potential introduction and spread of INNS are minimised.		

Table 6.6: Impacts Proposed to be Scoped Out of the Proposed Development Assessment for Fish and Shellfish

Impact	Designed in Measures	Justification
		Construction
Accidental release of pollutants	• development of, and adherence to, an appropriate CoCP; • development of, and adherence to, an Environmental Management Plan, including Marine Pollution Contingency Plans; and •	There is a risk of pollution being accidentally released during the construction phases from sources including vessels/vehicles and equipment/machinery. However, the risk of such events is managed by the implementation of measures set out in standard post consent plans, e.g. Environmental Management Plans, including Marine Pollution Contingency Plans. These plans include planning for accidental spills, address all potential contaminant releases and include key emergency contact details. It will also set out industry good practice and OSPAR, International Maritime Organisation (IMO), MARPOL (International Convention for the Prevention of Pollution from Ships) guidelines for preventing pollution at sea. Therefore, the likelihood of an accidental spill occurring is very low and in the unlikely event that such events occur, the magnitude of these will be minimised through measures such as marine pollution contingency planning. On this basis, and subject to consultation with the SNCBs and feedback received on this Offshore EIA Scoping Report, it is proposed to scope this impact out of further consideration within the EIA for fish and shellfish.
		Operation and Maintenance
Accidental release of pollutants	• development of, and adherence to, an Environmental Management Plan, including Marine Pollution Contingency Plans; and •	As above for construction phase.
Underwater noise from wind turbine operation	N/A	Noise generated by operational wind turbines is of a very low frequency and low sound pressure level (Andersson *et al.,* 2011). Studies have found that sound levels are only high enough to possibly cause a behavioural reaction within metres from a wind turbine (Sigray and Andersson, 2011, and therefore such levels are not considered to have potentially effects on fish and shellfish receptors.
Underwater noise from vessels	N/A	Operational underwater noise generated from vessels is likely to be low and effects would only occur if fish species remained within immediate vicinity of the vessel (i.e. within metres) for a number of hours which is highly unlikely.
		Decommissioning
Accidental release of pollutants	• development of, and adherence to, an Environmental Management Plan, including Marine Pollution Contingency Plans; and • development of, and adherence to, a Decommissioning Plan	As above for the construction phase.

6.2.7. PROPOSED APPROACH TO THE ENVIRONMENTAL IMPACT ASSESSMENT

153. The fish and shellfish EIA will follow the methodology set out in section 4. Specific to the fish and shellfish EIA, the following guidance documents will also be considered:

- Guidelines for EcIA in the UK and Ireland. Terrestrial, Freshwater, Coastal and Marine (CIEEM, 2019);
- Consenting, EIA and HRA Guidance for Marine Renewable Energy Developments in Scotland (European Marine Energy Centre (EMEC) and Xodus, 2010) and
- Guidance on Environmental Considerations for Offshore Wind Farm Development (OSPAR, 2008).

154. In addition, and specific to marine ecology topics, IEFs will be identified, in accordance with CIEEM (2019) guidelines, and assessments will be presented for appropriate ecological receptor groups in the baseline characterisation of each relevant technical section. Criteria defining the value of each IEF will be defined to reflect topic-specific interests, with reference to the CIEEM (2019) guidelines and will include specific consideration of Priority Marine Features (PMFs) within the fish and shellfish ecology study area.

155. Additionally, a staged Marine Protected Area (MPA) assessment will be undertaken to assess the potential for the activities associated with the construction, operation and maintenance and decommissioning of the Proposed Development to hinder site conservation objectives. This MPA assessment will consider Marine Protected Areas with fish and shellfish features within or near the Proposed Development based on the outputs of a Stage 1 Screening Exercise, including the Firth of Forth Banks Complex Nature Conservation MPA (ncMPA) with regard to ocean quahog *Arctica islandica.*

156. SSER will include diadromous fish in the fish and shellfish ecology impact assessment, and a separate section covering sensitivity of and implications of the impact on diadromous fish in each impact assessment. The approach and focus of these impact assessments will be discussed with stakeholders through the Benthic Ecology, Fish and Shellfish and Physical Processes Road Map process.

157. The importance of fish species (such as herring, sandeels and sprat) as key prey species will be assessed in the relevant sections (section 6.4: Ornithology, section 6.3: Marine Mammals). These will be informed by the fish and shellfish ecology EIA section which will provide clear outputs over which to inform these assessments.

158. Habitat suitability for sandeels and herring will be assessed using data collected as part of the benthic ecology survey in line with industry good practice guidelines with discussion with stakeholders via the Road Map process.

159. A Fish and Shellfish Ecology Technical Report will present a detailed baseline characterisation for the Proposed Development using specific survey data and the most recent desktop data. This report will inform the Fish and Shellfish Ecology ES section.

Potential Cumulative Effects

160. The majority of predicted effects of construction, operation and maintenance, and decommissioning from the Proposed Development on fish and shellfish ecology are considered to be localised to within the footprint of the project. The key cumulative effect is likely to result from increased underwater noise during pile driving. The cumulative effects assessment will follow the approach outlined in section 4.3.7.

Potential Transboundary Impacts

161. A screening of transboundary impacts has been carried out and is presented in Appendix 3. The potential for transboundary effects has been identified for fish and shellfish ecology receptors and will be considered within the EIAR.

6.2.8. SCOPING QUESTIONS TO CONSULTEES

- Do you agree with the study areas defined for fish and shellfish ecology?
- Do you agree that the existing desktop data on fish and shellfish resources in the fish and shellfish study area is sufficient to characterise the fish and shellfish baseline?
- Do you agree with the sites screened into the MPA Assessment (as presented in Appendix 17)?
- Do you agree with the sites screened into the MPA Assessment (as presented in Appendix 17)?
- Do you agree that all potential impacts (Table 6.5) have been identified for fish and shellfish ecology?
- Do you agree that the impacts described in Table 6.6 can be scoped out of the fish and shellfish ecology Offshore EIAR section?

6.2.9. NEXT STEPS

162. The following topic specific next steps as summarised below and will be undertaken through the Benthic Ecology, Fish and Shellfish and Physical Processes Road Map process:

- define the baseline environment and assessment approach:
  - discuss availability of datasets with District fisheries boards; and
  - present evidence base (including site-specific subtidal and intertidal surveys), baseline characterisation (including key marine fish, diadromous fish species, habitats and coastal processes) to stakeholders and agree on impacts and receptors to be scoped in/out of EIA Report.
- assessment of fish and shellfish ecology potential impacts through the EIA Report process:
  - present Maximum Design Scenarios and impact assessment approach including sensitivity of receptors, method of quantifying impacts to stakeholders; and
  - discuss initial findings of impact assessment, appropriate mitigation and monitoring with stakeholders.

163. Any impacts that cannot be quantitatively assessed will be discussed with key stakeholders as part of the Benthic Ecology, Fish and Shellfish and Physical Processes Road Map process.

164. Any potential need for strategic monitoring will be detailed in Fish and Shellfish Ecology section of the Offshore EIAR and will be discussed further with stakeholders through the Benthic Ecology, Fish and Shellfish and Physical Processes Road Map process.

6.3. MARINE MAMMALS

6.3.1. INTRODUCTION

165. This section of the Offshore EIA Scoping Report identifies the marine mammals of relevance to the Proposed Development and considers the potential impacts from the construction, operation and maintenance, and decommissioning of the offshore and intertidal components (seaward of the mean high water spring (MHWS) mark) of the Proposed Development on marine mammals.

166. Marine mammals were reported on in the initial Scoping Report. Although the change in project scope applied to this Scoping Report, which is combining the offshore Proposed Development Array Areas, the impacts are anticipated to generally be the same as identified in the initial Scoping Report. The SOR requested additional impacts were scoped in, such as injury and disturbance from underwater noise generated during clearance of unexploded ordnance (UXO) and disturbance to marine mammals from pre-construction surveys. The initial Berwick Bank Wind Farm Proposal Scoping Opinion response has been considered for the development of this section.

6.3.2. STUDY AREA

167. The marine mammal study area proposed for the purpose of the offshore EIA varies depending on the species, considering individual species ecology and behaviour. The marine mammal study area has been defined at two spatial scales:

- Proposed Development marine mammal study area: this includes the area covered by 2019 to 2021 site-specific marine mammal surveys which have been carried out for the Proposed Development. These will provide an indication of the marine mammals present across potential impact footprints (i.e. potential Zones of Influence (ZoI) associated with the Proposed Development). The area broadly encompasses the Proposed Development and export cable route plus a 16 km buffer. The Proposed Development marine mammal study area is shown in Figure 6.6; and
- Regional marine mammal study areas: marine mammals are highly mobile and may range over large distances and therefore to provide a wider geographic context, the desk top review will also consider the marine mammal ecology, distribution and density/abundance at the appropriate scales for each key species. In accordance with advice received during consultation (Initial Berwick Bank Wind Farm Proposal Offshore EIA Scoping Opinion, 2020), the Regional Marine Mammal Study Areas will be informed by species Management Unit (MU): cetacean MUs are defined by the Inter Agency Marine Mammal Working Group (IAMMWG, 2015) and seal MUs are provided by the Special Committee on Seals (SCOS, 2021). MUs will provide the baseline reference populations, inform the consideration of designated sites for marine mammals and help to identify cumulative projects. However, the site-specific (arial survey) data (as above) will define marine mammal presence in the study area. Where MUs for a given species extend over a very large scale (e.g., minke whale and white-beaked dolphin over the Celtic and Greater North Sea MU) the assessment will focus in on the appropriate SCANS-III Block (Block R) which overlaps the Proposed Development.

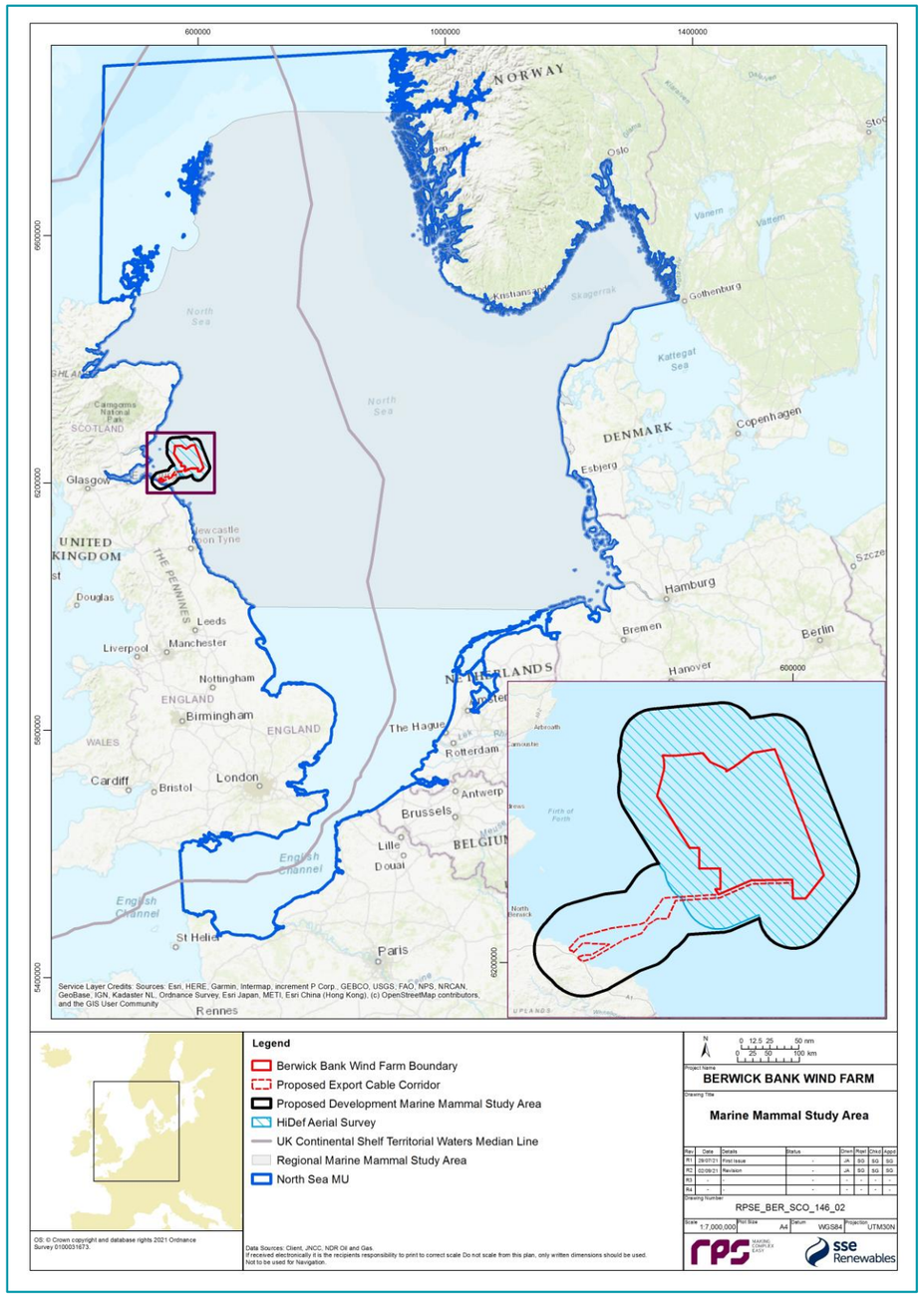

Figure 6.6: Marine Mammal Study Area

6.3.3. BASELINE ENVIRONMENT

168. This section provides a concise summary of the marine mammal baseline environment of the Proposed Development, reference should be made to Appendix 9 where a detailed description is provided. An initial desk-based review of literature and data sources to support this Offshore EIA Scoping Report has identified a number of baseline datasets. These are summarised in Appendix 9. SSER is cognisant that Scottish Ministers have advised that all data sources, references of note and resources identified in the representation from NatureScot (NS) and the Marine Scotland Science (MSS) November Advice must be fully considered by the Developer (Initial Berwick Bank Wind Farm Proposal Offshore EIA Scoping Opinion, 2020). SSER will ensure all such information sources are considered.

169. Site-specific surveys for the Proposed Development have been carried out (2019 – 2021). These, along with surveys undertaken in the former Forth of Forth Zone in relation to Seagreen Phase 1 have informed the baseline environment characterisation outlined below.

Harbour porpoise

170. The most recent assessment of harbour porpoise *Phocoena phocoena* in UK waters concluded that the overall trend in Conservation Status was Unknown, highlighting that there was insufficient data to establish a trend for the population size nor potential future prospects for the population (JNCC, 2019b). The Proposed Development is located within the North Sea MU for harbour porpoise (IAMMWG, 2015), which is estimated to have an abundance of 346,601 porpoise (CV: 0.09, 95% CI: 289,498 – 419,96) (IAMMWG, 2021) based on estimates from the Small Cetaceans in the European Atlantic and North Seas (SCANS) III survey (Hammond *et al.,* 2017; Hammond *et al.,* 2021).

171. Hague (et al, 2020) present information on regional baselines for marine mammals across the North Sea and Atlantic areas of Scottish waters. The most recent broad scale data on harbour porpoise is reported to be that available from the SCANS III survey (Hammond *et al.,*2017) and the series of SCANS surveys between 1994 and 2016, although these only reflect summer distribution. These data suggest densities range of harbour porpoise from 0.058 porpoise/km^2 in Block J (western Outer Hebrides) to 0.599 porpoise/km^2 in Block R (east coast) (Hammond *et al.,* 2017 cited in Hague *et al.,* 2020).

172. Analyses of the count data from the site-specific (aerial) surveys indicate harbour porpoise densities in the study area are higher in the spring and summer months, with lower values in late autumn and winter (see Appendix 9). The overall mean relative density of harbour porpoise (estimated from data pooled across all transects and all months, with bootstrapping (1,000 simulations) was 0.10 animals per km^2 (lower 95% CL: 0.026; upper 95% CL: 0.198). A relative high coefficient of variation (CV = 1.91) was calculated for mean monthly density, with high variance most likely to be a result of the large densities seen in May 2019 and April 2020. Once corrected for availability bias[6] (see Appendix 9 for full analysis) the mean corrected density estimate (from the bootstrapped average) across all monthly surveys for the aerial survey area was estimated as 0.24 animals per km^2 (lower 95% CL: 0.063; upper 95% CL: 0.472).

173. Given the sightings recorded during the site-specific aerial surveys, and from previous surveys in the Firth of Forth Round 3 Zone, harbour porpoise is therefore considered likely to occur year-round within the Proposed Development marine mammal study area and wider potential ZoIs.

Minke whale

174. The most recent assessment of minke whale *Balaenoptera acutorostrata* in UK waters concluded that the overall trend in Conservation Status was Unknown, highlighting that there was insufficient data to establish a trend for the population size nor potential future prospects for the population (JNCC, 2019f). All minke whales in UK waters are considered to be part of the Celtic and Greater North Seas MU (IAMMWG, 2021), which is estimated to have an abundance of 20,118 whales (CV: 0.18, 95% CI: 14,061 – 28,786) based on estimates from the SCANS III survey (Hammond *et al.,* 2017; Hammond *et al.,* 2021) and the ObSERVE survey (Rogan *et al.,* 2018).

175. During the site-specific surveys, minke whale was sighted in low numbers during the summer months only. Mean relative density and CV were therefore estimated from data collected during the months of May to August inclusive from the averaged densities in these months only. An overall mean of 0.004 animals per km^2 (CV= 1.01) was calculated.

176. A visual tracking study of minke whale in Iceland recorded the time sequence of individual minke whales in terms of the duration when they were on the surface in between both short and long dive sequences (McGarry *et al.,* 2017). Surfacing time was estimated as 58 s whilst dive duration was a mean of 73 s. Therefore, based on these data, availability bias would be approximately 0.44 and consequently absolute density can be approximated as 0.009 animals per km^2.

177. For minke whale, the density estimates reported in Hague (*et al.,* 2020) are sourced from SCANS II (Hammond *et al.,* 2013) and CODA[7] (Macleod *et al.* ,2009), with the most recent broad scale data available cited (in terms of broad scale data) as that available from the SCANS III survey. With reference to these data (Hammond and Lacey (Appendix 3: SCANS surveys), density estimates in Scottish waters range from 0.008 to 0.039 minke whales/km^2. Block R (the east coast) along with two other Blocks[8] was associated with the highest estimated densities. At sites (NE4 and NE5) within the Moray Firth, densities of >0.04 whale per km^2 are predicted. Surface density estimates for North and East regions are noted to be particularly high (Hague *et al.,* 2020).

178. Given the sightings recorded during the site-specific aerial surveys, and from previous surveys in the Firth of Forth Round 3 Zone, minke whales are considered likely to occur regularly in the summer months within the Proposed Development marine mammal study area and wider potential ZoIs.

White-beaked dolphin

179. The most recent assessment of white-beaked dolphins *Lagenorhynchus albirostris* in UK waters concluded that the overall trend in Conservation Status was Unknown, highlighting that there was insufficient data to establish a trend for the population size nor potential future prospects for the population (JNCC, 2019e).The relevant MU for white-beaked dolphins is the Celtic and Greater North Seas MU (IAMMWG, 2021), which has an estimated population size of 43,951 dolphins (CV: 0.22, 95% CI: 28,439 – 67,924) based on estimates from the SCANS III survey (Hammond *et al.,* 2017; Hammond *et al.,* 2021) and the ObSERVE survey (Rogan *et al.,* 2018).

180. During the site-specific surveys, white-beaked dolphin was sighted in low numbers during the summer months only. Mean relative density and CV were therefore estimated from data collected during the months of June to September inclusive from the averaged densities in these months only. An overall mean of 0.004 animals per km^2 (CV= 0.79) was calculated.

181. There is limited information on diving and surfacing times of white-beaked dolphin and consequently many studies report relative density estimates only (see Paxton *et al.,* 2016). A bio-logging study of two individual free-ranging white-beaked dolphins in Iceland found that, on average, animals spent 18% of time close to the surface (0 to 2 m depth) and 82% of the time diving (Rasmussen *et al.,* 2013). Therefore, based on these data, availability bias would be 0.18 and consequently absolute density can be approximated as 0.022 animals per km^2. Given the sightings recorded during the site-specific aerial surveys, and from previous surveys in the Firth of Forth Round 3 Zone, white-beaked dolphins are therefore considered likely

[6] The analysis applied the most conservative estimate of availability (based on winter months) of 42.5% and an estimated calculated using mean values (42.4%) (Teilman *et al.,* 2013). Both estimates resulted in a corrected mean density estimate of 0.24 animals per km^2

[7] Cetacean Offshore Distribution and Abundance in the European Atlantic (CODA) (Hammond *et al.,*2009)

[8] Block G (Northern Ireland and southern Inner Hebrides) and T (Shetland)

to occur regularly (mostly likely in the summer months) within the Proposed Development marine mammal study area and wider potential ZoIs.

Bottlenose dolphin

182. The most recent assessment of bottlenose dolphins *Tursiops truncatus* in UK waters concluded that the overall trend in Conservation Status was Unknown, highlighting that although the population size appears to be stable, there were too few datapoints to confidently conclude on the current and future population trends (JNCC, 2019a).

183. The Moray Firth population of bottlenose dolphins is the only known remaining resident population in the North Sea and it was for this reason that the Moray Firth Special Area of Conservation (SAC) was established in order to protect this population. The current population estimate of bottlenose dolphin abundance for the Coastal East Scotland MU population is 189 dolphins (95% CI: 155 – 216) (IAMMWG, 2021), based on capture-mark-recapture photo-ID and calculated using a Bayesian model with 95% Highest Posterior Credible Interval for 2015 (Cheney *et al.,* 2018).

184. In Hague *et al.* (2020) uniform densities estimates (based on SCANS III blocks) in Scottish waters ranged from 0.000 to 0.121 bottlenose dolphins per km$^{2.}$

185. Due to the low number of sightings of bottlenose dolphin during the site-specific surveys, it was necessary to explore published density estimates, including previous site-specific data from Seagreen Alpha/Bravo or other Firth of Forth and Firth of Tay offshore wind farms (Neart na Gaoithe and Inch Cape) to inform the marine mammal baseline characterisation.

186. Given the presence of bottlenose dolphins within coastal waters in east Scotland, they are considered likely to occur regularly within the Proposed Development marine mammal study area and wider potential ZoIs.

Harbour seal

187. In the UK, harbour seals *Phoca vitulina* have been assessed as having an Unfavourable – Inadequate conservation status (JNCC, 2019d). The assessment concluded Unfavourable – Inadequate for population size as the short-term trend is unknown and the current population size is below the Favourable Reference Range. In addition, the future prospects were assessed as Unfavourable – Inadequate because the future prospects of the population are poor.

188. The Proposed Development is located within the East Scotland Seal MU and adjacent to the North East England MU. The most recent harbour seal August moult count presented for this East Scotland MU is 343 (2016-2019 count period) (SCOS, 2021), which can be scaled by the estimated proportion hauled-out (0.72, 95% CI: 0.54-0.88) (Lonergan *et al.,* 2013) to provide an estimate of 476 harbour seals in the East Scotland MU in 2019 (95% CI: 390 - 635). The most recent (as reported in SCOS, 2020) August counts of harbour seals at haul-out sites in the Northeast England MU (Unit 8) reported for 2016- 2019 was 79. There recent count data at the Firth of Tay and Eden Estuary SAC shows no evidence that the population is recovering after the decline in the 2000s, and the 2019 SAC count is ~95% lower than the 1992 count (SCOS, 2021).

189. Due to the low number of sightings of harbour seal during the site-specific surveys, it was necessary to explore published density estimates, including previous site-specific data from Seagreen Alpha/Bravo or other Firth of Forth and Firth of Tay Offshore wind farms (Neart na Gaoithe and Inch Cape) to inform the marine mammal baseline characterisation.

190. Given the sightings recorded during the site-specific aerial surveys, from previous surveys in the Firth of Forth Round 3 Zone (Grellier and Lacey, 2012; Sparling, 2012), and from the seal telemetry and habitat preference maps (Carter *et al.,* 2020), harbour seals are considered likely to occur year-round (primarily in coastal waters) within the Proposed Development marine mammal study area and wider potential ZoIs.

Grey seal

191. The most recent assessment of grey seals *Halichoerus grypus* in UK waters concluded that the overall trend in Conservation Status was Favourable, with an overall trend in Conservation Status assessed as Improving (JNCC, 2019c).

192. The most recent UK wide grey seal pup production count was in 2016 and 2018, which resulted in a modelled UK adult population size in 2019 of 149,700 grey seals (95% CI 120,000 – 174,900) (SCOS, 2021). Pup production in the North Sea region (which includes the Firth of Forth breeding colonies) increased rapidly between 2010 to 2016 (annual increase of 11.5% per annum), however the rate of increase has been slowing in more recent years (annual increase of 7.5% per annum between 2014 and 2018) (SCOS, 2021).

193. The Proposed Development is located within the East Scotland Seal MU where the most recent August count was 3,683 (between 2016-2019) (SCOS, 2021). This count can be scaled by the estimated proportion hauled-out (0.239, 95% CI: 0.192 – 0.286) (Russell *et al.,* 2016) to produce an estimate of 15,410 grey seals in the MU (95% CI: 12,878 – 19,182). The Proposed Development is adjacent to the North-East England MU and the East Coast Scotland MU (SCOS, 2021).

194. Relative densities of grey seal (henceforth these include 'seal species') across the aerial survey area were, on average, very low for all seasons. Relative densities of grey seal peaked in May 2019 with a mean of 0.14 animals per km^2 (lower 95% CL:0.073; upper 95% CL: 0.239). For all months (apart from May 2019) there was a very low sightings rate of grey seal including 'seal species', with less than 20 individuals recorded across all transects. As a result, the overall mean relative density of grey seal estimated from data pooled across all transects and all months was very low, with an average of 0.03 animals per km^2 (lower 95% CL: 0.013; upper 95% CL: 0.044). Variance was high (CV = 1.402), most likely due to the high peak in sightings in May 2019.

195. Given the sightings recorded during the site-specific aerial surveys, from previous surveys in the Firth of Forth Round 3 Zone (Grellier and Lacey, 2012; Sparling, 2012), and from the seal telemetry and habitat preference maps (Carter *et al.,* 2020), grey seals are considered likely to occur year round within the Proposed Development marine mammal study area and wider potential ZoIs.

Distribution of sightings

196. Sightings of marine mammals were spatially distributed throughout the aerial survey area. Figure 6.7 to Figure 6.10 show the distribution of the sightings overlaid on the transects flown each month (i.e., highlighting where there were missed transects and therefore no sightings data).

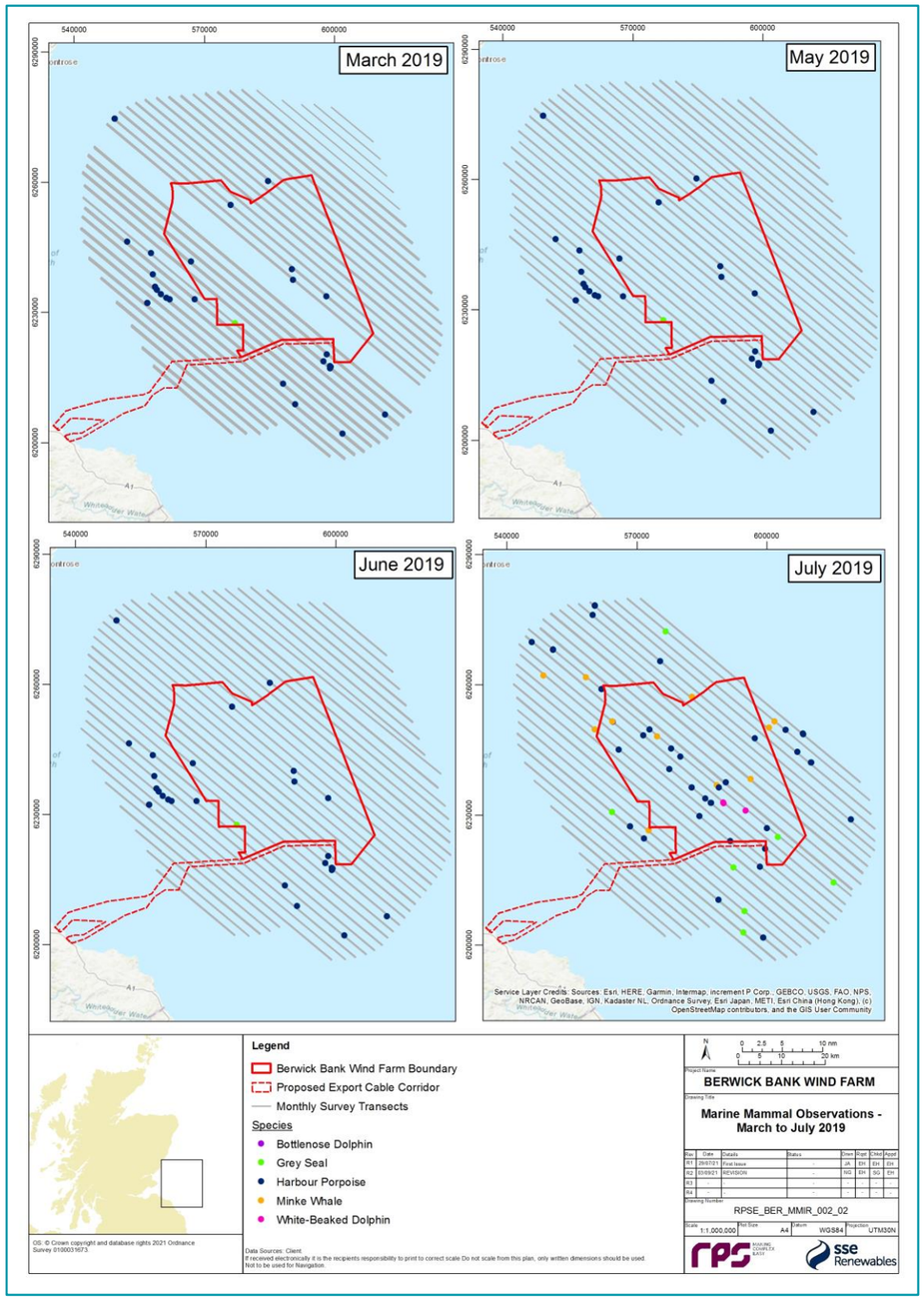

Figure 6.7: Distribution of Sightings of Marine Mammals in the Aerial Survey Area Overlaid on Transects Flown each Month: March, May, June and July 2019

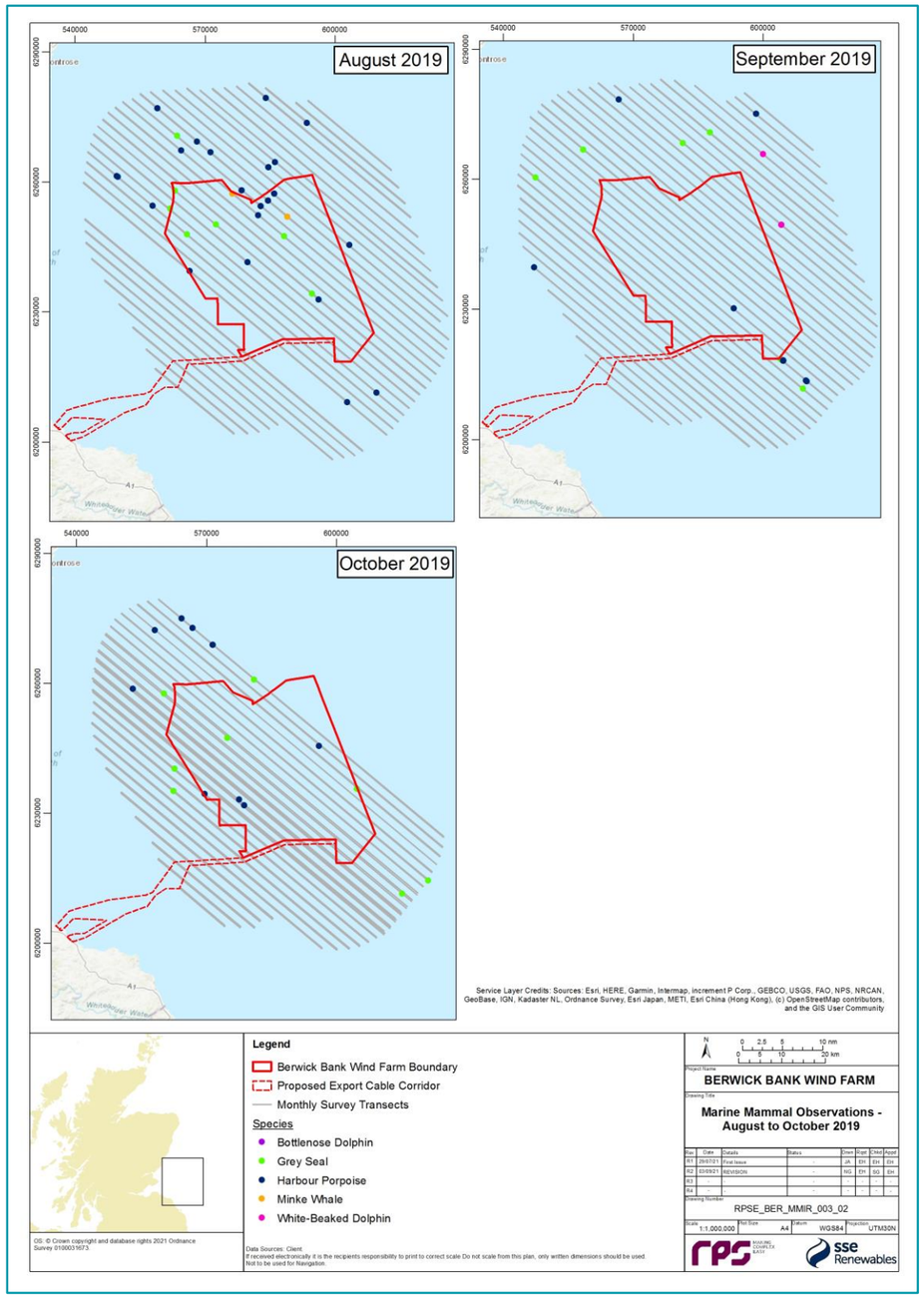

Figure 6.8: Distribution of Sightings of Marine Mammals in the Aerial Survey Area Overlaid on Transects Flown Each Month: August, September and October 2019

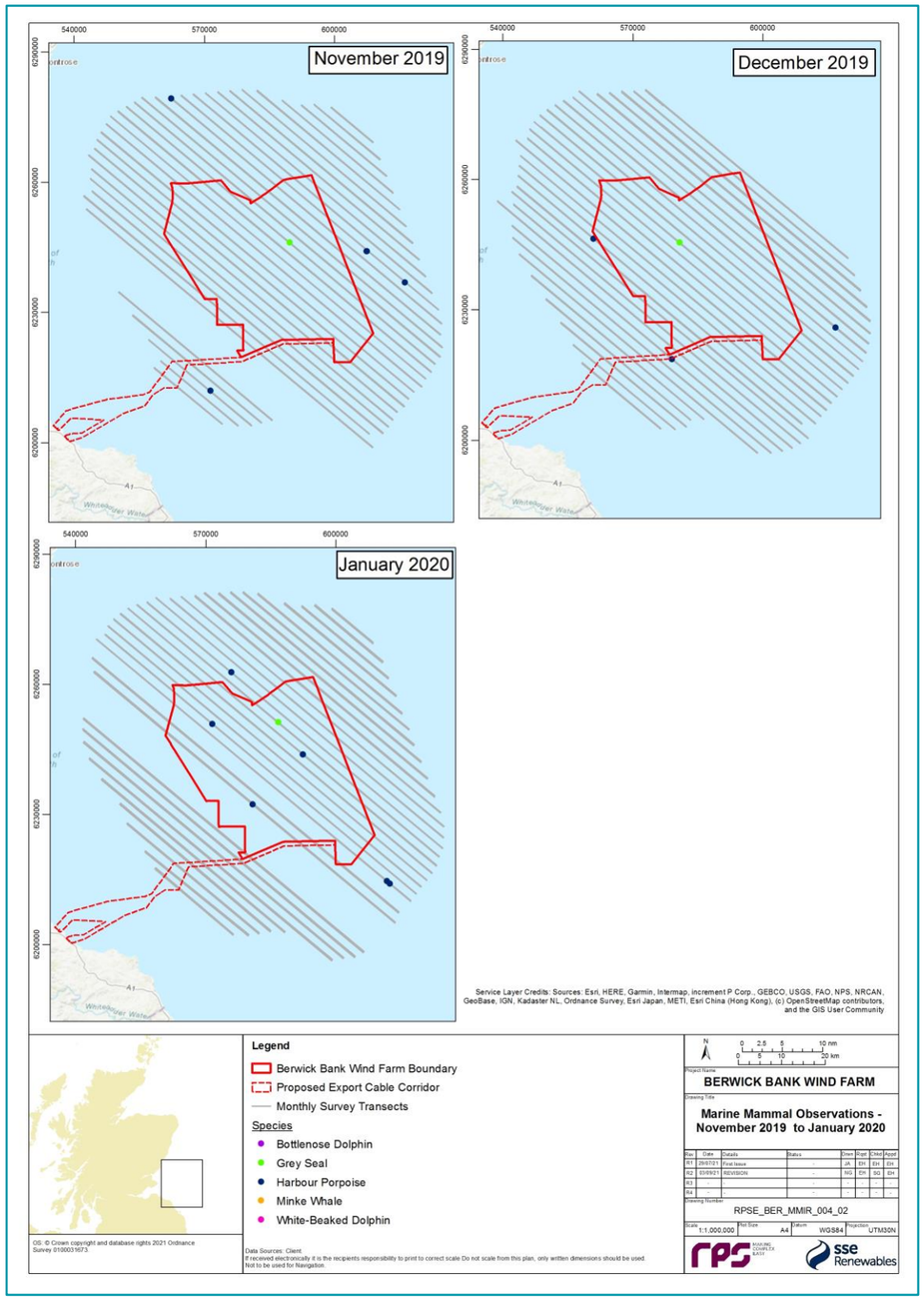

Figure 6.9: Distribution of Sightings of Marine Mammals in the Aerial Survey Area Overlaid on Transects Flown Each Month: November 2019, December 2019 and January 2020

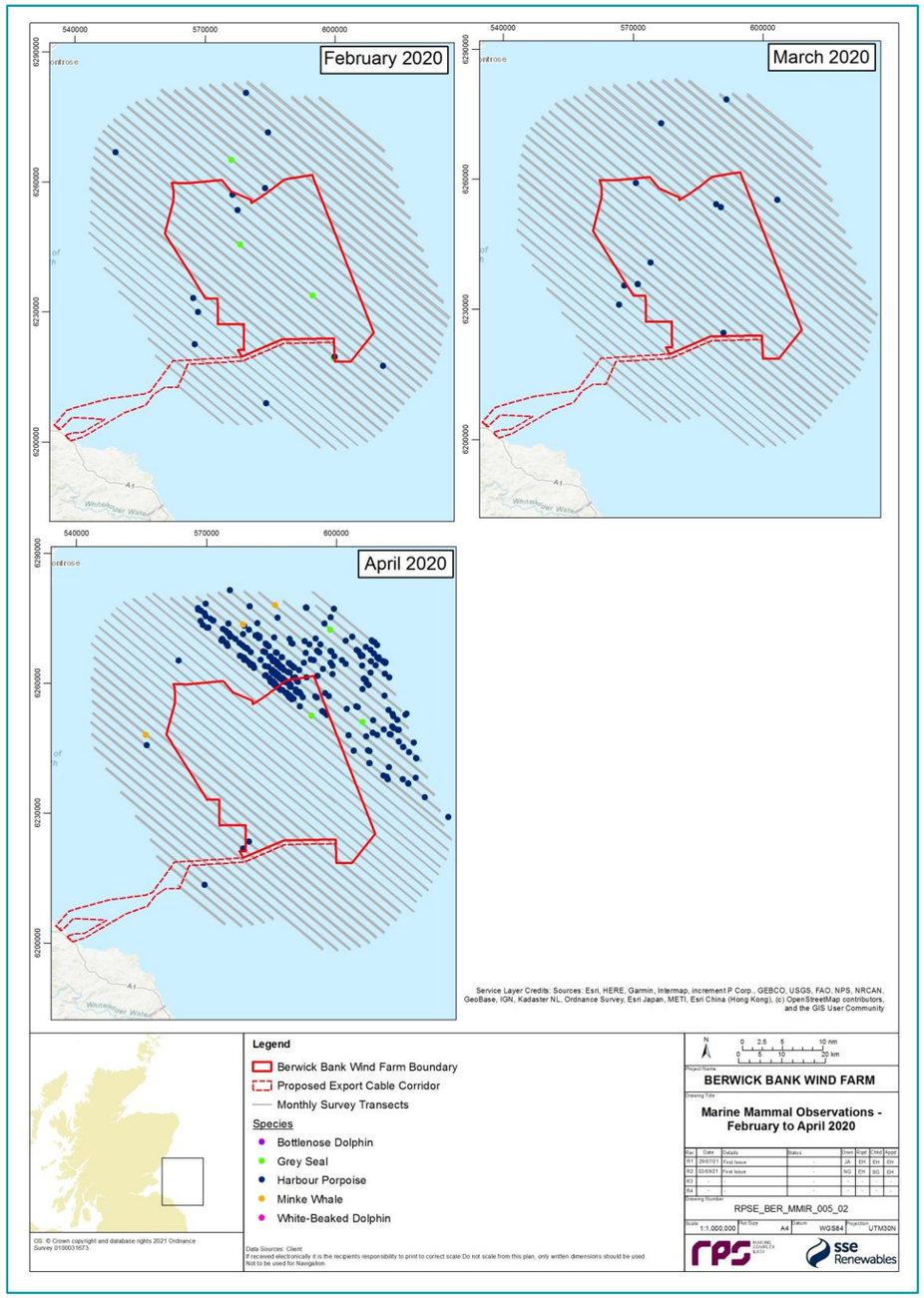

Figure 6.10: Distribution of Sightings of Marine Mammals in the Aerial Survey Area Overlaid on Transects Flown Each Month: February, March and April 2020

Designated Sites

197. The potential for LSE on European sites designated for marine mammals has been considered as part of the HRA for the Proposed Development. 24 European sites were considered at Stage one of the HRA process (screening) for relevant Annex II marine mammals likely to occur in the vicinity of the Proposed Development, as follows:

- 19 European sites for harbour porpoise;
- a single European site for bottlenose dolphin;
- two European sites for grey seal; and
- a single European site for harbour seal.

198. The five European sites (relevant features and pathways) for which potential LSEs could not be discounted at the conclusion of the HRA screening exercise are set out in Table 6.7. These sites will be considered further at the second state of the HRA process.

Table 6.7: Summary of European Sites and Relevant Qualifying Features for Which Potential LSEs Have Been Identified and Screened in for Further Assessment

European Site	Relevant Qualifying Interest Feature(s)[a]	Project Phase	Impact
Berwickshire and North Northumberland Coast SAC	Grey seal (*Halichoerus grypus*)	Construction/ decommissioning	Underwater noise from piling
			Underwater noise from vessels
			Vessel collision risk
			Changes in prey availability
			Accidental pollution
		Operation and maintenance	Underwater noise from vessels
			Vessel collision risk
			Accidental pollution
Isle of May SAC	Grey seal (*Halichoerus grypus*)	Construction / decommissioning	Underwater noise from piling
			Underwater noise from vessels
			Vessel collision risk
			Changes in prey availability
			Accidental pollution
		Operation and maintenance	Underwater noise from vessels
			Vessel collision risk
			Accidental pollution
Firth of Tay and Eden Estuary SAC	Harbour seal (*Phoca vitulina*)	Construction / decommissioning	Underwater noise from piling
			Underwater noise from vessels
			Vessel collision risk
			Accidental pollution
		Operation and maintenance	Underwater noise from vessels
			Vessel collision risk
			Accidental pollution
Southern North Sea SAC	Harbour porpoise (*Phocoena phocoena*)	Construction / decommissioning	Underwater noise from piling
			Accidental pollution
Moray Firth SAC	Bottlenose dolphin (*Tursiops truncatus*)	Construction / decommissioning	Underwater noise from piling
			Accidental pollution

6.3.4. POTENTIAL PROPOSED DEVELOPMENT IMPACTS

199. A comprehensive range of potential impacts on marine mammals have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Proposed Development in the absence of designed in measures:

- Construction
  - Injury and disturbance from underwater noise during pile driving;
  - Injury and disturbance from underwater noise generated during clearance of unexploded ordnance (UXO);
  - Disturbance to marine mammals from pre-construction surveys;
  - Disturbance to marine mammals from vessel use and other construction related activities;
  - Injury of marine mammals due to collision with construction vessels;
  - Effects on marine mammals due to changes in prey availability;
  - Accidental pollution during the construction phase; and
  - Increased suspended sediment concentrations and associated sediment deposition.
- Operation and Maintenance
  - Electro-magnetic fields (EMF);
  - Disturbance to marine mammals from operational noise;
  - Disturbance to marine mammals from vessel use;
  - Injury to marine mammals from collisions with operation and maintenance vessels;
  - Effects on marine mammals due to changes in prey availability; and
  - Accidental pollution during the operation and maintenance phase.
- Decommissioning
  - Disturbance to marine mammals from vessel use and other decommissioning activities;
  - Injury to marine mammals from collisions with decommissioning vessels;
  - Effects on marine mammals due to changes in prey availability;
  - Accidental pollution during the decommissioning phase; and
  - Increased suspended sediment concentrations and associated sediment deposition.

6.3.5. DESIGNED IN MEASURES

200. The following designed in measures, and how these can reduce potential for impact have been considered in identification of impacts that have been scoped into (Table 6.8) or out of (Table 6.9) the Proposed Development assessment.

201. Measures adopted as part of the Proposed Development will follow good practice and may include:

- the development of, and adherence to, an appropriate CoCP;
- the development of, and adherence to, an Environmental Management Plan, including Marine Pollution Contingency Plan;
- the development of, and adherence to, a Piling Strategy (PS);
- development of, and adherence to, a Vessel Management Plan (VMP);
- use of low order deflagration to clear all UXOs;
- development of, and adherence to, a Marine Mammal Mitigation Protocol (MMMP - geophysical survey specific);
- implementation of piling soft-start and ramp-up measures;
- development of, and adherence to, a Marine Mammal Mitigation Protocol (MMMP - piling specific); and
- implementation of a Decommissioning Plan.

202. The requirement for additional mitigation measures will be dependent on the significance of the effects on marine mammals and will consider best available evidence, including any outputs from work undertaken during construction of other wind farm, and will be consulted upon with statutory consultees throughout the Marine Mammal Road Map process.

6.3.6. POTENTIAL IMPACTS AFTER THE IMPLEMENTATION OF DESIGNED IN MEASURES

203. The impacts that have been scoped into the Proposed Development assessment are outlined in Table 6.8 together with a description of any additional data collection (e.g. site-specific surveys) and/or supporting analyses (e.g. modelling) that will be required to enable a full assessment of the impacts.

204. At this stage, potential impacts to marine mammals have been scoped out of the assessment, described in Table 6.9.

Table 6.8: Impacts Proposed to be Scoped In to the Proposed Development Assessment for Marine Mammals. Project Phase Refers to Construction (C), Operation and Maintenance (O) and Decommissioning (D) Phase of the Proposed Development

Impact	Project Phase			Designed In Measures	Justification (including consideration of designed in measures)	Data Collection and Analysis Required to Characterise the Baseline Environment for the EIA	Summary of Proposed Approach to Assessment
	C	O	D				
Injury and disturbance from underwater noise generated during clearance of unexploded ordnance (UXO)	✓			Use of low order deflagration for UXO clearance	Deflagration will be implemented for UXO clearance. Assessments to date of the noise reduction achieved by low-order disposal of UXO via deflagration indicate significantly reduced noise emissions can be achieved by this method. In 2020, under a contract for BEIS, the National Physical Laboratory and Loughborough University (BEIS, 2020) reported a series of controlled experiments conducted in a flooded quarry. To assess the noise abatement potential of deflagration to neutralise UXO underwater, experiments were run on charge sizes between 15 g and 18.7 kg (with and without an enclosing shell), with data recorded on pressure gauges and hydrophones. In this study, deflagration resulted in significantly reduced noise emissions (impulse and bubble periods) with a > 20 dB reduction in noise level (a factor of 10 reduction in peak sound pressure) compared to high-order detonations of the same charge size. The study results showed that the peak sound pressure during deflagration appeared to be due only to the size of the shaped charge used to initiate deflagration, and not the UXO itself. As UXOs can be up to 820kg, low-order deflagration used to dispose ordnance at sea would be up to several hundred times quieter (BEIS, 2020). Therefore, it is anticipated that clearance of UXOs by deflagration will mitigate the potential for injury and disturbance to marine mammals as predicted noise from deflagration is negligible and therefore there is little or no route to impact.	N/A	Noise modelling will be undertaken to quantitatively assess the risk of auditory injury and disturbance.
Injury and disturbance from piling	✓			Piling ramp-up and soft-start measures; Marine Mammal Mitigation Protocol (piling specific)	Impact piling during construction may result in hearing damage/auditory injury or behavioural disturbance/displacement of marine mammals	Aerial surveys to obtain density estimates, where data allows, for each species within the relevant impact footprint.	Noise modelling will be undertaken to quantitatively assess the risk of auditory injury. Unless any new guidance is published prior to the impact assessment, the Southall *et al.* (2019) thresholds will be used to assess the risk of a permanent auditory injury. The risk of injury will be based on both of the dual criteria: cumulative sound exposure level (SEL_{cum}) and peak sound pressure level (SPL_{peak}). The assessment of disturbance will be based on the good practice methodology at the time of assessment, making use of the best available scientific evidence. Noise contours at appropriate intervals will likely be generated by noise modelling and overlain on species density surfaces to predict the number of animals potentially affected.

Impact	Project Phase			Designed In Measures	Justification (including consideration of designed in measures)	Data Collection and Analysis Required to Characterise the Baseline Environment for the EIA	Summary of Proposed Approach to Assessment
	C	O	D				
							In order to understand the ecological consequences of piling over the construction period on marine mammals, the assessment will also use population modelling (iPCoD) and potential for short-term and longer-term population level effects.
Disturbance to marine mammals from pre-construction surveys	✓			Marine Mammal Mitigation Protocol (geophysical survey specific)	The impact of pre-construction related activities (in particular geophysical surveys) may result in behavioural disturbance/ displacement of marine mammals.	N/A	Comparative noise modelling for non-piling 'noisy' activities will be undertaken to inform a qualitative assessment of non-piling noise-generating activities, e.g. geophysical survey, rick placement, vessel movement.
Disturbance of marine mammals from vessel use and other vessel activities	✓	✓	✓	Implementation of a Vessel Management Plan; Decommissioning Plan; and Marine Mammal Mitigation Protocol (decommissioning specific)	The impact of vessel use and other construction-related activities (e.g. dredging, trenching, and rock placement), operation and maintenance activities and decommissioning activities may result in behavioural disturbance/ displacement of marine mammals.	N/A	Comparative noise modelling for non-piling 'noisy' activities will be undertaken to inform a qualitative assessment of non-piling noise-generating activities, e.g. geophysical survey, rick placement, vessel movement.
Injury of marine mammals due to collision with vessels	✓	✓	✓	Implementation of a Vessel Management Plan	Increased vessel traffic during construction activities, operation and maintenance activities and decommissioning activities may result in collisions with marine mammals.	N/A	A qualitative assessment will be undertaken, based on best available literature at the time of writing.
Effects on marine mammals due to changes in prey availability	✓	✓	✓	N/A	Changes in prey abundance and distribution resulting from construction activities, operation and maintenance activities and decommissioning activities may impact on the ability of marine mammals to forage in the area.	N/A	No specific modelling required for this impact although the assessment will be based on the results of the subsea noise modelling assessment, Physical Processes assessment and the resulting impact assessment carried out fish and shellfish receptors.

Table 6.9: Impacts Proposed to be Scoped Out of the Proposed Development Assessment for Marine Mammals

Impact	Designed in Measures	Justification
Construction		
Accidental pollution	• the development of, and adherence to, an appropriate CoCP; • the development of, and adherence to, an Environmental Management Plan, including Marine Pollution Contingency Plan;	The impact of pollution including accidental spills and contaminant releases associated with the construction of infrastructure and use of supply/service vessels may lead to direct mortality of marine mammals or a reduction in prey availability, either of which may affect species' survival rates. With implementation of an appropriate pollution prevention plan, and based on evidence from other Offshore Wind Farm consent applications, that significant impact within the equivalent extent of a windfarm's array plus buffer area is considered very unlikely to occur, and a major incident that may impact any species at a population level is considered very unlikely. It was predicted that any impact would be of local spatial extent, short-term duration, intermittent and medium reversibility within the context of the regional populations and therefore not significant in EIA terms. This is considered to be equally applicable to the Proposed Development for which construction will be comparable in scale and operation within the same environment, whilst implementing an appropriate pollution prevention plan.
Increased suspended sediment concentrations and associated sediment deposition	• the development of, and adherence to, an appropriate CoCP; • the development of, and adherence to, an Environmental Management Plan, including Marine Pollution Contingency Plan;	Disturbance to water quality as a result of construction operations can have both direct and indirect impacts on marine mammals. Indirect impacts would include effects on prey species (which is scoped in). Direct impacts include the impairment of visibility and therefore foraging ability which might be expected to reduce foraging success. Marine mammals are well known to forage in tidal areas where water conditions are turbid and visibility conditions poor. For example, harbour porpoise and harbour seals in the UK have been documented foraging in areas with high tidal flows (e.g. Pierpoint, 2008; Marubini *et al.,* 2009; Hastie *et al.,* 2016); therefore, low light levels, turbid waters and suspended sediments are unlikely to negatively impact marine mammal foraging success. When the visual sensory systems of marine mammals are compromised, they are able to sense the environment in other ways, for example, seals can detect water movements and hydrodynamic trails with their mystacial vibrissae; while odontocetes primarily use echolocation to navigate and find food in darkness. Whilst elevated levels of suspended sediment concentrations (SSC) arising during construction of the offshore wind farm may decrease light availability in the water column and produce turbid conditions, the maximum impact range is expected to be localised with sediments rapidly dissipating over one tidal excursion. In addition, there is likely to be large natural variability in the SSC within the Proposed Development Marine Mammal Study Area due the proximity to the Firth of Forth estuary, so marine mammals living here will be tolerant of any small scale increases, such as those associated with the construction activities. In summary, the Zone of Influence of increased SSC will be small, particularly in the context of the wider available habitat, and the duration of effects will be short (one tidal excursion). Marine mammal receptors in the Proposed Development Marine Mammal Study Area are not considered to be sensitive to increases in SSC as they are likely to be adapted to high natural variation in sediment levels. Therefore, it is proposed that this impact is scoped out of the EIA.
Disturbance to seals on land (hauled out) from construction and pre-construction activities	• development of, and adherence to, a Marine Mammal Mitigation Protocol (MMMP - piling specific);	As advised by NS and MS-LOT in their advice on the initial Berwick Bank Wind Farm Proposal Offshore EIA Scoping Report, it is considered that that the proposed construction activities at the landfall locations and those associated with the cable installation are unlikely to affect any individual seals hauled out at the nearest designated seal haul out site, namely Fast Castle and this impact is proposed to be Scoped out of further assessment.
Operation and Maintenance		
EMF (from surface lain or buried cables)	• Cable burial	Based on the data available to date, there is no evidence of EMF related to marine renewable devices having any impact (either positive or negative) on marine mammals (Copping, 2018). There is no evidence that seals can detect or respond to EMF, however, some species of cetaceans may be able to detect variations in magnetic fields (Normandeau *et al.,* 2011). To date, the only marine mammal known to show any response to EMF is the Guiana dolphin (*Sotalia guianensis*) which has been shown to possess an electroreceptive system, which uses the vibrissal crypts on their rostrum to detect electrical stimuli similar to those generated by small to medium sized fish (Czech-Damal *et al.,* 2013). However, this has not been shown in any other species of marine mammal and this species does not occur within the Proposed Development marine mammal study area.
Disturbance to marine mammals from operational noise	• N/A	The Marine Management Organisation (MMO, 2014) review of post-consent monitoring at offshore wind farms found that available data on the operational wind turbine generator (WTG) noise, from the UK and abroad, in general showed that noise levels from operational WTGs are low and the spatial extent of the potential impact of the operational WTG noise on marine receptors is generally estimated to be small, with behavioural response only likely at ranges

Impact	Designed in Measures	Justification
		close to the WTGs. This is supported by several published studies which provide evidence that marine mammals are not displaced from operational wind farms. At the Horns Rev and Nysted offshore wind farms in Denmark, long-term monitoring showed that both harbour porpoise and harbour seals were sighted regularly within the operational offshore wind farms, and within two years of operation, the populations had returned to levels that were comparable with the wider area (Diederichs *et al.,* 2008). Similarly, a monitoring programme at the Egmond aan Zee Offshore Wind Farm in the Netherlands reported that significantly more porpoise activity was recorded within the Offshore Wind Farm compared to the reference area during the operational phase (Scheidat *et al.,* 2011). Other studies at Dutch and Danish Offshore wind farms (Lindeboom *et al.,* 2011) also suggest that harbour porpoise may be attracted to increased foraging opportunities within operating offshore wind farms. In addition, recent tagging work by Russell *et al.* (2014) found that some tagged harbour and grey seals demonstrated grid-like movement patterns as these animals moved between individual WTGs, strongly suggestive of these structures being used for foraging. Other reviews have also concluded that operational wind farm noise will have negligible effects (Madsen *et al.,*2006; Teilmann *et al.,* 2006a; Teilmann *et al.,* 2006b; CEFAS, 2010; Brasseur *et al.,* 2012). In addition, previous modelling by Subacoustech (e.g. Hornsea Project Three EIA) concluded that underwater noise during the operational phase is expected to have a negligible range of influence on any marine receptors.
Decommissioning		
Accidental pollution during the decommissioning phase	• implementation of a Decommissioning Plan • the development of, and adherence to, an Environmental Management Plan, including Marine Pollution Contingency Plan.	As per construction.
Increased suspended sediment concentrations and associated sediment deposition	• implementation of a Decommissioning Plan • the development of, and adherence to, an Environmental Management Plan, including Marine Pollution Contingency Plan,	As per construction.

6.3.7. PROPOSED APPROACH TO THE ENVIRONMENTAL IMPACT ASSESSMENT

205. The marine mammal offshore EIA will follow the methodology set out in section 4. Specific to the marine mammal EIA, the following guidance documents will also be considered:

- Institute of Ecology and Environmental Management (IEEM) guidelines for marine and coastal ecological impact assessment in Britain and Ireland (IEEM, 2010, CIEEM, 2019);
- European Union Guidance on wind energy developments and Natura 2000 legislation (European Commission, 2010);
- Oslo Paris Convention (OSPAR) Guidance on Environmental Considerations for Offshore Wind Farm Development (OSPAR, 2008); and the marine mammal injury noise exposure-onset noise exposure criteria recommended in Southall *et al.,* (2019).

206. The impact assessment will consist of a detailed quantitative assessment for underwater noise (pile driving, geophysical surveys and vessel noise). The assessment will include permanent auditory injury and behavioural disturbance. The risk of injury will be based on both of the dual criteria: cumulative sound exposure level (SEL_{cum}) and peak sound pressure level (peak SPL). To assess the SEL_{cum} criterion, the predictions of received sound level over 24 hours are frequency weighted, to reflect the hearing sensitivity of each functional hearing group. The peak SPL criterion is for unweighted received sound level. The assessment of disturbance will be based on the good practice methodology at the time of assessment, and, where possible, will include consideration of species-specific dose-response curves. Noise contours at appropriate intervals will be generated by noise modelling and overlain on species density surfaces to predict the number of animals potentially disturbed. This will allow the quantification of the number of animals that potentially will respond.

207. The densities to be used in the assessment process for assessing potential impacts on harbour seals, and agreement of correction factors for availability bias will be discussed with stakeholders as part of the Marine Mammal Road Map process.

208. In addition, and specific to marine ecology topics, IEFs will be identified and assessments will be presented for appropriate ecological receptor groups in the baseline characterisation of each relevant technical chapter. Criteria defining the value of each IEF will be defined to reflect topic-specific interests.

Potential Cumulative Effects

209. For marine mammal receptors the approach to cumulative impact assessment will be holistic and combine all potential sources of underwater noise including:

- pile driving,
- disturbance from vessels,
- UXO clearance,
- seismic surveys, and
- any other offshore construction developments that are planned within the relevant MUs for each species.

210. The key cumulative effect is likely to come from underwater noise from pile driving. A range of realistic scenarios for cumulative underwater noise effects will be developed for the cumulative effects assessment, based on publicly available information, liaison with other developers where possible, as well as consultation with the regulators and stakeholders.

211. The impacts of fishing and shipping will not be considered in the cumulative effects assessment since these activities occur throughout the baseline and are therefore already accounted for in the existing marine mammal baseline characterisation abundance and density estimates.

212. The cumulative effects assessment will follow the approach outlined in section 4.3.7.

Potential Transboundary Impacts

213. A screening of transboundary impacts has been carried out and is presented in Appendix 3. No potential transboundary effects have been identified for marine mammals and therefore this will not be considered within the EIAR.

6.3.8. SCOPING QUESTIONS TO CONSULTEES

- Do you agree that the existing data available to describe the marine mammal baseline is sufficient to describe the environment in relation to the Proposed Development?
- Do you agree that the designed in measures described provides a suitable means for managing and mitigating the potential effects of the Proposed Development on the marine mammal receptors?
- Do you agree that the impacts listed in Table 6.8 cover the impacts that should be assessed in the impact assessment for marine mammals?
- Do you agree with the sites screened into the MPA Assessment (as presented in Appendix 17)?
- Do you agree that the impacts listed inTable 6.9 can be scoped out of the Proposed Development EIA?

6.3.9. NEXT STEPS

214. The following topic specific next steps as summarised below and will be undertaken through the Marine Mammal Road Map process:

- baseline characterisation;
  - seek agreement from stakeholders on species, abundance and density estimates taken forward to the impact assessment.
- seek agreement with stakeholders on the approach to and parameters to be used in subsea noise modelling including
  - modelling locations;
  - pile types;
  - maximum hammer energy and duration;
  - soft start and ramp up hammer energies and durations;
  - number of piles to be installed in one day; and
  - occurrence of concurrent piling (two piling operations occurring on the same day).
- undertake ongoing stakeholder engagement throughout the pre-application phase including seeking agreement on densities to be used in the assessment process for assessing potential impacts on harbour seals, and appropriate correction factors for availability.

215. Further, there will be discussion around the additional mitigation measure such as the use of Marine Mammal Observers (MMOs) and Acoustic Deterrent Device (ADD).

6.4. OFFSHORE AND INTERTIDAL ORNITHOLOGY

6.4.1. INTRODUCTION

216. This Offshore EIA Scoping Report considers the potential impacts on birds from construction, operation and maintenance, and decommissioning of the offshore and intertidal components of the Proposed Development (seaward of the MHWS mark).

217. An assessment of offshore and intertidal ornithology was included in the Initial Berwick Bank Offshore EIA Scoping Report. There have been subsequent changes in the Proposed Development area and project description (as described in Section 3) and this has been applied to this Berwick Bank Offshore EIA Scoping Report. These changed include:

- Increasing the minimum blade to tip clearance from 22 m to 37 m (above LAT) in order to minimise impacts to key species such as kittiwake and gannet;
- Refinement of the site boundary to avoid relative 'hot spot' areas for key species such as guillemot and kittiwake towards the north of the Array Site;
- Implementing a minimum 4 km buffer between Seagreen Wind Farm to minimise possible barrier effects.

218. The initial Berwick Bank Scoping Opinion response has been considered in developing this section. As a result of this review, additional impacts have been scoped in including potential impacts resulting from temporary disturbance during export cable installation activities.

6.4.2. OFFSHORE ORNITHOLOGY STUDY AREA

219. Three study areas inform the Offshore Scoping Report (and subsequently the Offshore EIAR). These are listed below, with further detail provided in the following sections:

- Offshore Ornithology Regional Study Area;
- Offshore Ornithology Study Area; and
- Intertidal Ornithology Study Area.

Offshore Ornithology Regional Study Area

220. he offshore ornithological regional study area was determined by the area within which potential impacts to breeding seabirds could occur and was based on the foraging ranges of breeding seabirds. Many seabirds have large foraging ranges which extend several hundred kilometres from their breeding colonies. Birds may therefore overlap (i.e. have connectivity with) the Proposed Development, even when the colonies they originate from are a significant distance away. The offshore ornithology regional study area therefore identifies the SPA breeding colonies with potential connectivity to the Proposed Development (Figure 6.11).

221. Published mean-maximum foraging ranges (plus one standard deviation (+1 S.D.)) in Woodward et al. (2019) were used to define the offshore ornithology regional study area. Northern gannet Morus bassanus has the largest foraging range (315.2 km ± 194.2 km) of the key species considered in the ornithology assessment. The offshore ornithology regional study area therefore extends 509.4 km from the Proposed Development (Figure 6.11). Search areas for SPA breeding colonies and regional search areas for other key species in the assessment will fall within the mean-maximum foraging range of gannet. Therefore, this approach is appropriate to define the maximum extent of the offshore ornithology regional study area.

222. A seabird breeding colony that is affected by the potential impacts of the Proposed Development could also be affected by the potential impacts at other developments within the foraging range of seabirds from that colony. The offshore ornithology cumulative study area for each species will therefore be defined by implementing a search area equivalent to the species-specific mean-maximum foraging range (+ 1 S.D.) along a marine pathway, from those potentially affected breeding colonies of that species.

223. In the non-breeding season, seabirds are not constrained by colony location and can, depending on individual species, range widely within UK seas and beyond. The Zone of Influence (ZoI) for seabird species in the non-breeding season (where an assessment is deemed to be required) is based on Furness (2015) which presents Biologically Defined Minimum Population Scales (BDMPS). It is not possible to represent these scales on a figure.

Offshore Ornithology Study Area

224. The aerial survey area encompasses the Proposed Development Proposed Development Array Area, plus a 16 km buffer, which makes up the Offshore Ornithology Study Area (Figure 6.12). For the purposes of the assessment on bird impacts data obtained within the 16 km buffer area will be used.

225. Using this extensive study area will provide a wide ornithological context for the Proposed Development. It is also an appropriate size to provide a robust pre- and post-construction comparison of seabird abundance and distribution along a gradient outward from the proposed development and to allow this to be monitored.

226. The proposed export cable corridor beyond the 16 km buffer area is not included in the digital aerial survey area. Based on the predicted level of impact arising from cable laying on seabirds the use of existing data sources is considered sufficient to characterise baseline characteristics of the proposed export cable corridor for the purposes of the EIAR.

227. The offshore ornithology assessment will also include consideration of the potential impacts on migratory species.

Intertidal Ornithology Study Area

228. The study area for the assessment of effects on birds in the intertidal zone covers the coastal area between MHWS and MLWS at the landfall locations within which intertidal bird surveys have been carried out in the non-breeding season. This study area extends approximately 6km along the coast to cover both landfall locations and extends up to 1.5 km seaward from MHWS, encompassing the whole of the inter-tidal area (Figure 6.13).

6.4.3. BASELINE ENVIRONMENT

229. There is a considerable amount of information on seabirds and other birds in the outer Firth of Forth. These data are available following surveys and data collection programmes associated with the existing Forth and Tay offshore wind farm developments including: Seagreen 1 (Seagreen Alpha and Bravo), Neart na Gaoithe and Inch Cape offshore wind farms. However, guidelines and best practice applicable to the assessment of potential impacts of offshore wind farms on bird receptors are continually developing. Therefore, further site-specific baseline ornithological data collection has been undertaken between March 2019 and April 2021. Ongoing consultation with Marine Scotland (MS), NatureScot (NS) and the Royal Society for the Protection of Birds Scotland (RSPB) has informed the range of data collection to date and will continue to help to inform the scope of the analysis and assessment of the Proposed Development in the Offshore EIA Report. Details of the key desktop reports and site-specific surveys which inform the ornithology scoping assessment are given in Appendix 10.

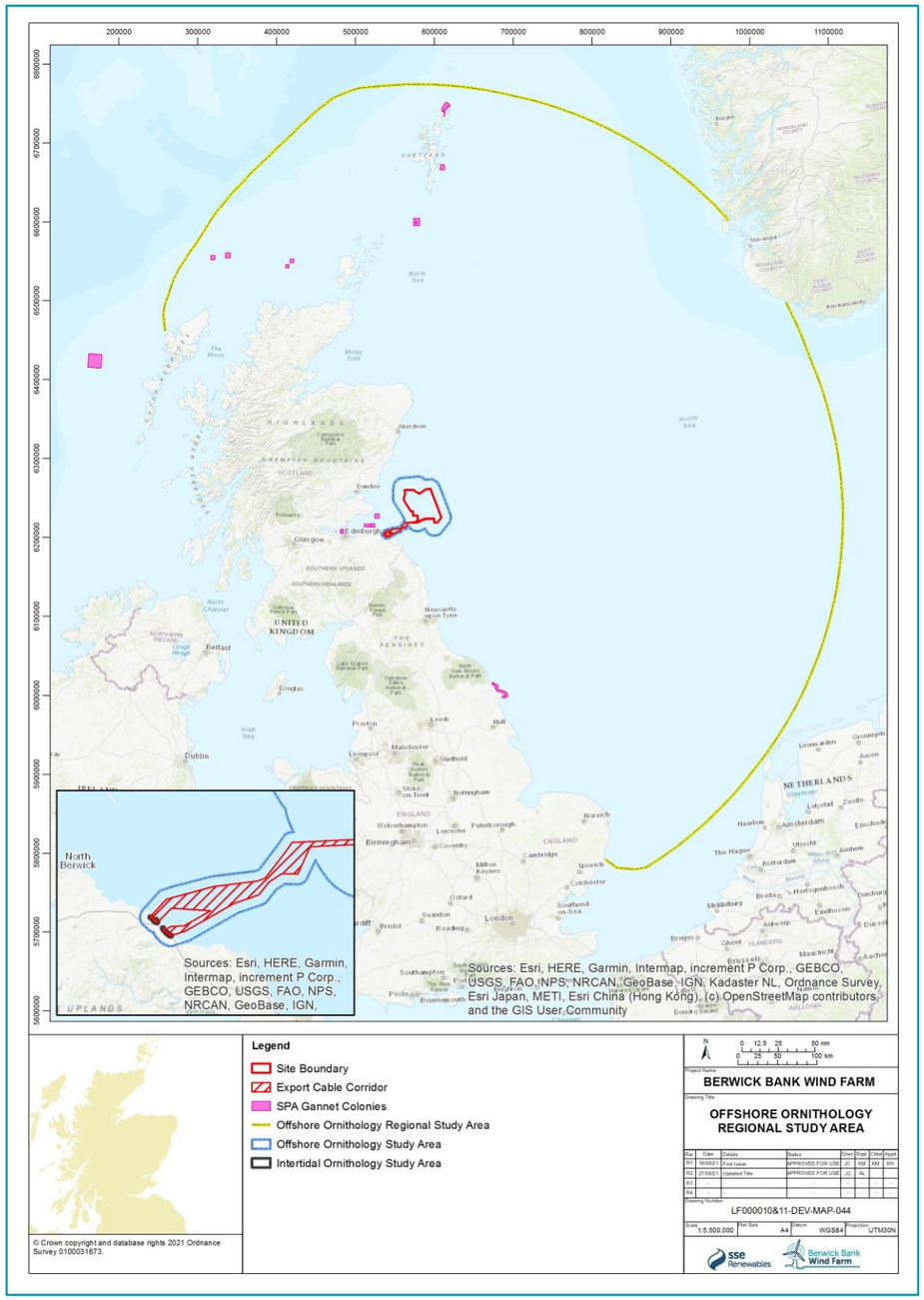

Figure 6.11: Offshore Ornithology Regional Study Area

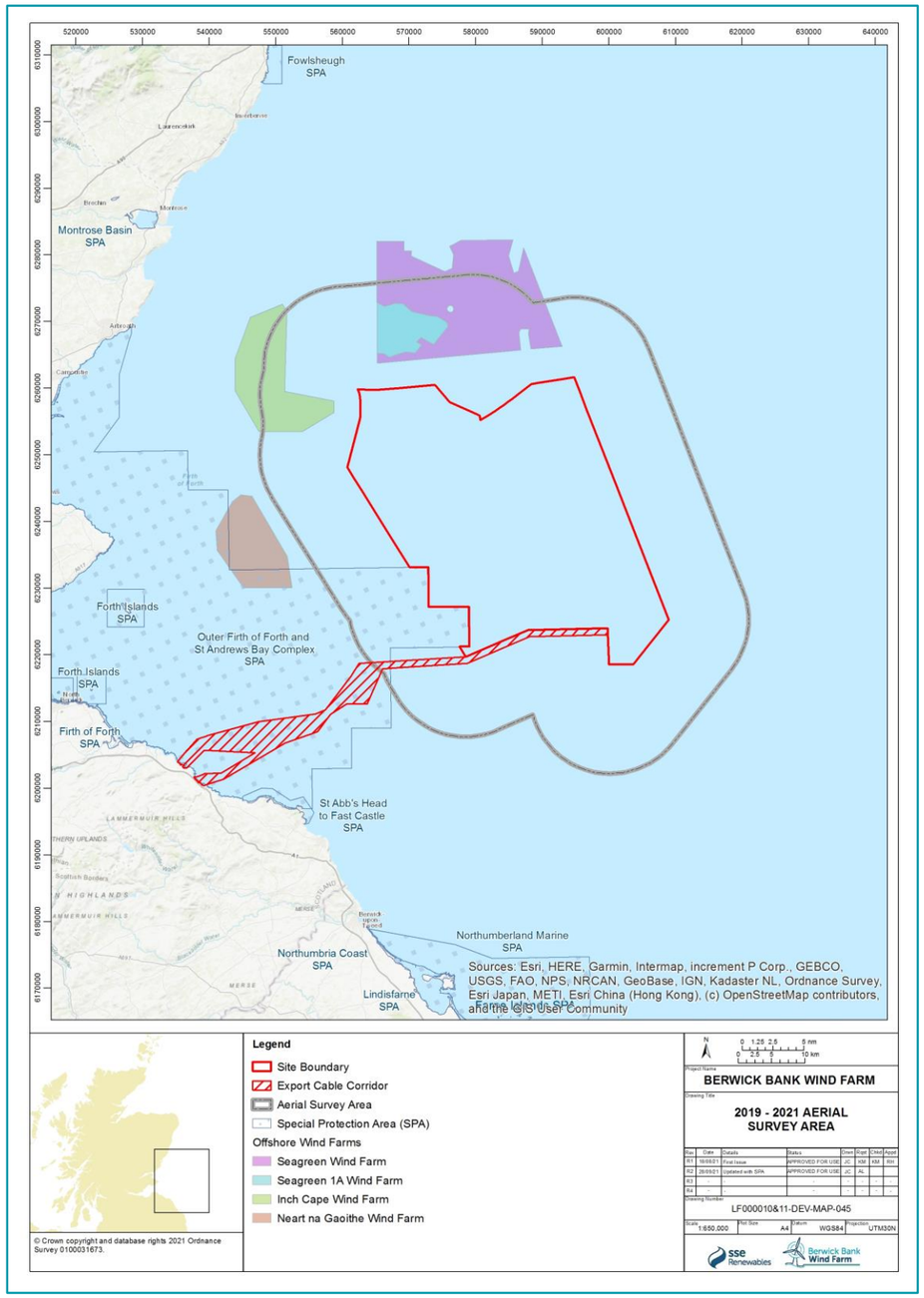

Figure 6.12: Offshore Ornithology Study Area

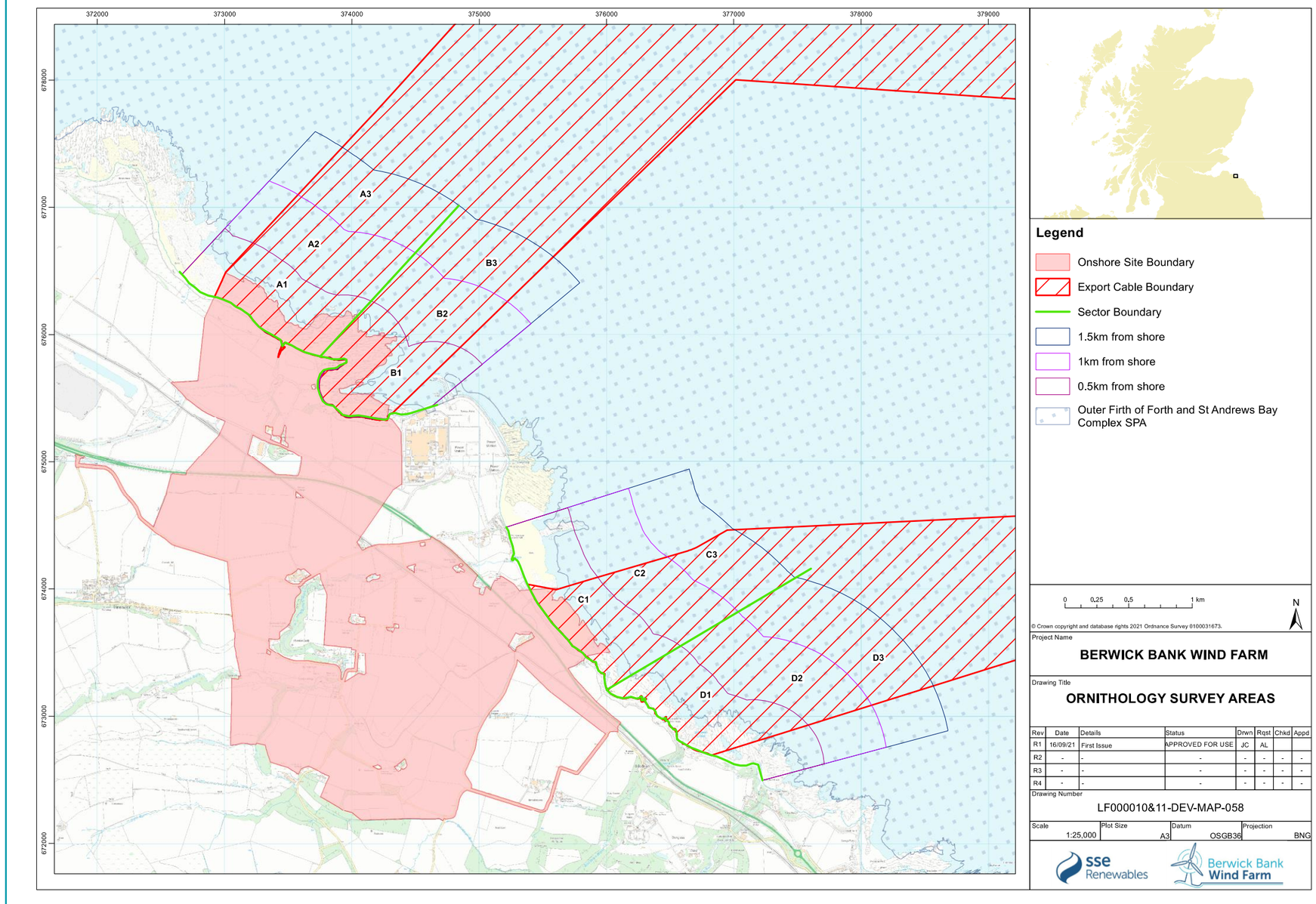

Figure 6.13: Intertidal Ornithology Study Area

Baseline Characterisation

230. The Proposed Development lies within the Forth and Tay region, recognised as one of the most important areas for birds in the North Sea (Heath et al. 2000). The Forth and Tay region supports internationally important populations of gannet, auk and gull species, and as a result, has been the focus of extensive seabird research. This has demonstrated the importance of the shallow sand banks of the Wee Bankie and Marr Bank as feeding areas for seabirds from local colonies such as the Isle of May (e.g. Daunt et al. 2011a; Wanless et al. 1998), and demonstrated that, in general, seabird numbers and species diversity decline with distance from shore.

231. As a result of this research, seabird distribution and abundance of the Proposed Development and surrounding area is known in part from previous surveys, reports and scientific studies (e.g. Kober *et al.,* 2010). However, new information has become available through a combination of site-specific and regional research projects, as detailed above. An interim baseline report has been produced which summarises the existing baseline information (based upon the 19 months of aerial data analysed to date), updating and describing the current baseline knowledge on key species and trends in their population and distribution. Consultation on the Interim Baseline Report was undertaken in July – August 2021 with Marine Scotland, NatureScot and RSPB Scotland. Comments received in response to consultation on the Interim Baseline Report will be considered when preparing the final baseline report. The following provides a summary of general baseline characteristics of seabirds in the vicinity of the Proposed Development, divided into breeding, wintering and passage periods. Further detail is provided in Appendix 10.

Breeding Season

232. Survey data to date indicate that the most numerous species in the offshore ornithology study area during the breeding season are gannet, kittiwake, guillemot, razorbill and puffin. For these species, numbers are typically highest during the pre-breeding period when birds forage further from their breeding colonies and during post -breeding dispersal.

233. Although there is considerable spatial variation in abundance and distribution within and between breeding seasons, published literature suggest relatively higher auk densities occur in the shallower waters of the Wee Bankie / Marr Bank sand bank complex in the west of the Proposed Development (Skov *et al*. 1995). Higher kittiwake densities have ranged further east (Daunt *et al.,* 2011a, 2011b) but recent boat and aerial surveys indicate other foraging areas, for example in the south west of the Offshore Ornithology Study Area.

234. The Proposed Development lies within the core foraging range of gannets from the Bass Rock colony. Numbers of gannet at the Bass Rock colony have increased significantly in recent years, and this internationally important gannetry is now the largest in the world, with approximately 75,000 pairs (Murray *et al.,* 2015).

235. Other species such as fulmar, herring gull, lesser black-backed gull and great black backed gull are distributed uniformly across the region at low densities during the breeding season. Species such as skuas and Manx shearwaters have not been recorded in surveys in the Offshore Ornithology Study Area in notable numbers in the breeding season.

236. The abundance of the key species above (gannet, kittiwake and auks) is consistent with the presence of internationally important breeding seabird colonies around the coast and islands of the Firths of Forth and Tay, in particular the Forth Islands SPA, which includes the Isle of May and Bass Rock, and the sea cliffs of St Abb's Head to Fast Castle SPA and Fowlsheugh SPA. The breeding success of some species at these colonies is in decline reflecting what appear to be general trends for seabirds in the North Sea (Mavor *et al.,* 2008; Parsons *et al.,* 2008; JNCC, 2020). The proposed ECC runs through the Outer Firth of Forth and St Andrew's Bay Complex SPA designated for breeding and non-breeding seabirds and waterfowl.

Non-Breeding Season

237. Surveys in the Offshore Ornithology Study Area indicate that in the non-breeding season, auks remain the dominant species group, although puffins are present in lower numbers than during the breeding period. Greater numbers of little auks, a winter visitor to the region, have also been recorded at this time. Kittiwakes are also widespread together with wintering herring and great black-backed gulls, including birds of Scandinavian origin. Gannets remain present but in reduced numbers as birds from the Bass Rock tend to winter in waters south of the UK, predominantly off West Africa (Deakin *et al*. 2019). By contrast, fulmars may be present in greater densities than in summer in the Firth of Forth area (Kober *et al.,* 2010).

238. Seaducks, divers, grebes and waders which winter in the inner Firths of Forth and Tay in nationally important numbers appear to be present only in very low numbers further offshore.

Spring and Autumn Passage Periods

239. Passage movements in spring and autumn have traditionally been difficult to assess comparatively, using boat-based or aerial survey methods, as they generally occur over relatively short periods and therefore may be missed by surveys only undertaken once a month. Migration may also take place at high altitudes and at night when visual detection is difficult. This has been resolved to a degree for some species through satellite tagging individuals (notably bean goose and barnacle goose, for example see Wildfowl and Wetlands Trust (2017) although sample sizes remain relatively small and therefore only provide a partial indication of these species' movements.

240. Migrating species were, nonetheless, still recorded during boat-based surveys in the Offshore Ornithology Study Area, particularly pink footed geese and a smaller number of barnacle geese. Overall, the relatively low numbers seen and evidence from tracking projects suggest that goose migration tends to occur predominantly inshore of the proposed Development (Griffin *et al.,* 2011).

241. Other passage species occurring in relatively high numbers during boat-based surveys include little gulls and Arctic terns with common and Sandwich terns also recorded on passage in smaller numbers. Shearwaters and petrels which may have been anticipated on passage have been seen in relatively low numbers, as have skuas and gulls.

242. The SPAs of the inner Firths of Forth and Tay support large populations of species including sea ducks, divers, grebes and waders on passage, but these have not been regularly recorded on surveys in the Offshore Ornithology Study Area other than as isolated individuals. Passerine species are known to cross the North Sea in spring and autumn in large numbers, moving to and from continental Europe. However, there have been relatively few sightings of passerines from the surveys undertaken within the Offshore Ornithology Study Area with redwing being the most frequently recorded species occurring during autumn passage.

243. Overall, the aerial and boat-based data collected to date broadly confirm the distribution of key species predicted for the Firth of Forth region using European Seabirds at Sea (ESAS) data (Kober *et al.,* 2010).

Intertidal Seasonal Variation

244. Intertidal and near-shore bird populations recorded during intertidal surveys vary seasonally, across the breeding, wintering and passage periods, although highest numbers were recorded during winter and passage, with relatively low numbers of individuals and species recorded in the breeding season (See Appendix 10 for further details).

245. The choice of preferred export cable landfall location (Skateraw or Thorntonloch) is yet to be finalised. However, for both options the export cable corridor passes through the Outer Firth of Forth and St Andrews Bay Complex SPA, the boundary of which follows the Mean Low Water Springs (MLWS) mark (Figure 6.13). The Skateraw landfall location overlaps Barns Ness Coast SSSI which is designated for geological feature and biological features (saltmarsh, sand dune and shingle); the citation also notes that a good diversity of birds adds to the interest of the site. Oystercatcher was the most abundant and regularly present wader species throughout the Intertidal Study Area, with typical numbers between 10 and 60 individuals. Turnstone, curlew, dunlin, redshank and ringed plover were also recorded regularly in lower numbers.

Designated Conservation Sites for Birds

246. A full screening of European designated sites with qualifying bird species will be undertaken in the LSE Screening Report for the Proposed Development which is planned to be submitted to MS-LOT in October 2021. Relevant qualifying species of European designated sites screened into the ornithology assessment will be fully considered and assessed in the Offshore EIA Report chapter with the assessment on the European designated sites itself deferred to the report to inform the Appropriate Assessment (RIAA).

247. Designated sites including SPAs, proposed SPAs (pSPA) and Ramsar sites, will be identified through the process described for identification of the offshore ornithology regional study area This will generate a 'long-list' of designated sites with potential connectivity to the Proposed Development derived from the relevant species foraging ranges (mean-maximum + 1 S.D.). Due to their proximity to the Proposed Development and based on the experience of Seagreen 1 and other Forth and Tay offshore wind farm developments, the assessment is likely to focus on the potential effects on:

- Forth Islands SPA;
- Fowlsheugh SPA;
- St Abb's Head to Fast Castle SPA; and
- Outer Firth of Forth and St Andrew's Bay Complex SPA.

248. However, it is also recognised that there will be many other colonies, including designated sites, that could be impacted by both project alone and cumulatively/in-combination. The LSE Screening Report and subsequent RIAA will provide full details of the relevant sites, features and possible effects.

249. Recent colony counts for the key seabird species at these SPAs are presented in Appendix 10. The screening to be undertaken in the Offshore Ornithology EIA Report chapter will also include national designations, including SSSIs and MPAs.

6.4.4. POTENTIAL PROPOSED DEVELOPMENT IMPACTS

250. A range of potential impacts on offshore and intertidal ornithology have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Proposed Development in the absence of designed in measures. These include:

- Construction:
  - Temporary Habitat Loss and Disturbance;
  - Indirect Impacts from construction noise;
  - Indirect impacts from UXO clearance;
- Operation and maintenance:
  - Collision impacts with wind turbines;
  - Disturbance and Displacement from maintenance vessels and the physical presence of the wind turbines;
  - Barrier to movements; and
- Decommissioning (similar to construction effects):
  - Temporary Habitat Loss and Disturbance;
  - Indirect Impacts from decommissioning noise;

251. The impacts that have been scoped into the Proposed Development assessment are outlined in Table 6.10 together with a description of any additional data collection (e.g. site-specific surveys) and/or supporting analyses (e.g. modelling) that will be required to enable a full assessment of the impacts.

6.4.5. DESIGNED IN MEASURES

252. Measures adopted as part of the Proposed Development include:

- the draught gap, i.e. the gap between the lower blade tip and the sea surface has been raised to 37 m above LAT, significantly reducing the potential number of collisions for key species including kittiwake and gannet;
- the boundary of the Proposed Development Array Area has been refined and has decreased the area by 128 km^2, which reduces the area of potential displacement and barrier effects;
- the development of, and adherence to, a Vessel Management Plan (VMP);
- use low-order deflagration to clear UXOs where necessary; and

253. the development of, and adherence to, an Environmental Management Plan, including Marine Pollution Contingency Plan.The requirement and feasibility of additional measures will be dependent on the significance of the effects on offshore and intertidal birds and will be consulted upon with statutory consultees throughout the EIA process, including as part of the Ornithology Road Map process.

6.4.6. POTENTIAL IMPACTS AFTER THE IMPLEMENTATION OF DESIGNED IN MEASURES

254. The impacts that have been scoped into the Proposed Development assessment are outlined in Table 6.10 together with a description of any data collected (e.g. site specific surveys) and/or supporting analyses (e.g. modelling) that may be required to enable a full assessment of the impacts.

255. Preliminary analysis of the digital aerial survey data, as well as the key species identified by the Forth and Tay Regional Advisory Group ornithology subcommittee, suggest that the seabird species on which the assessment will primarily be focussed on for the Proposed Development are:

- Gannet;
- Herring gull;
- Lesser black-backed gull;
- Kittiwake;
- Arctic tern;
- Guillemot;
- Razorbill; and
- Puffin.

256. A brief summary of the interim analysis of survey data for each of these species is presented in Appendix 10. In addition to the species listed above, all qualifying species for any SPAs that could be impacted will also be subject to a detailed assessment. All other species that were recorded less frequently and at lower densities within the offshore ornithology study area may not be assessed in as much detail as the key species listed above. In 2021 storm petrels were confirmed to be breeding on the Isle of May for the first time, with an estimated less than 20 pairs breeding on the island. Although there were no sightings of storm petrel during any of the aerial surveys the presence of this species in the region will be recognised in the EIAR.

257. The level of assessment required for all species will be considered and discussed in the EIAR.

258. It is proposed that collision risk will primarily be focussed on gannet, kittiwake, herring gull, lesser black-backed gull and Arctic tern, whilst displacement and barrier impacts will primarily be focussed on gannet, kittiwake, guillemot, razorbill and puffin. This will be kept under review as further evidence emerges on the potential effects of offshore wind farm developments on these and other species.

259. The offshore EIA approach will also consider the wider ecosystem characteristics of the Proposed Development area by drawing together information on environmental and biological drivers of seabird abundance and distribution, where available. This will include particular consideration of the relationships between seabird distribution and prey availability and distribution, as well as the physical influences of bathymetry, tidal conditions and distance from colonies. Where information is available on changes to prey abundance following wind farm construction, this will also be incorporated into the ecosystem assessment. The ecosystem characteristics analysis will be discussed and agreed as part of the Ornithology Road Map process, and Ecosystem Approach Technical Report will be produced and included as an appendix to the final EIAR.

260. Pollution impacts during all phases of the Proposed Development are scoped out on the basis that designed in measures, e.g., the implementation of agreed pollution prevention plans, will avoid the risk of significant pollution events. Consequently, seabirds and shorebirds are extremely unlikely to be impacted by any such pollution impacts.

Table 6.10: Impacts Proposed to be Scoped In to the Proposed Development Assessment for Offshore and Intertidal Ornithology

Impact	Project Phase			Justification (including consideration of designed in measures)	Data Collection and Analysis Required to Characterise the Baseline Environment for the EIA	Summary of Proposed Approach to Assessment
	C	O	D			
Temporary Habitat Loss and Disturbance	✓		✓	Presence of vessels and construction or decommissioning works may temporarily disturb birds from foraging areas	Ornithological baseline surveys and data analysis. Supported by information presented in: Offshore Physical Environment and Fish and Shellfish Ecology	No specific modelling required for this impact. Quantified assessment based on area of seabed disturbed during construction and the impacts from vessels on birds. The extent of disturbance from vessels and the species' sensitivities will be based on published literature, e.g. Furness and Wade (2012), Furness *et al.* (2013) and Wade *et al.* (2016).
Indirect Impacts from construction/ decommissioning noise	✓		✓	Reduction or disruption of prey availability may cause reduced energy intake affecting productivity or survival, mitigated by piling ramp-up and soft start measures	Existing baseline data and epibenthic beam trawl survey. Supported by information presented in: Fish and Shellfisheries and the noise modelling technical report.	Project specific noise modelling will be used to inform potential impacts on fish from construction noise. The potential effects on birds will draw upon the results from Fish and Shellfish chapter and a qualitative assessment will be undertaken based on predicted extent of impact and known behaviour of fish to noise using the latest published literature.
Indirect impacts from UXO clearance	✓			Physical injury and death to birds below water at time of detonation. Reduction or disruption of prey availability may cause reduced energy intake affecting productivity or survival, mitigated by low-order clearance	Ornithological baseline surveys and data analysis. Existing baseline data and epibenthic beam trawl survey. Supported by information presented in: Fish and Fisheries and the noise modelling technical report.	Results from project specific noise modelling will be used to inform the potential impacts on fish (prey species) from UXO clearance and a qualitative assessment undertaken based on predicted area of impact and the known behaviour of fish from noise using the latest published literature.
Collision impacts with wind turbines		✓		Additional mortality may cause a decrease in seabird populations, mitigated by increased minimum turbine tip height, i.e. draught gap from 22.5 m to a minimum of 37 m above LAT	Ornithological baseline surveys and site-specific flight height data using multiple methods. Supported by information presented in ornithological technical report.	Collision risk modelling and population viability analysis will be undertaken to quantify the estimated level of impact arising from collisions. Section 6.4.5 presents details of the proposed approach to the collision risk modelling and population viability analysis.
Displacement and Disturbance from the physical presence of the wind turbines and maintenance vessels		✓		Presence of operational wind turbines and associated maintenance activities may disturb birds and displace them from their foraging or resting areas, mitigated by a reduced area of the site by 128 km^2 (compared to total AfL areas)	Ornithological baseline surveys and data analysis. Supported by information presented in ornithological technical report.	Displacement modelling and population viability analysis will be undertaken to quantify the estimated level of impact arising from displacement impacts. Section 6.4.5 presents details of the proposed to be undertaken for displacement modelling and population viability analysis.

Impact	Project Phase			Justification (including consideration of designed in measures)	Data Collection and Analysis Required to Characterise the Baseline Environment for the EIA	Summary of Proposed Approach to Assessment
	C	O	D			
Barrier to movement		✓		Presence of operational wind turbines may result in additional energy expenditure as migrating or commuting birds fly longer distances around the wind farm mitigated by a reduced area of the site by 128 km^2 (compared to total AfL areas)		No specific modelling. Barrier effects will be assessed alongside displacement impacts using the recommended SNCB matrix approach and PVA analysis.

6.4.7. PROPOSED APPROACH TO THE ENVIRONMENTAL IMPACT ASSESSMENT

261. The offshore and intertidal ornithology EIA will follow the methods set out below. The offshore and intertidal EIA will be supported by a number of technical appendices including:

- Baseline report;
- Collision Risk Modelling;
- Displacement;
- Apportioning;
- Population Viability Analysis
- Ecosystems Approach.

262. Sources of guidance and information to inform the ornithological assessment will be identified and the offshore and intertidal ornithology Offshore EIA Report chapter will detail all guidance considered in the preparation of the assessment. Emerging guidance will be monitored and applied as appropriate to the assessment and in discussion with consultees, including as part of the Ornithology Road Map process. These will be applied where possible within the internal Proposed Development programme for application for consent submission.

Seasonality

263. The length of the breeding and non-breeding seasons varies between seabird species. For identified sensitive seabird species, the breeding and non-breeding periods that will be used in the offshore EIA analysis will follow NS seasonal definitions (NatureScot 2020). The phenological periods for each species that will be considered in the offshore EIA scoping report are listed in Table 6.11. Where the season is defined as occurring halfway through a month (e.g. kittiwake breeding and non-breeding seasons in March), the same density value for that month will be used for each season that is affected and the number of days split across each season.

264. The definitions and combinations of seasons (e.g., pre-breeding and breeding, post-breeding and non-breeding) to be used in the offshore EIA report will be subject to further discussion and agreement with consultees through the Ornithology Road Map process; similarly, the treatment of half-months need consideration with regard to the derivation of seasonal peak-mean values used in displacement analysis.

Table 6.11: Seasonal Definitions for Seabird Species

Species	Breeding	Post-Breeding	Non-Breeding	Pre-Breeding
Gannet	Mid-March to September	-	October to mid-February	mid-February to mid-March
Kittiwake	Mid-April to August	-	September to March	Early April
Herring Gull	April to August	-	September to February	March
Lesser Black-backed Gull	Mid-March to August	-	September to mid-March	
Arctic Tern	May to August	-	September to April	
Guillemot	April to mid-August	Late August, flightless moult August to mid-October	September to January	February to March
Razorbill	April to mid-August	Late August, flightless moult mid-August to November	September to February	March
Puffin	April to mid-August	Late August	September to mid-March	Late March, flightless moult February to mid-March

Seabird Populations

265. The breeding seabird populations used will be based on the latest published data from the Seabird Monitoring Programme (SMP) online database (BTO, 2021) with non-breeding seabird populations derived from the zones determined by the BDMPS report (Furness, 2015). Most recently available colony populations for the key seabird species at the four key SPAs are presented in Appendix 10.

Seabird Foraging Ranges and Connectivity

266. In order to determine connectivity between SPA colonies and the Proposed Development, the mean-maximum +1 SD (standard deviation) foraging ranges by Woodward *et al*. (2019) will be used (Table 6.12).

267. It may be that just the mean or mean-maximum value will be used for apportioning, depending on the number of sites considered to have connectivity to the development. The apportioning of birds will be undertaken based on the appropriate foraging ranges agreed through the Ornithology Road Map process.

Table 6.12: Mean-maximum and Maximum Foraging Ranges of Identified Sensitive Species (Woodward *et al.*, 2019)

Species	Mean-maximum Foraging Range (km)
Gannet	315.2±194.2
Kittiwake	156.1±144.5
Herring Gull	58.8±26.8
Lesser Black-backed Gull	127±109
Arctic Tern	25.7±14.8
Guillemot	73.2±80.5

Species	Mean-maximum Foraging Range (km)
Razorbill	88.7±75.9
Puffin	137.1±128.3

Displacement and Barrier Effects

268. Displacement and barrier effects will be assessed using the SNCB recommended matrix methods (JNCC, 2017) and the use of SeabORD (Searle *et al.,* 2018) for species with available tracking data to parameterise the model.

269. Seabird densities will be based on estimated densities derived from the March 2019 to April 2021 aerial survey data. The mean-peak population abundances within the offshore Proposed Development Array Area and a surrounding 2 km buffer for each season and for species identified as potentially vulnerable to displacement will be derived from estimated densities of birds on the water and in flight, either from MRSea model estimates or from design-based abundance estimates (depending on the functionality of the MRSea model which is subject to discussion at Road Map meetings).

270. Species for which detailed assessment of displacement impacts will be undertaken are: gannet, kittiwake, guillemot, razorbill and puffin. Displacement impacts will be assessed based on the whole year.

271. To assess impacts from displacement on auk species in the breeding season, the assessment area and regional populations will be derived using Woodward *et al*., (2019) mean-maximum foraging ranges. In the non-breeding season the BDMPS will be applied (except for guillemot where, due to their more localised wintering distribution compared to other breeding seabirds in the region, the assessment area and regional population will be based on breeding season estimates).

272. The SeaBORD displacement assessment tool (Searle *et al.,* 2018) will be used for assessing displacement for kittiwake, guillemot, razorbill and puffin during the breeding season. During the non-breeding seasons displacement effects on these and other species will be assessed using the SNCB interim recommended approach (JNCC, 2017). Based on the mean maximum densities, the full range of potential level of displacement and mortality will be presented ranging from 0% to 100%. The level of displacement and mortality to be used for assessment will vary between species (Table 6.13). This approach follows that taken in previous offshore wind farm developments in the region (e.g. Seagreen 2018). Outputs from both methods will be presented and compared in the assessment.

273. Suitable displacement and mortality rates will be discussed and agreed with consultees during the development of the displacement assessment together with new relevant techniques, as part of the Ornithology Road Map process. In addition, further discussion on how to assess gannet displacement and barrier effects will also be required as part of the Road Map process.

Table 6.13: Proposed Parameters to be Used in the Assessment of Displacement Impacts

Parameter	Approach	Primary Source	Comment
Monthly density estimates	MRSea (if possible)	Digital aerial surveys	Peak mean monthly densities for Proposed Development and 2 km buffer to be used where densities are high enough.
Monthly density estimates	Design based	Digital aerial surveys	Peak mean monthly densities for Proposed Development and 2 km buffer to be used where densities are too low for use of MRSea, or if the MRSea model proves to be unusable for the size of datasets.
Mortality due to displacement	Matrix	JNCC 2017	To be used on gannet, kittiwake, guillemot, razorbill and puffin for whole year.
Mortality due to displacement	SeabORD	Searle *et al.* 2018	To be used on kittiwake, guillemot, razorbill and puffin during the breeding season.
Proportion displaced	Generic	Seagreen 2018	Gannet 60 - 70%, Kittiwake 30%, Guillemot 50% - 60%, Razorbill 40% - 60%, Puffin 30%.
Mortality rate	Generic	Seagreen 2018	Gannet 1%, Kittiwake 1%, Guillemot 1%, Razorbill 1%, Puffin 2%.

Collision Risk

274. The predicted collision risk to birds will be analysed using two collision risk modelling (CRM) techniques. Collision risk modelling will be undertaken for gannet, kittiwake, herring gull, lesser black-backed gull and other species depending on data analysis / abundance. The monthly densities of flying birds derived from the aerial surveys will be used to populate the offshore deterministic Band model (2012) and the Stochastic Collision Risk model (sCRM) developed by Masden (2015) and MacGregor *et al*. (2018). The results from the sCRM will be relied upon and used in further analysis following MSS advice, with the sCRM allowing for the variation and uncertainty surrounding the input parameters to be accounted for during modelling. The results from the deterministic Band model will be used for contextual and comparative purposes. Models will be run using Option 2 (Basic model) and Option 3 (Extended model) of the Basic and Extended Band (2012) Model.

275. Option 2 and Option 3 will utilise generic flight height distributions from Johnston *et al.* (2014). Further discussion and agreement on the use of the Band model Option 4 is required, as Option 4 utilises evidence-based flight height distributions from site-specific aerial/boat-based surveys. Further discussion with consultees is needed to agree on the appropriate source for evidence-based site-specific flight heights to ensure values used are robust and representative.

276. Collision risk outputs from all Options modelled will be presented alongside each other for comparative purposes.

277. Cook (2021) presents revised avoidance rates that for many species are lower than those previously published. No formal advice has been received on the use of these rates and they may be amended following any future peer review. Collision risk modelling using previously published avoidance rates will also be undertaken and the results presented for comparative purposes. Deterministic and stochastic avoidance rates to be used in the modelling are presented in Table 6.14.Discussions with consultees through the Ornithology Road Map process will determine the finalised avoidance rates and modelling options to be used.

Table 6.14: Avoidance Rates for Use in Collision Risk Modelling

Species	Cook 2021		Cook *et al*. 2014		Cook 2021		Bowgen and Cook (2018)	
	Deterministic Band Model		Deterministic Band Model		Stochastic Collision Risk Model		Stochastic Collision Risk Model	
	Option 1 and 2	Option 3	Option 1 and 2	Option 3	Option 1 and 2	Option 3	Option 1 and 2	Option 3
Gannet	98.74%	99.5 %	98.9%	98.0%	98.79%	92.61%	99.5%	NA
Kittiwake	98.74%	99.0%	98.9%	98.0%	98.79%	92.61%	99.0%	98.0%
Large Gulls	98.60%	99.5%	99.5%	99.0%	98.61%	91.04	99.5%	99.3%
Arctic tern *	97.09%	69.54%	98.5%	95.0%	97.07%	69.33%	-	-

* note avoidance rates for Arctic tern for Cook 2021 are for all tern species.

278. Morphological and behavioural parameters for the key species have been derived from literature and are summarised in Table 6.15. Body length and wingspan were taken from Robinson (2005) and flight speeds from Pennycuick (1997) and Alerstam *et al.* (2007). Evidence-based in-field flight speeds obtained by Skov *et al.* (2018) have been presented alongside literature derived flight speeds and will be used in the assessment for comparative purposes. It is recognised that flight speeds may be updated following publication of forthcoming studies.

279. Nocturnal activity scores for kittiwake have been obtained from those accepted in previous scoping reports (e.g., Seagreen EIA Optimised Project Addendum 2018), while gannet nocturnal activity scores have been obtained from updated evidence from Furness *et al*. (2018). Herring gull and lesser black-backed gull nocturnal scores have been taken from Garthe and Hüppop (2004). It should however be noted that the level of nocturnal activity suggested by Garthe and Hüppop (2004) may be too conservative. These nocturnal activity scores will require further discussion with consultees which will be undertaken through the Ornithology Road Map process. Flight type will be set as flapping for all species as flight behaviour in the rotor swept area can be difficult to define.

280. Monthly density data for flying gannet and kittiwake will be derived from design-based methods (or MRSea outputs if this model is capable of analysing the large datasets involved without causing major run-time or error issues), whereas density data for flying herring gull, lesser black-backed gull and Arctic tern will use Design-based abundance estimates (as MRSea outputs will not be generated for these three species due to low abundances). The density values to be used within collision risk modelling will be discussed and agreed further with consultees (i.e., use of mean monthly or monthly max values).

281. Initial CRM will model a range of turbine scenarios, including realistic worst case and most likely scenario for each species. This will be informed by the Project Design Envelope. Outputs from initial CRM will inform future discussions on the worst case scenario CRM for each of the key species. These discussions will be undertaken as part of the Ornithology Road Map process.

282. To assess potential collision mortality for migratory non-seabird species, the Marine Scotland commissioned strategic level report (Marine Scotland, 2014) will be used. Species likely to migrate across the offshore ornithology study area will be identified. The report mentions that an avoidance rate of 98% is to be assumed for all species apart from an avoidance rate of 99.8% to be assumed for all geese. Collision risk modelling will be undertaken using Band Option 1 and estimates will be presented for the spring and autumn passage respectively.

283. Currently, an MS commissioned strategic report containing information on the development of the sCRM tool and the risk of collision to migratory species is awaited and will be used in future assessments if available within the EIA timescale.

Table 6.15: Species Parameters to be Used in the Collision Risk Modelling

Species	Bird Length (m)	Wing Span (m)	Flight Speed (m sec $^{-1}$)	Flight Speed (Skov *et al.* 2018) (m sec $^{-1}$)	Nocturnal Activity (% of Daytime Activity)	Flight Type
Gannet	0.94	1.72	14.9	13.33	3%-8%	Flapping
Kittiwake	0.39	1.08	13.1	8.71	25%	Flapping
Herring Gull	0.60	1.44	12.8	9.68	50%	Flapping
Lesser Black-backed Gull	0.58	1.42	13.1	10.13	50%	Flapping
Arctic Tern	0.34	0.80	12.0	N/A	0%	Flapping

Apportioning

284. For the assessment of impacts on different breeding colonies and in different seasons, particularly in relation to SPA breeding colonies, it is necessary to apportion the entire potential impact described for the development (e.g., the additional mortality as a result of collision risk, and/or displacement) between breeding colonies and across age-classes and seasons.

285. In the breeding season age class apportioning will be based on stable age population models, with impacts being assigned between adults and immatures using proportions derived from site specific survey data. For auk species and kittiwake, age classes will follow methods used and approved for the Seagreen 2018 assessment.

286. Impacts to all adults will be regarded as breeding adults. However, this would be a precautionary approach and it is proposed that sabbatical birds are accounted for during the assessment.

287. Apportioning during the non-breeding season will follow the BDMPS approach (Furness, 2015). For seasons defined with half months, the estimated collision mortality for that month will be split equally between the phenological periods, with seasonal definitions for each species following NS definitions (NatureScot, 2020).

288. For species such as guillemot and razorbill however, further discussion on non-breeding apportioning is required as auk species are known to disperse less widely from the breeding area during the non-breeding season. Woodward *et al.* (2019) mean-maximum foraging ranges for guillemot will be utilised to establish the appropriate non-breeding populations, with further discussion and agreement on razorbill non-breeding season apportioning needed. This will be undertaken as part of the Ornithology Road Map process.

Population Viability Analysis

289. The Natural England Population Viability Analysis (PVA) tool (Searle *et al.* 2019) will be used to model the effects of collision and displacement mortality on populations of key species from relevant SPA breeding colonies. The PVA will focus on birds where the assessed mortality exceeds a change to adult annual survival rates of 0.2% over both a 35 year and 50 year period. This will require further discussion with consultees because the 0.2% change in adult mortality may not be appropriate for all species because of interspecific variation in annual survival. This will be undertaken as part of the Ornithology Road Map process.

290. No recovery period will be applied and impacts will be applied to all ages in agreement with the age apportioning approach, with sabbatical rates of adult birds also being taken into account. The two-ratio metrics, which are generally termed 'Counterfactual (ratio) of final population size" and "Counterfactual (ratio) of population growth-rate" will be presented.

291. In situations where there is a reasonable amount of species abundance data available, semi-integrated Bayesian population models will be considered in place of the NE PVA (Searle *et al.,* 2020), where it is possible to run these models. These semi-integrated models tend to perform better due to the integration of abundance data.

292. The PVA input parameters (e.g., demographic species productivity and age-class survival rates) will follow the recommendations of Searle *et al.* (2020), with productivity and survival rates taken from Horswill and Robinson (2015). Consideration however will be given to these demographic parameters as rates suggested for certain species in Horswill and Robinson (2015) may no longer be appropriate. Clarification on the appropriate productivity and survival rates for use in the PVA for each of the key colonies will be required.

Ecosystem Approach

293. An ecosystems approach will be applied using the outputs of the analysis of ornithology data, taking into account broad and local scale connections between birds and the ecosystem and responses to change. The Ornithological Road Map provides a framework for engagement with consultees regarding the scope of the ecosystem approach to be taken. The road map will also need to consider the engagement required with a broad group of stakeholders for input to the ecosystem approach.

294. There are a range of tools (https://ecosystemsknowledge.net/tool-assessor-list-of-tools) available to assist with delivering the ecosystems approach and these will be discussed to determine whether they are fit for this purpose at meetings scheduled in the road map. However, the ecosystem approach assessment will draw on the outputs of the deliverables assessing collision risk, displacement, apportioning to SPAs and population viability. As a minimum, the assessment will consider marginal changes that recognise the changes to services between the baseline state and the "post-intervention" state, qualifying "likelihood of impact" for all the identified ecosystem services.

Potential Cumulative Effects

295. The Cumulative Effects Assessment (CEA) for birds will follow the approach set out in section 4.3.7. The identification of cumulative effects on birds will follow a receptor-specific approach to determine receptor-impact pathways from the cumulative screening matrix. The offshore and intertidal ornithology cumulative assessment will also take into account the principles set out in COWRIE guidance (King *et al.,* 2009). Where necessary, effects related to operational collision and displacement will be summed across cumulative developments and subject to population assessment at relevant breeding colonies.

296. The cumulative effects assessment will focus on the cumulative effects with Seagreen 1, Neart Na Goaithe and Inch Cape. Additional projects located in Scottish and English waters will be scoped into the cumulative assessment for breeding birds based on the mean-maximum foraging ranges from Woodward *et al*. (2019). The non-breeding season cumulative assessment, for species that migrate or disperse from their colonies, will include relevant developments within the BDMPS region (Furness, 2015). However, for guillemot that do not disperse, the population will also be based on mean-maximum foraging range from the Proposed Development.

297. When considering the predicted collision and displacement impacts from other developments, the most recent assessments will be used as presented in the Design Specification and Layout Plans (DSLP), rather than designs for the original consented wind farms. The exception being for Inch Cape where there is no DSLP and the cumulative effects from the Section 36 application will be considered based on the revised design envelope. If suitable, collision risk modelling is available from the other relevant projects, e.g. Seagreen 2018, the results from this existing modelling will be used. If it is determined that the modelling is not suitable then new modelling will be undertaken.

298. Additional discussion will be required regarding the approach for including developments in England in the CEA. These discussions will be undertaken as part of the Ornithology Road Map process.

Potential Transboundary Impacts

299. A screening of transboundary impacts has been carried out and is presented in Appendix 3.

6.4.8. SCOPING QUESTIONS

- Do you agree that the existing data available to describe the offshore and intertidal ornithology is sufficient to describe the environment in relation to the Proposed Development?
- Do you agree that all receptors and impacts have been identified for offshore and intertidal ornithology?
- Do you agree with the suggested designed in measures and is this mitigation appropriate?
- Do you agree with the proposed approach to assessment?
- Do you agree with the proposal to scope out pollution impacts during all phases of the Proposed Development?
- Do you agree with the sites screened into the MPA Assessment (as presented in Appendix 17)?

6.4.9. NEXT STEPS

300. Undertaking an EIAR is an iterative process and not all issues relating to the ornithological impact assessment have been agreed. Further discussion is required throughout the preparation of the EIAR. Furthermore, new information or new guidance may become available that require adjustments in the approaches to impact assessment.

301. The over-arching next steps are outlined in section 4.3.4. As part of the Ornithological Road Map process any on-going uncertainties and approaches to be used in the assessment will be discussed. Results from the aerial surveys and, when ready, the initial outputs from the collision risk modelling, displacement modelling and population viability analysis will be presented

7. OFFSHORE HUMAN AND SOCIO-ECONOMIC ENVIRONMENT

7.1. COMMERCIAL FISHERIES

7.1.1. INTRODUCTION

302. This section of the Offshore EIA Scoping Report identifies the elements of commercial fishing of relevance to the Proposed Development and considers the potential impacts from the construction, operation and maintenance, and decommissioning of the offshore and intertidal components (seaward of the MHWS mark) of the Proposed Development on commercial fisheries receptors.

303. Commercial fisheries were reported on in the initial Scoping Report. Although the change in project scope applied to this Scoping Report, which is combining the offshore Proposed Development Array Areas, the impacts are anticipated to generally be the same as identified in the initial Scoping Report. The initial Berwick Bank Wind Farm Proposal Scoping Opinion response has been considered for the development of this section.

7.1.2. STUDY AREA

304. The Proposed Development is located in International Council for the Exploration of the Sea (ICES) Division IVc (Central North Sea). Fisheries data are recorded and collated by statistical rectangles within each ICES Division. The commercial fisheries study area has therefore been defined with reference to the ICES rectangles within which the Proposed Development is located. As shown in Figure 7.1, these are as follows:

- ICES rectangle 41E8: where the Berwick Bank Wind Farm Proposed Development Array Area and part of the Berwick Bank Wind Farm ECC are located; and
- ICES rectangles 41E7[9] and 40E7: where the inshore section of the Berwick Bank Wind Farm ECC is located.

305. The commercial fisheries study area defined above will be used to identify fisheries active in areas relevant to the Proposed Development. Where relevant, however, data and information will be analysed for wider areas to provide context and describe the full extent of activity of the fisheries included in the assessment.

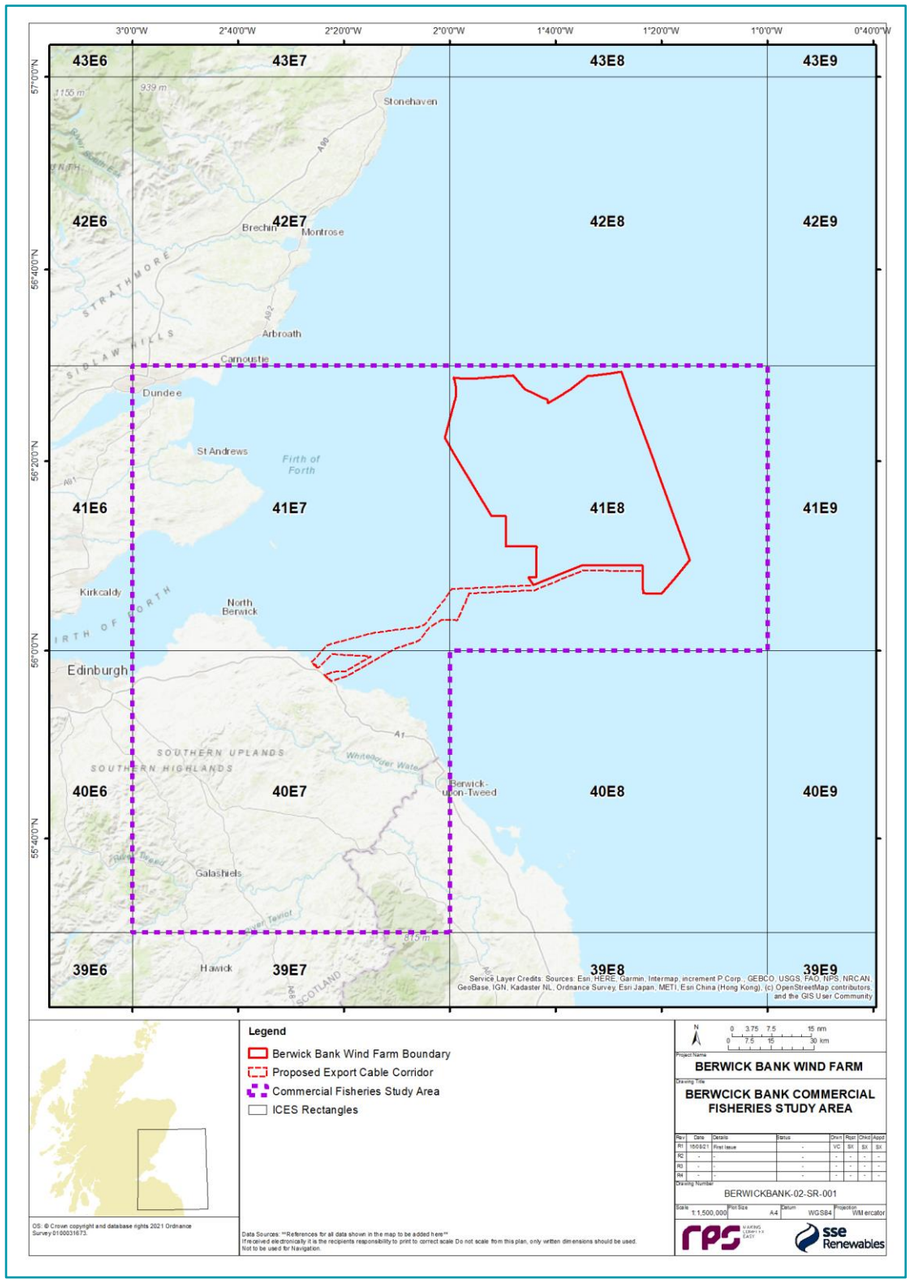

Figure 7.1: Commercial Fisheries Study Area

[9] Although very limited, there is some overlap between ICES rectangle 41E7 and the western edge of the Proposed Development Array Area.

7.1.3. BASELINE ENVIRONMENT

306. This section provides a concise summary of the baseline environment of the Proposed Development; reference should be made to Appendix 11 where a more detailed description is provided.

307. An initial desk-based review of literature and data sources to support this commercial fisheries section of the Offshore EIA Scoping Report has identified a number of baseline datasets. These are summarised in Appendix 11. Based on this review, it has been concluded that the commercial fisheries study area supports a range of commercial fishing activities:

- demersal trawling for *Nephrops*;
- potting for lobster and crab; and
- Scallop dredging.

308. No site-specific surveys have been undertaken to inform the Offshore EIA Scoping Report for commercial fisheries, however, extensive consultation with fisheries stakeholders is planned to be undertaken to help inform the commercial fisheries baseline within the Offshore EIAR, and benthic subtidal and shipping and navigation survey data will be reviewed as part of the EIA and integrated into the characterisation of the commercial fisheries baseline, as appropriate.

309. As shown in Figure 7.2, in the commercial fisheries study area *Nephrops* are predominantly targeted in ICES rectangles 41E7 and 40E7 whilst landings of scallops are primarily recorded from ICES rectangles 41E8 and 41E7. Landings of lobster and crab are recorded at varying degrees across the whole study area. The highest landings values are recorded in ICES rectangle 41E7, at approximately £8.6 Million annually (average 2015-2019).

310. Further detailed information on the commercial fisheries baseline environment is provided in Appendix 11.

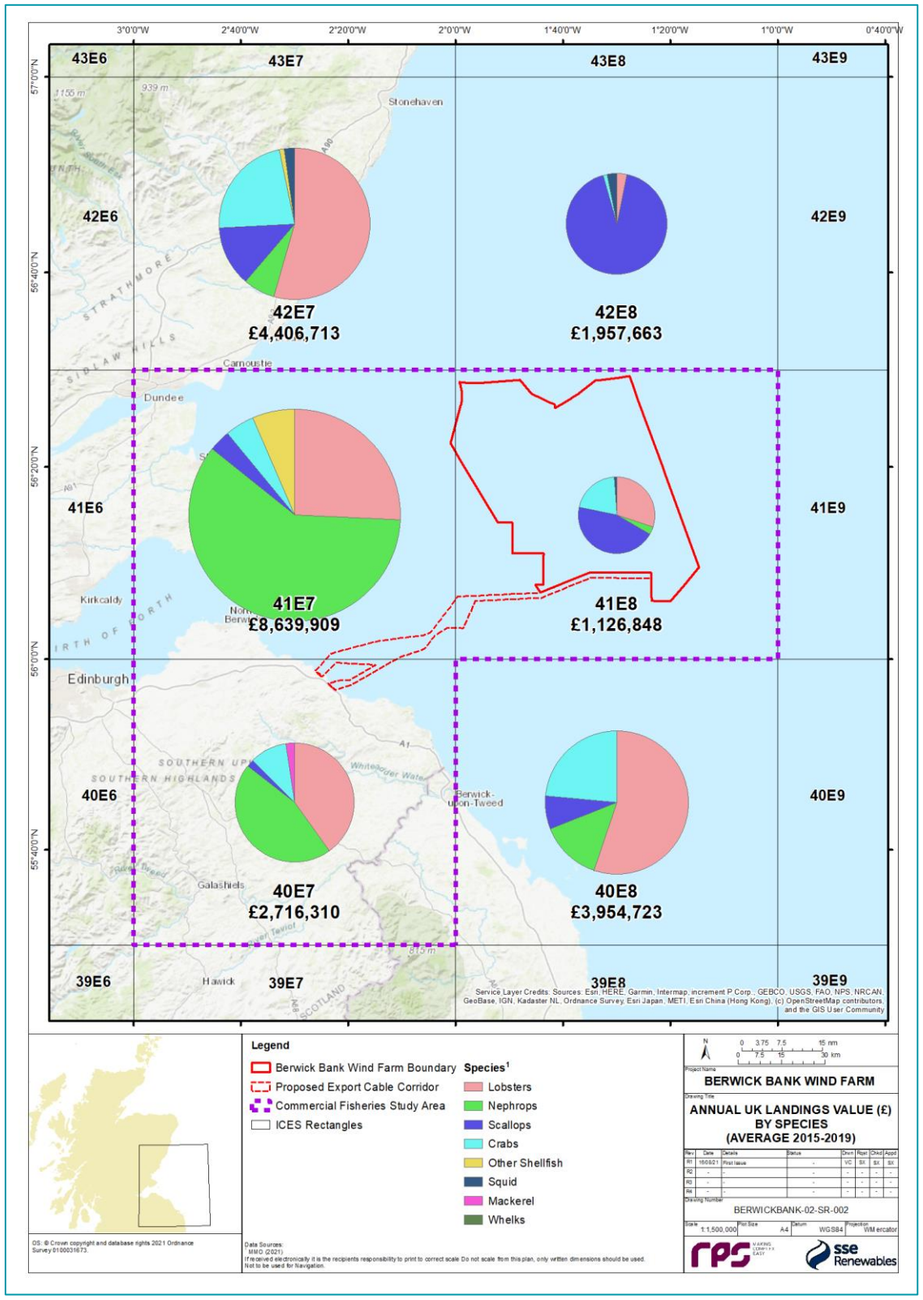

Figure 7.2: Landings Values (£) by Species (Annual Average 2015 – 2019)

7.1.4. POTENTIAL PROPOSED DEVELOPMENT IMPACTS

311. A range of potential impacts on commercial fisheries have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Proposed Development in the absence of designed in measures:

- Construction
  - Temporary loss or restricted access to fishing grounds;
  - Displacement of fishing activity into other areas;
  - Interference with fishing activity;
  - Increased steaming times;
  - Snagging risk - loss or damage to fishing gear; and
  - Potential impacts on commercially exploited species.
- Operation and Maintenance
  - Loss or restricted access to fishing grounds;
  - Displacement of fishing activity into other areas;
  - Interference with fishing activity;
  - Increased steaming times;
  - Snagging risk – loss or damage to fishing gear; and
  - Potential impacts on commercially exploited species.
- Decommissioning
  - As per Construction.

7.1.5. DESIGNED IN MEASURES

312. The following designed in measures, and how these can reduce potential for impact, have been considered in identification of impacts that have been scoped into the Proposed Development assessment (Table 7.1).

313. Measures adopted as part of the Proposed Development will include:

- ongoing consultation with the fishing industry and appointment of a Fisheries Liaison Officer (FLO);
- development of a Fisheries Management and Mitigation Strategy (FMMS);
- adherence to good practice guidance with regards to fisheries liaison (e.g. FLOWW, 2014;2015);
- timely and efficient distribution of Notice to Mariners (NtM), Kingfisher notifications and other navigational warnings of the position and nature of works associated with the Proposed Development;
- use of guard vessels and Offshore Fisheries Liaison Officers (OFLOs), as appropriate;
- implementation of a Vessel Management Plan (VMP) and Navigational Safety Plan (NSP);
- notification to the UK Hydrographic Office (UKHO) of the proposed works to facilitate the promulgation of maritime safety information and updating of nautical charts and publications;
- undertaking of post-lay and cable burial inspection surveys and monitoring,
- participation in the Forth and Tay Commercial Fisheries Working Group (FTCFWG) and liaison with Fisheries Industry Representatives (FIRs), as appropriate; and
- as per recommendation within the initial Berwick Bank Wind Farm Proposal Scoping Opinion, an assessment will be made of the as laid data (geophysical) in order to assess the potential for snagging. This will then inform the requirement for an overtrawlability study, which would then be planned and undertaken in discussion with fisheries stakeholders.

314. The requirement and feasibility of additional measures will be dependent on the significance of the effects on commercial fisheries and will be consulted upon with statutory consultees throughout the EIA process.

7.1.6. POTENTIAL IMPACTS AFTER THE IMPLEMENTATION OF DESIGNED IN MEASURES

315. The impacts that have been scoped into the Proposed Development assessment following considering of designed in measures are outlined in Table 7.1 together with a description of any additional data collection (e.g. site-specific surveys) and/or supporting analyses (e.g. modelling) that will be required to enable a full assessment of the impacts.

316. At this stage, no potential impacts to commercial fisheries have been scoped out of the assessment, on the basis of the baseline commercial fisheries information currently available and the Proposed Development description outlined in section 2.

Table 7.1: Impacts Proposed to be Scoped In to the Proposed Development Assessment for Commercial Fisheries. Project Phase Refers to Construction (C), Operation and Maintenance (O) and Decommissioning (D) Phase of the Proposed Development

Impact	Project Phase			Designed In Measures	Justification (including consideration of designed in measures)	Data Collection and Analysis Required to Characterise the Baseline Environment for the EIA	Summary of Proposed Approach to Assessment
	C	O	D				
Temporary loss or restricted access to fishing grounds.	✓		✓	• Ongoing consultation with the fishing industry and appointment of a Fisheries Liaison Officer (FLO); • Development of a Fisheries Management and Mitigation Strategy (FMMS); • Adherence to good practice guidance (e.g. FLOWW, 2014;2015); • Timely and efficient distribution of Notice to Mariners (NtM), Kingfisher notifications and other navigational warnings of the position and nature of works associated with the Proposed Development; • Use of guard vessels and Offshore Fisheries Liaison Officers (OFLOs), as appropriate; • Implementation of a Vessel Management Plan (VMP) and Navigational Safety Plan (NSP); • Notification to the UK Hydrographic Office (UKHO) of the proposed works to facilitate the promulgation of maritime safety information and updating of nautical charts and publications; • Undertaking of post-lay and cable burial inspection surveys and monitoring; • Participation in the Forth and Tay Commercial Fisheries Working Group (FTCFWG) and liaison with Fisheries Industry Representatives (FIRs) as appropriate; and • as per recommendation within the initial Berwick Bank Wind Farm Proposal Scoping Opinion, an assessment will be made of the as laid data (geophysical) in order to assess the potential for snagging. This will then inform the requirement for an overtrawlability study, which would then be planned and undertaken in discussion with fisheries stakeholders..	The implementation of safety zones around construction and decommissioning works may result in temporary loss/restricted access to fishing grounds.	• Analysis of fisheries data and information. • Consultation with fisheries stakeholders.	No modelling required for this impact. A qualitative assessment, based on a quantitative and qualitative analysis of fisheries data, will be undertaken to assess potential for impact.
Displacement of fishing activity into other areas.	✓	✓	✓		Fishing activity may be temporarily displaced to other areas as a result of loss of grounds/restricted access to fishing grounds during construction works, the operation and maintenance phase and decommissioning works.		
Interference with fishing activity.	✓	✓	✓		There may be potential for transiting construction, operation and maintenance and decommissioning vessels to cause interference (conflict) with fishing activities/fishing gears.		
Increased steaming times.	✓	✓	✓		Presence of safety zones around construction works, major maintenance works or decommissioning may result in temporary increases in steaming time/routes to/from fishing grounds.	• Analysis of fisheries data and information. • Consultation with fisheries stakeholders. • Outcomes of the shipping and navigation impact assessment.	
Snagging risk – loss or damage to fishing gear.	✓	✓	✓		The presence of pre-commissioned infrastructure associated with the Proposed Development (i.e. foundations, cables awaiting burial or protection); infrastructure associated with the Proposed Development (i.e. foundations, cable protection) and decommissioning related infrastructure as well as other seabed obstacles (i.e. accidentally dropped objects, etc) may pose a snagging risk to fishing vessels and have potential to result in loss or damage to fishing gear. It is noted that the above may also have implications with regard to the safety of fishing vessels and crews. Safety risks for fishing vessels associated with potential gear snagging, will be assessed together with navigational risks under Shipping and Navigation (see section 7.2).	• Analysis of fisheries data and information. • Consultation with fisheries stakeholders.	
Loss or restricted		✓		As above.	The presence of project infrastructure may result in a loss or restricted access to fishing grounds during the operation and maintenance phase. The implementation of	• Analysis of fisheries data and information.	No modelling required for this impact. A qualitative assessment, based on a quantitative and qualitative analysis of

Impact	Project Phase			Designed In Measures	Justification (including consideration of designed in measures)	Data Collection and Analysis Required to Characterise the Baseline Environment for the EIA	Summary of Proposed Approach to Assessment
	C	O	D				
access to fishing grounds.					safety zones around major maintenance activities may also result in temporary localised loss or restricted access to grounds.	• Consultation with fisheries stakeholders.	fisheries data, will be undertaken to assess potential for impact.
Potential impacts on commercially exploited species.	✓	✓	✓	As described in section 6.2 (Fish and Shellfish Ecology).			

7.1.7. PROPOSED APPROACH TO THE ENVIRONMENTAL IMPACT ASSESSMENT

317. The commercial fisheries EIA will follow the methodology set out in section 4. Specific to the commercial fisheries EIA, the following guidance documents will also be considered:

- FLOWW Best Practice Guidance for Offshore Renewables Developments: Recommendations for Fisheries Liaison: FLOWW (Fishing Liaison with Offshore Wind and Wet Renewables Group) (FLOWW, 2014);
- FLOWW Best Practice Guidance for Offshore Renewables Developments: Recommendations for Fisheries Disruption Settlements and Community Funds. FLOWW (Fishing Liaison with Offshore Wind and Wet Renewables Group) (FLOWW, 2015);
- Best practice guidance for fishing industry financial and economic impact assessments (UKFEN, 2012);
- Options and opportunities for marine fisheries mitigation associated with wind farms (Blyth-Skyrme, 2010); and
- Fishing and Submarine Cables - Working Together (ICPC, 2009).

318. The commercial fisheries EIA will also consider any new guidance and updates to existing guidance as and where applicable, including the Marine Scotland Science guidance for 'Assessing Fisheries Displacement' when publicly available.

Potential Cumulative Effects

319. There is potential for cumulative impacts to occur on commercial fisheries as a result of other projects or activities. In particular fishing closures within Marine Protected Areas (MPAs) in relation to the Firth of Forth Banks Complex ncMPA. The cumulative effects assessment will follow the approach outlined in section 4.3.7.

320. The projects or activities included in the cumulative assessment may vary depending on the fishery under consideration (e.g. depending on the extent of grounds and operational range of the vessels involved).

Potential Transboundary Impacts

321. A screening of transboundary impacts has been carried out and is presented in Appendix 3. The potential for transboundary effects has been identified for commercial fisheries receptors and will be considered within the EIAR.

7.1.8. SCOPING QUESTIONS TO CONSULTEES

- Are there any additional datasets to those included in Appendix 11 that you feel should be reviewed to characterise the commercial fisheries baseline?
- Do you agree that all potential impacts have been identified for commercial fisheries receptors?

7.1.9. NEXT STEPS

Consultation with fisheries stakeholders is on-going and will continue throughout the application process. Details on the proposed next steps with regard to consultation are provided in section 4.3.4. In particular, in identifying any mitigation measures following assessment of significance of effect, SSER will consider types of fishing within the Proposed Development and will engage with the wider fishing industry to seek broad agreement of such measures. Clarity will be provided regarding the level of commitment to such measures.

7.2. SHIPPING AND NAVIGATION

7.2.1. INTRODUCTION

322. This section of the Offshore EIA Scoping Report identifies the elements of shipping and navigation of relevance to the Proposed Development and considers the potential impacts from the construction, operation and maintenance, and decommissioning of the offshore and intertidal components (seaward of the Mean High Water Springs (MHWS) mark) of the Proposed Development on shipping and navigation receptors.

323. Shipping and navigation were reported on in the initial Scoping Report. Although the change in project scope applied to this Scoping Report, which is combining the offshore Proposed Development Array Areas, the impacts are anticipated to generally be the same as identified in the initial Scoping Report. The initial Berwick Bank Wind Farm Proposal Scoping Opinion response has been considered for the development of this section.

7.2.2. STUDY AREA

324. In the majority, data has been considered within a 10 nautical mile (nm) buffer of the Proposed Development Array Area (the "shipping and navigation study area"), as shown in Figure 7.3. The shipping and navigation study area is large enough to encompass vessel routeing which has the potential to be impacted, while remaining site-specific to the Proposed Development. The shipping and navigation study area is standard for shipping and navigation assessments and has been agreed in consultation with the Maritime and Coastguard Agency (MCA), Northern Lighthouse Board (NLB) and Trinity House (as per Appendix 5).

325. Relevant features in vicinity to the Proposed Development ECC have also been considered with a study area around the Proposed Development ECC to be defined in the Navigational Risk Assessment (NRA) for vessel traffic analysis.

326. A regional shipping and navigation study area of 50 nm from the Proposed Development Array Area will also be considered to assess the effects from the Proposed Development when considered together with other projects or activities (see section 7.2.8).

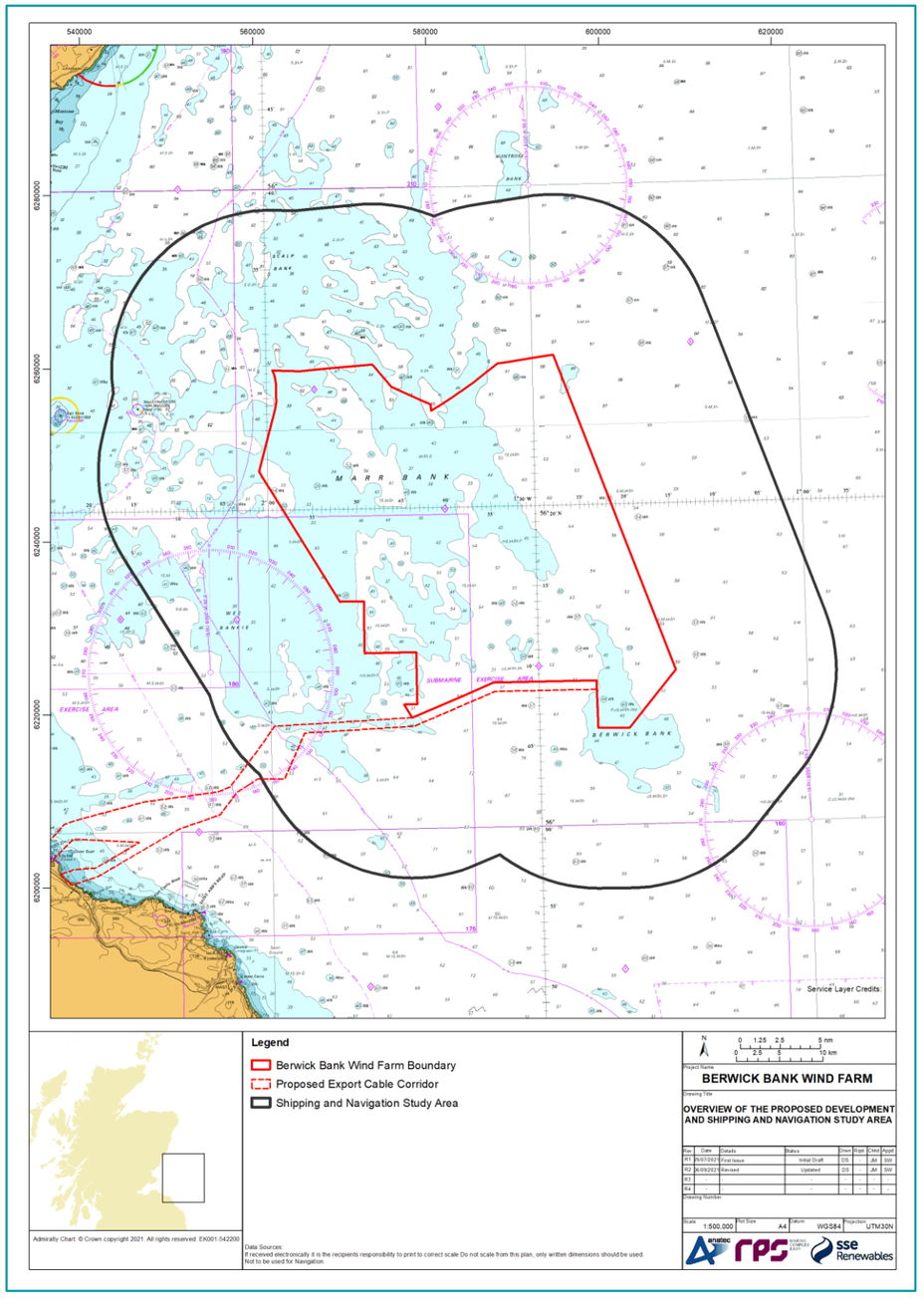

Figure 7.3: Overview of Proposed Development and Shipping and Navigation Study Area

7.2.3. BASELINE ENVIRONMENT

327. This section provides a concise summary of the baseline environment of the Proposed Development for navigational features, vessel traffic and marine incidents, reference should be made to Appendix 12 where a more detailed description is provided.

Desktop Study

328. An initial desk-based review of literature and data sources has been undertaken to establish the baseline environment. The data sources considered are summarised at Table 7.2 below.

Table 7.2: Summary of Key Desktop Data Sources

Title	Summary	Year(s)	Author
Admiralty Charts 160, 175, 190, 210, 734, 1407, 1409 and 1481	Latest United Kingdom Hydrographic Office (UKHO) Admiralty Charts covering the Proposed Development Array Area and ECC	2020/2021	UKHO
Admiralty Sailing Directions North Sea (West) Pilot NP54	Provides essential information to support port entry and coastal navigation.	2016	UKHO
Marine Accident Investigation Branch (MAIB) incident data	Maritime incidents reported to the MAIB within the shipping and navigation study area.	2010 to 2019	MAIB
Royal National Lifeboat Institution (RNLI) Incident Data	Maritime incidents responded to by the RNLI within the shipping and navigation study area.	2010 to 2019	RNLI
Royal Yachting Association (RYA) Coastal Atlas of Recreational Boating	Geographical Information System (GIS) dataset of recreational boating activity around the United Kingdom (UK).	2019	RYA

Site-specific Survey Data

329. A requirement of Marine Guidance Note (MGN) 654 is for a minimum of 28 days of seasonally varied data which is usually collected during two, 14-day surveys, in summer and winter. Therefore, on-site vessel traffic surveys have been undertaken during two 14-day periods, in July 2020 and January 2021 following agreement with key stakeholders including the MCA and NLB. These surveys involved the collection of Automatic Identification System (AIS), visual observations and Radio Detection and Ranging (Radar) data, thus ensuring comprehensive coverage of non-AIS vessels.

330. It is acknowledged that COVID-19 has had a global effect on shipping movements and therefore the vessel traffic surveys may not be fully reflective of "normal" activity, particularly the summer survey. This has been discussed with key stakeholders and an additional 12-month AIS dataset (covering 2019) has been used to validate the vessel traffic survey data in the NRA. Other data sources will also be used to validate the vessel traffic survey data including Vessel Monitoring System (VMS) data, the RYA Coastal Atlas (RYA, 2019) and further consultation with RYA Scotland and local clubs.

Baseline Characterisation

Navigational Features

331. Navigational features have been identified via a review of Admiralty Charts and the local Admiralty Sailing Directions (United Kingdom Hydrographic Office (UKHO), 2016).

332. The key navigational features in proximity to the Proposed Development are a number of other planned offshore wind farms, Ministry of Defence (MoD) practice areas, ammunition dumping grounds, spoil grounds and anchorage areas. Numerous charted wrecks and aids to navigation are also present in proximity to the Proposed Development. A plot of these key navigational features is provided in Appendix 12.

333. There are three other planned offshore wind farms located in proximity to the Proposed Development. The Seagreen Offshore Wind Farm is located approximately 2.2 nm north of the Proposed Development Array Area and has been consented with construction expected to commence in 2022. Inch Cape and Neart na Gaoithe (NnG) are located approximately 2.2 nm and 7.8 nm west of the Proposed Development Proposed Development Array Area, respectively. Both are consented with offshore construction of NnG ongoing (including a buoyed construction area).

334. Two MoD practice areas are located in proximity to the Proposed Development. The D513 practice firing area is located approximately 16 nm south east of the Proposed Development Proposed Development Array Area. The D604 practice firing range is located approximately 23 nm west of the Proposed Development Proposed Development Array Area. Both firing practice areas are operated using a clear range procedure.

335. A number of anchorage areas are located to the west of the Proposed Development Array Area towards the coast primarily within the Firth of Forth.

336. Two disused ammunition dumping ground are located approximately 20 nm west of the Proposed Development Proposed Development Array Area.

337. Fourteen charted wrecks are located within the Proposed Development Proposed Development Array Area, with the shallowest at a depth of 35 m below Chart Datum (CD). Three buoys are also located within the Proposed Development Proposed Development Array Area; two in the east and one in the west. All three are special marks.

Vessel Traffic

338. Twenty-eight days of AIS and Radar vessel traffic data within the shipping and navigation study area, collected during summer 2020 and winter 2021, is shown in Figure 7.4. It is noted that vessels involved in temporary, non-routine activities (e.g. vessels engaged in surveys) have been removed. This includes vessels visiting planned nearby offshore wind farm developments since these developments were not operational at the time of the surveys and this traffic is not considered representative of future operational traffic associated with these offshore wind farms.

339. An average of 14 unique vessels were recorded per day within the shipping and navigation study area during summer 2020, with an average of approximately six unique vessels per day intersecting the Proposed Development Proposed Development Array Area. An average of 16 unique vessels were recorded per day within the shipping and navigation study area during winter 2021, with an average of approximately six unique vessels per day intersecting the Proposed Development Proposed Development Array Area.

340. The main vessel types recorded during summer 2020 were tankers (34%), cargo vessels (30%) and fishing vessels (18%). The main vessel types recorded during winter 2021 were cargo vessels (36%), tankers (31%) and fishing vessels (15%).

341. The most regular destinations for vessels within the shipping and navigation study area were all United Kingdom (UK) east coast ports including Aberdeen (11%), Grangemouth (7%) and Immingham (5%).

342. Anchoring was also assessed for the 28 days of AIS v and Radar vessel traffic data (excluding temporary activities) based on the navigational status broadcast on AIS and a manual check for patterns characteristic of anchoring activity. No anchoring was observed during either the summer or winter periods within the Proposed Development Array Area or the Proposed Development ECC. It is noted that further anchoring activity assessment will be undertaken in the NRA using a speed analysis, in which vessels travelling at under one knot for more than 30 minutes are flagged as possible anchoring activity.

Marine Incidents

343. An analysis of the MAIB incident data from 2010 to 2019 indicated that a total of four incidents, all involving fishing vessels, were recorded within the shipping and navigation study area, but all occurred outside the Proposed Development Proposed Development Array Area. A further four incidents, involving four fishing vessels and one tanker (one of the incidents involved two vessels), were reported to the MAIB within the Proposed Development ECC, all within the northern landfall option.

344. An analysis of the RNLI incident data from 2010 to 2019 indicated that a total of 20 incidents were recorded within the shipping and navigation study area, with two of these occurring within the Proposed Development Proposed Development Array Area. Incidents either involved recreational vessels (75%) or fishing vessels (25%). A further 18 incidents were recorded within the Proposed Development ECC; five of these incidents were recorded within the southern landfall option, and 13 within the northern landfall option.

345. Within the NRA an additional 10 years of MAIB incident data will be considered qualitatively as a secondary dataset with consideration for the advancement in technology and changes to legislation that have improved maritime safety over the past 10 and 20 years.

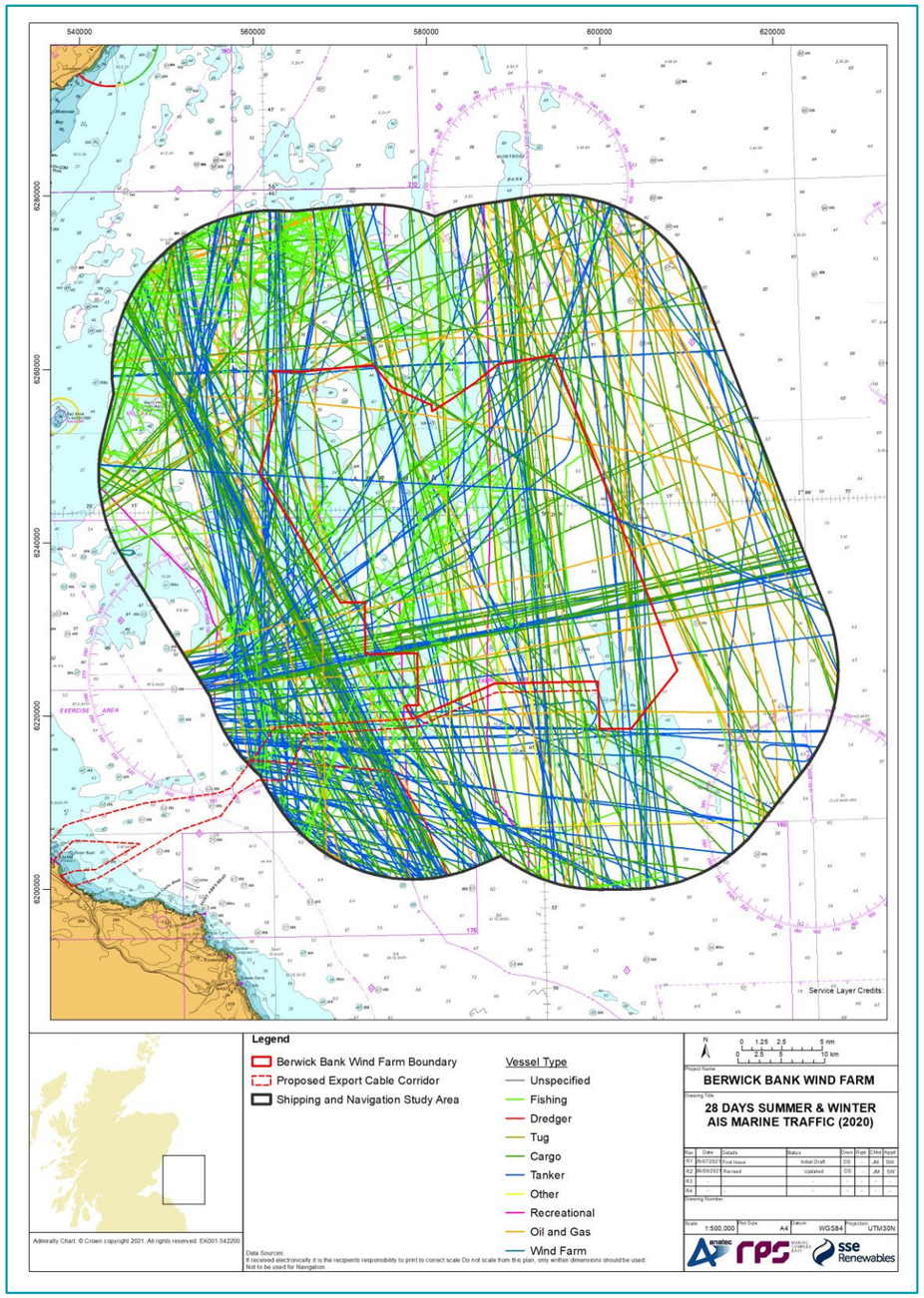

Figure 7.4: 28 Days Summer and Winter 2020/2021 AIS Marine Traffic

7.2.4. POTENTIAL PROPOSED DEVELOPMENT IMPACTS

346. A range of potential impacts on shipping and navigation have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Proposed Development in the absence of designed in measures:

- Construction
  - Vessel displacement;
  - Increased vessel to vessel collision risk between a third-party vessel and a project vessel;
  - Increased vessel to vessel collision risk;
  - Vessel to structure allision risk; and
  - Reduced access to local ports.
- Operation and Maintenance
  - Commercial traffic displacement;
  - Fishing vessel and recreational vessel displacement;
  - Increased vessel to vessel collision risk between a third-party vessel and a project vessel;
  - Increased vessel to vessel collision risk between third-party vessels (route-based);
  - Increased vessel to vessel collision risk involving fishing vessels and/or recreational vessels;
  - Vessel to structure allision risk for commercial vessels;
  - Vessel to structure allision risk for fishing vessels in transit;
  - Vessel to structure allision risk for recreational vessels;
  - Reduced access to local ports;
  - Reduction of under keel clearance;
  - Anchor interaction with subsea cables;
  - Interference with marine navigation, communications and position fixing equipment; and
  - Reduction of emergency response capability
- Decommissioning
  - As per Construction phase

7.2.5. DESIGNED IN MEASURES

347. The following designed in measures can reduce potential for impact for those impacts that have been scoped into the Proposed Development assessment.

- compliance with MGN 654 and its annexes (in particular Search and Rescue (SAR) annex 5 (MCA, 2021) and completion of a SAR checklist) where applicable;
- appropriate marking on UKHO Admiralty Charts;
- promulgation of information for vessel routes, timings and locations, safety zones and advisory passing distances as required via Kingfisher Bulletins;
- buoyed construction area in agreement with NLB;
- application for safety zones of up to 500 m during construction and periods of major maintenance;
- marine coordination and communication to manage project vessel movements;
- suitable implementation and monitoring of cable protection (via burial, or external protection where adequate burial depth as identified via risk assessment is not feasible) with any damage, destruction or decay of cables notified to MCA, NLB, Kingfisher and UKHO no later than 24 hours after discovered;
- marking and lighting of the site in agreement with NLB and in line with IALA Recommendation O-139 (IALA, 2013);
- compliance of all Proposed Development vessels with international marine regulations as adopted by the Flag State, notably the International Regulations for Preventing Collisions at Sea (COLREGs) (IMO, 1974) and the International Convention for the Safety of Life at Sea (SOLAS) (IMO, 1974);
- production of a Marine Pollution Contingency Plan;
- blade clearance of at least 37 m above MHWS (in line with RYA policy (RYA, 2015)); and
- guard vessel(s) as required by risk assessment.

348. The requirement and feasibility of additional measures will be dependent on the significance of the effects on shipping and navigation and will be consulted upon with statutory consultees throughout the Environmental Impact Assessment (EIA) process (see section 7.2.7).

7.2.6. POTENTIAL IMPACTS AFTER THE IMPLEMENTATION OF DESIGNED IN MEASURES

349. The impacts that have been scoped into the Proposed Development assessment are outlined in Table 7.3 together with a description of any additional data collection (e.g. site-specific surveys) and/or supporting analyses (e.g. modelling) that will be required to enable a full assessment of the impacts.

350. At this stage, no potential impacts have been scoped out of the assessment, in line with the assessment parameters set out in MGN 654 (MCA, 2021) which requires that the NRA determine which impacts (if any) may be scoped out of the assessment undertaken in the EIA Report.

Table 7.3: Impacts Proposed to be Scoped In to the Proposed Development Assessment for Shipping and Navigation. Project Phase Refers to Construction (C), Operation and Maintenance (O) and Decommissioning (D) Phase of the Proposed Development

Impact	Project Phase			Designed In Measures	Justification (including consideration of designed in measures)	Data Collection and Analysis Required to Characterise the Baseline Environment for the EIA	Summary of Proposed Approach to Assessment
	C	O	D				
Vessel displacement	✓		✓	• Promulgation of information as required (e.g. Notification to Mariners, Kingfisher Bulletin); and • Buoyed construction area in agreement with NLB.	Vessels may be displaced from their existing routes due to construction and decommissioning activities associated with the Proposed Development.	A dedicated vessel traffic survey has been undertaken to characterise vessel movements in the area.	Modelling of Maximum adverse scenario deviations for commercial vessel main routes will be undertaken in the NRA with input from Regular Operators and consideration of baseline environment.
Increased vessel to vessel collision risk between a third-party vessel and a project vessel	✓	✓	✓	• Promulgation of information as required (e.g. Notification to Mariners, Kingfisher Bulletin); • Marine coordination and communication to manage project vessel movements; • Compliance of all project vessels with international marine regulations as adopted by the Flag State, notably COLREGs (IMO, 1974) and SOLAS (IMO, 1974); and • Application for safety zones during construction of up to 500 m.	The presence of project vessels during construction phase, operation and maintenance phase and decommissioning phase may increase the likelihood of vessel to vessel encounters and subsequently increase the collision risk between third-party and project vessels.	A dedicated vessel traffic survey has been undertaken to characterise vessel movements in the area.	A qualitative assessment will be undertaken to assess potential for impact which will be informed by the NRA.
Increased vessel to vessel collision risk between third party vessels	✓		✓	Promulgation of information as required (e.g. Notifications to Mariners, Kingfisher Bulletin).	Displaced vessels may lead to increased traffic densities in certain areas and a subsequent increase in collision risk between third party vessels.	A dedicated vessel traffic survey has been undertaken to characterise vessel movements in the area.	Qualitative assessment, noting that some quantitative assessment will be undertaken for the operation and maintenance phase impact in the NRA.
Vessel to structure allision risk	✓		✓	• Appropriate marking on Admiralty Charts; • Promulgation of information as required (e.g. Notification to Mariners, Kingfisher Bulletin); • Buoyed construction area in agreement with NLB; • Application for safety zones during construction of up to 500 m; • Marking and lighting of the site in agreement with NLB and in line with IALA Recommendation O-139 (IALA, 2013); and • Guard vessel(s) as required by risk assessment.	Partially complete and completed structures within the Proposed Development Array Area could create an allision risk (powered or drifting) to passing traffic.	A dedicated vessel traffic survey has been undertaken to characterise vessel movements in the area.	Qualitative assessment, noting that some quantitative assessment will be undertaken for the operation and maintenance phase impact in the NRA.
Reduced access to local ports	✓		✓	• Marine coordination and communication to manage project vessel movements; and • Compliance of all project vessels with international marine regulations as adopted by the Flag State, notably COLREGs (IMO, 1974) and SOLAS (IMO, 1974).	Access to local ports may be impacted due to construction and decommissioning activities associated with the Proposed Development.	A dedicated vessel traffic survey has been undertaken to characterise vessel movements in the area.	A qualitative assessment will be undertaken to assess potential for impact which will be informed by the NRA.
Commercial traffic displacement		✓		Promulgation of information as required (e.g. Notification to Mariners, Kingfisher Bulletin).	Commercial vessels may be displaced from their existing routes due to the presence of the Proposed Development.	A dedicated vessel traffic survey has been undertaken to characterise vessel movements in the area.	Modelling of maximum adverse scenario deviations for commercial vessel main routes will be undertaken in the NRA with

Impact	Project Phase			Designed In Measures	Justification (including consideration of designed in measures)	Data Collection and Analysis Required to Characterise the Baseline Environment for the EIA	Summary of Proposed Approach to Assessment
	C	O	D				
							input from Regular Operators and consideration of baseline environment.
Fishing vessel and recreational vessel displacement		✓		Promulgation of information as required (e.g. Notification to Mariners, Kingfisher Bulletin).	Fishing vessels and recreational vessels may be displaced from their existing routes due to the presence of the Proposed Development.	A dedicated vessel traffic survey has been undertaken to characterise vessel movements in the area.	A qualitative assessment will be undertaken to assess potential for impact which will be informed by the NRA.
Increased vessel to vessel collision risk between third-party vessels (route-based)		✓		• Promulgation of information as required (e.g. Notification to Mariners, Kingfisher Bulletin); and • Application for safety zones during major maintenance of up to 500 m.	Displaced vessels may lead to increased traffic densities in certain areas and a subsequent increase in collision risk between third party commercial vessels.	A dedicated vessel traffic survey has been undertaken to characterise vessel movements in the area.	Collision risk modelling will be undertaken in the NRA to assess the change in collision risk for routeing third party vessels between pre and post Proposed Development scenarios.
Increased vessel to vessel collision risk involving fishing vessels and/or recreational vessels		✓		• Promulgation of information as required (e.g. Notification to Mariners, Kingfisher Bulletin); and • Application for safety zones during major maintenance of up to 500 m.	Displaced vessels may lead to increased traffic densities in certain areas and a subsequent increase in encounters.	A dedicated vessel traffic survey has been undertaken to characterise vessel movements in the area.	A qualitative assessment will be undertaken to assess potential for impact which will be informed by the NRA.
Vessel to structure allision risk for commercial vessels		✓		• Appropriate marking on Admiralty Charts; • Promulgation of information as required (e.g. Notification to Mariners, Kingfisher Bulletin); • Application for safety zones during periods of major maintenance of up to 500 m; • Marking and lighting of the site in agreement with NLB and in line with IALA Recommendation O-139 (IALA, 2013); and • Guard vessel(s) as required by risk assessment.	Structures within the Proposed Development Array Area could create an allision risk (powered or drifting) to passing commercial vessels.	A dedicated vessel traffic survey has been undertaken to characterise vessel movements in the area.	Powered and drifting allision risk modelling will be undertaken in the NRA.
Vessel to structure allision risk for fishing vessels in transit		✓		• Appropriate marking on Admiralty Charts; • Promulgation of information as required (e.g. Notification to Mariners, Kingfisher Bulletin); • Application for safety zones during periods of major maintenance of up to 500 m; • Marking and lighting of the site in agreement with NLB and in line with IALA Recommendation O-139 (IALA, 2013); and • Guard vessel(s) as required by risk assessment.	Structures within the Proposed Development Array Area could create an allision risk (powered or drifting) to passing fishing vessels.	A dedicated vessel traffic survey has been undertaken to characterise vessel movements in the area.	Internal allision risk modelling will be undertaken in the NRA.
Vessel to structure allision risk for recreational vessels				• Appropriate marking on Admiralty Charts; • Promulgation of information as required (e.g. Notification to Mariners, Kingfisher Bulletin); • Application for safety zones during periods of major maintenance of up to 500 m;	Structures within the Proposed Development Array Area could create an allision risk (powered or drifting) to passing recreational vessels.	A dedicated vessel traffic survey has been undertaken to characterise vessel movements in the area.	A qualitative assessment will be undertaken to assess potential for impact which will be informed by the NRA.

Impact	Project Phase			Designed In Measures	Justification (including consideration of designed in measures)	Data Collection and Analysis Required to Characterise the Baseline Environment for the EIA	Summary of Proposed Approach to Assessment
	C	O	D				
				• Marking and lighting of the site in agreement with NLB and in line with IALA Recommendation O-139 (IALA, 2013); • Guard vessel(s) as required by risk assessment; and • Minimum blade clearance of at least 37 m above MHWS.			
Reduced access to local ports		✓		• Promulgation of information as required (e.g. Notification to Mariners, Kingfisher Bulletin).	Access to local ports may be impacted due to maintenance activities associated with the Proposed Development.	A dedicated vessel traffic survey has been undertaken to characterise vessel movements in the area.	A qualitative assessment will be undertaken to assess potential for impact which will be informed by the NRA.
Reduction of under keel clearance		✓		• Appropriate marking on Admiralty Charts; • Promulgation of information as required (e.g. Notification to Mariners, Kingfisher bulletin); and • Suitable implementation and monitoring of cable protection (via burial, or external protection where adequate burial depth as identified by risk assessment is not feasible).	The implementation of cable protection to cables associated with the Proposed Development may reduce water depths in proximity and therefore reduce the under keel clearance for third-party traffic.	An assessment of the vessel traffic in proximity to the Proposed Development ECC will be undertaken (AIS only) and assessed against water depths within the Proposed Development ECC to identify any areas where under keel clearance may be of concern.	A qualitative assessment will be undertaken to assess potential for impact which will be informed by the NRA.
Anchor interaction with subsea cables		✓		• Appropriate marking on Admiralty Charts; • Promulgation of information as required (e.g. Notification to Mariners, Kingfisher bulletin); and • Suitable implementation and monitoring of cable protection (via burial, or external protection where adequate burial depth as identified by risk assessment is not feasible).	The presence of subsea cables associated with the Proposed Development may increase the likelihood of anchor interaction for third-party vessels including a snagging risk.	An assessment of the vessel traffic in proximity to the Proposed Development ECC will be undertaken (AIS only) including identification of areas where anchoring activity occurs frequently.	A qualitative assessment will be undertaken to assess potential for impact which will be informed by the NRA.
Interference with marine navigation, communications and position fixing equipment		✓		• None.	Communication and position fixing equipment may be affected by the presence of installations within the Proposed Development Array Area or ECC.	A dedicated vessel traffic survey has been undertaken to characterise vessel movements in the area.	A qualitative assessment will be undertaken to assess potential for impact which will be informed by the NRA.
Reduction of emergency response capability due to increased incident rates and reduced access for SAR responders		✓		• Compliance with MGN 654 and its annexes (in particular SAR annex 5 (MCA, 2021)) where applicable; • Marking and lighting of the site in agreement with NLB and in line with the IALA O-139 (IALA, 2013); and • Production of a Marine Pollution Contingency Plan.	The presence of the Proposed Development will increase the number of vessels in the area which may result in an increased number of incidents requiring emergency response and may reduce access for SAR responders.	MAIB and RNLI incident data and Department for Transport (DfT) SAR helicopter taskings data will be assessed to characterise baseline incident rates.	A qualitative assessment will be undertaken to assess potential for impact which will be informed by the NRA.

7.2.7. PROPOSED APPROACH TO THE ENVIRONMENTAL IMPACT ASSESSMENT

The shipping and navigation EIA will follow the methodology set out in section 4. Specific to the shipping and navigation EIA, the following guidance documents will also be considered:

- MGN 654 Offshore Renewable Energy Installations (OREIs) – Guidance on UK Navigational Practice, Safety and Emergency Response (MCA, 2021);
- Revised Guidelines for Formal Safety Assessment (FSA) (IMO, 2018);
- International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) Recommendation O-139 on the Marking of Man-Made Offshore Structures (IALA, 2013);
- MGN 372 Offshore Renewable Energy Installations (OREIs) – Guidance to Mariners Operating in the Vicinity of United Kingdom (UK) OREIs (MCA, 2008);
- The RYA's Position on Offshore Energy Developments: Paper 1 – Wind Energy (RYA, 2015).

351. As per the MCA methodology (Annex 1 of MGN 654), an NRA will be undertaken, the output of which will form the primary input into the Offshore EIAR. Given that the NRA includes a set of criteria under MGN 654 which must be considered, no impacts will be scoped out of the NRA process, as noted in section 7.2.6.

352. The IMO FSA methodology is the internationally recognised approach for assessing the impacts to shipping and navigation receptors, and is the approach required under the MCA methodology. This methodology is centred on risk control and assesses each impact in terms of its frequency and consequence so that its significance can be determined as:

- "Broadly Acceptable";
- "Tolerable"; or
- "Unacceptable".

353. Any impacts assessed as "Unacceptable" will require additional measures implemented beyond those considered designed in measures, so that the significance of the impact is reduced to within "Tolerable" or "Broadly Acceptable" parameters.

354. The significance of each impact assessed will be determined via a risk ranking matrix based on the frequency and consequence of the impact. The frequency and consequence of each impact will be related to parameters within the IMO FSA guidance and agreed at the Hazard Workshop. The risk ranking matrix is presented in Table 7.4. The frequency and consequence rankings of each impact will be determined using a number of inputs, including:

- quantitative modelling undertaken in the NRA;
- output of the baseline assessment;
- consideration of designed in measures;
- lessons learnt from other offshore wind farm developments;
- level of stakeholder concern;
- consultation output; and
- expert opinion.

Table 7.4: Risk Ranking Matrix

Consequence \ Frequency	Negligible	Extremely unlikely	Remote	Reasonably Probable	Frequent
Negligible	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable	Tolerable
Minor	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable	Tolerable	Tolerable
Moderate	Broadly Acceptable	Broadly Acceptable	Tolerable	Tolerable	Unacceptable
Serious	Broadly Acceptable	Tolerable	Tolerable	Unacceptable	Unacceptable
Major	Tolerable	Tolerable	Unacceptable	Unacceptable	Unacceptable

Potential Cumulative Effects

355. There is potential for cumulative effects to occur on shipping and navigation receptors as a result of other projects or activities. The cumulative effects assessment will follow the approach outlined in section 4.3.7. Offshore wind farms and any other relevant marine activity within the 50 nm shipping and navigation study area will be considered in the cumulative effects assessment with a screening process undertaken to determine which developments and activities should be considered in the assessment of cumulative effects.

356. Where relevant, impacts assessed within the NRA process for the Proposed Development in isolation (see section 7.2.4) will also be assessed for potential cumulative effect. In line with the approach for the isolation case, no cumulative effects will be scoped out for the NRA, noting the assessment criteria required under MGN 654.

Potential Transboundary Impacts

357. A screening of transboundary impacts has been carried out and is presented Appendix 3. The potential for transboundary effects has been identified for shipping and navigation receptors and will be considered within the EIAR.

7.2.8. SCOPING QUESTIONS TO CONSULTEES

358. Based on the findings of the Offshore EIA Scoping Report, the following questions should be considered by stakeholders seeking to respond:

- Do you agree that the data sources available relating to navigational features is sufficient to inform the assessment of shipping and navigation impacts?
- Do you agree that the designed in measures described provide a suitable means for managing and mitigating the potential effects of the Proposed Development on shipping and navigation receptors?
- Do you agree that the list of organisations provided for engagement and consultation (section7.2.9) are sufficient?
- What scoped or application projects should be considered within the cumulative assessment? What effects might be seen at a cumulative level?

7.2.9. NEXT STEPS

359. The output of this Offshore EIA Scoping Report (specifically the Scoping Opinion) will feed into the NRA, which will be drafted in support of the EIA Report as required under the MCA methodology (MCA, 2021). In addition, the Scoping Opinion on the initial Berwick Bank Wind Farm proposal will also be considered.

360. The primary purpose of the NRA is to identify scoped in impacts that require further assessment within the EIA. The NRA process will also include consultation with both statutory and non-statutory stakeholders including Regular Operators identified throughout AIS analysis.

361. In order to inform the shipping and navigation EIA, consultation during the pre-application phase, including a Hazard Workshop, is planned with the following statutory and non-statutory organisations:

- MCA;
- NLB;
- Chamber of Shipping (CoS);
- RYA;
- Cruising Association;
- Scottish Fishermen's Federation (SFF);
- regular vessel operators;
- North and East coast Regional Inshore fisheries Group (via the commercial fisheries stakeholder engagement)
- RNLI; and
- local port operators (including Forth Ports and relevant municipal ports).

362. Consultation undertaken to date with stakeholders is presented in Appendix 5, and this will be undertaken through the Shipping and Navigation Road Map process.

7.3. AVIATION, MILITARY AND COMMUNICATIONS

7.3.1. INTRODUCTION

363. This section of the Offshore EIA Scoping Report identifies the elements of aviation, military and communications of relevance to the Proposed Development and considers the potential impacts from the construction, operation and maintenance, and decommissioning of the offshore and intertidal components (seaward of the MHWS mark) of the Proposed Development on aviation, military and communications receptors.

364. The potential effects of wind turbines on aviation are widely publicised, but the primary concern is one of safety. Despite innumerable subtleties in the actual effects, there are two dominant scenarios that lead to potential impacts:

- physical obstruction: wind turbines can present a physical obstruction to aircraft; and
- impacts on aviation radar systems and the provision of radar-based Air Traffic Services (ATS): wind turbines can create unwanted radar clutter which appears on radar displays and can affect the provision of ATS to pilots. Radar clutter (or false radar returns) can confuse air traffic controllers making it difficult to differentiate between aircraft and those radar returns resulting from the detection of turbines. Furthermore, the appearance of multiple false targets in close proximity can generate false aircraft tracks and seduce those returns from 'real' aircraft away from the true aircraft position.

365. Aviation, military and communications were reported on in the initial Scoping Report. Although the change in project scope applied to this Scoping Report, which is combining the offshore Proposed Development Array Areas, the impacts are anticipated to generally be the same as identified in the initial Scoping Report. The initial Berwick Bank Wind Farm Proposal Scoping Opinion response has been considered for the development of this section.

7.3.2. STUDY AREA

366. The aviation, military and communications study area has been determined by the range of the affected aviation receptors; in particular, Air Traffic Control (ATC) and Air Defence (AD) Primary Surveillance Radars (PSRs). The operating range of these radars can be up to 200 nm (370 km); however, it is only the likely radar coverage over the Proposed Development that has been taken into account and assisted in identifying the relevant radars, and stakeholders, that may be affected. The aviation, military and communications study area can be seen in Figure 7.5 together with the locations of the relevant aviation receptors.

367. The construction, operation and maintenance, and decommissioning of the Proposed ECC will not affect aviation and therefore no infrastructure relating to the proposed ECC will be considered; as such, this has not been considered when defining the aviation, military and communications study area.

7.3.3. BASELINE ENVIRONMENT

Desktop Study

368. An initial desk-based review of literature and data sources to support this Offshore EIA Scoping Report has identified a number of baseline datasets. These are summarised at Table 7.5 below.

Table 7.5: Summary of Key Desktop Reports

Title	Source	Year
Seagreen Alpha/Bravo Environmental Statement	Seagreen Wind Energy	2012
Seagreen Alpha/Bravo Scoping Report	Seagreen Wind Energy	2017
Seagreen Alpha/Bravo Environmental Statement	Seagreen Wind Energy	2018
Inch Cape Offshore Wind Farm Environmental Statement	Inch Cape Offshore Wind Limited	2013
Neart na Gaoithe Offshore Wind Farm Environmental Statement	Neart na Gaoithe Offshore Wind Limited	2018
Seagreen Alpha/Bravo Airspace Change Proposal Regulatory Decision	Seagreen Wind Energy	2020

Site-specific Data

369. Pre-planning radar-line-of-sight (RLOS) assessments by the Ministry of Defence (MoD) and National Air Traffic Services En-Route PLC (NERL) will be undertaken to inform the Offshore EIAR. To inform this Offshore EIA Scoping Report an assessment of the likely impacts, backed-up by an 'in-house' database of civilian and military radar coverage, has been carried out.

Baseline Characterisation

370. The Proposed Development is located in close proximity, and to the south, of the consented Seagreen Alpha/Bravo project. As such, the potential impact on aviation, in particular aviation radar systems, will be similar to those assessed for Seagreen Alpha/Bravo ; therefore, data collected to inform the Seagreen Alpha/Bravo Environmental Statement (Seagreen Wind Energy, 2012), Scoping Report (Seagreen Wind Energy, 2017) and Environmental Statement (Seagreen Wind Energy, 2018) are appropriate sources of information to inform the assessment of impacts for the Proposed Development. An initial desk-based review has been undertaken to consider the aviation aspects likely to be affected by the Proposed Development utilising these, as well as other available datasets.

371. There are a number of civilian and military aviation interests which the Proposed Development could affect (see Figure 7.5). As a result, there is a potential aviation safety risk and the Proposed Development may only proceed once all parties are content that any risks are resolved.

372. A detailed desk-top review will be undertaken to characterise existing and future aviation, military and communications baseline conditions in the aviation, military and communications study area to inform the Offshore EIAR. This will be undertaken by reviewing the relevant aviation legislation and guidance documents, as well as data sources such as aviation flying charts and other flight information publications; in particular, the UK Integrated Aeronautical Information Package (UK IAIP).

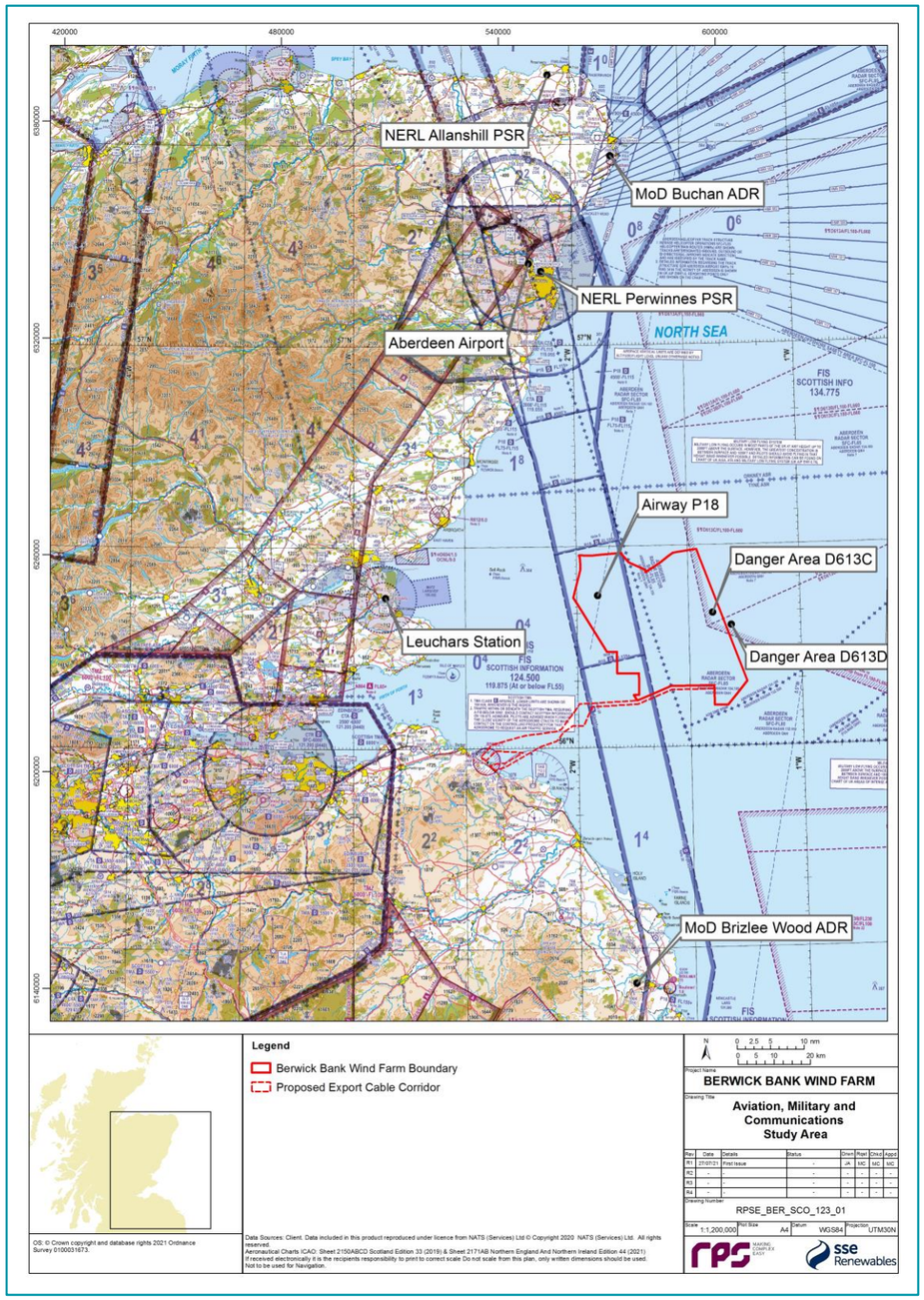

Figure 7.5: Aviation, Military and Communications Study Area and Associated Identified Receptors

373. An initial review of the aviation, military and communications study area has been carried out in order to identify which aviation activities might be affected by the Proposed Development; this included the following aviation receptors:

- civil airport patterns and procedures;
- military aerodrome patterns and procedures;
- civil ATC radar;
- military ATC radar;
- military AD radar;
- military low flying;
- Helicopter Main Routes (HMRs);
- offshore helicopter operations (including Search and Rescue); and
- offshore helicopter installations (oil and gas platforms).

374. In terms of airspace, the western portion of the Proposed Development is located underneath Airway P18 (see Figure 7.5) which is primarily used by commercial aircraft routing to, and from, Aberdeen Airport; the airway is activated upwards from Flight Level (FL) 115 (11,500 ft) in the northwest section of the Proposed Development and from FL 155 (15,500 ft) in the southwest section. The north-eastern portion of the Proposed Development overlaps the lateral boundaries of Danger Areas D613C and D613D (see Figure 7.5). These Danger Areas are activated periodically from FL 100 (10,000 ft) to FL 660 (66,000 ft) for military air combat training and supersonic flight. The presence of wind turbines within the boundaries of these Danger Areas, and just outside the boundaries of Airway P18, are not in themselves expected to impact on aviation operations. This will be covered in detail in the EIA Report.

375. From the review, it was confirmed that the Proposed Development was sufficiently distant from civil airports and military aerodromes to have any potential impact on their patterns and procedures. The nearest civil airport is Aberdeen Airport and the nearest military aerodrome is Leuchars station; both of which are identified on Figure 7.5. It was also determined that there were no HMRs or offshore helicopter installations that would be affected by the Proposed Development. As a result, these aviation receptors can be scoped out of the EIA while the remaining receptors (civil ATC radar, military ATC radar, military AD radar, military low flying and offshore helicopter operations (including SAR)) remain scoped in.

376. The key potential aviation issues to resolve are associated with the impact of wind turbines on civilian and military PSR systems; including ATC and AD PSR systems. The initial assessment has determined that there are five relevant ATC and AD PSR systems located throughout eastern Scotland and northern England. These radars provide coverage over much of the North Sea and could potentially be affected by the Proposed Development. The relevant civilian and military PSRs are as follows:

- Ministry of Defence (MoD) Brizlee Wood AD PSR;
- MoD Buchan AD PSR;
- MoD Leuchars Station ATC PSR;
- National Air Traffic Services (En-Route) PLC
- (NERL) Allanshill ATC PSR; and
- NERL Perwinnes ATC PSR.

377. Any adverse impact on these PSRs will be formally confirmed once MoD and NERL carry out pre-planning radar-line-of-sight (RLOS) assessments.

7.3.4. POTENTIAL PROPOSED DEVELOPMENT IMPACTS

378. A range of potential impacts on aviation, military and communications receptors have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Proposed Development in the absence of designed in measures:

- Construction
  - Potential impact on low flying (including SAR helicopter operations) due to presence of obstacles (cranes, stationary wind turbines).
  - Potential impacts on civil airport patterns and procedures due to presence of obstacles (cranes, stationary wind turbines).
  - Potential impact on military aerodrome patterns and procedures due to presence of obstacles (cranes, stationary wind turbines).
  - Potential impacts on Helicopter Main Routes (HMRs) due to presence of WTGs.
  - Potential impacts on Offshore helicopter installations (oil & gas platforms) due to the presence of WTGs.
- Operation and Maintenance
  - During the operation and maintenance phases, the movement of the wind turbine blades can interfere with civil and military PSR systems:

- Potential impact on NERL ATC radars due to presence of wind turbines;
- Potential impact on Military ATC radars due to presence of wind turbines;
- Potential impact on Military AD radars due to presence of wind turbines; and
- Potential impact on low flying (including SAR helicopter operations) due to presence of wind turbines.

- Decommissioning
  - Potential impact on low flying aircraft (including SAR helicopter operations) due to presence of obstacles (e.g. cranes, stationary wind turbines).

7.3.5. DESIGNED IN MEASURES

379. The following designed in measures, and how these can reduce potential for impact have been considered in identification of impacts that have been scoped into the Proposed Development assessment (Table 7.6):

- adherence to Civil Aviation Publication (CAP) 393 Article 223 (Civil Aviation Authority (CAA), 2018) which sets out the mandatory requirements for lighting of offshore wind turbines to be followed. This will require approval and implementation of a Lighting and Marking Plan (LMP) which will set out specific requirements in terms of aviation lighting to be installed on the wind turbines. The LMP will be prepared in consultation with the CAA and other aviation stakeholders and will take into account requirements for aviation lighting as specified in Article 223 of the UK Air Navigation Order (ANO) 2016 and changes to International Civil Aviation Organization (ICAO) Annex 14 Volume 2, Chapter 6, paragraph 6.2.4 promulgated in November 2016; and
- all structures > 91.4 m in height will be charted on aeronautical charts and reported to the Defence Geographic Centre (DGC) which maintains the UKs database of tall structures (Digital Vertical Obstruction File) at least ten weeks prior to construction.

380. The requirement and feasibility of additional measures will be dependent on the significance of the effects on aviation, military and communications and will be consulted upon with statutory consultees throughout the EIA process.

7.3.6. POTENTIAL IMPACTS AFTER THE IMPLEMENTATION OF DESIGNED IN MEASURES

381. The impacts that have been scoped into the Proposed Development assessment are outlined in Table 7.6 together with a description of any supporting analyses (e.g. modelling) that will be required to enable a full assessment of the impacts.

382. At this stage, potential impacts to civil airport and military aerodrome patterns and procedures, HMRs and offshore helicopter installations within the aviation, military and communications study area have been scoped out of the assessment, described in Table 7.7.

Table 7.6: Impacts Proposed to be Scoped In to the Proposed Development Assessment for Aviation, Military and Communications. Project phase refers to construction (C), operation and maintenance (O) and decommissioning (D) phase of the Proposed Development

Impact	Project Phase			Designed In Measures	Justification (including consideration of designed in measures)	Data Collection and Analysis Required to Characterise the Baseline Environment for the EIA	Summary of Proposed Approach to Assessment
	C	O	D				
Potential impact on low flying (including SAR helicopter operations) due to presence of obstacles (cranes, stationary wind turbines).	✓	✓	✓	Installation of appropriate aviation lighting and promulgation on aviation charts.	The impact on PSRs are scoped in following the NATS consultation response to the Initial Berwick Bank Wind Farm Proposal Scoping Opinion. Wind turbines create a physical obstruction to low flying operations.	Consultation with MoD and SAR helicopter operators will be required on wind turbine layout.	No modelling is required for this potential impact. A qualitative assessment will be undertaken based on industry guidance.
Potential impact on NERL ATC radars due to presence of wind turbines.		✓		No designed in measures for this impact.	Wind turbines can cause permanent interference to civil ATC radars.	RLOS and operational assessments to be carried out by NERL.	Pre-planning RLOS assessment by NERL will be undertaken and presented within the EIA Report.
Potential impact on Military ATC radars due to presence of wind turbines.		✓		No designed in measures for this impact.	Wind turbines can cause permanent interference to military ATC radars.	RLOS and operational assessments to be carried out by MoD.	Pre-planning RLOS assessment by MoD will be undertaken and presented within the EIA Report.
Potential impact on Military AD radars due to presence of wind turbines.		✓		No designed in measures for this impact.	Wind turbines can cause permanent interference to military AD radars.	RLOS and operational assessments to be carried out by MoD.	Pre-planning RLOS assessment by MoD will be undertaken and presented within the EIA Report.

Table 7.7: Potential Impacts Proposed to be Scoped Out of the Proposed Development Assessment for Aviation, Military and Communications

Impact	Designed in Measures	Justification
Construction		
Potential impact on civil airport patterns and procedures due to presence of obstacles (cranes, stationary wind turbines).	• adherence Civil Aviation Publication (CAP) 393 Article 223 which sets out the mandatory requirements for lighting of offshore wind turbines to be followed. This will require approval and implementation of a LMP which will set out specific requirements in terms of aviation lighting to be installed on the wind turbines • all structures > 91.4 m in height will be charted on aeronautical charts and reported to the DGC which maintains the UK's database of tall structures (Digital Vertical Obstruction File) at least ten weeks prior to construction	The Proposed Development Array Area will be sufficiently distant from any civilian airports to have any potential impact on their patterns and procedures.
Potential impact on military aerodrome patterns and procedures due to presence of obstacles (cranes, stationary wind turbines).		The Proposed Development Array Area will be sufficiently distant from any military aerodromes to have any potential impact on their patterns and procedures.
Potential impacts on Helicopter Main Routes (HMRs) due to presence of WTGs.		There are no HMRs within the aviation, military and communications study area that can be affected by the Proposed Development.
Potential impacts on Offshore helicopter installations (oil & gas platforms) due to the presence of WTGs.		There are no offshore helicopter installations within the aviation, military and communications study area that can be affected by the Proposed Development.

7.3.7. PROPOSED APPROACH TO THE ENVIRONMENTAL IMPACT ASSESSMENT

383. The aviation, military and communications offshore EIA will follow the methodology set out in section 4. Specific to the aviation, military and communications EIA, the following guidance documents will also be considered:

- CAP 393 – Air Navigation: The Order and the Regulations (2016);
- CAP 670 - Air Traffic Services Safety Requirements (Issue 3, 7 June 2019);
- CAP 764 - CAA Policy and Guidelines on Wind Turbines (Version 6, February 2016);
- CAP 774 - The UK Flight Information Services (Version 3, 25 May 2017);
- CAP 032 - UK Integrated Aeronautical Information Package (2020);
- Military Aviation Authority (MAA): MAA Regulatory Publication 3000 Series: Air Traffic Management Regulations (21 September 2018);
- MAA: Manual of Military Air Traffic Management (30 September 2019);
- UK Military Aeronautical Information Publication (2020);
- Marine Guidance Note (MGN) 543: Offshore Renewable Energy Installations - Guidance on UK Navigational Practice, Safety and Emergency Response Issues (19 August 2016); and
- Civil Aviation Authority (CAA) Visual Flight Rules Chart (CAA, 2020).

Potential Cumulative Effects

384. Although the predicted effects from the Proposed Development on aviation, military and communications receptors are considered to be localised to within the footprint of the Proposed Development, there is potential for the predicted impacts to interact with impacts from other projects and activities in the aviation, military and communications study area which may lead to a cumulative effect on receptors. The cumulative effects assessment will follow the approach outlined in section 4.3.7.

385. The cumulative assessment will consider other offshore wind farms and associated helicopter requirements within the aviation, military and communications study area.

Potential Transboundary Impacts

386. A screening of transboundary impacts has been carried out and is presented in Appendix 3. No potential transboundary effects have been identified for aviation, military and communication and therefore this will not be considered within the EIAR.

7.3.8. SCOPING QUESTIONS TO CONSULTEES

- Do you agree that the existing data available to describe the aviation, military and communications baseline remains sufficient to describe the physical environment in relation to the Proposed Development?
- Do you agree that the designed in measures described provides a suitable means for managing and mitigating the potential effects of the Proposed Development on the aviation, military and communications receptors?
- Do you agree that the assessment of aviation, military and communications receptors should be scoped out of the Proposed Development EIA?
- Do you agree with the proposal to scope transboundary impacts out of the EIA?

7.3.9. NEXT STEPS

387. Consultation will commence with the relevant aviation, military and communications stakeholders, in particular MoD and NERL, to ensure that the key aviation impacts are clearly identified prior to submission of the EIA Report. This will also allow mitigations discussions to take place early to ensure that suitable mitigations solutions can reduce potential significance of effect prior to Application. In particular:

- the MOD will be consulted in regard to potential impacts from the final agreed ECC including in relation to UXO clearance;
- consultation with NATS will be undertaken to establish appropriate mitigation for potential adverse impact on Perwinnes PSR;
- the CAA as part of pre-Application engagement; and
- the MOD will be consulted on the Proposed Development aviation lighting and marking plan and the implementation of suitable ATC and AD PSR solutions.

7.4. MARINE ARCHAEOLOGY

7.4.1. INTRODUCTION

388. This section of the Offshore EIA Scoping Report identifies marine archaeology resources of relevance to the Proposed Development and considers the potential impacts from the construction, operation and maintenance, and decommissioning of the offshore and intertidal components (seaward of the MLWS mark) of the Proposed Development on marine archaeology resources.

389. Marine archaeology was included in the initial Offshore EIA Scoping Report. Although the change in project scope applied to this Offshore EIA Scoping Report, which is combining the offshore Proposed Development Array Areas, the impacts are anticipated to generally be the same as identified in the initial Scoping Report. The initial Berwick Bank Proposal Scoping Opinion response has been considered for the development of this section. SSER intends to scope out marine archaeology as per the initial Offshore EIA Scoping Report.

7.4.2. STUDY AREA

390. The marine archaeology study area is defined as the area encompassing the offshore components of the Proposed Development (i.e. the Proposed Development Array Area and proposed ECC seaward of MLWS) as this area is considered to be directly affected by the Proposed Development. A 2 km buffer to allow the site-specific data to be put in a wider context (Figure 7.6) has been applied.

7.4.3. BASELINE ENVIRONMENT

391. This section provides a concise summary of the baseline environment of the Proposed Development, reference should be made to Appendix 13 where a more detailed description is provided.

392. A geophysical survey of the Proposed Development was undertaken between August and October 2019. The data were collected to a specification appropriate to achieve the following interpretation requirements:

- Magnetometer: identification of anomalies > 5 nT;
- SSS: ensonification of anomalies > 0.3 m;
- SBP: penetration > 10 m; and
- Multibeam bathymetry: ensonification of anomalies < 1.0 m.

393. All data were collected and referenced relative to the WGS84 datum and UTM30N projection. Details of the survey specification of the offshore and nearshore geophysical surveys are presented within Appendix 13. An overview of the known archaeological features is provided below.

394. There are no protected areas or statutory designations recorded in relation to submerged landscapes within the limits of the Proposed Development. It is also considered unlikely that evidence of in situ Palaeolithic and Mesolithic activity will be found within the limits of the Proposed Development Array Area due to the effects of repeated glaciations, marine transgressions and associated fluvial activity.

395. There is however some paleoenvironmental potential within the Aberdeen Ground Formation. Within the ECC there is some potential for late Palaeolithic/Mesolithic deposits in the near shore area. However, due to the effects of erosion, redeposited material is more likely than in situ evidence. In addition, the localised presence of peat buried in the Quaternary deposits within the ECC could suggest a good palaeo-environmental potential and where these sediments are present there is a good potential for organic preservation of remains such as fish traps. These are likely to be associated with prehistoric exploitation of the coastal margins.

396. There has been one designated wreck recorded within the limits of the Proposed Development (U 12 SSS_2020_0165 – a designated war grave) which falls within the protection of the Protection of Military Remains Act.

397. There are 20 wrecks recorded by the project specific geophysical survey within the Proposed Development Array Area, of these, four are known wrecks: Oswin, Kitty, Burnstone and U12 (discussed above). Of the remaining 16 wrecks, 14 are also recorded as UKHO data. The remaining two wrecks may represent one of the 16 wrecks recorded on the NRHE as potentially lying within the Proposed Development Array Area (although none of their positions have been verified: Figure 7.7).

398. No wrecks were recorded within the limits of the ECC during the Proposed Development geophysical survey carried out in 2019 (although the survey did not cover the full extent of the ECC). There are eight wrecks and obstructions recorded on the UKHO that lie beyond the extent of the survey and so their locations must still be assumed at this stage (UKHO 2873, UKHO 2875 Sharon Vale, UKHO 2884, UKHO 2890, UKHO 2892, UKHO2904 Cradock, UKHO 3101 Obstruction, UKHO 63948). These are illustrated in Figure 7.7.

399. A further 43 unconfirmed anomalies of medium archaeological potential and 119 large magnetic anomalies of archaeological potential were recorded within the limits of the Proposed Development. Some of these anomalies may be associated with wrecks recorded on the UKHO or NRHE that have no known position, or they could represent anomalies of as yet unknown archaeological interest (shown in Figure 7.7).

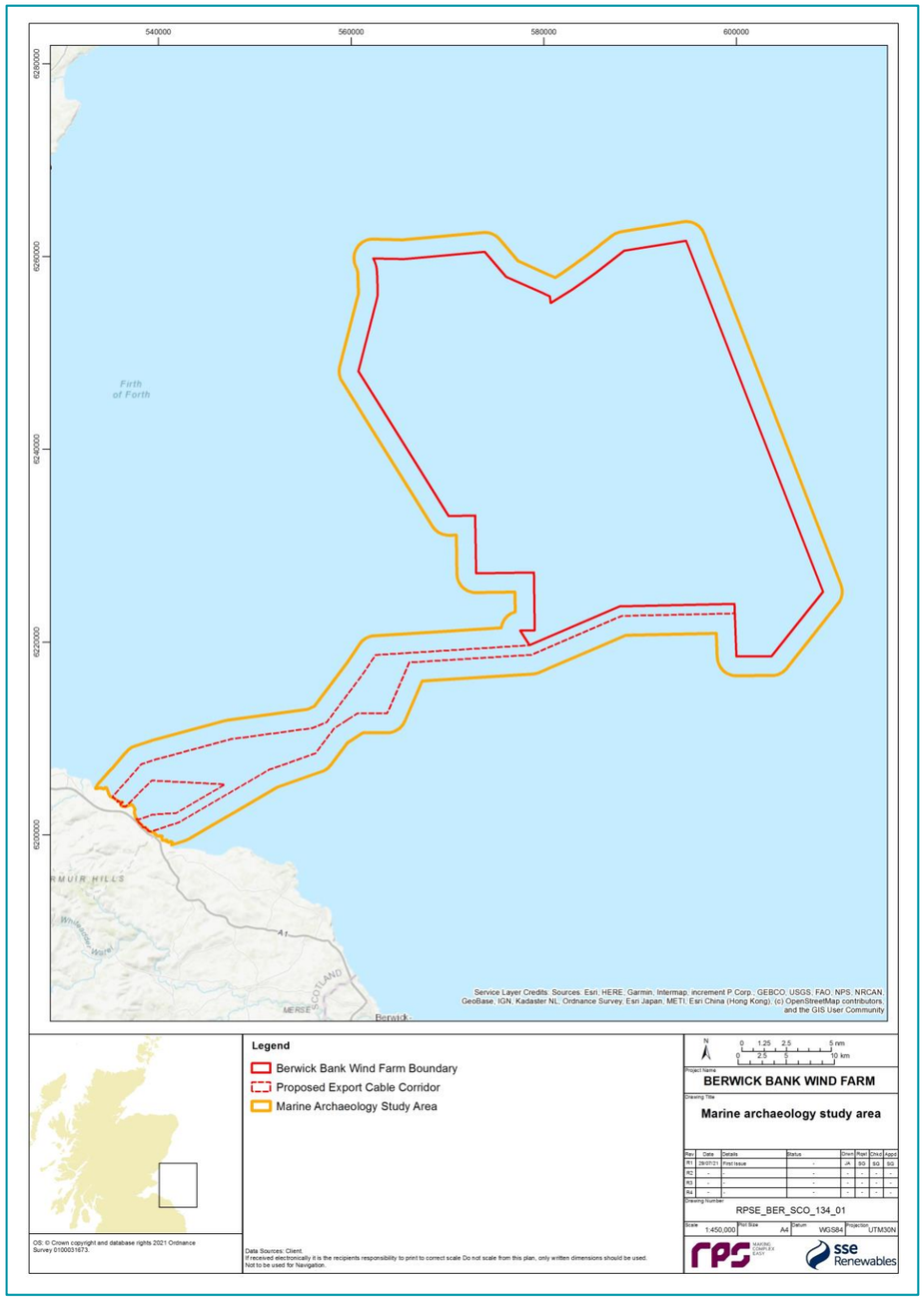

Figure 7.6: Marine Archaeology Study Area

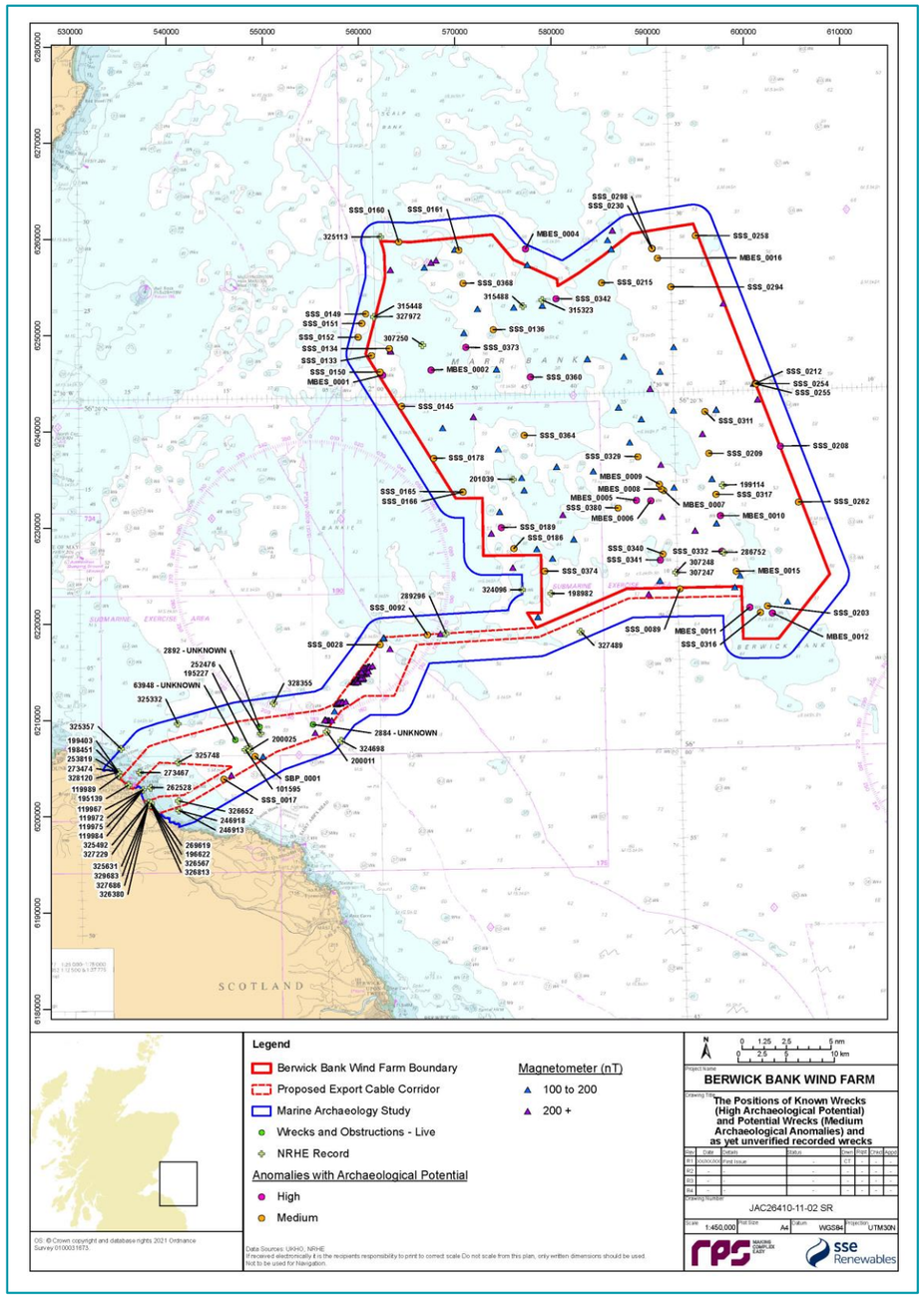

Figure 7.7: Positions of Known Wrecks (High Archaeological Potential) and Potential Wrecks (Medium Archaeological Anomalies) and as yet Unverified Recorded Wrecks

7.4.4. POTENTIAL PROPOSED DEVELOPMENT IMPACTS

400. A range of potential impacts on marine archaeology have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Proposed Development in the absence of designed in measures:

- Construction
  - Construction activities including installation of wind turbine foundations and substation foundations, use of jack-up vessel during foundation installation, installation of array cables and offshore export cable and anchor placement during cable installation may affect archaeological remains.
- Operation and Maintenance
  - Component replacement and cable repair activities including use of jack-up vessel may affect archaeological remains.
- Decommissioning
  - As for construction phase.

7.4.5. DESIGNED IN MEASURES

401. As part of the Proposed Development design process, a number of designed in measures are proposed to reduce the potential for impacts on marine archaeology (see Table 7.8). As there is a commitment to implementing these measures, they are considered inherently part of the design and will evolve over the development process as the EIA progresses and will inform the preparation of a Written Scheme of Investigation (WSI) and Protocol for Archaeological Discoveries (PAD). These measures are considered standard industry practice for this type of development.

402. When taking into account the baseline marine archaeology information (Appendix 13), the designed in measures included and the Proposed Development description outlined in section 2, all impacts are proposed to be scoped out of the assessment for marine archaeology. These impacts are outlined, together with a justification for scoping them out, in Table 7.9.

Table 7.8: Designed in Measures to be Adopted as Part of the Proposed Development

Measures Adopted as Part of the Proposed Development	Justification
The identification and implementation of Archaeological Exclusion Zones (AEZs) around sites identified as having a known important archaeological potential. To ensure that all offshore infrastructure will be located to avoid any known wrecks (50 m - 100 m buffer). The size of the AEZ will be evidence-based and established using the precautionary principle to ensure that it is of sufficient size to protect the site from the nature of impact (Wessex Archaeology, 2007;Wessex Archaeology for The Crown Estate, 2020).	To avoid direct impacts on sites of identified archaeological importance.
Archaeological input into specifications for and analysis of future pre-construction geophysical surveys.	To avoid future impacts on sites of known archaeological interest.
Archaeologists to be consulted in the preparation of any pre-construction Remotely Operated Vehicle (ROV)/diver surveys and, if appropriate, in monitoring/checking of data.	To avoid impacts on unrecognised archaeological sites and/or to improve understanding of identified sites of potential archaeological importance.
All anomalies of unconfirmed archaeological potential to be taken into account during final design. If they are likely to be impacted, these anomalies would undergo further archaeological investigation. Should these anomalies prove to be of archaeological importance then future AEZs may be implemented following consultation with Historic Environment Scotland (HES).	To avoid direct impacts on sites of archaeological importance.
Archaeological input into specifications for and analysis of pre-construction geotechnical surveys. This might include the presence of a geoarchaeologist on board the survey vessel and a provision for sampling, analysis and reporting of recovered cores. The results of all geoarchaeological investigations to be complied in a final report which includes a sediment deposit model.	To offset the potential impact of offshore development activities on potential geoarchaeological and palaeo-environmental sediments.
Provision of a PAD similar to that set out by TCE (2014) for unexpected archaeological discoveries made during the course of the development.	To enable the protection and, if necessary, recording of any sites/objects of archaeological significance identified during the course of the development.
Archaeologists to be consulted in advance of pre-construction site preparation activities and, if appropriate, to carry out watching briefs of such work.	To record archaeological remains that may be affected by pre-construction operations.
Micro-siting of turbines to avoid known wrecks.	To avoid direct impacts on sites identified as of archaeological importance.
Mitigation of unavoidable direct impacts on known sites of archaeological importance. Options include i) preservation by record, and ii) stabilisation.	To offset the effects of disturbance/destruction of irreplaceable archaeological remains.

Table 7.9: Impacts Proposed to be Scoped Out of the Proposed Development Assessment for Marine Archaeology

Impact	Designed in Measures	Justification
Construction		
Construction activities causing the removal or disturbance of sediments resulting in a potential effect on near-surface prehistoric land surfaces	Implementation of WSI and PAD	A Marine Archaeology Technical Report, together with associated data review of the geophysical data for the Proposed Development Array Area and proposed ECC, will provide an overview of the identifiable marine archaeology features within the marine archaeology study area. This Marine Archaeology Technical Report form the basis of a WSI and PAD, which has been prepared for approval with HES. The WSI and PAD will include (as outlined above): • the identification of AEZs around sites identified as having a known important archaeological potential; • archaeological input into specifications for and analysis of future pre-construction geophysical surveys; • archaeologists to be consulted in the preparation of any pre-construction ROV/diver surveys and, if appropriate, in monitoring/checking of data; • all anomalies of unconfirmed archaeological potential to be taken into account during final design; • archaeological input into specifications for and analysis of pre-construction geotechnical surveys; • provision of a PAD similar to that set out by TCE (2014) for unexpected archaeological discoveries; • archaeologists to be consulted in advance of pre-construction site preparation activities and, if appropriate, to carry out watching briefs of such work; and • mitigation of unavoidable direct impacts on known sites of archaeological importance. Options include i) preservation by record, and ii) stabilisation. These measures will therefore ensure that all impacts are reduced to not significant in EIA terms.
Construction activities causing the removal or disturbance of sediments resulting in a potential effect on shipwrecks and aircraft wrecks.		
Construction of wind turbines and substations causing the removal or disturbance of sediments resulting in a potential effect on deeply buried prehistoric land surfaces.		
Construction activities resulting in an increase in suspended sediment concentrations and associated sediment deposition on shipwrecks and aircraft wrecks.		
Operation and Maintenance		
Maintenance activities causing the removal or disturbance of sediments resulting in a potential effect on near-surface prehistoric land surfaces.	Implementation of WSI and PAD	Justification as described within construction phase.
Maintenance activities causing the removal or disturbance of sediments resulting in a potential effect on shipwrecks and aircraft wrecks.		
Decommissioning		
Decommissioning activities causing the removal or disturbance of sediments resulting in a potential effect on near-surface prehistoric land surfaces.	Implementation of WSI and PAD	Justification as described within construction phase.
Decommissioning activities causing the removal or disturbance of sediments resulting in a potential effect on shipwrecks and aircraft wrecks.		

7.4.6. PROPOSED APPROACH TO THE ENVIRONMENTAL IMPACT ASSESSMENT

403. The marine archaeology EIA, should it be required and agreement to scope out is not reached, will follow the methodology set out in section 4. A marine archaeology Technical Report has been prepared to characterise the baseline conditions for the Proposed Development, and an associated WSI has also been prepared. Specific to the marine archaeology, the following guidance documents will also be considered:

- Marine Scotland Act 2010;
- Protection of Military Remains Act 1986;
- Ancient Monuments and Areas Act 1979;
- Merchant Shipping Act 1995;
- Marine Policy Statement 2011;
- Standard and guidance for historic environment desk-based assessment (Chartered Institute for Archaeologists, 2014);
- Scottish National Marine Plan (Scottish Government, 2015); and
- Designation Policy and Selection Guidance (HES, 2019).

Technical Report and WSI

404. Information on marine archaeology has been collected through a detailed desktop review of existing studies and datasets from the following principal primary sources:

- records of UKHO wrecks and obstructions;
- records of MPAs held by Historic Scotland in their online Historic Environment Portal;
- catalogue of heritage sites recorded on the National Record of the Historic Environment (NRHE) held by Historic Environment Scotland;
- records held in the Historic Environment Records of East Lothian and the Scottish Borders; and
- Proposed Development archaeological assessment of geophysical survey data undertaken by MSDS in 2021.

405. The baseline data has been plotted to identify the general distribution of known and recorded shipping casualties and geophysical anomalies with archaeological potential. Information drawn from secondary sources and is presented within the Marine Archaeology Technical report and WSI. These have been used to qualitatively develop an understanding of the likelihood of unknown and unrecorded maritime archaeological sites. These reports will be provided to Marine Archaeology consultees for discussion.

7.4.7. SCOPING QUESTIONS TO CONSULTEES

- Do you agree with the Study Area as defined e.g. the Berwick Bank Offshore Wind Farm Proposed Development Array Area, the Berwick Bank Offshore Wind Farm ECC and a wider search area encompassing 2 km from the limits of the offshore Proposed Development up to the MLWS?
- Do you agree that the designed in measures described provides a suitable means for managing and mitigating the potential effects of the Proposed Development on the marine archaeology receptors?
- Do you agree that it is appropriate to scope out those impacts proposed to be scoped out that the assessment of marine archaeology receptors should be scoped out of the Proposed Development EIA?

7.4.8. NEXT STEPS

406. As Marine Archaeology is proposed to be scoped out of the Offshore EIAR, the next steps will be to reach agreement on this with the stakeholders via consultation. A Written Scheme of Investigation (WSI) and Technical Report has been developed for the Proposed Development and will be submitted to stakeholders for further discussion and agreement.

7.5. SEASCAPE, LANDSCAPE AND VISUAL RESOURCES

7.5.1. INTRODUCTION

407. This section of the Scoping Report identifies the elements of the seascape, landscape and visual environment of relevance to the Proposed Development and considers the potential impacts from the construction, operation and maintenance, and decommissioning of the offshore and intertidal components (seaward of the MHWS mark) of the Proposed Development on seascape, landscape and visual receptors.

408. The initial Scoping Opinion request (Marine Scotland, 2021) has informed the preparation of this section of the Scoping Report. In particular, section 5.14 'Seascape, Landscape, Visual Resources and Cultural Heritage' and Appendix I Consultation Representations and Advice from NatureScot, East Lothian Council, Scottish Borders Council and Northumberland County Council were relevant to seascape, landscape and visual resources. This stakeholder feedback has been considered in production of this Offshore EIA Scoping Report.

409. Seascape, landscape and visual elements were reported on in the initial Scoping Report. Due to the change in project scope being combining the offshore Proposed Development Array Areas, the anticipated significant effects have changed, as set out in this section. Therefore, advice is being sought on this change for seascape, landscape and visual resources.

7.5.2. STUDY AREA

410. The Proposed Development Array Area is located offshore in the Outer Forth and Firth of Tay area of the North Sea, approximately 33.35 km from the closest section of coastline at St. Abbs Head in the Scottish Borders, 34.1 km from the Angus coastline at Red Head and 36.6 km from the Fife coast at Fife Ness.

411. The seascape, landscape and visual impact assessment (SLVIA) study area for the Proposed Development is proposed as covering a radius of 60 km from the Proposed Development Array Area, as illustrated in Figure 7.8.

412. Broadly, the SLVIA study area is defined by a large area of the seascape including parts of the Forth and Tay Estuaries and includes the coastal areas of Aberdeenshire, Angus, Fife, East Lothian, Scottish Borders and Northumberland.

413. The SLVIA will generally focus on locations from where it may be possible to see the Proposed Development, as defined by the blade tip Zone of Theoretical Visibility (ZTV), which is presented at Figure 7.15 (A3 scale).

414. Consideration of the blade tip ZTV indicates that theoretical visibility of the Proposed Development mainly occurs within 60 km and that beyond this distance, the geographic extent of visibility will become very restricted. At distances over 60 km, the lateral (or horizontal) spread of the Proposed Development will also occupy a small portion of available views and the apparent height (or 'vertical angle') of the wind turbines would also appear very small, therefore significant visual effects are unlikely to arise at greater than this distance, even if the wind turbines are theoretically visible.

415. The influence of earth curvature begins to limit the apparent height and visual influence of the wind turbines visible at long distances (such as over 60 km), as the lower parts of the turbines would be partially hidden behind the apparent horizon, leaving only the upper parts visible above the skyline.

416. The SLVIA study area is defined as the outer limit of the area where significant effects could occur, using professional judgement. Institute of Environmental Management and Assessment Guidance (IEMA, 2015 and 2017) recommends a proportionate EIA focused on the significant effects. An overly large SLVIA study area may be considered disproportionate if it makes the understanding of the key impacts of the Proposed Development more difficult.

417. This is supported by Landscape and Visual Impact Assessment (LVIA) Guidance produced by the Landscape Institute (GLVIA3) (Landscape Institute, 2013) (para 3.16). This guidance recommends that *'The level of detail provided should be that which is reasonably required to assess the likely significant effects'*. Para 5.2 and p70 also states that *'The study area should include the site itself and the full extent of the wider landscape around it which the proposed development may influence in a significant manner'*.

418. Other wind farm specific guidance, such as NatureScot's Visual Representation of Wind Farms Guidance (NatureScot, 2017) recommends that ZTV distances are used for defining study area based on wind turbine height. This guidance recommends a 45 km radius for wind turbine greater than 150m to blade tip (para 48, p12), however it does not go beyond turbines above 150m in height. The height of current offshore wind turbine models has now exceeded the heights covered in this guidance. The NatureScot guidance recognises that greater distances may need to be considered for larger wind turbines used offshore, as is the case for the SLVIA study area for the Proposed Development.

419. Other projects in the SLVIA study area, such as Inch Cape and Seagreen 1, defined a 50 km radius study area for the purposes of their SLVIA. A precautionary approach is taken in defining a 60 km radius study area for the Proposed Development due to the larger proposed maximum blade tip height of 355 m above LAT.

420. The variation of weather conditions influencing visibility off the coast has also informed the SLVIA study area. Based on understanding of Met Office data, visibility beyond 60 km is likely to be very infrequent.

421. In considering the SLVIA study area, the sensitivity of the receiving seascape, landscape and visual receptors has also been reviewed, taking particular account of the landscape designations shown in Figure 7.14 and other visual receptors. These include the nationally designated Northumberland Coast Area of Outstanding Natural Beauty (AONB), which is located approximately 43.5 km from the Proposed Development Proposed Development Array Area.

422. Potential cumulative effect interactions with other offshore wind farms (OWFs) have also influenced the definition of the SLVIA study area. Other offshore windfarms within the SLVIA study area are shown in Figure 7.8.

423. Seascape, landscape and visual effects as a result of the Proposed Development are proposed to be scoped out beyond 60 km. The study area will be reviewed and amended in response to such matters as refinement of the Proposed Development, the identification of additional impact pathways and in response, where appropriate, to feedback from consultation.

7.5.3. BASELINE ENVIRONMENT

424. This section provides an initial overview of the baseline description provided in Appendix 14.

Introduction

425. The SLVIA takes into account definitions of seascape by NatureScot (2012) para 1.8 *'Seascapes refers to an area, as perceived by people, from land, sea or air, where the sea is a key element of the physical environment'*, and *'the visual and physical conjunction of land and sea which combines maritime, coast and hinterland character'.* It also takes account of Natural England (2012), NPS EN3 (para 2.6.203) and that set out in the UK Marine Policy Statement (UK Government, 2011), which states that *'…references to seascape should be taken as meaning landscapes with views of the coast or seas, and coasts and the adjacent marine environment with cultural, historical and archaeological links with each other'.*

426. There is a subtle transition between seascape and landscape and the importance of the interaction of sea, coastline and land as perceived by people is highlighted in definitions of seascape. The seascape impact assessment in the SLVIA will therefore focus particularly on coastal areas of onshore landscape with views of the coast or seas and marine environment, as perceived by people, on the premise that the most important effect of offshore wind farms is on the perception of seascape character from the coast.

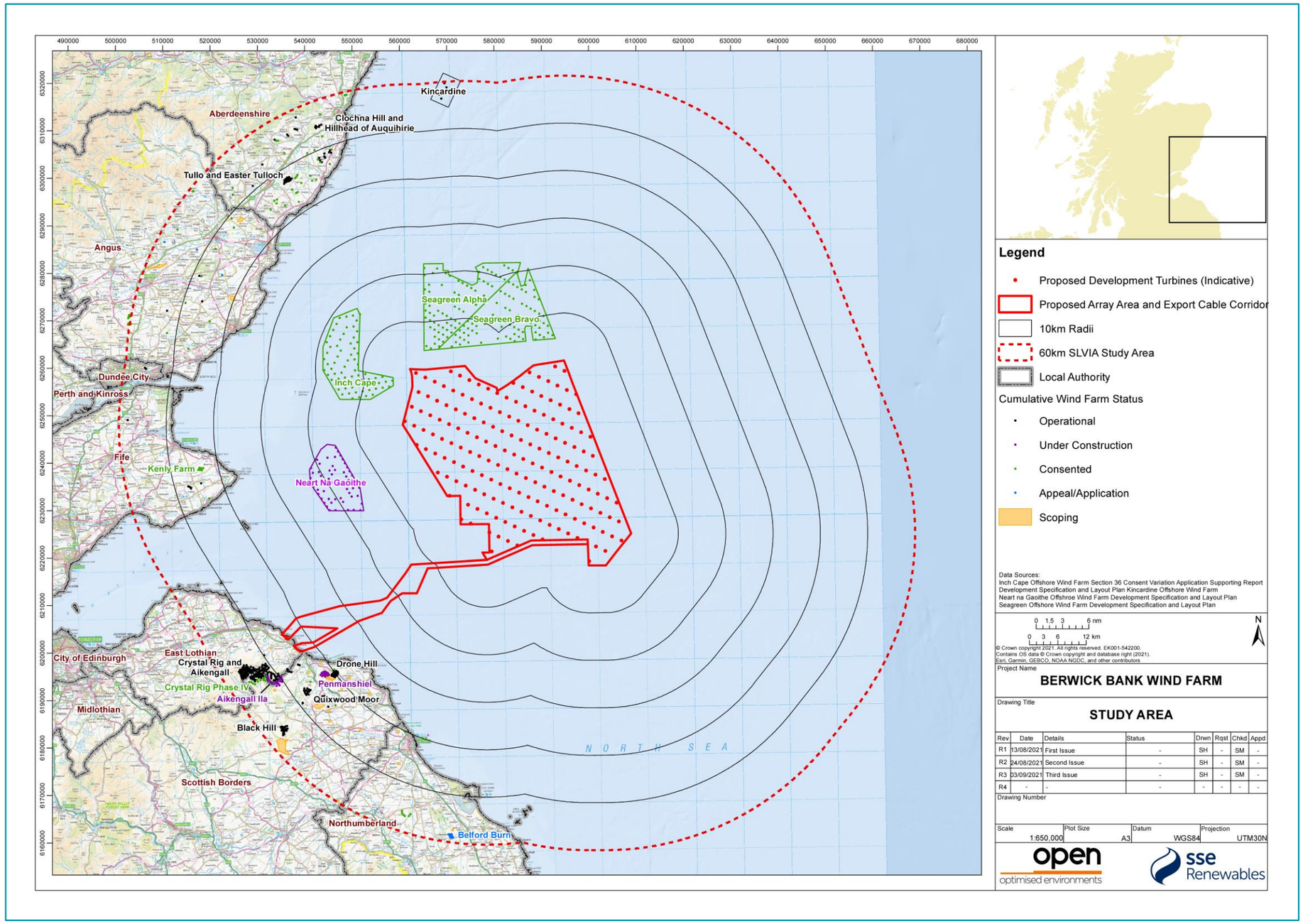

Figure 7.8: SLVIA Study Area

Data Sources

427. Data sources used to collate the information for the SLVIA are set out in Appendix 14.

Seascape Baseline

Scotland

428. The coastal character of the SLVIA study area within Scotland is defined at the regional level within the Regional Seascape Character Assessment Aberdeen to Holy Island Suffolk (Forth and Tay Offshore Windfarm Developer Group, 2011), as shown in Figure 7.9 to Figure 7.11Figure 7.12. The regional coastal character types identified within this coastal character assessment (Figure 7.9) will provide the baseline coastal characterisation and mapping for the SLVIA, against which the seascape effects of the Proposed Development will be assessed. At a regional scale, the SLVIA study area includes several regional coastal character types which are mapped in Figure 7.9 to Figure 7.11.

England

429. At a national scale the Marine Management Organisation (MMO) identified Marine Character Areas (MCA's) within the Seascape Character Assessment for the North East Inshore and Offshore Marine Plan Areas (MMO, 2018). There are four MCAs within the SLVIA study area, as shown in Figure 7.12, including MCA 23: Rural Northumberland and Coastal Waters which extends along the Northumberland coastline.

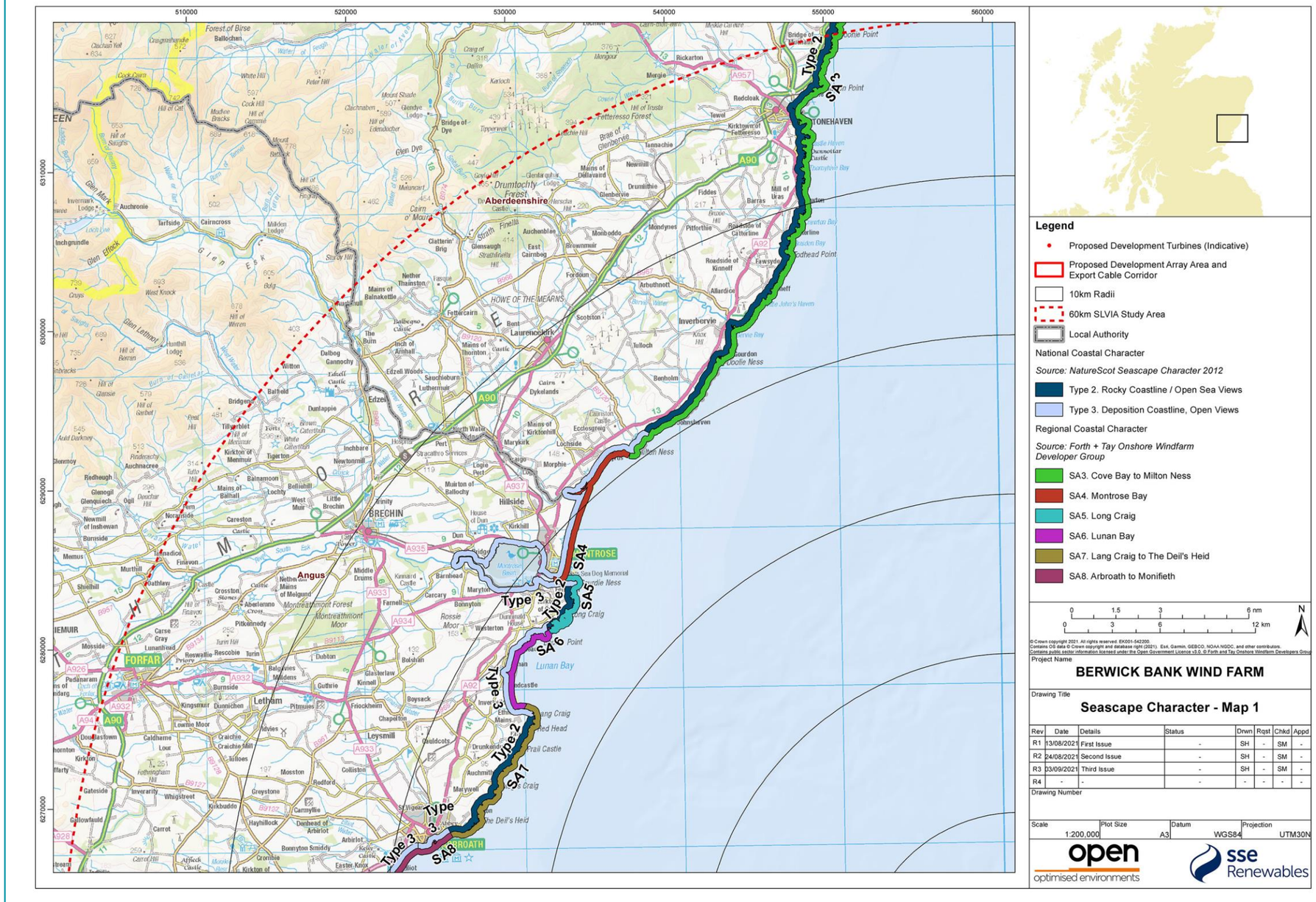

Figure 7.9: Seascape Character: Map 1

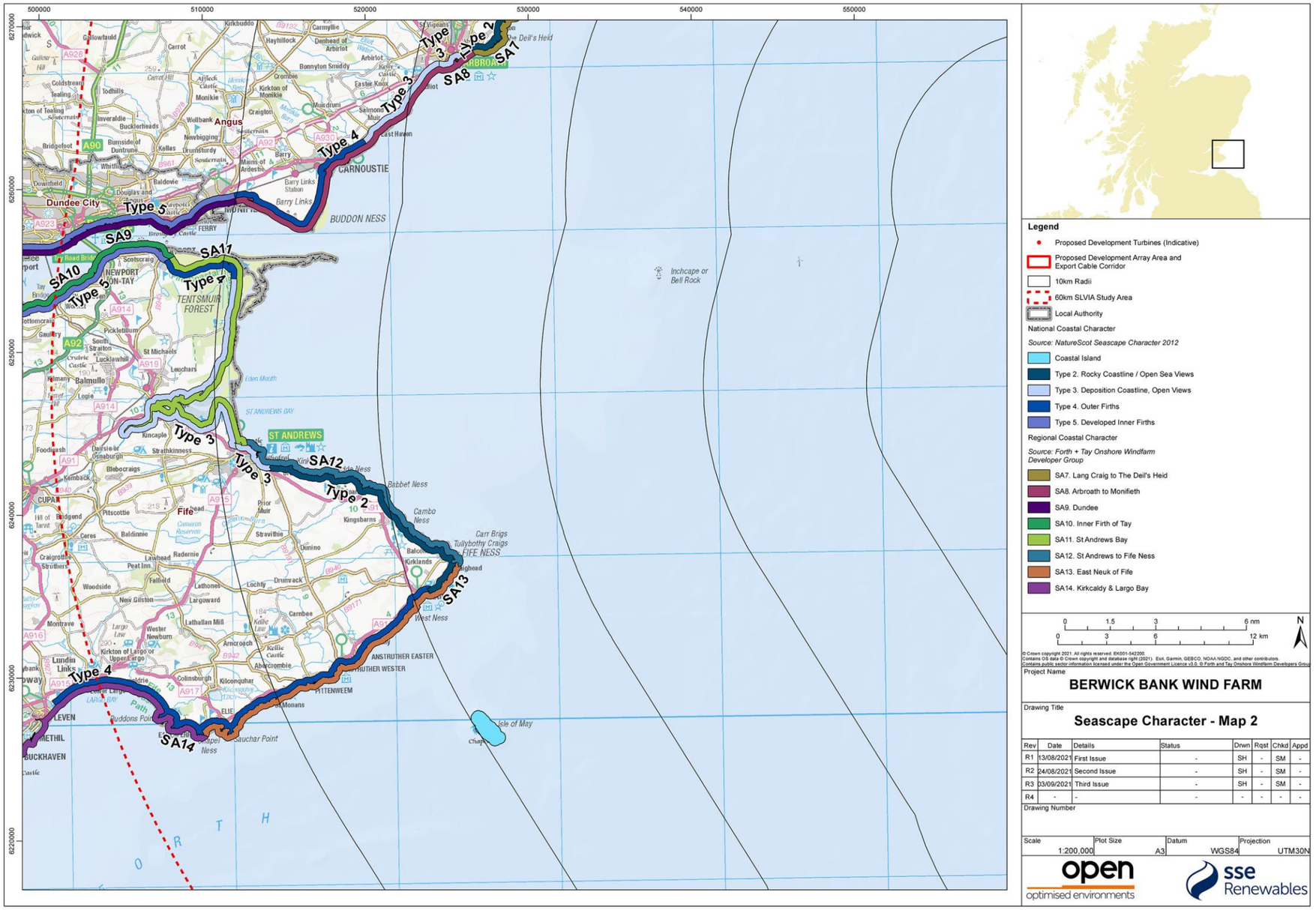

Figure 7.10: Seascape Character: Map 2

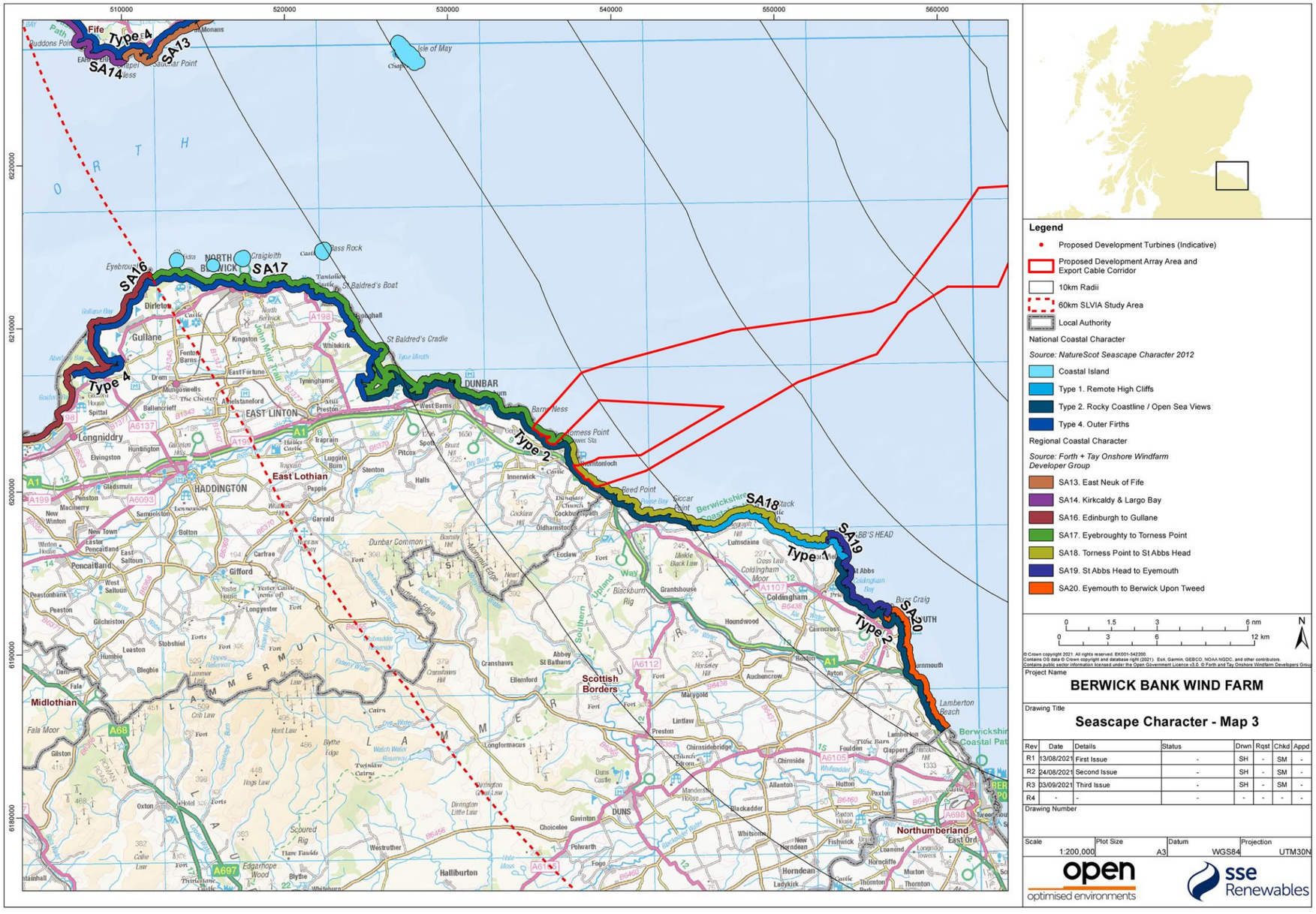

Figure 7.11: Seascape Character: Map 3

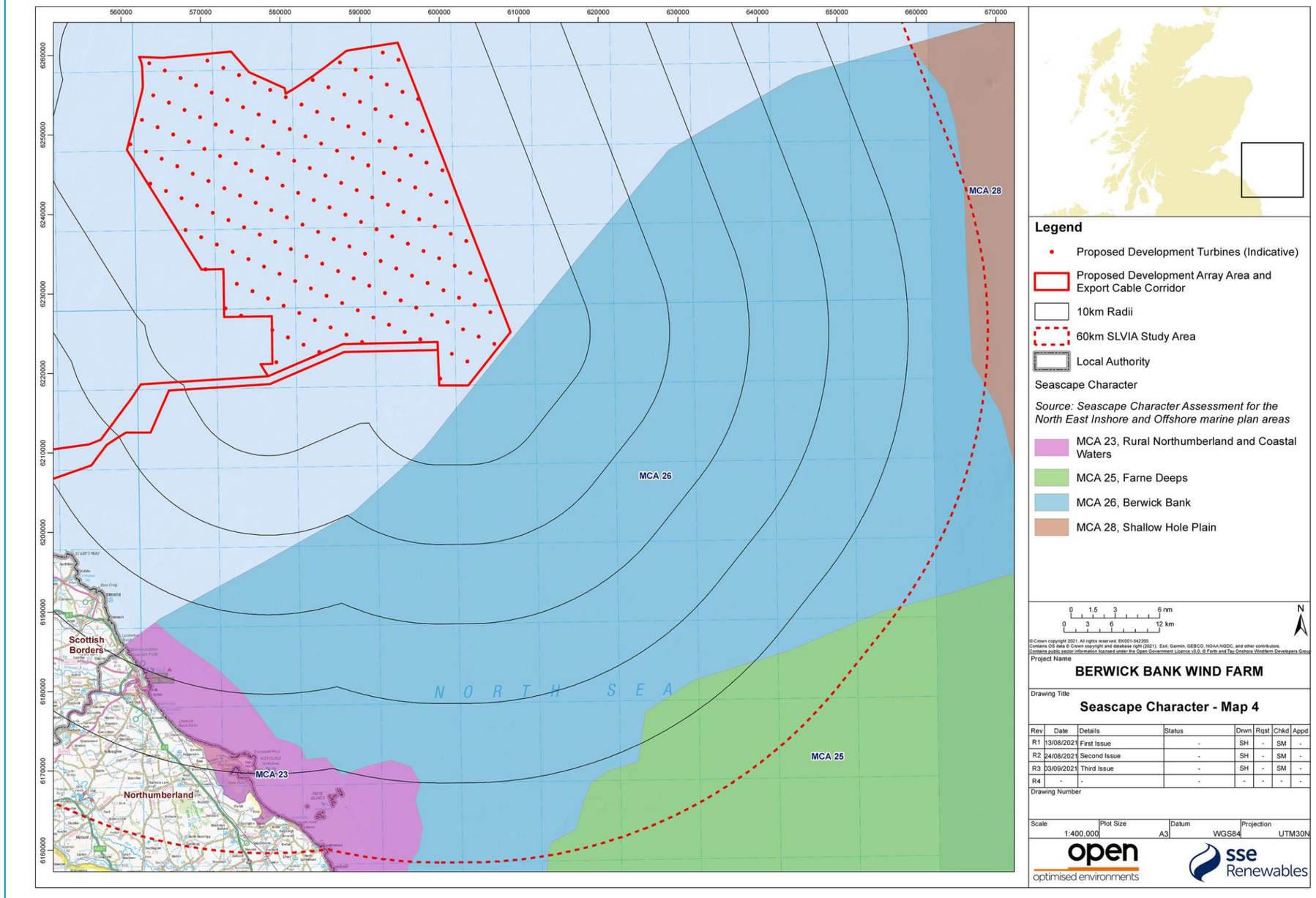

Figure 7.12: Seascape Character: Map 4

Landscape Baseline

Scotland

430. NatureScot's landscape character map (NatureScot, 2019) and associated LCT descriptions will form the basis of the baseline landscape character description of the SLVIA study area and the assessment of the visual aspects of perceived character resulting from the Proposed Development. These LCTs are shown in Figure 7.13 with the key coastal landscapes in the SLVIA study area identified as follows by region:

- Aberdeenshire – 11. Fragmented Rocky Coast; and 13. Raised Beach Coast;
- Angus – 388. Beaches, Dunes and Links; and 389. Cliffs and Rocky Coast;
- Fife – 193. Coastal Terraces; 194. Coastal Cliffs; and 196. Coastal Flats;
- East Lothian – 277. Coastal Margins; and 278. Coastal Terrace; and
- Scottish Borders – 110. Coastal Farmland; 111. Coastal Pasture; and 112. Coastal Moorland.

431. The Proposed Development is located beyond the boundaries of any areas subject to international, national or regional landscape designation in Scotland intended to protect landscape quality. Certain designated landscapes or defined areas found within the study area in Scotland have been designated or defined due to their scenic qualities or historic landscape qualities and are of relevance to the SLVIA as shown in Figure 7.14.

England

432. The landscape of the onshore parts of the study area will be described and assessed in relation to the published Northumberland County Council Landscape Character Assessment (Northumberland County Council, 2010) that describes the associated coastal landscapes within the SLVIA study area at the regional scale. The key coastal landscape character areas in the Northumberland part of the SLVIA study area form the North Northumberland Coastal Plain:

- 1a. Tweed River Mouth;
- 3a. Haggerston;
- 4a. North Tweed Coast; and
- 5a. Holy Island Coast.

433. The SLVIA study area includes part of the area covered by the Northumberland Coast Area of Outstanding Natural Beauty (AONB) designation, within the north of the County between Berwick upon Tweed and Holy Island (Figure 7.14). The Northumberland Coast AONB covers an area of 138 km^2 along 64 km of coastline from just south of Berwick-upon-Tweed to the Coquet Estuary. The AONB is only 2.5 km wide at its widest point, and yet it contains a variety of features of natural, historical and cultural value.

434. The 'natural beauty' of the Northumberland Coast AONB is best expressed as the special qualities of the landscape, embracing all of these elements. These special qualities are set out in Part One of the AONB Management Plan 2020-2024 and in Appendix 14.

435. The North Northumberland Heritage Coast is largely contained within the AONB (Figure 7.14) between Cocklawburn Beach in the north to the edge of the SLVIA study area at Seahouses in the south. A further area of coastline to the north is also defined within the Heritage Coast outside the AONB, consisting of the Berwickshire coastline at Berwick-upon-Tweed.

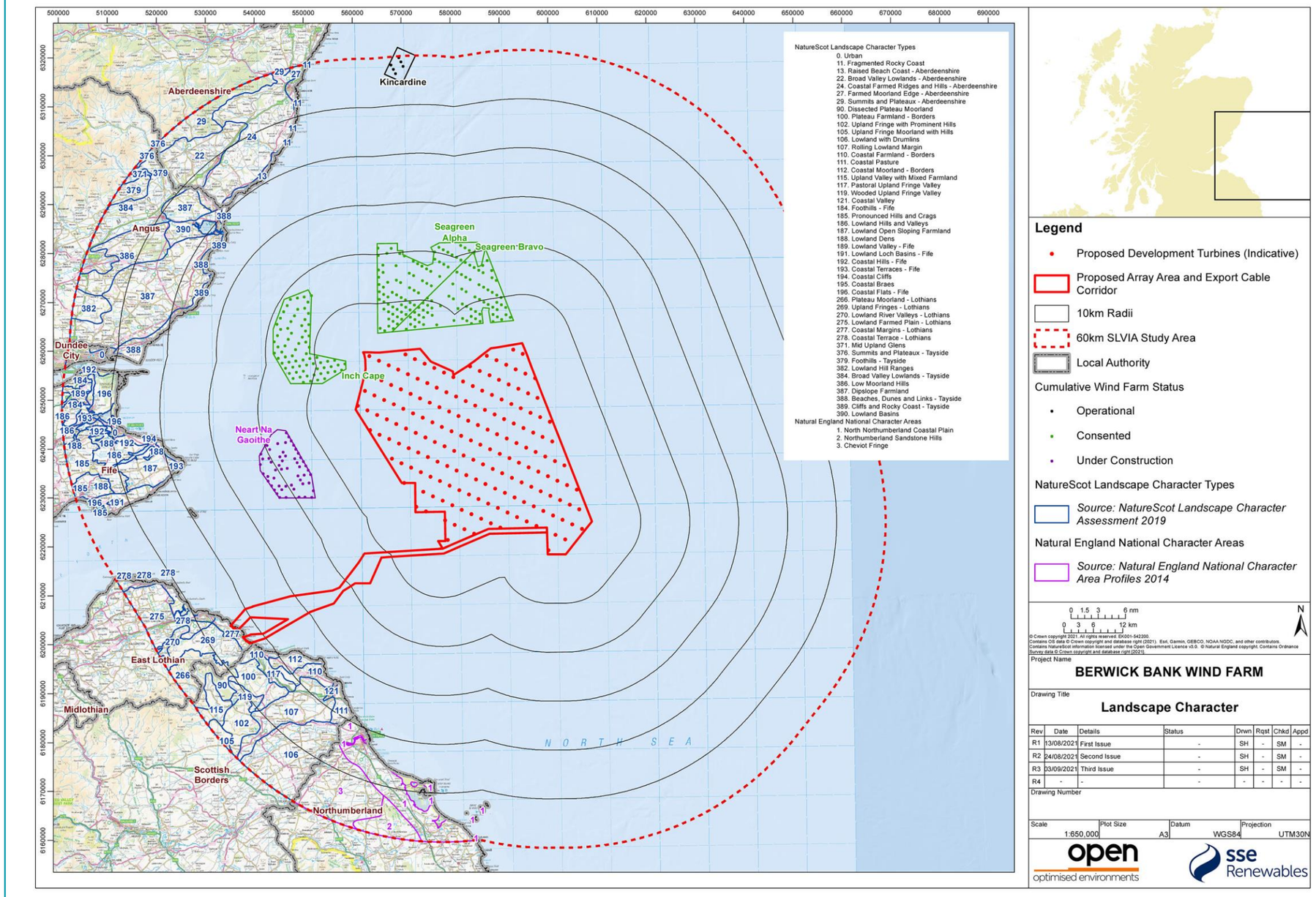

Figure 7.13: Landscape Character

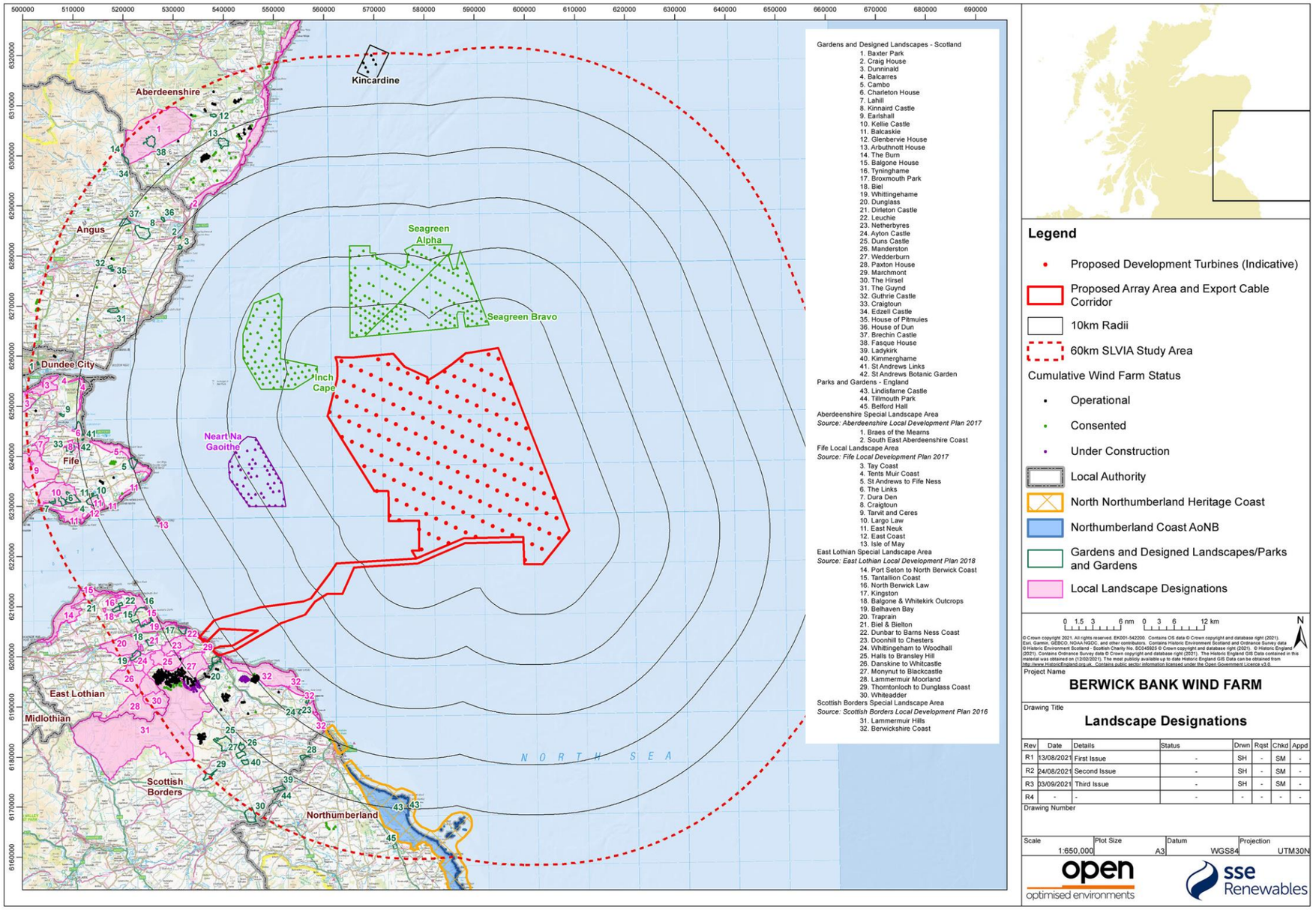

Figure 7.14: Landscape Designations

Visual Baseline

Introduction

436. The baseline visual resource experienced from the Scottish coastline within the SLVIA study area is diverse. From the remote high cliffs at St Abbs, there are wide elevated views directed along the coast and out to open sea, where there are dramatic coastlines due to the height of cliffs giving elevated and distant views. From the rocky coastlines of East Lothian and Fife the views over the North Sea are generally wide and open, but settlements and built features often appear at regular intervals providing foci along the coast, and shipping is a common feature seen out to sea. From the deposition coasts of Fife, which are low lying, views are long and expansive along sandy beaches and extend out to the North Sea. The outer Firth of Forth and Firth of Tay have land to land views across the Firths, while also retaining open views east out to sea. Views from the outer Firths often focus on distinctive islands (such as Bass Rock/Isle of May), and land on either side of the Firths is a focus, with settlements, and often masts and other infrastructure located on ridges, forming significant features in views.

437. The Berwick Bank seascape (MCA26) in which the Proposed Development is located covers an expansive offshore area of water located off the coast of Northumberland, where the visual baseline is described as being influenced by shipping activity (although less so than seascapes to the south), where the Northumberland coast *'is visible from the westernmost parts of the MCA, with coastal landmarks providing orientation for seafarers'* and forming *'part of the wider maritime setting to the Northumberland Coast AONB and North Northumberland Heritage Coast'* (MMO, 2018).

Zone of Theoretical Visibility (ZTV)

438. The visual baseline is largely defined by the ZTV shown in Figure 7.15. The ZTV shows the main area in which the Proposed Development would theoretically be visible, highlighting the different groups of people who may experience views of the wind turbines located within the Proposed Development Array Area and assisting in the identification of viewpoints where they may be affected. The ZTVs are based on wind turbines of 355 m to blade tip (above LAT) and represents the MDS for the SLVIA considered in the scoping assessment.

439. The blade tip ZTV also illustrates the main coastal areas of the SLVIA Study Area with theoretical visibility of the Proposed Development. These areas of visibility have the potential to extend over relatively wide terrestrial areas extending from Aberdeenshire in the north to Northumberland in the south, along the coastlines of the outer Firth of Forth and Firth of Tay, with the main areas of coastal visibility described in Appendix 14. The closest coastal areas with visibility of the Proposed Development will be from the Scottish Borders coastline from Cockburnspath extending along the elevated cliffs between Cove/Pease Bay to St Abbs Head and Eyemouth at distances of 33.3km at the closest point at St Abbs Head.

Visibility

440. Atmospheric conditions will affect visibility and therefore the ability of observers to see the Proposed Development from areas where theoretical visibility is indicated in the ZTV. A range of visibility conditions prevail in the SLVIA study area, at different locations, times of day/year and in different weather, ranging from the *'Windswept coast with frequent 'haar', or coastal fog, caused by warmer moist air moving over the relatively cooler North Sea'* noted in MMO (2018) to the *'northern quality of light often gives intense clarity in views'* described in NatureScot (2005).

441. Met office visibility data will be used to inform the assessment of the likelihood (or frequency) of effects in the SLVIA, based on data form the closest Met Office weather stations to the coastal parts of the SLVIA study area. Due to its distance at over 33.3km from the coast, the Proposed Development will only be visible in very good or excellent visibility and is unlikely to be visible in periods of very poor, poor, moderate or good visibility (less than 20km).

Visual Receptors

442. The principal visual receptors in the SLVIA study area are likely to be found along the closest sections of the Aberdeenshire, Angus, Fife, East Lothian, Scottish Borders and Northumberland coastlines, including:

- coastal settlements – including Montrose, Arbroath, St Andrews, St Abbs, settlements around the East Neuk of Fife, North Berwick, Dunbar, Cockburnspath, Coldingham, Eyemouth, Burnmouth and Berwick-Upon-Tweed;
- recreational routes - including walkers, equestrians and cyclists using the public rights of way network including long-distance trails such as the Fife Coastal Path, John Muir Way, Southern Uplands Way, Berwickshire Coastal Path and Northumberland Coast Path;
- main transport routes - such as the A92, A917, A1, A1107 and the East Coast Mainline Railway;
- visitors to tourist facilities - such as beaches, public open space, common land, coastal caravan and camping sites;
- visitors to historic environment assets - such as Dunnottar Castle, Tantallon Castle, Fast Castle, Lindisfarne Castle, Bamburgh Castle and Holy Island; and
- nearshore recreational receptors – including motor cruising areas extending to the east towards the Proposed Development Array Area, as well as day boat trips to offshore islands such as the Isle of May and Bass Rock, and other recreation activities, such as kayaking and surfing that can be found along the coast.

Viewpoints

443. Viewpoints have been compiled based on the ZTV for the Proposed Development, the principal seascape, landscape and visual receptors and are informed by other projects and feedback from stakeholders.

444. Representative and illustrative viewpoints proposed for the visual assessment are identified in Appendix 14 and mapped in Figure 7.15.

445. Wireline visualisations showing the Proposed Development from each of the viewpoints are presented in Appendix 14.

446. In preparing photomontages for the SLVIA, the photographs for all viewpoints will, where possible, be taken in good visibility conditions, seeking to represent a maximum visibility scenario when the offshore elements of the Proposed Development may be most visible.

447. Night time viewpoint photomontages showing a representation of the appearance of visible aviation and marine navigation lighting will also be produced from up to six viewpoints (one from the coastline of each local authority area in the SLVIA study area), with the locations to be agreed in consultation with stakeholders. The Applicant proposes further discussion on a likely lighting scenario in consultation with Northern Lighthouse Board (NLB), the Civil Aviation Authority (CAA) and Marine Scotland (MS).

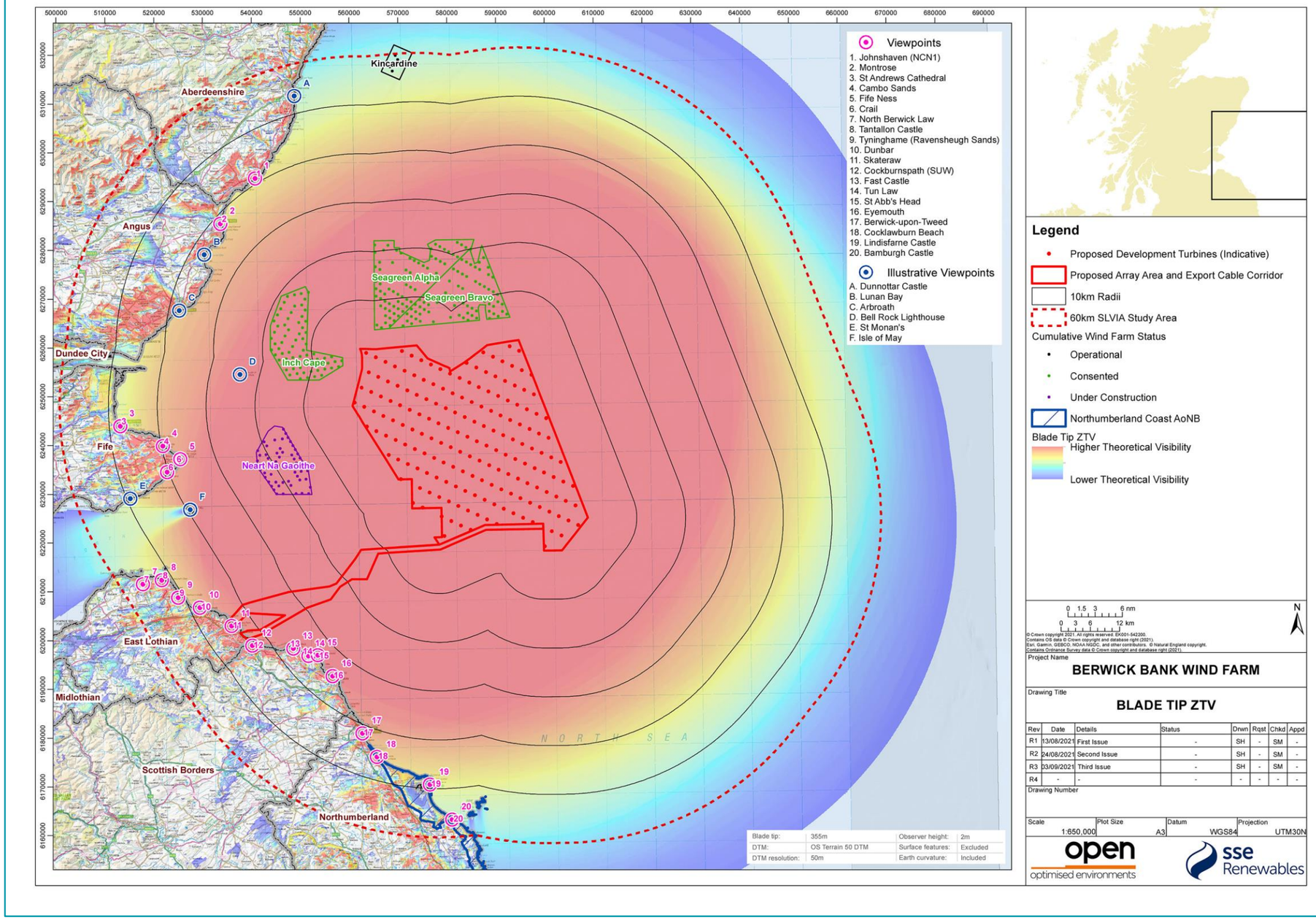

Figure 7.15: Blade Tip ZTV (A3)

7.5.4. DESIGNED IN MEASURES

448. The following designed in measures, and how these can reduce potential for impact have been considered in identification of impacts that have been scoped into the Proposed Development assessment (Table 7.10).

449. As part of the design process for the Proposed Development a number of designed in measures are proposed to reduce the potential for impacts on seascape, landscape and visual receptors. These are presented below. These will evolve over the development process as the EIA progresses and in response to consultation. The Applicant is committed to implement these measures, and also various standard sectoral practices and procedures. It is therefore considered that these measures are inherently part of the design of the Proposed Development and hence have been considered in the judgments as to which impacts can be scoped in/out presented in Table 7.10 and Table 7.11.

450. Measures adopted as part of the project will include:

- the number of wind turbines installed will not exceed 307;
- wind turbines will have a maximum blade tip height of 355 m above LAT and the rotor diameter will not exceed 310 m;
- regard to design principles to be developed for the Proposed Development, with particular consideration of the seascape, landscape and visual impacts on nationally designated landscapes such as the Northumberland Coast AONB; and
- a lighting scheme will be agreed with the relevant authorities for the marine navigation lighting and aviation lighting of structures (turbines and offshore support platforms). Aviation warning lights will have reduced intensity at and below the horizontal and allow a further reduction in lighting intensity when the visibility in all directions from every wind turbine is more than 5km.

451. The requirement and feasibility of any mitigation measures will be consulted upon with statutory consultees throughout the EIA process.

7.5.5. POTENTIAL IMPACTS AFTER THE IMPLEMENTATION OF DESIGNED IN MEASURES

452. The impacts that have been scoped into the Proposed Development assessment are outlined in Table 7.10 together with a description of any additional data collection (e.g. site-specific surveys) and/or supporting analyses (e.g. modelling) that will be required to enable a full assessment of the impacts.

453. Based on the baseline environment information currently available and the Proposed Development description (outlined in section 2) a number of impacts are proposed to be scoped out of the SLVIA. These impacts are outlined in Table 7.11, together with a justification for scoping them out.

454. The scoping out of individual seascape, landscape and visual receptors has not been undertaken at this stage as part of the Scoping Report due to the large SLVIA study area and number of receptors. An initial ‘simple’ assessment of the potential effects of the Proposed Development on seascape, landscape and visual receptors will be undertaken as part of the first stage of the EIA process, initially using desk based information, wirelines and ZTV analysis, with the aim of scoping out certain receptors where significant effects are unlikely to occur, in consultation with stakeholders. A detailed assessment undertaken as part of the EIA will then subsequently focus on those seascape, landscape and visual receptors that are identified as requiring further assessment, particularly those receptors where the combination of their sensitivity and potential magnitude of change resulting from the Proposed Development may give rise to significant effects.

Table 7.10: Impacts Proposed to be Scoped into the Proposed Development Assessment for Seascape, Landscape and Visual Resources

Impact	Project Phase			Justification (including consideration of designed in measures)	Data Collection and Analysis Required to Characterise the Baseline Environment for the EIA	Summary of Proposed Approach to Assessment
	C	O	D			
Effects (daytime) of the construction of the offshore elements of the Proposed Development on seascape character.	✓		✓	Potential for significant effect. Short term, temporary effects on perceived seascape character, arising as a result of the construction activities (including laying new offshore export cables to shore) and structures located within the Proposed Development Boundary, which may alter the seascape character of the area within the Proposed Development Boundary itself and the perceived character of the wider seascape through visibility of these changes.	FTOWDG (2011) Regional Seascape Character Assessment - Aberdeen to Holy Island. MMO (2018) Seascape Character Assessment for the North-East Inshore and Offshore Marine Plan Areas Project specific site-based seascape and coastal character analysis.	A preliminary assessment of the potential effects of the construction and decommissioning of the Proposed Development on Coastal Character Types and Marine Character Areas (MCAs) will be undertaken initially using desk-based information and ZTV analysis, with a detailed assessment focusing on those that are identified as requiring further assessment, particularly those where the Proposed Development may result in significant effects that are material to the consenting process. Detailed assessment to include desk based seascape character assessment publications and primary baseline data collection (for example through site surveys), quantitative and qualitative assessment methodologies to determine likely significance, and modelling such as ZTV analysis and wireline/photomontage visualisations.
Effects (daytime) of the construction of the offshore elements of the Proposed Development on perceived landscape character.	✓		✓	Potential for significant effect. Short term, temporary effects on perceived landscape character, arising as a result of the construction activities and structures, including laying new offshore export cables to shore, which will be visible from the coast (during good to excellent visibility conditions) and may therefore affect the perceived character of the landscape.	NatureScot Landscape Character Assessment 2019 Northumberland County Council Landscape Character Assessment (2010) Project specific site-based landscape character analysis.	A preliminary assessment of the potential effects of the construction and decommissioning of the Proposed Development on the perceived character of LCTs/LCAs will be undertaken initially using desk based information and ZTV analysis, with a detailed assessment focusing on those that are identified as requiring further assessment, particularly LCTs/LCAs where the Proposed Development may result in significant effects that are material to the consenting process. Detailed assessment to include desk-based landscape character assessment publications and primary baseline data collection (for example through site surveys), quantitative and qualitative assessment methodologies to determine likely significance, and modelling such as ZTV analysis and wireline/photomontage visualisations.
Effects (daytime) of the construction of the offshore elements of the Proposed Development on perceived landscape character/special qualities of designated landscapes.	✓		✓	Potential for significant effect. Short term, temporary effects on perceived landscape character and special qualities of designated landscapes, arising as a result of the operational wind turbines, substations and maintenance activities, which will be visible from the coast (during good to excellent visibility conditions) and may therefore affect the perceived character and qualities of the landscape.	Northumberland Coast AONB Management Plan 2020-2024 Northumberland Coast AONB Landscape Sensitivity and Capacity Study (August 2013) Project specific site-based landscape character analysis.	A preliminary assessment of the potential effects of the construction and decommissioning of the Proposed Development on the perceived character and qualities of designated landscape will be undertaken initially using desk-based information and ZTV analysis, with a detailed assessment focusing on those that are identified as requiring further assessment, particularly those where Proposed Development may result in significant effects that are material to the consenting process. Detailed assessment to include desk based assessment to define special qualities that may be affected by Proposed Development, using published documents and primary baseline data collection (for example through site surveys), quantitative and qualitative assessment methodologies to determine likely significance, and modelling such as ZTV analysis and wireline/photomontage visualisations. Relevant special qualities for detailed assessment will be agreed with stakeholders as part of the evidence plan process.
Effects (daytime) of the construction of the offshore elements of the Proposed Development on visual receptors/views.	✓		✓	Potential for significant effect. Short term, temporary effects on views and visual amenity experienced by people from principal visual receptors and representative viewpoints, arising as a result of the construction activities and structures, including laying new offshore export cables to shore, which will be visible from the coast (during good to excellent visibility conditions)	Visual receptor mapping datasets and OS data Met Office Visibility Data. Project specific site-based visual assessment.	A preliminary assessment of the potential effects of the construction and decommissioning of the Proposed Development on the views and visual receptors will be undertaken initially using desk-based information and ZTV analysis, with a detailed assessment focusing on those that are identified as requiring further assessment, particularly views and visual receptors where the Proposed Development may result in significant effects that are material to the consenting process. Detailed assessment to include desk based publications and primary baseline data collection (for example through site surveys), quantitative and qualitative assessment methodologies to determine likely significance, and modelling such as ZTV analysis and wireline/photomontage visualisations.

Impact	Project Phase			Justification (including consideration of designed in measures)	Data Collection and Analysis Required to Characterise the Baseline Environment for the EIA	Summary of Proposed Approach to Assessment
	C	O	D			
Effects (daytime) of the operation and maintenance of the offshore elements of the Proposed Development on seascape character.		✓		Potential for significant effect. Long term, reversible effects on perceived seascape character of Coastal Character Types and MCAs, arising as a result of the operational wind turbines, substations and maintenance activities located within the Proposed Development Array Area, which may alter the seascape character of the Array Area itself and the perceived character of the wider seascape.	FTOWDG (2011) Regional Seascape Character Assessment - Aberdeen to Holy Island. MMO (2018) Seascape Character Assessment for the North-East Inshore and Offshore Marine Plan Areas Project specific site-based seascape and coastal character analysis.	A preliminary assessment of the potential effects of the operation and maintenance of the Proposed Development on Coastal Character Types and MCAs will be undertaken initially using desk-based information and ZTV analysis, with a detailed assessment focusing on those that are identified as requiring further assessment, particularly those where the Proposed Development may result in significant effects that are material to the consenting process. Detailed assessment to include desk-based seascape character assessment publications and primary baseline data collection (for example through site surveys), quantitative and qualitative assessment methodologies to determine likely significance, and modelling such as ZTV analysis and wireline/photomontage visualisations.
Effects (daytime) of the operation and maintenance of the offshore elements of the Proposed Development on perceived landscape character/special qualities of designated landscapes.		✓		Potential for significant effect. Long term, reversible effects on perceived landscape character of LCAs/LCTs and qualities of designated landscapes, arising as a result of the operational wind turbines, substations and maintenance activities, which will be visible from the coast (during good to excellent visibility conditions) and may therefore affect the perceived character and qualities of the landscape.	NatureScot Landscape Character Assessment 2019 Northumberland County Council Landscape Character Assessment (2010) Northumberland Coast AONB Management Plan 2020-2024 Northumberland Coast AONB Landscape Sensitivity and Capacity Study (August 2013) Project specific site-based landscape character analysis.	A preliminary assessment of the potential effects of the operation and maintenance of the Proposed Development on the perceived character and qualities of LCTs/LCAs and designated landscapes will be undertaken initially using desk-based information and ZTV analysis, with a detailed assessment focusing on those that are identified as requiring further assessment, particularly LCTs/LCAs where the Proposed Development may result in significant effects that are material to the consenting process. Detailed assessment to include desk-based landscape character assessment publications and primary baseline data collection (for example through site surveys), quantitative and qualitative assessment methodologies to determine likely significance, and modelling such as ZTV analysis and wireline/photomontage visualisations. Relevant special qualities for detailed assessment will be agreed with stakeholders as part of the evidence plan process.
Effects (daytime) of the operation and maintenance of the offshore elements of the Proposed Development on visual receptors/views.		✓		Potential for significant effect. Long term, reversible effects on views and visual amenity experienced by people as principal visual receptors and representative viewpoints, arising as a result of the operational wind turbines, substations and maintenance activities when visible from the coast during very good to excellent visibility conditions. wind turbines will often be seen behind the operational wind farms however, their taller height and horizontal spread of the wind turbines may result in effects on views.	Visual receptor mapping datasets and OS data Met Office Visibility Data. Project specific site-based visual assessment.	A preliminary assessment of the potential effects of the operation and maintenance of the Proposed Development on the views and visual receptors will be undertaken initially using desk-based information and ZTV analysis, with a detailed assessment focusing on those that are identified as requiring further assessment, particularly views and visual receptors where the Proposed Development may result in significant effects that are material to the consenting process. Detailed assessment to include desk-based publications and primary baseline data collection (for example through site surveys), quantitative and qualitative assessment methodologies to determine likely significance, and modelling such as ZTV analysis and wireline/photomontage visualisations.
Effects (night time) of the operation and maintenance of the Proposed Development lighting on visual receptors/views		✓		Potential for significant effect. Long term, reversible effects on views and visual amenity experienced by people from principal visual receptors and representative viewpoints, including from within the Northumberland Coast AONB arising as a result of the marine navigation and aviation lights. Potential for significant effect on perception of dark night skies quality of the Northumberland Coast AONB arising from lighting of the Proposed Development in views from the coast of the seascape outside the Northumberland Coast AONB.	Visual receptor mapping datasets and OS data Met Office Visibility Data. Project specific site-based visual assessment.	A ZTV showing the geographic extent of visible aviation and marine navigation lighting will be used to inform the assessment of effects resulting from wind turbine lighting. Night time photographs and visualisations will be prepared from proposed night-time viewpoints to illustrate the effects of the lighting from key viewpoints, to be agreed with stakeholders.

Impact	Project Phase			Justification (including consideration of designed in measures)	Data Collection and Analysis Required to Characterise the Baseline Environment for the EIA	Summary of Proposed Approach to Assessment
	C	O	D			
Cumulative effect (daytime) of the operation of the Proposed Development on seascape character, landscape character and views/visual receptors.		✓		Potential for significant cumulative effect. Long term, reversible effects on perceived seascape character (Coastal Character Types and MCAs), landscape character of LCAs/LCTs and qualities of designated landscapes, and views / visual amenity experienced by people arising as a result of visibility of the operational wind turbines, substations and maintenance activities located within the Proposed Development Array Area cumulatively with other projects located within the study area.	In addition to the above data for seascape, landscape and visual baseline, cumulative wind farm databases, local authority planning portals and OWF development specification and layout plans.	A preliminary assessment of the potential cumulative effects of the Proposed Development on seascape, landscape and visual receptors will be undertaken initially using desk-based information and ZTV analysis, with a detailed cumulative assessment focusing on those that are identified as requiring further assessment, particularly where the Proposed Development may result in significant cumulative effects that are material to the consenting process. Detailed cumulative assessment to include desk-based publications and primary baseline data collection (for example through site surveys), quantitative and qualitative assessment methodologies to determine likely significance, and modelling such as cumulative ZTV analysis and cumulative wireline/photomontage visualisations.

Table 7.11: Impacts Proposed to be Scoped Out of the Proposed Development Assessment for Seascape, Landscape and Visual Resources

Impact	Justification
Seascape, landscape and visual effects of the offshore elements of the Proposed Development outside the 60km radius SLVIA study area..	The 60km radius SLVIA study area is defined to an outer limit within which significant effects could occur. Significant effects will not occur beyond 60km due to the limited changes to views arising from the Proposed Development at distances of over 60 km.
Areas of the SLVIA study area outside the ZTV	The Proposed Development will have no impacts on areas of the SLVIA study area outside the ZTV where it is not visible.
Effects of the Proposed Development on physical aspects of landscape character.	Due to the location of the Proposed Development at considerable distance offshore it will only impact on the perception of character and qualities – which is considered as an indirect effect in SLVIA. No physical attributes that define landscape character or special qualities of designated landscapes will be changed as a result of the Proposed Development. Construction stage works in the inter-tidal area will be assessed as part of the LVIA of the onshore infrastructure.
The seascape, landscape and visual effects of the offshore cable route operation.	The offshore cables will be located below the sea surface so would not be visible as part of the seascape or views once operational and would therefore have no operational effect on seascape, landscape and visual receptors.
Impact of the Proposed Development lighting on seascape character at night during construction, operation and decommissioning.	The features of seascape character are generally not apparent at night. No attributes of seascape character will be changed as a result of the lighting of the Proposed Development.
Transboundary impacts	Due to the long distance of the Proposed Development the maritime waters and coastline of European Members states and limited effect interactions on receptors along these coastlines.

7.5.6. PROPOSED APPROACH TO THE ENVIRONMENTAL IMPACT ASSESSMENT

455. The project wide approach to the SLVIA methodology is set out in section 4. Whilst this has informed the approach that will be used in the SLVIA, it is necessary to set out how this methodology will be applied, and adapted as appropriate, to address the specific needs of the SLVIA.

456. The SLVIA is an objective evaluation that is informed by experienced professional judgement based on the application of a methodology. The methodology proposed for the SLVIA is as set out in the example methodology provided in Appendix 14. The key guidance and an overview of the SLVIA approach are summarised as follows.

Technical Guidance

457. The assessment will be undertaken in accordance with the methods outlined in the following best practice guidance documents:

- Landscape Institute with the Institute of Environmental Management and Assessment (2013). Guidelines for Landscape and Visual Impact Assessment. Third Edition;
- Landscape Institute (2019). Visual Representation of Development Proposals TGN 06/19;
- Landscape Institute (2021). Landscape Value and Valued Landscapes. A Technical Guidance Note;
- Natural England (2012). An Approach to Seascape Character Assessment;
- Natural England (2014). An Approach to Landscape Character Assessment;
- NatureScot (2012). Assessing the Cumulative Impact of Onshore Wind Energy Developments;
- NatureScot (2017). Visual Representation of Windfarms: Version 2.2;
- NatureScot (2017). Siting and Designing Windfarms in the Landscape; and
- Planning Inspectorate (2018) Advice Note Nine: Rochdale Envelope.

Overview of Approach

458. The objective of the assessment of the Proposed Development will be to predict the significant effects on the seascape, landscape and visual resource. In accordance with the EIA Regulations 2017, the SLVIA effects will be assessed to be either significant or not significant. The methodology to undertake the SLVIA will reflect the 'Guidelines for Landscape and Visual Impact Assessment: Third Edition' (Landscape Institute, 2013).

459. The SLVIA will assess the effects of changes resulting from Proposed Development on seascape/landscape as a resource, the views available to people and their visual amenity. The SLVIA will be undertaken using the following steps.

- The features of the Proposed Development that may result in seascape, landscape and visual effects will be described. The overall scope of the assessment will be defined, including the study area and range of possible seascape, landscape and visual effects.
- The seascape/landscape baseline will be established using seascape /landscape character assessment and the ZTV of Proposed Development, to identify seascape and landscape receptors that may be affected and their key characteristics and value.
- The visual baseline will be established by identifying the ZTV, identifying the people who may be affected and identifying visual receptors and selecting viewpoints.
- A preliminary or 'simple' assessment will be undertaken of seascape, landscape and visual receptors using desk based information, wirelines and ZTV analysis, to identify which seascape, landscape and visual receptors are unlikely to be significantly affected and can be scoped out of the assessment (in consultation with relevant stakeholders) and those that are more likely to be significantly affected by the Proposed Development, which require to be assessed in full.
- Interactions are identified between the Proposed Development and seascape, landscape and visual receptors, to predict likely significant effects arising and measures that are proposed to mitigate effects.
- An assessment of the susceptibility of seascape, landscape and visual receptors to specific change and the value attached to landscape receptors and views will be undertaken, combining these judgements to assess the sensitivity of the landscape and visual receptors to Proposed Development.
- An assessment of the size/scale of seascape/landscape impact, the degree to which seascape/landscape elements are altered and the extent to which the impacts change the key characteristics of the landscape will be undertaken, combining these judgements to assess the magnitude of change on each seascape/landscape receptor.
- An assessment of the size/scale of visual impact, the extent to which the change would affect views, whether this is unique or representative of a wider area, and the position of the Proposed Development in relation to the principal orientation of the view and activity of the receptor will be undertaken. These judgements are combined to assess the magnitude of change on the visual receptor.
- The assessments of sensitivity to change and magnitude of change will be combined to assess the significance of seascape, landscape and visual effects.

460. The significance of effects will be assessed through a combination of two considerations – the sensitivity of the landscape or visual receptor / view and the magnitude of change that will result from the Proposed Development. In accordance with GLVIA3 (Landscape Institute, 2013), the SLVIA methodology requires the application of professional judgement, but generally, the higher the sensitivity and the higher the magnitude of change the more likely that a significant effect will arise.

7.5.7. POTENTIAL CUMULATIVE EFFECTS

461. The objective of the cumulative SLVIA is to describe, visually represent and assess the ways in which the Proposed Development will have additional effects when considered together with other existing, consented or application stage developments and to identify related significant cumulative effects arising. The guiding principle in preparing the cumulative SLVIA will be to focus on the likely significant effects and in particular those which are likely to influence the outcome of the consenting process.

462. It is likely that there will be cumulative effects which require assessing due to the spatial scope of the Proposed Development and associated assessment. Cumulative effects on seascape, landscape and visual receptors resulting from the effects of the Proposed Development and other developments will be assessed in accordance with relevant cumulative LVIA guidance and methodologies set out in section 4.3.7 and considering the other developments that have been screened in as part of the Cumulative Effects Assessment (CEA) screening exercise.

463. Cumulative effects may arise where two or more developments are experienced at a proximity where they may have a greater incremental effect, or where they may combine to have a sequential effect.

464. The impacts from the offshore elements of the Proposed Development have the potential to act cumulatively with impacts from other developments to contribute to cumulative effects. Such impacts from the offshore elements of the Proposed Development that have the potential to contribute to cumulative seascape, landscape and visual effects include during operation, effects on seascape, landscape and visual amenity due to inter-visibility of other planned projects with the Proposed Development. Cumulative effects during construction and decommissioning are considered less likely to be significant, due to the temporary nature of the activity.

465. A comprehensive list of national and international plans, projects and regulated activities that have the potential to contribute to cumulative impacts of the Proposed Development will be compiled as part of the EIA Report. The SLVIA will then undertake a process of scoping out plans, projects and activities from this list, based on expert judgement, assessment rationale and guidance relevant to seascape, landscape and visual impacts. Projects that are currently proposed to be included in the cumulative assessment for seascape, landscape and visual effects are as follows.

Offshore wind

466. The focus of the cumulative SLVIA will be on the additional effect of the Proposed Development in conjunction with other developments of the same type i.e. other OWFs that are being developed in the outer Firth of Forth and Firth of Tay. The SLVIA Study Area includes the following OWFs that will be scoped into the cumulative assessment (Figure 7.8):

- operational/under-construction OWFs – Neart na Gaoithe OWF and Kincardine OWF, which will be considered as part of the baseline environment; and
- consented OWFs – Inch Cape OWF and Seagreen OWF, which are both consented and will be considered as part of a consented OWF scenario in the SLVIA.

467. The location of these cumulative OWFs is shown in Figure 7.8 and they are illustrated in the wireline visualisations in Appendix 14.

468. There are no other application stage OWFs or OWF proposals subject to scoping requests or with an Area for Lease (AfL) from Crown Estates Scotland (CES) within the SLVIA study area however, the potential for cumulative effects with pre-application stage projects i.e., those in scoping and those with an AfL, will be considered during the SLVIA.

Onshore wind

469. The cumulative SLVIA will also consider the additional effect of the Proposed Development in conjunction with other onshore wind farm developments within the SLVIA study area. An initial cumulative wind farm search has been undertaken and the locations of known onshore wind farm projects are shown in Figure 7.8. The main clusters of onshore wind farm development occur in the Lammermuir Hills in East Lothian (Crystal Rig and Aikengall); Coldingham Moor in the Scottish Borders (Drone Hill, Penmanshiel and Quixwood Moor); and the Garvock and Glenbervie areas of Aberdeenshire (Tullo, Clochna Hill, Hillhead of Auquihirie and St Johns). There are a number of consented onshore wind farm projects which will be considered as part of a consented scenario in the SLVIA, including Crystal Rig Phase IV, Kenly Farm (Fife) and numerous single turbines in the coastal farmlands of Aberdeenshire. A comprehensive list of onshore wind farm projects that have the potential to contribute to cumulative impacts of the Proposed Development will be compiled as part of the EIA Report and in consultation with relevant stakeholders.

470. In accordance with guidance (NatureScot, 2012), the SLVIA will assess the effect arising from the addition of the Proposed Development to the cumulative situation, and not the overall effect of multiple wind farms.

7.5.8. POTENTIAL TRANSBOUNDARY IMPACTS

471. A screening of transboundary impacts has been carried out and is presented in Appendix 3. This screening exercise identified that there is the no potential for transboundary impacts upon seascape, landscape and visual receptors due to construction, operational and maintenance, and decommissioning impacts of the Proposed Development. The SLVIA study area is located entirely outside the terrestrial areas and maritime boundaries of European Union (EU) member states. Due to the concentrated nature of any potential impacts on the seascape, landscape and visual resource to the UK coastline within the SLVIA study area, transboundary impacts are unlikely to occur on seascape, landscape or visual receptors and therefore transboundary impacts will be scoped out from further consideration within the SLVIA.

7.5.9. SCOPING QUESTIONS TO CONSULTEES

- Do you agree that the data sources identified in Appendix 14 are sufficient to inform the baseline for the Proposed Development EIA Report?
- Do you agree that all the designated areas within the ZTV have been identified?
- Do you agree with the proposed viewpoint list in Appendix 14Table 7.11 or do you have any proposed additions or alternatives?
- Have all potential impacts resulting from the Proposed Development been identified for seascape, landscape and visual receptors?
- Do you agree that the impacts described in Table 7.11 can be scoped out?
- For those impacts scoped in (Table 7.10), do you agree that the methods described are sufficient to inform a robust impact assessment?
- Do you have any specific requirements for the SLVIA methodology and/or visual representations (photomontages/ZTVs) to be included in the SLVIA?
- Do you agree that the designed in measures described provide a suitable means for managing and mitigating the potential effects of the Proposed Development on seascape, landscape and visual receptors?

7.5.10. NEXT STEPS

SLVIA Contents

472. The SLVIA chapter of the EIA Report will provide a summary of the significance of changes resulting from the construction and operation of the offshore elements of the Proposed Development to seascape, landscape and visual receptors. Full technical assessments of the seascape, landscape and visual impacts will be contained within technical appendices. The SLVIA will be supported by plan figures and visual representations (photomontages).

Desk Based and Site Survey Work

473. The SLVIA undertaken as part of the EIA Report will be informed by desk based studies and field survey work undertaken within the SLVIA study area. The landscape, seascape and visual baseline will be informed by desk based review of landscape and seascape character assessments, and the ZTV, to identify receptors that may be affected by the offshore elements of the Proposed Development and produce written descriptions of their key characteristics and value.

474. A preliminary desk based assessment will be undertaken of seascape, landscape and visual receptors using ZTV analysis, to identify which landscape and visual receptors are unlikely to be significantly affected, which will be subject to a preliminary assessment, and those that are more likely to be significantly affected by the offshore elements of the Proposed Development, which require a detailed assessment.

475. Interactions will be identified between the offshore elements of the Proposed Development and seascape, landscape and visual receptors, to predict potentially significant effects arising and measures may be proposed to mitigate effects.

476. For those receptors where a detailed assessment is required, primary data acquisition will be undertaken through a series of surveys. These surveys will include field survey verification of the ZTV from terrestrial LCAs/LCTs, micro-siting of viewpoint locations, panoramic baseline photography and visual assessment survey from all representative viewpoints (as listed in Table 7.11). These viewpoint photography and visual assessment surveys are planned to be undertaken during autumn/winter 2021-2022.

477. There is some risk of delay in being able to take viewpoint photographs due to the ongoing Covid-19 public health situation, however it is anticipated that site visits to the study area will be possible to undertake in autumn/winter 2021-2022. Further visual assessment surveys are then likely to be undertaken prior to the EIA Report submission, using the photomontage visualisations to undertake field survey assessment of visual effects from each representative viewpoint. Sea-based offshore surveys are not proposed to be undertaken as part of the SLVIA, given that the key impacts are land-based. Illustrative wirelines (without baseline photography) will be prepared for offshore viewpoints if required.

478. Detailed assessment methods will be based on quantifying impacts through modelling to enable prediction of seascape, landscape and visual effects. Assessment of the sensitivity of seascape, landscape and visual receptors will be undertaken, together with an assessment of the magnitude of change arising as a result of the offshore elements of the Proposed Development. Judgements on sensitivity and magnitude will be combined to arrive at an overall assessment as to whether the offshore elements of the Proposed Development will have an effect that is significant or not significant on each seascape, landscape and visual receptor.

479. The SLVIA undertaken as part of the EIA Report will prepare the necessary information to assess the night time visual effects of the proposed lighting of the offshore elements of the Proposed Development.

Study Area Refinements for EIA Report

480. The 60km radius SLVIA study area may be further refined for the EIA Report if the Proposed Development Array Area changes from that currently shown in Figure 7.8. The ZTV (Figure 7.15) of the Proposed Development may also be further refined to address any ongoing design changes, or changes in the design envelope, for example in response to embedded environmental measures that may influence the MDS for the SLVIA.

Stakeholder Engagement

481. Consultation will be a key feature of the SLVIA process for the Proposed Development, with relevant statutory and non-statutory organisations, the public and interested parties. The proposed approach to stakeholder engagement during the pre-application phase is outlined in section 4.3.4.

482. Further pre-application consultations with regards to SLVIA are proposed to be undertaken primarily through specialist consultations with relevant stakeholders including consultation meetings with representatives from NE, Northumberland County Council, Northumberland Coast AONB Partnership, NatureScot, Aberdeenshire Council, Angus Council, Fife Council, East Lothian Council and Scottish Borders Council. Feedback received through this consultation process will be considered and addressed in the EIA Report.

7.6. CULTURAL HERITAGE

7.6.1. INTRODUCTION

483. This section of the Offshore EIA Scoping Report identifies onshore cultural heritage assets of relevance to the Proposed Development and potential impacts of the offshore and intertidal components (seaward of the MHWS mark) of the Proposed Development on cultural heritage assets of national importance. As discussed below, there is no potential for significant effects to arise in relation to the offshore export cables and this section therefore focuses on the Proposed Development Array Area only.

484. The potential impacts of the Proposed Development upon onshore cultural heritage assets relate entirely to visual change in their setting. As such, there is substantial overlap between the Cultural Heritage Impact Assessment (CHIA) and the Seascape, Landscape and Visual Impact Assessment (SLVIA) as the proposed cultural heritage viewpoints are also SLVIA viewpoints. The assessment methodology to be employed, is however, specific to the CHIA. The SLVIA includes a number of viewpoints that are near cultural heritage assets, which will not be considered in the CHIA as, given the different assessment criteria being applied there is no potential for a significant effect in respect of cultural heritage.

7.6.2. STUDY AREA

485. The Proposed Development Array Area is located offshore in the outer Firth of Forth and Firth of Tay region of the North Sea, approximately 43 km east of the East Lothian, 33.4 km from the Scottish Borders coastline (St. Abb's Head), 34.1 km from the Angus coastline at Red Head and 36.6 km from the Fife coast at Fife Ness.

486. The cultural heritage assessment study area for the Proposed Development extends 60 km from the Proposed Development Array Area (Figure 7.16). There is no discipline specific guidance on appropriate cultural heritage study areas. Consequently, the cultural heritage study area is based on that developed for the SLVIA, which has been defined through consideration of the blade tip Zone of Theoretical Visibility (ZTV). This shows that beyond 60 km the extent of visibility will be very restricted. As explained in section 7.5.

487. At distances over 60 km, the lateral (or horizontal) spread of the Proposed Development will also occupy a small portion of available views and the apparent height (or 'vertical angle') of the wind turbines would also appear very small, therefore significant visual effects are unlikely to arise at greater than this distance, even if the wind turbines are theoretically visible.

488. The influence of earth curvature begins to limit the apparent height and visual influence of the wind turbines visible at long distances (such as over 60 km), as the lower parts of the turbines would be partially hidden behind the apparent horizon, leaving only the upper parts visible above the skyline. The variation of weather conditions influencing visibility off the coast has also informed the SLVIA study area. Based on understanding of Met Office data, visibility beyond 60 km is likely to be very infrequent.

489. Given the above, it is evident that there is negligible potential for the Proposed Development to alter the setting of cultural heritage assets that are more than 60 km from the Proposed Development Array Area in such a way that their cultural significance might be adversely affected. As such, there is negligible potential for significant effects to occur outside the cultural heritage study area. Guidance directs that the EIA process should focus on significant environmental effects (Scottish Government, 2013) and consequently, 60 km represents an appropriate outer limit to the cultural heritage study area. The cultural heritage study area takes in all the assets raised by consultees in the Scoping Opinion (Marine Scotland, 2021).It is proposed that heritage assets outside the cultural heritage study area are scoped out of the assessment

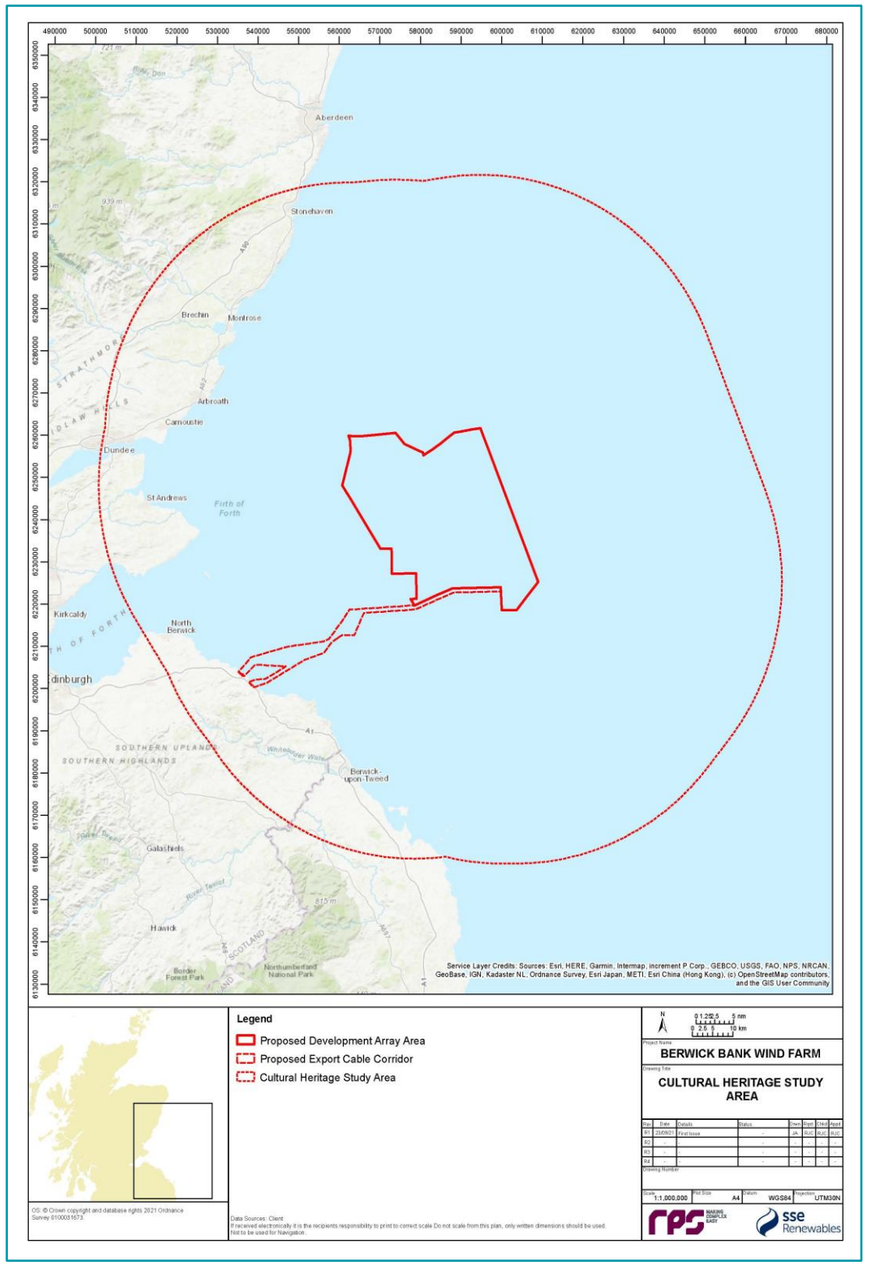

Figure 7.16: Cultural Heritage Study Area

490. Guidance on cultural heritage impact assessment in the context of EIA (Historic Environment Scotland (HES) and SNH, 2018) stresses that study areas should be applied with discretion, as their rigid application may lead to an unwieldy assessment that does not focus on the significant effects. Consequently, it is not proposed that the CHIA should consider all heritage assets within the cultural heritage study area; only those assets where it is considered there will be significant effect will be considered.

7.6.3. BASELINE ENVIRONMENT

491. This section of the Offshore EIA Scoping Report provides a brief summary of the baseline environment as relevant to the current CHIA.

Data Sources

492. This baseline section is based upon designations data from HES and Historic England (HE). It is informed by local knowledge and work undertaken in respect of previous offshore wind farms in the Firth of Forth, namely Neart na Gaoithe, Seagreen and Inch Cape. Site visits have yet to be undertaken.

Nationally Important Heritage Assets

493. The closest designated cultural heritage asset to the Proposed Development Array Area is the Bell Rock lighthouse (LB45197). This is a Category A Listed Building and is approximately 24.5 km to the northeast of the Proposed Development Proposed Development Array Area. Nationally important designated heritage assets are summarised in Table 7.12 and their locations are shown in Figure 7.17.

Table 7.12: Summary of Nationally Important Designated Heritage Assets by Distance within the Cultural Heritage Study Area

Distance from Proposed Development Array Area (km)	Designated Heritage Assets
0 – 20	None
20 – 30	Category A Listed Building: 1
30 – 40	Scheduled Monuments: • Scotland: 94 • Category A Listed Buildings: 58 • Inventory Gardens and Designed Landscapes: 5
40 – 50	Scheduled Monuments: • Scotland: 205 • England: 19 • Category A Listed Buildings: 146 • Grade I and II* Listed Buildings: 48 • Inventory Gardens and Designed Landscapes: 14 • Inventory Battlefields: 2
	• Registered Parks and Gardens: 1 • Registered Battlefields: 1
50 – 60	Scheduled Monuments: • Scotland: 312 • England: 45 • Category A Listed Buildings: 268 • Grade I and II* Listed Buildings: 26 • Inventory Gardens and Designed Landscapes: 23 • Registered Parks and Gardens: 2 • Registered Battlefields: 1

494. The cultural heritage study area takes in the fertile coastal plains of south-east Scotland and Northumberland, areas that have seen relatively intensive human activity through all periods of history. This results in a landscape with substantial and appreciable 'time depth' and the above designated heritage assets include Prehistoric settlements, burial cairns and hillforts, Medieval castles, forts and religious sites, Post-Medieval and Modern fortifications, industrial sites, designed landscapes, infrastructure and houses. In addition to these visible assets there is a large number of archaeological sites that have been effaced and survive only as subsurface remains.

495. Views to the sea are often available from many of the above designated heritage assets and in many instances, there are visual relationships between these assets and the sea that contribute positively to their cultural significance. These relationships may be functional, designed, fortuitous, or a combination of these.

496. Owing to the history of intensive activity, the setting of assets on the coastal plain and in the Lammermuirs, at the fringe of the cultural heritage study area, inevitably contains Modern features, including Torness nuclear power station, Dunbar cement works, wind farms, pylons, forestry, agricultural sheds, modern housing and infrastructure, seen at close range or in the middle distance. Consequently, whilst numerous assets in the cultural heritage study area have strong visual relationships with the sea, very few are sensitive to distant change. These are considered in the following section (see paragraph 734).

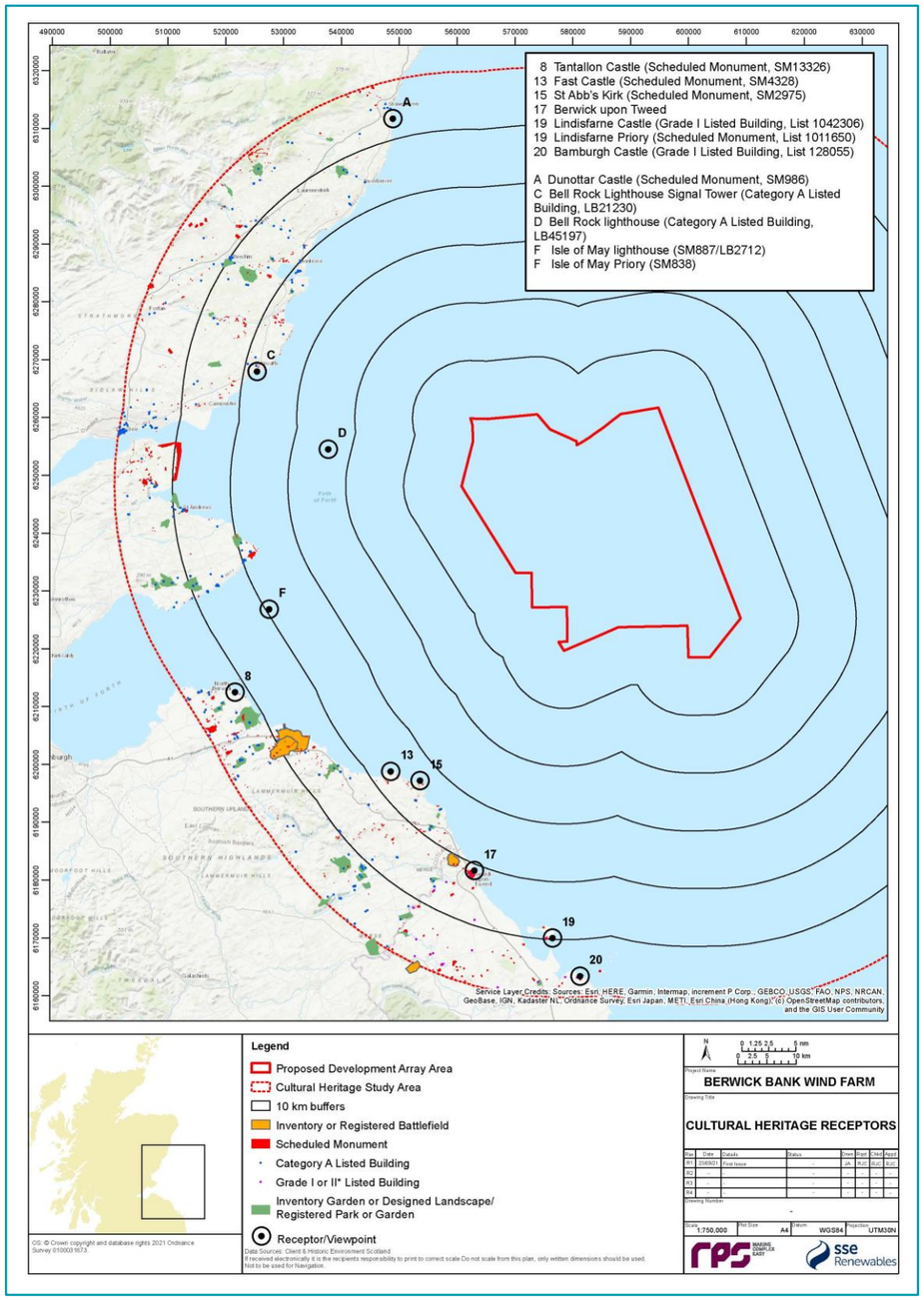

Figure 7.17: Cultural Heritage Receptors

Cultural Heritage Receptors

497. Cultural heritage assets have been identified as receptors where there is a known visual relationship with the sea that contributes to their cultural significance and which may be considered sensitive to distant change or where they have been raised by consultees in the initial Berwick Bank Wind Farm proposal Scoping Opinion (Marine Scotland, 2020). These are listed in Table 7.13.

Table 7.13: Nationally Important Designated Heritage Assets Considered as Potential Receptors

SLVIA Viewpoint Reference(s)	Asset	Relationship	Distance from Proposed Development Array Area (km)
13	Fast Castle (Scheduled Monument, SM4328)	The slight remains of a castle on an isolated promontory. The view out to sea contributes to a distinctively exposed and isolated sense of place and a fortuitous aesthetic relationship.	36.7 km
15	St Abb's Kirk, church and monastic remains (Scheduled Monument, SM2975)	Raised by SBC Archaeologist	34.6 km
17	Berwick-upon-Tweed	Raised by Northumberland County Council	41.2 km
19	Lindisfarne Castle (Grade I Listed Building, List 1042306)	The silhouetted form of this modest castle is a prominent feature on the Northumberland coastline, seen against the backdrop of the sea, giving rise to a fortuitous aesthetic relationship.	49.8 km
19	Lindisfarne Priory (Scheduled Monument, List 1011650)	Raised by Northumberland County Council	49.8 km
20	Bamburgh Castle (Grade I Listed Building, List 128055)	An iconic castle prominently located on the Northumberland coast, Bamburgh Castle is often seen against the backdrop of the sea, giving rise to a fortuitous aesthetic relationship	56 km
8	Tantallon Castle (Scheduled Monument, SM13326)	This iconic castle is often seen with the sea as a backdrop giving rise to a fortuitous aesthetic relationship	52 km

SLVIA Viewpoint Reference(s)	Asset	Relationship	Distance from Proposed Development Array Area (km)
A	Dunottar Castle (Scheduled Monument, SM986)	This iconic castle is often seen with the sea as a backdrop giving rise to a fortuitous aesthetic relationship between the two.	53.5 km
C & D	Bell Rock lighthouse (Category A Listed Building, LB45197) and Bell Rock Lighthouse Signal Tower (Category A Listed Building, LB21230)	The signal tower has a functional relationship with the lighthouse, which lies approximately 18 km from the signal tower	23.9 km and 37.8 km respectively
E & F	Isle of May lighthouse (SM887/LB2712)	The lighthouse has been placed to be highly visible from the Firth of Forth and is also visible from the surrounding coast.	39.7 km
F	Isle of May Priory (SM838)	The priory's location was chosen in part for its isolation. Open views to the North Sea contribute to the appreciation of its isolation and sense of place.	39.7 km

7.6.4. POTENTIAL PROPOSED DEVELOPMENT IMPACTS

498. A range of potential impacts on cultural heritage have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Proposed Development in the absence of designed in measures:

- construction
  - impacts upon the setting of onshore cultural heritage assets.
- operation and maintenance
  - impacts (daytime) of the operation and maintenance of the offshore elements of the Proposed Development upon the setting of cultural heritage assets;
  - impacts (night-time) of the operation and maintenance of the Proposed Development upon the setting of cultural heritage assets;
  - cumulative effect (daytime) of the operation of the Proposed Development upon the setting of cultural heritage assets;
  - cumulative effect (night-time) of the operation of the Proposed Development upon the setting of cultural heritage assets;
  - impacts upon the setting of cultural heritage assets of less than national importance (Category B and C and Grade II Listed Buildings and Conservation Areas); and
  - impacts upon the setting of cultural heritage assets outside the cultural heritage study area.
- decommissioning
  - impacts upon the setting of onshore cultural heritage assets.

7.6.5. DESIGNED IN MEASURES

499. As part of the design process for the Proposed Development, a number of designed in measures are proposed to reduce the potential for impacts on cultural heritage assets. These are presented in paragraph 122. These will evolve over the development process as the EIA progresses and in response to consultation. SSER is committed to implement these measures, and also various standard sectoral practices and procedures. It is therefore considered that these measures are inherently part of the design of the Proposed Development and hence have been considered in the judgements as to which impacts can be scoped in/out presented in Table 7.14 and Table 7.15.

500. Designed in measures adopted as part of the Proposed Development will include:

- the number of wind turbines installed will not exceed 307 wind turbines;
- wind turbines will have a maximum blade tip height of 355 m above LAT and the rotor diameter will not exceed 310 m;
- regard to design principles to be developed for the Proposed Development, to safeguard sensitive visual relationships, such as that between Bell Rock Lighthouse and its signal tower; and
- a lighting scheme will be agreed with the relevant authorities for the marine navigation lighting and aviation lighting of structures (turbines and offshore support platforms). Aviation warning lights will have reduced intensity at and below the horizontal and allow a further reduction in lighting intensity when the visibility in all directions from every wind turbine is more than 5 km.

501. The requirement and feasibility of any mitigation measures will be consulted upon with statutory consultees throughout the EIA process.

7.6.6. POTENTIAL IMPACTS AFTER THE IMPLENTATION OF DEGINED IN MEASURES

502. The impacts that have been scoped into the Proposed Development assessment are outlined in Table 7.14 together with a description of any additional data collection (e.g. site specific surveys) and/or supporting analyses (e.g. modelling) that will be required to enable a full assessment of the impacts.

503. Impacts proposed to be scoped out are listed in Table 7.15.

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Table 7.14: Impacts Proposed to be Scoped In to the Proposed Development Assessment for Cultural Heritage

Impact	Project Phase			Designed In Measures	Justification (including consideration of designed in measures)	Data Collection and Analysis Required to Characterise the Baseline Environment for the EIA	Summary of Proposed Approach to Assessment
	C	O	D				
Impacts (daytime) of the operation and maintenance of the offshore elements of the Proposed Development upon the setting of cultural heritage assets.		✓		Potential designed in measures may include development and implementation of design principles to mitigate impacts upon important visual relationships.	Limited potential for significant effects in respect of potential receptors resulting from disruption of visual relationships. Such impacts would be long term and reversible.	Analysis of the cultural significance and setting of the identified receptors drawing upon HES and Historic England data, published sources and site surveys.	A detailed assessment of the potential effects will be undertaken for the identified receptors. This will be informed by the baseline study, ZTV analysis and wireframe/photomontage visualisations.
Impacts (night-time) of the operation and maintenance of the Proposed Development upon the setting of cultural heritage assets.		✓		A lighting scheme will be agreed with the relevant authorities for the marine navigation lighting and aviation lighting of structures (turbines and offshore support platforms). Aviation warning lights will have reduced intensity at and below the horizontal and allow a further reduction in lighting intensity when the visibility in all directions from every wind turbine is more than 5 km	Limited potential for significant effects in respect of Bell Rock and Isle of May Lighthouses, resulting from disruption of visual relationships. Such impacts would be long term and reversible.	Analysis of the cultural significance and setting of the identified receptors drawing upon HES and Historic England data, published sources and site surveys.	A ZTV showing the geographic extent of visible aviation and marine navigation lighting will be used to inform the assessment of effects resulting from wind turbine lighting. Night-time visualisations will be prepared where potentially significant effects are identified.
Cumulative effect (daytime) of the operation of the Proposed Development upon the setting of cultural heritage assets.		✓		Potential designed in measures may include development and implementation of design principles to mitigate impacts upon important visual relationships.	Limited potential for significant cumulative effects in respect of potential receptors resulting from disruption of visual relationships. Such impacts would be long term and reversible.	In addition to the above data will be drawn from cumulative wind farm databases published data regarding wind farms in the outer Firth of Forth and Firth of Tay region.	Cumulative effects will be assessed where adverse effects are identified in respect of the Proposed Development alone. These will be supported by cumulative ZTVs and appropriate visualisations.
Cumulative effect (night-time) of the operation of the Proposed Development upon the setting of cultural heritage assets.		✓		A lighting scheme will be agreed with the relevant authorities for the marine navigation lighting and aviation lighting of structures (turbines and offshore support platforms). Aviation warning lights will have reduced intensity at and below the horizontal and allow a further reduction in lighting intensity when the visibility in all directions from every wind turbine is more than 5 km	Limited potential for significant cumulative effects in respect of Bell Rock and Isle of May Lighthouses, resulting from disruption of visual relationships. Such impacts would be long term and reversible.	In addition to the above data will be drawn from cumulative wind farm databases published data regarding wind farms in the outer Firth of Forth and Firth of Tay region.	Cumulative effects will be assessed where adverse effects are identified in respect of the Proposed Development alone. These will be supported by cumulative ZTVs and appropriate visualisations.

Table 7.15: Impacts Proposed to be Scoped Out of the Proposed Development Assessment for Cultural Heritage Assets

Impact	Justification
Construction	
Impacts upon the setting of onshore cultural heritage assets	Impacts relating specifically to the construction phase will be transitory and short-lived. There is therefore no potential for them to be significant.
Operation and Maintenance	
Impacts upon the setting of cultural heritage assets of less than national importance (Category B and C and Grade II Listed Buildings and Conservation Areas)	Given the distance of the Proposed Development Array Area from such assets, significant effects are only likely to occur where the receptor is of the highest sensitivity, i.e., of national or international importance. There is therefore no potential for significant effects to occur in respect of assets of less than national importance.
Impacts upon the setting of cultural heritage assets outside the cultural heritage study area	Potential visibility falls rapidly outside the cultural heritage study area and any visible change will be at a distance of over 60 km. Cultural heritage assets are very rarely sensitive such distant change, and any such change has no potential to result in a significant effect.
Impacts relating to the offshore export cables.	The offshore export cables have no potential to affect the setting of cultural heritage assets.
Decommissioning	
Impacts upon the setting of onshore cultural heritage assets	Impacts relating specifically to the decommissioning phase will be transitory and short-lived. There is therefore no potential for them to be significant.

7.6.7. PROPOSED APPROACH TO THE ENVIRONMENTAL IMPACT ASSESSMENT

504. The cultural heritage EIA will follow the methodology set out in section 4. Specific to the cultural heritage EIA, the following guidance documents will also be considered:

- Standard and Guidance for Historic Environment Desk-Based Assessment (Chartered Institute for Archaeologists (2017);
- Historic Environment Guidance for the Offshore Renewable Energy Sector (COWRIE, 2007);
- Guidance for Assessment of Cumulative Impacts on the Historic Environment from Offshore Renewable Energy (COWRIE, 2008);
- Historic Environment Circular 1 (HES, 2016);
- EIA Handbook (HES and NatureScot (2018);
- Historic Environment Policy for Scotland (HES, 2019); and
- Managing Change in the Historic Environment: Setting (HES, 2020).

505. The CHIA will be undertaken in accordance with the approach outlined in the EIA Handbook (HES and NatureScot, 2018) and Managing Change in the Historic Environment: Setting (HES, 2019). This approach considers magnitude in terms of change in the cultural significance of the affected heritage asset and sensitivity in terms of importance. It involves the following stages:

- stage 1: identify the historic assets that might be affected by the Proposed Development;
- stage 2: define and analyse the setting by establishing how the surroundings contribute to the ways in which the historic asset or place is understood, appreciated and experienced; and
- stage 3: evaluate the potential impact of the proposed changes on the setting, and the extent to which any negative impacts can be mitigated.

506. This scoping exercise, which is a qualitative assessment, represents stage 1.

7.6.8. POTENTIAL CUMULATIVE EFFECTS

507. Cumulative effects may arise as a result of the Proposed Development being seen in combination with other offshore wind farms in the outer Firth of Forth and Firth of Tay region. Where the Proposed Development results in an adverse impact, this may result in greater impact magnitude and hence a greater cumulative effect. Cumulative effects will therefore be considered where adverse effects have been identified in respect of the Proposed Development alone and significant cumulative effects identified.

7.6.9. SCOPING QUESTIONS TO CONSULTEES

- Do you agree that the proposed cultural heritage study area is appropriate?
- Do you agree with the proposed list of potential receptors (Table 7.13) or are there other assets where you consider there might be significant effects?
- Do you agree that the impacts listed in **Table 7.15** can be scoped out?
- Do you agree with the proposed approach to baseline data gathering and impact assessment?

7.6.10. NEXT STEPS

The CHIA will be informed by desk-based studies and site visits to fully characterise the cultural significance of the identified receptors and the contribution of cultural significance. This will identify key views and aspects of setting that should be taken into account in the design of the Proposed Development. This work will be undertaken during the autumn/winter of 2021.

7.7. INFRASTRUCTURE AND OTHER USERS

7.7.1. INTRODUCTION

508. This section of the Offshore EIA Scoping Report identifies the elements of the infrastructure and other users of relevance to the Proposed Development and considers the potential impacts from the construction, operation and maintenance, and decommissioning of the offshore and intertidal components (seaward of the MHWS) of the Proposed Development on the infrastructure and other users receptors.

509. Infrastructure and other users were reported on in the initial Scoping Report. Although the change in project scope applied to this Scoping Report, which is combining the offshore Proposed Development Array Areas, the impacts are anticipated to generally be the same as identified in the initial Scoping Report. The initial Berwick Bank Wind Farm Proposal Scoping Opinion response has been considered for the development of this section.

7.7.2. STUDY AREA

510. The infrastructure and other users study area is shown in Figure 7.18 and includes the Proposed Development Array Area and proposed ECC.

511. The infrastructure and other users study area varies in scale depending on the receptor and has been divided into different areas according to each receptor, as listed below:

- infrastructure and other users study area: inner (purple) area (within 1 km of the Proposed Development Array Area and proposed ECC. This area includes the extent of potential direct physical overlap between the Proposed Development activities and the following receptors:
  - recreational receptors (including receptors carrying out fishing, sailing and motor cruising; kite surfing; surfing; windsurfing; sea/surf kayaking and canoeing; and beach users);
  - offshore energy projects (e.g. offshore wind farms, tide and wave projects);
  - cable and pipeline operators;
  - carbon capture and storage, natural gas storage and underground coal gasification;
  - oil and gas; and
  - coal deposits.
- infrastructure and other users study area: potential increased turbidity area. This area is based on one tidal ellipse of the Proposed Development (see section 2 for further information) and relates to the potential for increases in suspended sediments to occur relating to the Proposed Development. As details relating to the tidal ellipse are not yet available, this study is not specifically defined at this stage. This study area is related to only those receptors which are susceptible to increases in Suspended Sediment Concentrations (SSCs), specifically:
  - aggregate extraction and disposal sites; and
  - recreational receptors (diving sites).
- the cumulative effect assessment will consider all other projects/plans within the broad infrastructure and other users study area (yellow area).

7.7.3. BASELINE ENVIRONMENT

512. This section provides a concise summary of the baseline environment of the Proposed Development. Reference should be made to Appendix 15 where a more detailed description is provided. The following receptors have been considered as part of the baseline environment for infrastructure and other users.

513. No site-specific surveys have been undertaken to inform the Offshore EIA Scoping Report, and due to availability of suitable data throughout the Forth and Tay, new data or modelling studies will not be required to characterise the infrastructure and other users baseline for the Offshore EIAR.

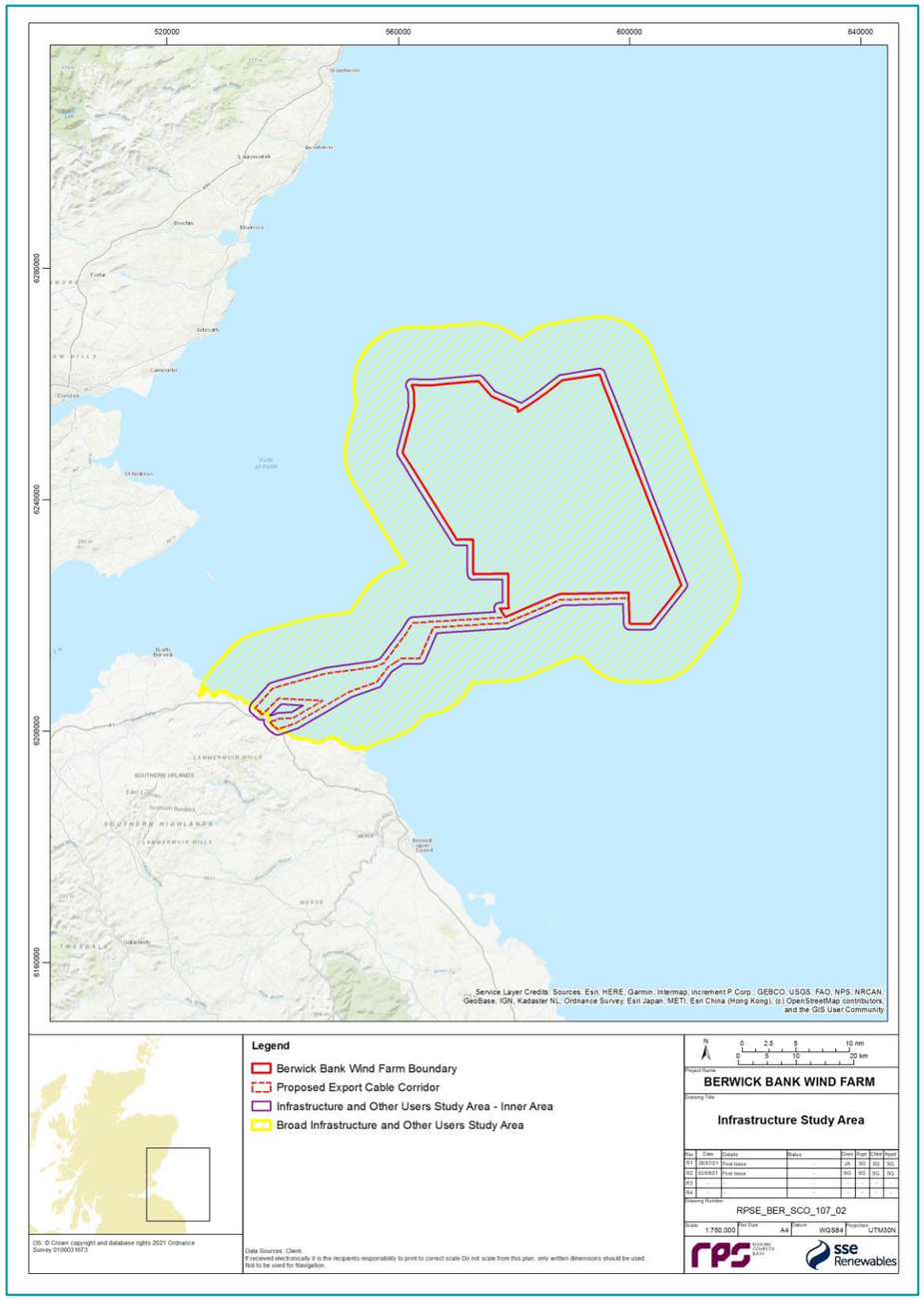


Figure 7.18: Infrastructure and Other Users Study Area

Recreational Activity

514. The National Marine Plan Interactive (NMPi) presents several data layers for recreational activities which provide an overview of recreational activities around the Scottish Coast. Apx. Figure 15. 2 provides a heat map of 23 different recreation and tourism activities undertaken at sea or around the coastline (Marine Scotland, 2015). There are varying levels of recreational activity including recreational boating, motor cruising areas, recreational sea angling, shore angling, canoeing, kayaking, windsurfing, kite surfing and scuba diving along the coast (Appendix 15).

515. Scuba diving occurs within the infrastructure and other users study area along the proposed ECC. It is noted that all recreational activities are highly seasonal and dependant on certain weather conditions.

Offshore Wind, Wave and Tidal Projects

516. An overview of the key infrastructure within the vicinity of the Proposed Development is illustrated within Figure 7.19. Offshore energy projects within the infrastructure and other users study area (inner) include Neart Na Gaoithe (NnG)). The NnG ECC also intersects the proposed export cable for the Proposed Development.

517. There are currently no wave and tidal energy projects, active licence blocks, oil and gas pipelines, no carbon capture, natural gas storage, underground gasification or coal deposits, no active or closed disposal sites and no subsea telecommunication cables located within the infrastructure and other users study area (inner). There are also no currently active licences for marine aggregate extraction in the Forth and Tay marine region.

518. Therefore wave and tidal projects, oil and gas activities within licenced blocks, carbon capture, natural gas storage, underground gasification and coal deposits, subsea telecommunication cables, marine disposal sites and marine aggregate extraction sites have not been considered further within this Offshore EIA Scoping Report.

7.7.4. POTENTIAL PROPOSED DEVELOPMENT IMPACTS

519. A range of potential impacts on infrastructure and other users have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Proposed Development in the absence of designed in measures:

- Construction
  - Displacement of recreational sailing and motor cruising, recreational fishing (boat angling) and other recreational activities (diving vessels) due to safety zones and advisory safety distances in the Proposed Development Array Area and proposed ECC may result in a loss of recreational resource;
  - Displacement of recreational fishing (shore angling) and other recreational activities (kayaking, kite surfing, surfing and windsurfing, scuba diving and beach users) due to advisory safety distances in the nearshore and intertidal section of the proposed ECC resulting in a loss of recreational resource; and
  - Installation of the export cable, including associated safety distances, may temporarily affect or restrict access to the Neart na Gaoithe offshore export cable.
- Operation and Maintenance
  - Displacement of recreational sailing and motor cruising, recreational fishing (boat angling) and other recreational activities (diving vessels) in the Proposed Development Array Area and proposed ECC may result in a loss of recreational resource;
  - Maintenance activities, including associated safety distances, for the export cable may temporarily affect or restrict access to the Neart na Gaoithe offshore export cable.

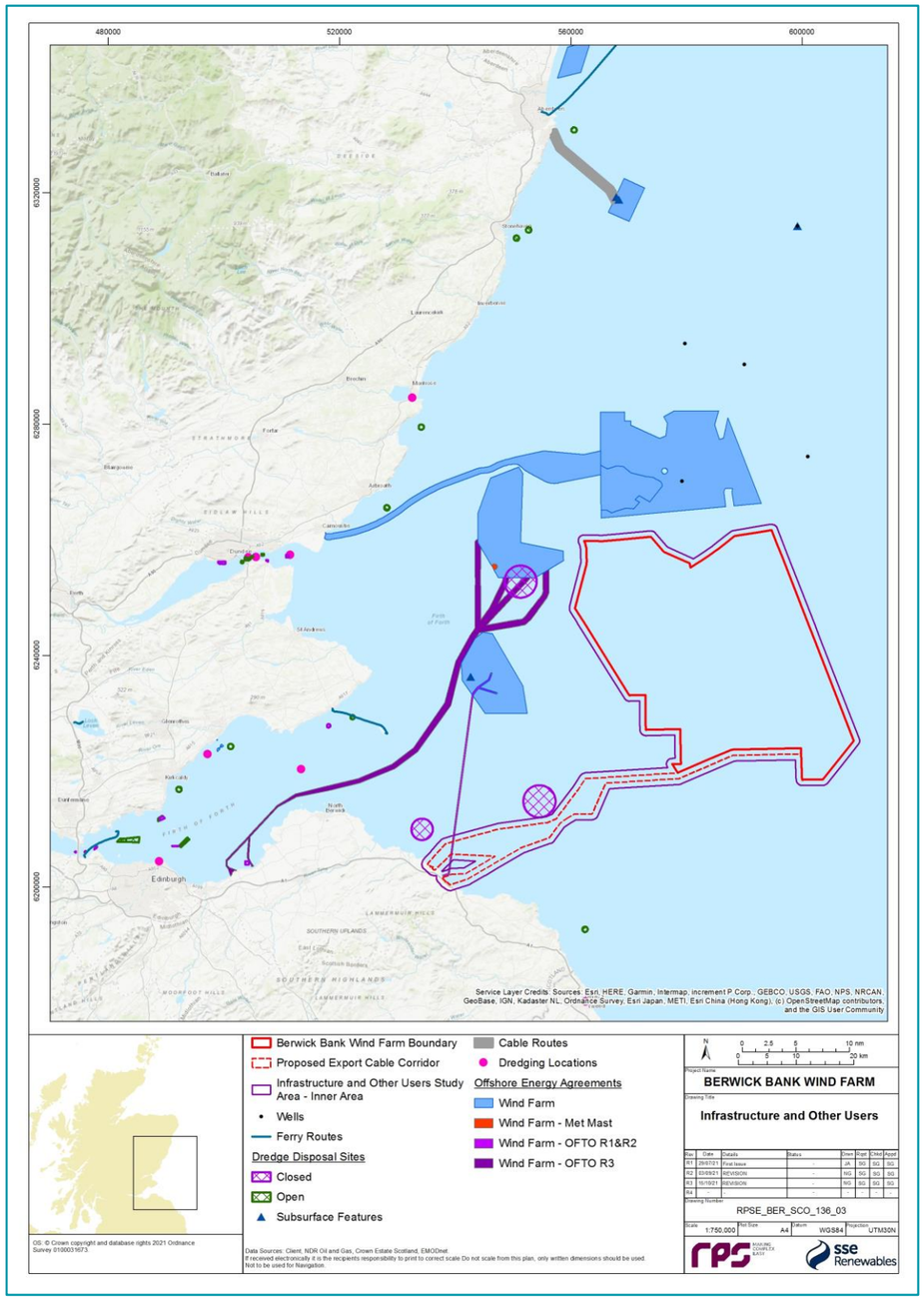


Figure 7.19: Key Infrastructure and Other Users in the Vicinity of the Proposed Development Marine Disposal and Aggregate Extraction Sites

- Decommissioning
  - Displacement of recreational sailing and motor cruising, recreational fishing (boat angling) and other recreational activities (diving vessels) in the Proposed Development Array Area and proposed ECC may result in a loss of recreational resource;
  - Displacement of recreational fishing (shore angling) and other recreational activities (kayaking, kite surfing, surfing and windsurfing, scuba diving and beach users) along the nearshore and intertidal section of the proposed ECC resulting in a loss of recreational resource; and
  - Decommissioning activities, including associated safety distances, for the export cable may temporarily affect or restrict access to the Neart na Gaoithe offshore export cable.

7.7.5. DESIGNED IN MEASURES

520. The following designed in measures, and how these can reduce the potential for impact have been considered in the identification of impacts that have been scoped into/out of the Proposed Development assessment (Table 7.16).

- promulgation of information: timely and efficient distribution of NtM, Kingfisher notifications and other navigational warnings of the position and nature of works associated with the Proposed Development;
- application and use of Safety Zones during construction, maintenance and decommissioning activities associated with wind turbines and offshore platforms;
- use of advisory safety distances around vessels undertaking construction, major maintenance, and decommissioning activities; and
- crossing or laying of cables over or adjacent to known or future cables will be subject to crossing and/or proximity agreements.

521. The requirement and feasibility of additional measures will be dependent on the significance of the effects on infrastructure and other users and will be consulted upon with statutory consultees throughout the EIA process.

7.7.6. POTENTIAL IMPACTS AFTER THE IMPLEMENTATION OF DESIGNED IN MEASURES

522. The potential impacts that have been scoped into the Proposed Development assessment are outlined in Table 7.16 together with a description of any additional data collection (e.g. site-specific surveys) and/or supporting analyses (e.g. modelling) that will be required to enable a full assessment of the impacts.

523. At this stage, the potential impacts to infrastructure and other users that are proposed to be scoped out of the assessment are described in Table 7.17.

Table 7.16: Impacts Proposed to be Scoped into the Proposed Development Assessment for Infrastructure and Other Users. Project phase refers to construction (C), operation and maintenance (O) and decommissioning (D) phase of the Proposed Development

Impact	Project Phase			Designed In Measures	Justification (including consideration of designed in measures)	Data Collection and Analysis Required to Characterise the Baseline Environment for the EIA	Summary of Proposed Approach to Assessment
	C	O	D				
Displacement of recreational sailing and motor cruising, recreational fishing (boat angling) and other recreational activities (diving vessels) due to safety zones and advisory safety distances in the Proposed Development Array Area and proposed ECC may result in a loss of recreational resource.	✓	✓	✓	• Promulgation of information; and • Implementation of Safety Zones and advisory safety distances.	The construction of infrastructure and implementation of safety distances around construction vessels may displace recreation vessels. Likewise, maintenance and decommissioning activities may also displace recreation vessels.	None required.	No modelling required for this impact. A qualitative assessment will be undertaken and presented within the Offshore EIAR based on a detailed desktop data review of sources such as RYA Scotland, Marine Scotland and the Oil and Gas Authority. An overview of this is presented within Appendix 15.
Displacement of recreational fishing (shore angling) and other recreational activities (kayaking, kite surfing, surfing and windsurfing, scuba diving and beach users) due to advisory safety distances in the nearshore and intertidal section of the proposed ECC resulting in a loss of recreational resource.	✓		✓	• Promulgation of information; and • Implementation of Safety Zones and advisory safety distances.	The construction of infrastructure and implementation of safety distances around the landfall location may prevent access to the area for recreation users. Likewise, maintenance and decommissioning activities may also restrict access.		
Installation, maintenance, and decommissioning activities including associated safety distances, may temporarily affect or restrict access to the NNG offshore export cable.	✓	✓	✓	• Promulgation of information; and • Crossing and/or proximity agreements.	The construction of export cables and implementation of safety distances around vessels may affect or restrict access to existing cables. Likewise, maintenance and decommissioning activities may also restrict access.		

Table 7.17: Impacts Proposed to be Scoped Out of the Proposed Development Assessment for Infrastructure and Other Users

Impact	Designed In Measures	Justification
Construction		
Impact on wave and tidal projects	N/A	There are no wave and tidal projects within the infrastructure and other users study area (inner). As such, impacts on wave and tidal projects have been scoped out of the assessment. As per agreement on the scoping out of this impact pathway from the initial Berwick Bank Wind Farm Scoping Opinion, SSER intends to scope this impact out.
Impact on oil and gas activities within licenced blocks	N/A	There are no licenced oil and gas licence blocks within the infrastructure and other users study area (inner). As such, impacts on oil and gas licence blocks have been scoped out of the assessment. As per agreement on the scoping out of this impact pathway from the initial Berwick Bank Wind Farm Scoping Opinion, SSER intends to scope this impact out.
Impact on carbon capture, natural gas storage, underground gasification and coal deposits	N/A	There are no carbon capture, natural gas storage, underground gasification or coal deposit projects within the infrastructure and other users study area (inner). As such, impacts on carbon capture, natural gas storage, underground gasification and coal deposit projects have been scoped out of the assessment. As per agreement on the scoping out of this impact pathway from the initial Berwick Bank Wind Farm Scoping Opinion, SSER intends to scope this impact out.
Impact on subsea telecommunications cables	N/A	There are no subsea telecommunications cables within the infrastructure and other users study area (inner). As such, impacts on subsea telecommunications cables have been scoped out of the assessment. As per agreement on the scoping out of this impact pathway from the initial Berwick Bank Wind Farm Scoping Opinion, SSER intends to scope this impact out.
Impact on marine disposal sites	N/A	There are no marine disposal sites within the infrastructure and other users study area (inner). As such, impacts on marine disposal sites have been scoped out of the assessment. As per agreement on the scoping out of this impact pathway from the initial Berwick Bank Wind Farm Scoping Opinion, SSER intends to scope this impact out.
Impact on marine aggregate extraction sites	N/A	There are no marine aggregate extraction sites within the infrastructure and other users study area (inner). As such, impacts on marine aggregate extraction sites have been scoped out of the assessment. As per agreement on the scoping out of this impact pathway from the initial Berwick Bank Wind Farm Scoping Opinion, SSER intends to scope this impact out.
Operation and Maintenance		
Displacement of recreational fishing (shore angling) and other recreational activities (kayaking, kite surfing, surfing and windsurfing, beach users) along the nearshore and intertidal section of the proposed ECC resulting in a loss of recreational resource	Advisory clearance distances	Operational and maintenance phase effects have been scoped out due to the expected low frequency of cable inspection, repair or reburial activities along the intertidal sections of the export cable. Any effects are likely to be limited to the presence of a temporary advisory clearance distance around the vessels carrying out maintenance activities. Notices to Mariners will be issued to advise other users of the nature, location and timing of any major maintenance activities. As per agreement on the scoping out of this impact pathway from the initial Berwick Bank Wind Farm Scoping Opinion, SSER intends to scope this impact out.
Impact on wave and tidal projects	N/A	As per the construction phase.
Impact on oil and gas activities	N/A	As per the construction phase.
Impact on carbon capture, natural gas storage, underground gasification and coal deposits	N/A	As per the construction phase.
Impact on subsea telecommunications cables	N/A	As per the construction phase.
Impact on marine disposal sites	N/A	As per the construction phase.
Impact on marine aggregate extraction sites	N/A	As per the construction phase.
Decommissioning		
Impact on wave and tidal projects	N/A	As per the construction phase.
Impact on oil and gas activities	N/A	As per the construction phase.
Impact on carbon capture, natural gas storage, underground gasification and coal deposits	N/A	As per the construction phase.
Impact on subsea telecommunications cables	N/A	As per the construction phase.
Impact on marine disposal sites	N/A	As per the construction phase.

Impact	Designed In Measures	Justification
Impact on marine aggregate extraction sites	N/A	As per the construction phase.

7.7.7. PROPOSED APPROACH TO THE ENVIRONMENTAL IMPACT ASSESSMENT

524. The infrastructure and other users EIA will follow the methodology set out in section 4. Specific to the infrastructure and other users EIA, the following guidance documents will also be considered:

- the RYA's Position on Offshore Renewable Energy Developments: Paper 1 (of 4) – Wind Energy, June 2019 (RYA, 2019);
- assessment of Impact of Offshore Wind Energy Structures on the Marine Environment (Marine Institute, 2000);
- guidance on Environmental Impact Assessment of Offshore Renewable Energy Development on Surfing Resources and Recreation (Surfers Against Sewage (SAS), 2009);
- European Subsea Cables Association (ESCA) Guideline No 6, The Proximity of Offshore Renewable Energy Installations and Submarine Cable Infrastructure in UK Waters (ESCA, 2016);
- International Cable Protection Committee (ICPC) recommendations:
  - Recommendation No. 2. Cable Routing and Reporting Criteria;
  - Recommendation No.3. Telecommunications Cable and oil Pipeline / Power Cables Crossing Criteria; and
  - Recommendation No.13. The Proximity of Offshore Renewable Wind Energy Installations and Submarine Cable Infrastructure in National Waters.
- TCE and CES Agreements and Oil and Gas Licences (OGA, 2018);
- Oil and Gas UK, Pipeline Crossing Agreement and Proximity Agreement Pack (Oil and Gas UK, 2015);
- TCE Guidance: Export transmission cables for offshore renewable installations – Principles of cable routeing and spacing (TCE, 2012a); and
- TCE Guidance: Submarine cables and offshore renewable energy installation – Proximity study (TCE, 2012b).

Potential Cumulative Effects

525. There is the potential for cumulative effects to occur as the result of the Proposed Development with other plans or projects. The CEA will follow the methodology set out in section 4.

Potential Transboundary Impacts

526. A screening of transboundary impacts has been carried out and is presented in Appendix 3. No potential transboundary effects have been identified for infrastructure and other users and therefore this will not be considered within the EIAR.

7.7.8. SCOPING QUESTIONS TO CONSULTEES

- Do you agree that the existing data available to describe the infrastructure and other users baseline remains sufficient?
- Do you agree that the designed in measures described provides a suitable means for managing and mitigating the potential effects of the Proposed Development on the infrastructure and other users receptors?
- Do you agree with the potential impacts to be scoped out of the Proposed Development assessment?
- Do you agree with the potential impacts to be scoped in for the Proposed Development assessment?
- Do you agree with the proposal to scope transboundary impacts out of the EIA?

7.7.9. NEXT STEPS

527. Consultation will commence with the relevant infrastructure stakeholders and other users to ensure that the key impacts and receptors are clearly identified prior to submission of the Offshore EIAR. This will also allow mitigations discussions to take place early to ensure that suitable mitigations solutions can be delivered in good time for the construction phase of the Proposed Development. In particular consultation with RYA Scotland will be undertaken to agree any additional modes of communication with recreational sailors, and early engagement will be undertaken with Neart na Gaoithe.

7.8. OFFSHORE SOCIO-ECONOMICS AND TOURISM

7.8.1. INTRODUCTION

528. This section of the Offshore EIA Scoping Report identifies the elements of the offshore socio-economics and tourism of relevance to the Proposed Development and considers the potential impacts from the construction, operation and maintenance, and decommissioning of the offshore and intertidal components (seaward of the MHWS mark) of the Proposed Development on the offshore socio-economics and tourism receptors.

529. In the case of socio-economic impact assessment, there is a complexity with the impacts associated with offshore and intertidal activities primarily manifesting onshore. As above, the current approach is focused on the 'source' of the impact, rather than the ultimate location. This is consistent with the broader approach to separating on and offshore effects.

530. The potential impacts from the construction, operation and maintenance, and decommissioning of the onshore components (namely onshore substation and associated infrastructure) of the Proposed Development on socio-economics and tourism receptors are considered as part of the Onshore EIA Scoping Report.

531. Offshore socio-economics and tourism were reported on in the initial Scoping Report. Although the change in project scope applied to this Scoping Report, which is combining the offshore Proposed Development Array Areas, the impacts are anticipated to generally be the same as identified in the initial Scoping Report. The initial Berwick Bank Wind Farm Proposal Scoping Opinion response has been considered for the development of this section.

7.8.2. STUDY AREA

532. The selection of the study areas for the socio-economic impact analysis has taken account of the spatial scale at which impacts upon different receptors are likely to materialise. This is likely to vary across receptors and will therefore require a localised study area and a larger regional study area. The study area will be linked to the selection of construction (and therefore decommissioning), and operation and maintenance ports, and the supply of a range of inputs and services for the Proposed Development.

533. The 'local' socio-economics study area will cover the Proposed Development and coastline authorities (East Lothian, Fife, Dundee City, and Angus local authorities) as illustrated in Figure 7.20. It will be linked to the selection of construction, and operation and maintenance ports and the supply of a range of inputs and services for the Proposed Development.

534. A larger regional socio-economics study area is defined to reflect the wider reach of Scottish Gross Value Added (GVA) and employment impacts that are likely to materialise through the supply chain and provision of labour. This regional study area will be defined following review of the results of the socio-economics assessment being undertaken for the Socio-economic Technical Report which will be appended to the EIAR report and provide technical detail in which the onshore and offshore EIA socio-economic impact assessments will draw from.

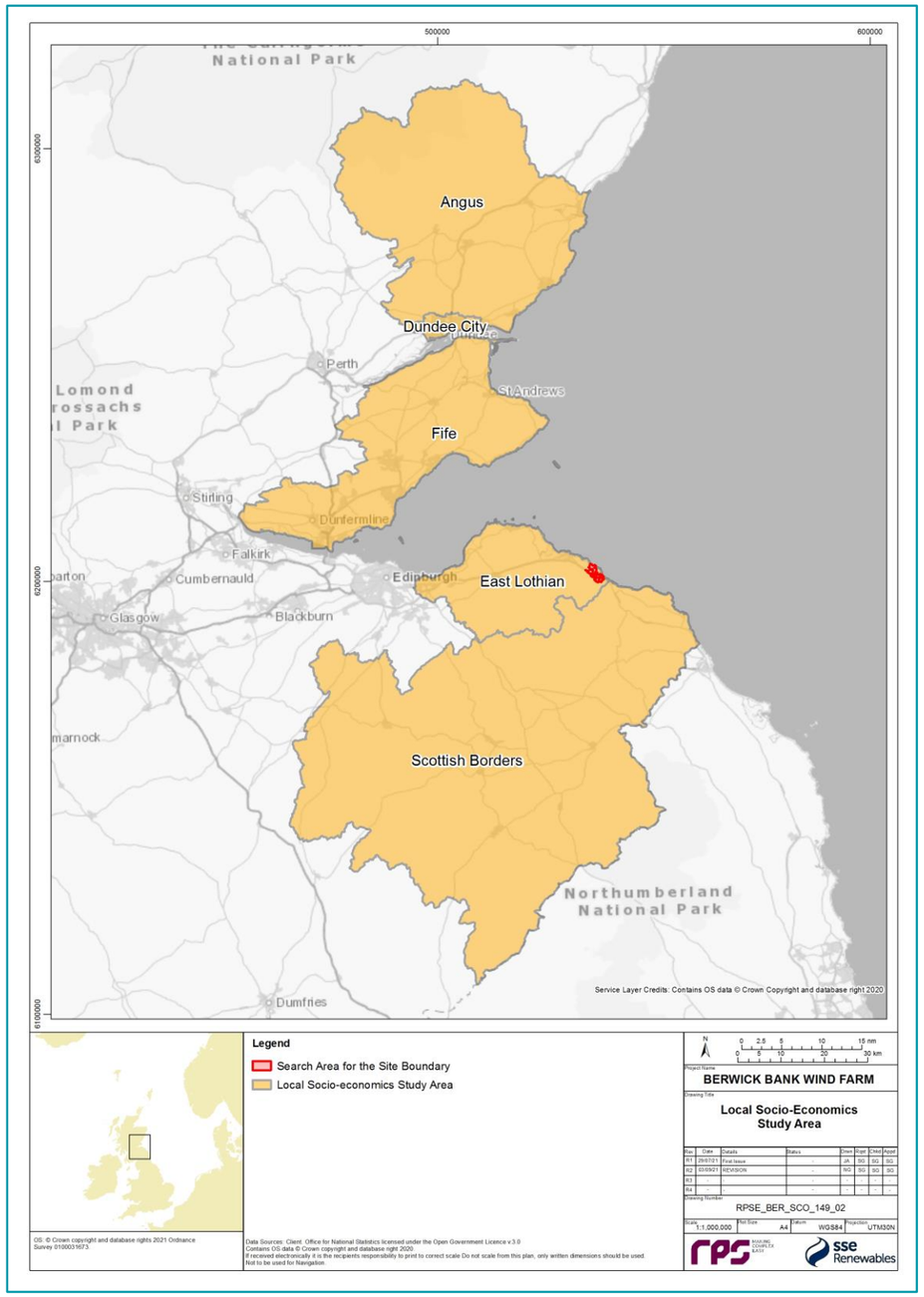


Figure 7.20: Local Socio-Economics and Tourism Study Area for the Proposed Development

7.8.3. BASELINE ENVIRONMENT

535. This section provides a concise summary of the socio-economics and tourism baseline environment of the Proposed Development, reference should be made to Appendix 16 where a more detailed description is provided.

Socio-Economics Overview

536. The Seagreen Alpha/Bravo socio-economic baseline profile noted that the majority of the open coastline between Aberdeen and Eyemouth is sparsely populated with major population centres present within the Firths of Forth and Tay (Dundee and Edinburgh).

537. In mid-2020, the median age across the local authorities within the Regional Study Area ranged from 36.5 years of age in the City of Edinburgh, to 47.1 years of age in Angus (National Records of Scotland, 2019). The percentage of the population in the working age group varied from 60% of the population of Angus, to 70% of the City of Edinburgh.

538. A review of Scotland's labour market (Scottish Government, 2020b) suggests that in 2019 the second highest employment rate across Scotland was in Perth and Kinross with 83.4% employment. Comparatively, the lowest employment rate across Scotland was observed in Dundee City with an employment rate of 68.6%. (Scottish Government, 2020b).

539. The renewable energy sector has grown steadily in Scotland over the past few years, with an annual capacity increase of 770 MW between 2009 to 2019 (Scottish Renewables, 2020). A survey in 2017 suggest that around 17,700 full-time employees in the Scottish renewable energy sector, of which 3,400 were within the offshore wind segment (Office for National Statistics, 2019).

Tourism Overview

540. Due to the offshore nature of the Proposed Development, it is unlikely to support recreational or tourism activities. The western boundary of the Proposed Development Array Area is approximately 33.5 km from the nearest coastline and approximately 16.4 km from the closest recognised Royal Yachting Association (RYA) sailing area. There are several wrecks located within the Proposed Development Array Area and proposed ECC, but the depths of these wrecks exceed those which attract recreational divers. Likewise, the seabed within the Proposed Development Array Area and proposed ECC is relatively featureless and does not contain notable features which typically attract recreational divers. The nearshore and inshore waters which the proposed ECC crosses may also support recreational sea angling.

541. A review of the tourism in the region associated within the landfall locations (Thorntonloch and Skateraw, in East Lothian) suggests approximately 62% of tourists visit the beach and approximately 55% undertake sightseeing and tours (Scottish Tourism Alliance, 2019). In 2018, nearly half (48%) of all visitors undertook some kind of sporting activity, and hiking / walking / rambling remains the most popular sporting activity amongst visitors, especially overseas visitors (36%), whilst golf and birdwatching are undertaken by around one-tenth of all visitors, outdoor water sports only 5% and fishing only 2% (Scottish Tourism Alliance, 2019).

7.8.4. POTENTIAL PROPOSED DEVELOPMENT IMPACTS

542. A range of potential impacts on socio-economics and tourism have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Proposed Development in the absence of designed in measures (Table 7.18):

- Construction
  - Direct, indirect, and induced employment impacts in the supply chain supported by construction activity;
  - Direct, indirect, and induced GVA impacts in the supply chain supported by construction activity;
  - Impact on access to construction-related employment amongst local residents;
  - Impact on the demand for housing, accommodation and local services; and
  - Impact on tourism and recreation activity and associated economic value.
- Operation and Maintenance
  - Direct, indirect, and induced employment impacts in the supply chain supported by operation and maintenance activity;
  - Impact on the amount of GVA (£m) supported by operation and maintenance activity;
  - Impact on access to operation and maintenance related employment amongst local residents;
  - Impact on the demand for housing, accommodation and local services; and
  - Impact on tourism and recreation activity and associated economic value.
- Decommissioning
  - Direct, indirect, and induced employment impacts in the supply chain supported by decommissioning activity;
  - Impact on access to decommissioning related employment amongst local residents;
  - Impact on demand for housing, accommodation and local services; and
  - Impact on tourism and recreation activity and associated economic value.

7.8.5. DESIGNED IN MEASURES

543. At this stage, there are no designed in measures considered for socio-economics receptors, as it is anticipated that the overriding socio-economic impacts of the Proposed Development will be positive in nature. Consultation will be carried out with local stakeholders and public sector bodies, such as Scottish Enterprise, and through other activities that raise awareness of the opportunities that the Proposed Development provide to maximise the positive socio-economic impacts.

544. Several opportunities which could be considered to enhance the positive impacts include:

- the use of locally manufactured content where possible;
- the use of local contractors (where possible) during construction for onshore infrastructure and potential offshore construction work where possible;
- employment and training possibilities for local people on the operation and maintenance of a wind farm where feasible;
- supporting the community through sponsorship of local groups and teams;
- open approach to engagement with all members of the local community, including attendance at community meetings when requested; and
- continued engagement and discussion with local environmental agencies, such as Restoration Forth.

545. However, the requirement and feasibility of any mitigation measures will be dependent on the significance of the effects on the socio-economics receptors and will be consulted upon with relevant consultees throughout the EIA process.

7.8.6. POTENTIAL IMPACTS AFTER THE IMPLEMENTATION OF DESIGNED IN MEASURES

546. The impacts that have been scoped into the Proposed Development assessment are outlined in Table 7.18 together with a description of any additional data collection (e.g. site-specific surveys) and/or supporting analyses (e.g. modelling) that will be required to enable a full assessment of the impacts.

547. On the basis of the baseline socio-economics and tourism information currently available and the Proposed Development description outlined in section 2, no impacts are proposed to be scoped out of the assessment for socio-economics and tourism at this stage.

Table 7.18: Impacts Proposed to be Scoped In to the Proposed Development Assessment for Socio-Economics and Tourism. Project phase refers to construction (C), operation and maintenance (O) and decommissioning (D) phase of the Proposed Development

Impact	Project Phase			Justification (including consideration of designed in measures)	Data Collection and Analysis Required to Characterise the Baseline Environment for the EIA	Summary of Proposed Approach to Assessment
	C	O	D			
Impact on employment in construction, operation and maintenance and decommissioning in the supply chain	✓	✓	✓	Potential Capital Expenditure (CAPEX) from the construction phase, operation and maintenance phase and decommissioning phase to support employment in Scottish companies that are directly engaged in the construction supply chain. The construction and operation and maintenance of the Proposed Development could also support employment indirectly in the wider Scottish supply chain.	A desk-based review will be undertaken to develop a baseline understanding of the socio-economic and tourism related conditions. Further, a BVG Associates (BVGA) (2021) Socio-economic Technical Report will be developed which presents an overview of both the onshore and offshore socio-economic environment of the Project. This will support the relevant chapter assessments within the Offshore EIAR and Offshore EIAR.	An economic impact model to estimate the direct, indirect and induced employment impact of Capital Expenditure (CAPEX) on construction, operation and maintenance and decommissioning of the Proposed Development in the socio-economics study area will be developed. Modelling will align with Draft Advice on Net Economic Benefit and Planning (The Scottish Government, 2016) and utilise Supply, Use and Input-Output Tables (Scottish Government, 2020).
Impact on the amount of GVA supported by construction, operation and maintenance and decommissioning activity	✓	✓	✓	Potential Capital Expenditure (CAPEX) on the construction, operation and maintenance and decommissioning of the Proposed Development to support GVA in Scottish companies that are directly engaged in the construction supply chain. The construction and operation and maintenance of the Proposed Development could also go on to support employment indirectly in the wider supply chain.		An economic impact model to estimate the direct, indirect and induced GVA impact of Capital Expenditure (CAPEX) on construction, operation and maintenance and decommissioning of Proposed Development in the socio-economics study area will be developed. Modelling will align with Draft Advice on Net Economic Benefit and Planning (The Scottish Government, 2016) and utilise Supply, Use and Input-Output Tables (Scottish Government, 2020).
Impact on access to construction, operation and maintenance and decommissioning related employment amongst local residents	✓	✓	✓	Direct and indirect employment associated with the construction phase, operation and maintenance phase and decommissioning phase and could increase the range and supply of employment opportunities that are accessible to residents of the area.		No specific modelling is required for this impact assessment. A qualitative assessment will be undertaken and presented within the Offshore EIAR. A qualitative assessment will be undertaken and presented within the Offshore EIAR. The assessment will be based on a desktop review of existing relevant studies and national datasets and indicators and will be supported by the development of an economic impact model.
Impact on the demand for housing, accommodation and local services	✓	✓	✓	Direct and indirect employment generated during the construction phase, operation and maintenance phase and decommissioning phase could increase demand for housing, accommodation and local services during the construction phase.		
Impact on tourism and recreation activity and associated economic value	✓	✓	✓	The construction, operation and maintenance and decommissioning of the Proposed Development could lead to disruption of local tourism and recreational resources.		

7.8.7. PROPOSED APPROACH TO THE ENVIRONMENTAL IMPACT ASSESSMENT

548. The socio-economics and tourism EIA will follow the methodology set out in section 4. The assessment will consider the Likely Significant Effect (LSE – as defined by the EIA Regulations) associated with the offshore infrastructure on onshore and offshore receptors. The socio-economic impacts of the construction, operation and maintenance and the decommissioning of the Proposed Development have the potential to be significant and will impact at a regional and local level.

549. The assessment will be based on a desktop review of existing relevant studies and national datasets and indicators and will be supported by the development of an economic impact model. The assessment will also draw on the information provided in other topics such as commercial fisheries (section 7.1), shipping and navigation (section 7.2), aviation, military and communications (section 7.3), marine archaeology (section 7.4), seascape and visual resources (section 7.5), and infrastructure and other users (section 7.6). The socio-economic impacts and benefits will be quantified in terms of local (Scottish Borders, East Lothian, Fife, Dundee City, and Angus local authorities) and regional (Scotland) impacts. The methodology for the socio-economic assessment will consider the results from the economic impact model that takes account of all possible impacts: direct, indirect, induced, supply chain effects, and potential for local production and maintenance. This will include consideration of factors such as leakage, displacement, substitution, and economic multipliers.

550. Policy precedent and established guidance on assessing the impact of development on socio-economics will also be utilised to inform the assessment, including:

- Environmental Impact Assessment Handbook: Guidance for competent authorities, consultation bodies, and others involved in the Environmental Impact Assessment process in Scotland (Scottish Natural Heritage/ Historic Environment Scotland, 2018);
- draft Advice on Net Economic Benefit and Planning (The Scottish Government, 2016); and
- Supply, Use and Input-Output Tables: 1998-2017 (Scottish Government, 2020).

551. SSER also understands there is additional guidance in development by Marine Scotland. This will also be utilised in the development of the assessment, if available.

552. A Project level socio-economics Technical Report will be developed and will support the Offshore and Onshore EIA Reports socio-economics and tourism assessments. This Technical Report will be appended to the Offshore EIAR, and will support the relevant chapters of the Offshore EIAR and Onshore EIA Report.

Potential Cumulative Effects

553. Although the predicted effects of the Proposed Development on socio-economics are considered to be localised, there is potential for cumulative effects to occur from other projects or activities within the regional socio-economics study area. Projects and activities which will be considered include:

- other offshore wind farms and associated onshore cabling and infrastructure;
- onshore energy generation projects;
- road and rail projects;
- major residential, commercial and leisure projects; and
- minerals extraction and landfill projects.

554. The CEA will follow the methodology set out in section 4.

Potential Transboundary Impacts

555. A screening of transboundary impacts has been carried out and is presented in Appendix 3. No potential transboundary effects have been identified for socio-economics and therefore this will not be considered within the EIAR.

7.8.8. SCOPING QUESTIONS TO CONSULTEES

- Are there any additional baseline datasets to those included in Appendix 16 that should be reviewed to characterise the socio-economics baseline?
- With regard to the cumulative effects assessment, are there projects and activities that consultees would particularly want to draw attention to for consideration/inclusion?
- Do you agree that all potential impacts have been identified for socio-economics receptors?

7.8.9. NEXT STEPS

556. Consultation will commence with the relevant stakeholders to ensure that the key impacts and receptors are clearly identified prior to submission of the Offshore EIAR. This will also allow mitigations discussions to take place early to ensure that suitable mitigations solutions can be delivered in good time for the construction phase of the Proposed Development, and also ensure positive impacts are enhanced. In particular, stakeholders and impacted communities will be consulted to identify social and tourism impacts, and potential mitigation measures.

557. A Socio-economic Technical Report (BVGA (2021) will be developed to cover the onshore and offshore socio-economic baseline environment of the Project, and will support the relevant chapters of the Offshore EIA Report and Onshore EIA Report.

8. SUMMARY OF THE OFFSHORE EIA SCOPING REPORT

8.1. OVERVIEW

558. SSER is proposing the development of the Berwick Bank Wind Farm (the Proposed Development) in the outer Firth of Forth and Firth of Tay, 33.5 km off of the East Lothian coastline. SSER intends to submit separate consents, licences and permissions for the offshore (seaward of MHWS and onshore (landward of MLWS) infrastructure of the Proposed Development. This Offshore EIA Scoping Report therefore considers all of the offshore infrastructure of the Project, seaward of MHWS (i.e. the Proposed Development). SSER is also considering an additional offshore ECC, which is under development. This ECC does not form part of the Proposed Development for which this Scoping request has been made however it will be considered within the CEA for the Offshore EIA Report (and the Onshore EIA Report) as appropriate, to ensure compliance with the requirements of the EIA Regulations.

559. This Offshore EIA Scoping Report has identified the potentially significant effects associated with the construction, operation and maintenance, and decommissioning phases of the Proposed Development, on a range or receptors. These are detailed in section 5 to section 7 of this Offshore EIA Scoping Report and are summarised in Appendix 1 and a proposed approach to assessment has been provided in each section.

560. The technical topics considered within this report and whether they have been scoped in or scoped out are presented in Table 8.1.

Table 8.1: Overview of Technical Topics Considered within this Offshore EIA Scoping Report and Scoped In/Out Status

Topic	Scoped in / Out
Offshore Physical Environment	
Physical Processes	In
Subsea Noise	In
Airborne Noise	Out
Offshore Air Quality	Out
Climatic Effects	In
Offshore Biological Environment	
Benthic Subtidal and Intertidal Ecology	In
Fish and Shellfish Ecology	In
Marine Mammals	In
Offshore and Intertidal Ornithology	In
Offshore Human and Socio-economic Environment	
Commercial Fisheries	In
Shipping and Navigation	In
Aviation, Military and Communications	In
Marine Archaeology	Out
Seascape, Landscape and Visual Resources	In
Cultural Heritage	In
Infrastructure and Other Users	In
Offshore Socio-economics and Tourism	In

8.2. CUMULATIVE EFFECTS SUMMARY

561. A summary of the potential cumulative effects associated with each topic is presented within each topic of this report. A detailed cumulative effects assessment will be undertaken to support the EIA Report, as per the methodology outlined in section 4.3.7.

562. An overview of the projects or activities which will be considered for cumulative effects include:

- other offshore wind farms and associated cabling and infrastructure;
- oil and gas infrastructure/development (cables and pipelines);
- other forms of cabling (i.e. telecommunications and interlinks);
- beach replenishment schemes;
- navigation and shipping; and
- aggregate extraction and disposal of dredging spoil.

8.3. TRANSBOUNDARY IMPACTS

563. A transboundary screening assessment for the Proposed Development has been undertaken as is presented in Appendix 3.

564. The following topics have been screened into further consideration of transboundary impacts:

- fish and shellfish ecology;
- non-breeding bird populations
- commercial fisheries; and
- shipping and navigation..

8.4. CONSULTATION

565. The proposed approach to stakeholder engagement during the pre-application phase is outlined in section 4.3.4. Because part of the Proposed Development is within Scottish Territorial Waters, the PAC Regulations apply, therefore as part of further consultation during the pre-application phase, a pre-application event will be held during March 2022. Further details on this PAC event will be published in Edinburgh Gazette and other local press. A PAC report will also be prepared and submitted with the Marine Licence Application for the Proposed Development. A summary of all the consultation undertaken will be presented in the Offshore EIAR. Combined Public exhibitions will be held for the onshore and offshore project elements to give a full understanding of the development.

8.5. NEXT STEPS

566. SSER will participate in pre-application consultation with key stakeholders in preparation for commencing technical reporting, assessment and preparation of the Offshore EIAR.

BERWICK BANK WIND FARM
OFFSHORE EIA REVISED BOUNDARY SCOPING REPORT

VOLUME II: APPENDICES

Appendix 1 SCOPING ROAD MAP

1.1 SCOPING ROAD MAP

1. As outlined in section 4.3.2, the Offshore Scoping Road Map[10] for the Proposed Development will be used as a tool to facilitate early engagement with stakeholders and subsequent engagement throughout the pre-application phase, including consultation on the developing baseline characterisation and development of the final application documentation. The Offshore Scoping Road Map is a 'live' document which will be used to reach and record further points of agreement on scoping impacts out of the assessment, and/or agreeing the level of assessment which will be presented for impacts, so that the focus in the EIA submission documents is on likely significant effects. The Scoping Road Map summarises the potential impacts of the Proposed Development that have been identified for each offshore EIA topic area listed in section 5, 6 and 7.

2. The information included within the Offshore Scoping Road Map (Apx. Table 1. 1):

   - expected receptors: Receptors expected to occur within the zone of influence, based on an initial desktop review;
   - sensitivity and evidence: Brief review of the sensitivity of the relevant receptors and evidence available on potential effects;
   - baseline data sources: Description of data and information to be used to inform the baseline characterisation. See further information below;
   - mitigation and monitoring: Potential measures which could be applied to remove significant effects; and
   - approach to EIA: Briefly describes whether impacts are scoped into the EIA, scoped out (with the relevant justification) or whether the impact has the potential to be scoped out at a later date.

3. The purpose of the Offshore Scoping Road Map is to separate the key impacts which will be considered in detail in the final Application from those which are less important (i.e. not likely to influence the decision to consent the project), with three broad categories:

   - impacts scoped in: For the key impacts which will be considered in the EIA. Where appropriate, a brief outline of how these impacts will be assessed is provided.
   - impacts scoped out: The Road Map will provide justification for scoping impacts out of assessment in the EIA.
   - scoped in, with the potential to be scoped out: This category is for impacts which are not likely to lead to a significant effect on a receptor, but for which there is not sufficient justification available at the time of drafting this Offshore EIA Scoping Report to remove the impact entirely.

4. The conclusion of the scoping stage assessments for the Proposed Development are presented Apx. Table 1. 1.

[10] Note that the Scoping Road Map differs to the topic specific Road Maps which are developed for a selection of topics to facilitate engagement.

Apx. Table 1. 1: Scoping Road Map

Impact	Expected receptors	Sensitivity and Evidence Following Consideration of Designed in Measures	Scoped in (✓)/out (X)	Information to Inform baseline characterisation	Approach to EIA	Mitigation and Monitoring post-EIA Assessment
Physical Processes						
Increase in suspended sediments due to construction, operation and maintenance and / or decommissioning related activities, and the potential impact to physical features and the potential impact to physical features within the Proposed Development Array Area – construction, O&M and decommissioning phases.	Benthic subtidal and intertidal ecology receptors, physical features and morphology.	There is potential for increased SSCs and associated deposition associated with seabed preparation activities, foundation installation and cable installation activities. This assessment will consider the potential impacts arisings due to changes in SSC and deposition, to physical coastal features and marine morphology. Elevations in SSC and subsequent deposition of disturbed sediments also have the potential to result in adverse and indirect impacts on a variety of receptor groups which lie in other Offshore EIAR topics, such as benthic subtidal and intertidal ecology, fish and shellfish ecology, marine mammals, marine archaeology and infrastructure and other users. For these receptor groups, a significance of effect will not be assigned within the physical processes assessment.	✓	Data collected during the 2019 geophysical survey campaign and to be collected during the 2020 geotechnical survey campaign will provide data to support the development of the physical processes numerical modelling. Data collected from previous metocean surveys may also be utilised. Further, a detailed desktop data review has been undertaken to gather other relevant data which will support the assessment.	Numerical modelling will be undertaken to provide an overview of the potential impacts to physical processes relating to the various activities of the Proposed Development. Further details of this modelling are presented in section 5.1.7. The decommissioning assessment will consider the outputs of the modelling undertaken, and also a qualitative assessment. The potential for impacts relating to the decommissioning of cables at the landfall will be assessed as part of the cable landfall desktop analysis described in relation to the construction and operation phases.	TBC
Increase in suspended sediments due to construction, operation and maintenance and / or decommissioning related activities, and the potential impact to physical features within the proposed ECC.	Benthic subtidal and intertidal ecology receptors.	Sediment disturbance may arise from export cable installation, from maintenance activities such as export cable repairs and associated deposition associated with decommissioning activities. This assessment will consider the potential impacts arisings due to changes in SSC and deposition, to physical coastal features and marine morphology. Elevations in SSC and subsequent deposition of disturbed sediments have the potential to result in adverse and indirect impacts on a variety of receptor groups, which are listed above.	✓	As above.	As above.	TBC

Impact	Expected receptors	Sensitivity and Evidence Following Consideration of Designed in Measures	Scoped in (✓)/out (X)	Information to Inform baseline characterisation	Approach to EIA	Mitigation and Monitoring post-EIA Assessment
Impacts to hydrodynamics, sediment transport and beach morphology due to cable installation activities and potential impact to physical features at landfall.	Benthic subtidal and intertidal ecology receptors.	Sediment disturbance may arise from Cable installation activities at the landfall have the potential to impact on the physical environment at the shoreline. Decommissioning activities at the landfall have the potential to impact on the physical environment at the shoreline.	✓	As above.	As above.	TBC
Impacts to the wave regime due to presence of infrastructure in the physical processes study area, and the associated potential impacts along adjacent shorelines. This will include designated sites with physical features or geodiversity features within the Physical Processes study area – operational phase.	Benthic subtidal and intertidal ecology receptors.	The interaction of the wind turbine foundations and associated infrastructure and the wave regime will result in a reduction to wave energy. This in turn has the potential to impact upon adjacent physical coastal features and marine morphology.	✓	As above.	The potential impact of the Proposed Development on coastal features and marine morphology will be informed by the Physical Processes numerical modelling outlined above. A qualitative assessment of impact on key coastal features will be presented within the Physical Processes section.	TBC
Impacts to tidal regime due to presence of infrastructure in the physical processes study area and associated potential impacts to physical features and morphology (e.g. bank morphology). This will include designated sites with physical features or geodiversity features within the Physical Processes study area..	Benthic subtidal and intertidal ecology receptors.	The interaction of the wind turbine foundations and associated infrastructure and the tidal regime will result in a change to sediment transport regimes. This in turn has the potential to impact upon adjacent physical coastal features and marine morphology.	✓	As above.	The potential impact of the Proposed Development on coastal features and marine morphology will be informed by the Physical Processes numerical modelling outlined above. A qualitative assessment of impact on key coastal features will be presented within the Physical Processes section.	TBC
Impacts to sediment transport and sediment transport pathways due to presence of infrastructure in the physical processes study area and associated potential impacts to physical features and morphology (e.g. bank morphology). This will include designated sites with physical features or geodiversity features within the Physical Processes study area – operation and maintenance phase.	Benthic subtidal and intertidal ecology receptors.	Foundations within the array may interrupt sediment transport pathways. In addition, cable protection may result in localised secondary scour or pose an obstacle to sediment transport pathways.	✓	As above.	The potential impact of the Proposed Development on sediment transport and sediment transport pathways will be informed by the Physical Processes numerical modelling outlined above. This assessment will be presented within the Physical Processes section.	TBC

Impact	Expected receptors	Sensitivity and Evidence Following Consideration of Designed in Measures	Scoped in (✓)/out (X)	Information to Inform baseline characterisation	Approach to EIA	Mitigation and Monitoring post-EIA Assessment
Impacts to beach morphology, hydrodynamics and sediment transport (littoral drift) due to operation and maintenance activities and potential impact to physical features at landfall. This will include designated sites with physical features or geodiversity features within the Physical Processes study area – operation and maintenance phase.	Benthic subtidal and intertidal ecology receptors.	Should the cable become exposed at the landfall, there is potential for impact on local coastal processes.	✓	As above.	The potential impact of coastal recession will be considered within the assessment of beach morphology, hydrodynamics and sediment transport. A cable burial engineering study will take into account the potential for changes in beach morphology and coastal recession, including potential for beach lowering, to influence cable burial depth, and this will be used to inform the Coastal Processes assessment.	TBC
Scour of seabed sediments	Benthic subtidal and intertidal ecology receptors.	There is the potential for scouring of seabed sediments to occur due to interactions between metocean regime (wave, sand and currents) and foundations or other seabed structures. This scouring can develop into depressions around the structure the use of scour protection around offshore structures and foundations will be employed.	✓	As above.	The potential impact of scour protection from the Proposed Development will be informed by the Physical Processes numerical modelling outlined above. An assessment of impact on key marine features will be presented within the Benthic Subtidal and Intertidal Ecology section,.	TBC
Subsea Noise						
Effects of subsea noise on marine life due to use of geophysical survey equipment – construction.	Impacts are assessed in marine mammal, fish and shellfish ecology, commercial fisheries and infrastructure and other users sections.	The use of soft start procedures, combined with Marine Mammal Observers (MMOs) and Acoustic Deterrent Device (ADD) as appropriate, will reduce the potential for injury to marine life due to survey activities. Nevertheless, due to the potentially high source levels involved, it will be important to carry out modelling and assessment of the proposed activities in order to determine the most appropriate mitigation strategy.	✓	Desktop data sources and bathymetry data.	The approach used for assessing subsea noise is detailed in section 5.2.7. The results of the noise modelling will be presented in a Subsea Noise Technical Report, which will inform the Fish and Shellfish Ecology, Marine Mammal, Commercial Fisheries and Infrastructure and Other Users EIA Report sections	TBC
Effects of subsea noise on marine life due to construction, operation and maintenance and decommissioning vessels and rigs.	As above.	Although noise from these sources will be relatively low in magnitude (e.g. compared to impact piling and continuous in nature (rather than impulsive) there is still some residual potential for disturbance due to increased traffic and use of rigs etc.	✓			TBC

Impact	Expected receptors	Sensitivity and Evidence Following Consideration of Designed in Measures	Scoped in (✓)/out (X)	Information to Inform baseline characterisation	Approach to EIA	Mitigation and Monitoring post-EIA Assessment
Effects of subsea noise on marine life due to impact driven and drilled pile installation for the WTG and OSP foundations	As above.	The combination of slow and soft start will provide additional time for animals to leave the area prior to commencement of full speed and full power impact piling. Nevertheless, due to the potentially high source levels involved and impulsive nature of the sound, it will be important to carry out modelling and assessment of the proposed piling activities in order to determine the most appropriate mitigation strategy.	✓			TBC
Effects of subsea noise on marine life due to operational noise from the wind turbines	As above.	Although operational noise from the wind turbines will be relatively low in magnitude (e.g. compared to impact piling and UXO, or vessels) and continuous in nature (rather than impulsive) there may be some potential for disturbance. Given that the wind turbines will operate more or less continuously over the life of the project (operational phase), it will be important to consider their potential effect on marine life.	✓			TBC
Effects of subsea noise on marine life due to jacket cutting and removal	As above.	There is potential for disturbance or possibly injury from decommissioning activities, depending on the techniques utilised. It is therefore proposed to include these activities in the assessment.	✓			TBC
Airborne Noise						
Change in noise level associated with the construction of the Proposed Development - Human Receptors	Human receptors landward of MLWS	There is the potential for activities associated with the construction of the Proposed Development to temporarily increase the noise levels experienced during offshore and nearshore construction activities. This includes potential helicopter related airborne noise throughout the construction phase. However, it is considered highly unlikely that flight activity relating to the construction of the Proposed Development with affect human receptors. This has	X	N/A	It is unlikely that the construction activities associated with the Proposed Development will significantly affect these receptors..	TBC

Impact	Expected receptors	Sensitivity and Evidence Following Consideration of Designed in Measures	Scoped in (✓)/out (X)	Information to Inform baseline characterisation	Approach to EIA	Mitigation and Monitoring post-EIA Assessment
		been agreed with East Lothian Council via consultation undertaken at the pre-scoping stage in September 2021.				
Piling activities will generate construction noise that may impact recreational and leisure receptors in the nearshore environment – construction phase.	Recreational users of the nearshore environment.	Nearshore construction activities will include cable laying, which will be conducted via a Cable Lay Vessel with support via a ROV.	X	N/A	It is unlikely that the construction activities associated with the Proposed Development will significantly affect these receptors. Construction activities within the offshore area are not predicted to affect these activities due to the offshore location of the project.	TBC
Piling activities will generate construction noise that may exceed guideline levels for commercial fishing vessels and commercial shipping traffic – construction phase.	Commercial fishing vessels and commercial shipping traffic.	N/A	X	N/A	The maximum scenario distance of the receptors from the nearest wind turbine/project boundary is proposed as 500 m for commercial fishing vessel and 1 nm for commercial shipping traffic, based on navigational safety guidelines. The effect of airborne noise from piling on receptors onboard commercial fishing vessels and commercial ships will be negligible.	TBC
Piling activities will generate construction noise that may exceed guideline levels for manned gas platforms – construction phase.	Manned gas platforms.	N/A	X	N/A	The nearest gas platform with accommodation, to the Proposed Development, is located greater than 65 km away. Given this distance, the effect of operational noise on receptors onboard gas accommodation platforms has therefore been scoped out of this assessment.	TBC
Airborne noise associated with the operation and maintenance of the Proposed Development may impact recreational and leisure receptors in the nearshore environment – operation and maintenance phase.	Recreational users of the nearshore environment.	N/A	X	N/A	It is unlikely that there will be airborne noise effects from the operational wind turbines on nearshore recreational and leisure noise sensitive receptors due to the low level of noise associated within this phase of the project. Any maintenance activities (e.g. cable inspection, repair or reburial) will be expected to be of low frequency along the intertidal sections of the proposed ECC.	TBC
Airborne noise may exceed guideline levels for commercial fishing vessels and commercial shipping traffic - operation and maintenance phase.	Commercial fishing vessels and commercial shipping traffic.	N/A	X	N/A	The maximum scenario distance of the receptors from the nearest wind turbine/project boundary is proposed as 500 m for commercial fishing vessel and 1 nm for commercial shipping traffic based on navigational safety guidelines. The effect of airborne noise from operation and maintenance activities receptors onboard commercial fishing vessels and commercial ships will therefore be negligible.	TBC

Impact	Expected receptors	Sensitivity and Evidence Following Consideration of Designed in Measures	Scoped in (✓)/out (X)	Information to Inform baseline characterisation	Approach to EIA	Mitigation and Monitoring post-EIA Assessment
Airborne noise may exceed guideline values for offshore accommodation platforms - operation and maintenance phase.	Manned gas platforms.	N/A	X	N/A	The nearest gas platform with accommodation, to the Proposed Development, is located greater than 65 km away.	TBC
Airborne noise and vibration impacts to human receptors – operation and maintenance phase.	Human receptors landward of MLWS.	N/A	X	N/A	There are unlikely to be any noise and vibration impacts relating to the operational phase of the wind turbines due to the very large distance between the nearest wind turbines and the shore (approximately 39.2 km) and the low level of noise associated within this phase of the project.	TBC
Decommissioning activities will generate decommissioning noise that may impact recreational and leisure receptors in the nearshore environment.	Recreational users of the nearshore environment.	N/A	X	N/A	Nearshore decommissioning activities are unlikely to affect recreational and leisure receptors due to the unexpected requirement for high-level emitting activities near to shore.	TBC
Airborne noise may exceed guideline levels for commercial fishing vessels and commercial shipping traffic.	Commercial fishing vessels and commercial shipping traffic.	N/A	X	N/A	The maximum distance of the receptors from the nearest wind turbine/project boundary is proposed as 500 m for commercial fishing vessel and 1 nm for commercial shipping traffic based on navigational safety guidelines. The effect of airborne noise from decommissioning activities to receptors onboard commercial fishing vessels and commercial ships will therefore be negligible.	TBC
Airborne noise may exceed guideline values for offshore accommodation platforms.	Manned gas platforms.	N/A	X	N/A	Decommissioning activities will be similar to construction activities with the exception that piling operations will not be required. Given that the level of noise generated from the decommissioning will be less than the construction phase, the effect of airborne noise from piling for receptors onboard gas accommodation platforms has been scoped out of this assessment.	TBC
Airborne noise and vibration impacts to human receptors – decommissioning phase.	Human receptors landward of MLWS.	N/A	X	N/A	The detail and scope of the decommissioning works would be determined by the relevant legislation and guidance at the time of decommissioning and agreed with the regulator. A decommissioning plan would be provided.	TBC
Air Quality						

Impact	Expected receptors	Sensitivity and Evidence Following Consideration of Designed in Measures	Scoped in (✓)/out (X)	Information to Inform baseline characterisation	Approach to EIA	Mitigation and Monitoring post-EIA Assessment
Atmospheric emissions from vessel and helicopter movements.	Users of the marine environment.	N/A	X	N/A	Atmospheric emissions from the Proposed Development are likely to arise from fuel used to power vessels and helicopters used throughout the construction, operation and maintenance and decommissioning phase. Taking into account the dispersive nature of the offshore environment, the distance of Proposed Development from static sources of potential pollutants and the relatively small potential contribution to emissions when compared with the total vessel and helicopter movements in the northern North Sea, it is considered highly unlikely that concentrations of potential atmospheric pollutants associated with the Proposed Development, will be at levels of environmental concern. Therefore, SSER intends to scope this impact out of further consideration within the Offshore EIAR, subject to consultation with the relevant stakeholders.	TBC
The generation of dust and particulates at the selected landfall site (e.g. from earth moving, directional drilling, open cut trenches)) have the potential to have an adverse (smothering) impact on ecological receptors	Ecological receptors landward of MHWS	N/A	X	N/A	The only relevant designated ecological receptor within 50 m of potential landfall construction, operation and maintenance and decommissioning activities is the Barns Ness SSSI. The SSSI is designated for saltmarsh, sand dunes and shingle. It is considered unlikely that areas of these habitats below MHWS where landfall connections could occur will be sensitive to dust deposition. The area of potential landfall construction activity within 50 m of the SSSI is small and the proposed construction methods are unlikely to generate significant amounts of airborne dust. Likewise, operation and decommissioning activities are unlikely to generate significant airborne dust. In accordance with the IAQM guidance, the low sensitivity, and low magnitude of impact is likely to result in a low risk of impacts associated with dust generation. It is considered that the good-practice measures included in the dust and air quality management plan within the CoCP will provide the necessary prevention and mitigation of potential impacts such that the effects will be negligible. It is therefore proposed that further assessment of dust impacts on onshore ecological receptors due to construction in the intertidal area (seaward of MHWS) is scoped out of the Offshore EIAR.	TBC

Impact	Expected receptors	Sensitivity and Evidence Following Consideration of Designed in Measures	Scoped in (✓)/out (X)	Information to Inform baseline characterisation	Approach to EIA	Mitigation and Monitoring post-EIA Assessment
The generation of dust and particulates at the selected landfall site have the potential to affect human health and cause nuisance as a result of dust soiling of surfaces at residential properties	Human receptors landward of MHWS.	N/A	X	N/A	All residential properties are considered to have a high sensitivity to dust deposition. The number of residential properties within 350 m of the proposed landfall options is less than 10, resulting in an overall low sensitivity. In accordance with the IAQM guidance the low sensitivity and low magnitude of dust emissions during the offshore construction, operation and maintenance and decommissioning phases are likely to result in a negligible risk of dust soiling impacts as a result of dust generation. The annual mean PM_{10} concentration at any onshore receptor is significantly below the IAQM guidance threshold for Scotland of 14 µg/m^3. With less than 10 properties within 350 m of landfall options, the overall sensitivity to human health impacts is considered to be low. The low sensitivity with the low magnitude of dust emissions during the offshore construction phase results in a negligible risk of dust impacts on human health. It is therefore proposed that further assessment of dust soiling impacts on human health at residential receptors due to activities in the intertidal area (seaward of MHWS) is scoped out of the Offshore EIAR.	TBC

Impact	Expected receptors	Sensitivity and Evidence Following Consideration of Designed in Measures	Scoped in (✓)/out (X)	Information to Inform baseline characterisation	Approach to EIA	Mitigation and Monitoring post-EIA Assessment
Exhaust emissions from offshore vessels used in the construction phase having the potential to increase local ambient concentrations of Sulphur Dioxide (SO_2), NO_2, PM10 and PM2.5 and impact human health	Human receptors landward of MHWS.	N/A	X	N/A	The specific port locations where vessels will travel to and from to support offshore construction, operation and maintenance and decommissioning activities has not yet been identified, however it is likely to be an established commercial/industrial port in the on the east coast of Scotland. Engine exhausts from offshore vessels associated with the construction, operation and maintenance, and decommissioning phases would contribute, at a small scale, to atmospheric emissions from existing shipping traffic in the area. It is considered that associated atmospheric emissions of infrequent vessel movements associated with the Proposed Development would be negligible in comparison to the total shipping activity in the area. Marine exhaust emissions are limited in line with the provisions of International Convention for the Prevention of Pollution from Ships (MARPOL) Annex VI (MARPOL, 2017) and International Maritime Organisation (IMO) global sulphur limit on vessel fuel of 0.50% percent by mass (m/m or mass/mass) (IMO, 2016). The potential effects of increased emissions on onshore receptors are therefore considered to be negligible. It is therefore proposed that further assessment of the effects of emissions from offshore vessels during the construction, operation and maintenance, and decommissioning phases on onshore receptors is scoped out of the Offshore EIAR.	TBC
Climatic Effects Assessment						

Impact	Expected receptors	Sensitivity and Evidence Following Consideration of Designed in Measures	Scoped in (✓)/out (X)	Information to Inform baseline characterisation	Approach to EIA	Mitigation and Monitoring post-EIA Assessment
The magnitude of greenhouse gas emissions from construction and operation.	Atmosphere	Emissions across the full lifecycle of the asset from production, manufacture and intra-manufacturing transport would contribute to the GHG footprint of the Proposed Development including: • Embodied carbon in materials used for construction; • Operational energy and water consumption; • Emissions from operational processes; • Emissions from construction and decommissioning activities; and • Benefits and loads outside the study area: Reduction in emissions.	✓	The baseline conditions will be identified through a detailed desktop review. Emissions will be calculated using an approach aligned with the Publicly Available Specification (PAS) 2080:2016 Carbon Management in Infrastructure, the technical standard for calculating and managing GHG emissions associated with infrastructure. Other data and information sources may be identified during the review as part of the EIAR.	To assess the Proposed Development's effects on climate, the magnitude of GHG emissions from construction and operation are calculated and considered in the context of local and national policy, and Scottish and UK carbon budgets. The carbon emissions of the maximum design scenarios' whole-life embodied greenhouse gasses (e.g. volume of materials and transportation etc) will be assessed against the forecasted units of zero-carbon power produced by Berwick Bank Wind Farm.	TBC
Benthic Ecology						
Temporary habitat loss and disturbance	All benthic IEFs as identified through site-specific benthic surveys.	There is potential for temporary, direct habitat loss and disturbance during construction due to cable laying operations (including anchor placements), spud-can leg impacts from jack-up operations and seabed preparation works; operational and maintenance phase as a result of maintenance operations (e.g. cable repair/reburial, use of jack-up vessels to facilitate wind turbine component repairs etc.); and decommissioning activities. The impacts associated with operational and maintenance phase are likely to be similar in nature to those associated with the construction phase although of reduced magnitude.	✓	The epibenthic beam trawl survey, undertaken to characterise the benthic subtidal baseline, will be used to enhance the existing data for fish and shellfish. There is also wide-ranging and comprehensive desktop information and data sources available to characterise the fish and shellfish baseline.	No specific modelling is required to inform this impact, and impacts will be assessed quantitatively wherever possible. In particular for habitat loss effects, this will largely focus on the footprint of the impacts on the seabed from all activities during pre-construction, construction and operation and maintenance phases. This will be based on information derived from the Project Design Envelope (PDE). Impacts during the decommissioning phase are anticipated to be less than or equal to the construction phase.	TBC

Impact	Expected receptors	Sensitivity and Evidence Following Consideration of Designed in Measures	Scoped in (✓)/out (X)	Information to Inform baseline characterisation	Approach to EIA	Mitigation and Monitoring post-EIA Assessment
Underwater noise impacting fish and shellfish receptors	All benthic IEFs as identified through site-specific benthic surveys.	There is potential for mortality, injury and/or disturbance to sensitive fish and shellfish species as a result of construction activities such as pile-driving and vessel noise and similar and decommissioning activities. Designed in measures such as piling soft-start and ramp-up measures will be implemented to reduce the potential impact arising from this impact pathway.	✓	As above.	Modelling undertaken for section 5.2 will be used to inform the assessment of underwater noise impacts to fish and shellfish. This will include consideration of the potential for disturbance to migration of diadromous fish species, with a particular focus on potential barriers to migration. In particular, the hearing ability of fish species will be considered, and both sound pressure and particle motion will be considered. Impacts during the decommissioning phase are anticipated to be less than or equal to the construction phase.	TBC
Increased suspended sediment concentrations and associated sediment deposition	All benthic IEFs as identified through site-specific benthic surveys.	There is potential for an increase in suspended sediments and associated deposition during construction activities such as cable installation and seabed preparation. Adherence to an appropriate CoCP will reduce the potential impact arising from this impact pathway.	✓	As above.	The outputs of numerical modelling undertaken for the physical processes assessment (section 5.1) will inform this impact assessment. This will include consideration of the potential for disturbance to migration of diadromous fish species, with a particular focus on potential barriers to migration and will consider differing sensitivities of the identified receptors to this impact. The impact on spawning grounds will also be considered. Impacts during the decommissioning phase are anticipated to be less than or equal to the construction phase.	TBC
Long-term habitat loss	All benthic IEFs as identified through site-specific benthic surveys.	The presence of wind turbines and scour/cable protection will result in the loss of habitat.	✓	As above.	No modelling is required for this impact. Impacts will be assessed quantitatively wherever possible. In particular for habitat loss effects, this will largely focus on the footprint of the impacts on the seabed from all activities during pre-construction, construction and operation and maintenance phases.	TBC
Electromagnetic Fields (EMF) from subsea electrical cabling	All benthic IEFs as identified through site-specific benthic surveys.	EMF generated through the subsea electrical cabling may affect fish and shellfish prey/predator relationship by inhibiting/interfering with fish and shellfish behaviours due to changes in background EMFs.	✓	As above.	No modelling is required for this impact. This will include consideration of the potential for disturbance or disruption to migration of diadromous fish species.	

Impact	Expected receptors	Sensitivity and Evidence Following Consideration of Designed in Measures	Scoped in (✓)/out (X)	Information to Inform baseline characterisation	Approach to EIA	Mitigation and Monitoring post-EIA Assessment
Colonisation of hard structures	To be agreed via consultations.	Artificial structures placed on the seabed (i.e. foundations and scour/cable protection) in the offshore environment are expected to be colonised by a range of marine organisms leading to localised increases in biodiversity and potential changes in prey-predator interactions. These structures may also facilitate the spread of marine invasive non-native species. Designed-in measures including an INNS Management Plan, which will include measures to ensure that the risk of potential introduction and spread of INNS are minimised.	✓	As above.	No specific modelling is required to inform this impact assessment.	TBC

Impact	Expected receptors	Sensitivity and Evidence Following Consideration of Designed in Measures	Scoped in (✓)/out (X)	Information to Inform baseline characterisation	Approach to EIA	Mitigation and Monitoring post-EIA Assessment
Accidental release of pollutants	All benthic IEFs as identified through site-specific benthic surveys.	There is a risk of pollution being accidentally released during the construction phases from sources including vessels/vehicles and equipment/machinery. However, the risk of such events is managed by the implementation of measures set out in standard post consent plans, e.g. Environmental Management Plans, including Marine Pollution Contingency Plans. These plans include planning for accidental spills, address all potential contaminant releases and include key emergency contact details. It will also set out industry good practice and OSPAR, International Maritime Organisation (IMO), MARPOL (International Convention for the Prevention of Pollution from Ships) guidelines for preventing pollution at sea. Therefore, the likelihood of an accidental spill occurring is very low and in the unlikely event that such events occur, the magnitude of these will be minimised through measures such as marine pollution contingency planning. On this basis, and subject to consultation with the SNCBs and feedback received on this Offshore EIA Scoping Report, it is proposed to scope this impact out of further consideration within the EIA for fish and shellfish.	×	N/A	N/A	TBC
Underwater noise from wind turbine operation	All benthic IEFs as identified through site-specific benthic surveys.	Noise generated by operational wind turbines is of a very low frequency and low sound pressure level (Andersson *et al.,* 2011). Studies have found that sound levels are only high enough to possibly cause a behavioural reaction within metres from a wind turbine (Sigray and Andersson, 2011, and therefore such levels are not considered to have potentially effects on fish and shellfish receptors.	×	N/A	N/A	TBC

Impact	Expected receptors	Sensitivity and Evidence Following Consideration of Designed in Measures	Scoped in (✓)/out (X)	Information to Inform baseline characterisation	Approach to EIA	Mitigation and Monitoring post-EIA Assessment
Underwater noise from vessels	All benthic IEFs as identified through site-specific benthic surveys.	Operational underwater noise generated from vessels is likely to be low and effects would only occur if fish species remained within immediate vicinity of the vessel (i.e. within metres) for a number of hours which is highly unlikely.	x	N/A	N/A	TBC
Fish and Shellfish Ecology						
Temporary habitat loss and disturbance	All fish and shellfish IEFs as identified through site-specific surveys and analysis of desktop data sources.	There is potential for temporary, direct habitat loss and disturbance during construction due to cable laying operations (including anchor placements), spud-can leg impacts from jack-up operations and seabed preparation works; operational and maintenance phase as a result of maintenance operations (e.g. cable repair/reburial, use of jack-up vessels to facilitate wind turbine component repairs etc.); and decommissioning activities. The impacts associated with operational and maintenance phase are likely to be similar in nature to those associated with the construction phase although of reduced magnitude.	✓	The epibenthic beam trawl survey, undertaken to characterise the benthic subtidal baseline, will be used to enhance the existing data for fish and shellfish. There is also wide-ranging and comprehensive desktop information and data sources available to characterise the fish and shellfish baseline.	No specific modelling is required to inform this impact, and impacts will be assessed quantitatively wherever possible. In particular for habitat loss effects, this will largely focus on the footprint of the impacts on the seabed from all activities during pre-construction, construction and operation and maintenance phases. This will be based on information derived from the Project Design Envelope (PDE). Impacts during the decommissioning phase are anticipated to be less than or equal to the construction phase.	TBC
Underwater noise impacting fish and shellfish receptors	All fish and shellfish IEFs as identified through site-specific surveys and analysis of desktop data sources.	There is potential for mortality, injury and/or disturbance to sensitive fish and shellfish species as a result of construction activities such as pile-driving and vessel noise and similar and decommissioning activities. Designed in measures such as piling soft-start and ramp-up measures will be implemented to reduce the potential impact arising from this impact pathway.	✓	As above.	Modelling undertaken for section 5.2 will be used to inform the assessment of underwater noise impacts to fish and shellfish. This will include consideration of the potential for disturbance to migration of diadromous fish species, with a particular focus on potential barriers to migration. In particular, the hearing ability of fish species will be considered, and both sound pressure and particle motion will be considered. Impacts during the decommissioning phase are anticipated to be less than or equal to the construction phase.	TBC
Increased suspended sediment concentrations and associated sediment deposition	All fish and shellfish IEFs as identified through site-specific surveys and analysis of	There is potential for an increase in suspended sediments and associated deposition during construction activities such as cable installation and seabed preparation. Adherence	✓	As above.	The outputs of numerical modelling undertaken for the physical processes assessment (section 5.1) will inform this impact assessment. This will include consideration of the potential for disturbance to migration of diadromous fish species,	TBC

Impact	Expected receptors	Sensitivity and Evidence Following Consideration of Designed in Measures	Scoped in (✓)/out (X)	Information to Inform baseline characterisation	Approach to EIA	Mitigation and Monitoring post-EIA Assessment
	desktop data sources.	to an appropriate CoCP will reduce the potential impact arising from this impact pathway.			with a particular focus on potential barriers to migration and will consider differing sensitivities of the identified receptors to this impact. The impact on spawning grounds will also be considered. Impacts during the decommissioning phase are anticipated to be less than or equal to the construction phase.	
Long-term habitat loss	All fish and shellfish IEFs as identified through site-specific surveys and analysis of desktop data sources.	The presence of wind turbines and scour/cable protection will result in the loss of habitat.	✓	As above.	No modelling is required for this impact. Impacts will be assessed quantitatively wherever possible. In particular for habitat loss effects, this will largely focus on the footprint of the impacts on the seabed from all activities during pre-construction, construction and operation and maintenance phases.	TBC
Electromagnetic Fields (EMF) from subsea electrical cabling	All fish and shellfish IEFs as identified through site-specific surveys and analysis of desktop data sources.	EMF generated through the subsea electrical cabling may affect fish and shellfish prey/predator relationship by inhibiting/interfering with fish and shellfish behaviours due to changes in background EMFs.	✓	As above.	No modelling is required for this impact. This will include consideration of the potential for disturbance or disruption to migration of diadromous fish species.	TBC
Colonisation of hard structures	All fish and shellfish IEFs as identified through site-specific surveys and analysis of desktop data sources.	Artificial structures placed on the seabed (i.e. foundations and scour/cable protection) in the offshore environment are expected to be colonised by a range of marine organisms leading to localised increases in biodiversity and potential changes in prey-predator interactions. These structures may also facilitate the spread of marine invasive non-native species. Designed-in measures including an INNS Management Plan, which will include measures to ensure that the risk of potential introduction and spread of INNS are minimised.	✓	As above.	No specific modelling is required to inform this impact assessment.	TBC
Accidental release of pollutants	All fish and shellfish IEFs as identified through site-specific surveys and analysis of desktop data sources.	There is a risk of pollution being accidentally released during the construction phases from sources including vessels/vehicles and equipment/machinery. However, the risk of such events is managed by the implementation of measures set out in standard post consent plans, e.g. Environmental Management Plans,	×	N/A	N/A	TBC

Impact	Expected receptors	Sensitivity and Evidence Following Consideration of Designed in Measures	Scoped in (✓)/out (X)	Information to Inform baseline characterisation	Approach to EIA	Mitigation and Monitoring post-EIA Assessment
		including Marine Pollution Contingency Plans. These plans include planning for accidental spills, address all potential contaminant releases and include key emergency contact details. It will also set out industry good practice and OSPAR, International Maritime Organisation (IMO), MARPOL (International Convention for the Prevention of Pollution from Ships) guidelines for preventing pollution at sea. Therefore, the likelihood of an accidental spill occurring is very low and in the unlikely event that such events occur, the magnitude of these will be minimised through measures such as marine pollution contingency planning. On this basis, and subject to consultation with the SNCBs and feedback received on this Offshore EIA Scoping Report, it is proposed to scope this impact out of further consideration within the EIA for fish and shellfish.				
Underwater noise from wind turbine operation	All fish and shellfish IEFs as identified through site-specific surveys and analysis of desktop data sources.	Noise generated by operational wind turbines is of a very low frequency and low sound pressure level (Andersson *et al.,* 2011). Studies have found that sound levels are only high enough to possibly cause a behavioural reaction within metres from a wind turbine (Sigray and Andersson, 2011, and therefore such levels are not considered to have potentially effects on fish and shellfish receptors.	×	N/A	N/A	TBC
Underwater noise from vessels	All fish and shellfish IEFs as identified through site-specific surveys and analysis of desktop data sources.	Operational underwater noise generated from vessels is likely to be low and effects would only occur if fish species remained within immediate vicinity of the vessel (i.e. within metres) for a number of hours which is highly unlikely.	×	N/A	N/A	TBC
Marine Mammals						

Impact	Expected receptors	Sensitivity and Evidence Following Consideration of Designed in Measures	Scoped in (✓)/out (X)	Information to Inform baseline characterisation	Approach to EIA	Mitigation and Monitoring post-EIA Assessment
Injury and disturbance from underwater noise generated during clearance of unexploded ordnance (UXO)	All marine mammals IEFs as identified through site-specific surveys and analysis of desktop data sources.	Deflagration will be implemented for UXO clearance. Assessments to date of the noise reduction achieved by low-order disposal of UXO via deflagration indicate significantly reduced noise emissions can be achieved by this method. In 2020, under a contract for BEIS, the National Physical Laboratory and Loughborough University (BEIS, 2020) reported a series of controlled experiments conducted in an Aberdeenshire quarry. To assess the noise abatement potential of deflagration to neutralise UXO underwater, experiments were run on charge sizes between 15 g and 18.7 kg (with and without an enclosing shell), with data recorded on pressure gauges and hydrophones. In this study, deflagration resulted in significantly reduced noise emissions (impulse and bubble periods) with an 11x reduction in sound emissions. As UXOs can be up to 820kg, low-order deflagration used to dispose ordnance at sea would be up to several hundred times quieter (BEIS, 2020). Therefore, it is anticipated that clearance of UXOs by deflagration will minimise the potential for injury and disturbance to marine mammals.	✓	N/A	Noise modelling will be undertaken to quantitatively assess the risk of auditory injury and disturbance.	TBC

Impact	Expected receptors	Sensitivity and Evidence Following Consideration of Designed in Measures	Scoped in (✓)/out (X)	Information to Inform baseline characterisation	Approach to EIA	Mitigation and Monitoring post-EIA Assessment
Injury and disturbance from piling	All marine mammals IEFs as identified through site-specific surveys and analysis of desktop data sources.	Impact piling during construction may result in hearing damage/auditory injury or behavioural disturbance/displacement of marine mammals	✓	Aerial surveys to obtain density estimates, where data allows, for each species within the relevant impact footprint.	Noise modelling will be undertaken to quantitatively assess the risk of auditory injury. Unless any new guidance is published prior to the impact assessment, the Southall *et al.* (2019) thresholds will be used to assess the risk of a permanent auditory injury. The risk of injury will be based on both of the dual criteria: cumulative sound exposure level (SEL_{cum}) and peak sound pressure level (SPL_{peak}). The assessment of disturbance will be based on the good practice methodology at the time of assessment, making use of the best available scientific evidence. Noise contours at appropriate intervals will likely be generated by noise modelling and overlain on species density surfaces to predict the number of animals potentially affected. In order to understand the ecological consequences of piling over the construction period on marine mammals, the assessment will also use population modelling (iPCoD) and potential for short-term and longer-term population level effects.	TBC
Disturbance to marine mammals from pre-construction surveys	All marine mammals IEFs as identified through site-specific surveys and analysis of desktop data sources.	The impact of pre-construction related activities (in particular geophysical surveys) may result in behavioural disturbance/ displacement of marine mammals.	✓	N/A	Comparative noise modelling for non-piling 'noisy' activities will be undertaken to inform a qualitative assessment of non-piling noise-generating activities, e.g. geophysical survey, rick placement, vessel movement.	TBC
Disturbance of marine mammals from vessel use and other vessel activities	All marine mammals IEFs as identified through site-specific surveys and analysis of desktop data sources.	The impact of vessel use and other construction-related activities (e.g. dredging, trenching, and rock placement), operation and maintenance activities and decommissioning activities may result in behavioural disturbance/ displacement of marine mammals.	✓	N/A	Comparative noise modelling for non-piling 'noisy' activities will be undertaken to inform a qualitative assessment of non-piling noise-generating activities, e.g. geophysical survey, rick placement, vessel movement.	TBC
Injury of marine mammals due to collision with vessels	All marine mammals IEFs as identified through site-specific surveys and analysis of desktop data sources.	Increased vessel traffic during construction activities, operation and maintenance activities and decommissioning activities may result in collisions with marine mammals.	✓	N/A	A qualitative assessment will be undertaken, based on best available literature at the time of writing.	TBC

Impact	Expected receptors	Sensitivity and Evidence Following Consideration of Designed in Measures	Scoped in (✓)/out (X)	Information to Inform baseline characterisation	Approach to EIA	Mitigation and Monitoring post-EIA Assessment
Effects on marine mammals due to changes in prey availability	All marine mammals IEFs as identified through site-specific surveys and analysis of desktop data sources.	Changes in prey abundance and distribution resulting from construction activities, operation and maintenance activities and decommissioning activities may impact on the ability of marine mammals to forage in the area.	✓	N/A	No specific modelling required for this impact although the assessment will be based on the results of the subsea noise modelling assessment, Physical Processes assessment and the resulting impact assessment carried out fish and shellfish receptors.	TBC
Accidental pollution		The impact of pollution including accidental spills and contaminant releases associated with the construction of infrastructure and use of supply/service vessels may lead to direct mortality of marine mammals or a reduction in prey availability, either of which may affect species' survival rates. With implementation of an appropriate pollution prevention plan, and based on evidence from other Offshore Wind Farm consent applications, that significant impact within the equivalent extent of a windfarm's array plus buffer area is considered very unlikely to occur, and a major incident that may impact any species at a population level is considered very unlikely. It was predicted that any impact would be of local spatial extent, short-term duration, intermittent and medium reversibility within the context of the regional populations and therefore not significant in EIA terms. This is considered to be equally applicable to the Proposed Development for which construction will be comparable in scale and operation within the same environment, whilst implementing an appropriate pollution prevention plan.	×	N/A	N/A	

Increased suspended sediment concentrations and associated sediment deposition	N/A	Disturbance to water quality as a result of construction operations can have both direct and indirect impacts on marine mammals. Indirect impacts would include effects on prey species (which is scoped in). Direct impacts include the impairment of visibility and therefore foraging ability which might be expected to reduce foraging success. Marine mammals are well known to forage in tidal areas where water conditions are turbid and visibility conditions poor. For example, harbour porpoise and harbour seals in the UK have been documented foraging in areas with high tidal flows (e.g. Pierpoint, 2008; Marubini *et al.,* 2009; Hastie *et al.,* 2016); therefore, low light levels, turbid waters and suspended sediments are unlikely to negatively impact marine mammal foraging success. When the visual sensory systems of marine mammals are compromised, they are able to sense the environment in other ways, for example, seals can detect water movements and hydrodynamic trails with their mystacial vibrissae; while odontocetes primarily use echolocation to navigate and find food in darkness. Whilst elevated levels of suspended sediment concentrations (SSC) arising during construction of the offshore wind farm may decrease light availability in the water column and produce turbid conditions, the maximum impact range is expected to be localised with sediments rapidly dissipating over one tidal excursion. In addition, there is likely to be large natural variability in the SSC within the Proposed Development Marine Mammal Study Area due the proximity to the Firth of Forth estuary, so marine mammals living here will be tolerant of any small scale increases, such as those associated with the construction activities. In summary, the Zone of Influence of increased SSC will be small, particularly in the context of the wider available habitat, and the duration of effects will be	X	N/A		TBC

Impact	Expected receptors	Sensitivity and Evidence Following Consideration of Designed in Measures	Scoped in (✓)/out (X)	Information to Inform baseline characterisation	Approach to EIA	Mitigation and Monitoring post-EIA Assessment
		short (one tidal excursion). Marine mammal receptors in the Proposed Development Marine Mammal Study Area are not considered to be sensitive to increases in SSC as they are likely to be adapted to high natural variation in sediment levels. Therefore, it is proposed that this impact is scoped out of the EIA.				
Disturbance to seals on land (hauled out) from construction and pre-construction activities	N/A	As advised by NS and MS-LOT in their advice on the initial Berwick Bank Wind Farm Proposal Offshore EIA Scoping Report, it is considered that that the proposed construction activities at the landfall locations and those associated with the cable installation are unlikely to affect any individual seals hauled out at the nearest designated seal haul out site, namely Fast Castle and this impact is proposed to be Scoped out of further assessment.	X	N/A	Whilst elevated levels of suspended sediment concentrations (SSC) arising during construction of the offshore wind farm may decrease light availability in the water column and produce turbid conditions, the maximum impact range is expected to be localised with sediments rapidly dissipating over one tidal excursion. In addition, there is likely to be large natural variability in the SSC within the Proposed Development Marine Mammal Study Area due the proximity to the Firth of Forth estuary, so marine mammals living here will be tolerant of any small scale increases, such as those associated with the construction activities. In summary, the Zone of Influence of increased SSC will be small, particularly in the context of the wider available habitat, and the duration of effects will be short (one tidal excursion). Marine mammal receptors in the Proposed Development Marine Mammal Study Area are not considered to be sensitive to increases in SSC as they are likely to be adapted to high natural variation in sediment levels. Therefore, it is proposed that this impact is scoped out of the EIA.	TBC
Disturbance to seals on land (hauled out) from construction and pre-construction activities	N/A	Potential to disturb seals on land at haul out sites.	X	N/A		TBC
Ornithology						
Temporary Habitat Loss and Disturbance	All Ornithology receptors as identified through site-specific survey or desktop analysis	Presence of vessels and construction works may temporarily disturb birds from foraging areas	✓	Baseline surveys and data analysis.	No specific modelling required for this impact .	TBC

Impact	Expected receptors	Sensitivity and Evidence Following Consideration of Designed in Measures	Scoped in (✓)/out (X)	Information to Inform baseline characterisation	Approach to EIA	Mitigation and Monitoring post-EIA Assessment
Indirect Impacts	All Ornithology receptors as identified through site-specific survey or desktop analysis	Reduction or disruption of prey availability may cause reduced energy intake affecting productivity or survival	✓	Existing baseline data and epibenthic beam trawl survey	Noise modelling will be used to inform potential impacts on fish from construction noise.	TBC
Collision	All Ornithology receptors as identified through site-specific survey or desktop analysis	Additional mortality may cause a decrease in seabird populations	✓	Baseline surveys and site-specific flight height data using multiple methods	Collision risk modelling and population viability analysis	TBC
Disturbance and Displacement	All Ornithology receptors as identified through site-specific survey or desktop analysis	Presence of operational wind turbines and associated maintenance activities may disturb birds and displace them from their foraging or resting areas.	✓	Baseline surveys and data analysis	Displacement modelling and population viability analysis	TBC
Barrier to movement	All Ornithology receptors as identified through site-specific survey or desktop analysis	Presence of operational wind turbines may result in additional energy expenditure as migrating or commuting birds fly longer distances around the wind farm	✓	Baseline surveys and data analysis.	No specific modelling.	TBC
Commercial Fisheries						
Temporary loss or restricted access to fishing grounds.	All Commercial fisheries receptors as identified through desktop analysis	The implementation of safety zones around construction and decommissioning works may result in temporary loss/restricted access to fishing grounds.	✓	• Analysis of fisheries data and information. • Consultation with fisheries stakeholders.	No modelling required for this impact. A qualitative assessment, based on a quantitative and qualitative analysis of fisheries data, will be undertaken to assess potential for impact.	TBC
Displacement of fishing activity into other areas.	All Commercial fisheries receptors as identified through desktop analysis	Fishing activity may be temporarily displaced to other areas as a result of loss of grounds/restricted access to fishing grounds during construction works, the operation and maintenance phase and decommissioning works.	✓	• Analysis of fisheries data and information. • Consultation with fisheries stakeholders.		TBC
Interference with fishing activity.	All Commercial fisheries receptors as identified through desktop analysis	There may be potential for transiting construction, operation and maintenance and decommissioning vessels to cause interference (conflict) with fishing activities/fishing gears.	✓	• Analysis of fisheries data and information. • Consultation with fisheries stakeholders.		TBC

Impact	Expected receptors	Sensitivity and Evidence Following Consideration of Designed in Measures	Scoped in (✓)/out (X)	Information to Inform baseline characterisation	Approach to EIA	Mitigation and Monitoring post-EIA Assessment
Increased steaming times.	All Commercial fisheries receptors as identified through desktop analysis	Presence of safety zones around construction works, major maintenance works or decommissioning may result in temporary increases in steaming time/routes to/from fishing grounds.	✓	• Analysis of fisheries data and information. • Consultation with fisheries stakeholders. • Outcomes of the shipping and navigation impact assessment.		TBC
Snagging risk – loss or damage to fishing gear.	All Commercial fisheries receptors as identified through desktop analysis	The presence of pre-commissioned infrastructure associated with the Proposed Development (i.e. foundations, cables awaiting burial or protection); infrastructure associated with the Proposed Development (i.e. foundations, cable protection) and decommissioning related infrastructure as well as other seabed obstacles (i.e. accidentally dropped objects, etc) may pose a snagging risk to fishing vessels and have potential to result in loss or damage to fishing gear. It is noted that the above may also have implications with regard to the safety of fishing vessels and crews. Safety risks for fishing vessels associated with potential gear snagging, will be assessed together with navigational risks under Shipping and Navigation (see section 7.2).	✓	• Analysis of fisheries data and information. • Consultation with fisheries stakeholders.		TBC
Loss or restricted access to fishing grounds.	All Commercial fisheries receptors as identified through desktop analysis	The presence of project infrastructure may result in a loss or restricted access to fishing grounds during the operation and maintenance phase. The implementation of safety zones around major maintenance activities may also result in temporary localised loss or restricted access to grounds.	✓	• Analysis of fisheries data and information • Consultation with fisheries stakeholders.	No modelling required for this impact. A qualitative assessment, based on a quantitative and qualitative analysis of fisheries data, will be undertaken to assess potential for impact.	TBC
Potential impacts on commercially exploited species	As described in section 6.2 (Fish and Shellfish Ecology).	As described in section 6.2 (Fish and Shellfish Ecology).	✓	As described in section 6.2 (Fish and Shellfish Ecology).	As described in section 6.2 (Fish and Shellfish Ecology).	TBC
Shipping and Navigation						

Impact	Expected receptors	Sensitivity and Evidence Following Consideration of Designed in Measures	Scoped in (✓)/out (X)	Information to Inform baseline characterisation	Approach to EIA	Mitigation and Monitoring post-EIA Assessment
Vessel displacement	All Shipping and Navigation receptors as identified through site-specific survey and/or desktop analysis	Vessels may be displaced from their existing routes due to construction and decommissioning activities associated with the Proposed Development.	✓	A dedicated vessel traffic survey has been undertaken to characterise vessel movements in the area.	Modelling of Maximum adverse scenario deviations for commercial vessel main routes will be undertaken in the NRA with input from Regular Operators and consideration of baseline environment.	TBC
Increased vessel to vessel collision risk between a third-party vessel and a project vessel	All Shipping and Navigation receptors as identified through site-specific survey and/or desktop analysis	The presence of project vessels during construction phase, operation and maintenance phase and decommissioning phase may increase the likelihood of vessel to vessel encounters and subsequently increase the collision risk between third-party and project vessels.	✓	A dedicated vessel traffic survey has been undertaken to characterise vessel movements in the area.	A qualitative assessment will be undertaken to assess potential for impact which will be informed by the NRA.	TBC
Increased vessel to vessel collision risk between third party vessels	All Shipping and Navigation receptors as identified through site-specific survey and/or desktop analysis	Displaced vessels may lead to increased traffic densities in certain areas and a subsequent increase in collision risk between third party vessels.	✓	A dedicated vessel traffic survey has been undertaken to characterise vessel movements in the area.	Qualitative assessment, noting that some quantitative assessment will be undertaken for the operation and maintenance phase impact in the NRA.	TBC
Vessel to structure allision risk	All Shipping and Navigation receptors as identified through site-specific survey and/or desktop analysis	Partially complete and completed structures within the Proposed Development Array Area could create an allision risk (powered or drifting) to passing traffic.	✓	A dedicated vessel traffic survey has been undertaken to characterise vessel movements in the area.	Qualitative assessment, noting that some quantitative assessment will be undertaken for the operation and maintenance phase impact in the NRA.	TBC
Reduced access to local ports	All Shipping and Navigation receptors as identified through site-specific survey and/or desktop analysis	Access to local ports may be impacted due to construction and decommissioning activities associated with the Proposed Development.	✓	A dedicated vessel traffic survey has been undertaken to characterise vessel movements in the area.	A qualitative assessment will be undertaken to assess potential for impact which will be informed by the NRA.	TBC
Commercial traffic displacement	All Shipping and Navigation receptors as identified through site-specific survey and/or desktop analysis	Commercial vessels may be displaced from their existing routes due to the presence of the Proposed Development.	✓	A dedicated vessel traffic survey has been undertaken to characterise vessel movements in the area.	Modelling of maximum adverse scenario deviations for commercial vessel main routes will be undertaken in the NRA with input from Regular Operators and consideration of baseline environment.	TBC

Impact	Expected receptors	Sensitivity and Evidence Following Consideration of Designed in Measures	Scoped in (✓)/out (X)	Information to Inform baseline characterisation	Approach to EIA	Mitigation and Monitoring post-EIA Assessment
Fishing vessel and recreational vessel displacement	All Shipping and Navigation receptors as identified through site-specific survey and/or desktop analysis	Fishing vessels and recreational vessels may be displaced from their existing routes due to the presence of the Proposed Development.	✓	A dedicated vessel traffic survey has been undertaken to characterise vessel movements in the area.	A qualitative assessment will be undertaken to assess potential for impact which will be informed by the NRA.	TBC
Increased vessel to vessel collision risk between third-party vessels (route-based)	All Shipping and Navigation receptors as identified through site-specific survey and/or desktop analysis	Displaced vessels may lead to increased traffic densities in certain areas and a subsequent increase in collision risk between third party commercial vessels.	✓	A dedicated vessel traffic survey has been undertaken to characterise vessel movements in the area.	Collision risk modelling will be undertaken in the NRA to assess the change in collision risk for routeing third party vessels between pre and post Proposed Development scenarios.	TBC
Increased vessel to vessel collision risk involving fishing vessels and/or recreational vessels	All Shipping and Navigation receptors as identified through site-specific survey and/or desktop analysis	Displaced vessels may lead to increased traffic densities in certain areas and a subsequent increase in encounters.	✓	A dedicated vessel traffic survey has been undertaken to characterise vessel movements in the area.	A qualitative assessment will be undertaken to assess potential for impact which will be informed by the NRA.	TBC
Vessel to structure allision risk for commercial vessels	All Shipping and Navigation receptors as identified through site-specific survey and/or desktop analysis	Structures within the Proposed Development Array Area could create an allision risk (powered or drifting) to passing commercial vessels.	✓	A dedicated vessel traffic survey has been undertaken to characterise vessel movements in the area.	Powered and drifting allision risk modelling will be undertaken in the NRA.	TBC
Vessel to structure allision risk for fishing vessels in transit	All Shipping and Navigation receptors as identified through site-specific survey and/or desktop analysis	Structures within the Proposed Development Array Area could create an allision risk (powered or drifting) to passing fishing vessels.	✓	A dedicated vessel traffic survey has been undertaken to characterise vessel movements in the area.	Internal allision risk modelling will be undertaken in the NRA.	TBC
Vessel to structure allision risk for recreational vessels	All Shipping and Navigation receptors as identified through site-specific survey and/or desktop analysis	Structures within the Proposed Development Array Area could create an allision risk (powered or drifting) to passing recreational vessels.	✓	A dedicated vessel traffic survey has been undertaken to characterise vessel movements in the area.	A qualitative assessment will be undertaken to assess potential for impact which will be informed by the NRA.	TBC

Impact	Expected receptors	Sensitivity and Evidence Following Consideration of Designed in Measures	Scoped in (✓)/out (X)	Information to Inform baseline characterisation	Approach to EIA	Mitigation and Monitoring post-EIA Assessment
Reduced access to local ports	All Shipping and Navigation receptors as identified through site-specific survey and/or desktop analysis	Access to local ports may be impacted due to maintenance activities associated with the Proposed Development.	✓	A dedicated vessel traffic survey has been undertaken to characterise vessel movements in the area.	A qualitative assessment will be undertaken to assess potential for impact which will be informed by the NRA.	TBC
Reduction of under keel clearance	All Shipping and Navigation receptors as identified through site-specific survey and/or desktop analysis	The implementation of cable protection to cables associated with the Proposed Development may reduce water depths in proximity and therefore reduce the under keel clearance for third-party traffic.	✓	An assessment of the vessel traffic in proximity to the Proposed Development ECC will be undertaken (AIS only) and assessed against water depths within the Proposed Development ECC to identify any areas where under keel clearance may be of concern.	A qualitative assessment will be undertaken to assess potential for impact which will be informed by the NRA.	TBC
Anchor interaction with subsea cables	All Shipping and Navigation receptors as identified through site-specific survey and/or desktop analysis	The presence of subsea cables associated with the Proposed Development may increase the likelihood of anchor interaction for third-party vessels including a snagging risk.	✓	An assessment of the vessel traffic in proximity to the Proposed Development ECC will be undertaken (AIS only) including identification of areas where anchoring activity occurs frequently.	A qualitative assessment will be undertaken to assess potential for impact which will be informed by the NRA.	TBC
Interference with marine navigation, communications and position fixing equipment	All Shipping and Navigation receptors as identified through site-specific survey and/or desktop analysis	Communication and position fixing equipment may be affected by the presence of installations within the Proposed Development Array Area or ECC.	✓	A dedicated vessel traffic survey has been undertaken to characterise vessel movements in the area.	A qualitative assessment will be undertaken to assess potential for impact which will be informed by the NRA.	TBC
Reduction of emergency response capability due to increased incident rates and reduced access for SAR responders	All Shipping and Navigation receptors as identified through site-specific survey and/or desktop analysis	The presence of the Proposed Development will increase the number of vessels in the area which may result in an increased number of incidents requiring emergency response and may reduce access for SAR responders.	✓	MAIB and RNLI incident data and Department for Transport (DfT) SAR helicopter taskings data will be assessed to characterise baseline incident rates.	A qualitative assessment will be undertaken to assess potential for impact which will be informed by the NRA.	TBC
Aviation, Military and Communications						

Impact	Expected receptors	Sensitivity and Evidence Following Consideration of Designed in Measures	Scoped in (✓)/out (X)	Information to Inform baseline characterisation	Approach to EIA	Mitigation and Monitoring post-EIA Assessment
Potential impact on low flying (including SAR helicopter operations) due to presence of obstacles (cranes, stationary wind turbines).	All Aviation, military and communications receptors as identified through desktop analysis	The impact on PSRs are scoped in following the NATS consultation response to the Initial Berwick Bank Wind Farm Proposal Scoping Opinion. Wind turbines create a physical obstruction to low flying operations.	✓	Consultation with MoD and SAR helicopter operators will be required on wind turbine layout.	No modelling is required for this potential impact. A qualitative assessment will be undertaken based on industry guidance.	TBC
Potential impact on NERL ATC radars due to presence of wind turbines.	All Aviation, military and communications receptors as identified through desktop analysis	Wind turbines can cause permanent interference to civil ATC radars.	✓	RLOS and operational assessments to be carried out by NERL.	Pre-planning RLOS assessment by NERL will be undertaken and presented within the EIA Report.	TBC
Potential impact on Military ATC radars due to presence of wind turbines.	All Aviation, military and communications receptors as identified through desktop analysis	Wind turbines can cause permanent interference to military ATC radars.	✓	RLOS and operational assessments to be carried out by MoD.	Pre-planning RLOS assessment by MoD will be undertaken and presented within the EIA Report.	TBC
Potential impact on Military AD radars due to presence of wind turbines.	All Aviation, military and communications receptors as identified through desktop analysis	Wind turbines can cause permanent interference to military AD radars.	✓	RLOS and operational assessments to be carried out by MoD.	Pre-planning RLOS assessment by MoD will be undertaken and presented within the EIA Report.	TBC
Potential impact on civil airport patterns and procedures due to presence of obstacles (cranes, stationary wind turbines).	N/A	The Proposed Development Array Area will be sufficiently distant from any civilian airports to have any potential impact on their patterns and procedures.	X	N/A	N/A	TBC
Potential impact on military aerodrome patterns and procedures due to presence of obstacles (cranes, stationary wind turbines).	N/A	The Proposed Development Array Area will be sufficiently distant from any military aerodromes to have any potential impact on their patterns and procedures.	X	N/A	N/A	TBC
Potential impacts on Helicopter Main Routes (HMRs) due to presence of WTGs.	N/A	There are no HMRs within the aviation, military and communications study area that can be affected by the Proposed Development.	X	N/A	N/A	TBC

Impact	Expected receptors	Sensitivity and Evidence Following Consideration of Designed in Measures	Scoped in (✓)/out (X)	Information to Inform baseline characterisation	Approach to EIA	Mitigation and Monitoring post-EIA Assessment
Potential impacts on Offshore helicopter installations (oil & gas platforms) due to the presence of WTGs.	N/A	There are no offshore helicopter installations within the aviation, military and communications study area that can be affected by the Proposed Development.	X	N/A	N/A	TBC
Cultural Heritage						
Impacts (daytime) of the operation and maintenance of the offshore elements of the Proposed Development upon the setting of cultural heritage assets.	All cultural heritage receptors as identified through desktop analysis	Limited potential for significant effects in respect of potential receptors resulting from disruption of visual relationships. Such impacts would be long term and reversible.	✓	Analysis of the cultural significance and setting of the identified receptors drawing upon HES and Historic England data, published sources and site surveys.	A detailed assessment of the potential effects will be undertaken for the identified receptors. This will be informed by the baseline study, ZTV analysis and wireframe/photomontage visualisations.	TBC
Impacts (night-time) of the operation and maintenance of the Proposed Development upon the setting of cultural heritage assets.	All cultural heritage receptors as identified through desktop analysis	Limited potential for significant effects in respect of Bell Rock and Isle of May Lighthouses, resulting from disruption of visual relationships. Such impacts would be long term and reversible.	✓	Analysis of the cultural significance and setting of the identified receptors drawing upon HES and Historic England data, published sources and site surveys.	A ZTV showing the geographic extent of visible aviation and marine navigation lighting will be used to inform the assessment of effects resulting from wind turbine lighting. Night-time visualisations will be prepared where potentially significant effects are identified.	TBC
Cumulative effect (daytime) of the operation of the Proposed Development upon the setting of cultural heritage assets.	All cultural heritage receptors as identified through desktop analysis	Limited potential for significant cumulative effects in respect of potential receptors resulting from disruption of visual relationships. Such impacts would be long term and reversible.	✓	In addition to the above data will be drawn from cumulative wind farm databases published data regarding wind farms in the outer Firth of Forth and Firth of Tay region.	Cumulative effects will be assessed where adverse effects are identified in respect of the Proposed Development alone. These will be supported by cumulative ZTVs and appropriate visualisations.	TBC
Cumulative effect (night-time) of the operation of the Proposed Development upon the setting of cultural heritage assets.	All cultural heritage receptors as identified through desktop analysis	Limited potential for significant cumulative effects in respect of Bell Rock and Isle of May Lighthouses, resulting from disruption of visual relationships. Such impacts would be long term and reversible.	✓	In addition to the above data will be drawn from cumulative wind farm databases published data regarding wind farms in the outer Firth of Forth and Firth of Tay region.	Cumulative effects will be assessed where adverse effects are identified in respect of the Proposed Development alone. These will be supported by cumulative ZTVs and appropriate visualisations.	TBC
Impacts upon the setting of onshore cultural heritage assets	N/A	Impacts relating specifically to the construction phase will be transitory and short-lived. There is therefore no potential for them to be significant.	X	N/A	N/A	TBC

Impact	Expected receptors	Sensitivity and Evidence Following Consideration of Designed in Measures	Scoped in (✓)/out (X)	Information to Inform baseline characterisation	Approach to EIA	Mitigation and Monitoring post-EIA Assessment
Impacts upon the setting of cultural heritage assets of less than national importance (Category B and C and Grade II Listed Buildings and Conservation Areas)	N/A	Given the distance of the Proposed Development Array Area from such assets, significant effects are only likely to occur where the receptor is of the highest sensitivity, i.e., of national or international importance. There is therefore no potential for significant effects to occur in respect of assets of less than national importance.	X	N/A	N/A	TBC
Impacts upon the setting of cultural heritage assets outside the cultural heritage study area	N/A	Potential visibility falls rapidly outside the cultural heritage study area and any visible change will be at a distance of over 60 km. Cultural heritage assets are very rarely sensitive such distant change, and any such change has no potential to result in a significant effect.	X	N/A	N/A	TBC
Impacts relating to the offshore export cables.	N/A	The offshore export cables have no potential to affect the setting of cultural heritage assets.	X	N/A	N/A	TBC
Impacts upon the setting of onshore cultural heritage assets	N/A	Impacts relating specifically to the decommissioning phase will be transitory and short-lived. There is therefore no potential for them to be significant.	X	N/A	N/A	TBC
Infrastructure and Other Users						
Displacement of recreational sailing and motor cruising, recreational fishing (boat angling) and other recreational activities (diving vessels) due to safety zones and advisory safety distances in the Proposed Development Array Area and proposed ECC may result in a loss of recreational resource.	All Infrastructure and Other Users receptors as identified through desktop analysis	The construction of infrastructure and implementation of safety distances around construction vessels may displace recreation vessels. Likewise, maintenance and decommissioning activities may also displace recreation vessels.	✓	None required.	No modelling required for this impact. A qualitative assessment will be undertaken and presented within the Offshore EIAR based on a detailed desktop data review of sources such as RYA Scotland, Marine Scotland and the Oil and Gas Authority.	
Displacement of recreational fishing (shore angling) and other recreational activities (kayaking, kite surfing, surfing and windsurfing, scuba diving	All Infrastructure and Other Users receptors as identified through desktop analysis	The construction of infrastructure and implementation of safety distances around the landfall location may prevent access to the area for recreation users. Likewise,	✓	None required.		TBC

Impact	Expected receptors	Sensitivity and Evidence Following Consideration of Designed in Measures	Scoped in (✓)/out (X)	Information to Inform baseline characterisation	Approach to EIA	Mitigation and Monitoring post-EIA Assessment
and beach users) due to advisory safety distances in the nearshore and intertidal section of the proposed ECC resulting in a loss of recreational resource.		maintenance and decommissioning activities may also restrict access.				
Installation, maintenance, and decommissioning activities including associated safety distances, may temporarily affect or restrict access to the NNG offshore export cable.	All Infrastructure and Other Users receptors as identified through desktop analysis	The construction of export cables and implementation of safety distances around vessels may affect or restrict access to existing cables. Likewise, maintenance and decommissioning activities may also restrict access.	✓	None required.		TBC
Displacement of recreational fishing (shore angling) and other recreational activities (kayaking, kite surfing, surfing and windsurfing, beach users) along the nearshore and intertidal section of the proposed ECC resulting in a loss of recreational resource	N/A	Operational and maintenance phase effects have been scoped out due to the expected low frequency of cable inspection, repair or reburial activities along the intertidal sections of the export cable. Any effects are likely to be limited to the presence of a temporary advisory clearance distance around the vessels carrying out maintenance activities. Notices to Mariners will be issued to advise other users of the nature, location and timing of any major maintenance activities. As per agreement on the scoping out of this impact pathway from the initial Berwick Bank Wind Farm Scoping Opinion, SSER intends to scope this impact out.	X	N/A	N/A	TBC
Impact on wave and tidal projects	N/A	There are no wave and tidal projects within the infrastructure and other users study area (inner). As such, impacts on wave and tidal projects have been scoped out of the assessment. As per agreement on the scoping out of this impact pathway from the initial Berwick Bank Wind Farm Scoping Opinion, SSER intends to scope this impact out.	X	N/A	N/A	TBC
Impact on oil and gas activities within licenced blocks	N/A	There are no licenced oil and gas licence blocks within the infrastructure and other users study area (inner). As such, impacts on oil and gas licence blocks have been scoped out of the	X	N/A	N/A	TBC

Impact	Expected receptors	Sensitivity and Evidence Following Consideration of Designed in Measures	Scoped in (✓)/out (X)	Information to Inform baseline characterisation	Approach to EIA	Mitigation and Monitoring post-EIA Assessment
		assessment. As per agreement on the scoping out of this impact pathway from the initial Berwick Bank Wind Farm Scoping Opinion, SSER intends to scope this impact out.				
Impact on carbon capture, natural gas storage, underground gasification and coal deposits	N/A	There are no carbon capture, natural gas storage, underground gasification or coal deposit projects within the infrastructure and other users study area (inner). As such, impacts on carbon capture, natural gas storage, underground gasification and coal deposit projects have been scoped out of the assessment. As per agreement on the scoping out of this impact pathway from the initial Berwick Bank Wind Farm Scoping Opinion, SSER intends to scope this impact out.	X	N/A	N/A	TBC
Impact on subsea telecommunications cables	N/A	There are no subsea telecommunications cables within the infrastructure and other users study area (inner). As such, impacts on subsea telecommunications cables have been scoped out of the assessment. As per agreement on the scoping out of this impact pathway from the initial Berwick Bank Wind Farm Scoping Opinion, SSER intends to scope this impact out.	X	N/A	N/A	TBC
Impact on marine disposal sites	N/A	There are no marine disposal sites within the infrastructure and other users study area (inner). As such, impacts on marine disposal sites have been scoped out of the assessment. As per agreement on the scoping out of this impact pathway from the initial Berwick Bank Wind Farm Scoping Opinion, SSER intends to scope this impact out.	X	N/A	N/A	TBC
Impact on marine aggregate extraction sites	N/A	There are no marine aggregate extraction sites within the infrastructure and other users study area (inner). As such, impacts on marine aggregate extraction sites	X	N/A	N/A	TBC

Impact	Expected receptors	Sensitivity and Evidence Following Consideration of Designed in Measures	Scoped in (✓)/out (X)	Information to Inform baseline characterisation	Approach to EIA	Mitigation and Monitoring post-EIA Assessment
		have been scoped out of the assessment. As per agreement on the scoping out of this impact pathway from the initial Berwick Bank Wind Farm Scoping Opinion, SSER intends to scope this impact out.				
Marine Archaeology and Ordnance						
Construction and decommissioning activities causing the removal or disturbance of sediments resulting in a potential effect on near-surface prehistoric land surfaces – construction and decommissioning phases.	Near surface prehistoric land surfaces.	N/A	X	Desktop data sources Archaeological analysis of geophysical survey data.	A Marine Archaeology Technical Report, together with associated data review of the geophysical data for the Proposed Development Array Area and proposed ECC, will provide an overview of the identifiable marine archaeology features within the marine archaeology study area. This Marine Archaeology Technical Report form the basis of a WSI and PAD, which has been prepared for approval with Historic Environment Scotland. These measures will ensure that all impacts are reduced to not significant in EIA terms.	TBC
Construction or decommissioning activities causing the removal or disturbance of sediments resulting in a potential effect on shipwrecks and aircraft wrecks – construction and decommissioning phases.	Shipwrecks and aircraft wrecks.	N/A	X	As above.	As above.	TBC
Construction of wind turbines and substations causing the removal or disturbance of sediments resulting in a potential effect on deeply buried prehistoric land surfaces – construction phase.	Deeply buried prehistoric land surfaces.	N/A	X	As above.	As above.	TBC
Construction activities resulting in an increase in suspended sediment concentrations and associated sediment deposition on shipwrecks and aircraft wrecks – construction phase.	Shipwrecks and aircraft wrecks.	N/A	X	As above.	As above.	TBC
Maintenance activities causing the removal or disturbance of sediments resulting in a	Near surface prehistoric land surfaces.	N/A	X	As above.	As above.	TBC

Impact	Expected receptors	Sensitivity and Evidence Following Consideration of Designed in Measures	Scoped in (✓)/out (X)	Information to Inform baseline characterisation	Approach to EIA	Mitigation and Monitoring post-EIA Assessment
potential effect on near-surface prehistoric land surfaces - operation and maintenance phase.						
Maintenance activities causing the removal or disturbance of sediments resulting in a potential effect on shipwrecks and aircraft wrecks - operation and maintenance phase.	Shipwrecks and aircraft wrecks.	N/A	X	As above.	As above.	TBC
Seascape, Landscape and Visual Resources						
Effects (daytime) of the construction of the offshore elements of the Proposed Development on seascape character.	All SLVIA receptors as identified through desktop analysis	Potential for significant effect. Short term, temporary effects on perceived seascape character, arising as a result of the construction activities (including laying new offshore export cables to shore) and structures located within the Proposed Development Boundary, which may alter the seascape character of the area within the Proposed Development Boundary itself and the perceived character of the wider seascape through visibility of these changes.	✓	FTOWDG (2011) Regional Seascape Character Assessment - Aberdeen to Holy Island. MMO (2018) Seascape Character Assessment for the North-East Inshore and Offshore Marine Plan Areas Project specific site-based seascape and coastal character analysis.	A preliminary assessment of the potential effects of the construction and decommissioning of the Proposed Development on Coastal Character Types and Marine Character Areas (MCAs) will be undertaken initially using desk-based information and ZTV analysis, with a detailed assessment focusing on those that are identified as requiring further assessment, particularly those where the Proposed Development may result in significant effects that are material to the consenting process. Detailed assessment to include desk based seascape character assessment publications and primary baseline data collection (for example through site surveys), quantitative and qualitative assessment methodologies to determine likely significance, and modelling such as ZTV analysis and wireline/photomontage visualisations.	TBC
Effects (daytime) of the construction of the offshore elements of the Proposed Development on perceived landscape character.	All SLVIA receptors as identified through desktop analysis	Potential for significant effect. Short term, temporary effects on perceived landscape character, arising as a result of the construction activities and structures, including laying new offshore export cables to shore, which will be visible from the coast (during good to excellent visibility conditions) and may therefore affect the perceived character of the landscape.	✓	NatureScot Landscape Character Assessment 2019 Northumberland County Council Landscape Character Assessment (2010) Project specific site-based landscape character analysis.	A preliminary assessment of the potential effects of the construction and decommissioning of the Proposed Development on the perceived character of LCTs/LCAs will be undertaken initially using desk based information and ZTV analysis, with a detailed assessment focusing on those that are identified as requiring further assessment, particularly LCTs/LCAs where the Proposed Development may result in significant effects that are material to the consenting process. Detailed assessment to include desk-based landscape character assessment publications and primary baseline data collection (for example through site surveys), quantitative and qualitative assessment methodologies to determine likely significance, and modelling such as ZTV analysis and wireline/photomontage visualisations.	TBC

Impact	Expected receptors	Sensitivity and Evidence Following Consideration of Designed in Measures	Scoped in (✓)/out (X)	Information to Inform baseline characterisation	Approach to EIA	Mitigation and Monitoring post-EIA Assessment
Effects (daytime) of the construction of the offshore elements of the Proposed Development on perceived landscape character/special qualities of designated landscapes.	All SLVIA receptors as identified through desktop analysis	Potential for significant effect. Short term, temporary effects on perceived landscape character and special qualities of designated landscapes, arising as a result of the operational wind turbines, substations and maintenance activities, which will be visible from the coast (during good to excellent visibility conditions) and may therefore affect the perceived character and qualities of the landscape.	✓	Northumberland Coast AONB Management Plan 2020-2024 Northumberland Coast AONB Landscape Sensitivity and Capacity Study (August 2013) Project specific site-based landscape character analysis.	A preliminary assessment of the potential effects of the construction and decommissioning of the Proposed Development on the perceived character and qualities of designated landscape will be undertaken initially using desk-based information and ZTV analysis, with a detailed assessment focusing on those that are identified as requiring further assessment, particularly those where Proposed Development may result in significant effects that are material to the consenting process. Detailed assessment to include desk based assessment to define special qualities that may be affected by Proposed Development, using published documents and primary baseline data collection (for example through site surveys), quantitative and qualitative assessment methodologies to determine likely significance, and modelling such as ZTV analysis and wireline/photomontage visualisations. Relevant special qualities for detailed assessment will be agreed with stakeholders as part of the evidence plan process.	TBC
Effects (daytime) of the construction of the offshore elements of the Proposed Development on visual receptors/views.	All SLVIA receptors as identified through desktop analysis	Potential for significant effect. Short term, temporary effects on views and visual amenity experienced by people from principal visual receptors and representative viewpoints, arising as a result of the construction activities and structures, including laying new offshore export cables to shore, which will be visible from the coast (during good to excellent visibility conditions)	✓	Visual receptor mapping datasets and OS data Met Office Visibility Data. Project specific site-based visual assessment.	A preliminary assessment of the potential effects of the construction and decommissioning of the Proposed Development on the views and visual receptors will be undertaken initially using desk-based information and ZTV analysis, with a detailed assessment focusing on those that are identified as requiring further assessment, particularly views and visual receptors where the Proposed Development may result in significant effects that are material to the consenting process. Detailed assessment to include desk based publications and primary baseline data collection (for example through site surveys), quantitative and qualitative assessment methodologies to determine likely significance, and modelling such as ZTV analysis and wireline/photomontage visualisations.	TBC

Impact	Expected receptors	Sensitivity and Evidence Following Consideration of Designed in Measures	Scoped in (✓)/out (X)	Information to Inform baseline characterisation	Approach to EIA	Mitigation and Monitoring post-EIA Assessment
Effects (daytime) of the operation and maintenance of the offshore elements of the Proposed Development on seascape character.	All SLVIA receptors as identified through desktop analysis	Potential for significant effect. Long term, reversible effects on perceived seascape character of Coastal Character Types and MCAs, arising as a result of the operational wind turbines, substations and maintenance activities located within the Proposed Development Array Area, which may alter the seascape character of the Proposed Development Array Area itself and the perceived character of the wider seascape.	✓	FTOWDG (2011) Regional Seascape Character Assessment - Aberdeen to Holy Island. MMO (2018) Seascape Character Assessment for the North-East Inshore and Offshore Marine Plan Areas Project specific site-based seascape and coastal character analysis.	A preliminary assessment of the potential effects of the operation and maintenance of the Proposed Development on Coastal Character Types and MCAs will be undertaken initially using desk-based information and ZTV analysis, with a detailed assessment focusing on those that are identified as requiring further assessment, particularly those where the Proposed Development may result in significant effects that are material to the consenting process. Detailed assessment to include desk-based seascape character assessment publications and primary baseline data collection (for example through site surveys), quantitative and qualitative assessment methodologies to determine likely significance, and modelling such as ZTV analysis and wireline/photomontage visualisations.	TBC
Effects (daytime) of the operation and maintenance of the offshore elements of the Proposed Development on perceived landscape character/special qualities of designated landscapes.	All SLVIA receptors as identified through desktop analysis	Potential for significant effect. Long term, reversible effects on perceived landscape character of LCAs/LCTs and qualities of designated landscapes, arising as a result of the operational wind turbines, substations and maintenance activities, which will be visible from the coast (during good to excellent visibility conditions) and may therefore affect the perceived character and qualities of the landscape.	✓	NatureScot Landscape Character Assessment 2019 Northumberland County Council Landscape Character Assessment (2010) Northumberland Coast AONB Management Plan 2020-2024 Northumberland Coast AONB Landscape Sensitivity and Capacity Study (August 2013) Project specific site-based landscape character analysis.	A preliminary assessment of the potential effects of the operation and maintenance of the Proposed Development on the perceived character and qualities of LCTs/LCAs and designated landscapes will be undertaken initially using desk-based information and ZTV analysis, with a detailed assessment focusing on those that are identified as requiring further assessment, particularly LCTs/LCAs where the Proposed Development may result in significant effects that are material to the consenting process. Detailed assessment to include desk-based landscape character assessment publications and primary baseline data collection (for example through site surveys), quantitative and qualitative assessment methodologies to determine likely significance, and modelling such as ZTV analysis and wireline/photomontage visualisations. Relevant special qualities for detailed assessment will be agreed with stakeholders as part of the evidence plan process.	TBC

Impact	Expected receptors	Sensitivity and Evidence Following Consideration of Designed in Measures	Scoped in (✓)/out (X)	Information to Inform baseline characterisation	Approach to EIA	Mitigation and Monitoring post-EIA Assessment
Effects (daytime) of the operation and maintenance of the offshore elements of the Proposed Development on visual receptors/views.	All SLVIA receptors as identified through desktop analysis	Potential for significant effect. Long term, reversible effects on views and visual amenity experienced by people as principal visual receptors and representative viewpoints, arising as a result of the operational wind turbines, substations and maintenance activities when visible from the coast during very good to excellent visibility conditions. wind turbines will often be seen behind the operational wind farms however, their taller height and horizontal spread of the wind turbines may result in effects on views.	✓	Visual receptor mapping datasets and OS data Met Office Visibility Data. Project specific site-based visual assessment.	A preliminary assessment of the potential effects of the operation and maintenance of the Proposed Development on the views and visual receptors will be undertaken initially using desk-based information and ZTV analysis, with a detailed assessment focusing on those that are identified as requiring further assessment, particularly views and visual receptors where the Proposed Development may result in significant effects that are material to the consenting process. Detailed assessment to include desk-based publications and primary baseline data collection (for example through site surveys), quantitative and qualitative assessment methodologies to determine likely significance, and modelling such as ZTV analysis and wireline/photomontage visualisations.	TBC
Effects (night time) of the operation and maintenance of the Proposed Development lighting on visual receptors/views	All SLVIA receptors as identified through desktop analysis	Potential for significant effect. Long term, reversible effects on views and visual amenity experienced by people from principal visual receptors and representative viewpoints, including from within the Northumberland Coast AONB arising as a result of the marine navigation and aviation lights. Potential for significant effect on perception of dark night skies quality of the Northumberland Coast AONB arising from lighting of the Proposed Development in views from the coast of the seascape outside the Northumberland Coast AONB.	✓	Visual receptor mapping datasets and OS data Met Office Visibility Data. Project specific site-based visual assessment.	A ZTV showing the geographic extent of visible aviation and marine navigation lighting will be used to inform the assessment of effects resulting from wind turbine lighting. Night time photographs and visualisations will be prepared from proposed night-time viewpoints to illustrate the effects of the lighting from key viewpoints, to be agreed with stakeholders.	TBC
Cumulative effect (daytime) of the operation of the Proposed Development on seascape character, landscape character and views/visual receptors.	All SLVIA receptors as identified through desktop analysis	Potential for significant cumulative effect. Long term, reversible effects on perceived seascape character (Coastal Character Types and MCAs), landscape character of LCAs/LCTs and qualities of designated landscapes, and views / visual amenity experienced by people arising as a result of visibility of the operational wind turbines, substations and maintenance activities located within the Proposed Development Array Area cumulatively with other projects located within the study area.	✓	In addition to the above data for seascape, landscape and visual baseline, cumulative wind farm databases, local authority planning portals and offshore wind farm development specification and layout plans.	A preliminary assessment of the potential cumulative effects of the Proposed Development on seascape, landscape and visual receptors will be undertaken initially using desk-based information and ZTV analysis, with a detailed cumulative assessment focusing on those that are identified as requiring further assessment, particularly where the Proposed Development may result in significant cumulative effects that are material to the consenting process. Detailed cumulative assessment to include desk-based publications and primary baseline data collection (for example through site surveys), quantitative and qualitative assessment methodologies to determine likely significance, and modelling such as cumulative ZTV analysis and cumulative wireline/photomontage visualisations.	TBC

Impact	Expected receptors	Sensitivity and Evidence Following Consideration of Designed in Measures	Scoped in (✓)/out (X)	Information to Inform baseline characterisation	Approach to EIA	Mitigation and Monitoring post-EIA Assessment
Seascape, landscape and visual effects of the offshore elements of the Proposed Development outside the 60km radius SLVIA study area.	N/A	The 60km radius SLVIA study area is defined to an outer limit within which significant effects could occur. Significant effects will not occur beyond 60km due to the limited changes to views arising from the Proposed Development at distances of over 60 km.	X	N/A	N/A	TBC
Areas of the SLVIA study area outside the ZTV.	N/A	The Proposed Development will have no impacts on areas of the SLVIA study area outside the ZTV where it is not visible.	X	N/A	N/A	TBC
Effects of the Proposed Development on physical aspects of landscape character.	N/A	Due to the location of the Proposed Development at considerable distance offshore it will only impact on the perception of character and qualities – which is considered as an indirect effect in SLVIA. No physical attributes that define landscape character or special qualities of designated landscapes will be changed as a result of the Proposed Development. Construction stage works in the inter-tidal area will be assessed as part of the LVIA of the onshore infrastructure.	X	N/A	N/A	TBC
The seascape, landscape and visual effects of the offshore cable route operation.	N/A	The offshore cables will be located below the sea surface so would not be visible as part of the seascape or views once operational and would therefore have no operational effect on seascape, landscape and visual receptors.	X	N/A	N/A	TBC
Impact of the Proposed Development lighting on seascape character at night during construction, operation and decommissioning.	N/A	The features of seascape character are generally not apparent at night. No attributes of seascape character will be changed as a result of the lighting of the Proposed Development.	X	N/A	N/A	TBC

Impact	Expected receptors	Sensitivity and Evidence Following Consideration of Designed in Measures	Scoped in (✓)/out (X)	Information to Inform baseline characterisation	Approach to EIA	Mitigation and Monitoring post-EIA Assessment
Transboundary impacts	N/A	Due to the long distance of the Proposed Development the maritime waters and coastline of European Members states and limited effect interactions on receptors along these coastlines.	X	N/A	N/A	TBC
Offshore Socio-economics and Tourism						
Impact on employment in construction, operation and maintenance and decommissioning in the supply chain	All offshore socio-economic and tourism receptors as identified through desktop analysis	Potential Capital Expenditure (CAPEX) from the construction phase, operation and maintenance phase and decommissioning phase to support employment in Scottish companies that are directly engaged in the construction supply chain. The construction and operation and maintenance of the Proposed Development could also support employment indirectly in the wider Scottish supply chain.	✓	A desk-based review will be undertaken to develop a baseline understanding of the socio-economic and tourism related conditions. Further, a BVG Associates (BVGA) (2021) Socio-economic Technical Report will be developed which presents an overview of both the onshore and offshore socio-economic environment of the Project. This will support the relevant chapter assessments within the Offshore EIAR and Offshore EIAR.	An economic impact model to estimate the direct, indirect and induced employment impact of Capital Expenditure (CAPEX) on construction, operation and maintenance and decommissioning of the Proposed Development in the socio-economics study area will be developed. Modelling will align with Draft Advice on Net Economic Benefit and Planning (The Scottish Government, 2016) and utilise Supply, Use and Input-Output Tables (Scottish Government, 2020).	TBC
Impact on the amount of GVA supported by construction, operation and maintenance and decommissioning activity	All offshore socio-economic and tourism receptors as identified through desktop analysis	Potential Capital Expenditure (CAPEX) on the construction, operation and maintenance and decommissioning of the Proposed Development to support GVA in Scottish companies that are directly engaged in the construction supply chain. The construction and operation and maintenance of the Proposed Development could also go on to support employment indirectly in the wider supply chain.	✓		An economic impact model to estimate the direct, indirect and induced GVA impact of Capital Expenditure (CAPEX) on construction, operation and maintenance and decommissioning of Proposed Development in the socio-economics study area will be developed. Modelling will align with Draft Advice on Net Economic Benefit and Planning (The Scottish Government, 2016) and utilise Supply, Use and Input-Output Tables (Scottish Government, 2020).	TBC
Impact on access to construction, operation and maintenance and decommissioning related employment amongst local residents	All offshore socio-economic and tourism receptors as identified through desktop analysis	Direct and indirect employment associated with the construction phase, operation and maintenance phase and decommissioning phase and could increase the range and supply of employment opportunities that are accessible to residents of the area.	✓		No specific modelling is required for this impact assessment. A qualitative assessment will be undertaken and presented within the Offshore EIAR. A qualitative assessment will be undertaken and presented within the Offshore EIAR. The assessment will be based on a desktop review of existing relevant studies and national datasets and indicators and will	TBC

Impact	Expected receptors	Sensitivity and Evidence Following Consideration of Designed in Measures	Scoped in (✓)/out (X)	Information to Inform baseline characterisation	Approach to EIA	Mitigation and Monitoring post-EIA Assessment
Impact on the demand for housing, accommodation and local services	All offshore socio-economic and tourism receptors as identified through desktop analysis	Direct and indirect employment generated during the construction phase, operation and maintenance phase and decommissioning phase could increase demand for housing, accommodation and local services during the construction phase.	✓		be supported by the development of an economic impact model.	TBC
Impact on tourism and recreation activity and associated economic value	All offshore socio-economic and tourism receptors as identified through desktop analysis	The construction, operation and maintenance and decommissioning of the Proposed Development could lead to disruption of local tourism and recreational resources.	✓			TBC

Appendix 2 MITIGATION AND MONITORING

2.1 INTRODUCTION

5. Throughout this Offshore EIA Scoping Report, a range of ‘designed in measures’ have been applied and are detailed in the technical assessment of each section. The following commitments register summarises the mitigation and monitoring commitments set out in this Offshore EIA Scoping report and categorises these as per section 4.3 as either:

   - Primary inherent mitigation (P);
   - Secondary foreseeable mitigation (S); or
   - Tertiary inexorable mitigation (T).

6. Both primary and tertiary measures can be designed into the project design. The basis of the Offshore EIA can therefore be undertaken on the basis that these measures will definitely be delivered and therefore any effects which might arise without these mitigation measures do not need to be identified as potential effects as there is no potential for them to arise (IEMA, 2016).

7. Mitigation measures will evolve whilst the EIA progresses and in response to stakeholder engagement, therefore this Mitigation and Monitoring Commitments Register (Apx. Table 2. 1) is a ‘live’ document and will be updated over the course of the EIA process. Any additional measures identified throughout the EIA process will also be updated in the Offshore Scoping Road Map (Apx. Table 2. 1).

Apx. Table 2. 1: Proposed Development Mitigation and Monitoring Commitments Register

Reference	Proposed Development phase	Mitigation and Monitoring Commitment	Offshore Topics of Relevance																	Means of Implementation	Mitigation category (primary (P), secondary (S) or tertiary (T))
			Physical Processes	Subsea Noise	Airborne Noise	Air Quality	Benthic Subtidal and Intertidal Ecology	Fish and Shellfish Ecology	Marine Mammals	Ornithology	Commercial Fisheries	Shipping and Navigation	Aviation, Military and Communications	Infrastructure and Other Users	Marine Archaeology	Seascape, Visual Resources	Cultural Heritage	Offshore Socio-economics and Tourism			
1	Operation and maintenance.	The use of scour protection around offshore structures and foundations will be employed.	✔																	Secured in the Section 36 Consent and Marine Licence, via the requirement for a Scour Protection Management Plan and Cable Specification Installation Plan.	P
2	Operation and maintenance.	Suitable implementation and monitoring of cable protection through the Development and adherence to a Cable Plan (CaP).	✔																	Secured in the Section 36 Consent and Marine Licence, via the requirement for a CaP.	S
3	Construction.	Implementation of piling soft-start and ramp-up measures.		✔				✔	✔											Secured in the Section 36 Consent and Marine Licence via the requirement for a Construction Method Statement (CMS).	P
4	Construction.	Development of, and adherence to, a CoCP.				✔	✔	✔	✔											Secured in the Section 36 Consent and Marine Licence, via the requirement for a CoCP.	T
5	Construction, operation and maintenance, and decommissioning.	Development of, and adherence to, an Environmental Management Plan, including Marine Pollution Contingency Plan and Invasive Non-Native Species Management Plan (INNS).					✔	✔	✔	✔		✔								Secured in the Marine Licence via the requirement for an Environmental Management Plan, including Marine Pollution Contingency Plans and INNS Management Plan.	T
6	Construction, operation and maintenance, and decommissioning.	Development of, and adherence to, a Pollution Prevention Plan.					✔	✔	✔	✔										Secured in the Marine Licence via the requirement for a Pollution Prevention Plan.	T
7	Decommissioning	Development of, and adherence to, a Decommissioning Plan.					✔	✔	✔	✔										Secured in the Marine Licence via the requirement for a Decommissioning Plan.	T
8	Construction, operation and maintenance, and decommissioning.	Development of, and adherence to, a Vessel Management Plan (VMP).							✔	✔	✔	✔								Secured in the Section 36 Consent and Marine Licence via the requirement for a VMP.	T
9	Construction, operation and maintenance, and decommissioning.	On-going consultation with fishing industry via the appointment of a Fisheries Liaison Officer (FLO).									✔									Secured in the Section 36 Consent and Marine Licence via the requirement for appointment of a FLO.	T

Reference	Proposed Development phase	Mitigation and Monitoring Commitment	Offshore Topics of Relevance																	Means of Implementation	Mitigation category (primary (P), secondary (S) or tertiary (T))
			Physical Processes	Subsea Noise	Airborne Noise	Air Quality	Benthic Subtidal and Intertidal Ecology	Fish and Shellfish Ecology	Marine Mammals	Ornithology	Commercial Fisheries	Shipping and Navigation	Aviation, Military and Communications	Infrastructure and Other Users	Marine Archaeology	Seascape, Visual Resources	Cultural Heritage	Offshore Socio-economics and Tourism			
10	Construction and decommissioning.	Development of, and adherence to, a Marine Mammal Mitigation Protocol (piling, UXO and decommissioning specific)							✔	✔										Secured in the Section 36 Consent and Marine Licence via requirement for a Marine Mammal Mitigation Protocol.	T
11	Construction, operation and maintenance, and decommissioning.	Development of a Fisheries Management and Mitigation Strategy (FMMS).									✔									Secured in the Section 36 Consent and Marine Licence via the requirement for a FMMS.	T
12	Construction, operation and maintenance, and decommissioning.	Timely and efficient distribution of NtM, Kingfisher notifications and other navigational warnings of the position and nature of works associated with the Proposed Development.									✔	✔		✔						Secured in the Section 36 Consent and Marine Licence.	T
13	Construction, operation and maintenance, and decommissioning.	Use of guard vessels, where necessary.									✔	✔								Secured in the Section 36 Consent and Marine Licence via the requirement for an application for safety zones and requirement for a VMP.	S
14	Construction, operation and maintenance, and decommissioning.	Appointment of Offshore Fisheries Liaison Officers (OFLOs), where necessary.									✔									Secured in the Section 36 Consent and Marine Licence via the requirement for an OFLO	P
15	Construction, operation and maintenance, and decommissioning.	Application and use of Safety Zones during construction, maintenance and decommissioning activities associated with wind turbines and offshore platforms.										✔		✔						Secured via an application for safety zone prior to construction commencing	T
16	Construction, operation and maintenance, and decommissioning	Notification to the UK Hydrographic Office (UKHO) of the proposed works to facilitate the promulgation of maritime safety information and updating of nautical/admiralty charts and publications.									✔	✔								Secured in the Section 36 Consent and Marine Licence	T
17	Construction, and operation and maintenance	Undertaking of post-lay and cable burial inspection surveys.									✔									Secured in the Section 36 Consent and Marine Licence via the requirement for Cable Specification and Installation Plan (CSIP)	T
18	Construction, operation and maintenance, and decommissioning.	Participation in the Forth and Tay Commercial Fisheries Working Group (FTCFWG) and liaison with Fisheries Industry Representatives (FIRs)									✔									Through SSER commitment	P
19	Construction, operation and maintenance, and decommissioning.	Compliance with MGN 654 its annexes (in particular Search and Rescue (SAR) annex 5 (MCA, 2021) and completion of a SAR checklist										✔								Secured in the Section 36 Consent and Marine Licence via the requirement for an Aid to Navigation Management Plan	P

Reference	Proposed Development phase	Mitigation and Monitoring Commitment	Offshore Topics of Relevance																	Means of Implementation	Mitigation category (primary (P), secondary (S) or tertiary (T))
			Physical Processes	Subsea Noise	Airborne Noise	Air Quality	Benthic Subtidal and Intertidal Ecology	Fish and Shellfish Ecology	Marine Mammals	Ornithology	Commercial Fisheries	Shipping and Navigation	Aviation, Military and Communications	Infrastructure and Other Users	Marine Archaeology	Seascape, Visual Resources	Cultural Heritage	Offshore Socio-economics and Tourism			
20	Construction, operation and maintenance, and decommissioning.	Marking and lighting of the site in agreement with NLB and in line with IALA Recommendations.										✔				✔	✔			Secured in the Section 36 Consent and Marine Licence via the requirement for an Aid to Navigation Management Plan	S
21	Construction, operation and maintenance, and decommissioning.	Compliance of all project vessels with international marine regulations as adopted by the Flag State, notably the International Regulations for Preventing Collisions at Sea (COLREGs) (IMO, 1974) and the International Convention for the Safety of Life at Sea (SOLAS) (IMO, 1974.										✔								Secured in the Section 36 Consent and Marine Licence via the requirement for a Vessel Management Plan (VMP)	T
22	Construction, operation and maintenance, and decommissioning.	Blade clearance of at least 37 m above MHWS (in line with RYA policy (RYA, 2015).								✔		✔								Secured via the Section 36 Consent and Marine Licence	P
23	Operation and maintenance	Suitable implementation and monitoring of cable protection (via burial, or external protection where adequate burial depth as identified via risk assessment is not feasible) with any damage, destruction or decay of cables notified to Maritime Coastal Agency (MCA), NLB, Kingfisher and UKHO no later than 24 hours after discovered.										✔								Secured via the Section 36 Consent and Marine Licence via the requirement for an Aid to Navigation Management Plan	P
24	Construction	Buoyed construction area in agreement with NLB										✔								Secured via the Section 36 Consent and Marine Licence via the requirement for an Aid to Navigation Management Plan	P
25	Construction.	Minimise construction footprint at landfall site and minimise infrastructure and length of construction phase.														✔				Secured via the Section 36 Consent and Marine Licence	P
26	Construction, operation and maintenance, and decommissioning.	Design and layout of wind turbines, offshore substations and platforms within the Proposed Development Array Area to minimise loss of landscape features at landfall site and achieve appropriate design and layout of wind turbines within array will be agreed via the DSLP														✔				Secured via the Section 36 Consent, Marine Licence and T&CP permission.	P
27	Construction, operation and maintenance and decommissioning.	Adherence to CAP 393 Article 223 (CAA, 2018) which sets out the mandatory requirements for lighting of offshore wind turbines.											✔							Secured in the Section 36 Consent and Marine Licence via the requirement for Lighting and Marking Plan	T

Reference	Proposed Development phase	Mitigation and Monitoring Commitment	Offshore Topics of Relevance: Physical Processes	Subsea Noise	Airborne Noise	Air Quality	Benthic Subtidal and Intertidal Ecology	Fish and Shellfish Ecology	Marine Mammals	Ornithology	Commercial Fisheries	Shipping and Navigation	Aviation, Military and Communications	Infrastructure and Other Users	Marine Archaeology	Seascape, Visual Resources	Cultural Heritage	Offshore Socio-economics and Tourism	Means of Implementation	Mitigation category (primary (P), secondary (S) or tertiary (T))
28	Operation and maintenance.	All structures over 91.4 m in height will be charted on aeronautical charts and reported to the Defence Geographic Centre (DGC).											✔						Secured in the Section 36 Consent and Marine Licence via the requirement for notifications	T
29	Operation and maintenance.	Crossing or laying of cables over or adjacent to known or future cables will be subject to crossing and/or proximity agreements.												✔					Secured through a commercial agreement with cable owner/operators	T
30	Construction, operation and maintenance, and decommissioning	Development and agreement of an archaeological Written Scheme of Archaeological Investigation (WSI), including: • The identification and implementation of Archaeological Exclusion Zones (AEZs) around sites identified as having a known important archaeological potential; • Archaeological input into specifications for and analysis of future pre-construction geophysical and geotechnical surveys; • Archaeological input into specifications for and analysis of pre-construction geotechnical surveys • Archaeologists to be consulted in the preparation of any pre-construction ROV/diver surveys and, if appropriate, in monitoring/checking of data • Provision and adherence to a Protocol for Archaeological Discoveries (PAD); • Identification and implementation of Archaeological Exclusion Zones (AEZs) around sites identified of archaeological potential; • Archaeologists to be consulted in advance of pre-construction site preparation activities and, if appropriate, to carry out watching briefs of such work; • All anomalies of unconfirmed archaeological potential to be taken into account during final design; and Mitigation of unavoidable direct impacts on known sites of archaeological importance. Options include i) preservation by record, and ii) stabilisation													✔					Secured in the Section 36 Consent and Marine Licence via the requirement for a WSI	T
30	Construction and decommissioning.	The proposed offshore ECC landfall (below MHWS) avoids designated sites for birds.								✔									Secured via the Section 36 Consent, Marine Licence and T&CP permission.	P

Reference	Proposed Development phase	Mitigation and Monitoring Commitment	Offshore Topics of Relevance																	Means of Implementation	Mitigation category (primary (P), secondary (S) or tertiary (T))
			Physical Processes	Subsea Noise	Airborne Noise	Air Quality	Benthic Subtidal and Intertidal Ecology	Fish and Shellfish Ecology	Marine Mammals	Ornithology	Commercial Fisheries	Shipping and Navigation	Aviation, Military and Communications	Infrastructure and Other Users	Marine Archaeology	Seascape, Visual Resources	Cultural Heritage	Offshore Socio-economics and Tourism			
31	Construction	Use of locally manufactured content where possible and appropriate.																✔		Through SSER commitment	P
32	Construction and operation and maintenance.	Use of local contractors (where possible) during construction for onshore infrastructure and potential offshore construction work where possible and appropriate and the employment and training possibilities for local people on the operation and maintenance of a wind farm where feasible.																✔		Through SSER commitment	P
33	Operation and maintenance.	Minimum blade clearance above LAT of 37 m.								✔		✔				✔	✔			Secured via the Section 36 Consent and Marine Licence	P
34	Pre-Construction.	Use of low-order delfagration for UXO removal.							✔											Secured via the Section 36 Consent and Marine Licence	P
35	Operation and maintenance.	Undertake an overtrawlability assessment of installed cables.									✔									Secured via the Section 36 Consent and Marine Licence	S

Appendix 3 TRANSBOUNDARY SCREENING

3.1 INTRODUCTION

8. The section identifies the potential transboundary receptors that may be affected by the Proposed Development, and assess potential impacts associated with construction, operation and maintenance, and decommissioning phases of the Proposed Development.

3.1.1 BACKGROUND

9. The potential for transboundary effects to arise is a result of an impact from a proposed development within one European Economic Area (EEA) state which has the potential to affect the environment of another EEA state(s).

10. SSER has completed a transboundary screening impact assessment, including a screening matrix, for potential transboundary effects arising from the construction, operation and maintenance, and decommissioning of the Proposed Development. The outcome of this transboundary screening assessment is set out in section 3.3 and section 3.4. Where no potential transboundary impacts have been identified as part of the transboundary screening process, this is also stated in section 3.3. Marine Scotland Consenting and Licensing Guidance for Offshore Wind, Wave and Tidal Energy Applications (Scottish Government, 2018) advises that transboundary impacts in relation to offshore renewable energy projects in Scotland are likely to relate primarily to

- projects that may have an impact on mobile species; and
- where projects are close to national boundaries or areas administered by other relevant authorities.

3.1.1.1 Legislative Context

11. The United Nations Economic Commission for Europe (UNECE) Convention on EIA in a Transboundary Context (the Espoo Convention) (as amended) provides guidance on assessment of Transboundary impacts with the aim of promoting “environmentally sound and sustainable development”, while enhancing “international co-operation in assessing environmental impact” of a proposed project.

12. The Espoo Convention (named after the Finish city of Espoo where the Convention was adopted) requires that EIAs consider potential impacts across national borders where there is the potential for an activity occurring in one country to have the potential for significant effect in another country. The UK is also a signatory to the Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters (the ‘Aarhus Convention’) and its Protocol which provide people with the rights to access information, public participation in decision-making and access to justice in environmental matters.

13. European Union (EU) Directive 85/337/EEC (as amended) (the EIA Directive) implements both the Espoo and Aarhus Conventions in EU States. This Directive was transposed into UK law through the EIA Regulations (see section 4.3.8).

Environmental Impact Assessment

14. Under the EIA Regulations (see section 4.3.8), Scottish Ministers are required to determine if a proposed development is likely to have significant impacts on the receiving environment of another European Economic Area (EEA) State – i.e. a “transboundary impact”. For example, Regulation 30 1(a) of the Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017 states that where “*it comes to the attention of the Scottish Ministers that works proposed to be carried out in Scotland are the subject of an EIA application and are likely to have significant effects on the environment in an EEA State other than the United Kingdom*” Scottish Ministers must:

- send to the EEA State, as soon as possible and no later than their date of publication in The Edinburgh Gazette… the particulars mentioned in paragraph (3) (and paragraph 4 if required)
- publish the information in a notice placed in The Edinburgh Gazette, indicating the address where further information is available; and
- give the EEA State a reasonable period of time in which to indicate whether it wishes to participate in the procedure for which these Regulations provide.
- The information required to be shared with EEA States includes:
- a description of the works, together with any available information on their possible significant effect on the environment in another EEA State; and
- information on the nature of the decision which may be taken.

15. Similar provisions requiring transboundary consultation exist in the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 and the Marine Works (Environmental Impact Assessment) Regulations 2007.

Habitats Regulations Appraisal

16. The Habitats Directive has been transposed into UK law through:

- the Conservation (Natural Habitats &c.) Regulations 1994 (as amended);
- the Conservation of Habitats and Species Regulations 2017; and
- the Conservation of Offshore Marine Habitats and Species Regulations 2017 (which apply to marine licences and Section 36 applications within the Scottish Offshore region.

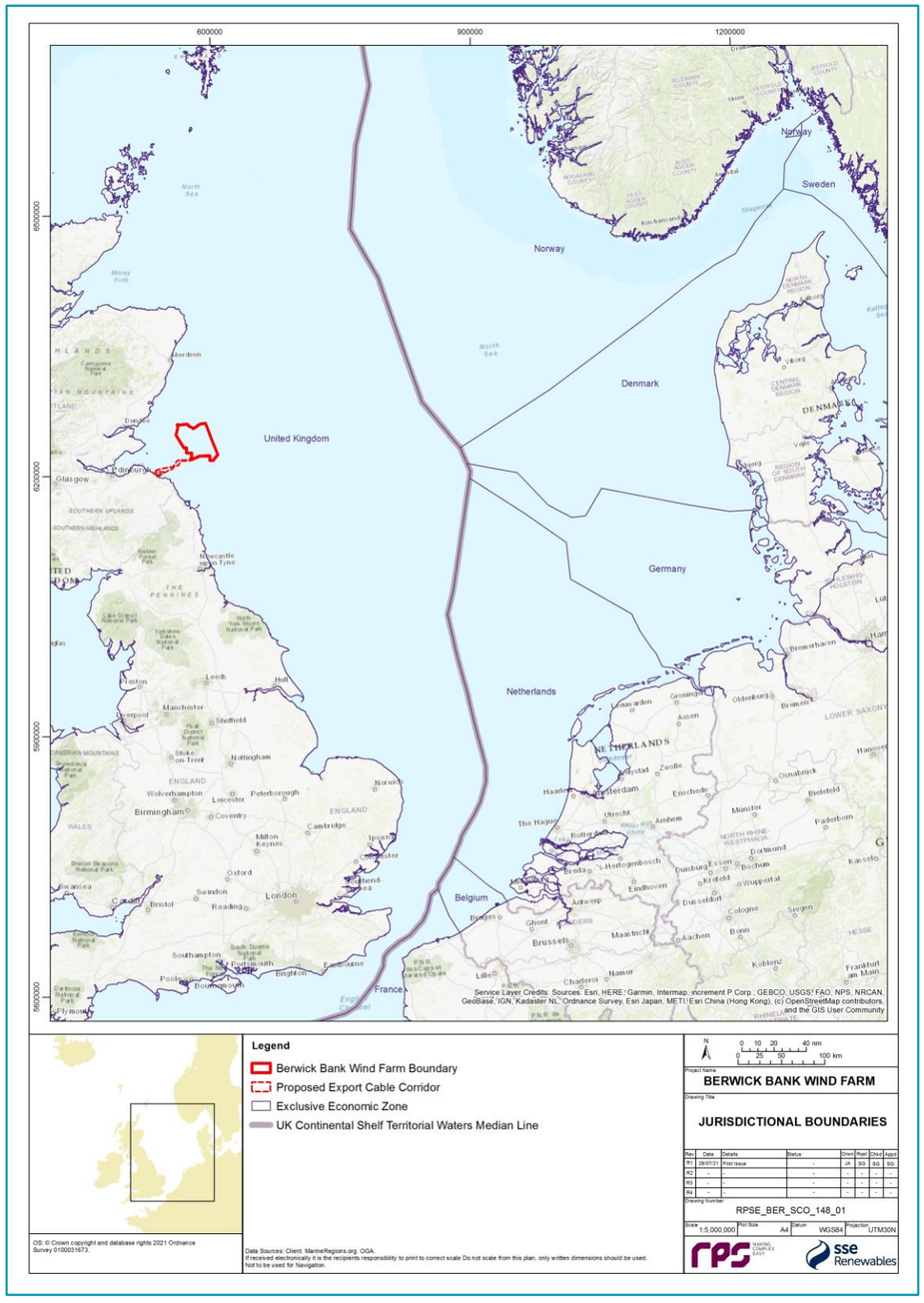
3.2 CONSULTATION

17. Once an EEA State has confirmed that they wish to participate in discussion on potential transboundary assessment of a project, that EEA State must be consulted by the Scottish Ministers. It is proposed that the following EU states should be consulted on whether they intend to participate:

- Netherlands;
- Denmark;
- Germany; and
- Norway.

3.3 SCREENING OF TRANSBOUNDARY IMPACTS

18. Apx. Figure 3. 1 illustrates the proximity of the Proposed Development to other EEA states. The distance of the Proposed Development to other EEA states with which there may be the potential for transboundary impacts has been considered within this assessment.



Apx. Figure 3. 1: Location of the Proposed Development in Relation to other EEA States

3.3.1 PHYSICAL AND BIOLOGICAL ENVIRONMENT

19. SSER has carried out a transboundary screening for all potential physical and biological receptors. The conclusion of the transboundary screening assessment undertaken for each physical and biological environment topic is presented in the following sections. Where impacts have proposed to be scoped out of the Offshore EIAR, these have not been considered within this transboundary screening assessment (airborne noise and air quality), on the basis that no significant effects are predicted and will therefore not result in a significant effect in another EEA state.

20. The potential for the Proposed Development to impact benthic subtidal and intertidal, fish and shellfish, marine mammal or ornithology features of nature conservation designations outside of the UK European Economic Zone (EEZ) will be considered within the HRA process.

3.3.1.1 Subsea Noise

21. Potential impacts from subsea noise will likely be localised and temporary in nature. Therefore, no potential transboundary impacts are predicted for subsea noise.

3.3.1.2 Physical Processes

22. Potential impacts on physical processes receptors will likely be localised and temporary in nature as any sediments suspended during activities associated with the construction, operation and maintenance, or decommissioning of the Proposed Development are likely to re-settle.

23. Therefore, considering both the location of the Proposed Development and the identified physical processes receptors and initial assessment of the physical processes baseline characterisation, no potential transboundary impacts are predicted for physical processes.

3.3.1.3 Benthic Ecology

24. Potential impacts on benthic subtidal and intertidal ecology receptors include:

- temporary habitat loss / disturbance;
- increased suspended sediment concentrations and associated deposition;
- impacts to invertebrates due to electromagnetic fields (EMF);
- long-term subtidal habitat loss;
- colonisation of hard structures; and
- changes in physical processes.

25. Potential impacts on benthic subtidal and internal ecology receptors will largely be focused within the footprint of the Proposed Development and therefore no potential for transboundary impacts are predicted. Potential impacts as a result of suspension of sediments (SSC) are likely to be restricted to one tidal excursion.

26. Therefore, considering both the location of the Proposed Development and an initial assessment of baseline characterisation, and as the predicted impacts on the benthic and epibenthic communities will largely be focused within the footprint of the Proposed Development no potential transboundary impacts are precited for benthic subtidal and intertidal ecology. This position is supported by stakeholder feedback on the initial Berwick Bank Wind Farm proposal Offshore EIA Scoping Report.

3.3.1.4 Fish and Shellfish Ecology

27. Potential impacts on fish and shellfish ecology receptors include:

- temporary habitat loss and disturbance;
- underwater noise;
- increased suspended sediment concentrations and associated sediment deposition;
- long-term habitat loss;

- colonisation of hard structures; and
- electromagnetic Fields (EMF) from subsea electrical cabling.

28. There is the potential for injury and/or disturbance to fish receptors as a result of increased noise during the construction phase of the Proposed Development. In particular, increased noised during construction has the potential to affect Annex II migratory fish species, or species that have commercial value. Direct impacts may occur as a result of, for example, piling during construction of foundations, and indirect impacts may occur as a result of, for example, changes in prey availability during the construction phase. There is therefore the potential for transboundary impacts associated with the Proposed Development as a result of the construction of the Proposed Development.

3.3.1.5 Marine Mammals

29. Potential impacts on marine mammal receptors include:

- injury and disturbance from piling;
- disturbance of marine mammals from vessel use and other construction activities;
- increased vessel may result in collision with marine mammals;
- changes in prey availability; and
- injury and disturbance from operation and maintenance activities.

30. The regional marine mammal study area extends beyond the limits of Scottish or UK territorial waters, and it is acknowledged that some marine mammals can travel large distances to forage, including between the waters of neighbouring EU countries. Direct impacts may occur as a result of, for example, piling during construction of foundations, and indirect impacts may occur as a result of, for example, changes in prey availability. There is therefore the potential for transboundary impacts associated with the Proposed Development. However, it is not expected that any impact from the Proposed Development will have a direct impact on the environment of any another EEA State due to the distance from the Proposed Development boundary in relation to the potential scale over which direct effects could occur (i.e. elevations in subsea noise would not reach this far). Therefore, it is not anticipated that there will significant transboundary effects and it is proposed to scope this out of further consideration in the Offshore EIAR.

3.3.1.6 Ornithology

31. Potential impacts on offshore and intertidal ornithology receptors include:

- disturbance of birds from vessels and other construction activities;
- disturbance from operation and maintenance activities;
- barrier effects arising from presence of turbines;
- displacement (avoidance resulting from disturbance, loss of foraging habitat);
- collisions with turbines;
- changes in prey availability

32. Based on the location of the Project and the likely key receptors, it is considered that there will be no significant transboundary effects on birds in the breeding season, on the basis that, (with the exception of fulmar) there are no non-UK seabird colonies within mean-maximum foraging range (+1SD) of the proposed Project, therefore there will not be any transboundary impacts.

33. In the non-breeding season, it is possible that birds from non-UK seabird colonies may occur within the proposed project area and therefore there may be impacts on birds originating from non-UK colonies. These potential impacts will be addressed in the EIAR

3.3.2 HUMAN ENVIRONMENT

34. SSER has carried out a transboundary screening for all potential human environment receptors. The conclusion of the transboundary screening assessment undertaken for each human environment topic is presented in the sections below. Where impacts have proposed to be scoped out of the Offshore EIAR, these have not been considered within this transboundary screening assessment, on the basis that no significant effects are predicted and will therefore not result in a significant effect in another EEA state.

3.3.2.1 Commercial Fisheries

35. As the Proposed Development array is located beyond the 12 nm limit, where EU member states currently have access to fishing, there is potential for transboundary impacts upon commercial fisheries due to the construction, operation and maintenance, and decommissioning phase of the Proposed Development. These include:

- loss or restricted access to fishing grounds;
- displacement of fishing activities into other areas;
- interference with fishing activity;
- increased steaming times;
- safety issues for fishing vessels; and
- potential impacts on commercially exploited species.

36. Where significant fishing activity is identified for non-UK fleets within the commercial fisheries study area, these will be included as a receptor throughout the impact assessment.

37. It is therefore concluded that there is the potential for transboundary impacts associated with the Proposed Development.

3.3.2.2 Shipping and Navigation

38. Potential impacts on shipping and navigation receptors include:

- construction related activities leading to vessel displacement;
- increased vessel to vessel collision risk between a third-party vessel and a project vessel
- Increased vessel to vessel collision risk between third party vessels;
- vessel to structure allision risk due to the presence of new structures associated with the Proposed Development;
- reduced access to local ports due to construction activities associated with the Proposed Development;
- commercial traffic displacement due to the presence of the Proposed Development;
- fishing vessel and recreational vessel displacement due to the presence of the Proposed Development;
- increased vessel to vessel collision risk between a third-party vessel and a project vessel due to the presence of project vessels;
- increased vessel to vessel collision risk between third-party vessels (route-based) due to the displacement of vessels from their usual routes;
- increased vessel to vessel collision risk involving fishing vessels and/or recreational vessels due to the displacement of fishing and/or recreational vessels;
- vessel to structure allision risk for commercial vessels due to the presence of new structures associated with the Proposed Development;
- vessel to structure allision risk for fishing vessels in transit due to the presence of new structures associated with the Proposed Development;
- vessel to structure allision risk for recreational vessels due to the presence of new structures associated with the Proposed Development;
- reduced access to local ports due to maintenance activities with the Proposed Development;
- reduction of under keel clearance due to the presence of cables/cable protection associated with the Proposed Development;
- anchor interaction with subsea cables due to the presence of subsea cables associated with the Proposed Development;
- interference with marine navigation, communications and position fixing equipment due to the presence of new structures associated with the Proposed Development; and

- reduction of emergency response capability due to increased incident rates and reduced access for SAR responders due to an increase in the number of vessels in the area and a reduction of freely navigable sea room and airspace.

39. It is considered that there is the potential for transboundary impacts, particularly in relation to transits to/from other countries including effects on shipping routes to/from other EEA State ports. This is particularly in relation to transits to/from other countries including effects on shipping routes to/from transboundary ports potentially leading to impacts.

3.3.2.3 Aviation, Military and Communications

40. Potential impacts associated with the Proposed Development identified for aviation, military and communication receptors include:

- potential impacts on low flying operation during all phases; and
- potential impacts on NERL ATC radar, Military ATC radar and military AD radars during the operation and maintenance phase.

41. As there are no oil and gas installations in the area, there is no potential for low flying operations (where oil and gas platforms are serviced from non-EEA States) associated with other EEA States to be affected. Radars identified are all UK based, therefore considering the location of the Proposed Development and the identified receptors above, no transboundary impacts associated with aviation, military and communications are predicted to arise.

3.3.2.4 Seascape, Landscape, Visual Resources and Cultural Heritage Setting

42. This screening exercise identified that there is the no potential for transboundary impacts upon seascape, landscape and visual receptors due to construction, operational and maintenance, and decommissioning impacts of the Proposed Development. The SLVIA study area is located entirely outside the terrestrial areas and maritime boundaries of European Union (EU) member states. Due to the concentrated nature of any potential impacts on the seascape, landscape and visual resource to the UK coastline within the SLVIA study area, transboundary impacts are unlikely to occur on seascape, landscape or visual receptors and therefore transboundary impacts will be scoped out from further consideration within the SLVIA.

3.3.2.5 Infrastructure and Other Users

43. Potential impacts associated with the Proposed Development identified for infrastructure and other users receptors include:

- displacement of recreational sailing and motor cruising, recreational fishing and other recreational activities during all phases; and
- displacement of recreational fishing and other recreational activities along the nearshore and intertidal section of the proposed ECC.

44. As no potential infrastructure and other users receptors associated with other EEA States have been identified it is considered that there are no potential transboundary impacts upon infrastructure and other users due to construction, operational and maintenance, and decommissioning associated with the Proposed Development.

3.3.2.6 Offshore Socio-economics and Tourism

45. Potential impacts associated with the Proposed Development identified for offshore socio-economics and tourism receptors include:

- impact on employment in the supply chain;
- impact on the amount of GVA supported;
- impact on access to related employment amongst local residents;
- impact on the demand for housing, accommodation and local services; and
- impact on tourism and recreation activity and associated economic value.

46. It is considered that there is the potential for transboundary impacts to occur if there is a potential impact on commercial fishing vessels or shipping and navigation receptors associated with other EEA States. These have been considered within their respective sections and are not considered within the socio-economic screening.

47. Potential transboundary socio-economics and tourism impacts upon other EEA states may arise through the purchase of project components, equipment and the sourcing of labour from companies based outside the UK. The sourcing of materials and labour from other EEA states is assumed to provide beneficial effects to the economies of other EEA states and so the consideration of measures envisaged to reduce or eliminate such effects is not relevant in the context of transboundary impacts. It is therefore proposed that transboundary impacts on offshore socio-economic and tourism receptors are screened out.

3.4 CONCLUSIONS

48. This transboundary screening has been carried out considering the location of the Proposed Development and the current Project Description. There is the potential for transboundary impacts associated with the Proposed Development for the following topics:

- fish and shellfish ecology;
- non-breeding bird populations
- commercial fisheries; and
- shipping and navigation.

Appendix 4 POLICY AND LEGISLATION

4.1 INTRODUCTION

49. This appendix provides a summary of the policy and legislative context for the Proposed Development, specifically in relation to:

- international obligations and policy, including European legislation, relating to climate change, reducing greenhouse gas (GHG) emissions and the role of renewable energy;
- UK and Scottish climate change and energy legislation and policy;
- Scottish offshore wind consenting legislation, including the consent applications required for the construction, operation and maintenance, and decommissioning of the Proposed Development; and
- other legislation that may be relevant to the Proposed Development.

50. The consents required are dictated by the location, nature and scale of the Proposed Development and the consenting requirements are explained with reference to different legislative requirements within Scottish inshore waters (within 12 nautical miles (nm)) and within Scottish offshore waters (12 – 200 nm). Section 2.3 describes the consents and legislation relevant to the Proposed Development.

51. In order to combat climate change through decarbonisation of the energy system, Scotland and the UK, require new renewable sources of energy, which will ensure that a secure supply of electricity is available to meet increased future demand (Scottish Government, 2017). The provision of new renewable energy capacity will help the Scottish Government meet legally binding national and international commitments on climate change.

52. Offshore wind generation has been identified at national level as being capable of providing a significant contribution towards such commitments (HM Government, 2020b).

4.2 CLIMATE CHANGE POLICY AND THE NEED FOR THE DEVELOPMENT

4.2.1 INTERNATIONAL COMMITMENTS

53. The UK is a signatory to the Kyoto Protocol which commits state parties to reduce GHG emissions by setting internationally binding emission reduction targets. The protocol came into effect in 2005 and its commitments were transposed into UK law by the Climate Change Act 2008, which requires the net UK carbon account for the year 2050 to be 80% lower than the 1990 baseline.

54. In December 2015, 195 countries adopted the first-ever universal, legally binding global climate deal at the Paris climate conference (COP21). The Paris Agreement (2016) sets out a global action plan towards climate neutrality with the aims of stopping the increase in global average temperature to below 2 °C above pre-industrial levels, and to pursue efforts to limit global warming to 1.5 °C.

4.2.2 EUROPEAN PARLIAMENT AND COUNCIL DIRECTIVES

4.2.2.1 Brexit

55. On 31 January 2020, the UK formally left the European Union (EU) (hereafter referred to as Brexit) after triggering article 50 of the Lisbon Treaty. The UK then entered a transition period which ran until 31 December 2020. The transition period allowed the UK and EU to determine their future relationship. During the transition period, all EU policies and legislation were required to be implemented by the UK.

56. The "level playing field" provisions in the UK/EU Trade and Cooperation Agreement (TCA) cover environment aspects such as industrial emissions, air, nature and biodiversity, waste management, the aquatic and marine environments, chemicals and the management of impacts on the environment from agricultural or food production.

57. The TCA requires "non regression" in the level of environmental protection by the UK from the end of the transition period on environmental protection that were in place at 31 December 2020. Further, environmental targets through EU environment law will continue to be bound to the UK even where the attainment of the target is envisaged for a later date. On this basis, the existing EU renewable energy targets for the UK, including the EU Renewable Energy Directive 2009/28/EC will remain applicable. It is however considered unlikely that any new EU legislation or updates to existing directives will be transposed into UK law.

4.2.2.2 2020 Targets

58. In 2008, the European Parliament and Council agreed a set of climate and energy targets known as the “20-20-20” targets. The targets to be achieved by 2020 under the RED 2009/28/EC are:

- a reduction in EU GHG emissions of at least 20% below 1990 levels;
- 20% of EU energy consumption to come from renewable energy sources; and
- 20% reduction in primary energy use compared with projected levels, to be achieved by improvements in energy efficiency.

59. Based on this, the UK is subject to a mandatory national target of deriving 15% of gross final energy consumption from renewable sources by 2020 (HM Government, 2009a).

60. The UK Renewable Energy Strategy (RES), which was published alongside and in parallel with the UK Low Carbon Transition Plan in July 2009 (HM Government, 2009b and 2009c), sets out the path by which the UK can meet the target of 15% energy consumption from renewable sources by 2020.

4.2.2.3 2030 Targets including European Union Renewables Energy Directive

61. The 2030 Energy Strategy framework proposed by the European Commission (EC) in October 2014, builds on the 2020 climate and energy framework. The EC has proposed new climate and energy targets to be achieved by 2030 (European Commission, 2020a), including:

- at least 40% cuts in GHG emissions compared to 1990 levels;
- at least 27% of energy used in EC countries to be from renewable sources; and
- at least 27% improvement in energy efficiency.

62. The Revised Renewable Energy Directive (RRED) (2018/2001/EU) entered into force in 2018. Its aim was for the EU to remain a global leader in renewables while helping the EU to meet its emissions reduction commitments under the Paris Agreement (2016). The RRED sets the following targets:

- at least a 32% share of renewable energy consumption within the EU; and
- member States to establish their contribution to the renewable energy consumption target as part of integrated national energy and climate plans, pursuant to Regulation (EU) 2018/1999 of the European Parliament and of the Council.

4.2.2.4 2050 Low Carbon Economy

63. The EU aims to be climate-neutral by 2050 – an economy with net-zero GHG emissions. This objective is at the heart of the European Green Deal and in line with the EU’s commitment to global climate action under the Paris Agreement (European Commission, 2020b).

64. On March 2011, the EC presented “The roadmap for transforming the EU into a competitive, low-carbon economy by 2050” (European Commission, 2011). This report sets the goals for domestic EU action to keep global warming below 2 °C:

- reducing GHG emissions by 40% in 2030 when compared to 1990 levels;
- by 60% in 2040; and
- by 80% in 2050.

65. In order to achieve this, the roadmap suggests the need for all economic sectors to contribute to reducing GHG emissions and the need for increased investments in low-carbon energies (European Commission, 2011).

4.2.3 UK CLIMATE CHANGE AND ENERGY LEGISLATION

4.2.3.1 The Climate Change Act 2008

66. Under the Climate Change Act 2008 the UK has committed to a net reduction in GHG emissions by 2050 of 80% against the 1990 baseline. In June 2019, secondary legislation was passed that extended that target to at least 100% against 1990 baseline. The Climate Change Act 2008 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. The CCC has produced five four-yearly carbon budgets, covering 2008-2032. These carbon budgets represent a progressive limitation on the total quantity of GHG emissions to be emitted over the five-year period. The sixth carbon budget advice to government, covering 2033-2037, was published in December 2020.

67. The UK has met the target set in the first two carbon budgets, with GHG emissions being lower between 2008 and 2017 (HM Government, 2020a). The Institute for Government states that "the UK is on track to meet its third carbon budget (the current one, covering 2018-22) but is not on track to meet its fourth (2023-27) and fifth (2028-32) (Institute for Government, 2020).

68. The UK Government subsequently produced two Carbon Plans (in 2009 and then in 2011) which set out how the UK is planning to achieve decarbonisation within the framework of the energy policy and provide a vision for 2050. The importance of offshore wind generation is noted in the most recent plan published in 2011 (HM Government, 2011a).

4.2.3.2 The Energy Act 2013

69. 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.

70. The Energy Act contains provisions for Electricity Market Reform (EMR), which sets out the framework for replacing Renewables Obligation Certificates (ROCs) with Contracts for Difference (CfD) to provide stable financial incentives to encourage investment in low carbon electricity generation.

71. CfDs are private contracts between a low carbon electricity generator and the UK Government owned Low Carbon Contracts Company (LCCC). The aim of the CfDs is to give greater certainty and stability of revenues to electricity generators by reducing exposure to volatile wholesale prices, whilst protecting the consumer from paying for higher generation support costs when electricity prices are high (BEIS, 2020). CfDs aim to support development of renewable energy in the UK by incentivising development.

4.2.3.3 National Policy Statement

72. National Policy Statements (NPSs) were designated under the Planning Act 2008. They give reasons for the policy set out in the statement, and must include an explanation of how the policy takes into account of government policy relating to the mitigation of, and adaption to, climate change.

73. The Overarching National Policy Statement for Energy (NPS EN-1) sets out the UK Government's policy for the delivery of major energy infrastructure and supports the requirements of the RED. NPS EN-3 sets out National policy for renewable energy infrastructure. Energy policy is generally reserved to the UK Government, however, in Scotland offshore planning decisions remain with Scottish Ministers. Therefore, while NPS EN-1 is still a relevant consideration for planning decisions in Scotland, planning in respect of offshore energy installations is the responsibility of Scottish Ministers.

4.2.3.4 UK Marine Policy Statement

74. The UK-wide Marine Policy Statement (MPS) was published in March 2011, under Section 44 of the Marine and Coastal Access Act (MCAA) 2009, to provide 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, 2011b). The MPS was jointly adopted by Scottish Ministers, the Secretary of State, Welsh Ministers and the Department of the Environment Northern Ireland (DOENI). The MPS confirms that all public authorities, in examining and determining applications for all energy infrastructure, the relevant marine policy statement must be followed, and the following must be considered:

- the national level of need for energy infrastructure;
- the positive wider environmental, societal and economic benefits of low carbon electricity generation;
- that renewable energy resources can only be exploited where the resource exists and where economically feasible; and
- the potential for inward investment on energy related manufacturing and deployment activity and employment opportunities and regeneration of local national economies, supporting the objective of developing the UK's low carbon manufacturing capability.

75. The MPS states that "*Marine Plans should take into account and identify areas of potential for the deployment of different renewable energy technologies*", and notes that as offshore wind is the most developed offshore renewable energy technology, it has the biggest potential to improve the UK's medium-term energy security.

76. Potential impacts from renewable energy along with mitigation measures are considered in the NPS EN-3. This is specific to England and Wales, however the MPS confirms that in Scotland reference should be made to National Planning Framework (NPF) 2, now superseded by NPF 3 (Scottish Government, 2014a). The MPS states that renewable energy offers the potential for significant broad-scale environmental benefits through mitigating GHG emissions.

77. The MCAA 2009 requires all public authorities taking authorisation or enforcement decisions that affect or might affect the UK marine area, to do so in accordance with the MPS and the relevant Marine Plans. Decisions on activities in the UK marine area will be plan-led once Marine Plans are in place (HM Government, 2011b).

78. When considering potential benefits and adverse effects, decision makers should also consider any cumulative impacts of the proposals with other projects and activities. It also confirms that the level of assessment undertaken for any project should be proportionate to the scale and potential impact of the project, as well as the sensitivity of the environment concerned and in accordance with the EIA Directive (Directive 85/337/EEC), where applicable. It further notes that an Appropriate Assessment (AA) in accordance with the Habitats Directive (Directive 92/ 43/ EEC) may also be required, in accordance with relevant national legislation and Government circulars or guidance.

4.2.3.5 UK Offshore Wind Sector Deal

79. The UK Government published the Offshore Wind Sector Deal in 2019, which sets the key commitments and actions from the UK Government to support offshore wind energy development (HM Government, 2019). "*The Deal will drive the transformation of offshore wind generation, making it an integral part of a low-cost, low-carbon, flexible grid system and boost the productivity and competitiveness of the UK supply chain*" (HM Government, 2019). The Sector Deal is divided in terms of ideas, people, infrastructure, business environment and places, laying key commitments for each of these. In relation to infrastructure, it investigates:

- how clean, affordable energy is essential for economic prosperity;
- the need of reducing energy costs for consumers;
- how to deliver up to 30 GW of energy in a sustainable way; and
- the plans for offshore wind energy beyond 2030.

80. In 2020, the UK Government prepared a policy paper to reflect on the status of the offshore wind industry one year after the publication of the Offshore Wind Sector Deal (HM Government, 2020b). Since the launch of the Sector Deal in 2019, the UK Government and the offshore wind energy sector have made progress on delivering the commitments set out within the Sector Deal. Examples of these include:

- the development and establishment of Offshore Wind Growth Partnership;
- the development of Regional Clusters; and
- the appointment of a Diversity Champion.

4.2.4 SCOTTISH POLICY AND LEGISLATION

81. Climate Change (Emissions Reduction Targets) (Scotland) Act 2019Climate Change (Emissions Reduction Targets) (Scotland) Act 20192009 introduced binding targets on the Scottish Government to reduce net Scottish GHG emissions by at least 100% by 2045 from 1990 levels, with interim targets of at least:

- 56% by 2020;
- 75% by 2030; and
- 90% by 2040 (HM Government, 2009d).

82. The objective of this Act is to contribute appropriately to the world's efforts to deliver on the Paris Agreement reached at the 21st Conference of the Parties of the United Nations Framework Convention on Climate Change (paragraph 5).

4.2.4.1 The Electricity Generation Policy Statement

83. The Electricity Generation Policy Statement (EGPS) 2013 examines the way in which Scotland generates electricity and considers the changes which will be necessary to meet the targets that the Scottish Government has established (Scottish Government, 2013a). The Scottish Government's policy on electricity generation is that Scotland's generation mix should deliver a secure source of electricity supply at an affordable cost to consumers. Electricity generation should be largely decarbonised by 2030, while achieving the greatest possible economic benefit and competitive advantage for Scotland, including opportunities for community ownership and community benefits.

84. The EGPS states that in order to meet the ambitious targets set by the Scottish Government "a sustained annual renewable deployment rate of more than twice that ever experienced in Scotland, and thus investment in and installation of large-scale schemes especially of offshore wind" is required. The EGPS states the following targets:

- delivering the equivalent of at least 100% of gross electricity consumption from renewables by 2020 as part of a wider, balanced electricity mix, with thermal generation playing an important role though a minimum of 2.5 GW of thermal generation progressively fitted with Carbon Capture and Storage (CCS);
- enabling local and community ownership of at least 500 MW of renewable energy by 2020;
- lowering final energy consumption in Scotland by 12%;
- demonstrating CCS at commercial scale in Scotland by 2020, with full retrofit across conventional power stations thereafter by 2025-2030; and
- seeking increased interconnection and transmission upgrades capable of supporting projected growth in renewable capacity.

4.2.4.2 The Scottish Energy Strategy

85. 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. The strategy outlines six priorities around Scotland's 2050 vision which includes renewable and low carbon energy solutions. The strategy sets targets of the equivalent of 50% of the energy for Scotland's heat, transport and electricity consumption to be supplied from renewable sources; and an increase by 30% in the productivity of energy use across the Scottish economy, by 2030. The strategy highlights the success of Scottish projects in offshore wind in recent CfD auctions and highlights the great potential for future development, particularly within deeper waters.

4.2.4.3 National Planning Framework 3

86. The NPF 3 is the long-term strategy developed in 2014 by the Scottish Government, which expresses plans for development and investment in infrastructure by the Scottish Government over the next 25 years (Scottish Government, 2014a).

87. In relation to renewable energy and offshore wind energy, one of the key visions for Scotland's development is the enhancement of the low carbon economy and to be a world leader in low carbon energy generation, both onshore and offshore. The NPF 3 commits Scottish Ministers to maximising the economic benefits arising from the manufacturing, construction, operations and maintenance activities associated with offshore wind energy developments in Scottish Waters.

88. The NPF 3 is supported by the Scottish Planning Policy (SPP) (Scottish Government, 2014b), which set out national plans and strategies to provide a vision of how Scotland should evolve in the future. This includes policy on a series of topics, including renewable energy, and acknowledges Scotland's offshore renewable energy sources.

89. In relation to offshore renewables, the SPP confirms that Off-shore renewable energy generation presents significant opportunities to contribute to the achievement of Government targets. Although the planning system does not regulate offshore development, it is essential that development plans take into account the infrastructure and grid connection needs of the off-shore renewable energy generation industry.

4.2.4.4 The Renewables Action Plan and 2020 Routemap for Renewable Energy in Scotland

90. The Renewables Action Plan (RAP) was published by the Scottish Government's renewable energy division in June 2009. The overall aim of the RAP is to support and accelerate the implementation of renewable energy in line with EU targets, and it sets out short-term targets towards the delivery of 2020 targets for renewable energy (Scottish Government, 2009). In 2011 an updated extension to the RAP was published by the Scottish Government, the '2020 Routemap for Renewable Energy in Scotland'. This document commits to generating an equivalent of 100% electricity demand from renewable sources, along with at least 11% renewable heat, by 2020 (Scottish Government, 2011). The Routemap presents the potential opportunities and challenges facing the offshore wind energy industry, and reflects these in four key actions:

- market initiatives;
- invest in infrastructure;
- support innovation; and
- grid regulation and charging.

91. The latest update to the Routemap in 2015, highlighted that offshore wind is showing increasing promise as a source of renewable energy, and huge economic value (Scottish Government, 2015).

4.2.4.5 Scotland's Offshore Wind Route Map

92. The Offshore Wind Industry Group (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 to OWIG to build a strong and sustainable offshore wind industry in Scotland (OWIG, 2010). The ambition of the offshore wind industry is highlighted as with 25% of Europe's offshore wind potential, the manufacturing, supply chain, job creation and training opportunities present Scotland with huge scope for sustainable economic growth. The route map presented recommendations to support offshore wind making a significant contribution to achieving 80% of Scotland's electricity consumption coming from renewable sources by 2020. The latest review of this route map was in 2013, which studied the progress that has been made in line with the original recommendations and updated targets (OWIG, 2013). This concluded that offshore renewables, especially the full deployment of Round 3 and the Scottish territorial waters round, will play a key role in meeting both the 2020 targets and 2030 decarbonisation targets (OWIG, 2013).

4.2.4.6 Offshore Wind Policy Statement

93. The Offshore Wind Energy Policy Statement (OWEPS) (Scottish Government, 2020a) sets 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. The OWEPS builds upon the ambitions outlined in Scotland's Energy Strategy (Scottish Government, 2017). It also refers to the Offshore wind Sector Deal published in 2019 (HM Government, 2019) which details specific actions to be undertaken by governments and industry, designed to promote and grow the sector. Scotland's Energy Strategy forms a key component of the implementation of The Offshore Wind Energy Policy Statement through the identification of suitable offshore wind farm development areas.

4.2.5 SCOTTISH MARINE PLANNING POLICY

94. The Scottish Government has introduced a system of marine planning that covers Scottish offshore waters (12 to 200 nm) waters under the Marine and Coastal Access Act 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.

4.2.5.1 Scottish National Marine Plan

95. 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 to 200 nm). The NMP "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, 2015). In 2013, the Scottish Government published the draft Sectoral Marine Plans (SMP) for offshore wind, wave and tidal energy (Scottish Government, 2013b). The aim of this SMP was to identify potential future options for commercial scale offshore energy developments. These plans were not formally adopted by the Scottish Government, but the draft options were included in the NMP (Marine Scotland, 2020). The NMP has been prepared in accordance with, and gives consideration to, the EU Directive 2014/89/EU, which introduces a framework for marine spatial planning and aims to promote the sustainable development of marine areas and the sustainable use of marine resources. It also sets several minimum requirements including:

- achieving a sustainable marine economy;
- ensuring a strong, healthy and just society;
- living within environmental limits;
- promoting good governance; and.
- using sound science responsibly.

96. General policies have been developed to support these five strategic objectives, and sectoral objectives (e.g. offshore wind and marine renewable energy) are presented in the context of these strategic objectives and general policies set out in the NMP. The NMP sets out ambitions for Scotland's renewables and clean electricity to go beyond the 2020 targets (Marine Scotland, 2015).

97. The NMP is relevant to the Proposed Development as it addresses the potential for interactions between renewable energy development and other marine users, while recognising that significant development of the offshore wind energy sector will require investment.

4.2.5.2 Regional Marine Plans

98. Eleven Scottish Marine Regions (SMRs) have been created covering sea areas extending out to 12 nm. Regional Marine Plans (RMPs) are being developed at a local level within SMRs by Marine Planning Partnerships, to take account of local circumstances and smaller ecosystem units. Unless relevant considerations indicate otherwise, they are required to be in accordance with the NMP and MPS to ensure they are consistent with national objectives and priorities. They are subject to adoption by Scottish Ministers (Marine Scotland, 2015).

99. The Proposed Development lies within the Forth and Tay SMR. At the time of writing there is no RMP in place for the region.

4.2.5.3 Sectoral Marine Plan for Offshore Wind Energy

100. Scotland is committed to ensuring secure, reliable and affordable energy supplies, within the context of long-term decarbonised energy generation. In 2011, the first SMP for Offshore Wind Energy was adopted (Marine Scotland, 2011). In 2013, draft wind, wave and tidal SMPs were produced (Marine Scotland, 2013).

101. Building upon the work undertaken in the 2011 and 2013 plans, the SMP for Offshore Wind Energy (Scottish Government, 2020b) incorporates recent technological, policy, regulatory and market development to create a new strategic planning process. The SMP 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, which:

- minimises the potential adverse effects on other marine users, economic sectors and the environment resulting from further commercial scale offshore wind development; and
- maximises opportunities for economic development, investment and employment in Scotland, by identifying new opportunities for commercial scale offshore wind development, including deeper water wind technologies.

102. The SMP for Offshore Wind Energy identifies 17 plan options (POs), split across four regions, which can generate several GW of renewable energy, but observing the national limit on generating capacity of 10 GW. The POs identified have been subject to SEA, Habitats Regulations Appraisal (HRA) and socio-economic assessments, and reports have been produced to summarise these. Although the Berwick Bank Wind Farm project does not fall under the SMP and is not an option proposed within the 17 plan options areas, it has been considered within the SEA, Habitats Regulations Appraisal (HRA) and socio-economic assessments.

103. The SMP guides relevant consenting bodies with decision making on licence and consent applications but does not predetermine the decision making processes. The SMP has been developed to ensure consistency with the objectives and principles set out within Scotland's NMP (Marine Scotland, 2015) and the UK MPS (HM Government, 2011b).

4.3 PLANNING LEGISLATION

104. As the Proposed Development is a generating station with a capacity of greater than 50 MW, it requires the following key consents, licences and permissions:

- a Section 36 consent under the Electricity Act 1989;
- a marine licence under the MCAA 2009; and
- a marine licence under the Marine (Scotland) Act 2010 for the part of the export cable which is within 12 nm of the coast.

105. Each of these consents, licences and permissions are described below. Should additional pre-construction licences be required, these will be discussed and agreed with the relevant consenting authority during the pre-construction phase of the Proposed Development.

4.3.1 SECTION 36 CONSENT

106. As the Proposed Development is an offshore generating station which is greater than 50 MW and located in Scottish Offshore Waters (between 12 nm and up to 200 nm offshore) within the Scottish Renewable Energy Zone (REZ), there is a requirement for consent under Section 36 of the Electricity Act 1989. Section 36 consent will allow for the installation, operation and maintenance of wind turbines and inter-array cables associated with the Proposed Development.

4.3.2 MARINE LICENCE

107. Within the UK offshore waters (between 12 nm and up to 200 nm offshore), REZ, the MCAA 2009 applies. Under the MCAA 2009 (as amended) there is the requirement for a marine licence to be obtained prior to

the construction, alteration or improvement of any works or deposit any object in or over the sea, or on or under the seabed. Similarly, under the Marine (Scotland) Act 2010 which applies to Scottish Territorial Waters (between 0 and 12 nm from MHWS) there is also the requirement for a marine licence prior to the construction, alteration or improvement of any works or deposit any object in or over the sea, or on or under the seabed.

108. Where applications for both a marine licence under the MCAA 2009 and consent under Section 36 of the Electricity Act 1989 are made and where the Scottish Ministers are the determining authority, they may issue a note to SSER stating that both applications will be subject to the same administrative procedure. Where that is the case then that will ensure that the two related applications may be considered at the same time.

4.3.3 PLANNING PERMISSION

109. SSER will submit separate offshore and onshore applications to Marine Scotland and East Lothian Council (ELC), respectively, the latter being a single application for full planning permission, in accordance with the T&CP Act. It is currently anticipated that the applications will be made in May 2022.

4.4 ENVIRONMENTAL IMPACT ASSESSMENT REGULATIONS

4.4.1 OVERVIEW

110. In compliance with the EU Directive on the assessment of the effects of certain public and private projects on the environment (EIA Directive) (2011/92/EU, as amended by Directive 2014/52/EU), when applying for Section 36 consent, a marine licence or planning permission, an EIA Report is required to be prepared and submitted to support these applications if they are likely to have a significant effect on the environment due to factors such as their size nature or location. An EIA is specifically required (Schedule 2) for installations for the harnessing of wind power for energy production (wind farms) if:

- the development involves the installation of more than two wind turbines; or
- the hub height of any wind turbine or height of any other structure exceeds 15 m.
- The Proposed Development will consist of more than two wind turbines, with a hub height over 15 m, and therefore requires an EIA to be undertaken.
- The EIA must fulfil the requirements of the following regulations:
- in respect to a Section 36 consent application: The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017;
- in respect to a marine licence application: The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017; and
- in respect to a planning application: The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017.

111. Under Regulation 15 (2) of the EIA Regulations (The Marine Works (Environmental Impact Assessment (Scotland) Regulations) the information provided must include that which is necessary to “identify the location, nature and purpose of the works, and must indicate the main environmental consequences to which the applicant proposed to refer in the EIA Report”. This is supplemented by Schedule 4 of the 2017 EIA Regulations which specify the requirements of the information for inclusion in environmental impact assessment reports. Apx. Table 4. 1 below outlines where the requirements of Schedule 4 will be considered within the Proposed Development EIA Report.

Apx. Table 4. 1: Requirements Under The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017 and Where These are Proposed to be Addressed in the Offshore EIAR

Part	Information Required Under Schedule 4 of the 2017 EIA Regulations	How Matter will be Addressed in the Offshore EIAR
1	A description of the development, including in particular: • a description of the location of the works; • a description of the physical characteristics of the whole works, including, where relevant, requisite demolition works, and the land-use requirements during the construction and operational phases; • a description of the main characteristics of the operational phase of the works (in particular any production process), for instance, energy demand and energy used, nature and quantity of the materials and natural resources (including water, land, soil and biodiversity) used; • an estimate, by type and quantity, of expected residues and emissions (such as water, air, soil and subsoil pollution, noise, vibration, light, heat, radiation) and quantities and types of waste produced during the construction and operation phases.	The Offshore EIAR will contain a detailed project description, building upon the project description outlined in section 3 of this Offshore EIA Scoping Report. This will include details of the physical characteristics of the Proposed Development including construction, operation and maintenance, and decommissioning phases. The Offshore EIAR will also provide consideration of the mitigation measures adopted by SSER and will set out the realistic maximum adverse scenario (Rochdale Envelope) for each topic. Water quality is assessed through topic specific assessments including consideration of INNS settlement and distribution, risk from operational cleaning and paints and accidental release of lubricants or chemicals.
2	A description of the reasonable alternatives (for example in terms of development design, technology, location, size and scale) studied by the applicant, which are relevant to the proposed works and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects.	The Offshore EIAR will provide detail of the site selection process undertaken by SSER (this will expand on the description provided in this Offshore EIA Scoping Report in section 3), including the consideration of alternatives and the rationale for the selection and progression of the Proposed Development. A comparison of the environmental effects of alternatives and consideration of potential alternatives for topic specific mitigation will be provided, where relevant.
3	A description of the relevant aspects of the current state of the environment (the “baseline scenario”) and an outline of the likely evolution thereof without implementation of the project as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge.	Each of the technical topics within the Offshore EIAR will contain a ‘Future Baseline’ description, which will provide consideration of the potential future baseline and natural changes which are likely to occur for the given technical topic without the development of the Proposed Development.
4	A description of the factors specified in regulation 5(3) likely to be significantly affected by the works: population, human health, biodiversity (for example fauna and flora), land (for example land take), soil (for example organic matter, erosion, compaction, sealing), water (for example hydromorphological changes, quantity and quality), air, climate (for example greenhouse gas emissions, impacts relevant to adaptation), material assets, cultural heritage, including architectural and archaeological aspects, and landscape.	The Offshore EIAR will contain technical sections with descriptions of the existing conditions and identification of the topic specific receptors which may be impacted by the Proposed Development. A stand-alone section for human health will not be developed within the Offshore EIAR as this is considered to be assessed within technical topics such as airborne noise and air quality within this Offshore EIA Scoping Report (sections 5.3 and 5.4 respectively). Where these topics are scoped-out of further assessment, it is assumed that there will be no adverse effect on these receptors. A stand-alone section for climate will be developed within the Offshore EIAR, as discussed in section 5.5. The potential effects on climate will also considered within the ecosystem assessment for ecological topics.
5	A description of the likely significant effects of the works on the environment resulting from, inter alia: • the construction and existence of the works, including, where relevant, demolition works; • the use of natural resources, in particular land, soil, water and biodiversity, considering as far as possible the sustainable availability of these resources; • the emission of pollutants, noise, vibration, light, heat and radiation, the creation of nuisances, and the disposal and recovery of waste; • the risks to human health, cultural heritage or the environment (for example due to accidents or disasters); • the cumulation of effects with other existing and/or approved works, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources; • the impact of the works on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change; • the technologies and the substances used. The description of the likely significant effects on the factors specified in regulation 5(3) should cover the direct effects and any indirect, secondary, cumulative, transboundary, short-term, medium-term and long-term, permanent and temporary, positive and negative effects of the works. This description should take into account the environmental protection objectives established at Union or Member State level which are relevant to the works, including in particular those established under Council Directive 92/43/EEC(1) and Directive 2009/147/EC(2).	Each of the topic sections within the Offshore EIAR will provide an assessment of the likely significance of effect for each topic. This assessment will follow the process for assessment of significance as set out in section 4. Likewise, the Offshore EIAR will contain the cumulative effects assessment as per the methodology outlined in section 4.3.7. A stand-alone section for climate will be developed within the Offshore EIAR, as discussed in section 5.5. The potential effects on climate will also considered within the ecosystem assessment for ecological topics. The vulnerability of the Proposed Development to climate change will be provided in relevant topic sections.

Part	Information Required Under Schedule 4 of the 2017 EIA Regulations	How Matter will be Addressed in the Offshore EIAR
6	The description of the likely significant effects on the factors specified in regulation 5(3) should cover the direct effects and any indirect, secondary, cumulative, transboundary, short-term, medium-term and long-term, permanent and temporary, positive and negative effects of the works. This description should take into account the environmental protection objectives established at Union or Member State level which are relevant to the works including in particular those established under Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora(1) and Directive 2009/147/EC of the European Parliament and of the Council on the conservation of wild birds.	The approach and methodology which will be followed in the Offshore EIAR is outlined in section 4 of this Offshore EIA Scoping Report. An assessment of potential impacts on European and Ramsar sites will be presented within the Report to Inform Appropriate Assessment (RIAA).
7	A description of the forecasting methods or evidence, used to identify and assess the significant effects on the environment, including details of difficulties (for example technical deficiencies or lack of knowledge) encountered compiling the required information and the main uncertainties involved.	Offshore EIAR, each of the topic sections will contain a summary of the topic-specific methodology, including modelling methods and an overview of the evidence used and any limitations of the data. There will also be consideration of the uncertainty in each of the topic sections of the Offshore EIAR, including a discussion on how this uncertainty has been dealt with.
8	A description of the measures envisaged to avoid, prevent, reduce or, if possible, offset any identified significant adverse effects on the environment and, where appropriate, of any proposed monitoring arrangements (for example the preparation of a post-project analysis). That description should explain the extent to which significant adverse effects on the environment are avoided, prevented, reduced or offset, and should cover both the construction and operational phases.	The Offshore EIAR will contain a detailed project description, building upon the project description outlined in section 3 of this Offshore EIA Scoping Report. This project description will contain primary 'built in' mitigation measures for the Proposed Development. Topic-specific mitigation measures are discussed within this Offshore EIA Scoping Report and will be further discussed in each relevant topic section of the Offshore EIAR. If mitigation measures (including monitoring leading to identification of mitigation) are required, these will be discussed and summarised in an Annex of the Offshore EIAR, together with how they will be secured and their means of delivery.
9	A description of the expected significant adverse effects of the works on the environment deriving from the vulnerability of the works to risks of major accidents and/or disasters which are relevant to the project concerned. Relevant information available and obtained through risk assessments pursuant to legislation of the European Union such as Directive 2012/18/EU of the European Parliament and of the Council on the control of major-accident hazards involving dangerous substances, amending and subsequently repealing Council Directive 96/82/EC(3) or Council Directive 2009/71/Euratom establishing a community framework for the nuclear safety of nuclear installations(4) or relevant assessments carried out pursuant to national legislation may be used for this purpose provided that the requirements of the Directive are met. Where appropriate, this description should include measures envisaged to prevent or mitigate the significant adverse effects of such events on the environment and details of the preparedness for and proposed response to such emergencies.	Individual topic sections will contain an assessment of the potential effects arising from major accidental scenarios and disaster, and the associated control measures which will be employed to address these.
10	A non-technical summary of the information provided under paragraphs 1 to 9.	SSER will develop and submit a Non-Technical Summary of the Offshore EIAR.
11	A reference list detailing the sources used for the descriptions and assessments included in the EIA report.	Each topic section will contain a list of key sources of information used to support the development of the technical assessment. Further, all cited literature and webpages will be detailed in a bibliography in the Offshore EIAR. Project specific data such as survey data will be discussed in the relevant topic section, with a full survey report appended to the Offshore EIAR.

4.4.2 PRE-APPLICATION CONSULTATION

112. Where activity is planned within the Scottish Territorial Waters, the Marine Licensing (Pre-application Consultation) (Scotland) Regulations 2013 (hereafter referred to as the PAC Regulations) apply. There is no provision for PAC in the MCAA 2009, so these requirements do not apply in respect of relevant applications in the Scottish Offshore Region. There are no statutory requirements for consultation during the pre-application stage for Section 36 consent applications, however the principles of the PAC Regulations will be followed for all offshore components of the Proposed Development (below MHWS).

113. Public consultation will be carried out for the onshore and offshore elements at the same events to give 3rd parties a full understanding of the whole project.

114. The PAC Regulations require Applicants for a 'prescribed class' of activity to notify the Maritime and Coastguard Agency (MCA), Northern Lighthouse Board (NLB), NatureScot (NS), Scottish Environment Protection Agency (SEPA), and any delegate for a relevant marine region. Applicants must hold at least one pre-application event at which these bodies are notified, and members of the public may provide comments to the applicant. Applicants must publish in a local newspaper a notice containing a description of the activity, detail where further information may be obtained, the date and place of the event, how and when comments should be submitted to the applicant. A PAC report must be submitted alongside the marine licence application.

115. Further information on the proposed consultation for the Proposed Development is outlined in section 4.3.4.

4.5 THE HABITATS AND BIRD DIRECTIVE AND ASSOCIATED REGULATIONS

116. The Council Directive 92/43/EEC (the Habitats Directive) was adopted in 1992, providing a means for the EU to meet its obligations under the Bern Convention. The aim of the Directive is to maintain or restore natural habitats and wild species listed on the Annexes at a favourable conservation status. This protection is granted through the designation of European Sites and European Protected Species (EPS). 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 within Europe. The Directive affords rare and vulnerable species listed under Annex I of the Directive, and regularly occurring migratory species, protection through the identification and designation of Special Protection Areas (SPAs).

117. The Directives have been transposed into Scottish Law by various regulations, those of relevance to the Project include:

- the Conservation (Natural Habitats &c.) Regulations 1994 (as amended);
- the Conservation of Habitats and Species Regulations 2017; and
- the Conservation of Offshore Marine Habitats and Species Regulations 2017 (which apply to marine licences and Section 36 applications within the Scottish Offshore region).

118. These are hereafter referred to as the Habitats Regulations.

119. The Habitat Regulations require that where a plan or project that is not directly connected with, or necessary to the management of an European site, but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives. Marine Scotland must therefore consider whether the Proposed Development is likely to have significant effects on the conservation objectives of the sites considered in the Habitats Regulations Appraisal (HRA), and, where LSE cannot be excluded at the screening stage, and in the absence of mitigation measures[11], an 'Appropriate Assessment' of the implication of the plan or project must be undertaken by the competent authority before consent may be given for the proposed project.

120. The HRA process is a multi-stage process aligned with European Commission (EC) guidance documents 'Assessment of plans and projects significantly affecting Natura 2000 sites' (EC, 2001) and 'Managing Natura 2000 sites: The Provisions of Article 6 of the 'Habitats' Directive 92/43/EEC' (EC, 2019). In accordance with this guidance from the Commission, the obligations arising under Article 6 establish a step-wise procedure:

1. the first part of this procedure consists of a preliminary 'screening' stage to determine whether, firstly, the plan or project is directly connected with or necessary to the management of the site, and secondly, whether it is likely to have a significant effect on the site; it is governed by the first sentence of Article 6(3);
2. the second part of the procedure, governed by the second sentence of Article 6(3), relates to the appropriate assessment and the decision of the competent national authorities; and
3. a third part of the procedure (governed by Article 6(4)) comes into play if, despite a negative assessment, it is proposed not to reject a plan or project but to give it further consideration. In this case Article 6(4) allows for derogations from Article 6(3) under certain conditions.

121. The Proposed Development offshore HRA screening assessment is currently being prepared and will be consulted on in Quarter 4 of 2021.

122. The step-wise procedure has the aim of determining LSEs and, where necessary, assesses the implications of the Proposed Development for their potential to adversely affect the integrity of a European site or sites in accordance with Article 6(3) of the Habitats Directive. If a determination of adverse effect on site integrity is made despite the application of mitigation measures intended to avoid or reduce the harmful effects of the project(s) on the sites concerned, the step-wise procedure then provides for a derogation procedure under Article 6(4). Such a derogation is available to the competent authorities concerned following three tests to be met in sequential order:

1. there are no feasible alternative solutions to the project which are less damaging;
2. there are "imperative reasons of overriding public interest" (IROPI) for the project to proceed; and
3. compensatory measures are secured to ensure that the overall coherence of the network of European sites is maintained.

4.6 EUROPEAN PROTECTED SPECIES (EPS) LICENSING

123. EPS are animals and plants (species listed in Annex IV of the Habitats Directive) that are afforded protection under The Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) and the Conservation of Offshore Marine Habitats and Species Regulations 2017. All cetacean species (whales, dolphins and porpoise) are EPSs. If any activity is likely to cause disturbance or injury to an EPS a licence is required to undertake the activity legally.

124. Activities which can be licenced under EPS licences include those such as subsea noise disturbance to marine mammals due to piling construction activities. EPS licences are obtained from NatureScot or the Scottish Ministers, depending on the reason for the licence application. Although the grant of EPS licences is separate to the Section 36 and marine licence application process, it can be considered in parallel by Marine Scotland in order to constrict timelines.

125. Should additional pre-construction licences be required, these will be discussed and agreed with the relevant consenting authority during the pre-construction phase of the Proposed Development.

[11] The following 'Measures' (as per SNH guidance note (2019) "The handling of mitigation in Habitats Regulations Appraisal – the People Over Wind CJEU judgement" are proposed to be included for consideration at LSE screening: Project Environmental Management Plan, Biosecurity Plan, cables to be buried between 1-2 m depth, and installation of appropriate lighting on offshore structures.

4.7 DECOMMISSIONING

126. Sections 105 to 114 of the Energy Act 2004 (as amended by the Energy Act 2008 and the Scotland Act 2016) (hereafter referred to as the Energy Act) contain statutory requirements in relation to the decommissioning of offshore renewable energy installations (OREI) and their related electricity lines. 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 (Marine Scotland, 2020).

127. The responsibilities and powers associated with decommissioning for Offshore Renewables Energy Installation within Scottish Waters transferred from the Secretary of State, to Scottish Ministers in April 2017 (Section 62 of the Scotland Act 2016 transfers to Scottish Ministers powers under the Energy Act Part II chapter 2). Up to this point, BEIS was responsible for requiring decommissioning programmes and securities for Offshore Substation Platforms (OSP) (Scottish Government, 2019c). As part of this change in responsibilities, Marine Scotland are seeking to establish robust policies and procedures covering decommissioning, including securities, for offshore wind, wave and tidal projects. A consultation on future plans for decommissioning for Offshore Renewable Energy Installations in Scottish waters commenced in November 2019 and closed on 18 March 2020. Following this consultation, guidance will be finalised and made available to industry.

128. Scottish Ministers also have the power to determine specific approaches to decommissioning, including stipulating what form, timing and size of financial securities are required. The expected content of a decommissioning programme includes: decommissioning standards, financial security, residual liability, and, industry cooperation and collaboration.

129. The draft Offshore Renewable energy decommissioning guidance states (Section 5 – Submission, approval and review of decommissioning programmes) that “an indication of the decommissioning proposals should be included as part of the statutory consenting or licensing process so that the feasibility of removing the infrastructure can be assessed as part of the application process” (Scottish Government, 2019c). Question set out as part of this consultation state that the Scottish Government “aims to ensure that all future offshore renewable energy installations have an approved decommissioning programme in place prior to construction, as this will help manage the risk of projects going into the water without proper plans in place for removal” (Scottish Government, 2019)”.

130. The scope of decommissioning requirements in Scotland is between the MLWS mark and the seaward limits of the territorial waters, including coastal water and the Scottish part of the REZ. The Energy Act does not cover the intertidal zone, however decommissioning of infrastructure within the intertidal zone should be carried out under any conditions attached to a Marine Licence (under the Marine Scotland Act 2010).

Appendix 5 CONSULTATION AND STAKEHOLDER ENGAGEMENT

5.1 ENGAGEMENT TO DATE

131. To support the development of this Offshore EIA Scoping Report, pre-scoping stakeholder engagement has been undertaken. An overview of this consultation is presented in Apx. Table 5. 1. All pre-scoping engagement subsequent to March 2020 has been undertaken via conference calls reflecting the social distancing measures that have been in place for COVID-19.

132. Consultation undertaken to date has focused on the initial Berwick Bank Wind Farm Proposal and to a lesser extent the Marr Bank Wind Farm Proposal. Consultation has included general project introductions to key stakeholders and regulators; discussions on proposed survey methodologies; pre-scoping engagement on the initial Berwick Bank Wind Farm Proposal; presentation of landfall options and proposed intertidal assessment approach; interim updates with key SNCBs and stakeholders and updates on interim data results for topics such as marine mammals, ornithology and shipping and navigation. An overview of this consultation is presented in Apx. Table 5. 1.

Apx. Table 5. 1: Pre-Scoping Engagement Undertaken to Date

Topic	Stakeholder(s)	Date	Method of Engagement	Purpose of stakeholder engagement
Project introduction	NS/MS-LOT	19 December 2019	Meeting	To provide an overview and introduction to the project.
Ornithology introduction	NS/ Marine Scotland Science (MSS)/ MS - LOT	26 February 2020	Meeting	To provide an overview and introduction to the project.
Berwick Bank landfall and onshore infrastructure option for discussion	NS	11 March 2020	Meeting	Meeting to discuss landfall locations and potential onshore infrastructure options.
Pre-Scoping Consultation: Ornithology	NS / MSS / MS-LOT	02 June 2020	Meeting	Provide an overview of the project, the programme, the planned deliverables, overview of on-going surveys and an overview of the ornithology scoping. Discussions around the data to be used to support the assessments and Road Map approach.
Pre-Scoping Consultation: Shipping and Navigation	Maritime Coastal Agency (MCA)	09 June 2020	Meeting	Inform the Scoping stage of both projects (initial Berwick Bank Wind Farm proposal and Marr Bank Wind Farm) and options for the maritime traffic surveys given the current COVID-19 restrictions.
Pre-Scoping Consultation: Shipping and Navigation	Northern Lighthouse Board	10 June 2020	Meeting	Inform the Scoping stage of both projects (initial Berwick Bank Wind Farm proposal and Marr Bank Wind Farm) and options for the maritime traffic surveys given the current COVID-19 restrictions.
Pre-Scoping Consultation: Shipping and Navigation	Forth Ports	12 June 2020	Meeting	Inform the Scoping stage of both projects (initial Berwick Bank Wind Farm proposal and Marr Bank Wind Farm) and options for the maritime traffic surveys given the current COVID-19 restrictions.
RSPB Meeting: Ornithology	(RSPB	17 June 2020	Meeting	Provide an overview of the project, the programme, the planned deliverables, overview of on-going surveys and ornithology scoping. Discussions around the data to be used to support the assessments and Road Map approach. Discussions around assessment approach.
Marine Archaeology	Historic Environment Scotland	24 June 2020	Document	Comments on 'Archaeological Review of Geophysical and Hydrographic Data' method statement, with several suggestions for updates required provided.
Pre-Scoping Meeting: Marine Mammals, Fish and Shellfish and Benthic Ecology	NS / MS-LOT/ MSS	30 June 2020	Meeting	Introduction to both projects (initial Berwick Bank Wind Farm proposal and Marr Bank Wind Farm); overview of the programmes for both projects; overview of planned submissions for both projects. Initial Berwick Bank Wind Farm proposal scoping: overview of study areas

Topic	Stakeholder(s)	Date	Method of Engagement	Purpose of stakeholder engagement
				for benthic ecology, marine mammals and fish ecology. Overview of survey methods for these topics and overview of current noted impacts being considered for these topics. Discussion around other licences which may be required.
Proposed Benthic Survey Methodology	NS	14 July 2020	Email	Email from NatureScot relating to the consultation sought on the benthic subtidal proposed methodology for both the subtidal wind farm area and the intertidal area for the ECC.
Proposed Benthic Survey Methodology	MSS	15 July 2020	Email	Email from Marine Scotland Science relating to the consultation sought on the benthic subtidal proposed methodology for both the subtidal wind farm area and the intertidal area for the ECC.
Cultural Heritage Introductory Call	HES	23 July 2020	Meeting	Introductory call and overview programme; offshore cultural heritage setting; onshore and nearshore cultural heritage setting; study areas; approach to assessments and questions.
Initial Berwick Bank Wind Farm Proposal	MS-LOT	07 August 2020	Document	Submission of Initial Berwick Bank Wind Farm Proposal Scoping Report.
Pre-Scoping Meeting: Marine Mammals, Fish and Shellfish and Benthic Ecology	MSS / MS-LOT	21 August 2020	Email	Review of meeting minutes from 30 June 2020 by MSS and MS-LOT.
Marine Archaeology	HES	09 September 2020	Email	Confirmation from HES on the survey method statement.
Initial Berwick Bank Wind Farm Proposal	MS-LOT	09 October 2020	Document	Submission of Initial Berwick Bank Wind Farm Proposal LSE Screening Report
Initial Berwick Bank Wind Farm Proposal: Scoping Advice	NS	28 October 2020	Document	Advice on the natural heritage interests to be addressed within the Environmental Impact Assessment Report (EIAR) and Habitats Regulations Appraisal (HRA) below for the proposed Berwick Bank wind farm based on the reciept of the Scoping Report.
Initial Berwick Bank Wind Farm Proposal: Scoping Advice	RSPB	28 October 2020	Document	Advice on the Initial Berwick Bank Wind Farm Proposal Scoping Report
Submission of Marine Mammal Road Map	NS / MS-LOT/ MSS	02 November 2020	Document	Submission of the Berwick Bank Marine Mammals Road Map to the relevant stakeholders.
Submission of Benthic, Coastal Processes and Fish and Shellfish Ecology Road Map	NS / MS-LOT/ MSS	02 November 2020	Document	Submission of the Berwick Bank Benthic, Coastal Processes and Fish and Shellfish Ecology Road Map to the relevant stakeholders.
Submission of Ornithology Road Map	NS / MS-LOT / MSS / RSPB	02 November 2020	Document	Submission of the Berwick Bank Ornithology Road Map to the relevant stakeholders.
Submission of Shipping and Navigation Road Map	Champer of Shipping / Cruising Association / Forth Ports / Maritime Coastal Agency /RNLI / RYA Scotland	02 November 2020	Document	Submission of the Berwick Bank Shipping and Navigation Road Map to the relevant stakeholders.
Road Maps and General EIA Discussion	NS	09 November 2020	Meeting	Meeting to discuss Road Map approach.
Ornithology: Post-Scoping	NS / MS-LOT / MSS / RSPB	17 November 2020	Meeting	Post-scoping meeting to discuss EIA and programme update; Road Maps; Draft Ornithology Environmental Report; Interim Baseline Report; Project Design; missing transect report; 2020 boat surveys progress and Article 6 Derogation and compensation.

Topic	Stakeholder(s)	Date	Method of Engagement	Purpose of stakeholder engagement
				Refer to minutes for further information.
Initial Berwick Bank Wind Farm Proposal: Scoping Advice	HES	01 December 2020	Document	Advice on the Initial Berwick Bank Wind Farm Proposal Scoping Report
Initial Berwick Bank Wind Farm Proposal: Scoping Advice	Scottish Fishermen's Federation (SFF)	02 December 2020	Document	Advice on the Initial Berwick Bank Wind Farm Proposal Scoping Report
Scoping Template	NS / MS-LOT	16 December 2020	Meeting	Meeting to run through the proposed changes to the Scoping Template based on feedback received on the Initial Berwick Bank Wind Farm Proposal Offshore Scoping Report.
Ornithology and Digital EIA	NS / MS-LOT / MSS	20 January 2021	Meeting	Discuss ornithology update and digital data platform, digital content for further project Scoping and digital EIA for Berwick Bank (BB) proposal.
General Project Update Meeting: MS-LOT and NatureScot	NS / MS-LOT	04 February 2021	Meeting	• Berwick Bank programme still targeting submission in May 2022; • Scoping Opinion and LSE Screening due 26th February 2021; • Berwick Bank working towards PDE finalisation in June; • SSER undertaking some bird modelling prior to this on various scenarios to allow of the PDE and boundary finalisation; and Marr Bank programme still aligned with Berwick Bank programme.
Initial Berwick Bank Wind Farm Proposal: Scoping Opinion	MS-LOT	09 March 2021	Document	Notification from Marine Scotland on the issue of the Initial Berwick Bank Wind Farm Proposal Scoping Opinion as per the request for a Scoping Opinion for the proposed Section 36 Consent and Associated Marine Licence applications.
Maritime Coastal Agency - Interim Update	Maritime Coastal Agency (MCA)	28 April 2021	Meeting	Discuss data collection and assessment following completion of the vessel traffic surveys.
Initial Berwick Bank Wind Farm Proposal: HRA Screening Report Response Issued	MS-LOT	11 May 2021	Document	Notification from Marine Scotland on the issue of the Initial Berwick Bank Wind Farm Proposal LSE Screening Response as per the request for a Habitat Regulations Appraisal Screening Report ("HRA Report") received.
Berwick Bank and Marr Bank: Presentation of Intertidal Assessment in EIA Reports	MS / MS-LOT / East Lothian Council	18 May 2021	Meeting	Present and agree the approach to presenting the assessments within the intertidal area, within the onshore and Offshore EIARs for Berwick and Marr Bank, due to the overlap in jurisdictions in the intertidal area.
Berwick Bank Strategic Update meeting	MS / MS-LOT / NS / RSPB Scotland	24 June 2021	Meeting	High level discussion around Berwick Bank proposal and future engagement.
Ornithology Road Map 1	MS / MS-LOT / NS / RSPB Scotland	22 July 2021	Meeting	Introduce updated Proposed Project, discuss road map process and discussion on technical assessment approaches e.g., baseline production, collision risk, displacement etc.
Ornithology Road Map 2	MS / MS-LOT / NS / RSPB Scotland	9 August 2021	Meeting	To discuss approach to technical assessment e.g., baseline production, collision risk, displacement, apportioning and PVA etc.
Marine Mammals Road Map Meeting 1	MS / MS-LOT / NS	24 August 2021	Meeting	Discuss evidence base, scoped in and scoped out impact pathways and overview of next steps.
Benthic Ecology, Fish and Shellfish Ecology and	MS / MS-LOT / NS	03 September 2021	Meeting	Discuss evidence base for each topic, scoped in and scoped out

Topic	Stakeholder(s)	Date	Method of Engagement	Purpose of stakeholder engagement
Coastal Processes Road Map Meeting 1				impact pathways and overview of next steps.
Ornithology Road Map 3	MS / MS-LOT / NS / RSPB Scotland	28 September 2021	Meeting	To discuss approach to technical assessment e.g., baseline production, collision risk, displacement, apportioning,, and present initial outputs of the baseline characterisation work.
Shipping and Navigation	Various	28 September 2021	Meeting	To discuss potential hazards for Shipping and Navigation receptors.

Appendix 6 PHYSICAL PROCESSES – BASELINE ENVIRONMENT

6.1 DESKTOP STUDY

133. An initial desk-based review of literature and data sources to support this Offshore EIA Scoping Report has identified a number of baseline datasets. This includes a number of surveys that were undertaken to characterise the former Firth of Forth Zone, as summarised in Apx. Table 6. 1.

Apx. Table 6. 1: Summary of Key Desktop Reports and Datasets

Source	Coverage	Data Provision
Marine Environmental Data Information Network (MEDIN)	UK Waters	Bathymetry data
European Centre for Medium-range Weather Forecast (ECMWF)	European Waters	Historic and contemporary pressure, wind speed and wave datasets.
European Marine Observation and Data Network (EMODnet)	European Waters	Bathymetry, geology; and seabed substrate and classifications
Cefas Offshore observation data	UK Waters	Salinity, seawater temperature and turbidity.
Cefas Climatology Report (Cefas, 2016)	UK Waters	Suspended sediment concentrations (SSC)
British Oceanographic Data Centre (BODC) UK tide gauge network. Database of current observation	UK Waters	Tidal levels, current speed and current direction.
United Kingdom Hydrographic Office (UKHO) - Published Charts and Tide tables	UK Waters	Charts such and 1409/7 1:200000 and 210 1:75000 include tidal diamonds with current stream data
Summary of Seagreen Firth of Forth Metocean Surveys to Date (Interek Metoc, 2012)	Former Firth of Forth Zone	Wave data, current data, water level data, seawater temperature and turbidity.
Firth of Forth Zone Development: Metocean survey (Fugro GEOS, 2011)	Former Firth of Forth Zone	Metocean data.
UK Round 3 Offshore Wind Farm Zone 2 Firth of Forth: Wave Height Spells for Survey Operability (Metoc, 2010)	Former Firth of Forth Zone	Metocean data.
JNCC mapping data (https://jncc.gov.uk/mpa-mapper/)	UK Waters	Spatial data for marine protected areas incl. SPA, SSSI and conservation zones.
Marine Science Scotland Scottish Shelf model (http://marine.gov.scot/information/wider-domain-scottish-shelf-model, https://data.marine.gov.scot/dataset/climatology-surface-and-near-bed-temperature-and-salinity-north-west-european-continental and Berx 2009)	UK Waters	Climatology: temperature, salinity & current speed characteristics.
Marine Scotland mapping data (https://marinescotland.atkinsgeospatial.com/nmpi/)	Scottish Waters	Spatial data for physical characteristics, metocean, climate change, bathing waters and marine activities.
Berx, B. and Hughes, S.	North-West European	Climatology of Surface and Near-bed Temperature and Salinity on the North-West European Continental Shelf for 1971–2000 dataset
Marine Scotland	Scottish continental shelf waters	The Scottish Shelf Model 1990 – 2014 climatology – reduced precision output from version

6.2 SITE SPECIFIC SURVEY DATA

134. This section provides an overview of both the planned and existing project specific data sources of relevance to physical processes.

135. A recent geophysical survey campaign was completed across the Proposed Development Array Area and proposed ECC (Thortonloch landfall only) in July to August 2019. This survey provides both geophysical and bathymetric data which will support the development of the physical processes EIA for the Proposed Development. The aims of the data collection, and a summary of the data collected during these surveys includes:

- bathymetric data in order to determine site topography, gradients and a baseline for a seabed mobility study that may influence foundation design and cable installation using multibeam echo sounder (MBES);
- high-resolution sidescan sonar (SSS) data to determine seabed features and the presence of boulders, seabed sediments and debris;
- high-resolution sub-bottom profiler (SBP) data to determine the shallow sub-surface soil conditions that may influence foundation design and cable installation such as boulders and shallow geology features;
- multichannel 2D ultra-high resolution seismic (UHRS) data to foundation depth to determine the deeper sub-surface soil conditions; and
- magnetometer data across the site (along the planned survey lines) to support unexploded ordnance (UXO) risk reduction.

136. To support the acquisition of physical processes data, there are several surveys planned for summer 2020:

- geotechnical borehole campaign (approximately five weeks duration) to measure physical properties of soils;
- geotechnical survey cone penetrometer test (CPT) campaign (approximately two weeks duration) to test the geotechnical engineering properties of soils and soil stratigraphy;
- deployment of wave buoys and lidar to gather data relating to the metocean parameters within the Proposed Development Array Area and proposed ECC;
- subtidal benthic ecology surveys providing an overview of the seabed sediment composition to support the characterisation of the subtidal aspects of the Proposed Development; and
- landfall walkover site survey to provide an overview of the nature of the foreshore area, including a review of sediments; evidence of erosion/deposition or littoral sediment transport and any defence assets present. Photographs will be gathered to support the characterisation of the landfall area.

6.3 BASELINE CHARACTERISATION

137. This section provides a detailed baseline for physical processes established through a review of desktop data and site-specific survey results.

6.3.1 BATHYMETRY

6.3.1.1 Proposed Development Array Area

138. The bathymetry of the Proposed Development Array Area is influenced by the presence of large-scale morphological bank features, including the Marr Bank and the northern extent of the Berwick Bank. These two bank features are defined as Shelf Banks and Mounds and are part of the Firth of Forth Banks Complex.

139. Geophysical data collected in 2019 suggests the water depth within the Proposed Development Array Area varies between 32.8 m and 68.5 m relative to LAT, and average depths of generally 51 m below LAT. Minimum water depths of approximately 38 m below LAT are found on top of the western central part of the Proposed Development Array Area and maximum depth around 68 m below LAT in the east of the banks. Apx. Figure 6. 1 illustrates the bathymetry recorded across the Proposed Development Array Area during the 2019 geophysical survey.

6.3.1.2 Proposed ECC

140. The bathymetry of the proposed ECC is relatively variable, varying between 53.1 m and 69.8 m below LAT at the time of geophysical investigation. This variance in depth is influenced by the seafloor typography which slopes gently, reaching 60 m depth below LAT approximately 20 km from landfall (Kilometre Point (KP) 20), before decreasing to 44 m below LAT at KP 32 and varying between 40 and 30 m below LAT in the area of the cable corridor over the over the southern part of Marr Bank. The depth of the water in the far east extent of the route extends down to 64 m below LAT.

141. Apx. Figure 6. 2 illustrates the bathymetry recorded within the proposed ECC during the 2019 geophysical survey.

6.3.2 WIND AND WAVES

142. Throughout the North Sea, strong winds can occur with wave heights varying greatly due to fetch limitations and water depth effects. Waves in the northern North Sea can be generated either by local winds or from remote wind systems (swell waves). East of the mouth of the River Tay, the dominant wave conditions approach from between 200N and 600N. However, extreme wave conditions (> 4 m) can be experienced from the entire eastern sector (00 to 1800) (HR Wallingford, 2012).

143. Metocean surveys conducted across the former Firth of Forth Zone to characterise the zone provide an overview of the wave regime within the physical processes study area. During the stormiest event over the 18-month wave buoy deployment, a significant wave height of 6.7 m was recorded in January 2012, which correlated with a 1 in 1-year sea wave climate return period event (Fugro, 2012).

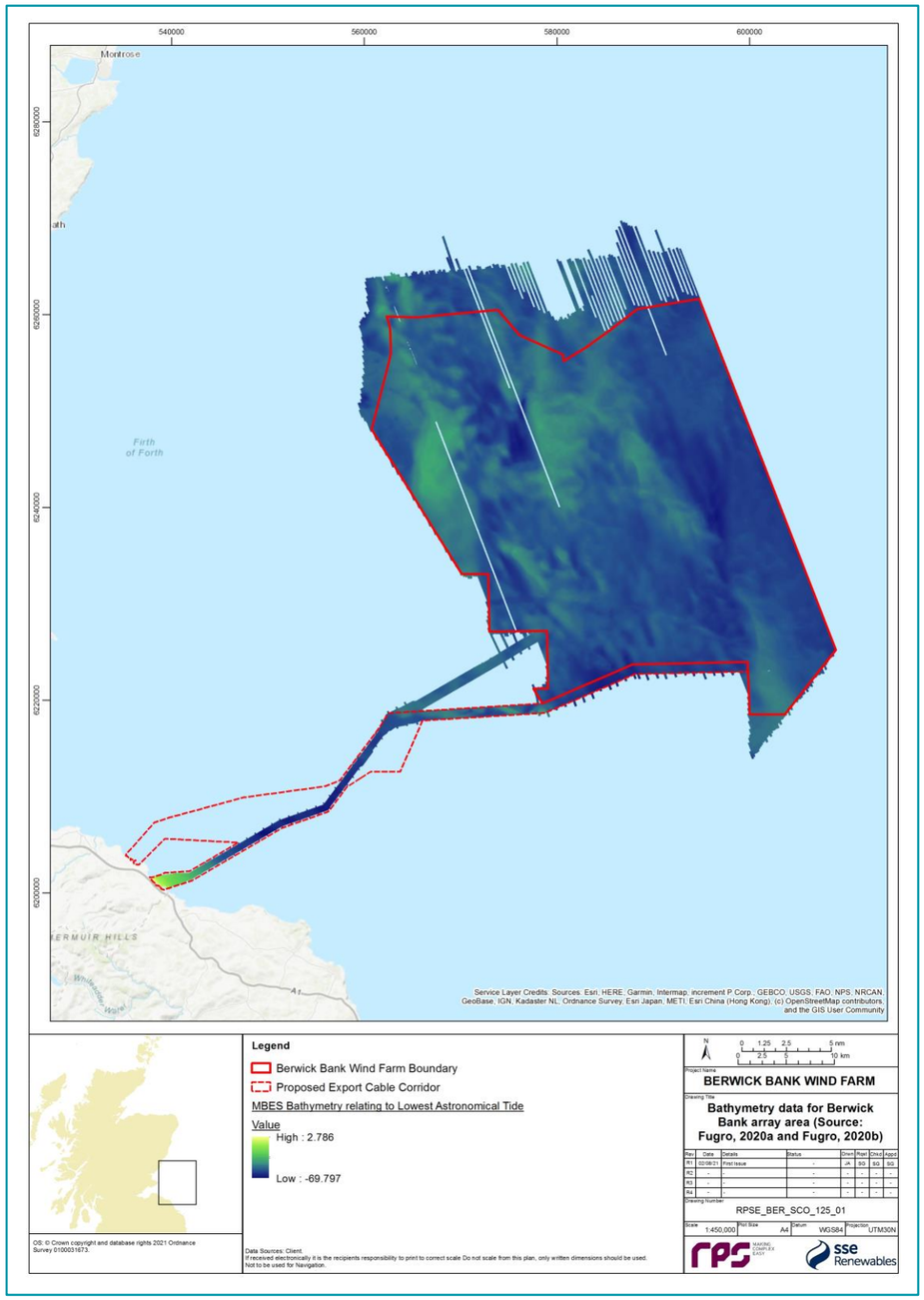
144. As offshore waves transfer from the deep offshore water to shallower coastal areas (e.g. proposed ECC to landfall), a number of important modifications may result due to interactions of offshore deep-water waves with the seabed, with the resultant modifications producing shallow water waves. These physical ‘wave transformation’ interactions include:

- shoaling and refraction (due to both depth and current interactions with the wave);
- energy loss due to breaking;
- energy loss due to bottom friction; and
- momentum and mass transport effect.

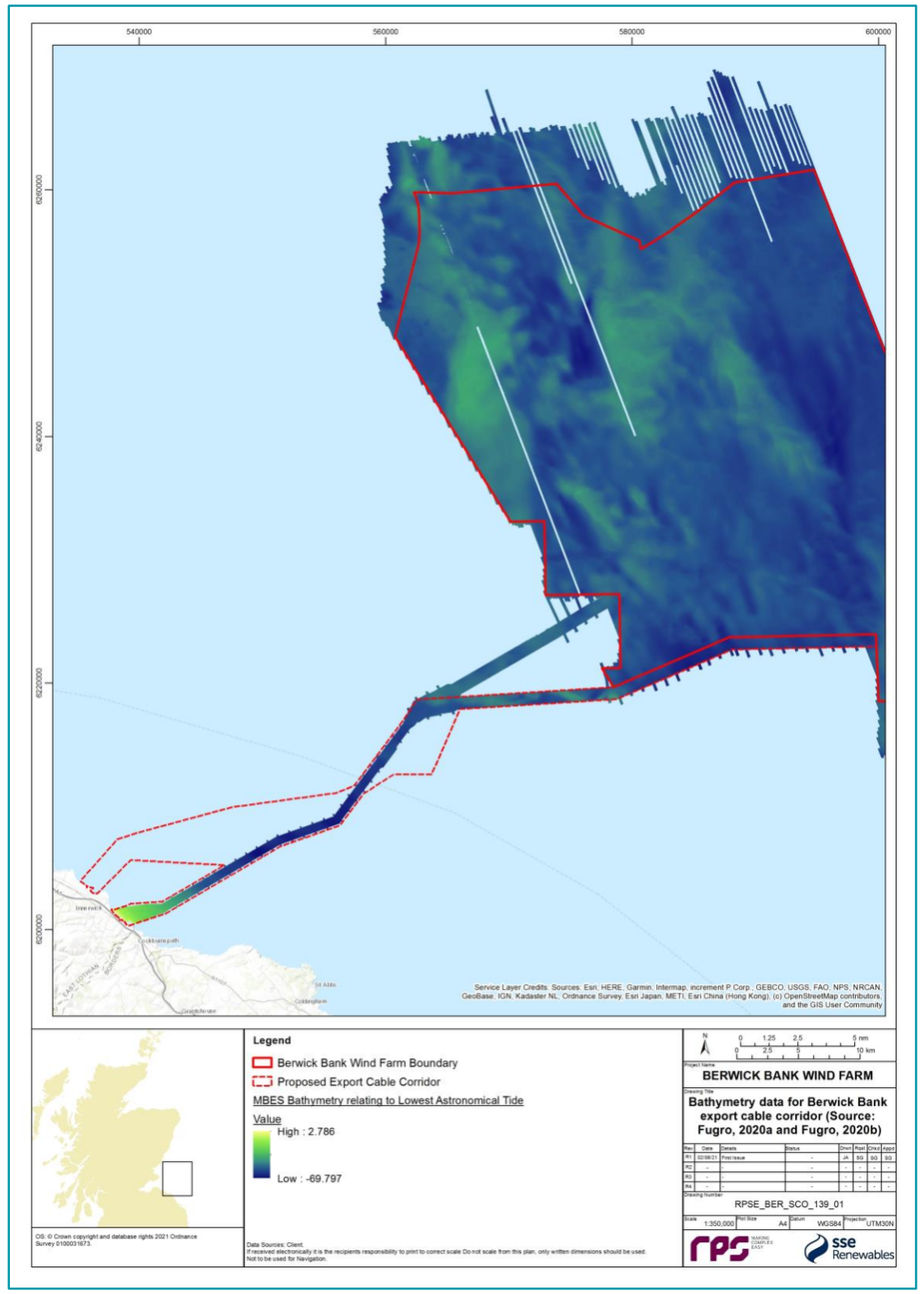
145. Within the Offshore EIAR physical processes baseline assessment, a detailed baseline will be presented which provides an overview of the wind and wave regime within the region and specific to the Proposed Development, utilising data collected from deployed wave buoys.

6.3.3 TIDAL CURRENTS AND ELEVATION

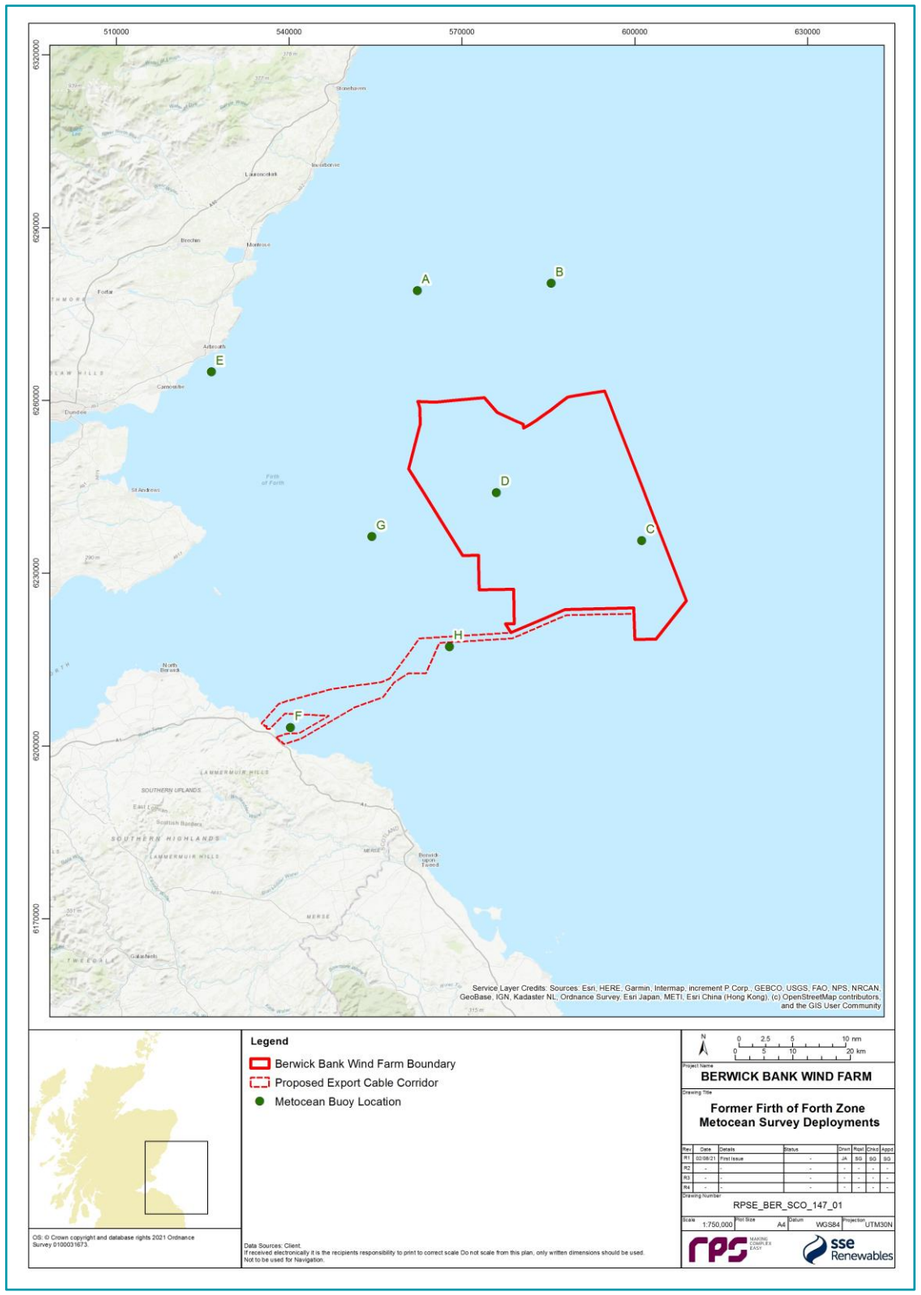
146. An understanding of the tidal currents provides an insight into the patterns and rates of naturally occurring sediment transport. Currents are primarily driven by tides with a residual component generally dominated by storm driven currents (Ramsay and Brampton, 2000). Tidal elevations across the outer Firth of Forth are governed by a southerly directed flood tide which moves along the eastern coastline of Scotland into the Firth of Forth and around Fife Ness (HR Wallingford, 2009). Across the mouth of the Firth, the flood tidal stream has a general east-southeast pattern, whilst the ebb tidal stream runs in a west-north-west direction. The main peak flood tide occurs approximately two hours before high water (HW), with the main peak ebb tide occurring approximately four hours after HW (HR Wallingford, 2009). Tidal processes are often characterised by the natural tidal elevation of an area. The Firth of Forth Zone is characterised by a tidal regime which is semi-diurnal with variable mean spring tidal ranges, based on the metocean data collated within the 2011 survey campaign (HR Wallingford, 2012).



Apx. Figure 6. 1: Proposed Development Array Area Bathymetry Data



Apx. Figure 6. 2: Proposed ECC Bathymetry Data



Apx. Figure 6. 3 **Former Firth of Forth Zone Metocean Survey Deployments**

147. Metocean surveys conducted across the former Firth of Forth Zone to support the development of the characterisation of the Zone provided an overview of the tidal current flows. The locations of the mooring positions used for the collection of data during these surveys are illustrated in Apx. Figure 6. 3. The strongest current flows during the survey period were recorded at the two most northerly sites (sites A and B) which correlates to the location of Seagreen Alpha/Bravo . At these sites (A and B), a maximum current of 0.91 metres per second (m/s) in April 2011 during a period of spring tides that correlated with the maximum water level at most sites. Current speeds decreased slightly at the other sites with maxima ranging from 0.68 m/s to 0.77 m/s (Fugro, 2012). Further detail is presented in Apx. Table 6. 2.

148. Further, while sites C, D and G were characterised by a north to south tidal axis, site E and site H displayed axes parallel to their respective nearby coastlines, which were northeast to southwest at Site E and northwest to southeast at Site H (Fugro, 2012).

Apx. Table 6. 2: Summary of Tidal Current Statistics from the 2011 Metocean Survey Deployments

Site	Depth (m) Below Mean Sea Level (bmsl)	Height (m) Above Seabed (asb)	Speed (m/s)		Direction at Max
			Max	Mean	
A – AWAC	10.50	43.00	0.91	0.35	029
A – ADCP	45.25	8.25	0.74	0.28	017
B	8.80	52.70	0.88	0.32	196
C	7.30	50.70	0.72	0.26	000
D	8.10	46.70	0.77	0.29	006
E	6.30	19.00	0.76	0.29	064
F	6.50	23.00	0.68	0.21	-
G	9.80	44.70	0.72	0.26	001
H	10.00	43.00	0.76	0.23	136

6.3.4 GEOLOGY

149. Information of the geology of the Proposed Development allows for an understanding of the origin and stability of the seabed, and the geology which will be encountered during the installation of wind turbines, offshore platform foundations, array cables and offshore export cables. Apx. Figure 6. 4 to Apx. Figure 6. 6 illustrate the seabed features, seabed sediments and boulders present across the Proposed Development Array Area and proposed ECC.

6.3.4.1 Proposed Development Array Area

150. The Proposed Development Array Area is part of a dynamic landscape where quaternary and pre-quaternary formations have been shaped as erosional surfaces by different geomorphic factors and continue to be shaped and modelled by the present day offshore marine conditions (Fugro, 2020a). The morphology features present due to advances and rapid retreats consistent with an oscillating and dynamic ice margin during British Ice Sheet (BIS) deglaciation (Graham *et al.,* 2009).

151. Subsequent sea level rise without new sediments led to the deepening and eroding of the sea mounds and banks present in the area. Seabed bottom currents have been actively mobilising and redistributing surficial sediments, developing bedforms and filling up both depressions and channels.

152. The seafloor morphology within the Proposed Development Array Area is very varied and can be classified into four types of morphological features:

- large scale banks (the Marr Bank and the Berwick Bank);
- arcuate ridges;
- incised valleys, relic glacial lakes and channels; and

- bedforms.

6.3.4.2 Proposed ECC

153. The seabed within the proposed ECC is variable with morphological features which are framed by relic pre-Holocenic landscape, and secondary morphological features characterised by bedforms and boulder fields formed by reworked and redeposition of available material in present-day shallow marine conditions.

154. The geophysical surveys observed that the bedforms in the proposed ECC are comprised of principally flow-transverse structures (subaqueous dunes: ripples, megaripples); locally the bedforms can be linear, braided and lobe-shaped (bars and ribbons). The seabed within the proposed ECC can be classified into several types of morphological features, which include:

- primary morphological features:
  - outcrops and erosional surfaces and platforms;
  - ridges; and
  - high topographic mounds and incised valleys and channels.
- secondary morphological features:
  - subaqueous dunes;
  - irregularity of the seafloor;
  - features related to anthropogenic activity; and
  - boulder fields.

6.3.5 SEABED SUBSTRATE

155. An overview of surficial sediment geology and the seabed features is presented in this section, based on interpretation undertaken of the SSS data collected during the recent geophysical surveys. An understanding of seabed substrate types is required to assess the potential impacts which may arise due to the installation of wind turbines, offshore platform foundations, array cables and offshore export cables.

156. Apx. Figure 6. 4 to Apx. Figure 6. 6 illustrate the seabed substrates present across the Proposed Development.

6.3.5.1 Proposed Development Array Area

157. The recent geophysical survey of the Proposed Development Array Area identified that it is comprised of several distinctive features:

- boulders and boulder fields;
- areas of ripples;
- areas of megaripples and sand waves; and
- areas of trawl marks.

158. The majority of the Proposed Development Array Area seabed is ‘featureless’ however the southern and north-western extent of the Proposed Development Array Area are dominated by megaripples, sandwaves, ribbons and bars. Boulders are also prevalent across the area and are either represented as isolated boulders or as clusters.

159. Seabed sediments present in the Proposed Development Array Area can be classified into several groups:

- coarse gravel, shelly gravelly sand with boulders;
- mixed sediment;
- mixed sediments with patchy coarse material or boulders; and
- muddy sand.

6.3.5.2 Proposed ECC

160. The recent geophysical survey of the proposed ECC identified that it is comprised of several distinctive features:

- boulders and boulder fields;
- area of ripples;
- area of megaripples and sand waves; and
- area of trawl marks.

161. The seabed within the proposed ECC was recorded as smooth with very few observed primary morphological features (such as high reliefs or ridges), while secondary morphological features such as ripples and megaripples, sand bars and ribbons characterise the seabed morphology.

162. Seabed sediments present in the proposed ECC can be classified into several groups:

- hard substrate: coarse sediment with cobbles, boulders and rock outcropping or sub outcropping characterised by high reflectivity signature in the sidescan data;
- gravelly sand and coarse sediments with medium reflectivity; and
- sandy sediments including fine sand and muddy sand with low reflectivity.

6.3.5.3 Landfall

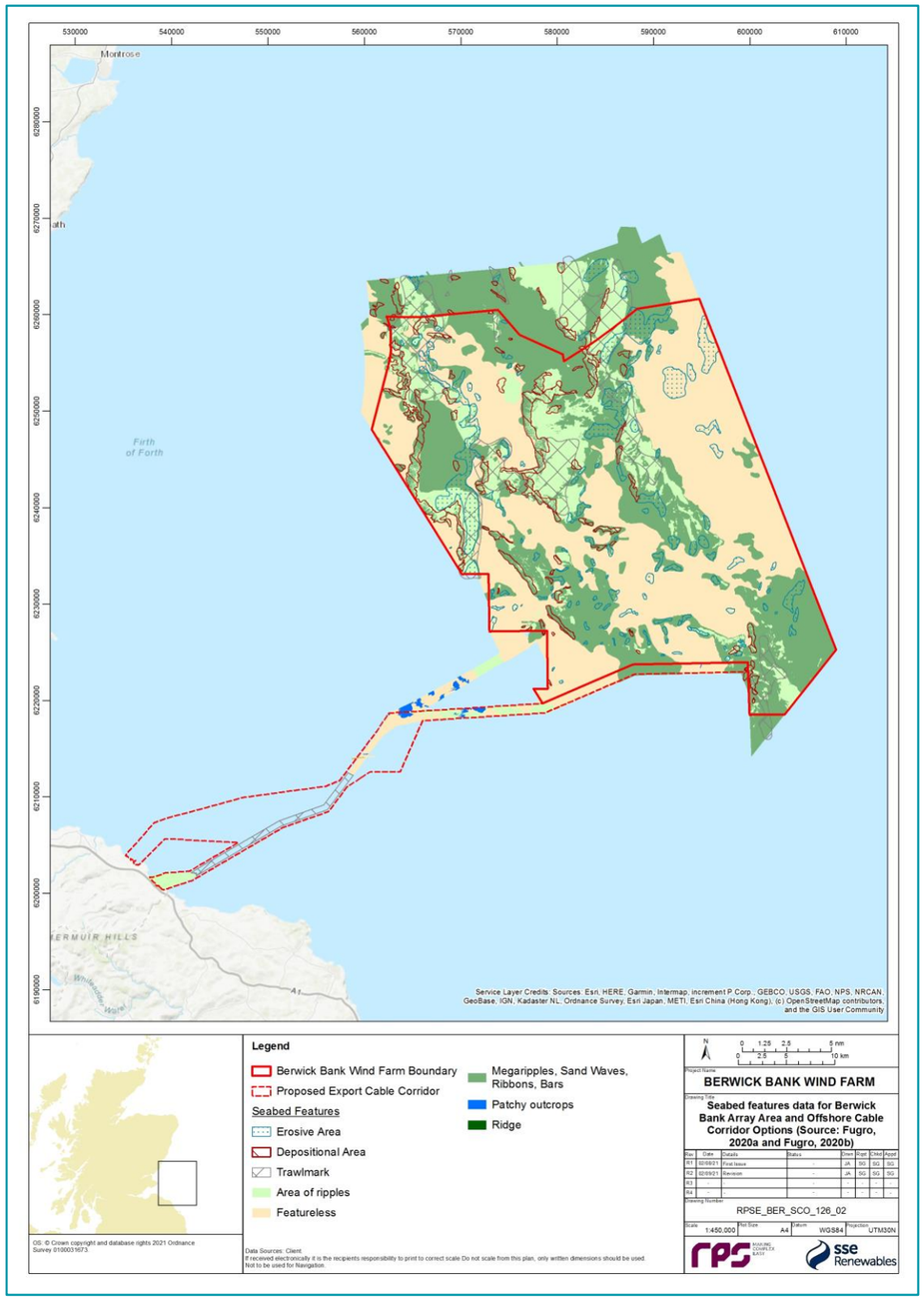
163. SSER is currently assessing the feasibility of two landfall locations on the East Lothian coast, Thorntonloch Landfall and Skateraw Landfall. SSER intends to refine this to only one landfall option by the submission of the application. The geophysical surveys provided an overview of the Thorntonloch landfall area, identifying a band of approximately 2 km along the shore to be defined as the coastal area for the surveys. This coastal area is comprised of a sandy beach to the north, a rocky platform in the middle and a pebble and rocky beach in the south. The nearshore area of the proposed ECC consists of a submerged beach and the rocky platform from the lowest tide until around 30 metres depth, approximately 2 miles from the shore.

6.3.6 SUSPENDED SEDIMENT

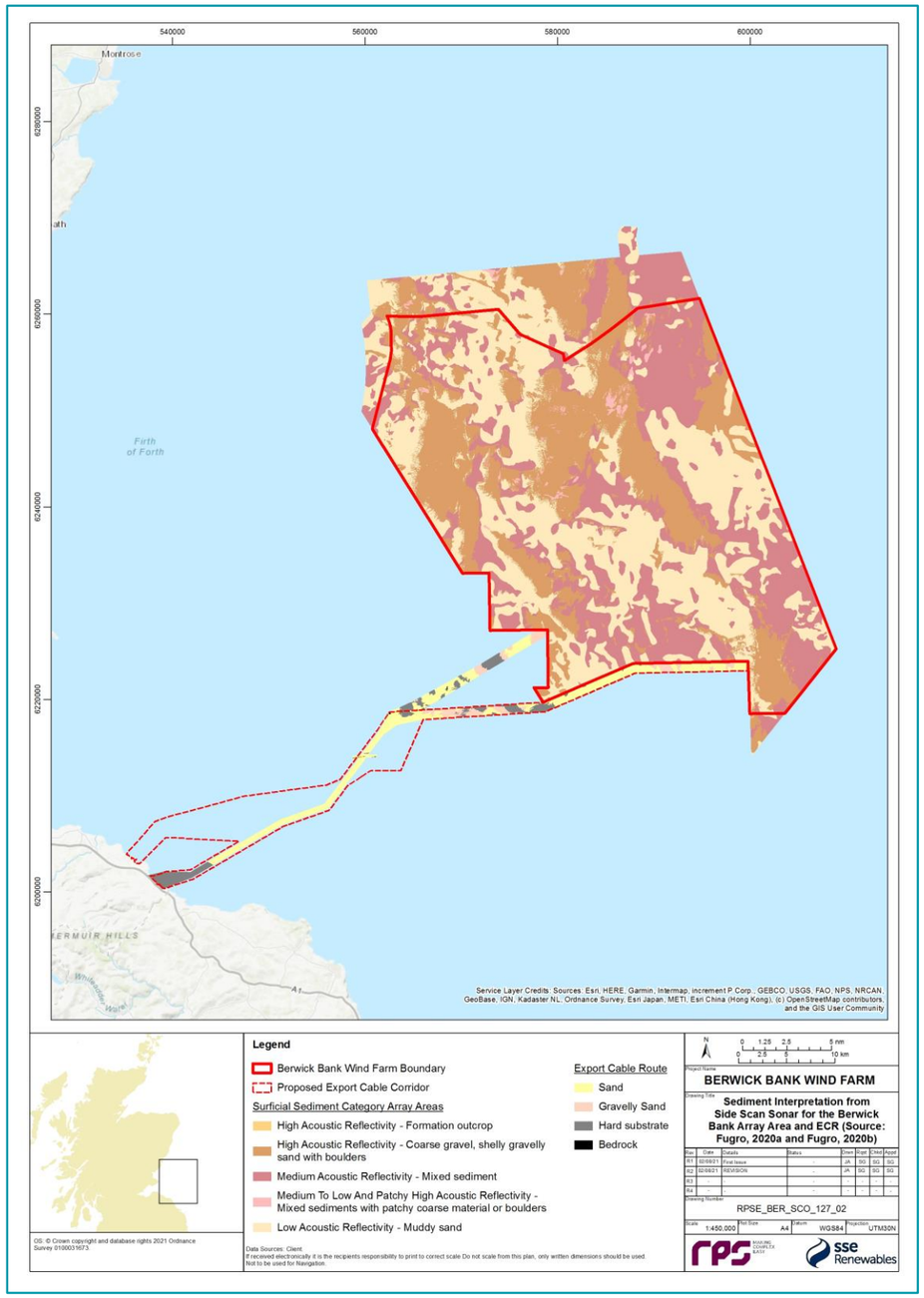
164. Sampling was conducted at an offshore station within Seagreen Alpha/Bravo in March and June 2011, suggesting total suspended solids (TSS) to be low. The samples collected illustrated a TSS of < 5 mg/l with a maximum reading of 10 mg/l during March 2011 (Fugro, 2012). Although all values are low, a slight increase in TSS was observed in March.

165. The principal mechanisms governing SSC in the water column are tidal currents, with fluctuations observed across the spring-neap cycle and across the different tidal stages (HW, peak ebb, low water, peak flood) observed throughout both datasets. It is key to note that SSCs can also be temporarily elevated by wave-driven currents during storm events. During high-energy storm events, levels of SSC can rise significantly, both nearbed and extending into the water column. Following storm events, SSC levels will gradually decrease to baseline conditions, regulated by the ambient regional tidal regimes. The seasonal nature and frequency of storm events supports a broadly seasonal pattern for SSC levels.

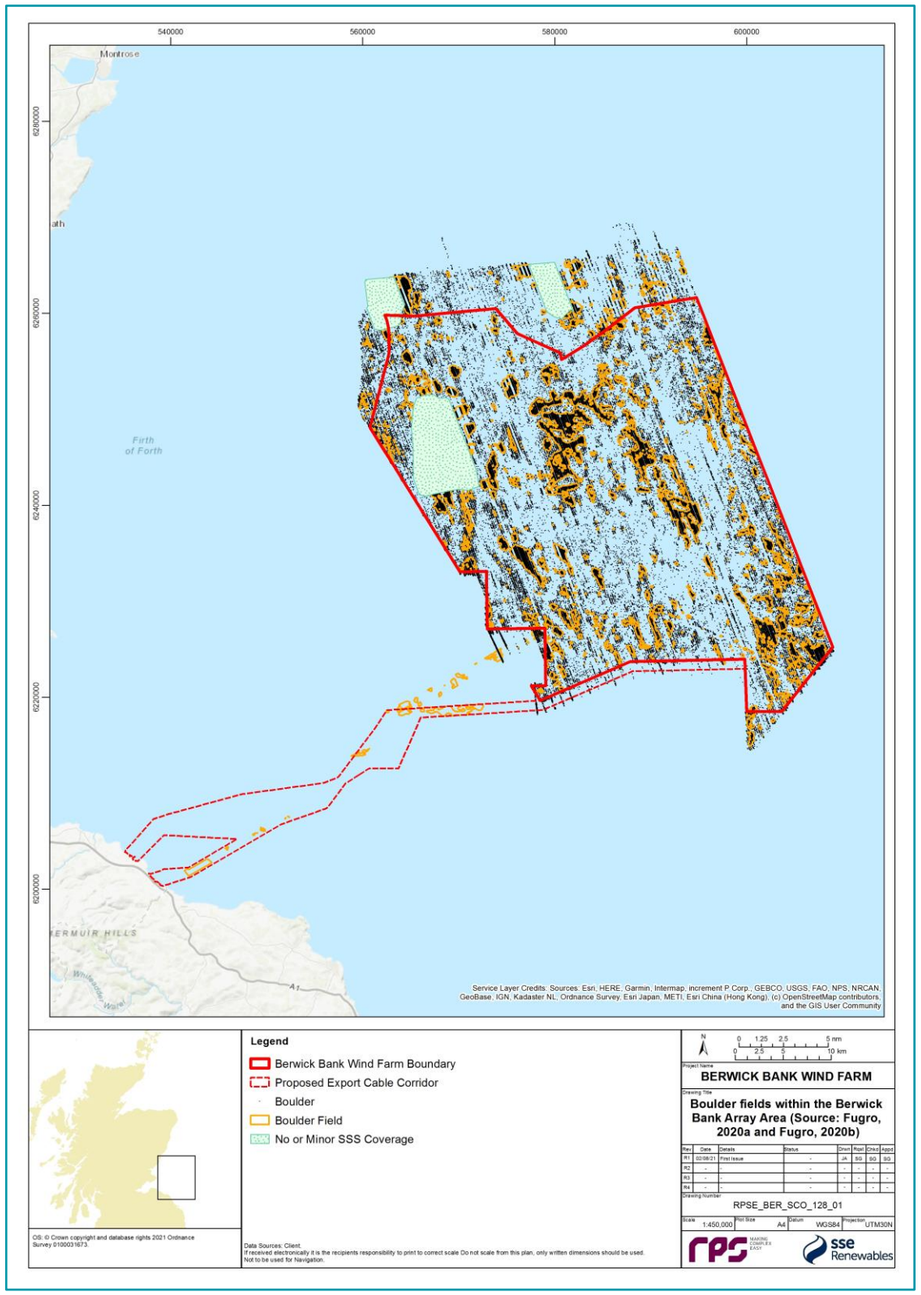
166. The Cefas Climatology Report 2016 (Cefas, 2016) provides the spatial distribution of average non-algal Suspended Particulate Matter (SPM) for the majority of the UK continental shelf (UKCS). Between 1998 and 2005, the greatest plumes are associated with large rivers such as the Thames Estuary, The Wash and Liverpool Bay, which show mean values of SPM above 30 mg/l. Based on the data provided within this study, the SPM associated with the Proposed Development has been estimated as approximately 0 mg/l to 1 mg/l over the 1998 to 2005 period. Higher levels of SPM are experienced more commonly in the winter months; however, due to the tidal influence, even during summer months the levels remain elevated.



Apx. Figure 6. 4: Proposed Development Array Area and Proposed ECC Seabed Features Data



Apx. Figure 6. 5: Sediment Interpretation from SSS Data for the Proposed Development Array Area and Proposed ECC



Apx. Figure 6. 6: Proposed Development Array Area and Proposed ECC Boulder Fields Data

Appendix 7 BENTHIC ECOLOGY – BASELINE ENVIRONMENT

7.1 DESKTOP STUDY

167. An initial desk based review of literature and data sources to support this Offshore EIA Scoping Report has identified a number of data sources which provide coverage of the Proposed Development, and which will provide context to the site-specific benthic ecology survey data collected (see section 7.2). These are summarised in Apx. Table 7. 1.

Apx. Table 7. 1: Summary of Key Desktop Datasets and Reports

Title	Source	Year	Author
The Marine Scotland National Marine Plan Interactive (NMPi) maps	Marine Scotland	2019	Marine Scotland for the Scottish Government
EMODnet broad-scale seabed habitat map for Europe (EUSeaMap)	EMODnet – Seabed Habitats	2014	EMODnet – Seabed Habitats
A big data approach to macrofaunal baseline assessment, monitoring and sustainable exploitation of the seabed	Cefas	2017	Cooper and Barry
Descriptions of Scottish Priority Marine Features (PMFs)	SNH (now NatureScot)	2016	SNH (now NatureScot)
Firth of Forth Banks Complex ncMPA: Assessment against MPA Selection Guidelines	Joint Nature Conservation Committee (JNCC)	2014	JNCC
Biotope Assignment of Grab Samples from Four Surveys Undertaken in 2011 Across Scotland's Seas (2012)	JNCC	2014	JNCC
Analysis of seabed imagery from the 2011 survey of the Firth of Forth Banks Complex, the 2011 IBTS Quarter 4 (Q4) survey and additional deep-water sites from Marine Scotland Science surveys	JNCC	2014	JNCC
Mapping habitats and biotopes from acoustic datasets to strengthen the information base of Marine Protected Areas (MPA) in Scottish waters	JNCC	2014	JNCC
Mapping habitats and biotopes from acoustic datasets to strengthen the information base of MPAs in Scottish waters – Phase 2	SNH (now NatureScot)	2013	SNH (now NatureScot)
Characterising Scotland's marine environment to define search locations for new MPA s. Part 2: The identification of key geodiversity areas in Scottish waters	Seagreen	2012	Seagreen
EIA baseline characterisation data for Seagreen Phase 1 (Alpha and Bravo)	SNH (now NatureScot)	2011	SNH (now NatureScot)
Barns Ness Coast Site of Special Scientific Interest (SSSI) citation	JNCC	1998	Brazier *et al.*
The Marine Nature Conservation Review (MNCR) Area Summary for south-east Scotland and north-east England	Seagreen	2021	Seagreen Wind Energy Ltd
Benthic subtidal ecology validation survey undertaken for the Seagreen 1A ECC Marine Licence application.	EDF Energy Ltd	2019	ABPmer
Environmental Appraisal for the Marine Licence Application for Seaweed removal at Torness Power Station			

7.2 SITE SPECIFIC SURVEY DATA

168. An overview of the site-specific survey data available to support the Offshore EIAR is provided below:

- existing data: habitat data and maps generated by the benthic baseline characterisation surveys (grab, video and epibenthic trawl surveys) for Seagreen Alpha/Bravo in 2011 (Seagreen, 2012a);
- Benthic subtidal ecology validation survey undertaken for the Seagreen 1A ECC Marine Licence application;
- acoustic geophysical survey data covering the Proposed Development Array Area and proposed ECC. Data includes high resolution side scan sonar and multibeam bathymetry. These data were collected in July - August 2019 (Fugro, 2020a and Fugro 2020b);
- site-specific survey data: benthic subtidal survey data gathered across the Proposed Development benthic ecology study area in summer 2020; and
- site-specific survey data: intertidal survey data from both landfall locations collected in summer 2020.

169. Other reference sites will also support the development and assessment of benthic subtidal and intertidal ecology in the Offshore EIAR, such as:

- the Marine Life Information Network (MarLIN);
- Marine Environmental Data and Information Network (MEDIN);
- the National Biodiversity Network Gateway (NBN);
- Scottish Environment Protection Agency (SEPA) for sediment contaminant data; and
- SeaSearch database.

7.2.1 BENTHIC SUBTIDAL SURVEYS

170. A site-specific subtidal survey was undertaken across the Proposed Development benthic subtidal and intertidal ecology study area in 2020. The subtidal survey combined DDV and 0.1 m^2 Hamon grab sampling with epibenthic trawls. The sampling strategy was designed to adequately sample the area to provide up to date data for baseline characterisation. The survey design was discussed and agreed with NatureScot and Marine Scotland in July 2020.

171. The benthic subtidal survey was undertaken by Ocean Ecology Ltd. (OEL) in September 2020. All sampling was conducted aboard the 22 m Category 2 survey vessel 'MV Marshall Art'. The survey comprised:

- combined Drop-Down Video (DDV) and 0.1 m^2 Hamon grab sampling at 92 sampling locations to ensure adequate data coverage for both infaunal and epifaunal communities at each location, with grab samples analysed for benthic infauna (abundance and biomass) and particle size analysis (PSA). Approximately a quarter of these sampling locations were located within the Firth of Forth Banks Complex MPA;
- 12 DDV transects within the proposed ECC which targeted areas of hard substrate where grab sampling was unlikely to be successful and where there was the potential for habitats of conservation importance to be present;
- Day grab samples for sediment chemistry at nine sampling locations, of which three sampling locations were located within the Firth of Forth Banks Complex MPA; and
- epibenthic 2 m beam trawling at 15 sampling locations distributed across representative sediment types to characterise epifaunal communities. Four of these sampling locations within the Firth of Forth Banks Complex MPA.

172. Six mini-Hamon grab stations were abandoned due to there being an insufficient quantity of sediment within the grab jaws after multiple attempts due to coarse or hard ground (ST25, ST39, ST66, ST67, ST75 and ST84 from with the east of the Proposed Development Array Area and the Proposed Development ECC). DDV was deployed prior to the deployment of the grab at every combined grab / DDV sample location in order to determine whether Annex I reef was present, such that grab sampling could be avoided in these areas. As a result, mini-Hamon grab stations were removed from the scope following an initial review of the seabed imagery from seven stations (ST02, ST04, ST20, ST38, ST56, ST69 and ST89). Additional grabs were added following the Annex I assessment as the DDV imagery showed soft sediments therefore grab sampling was possible (ST102, ST104, ST105, ST106, ST108, ST109 from with the Proposed Development ECC and ST112 from the east of the Proposed Development Proposed Development Array Area).

173. The sampling locations are illustrated within Apx. Figure 7. 1. A detailed analysis of these results will be appended to the EIA Report within a Benthic Subtidal and Intertidal Ecology Technical Report.

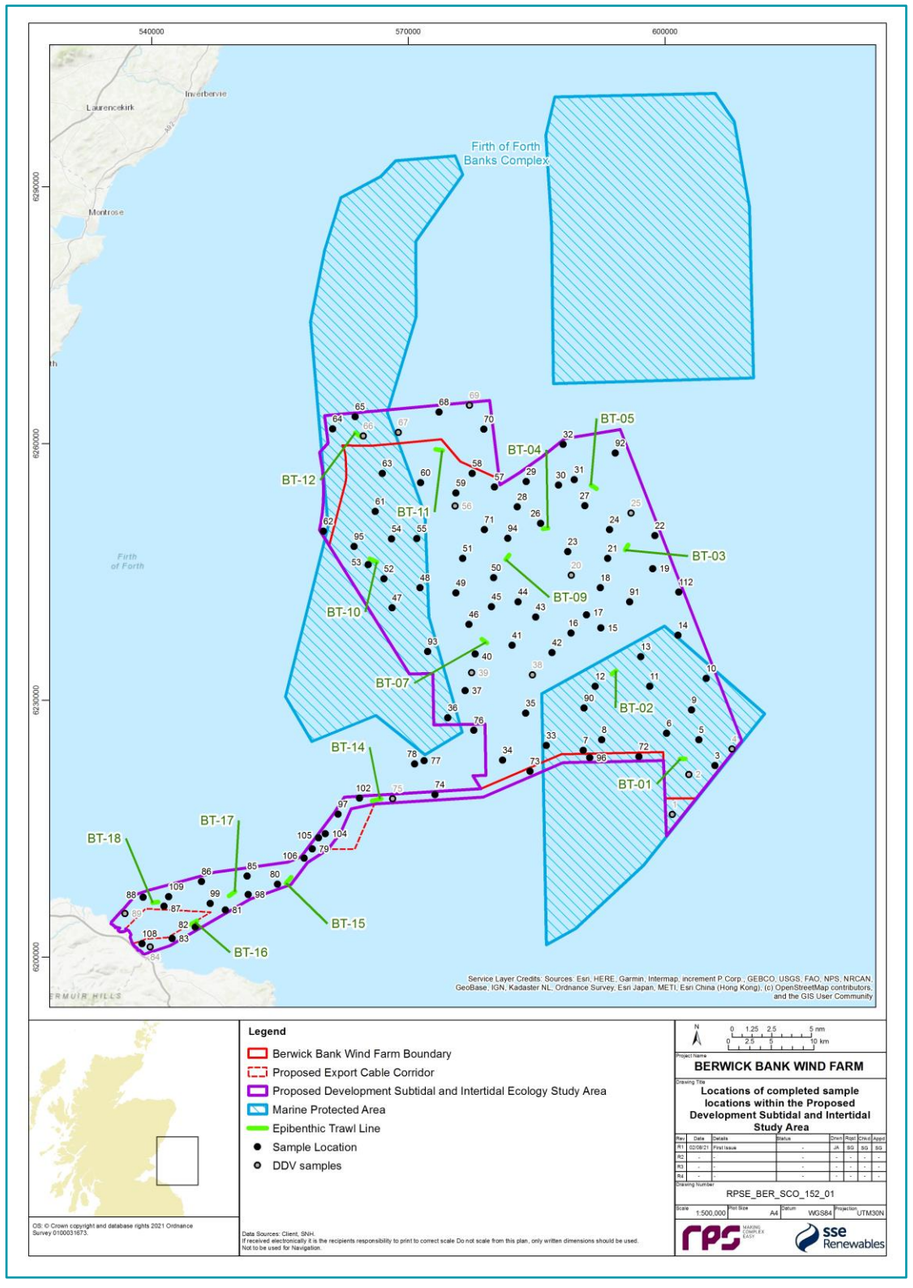
7.2.2 INTERTIDAL SURVEY

174. A phase 1 intertidal survey was undertaken at each of the selected landfall locations, Skateraw Landfall and Thorntonloch Landfall. The survey was undertaken on a spring tide cycle in August 2020 and focussed on intertidal biotopes from MHWS to approximately MLWS. The survey was undertaken with reference to standard intertidal survey methodologies as outlined in the JNCC Marine Monitoring Handbook (Davies *et al.,* 2001) within Procedural Guidance No 3-1 *In situ* intertidal biotope recording (Wyn and Brazier, 2001 and Wyn *et al.,* 2000) and The Handbook for Marine Intertidal Phase 1 Biotope Mapping Survey (Wyn *et al.,* 2006). The survey was carried out by two suitably qualified ecologists experienced in habitat mapping in intertidal, coastal and terrestrial environments.

175. The intertidal survey comprised both a general walkover, noting changes in ecological and physical characteristics, and on-site dig-over macrofauna sampling and analysis in soft sediments, to help characterise the habitats. During the walkover survey, notes were made on the shore type, wave exposure, sediments / substrates present and descriptions of species / biotopes present. The spatial relationships between these features were observed and waypoints were recorded by a hand-held global positioning system (GPS) device, in conjunction with hand-written descriptions and photographs. All biotopes present were identified, and their extents mapped, with the aid of aerial photography and a GPS recorder. Other features within the intertidal zone were also noted including rock pools, man-made structures and any habitats / species of conservation importance. Where present, these features were target noted in the intertidal biotope maps.

176. On-site dig-over sampling stations were undertaken in different biotopes, where possible, the locations of which were determined in the field. This involved the collection of four spade-loads (approximately 0.02 m^2) of sediment dug to a depth of 20-25 cm, which were then sieved through a series of stacked sieves, the finest of which was 0.5 mm mesh. All macrofauna species present were identified and enumerated on site, where possible. Field notes were also taken on the physical characteristics, including sediment type and presence of anoxic layers in the sediment.

177. A detailed analysis of these results will be appended to the EIA Report within a Benthic Subtidal and Intertidal Ecology Technical Report.



Apx. Figure 7. 1: Location of Benthic Subtidal Completed Samples within the Proposed Development Array Area and Proposed ECC Collected during the Site-specific Benthic Subtidal Survey

7.3 BASELINE CHARACTERISATION

7.3.1 SUBTIDAL SEDIMENTS

178. The subtidal benthic sediments recorded across the Proposed Development benthic subtidal and intertidal ecology study area during the site-specific survey were classified into sediment types according to the Folk classification. Sediments ranged from sandy gravel to muddy sand with a third of the samples classified as slightly gravelly sand. The sediments within the east of the Proposed Development Array Area were dominated by slightly gravelly sand with areas of gravelly sand in the north and south. The sediments within the west of the Proposed Development Array Area were typically slightly coarser and characterised by sandy gravel sediments in addition to slightly gravelly sand and gravelly sand. The sediments within the Proposed Development ECC were mainly muddy sands.

179. The EUSeaMap data illustrates the regions of higher topography and those associated with the Banks complexes within the Proposed Development Array Area are dominated by deep circalittoral coarse sediments whereas those in deeper water and flanks of the banks are dominated by deep circalittoral sands (Apx. Figure 7. 2). These two broad habitat types are also predicted across the majority of the proposed ECC, with discrete areas of faunal communities on deep low energy circalittoral rock. As the proposed ECCs moves into shallower waters towards landfall, sandy sediments grade into deep circalittoral muds, deep circalittoral mixed sediments and deep circalittoral coarse sediments (Apx. Figure 7. 2).

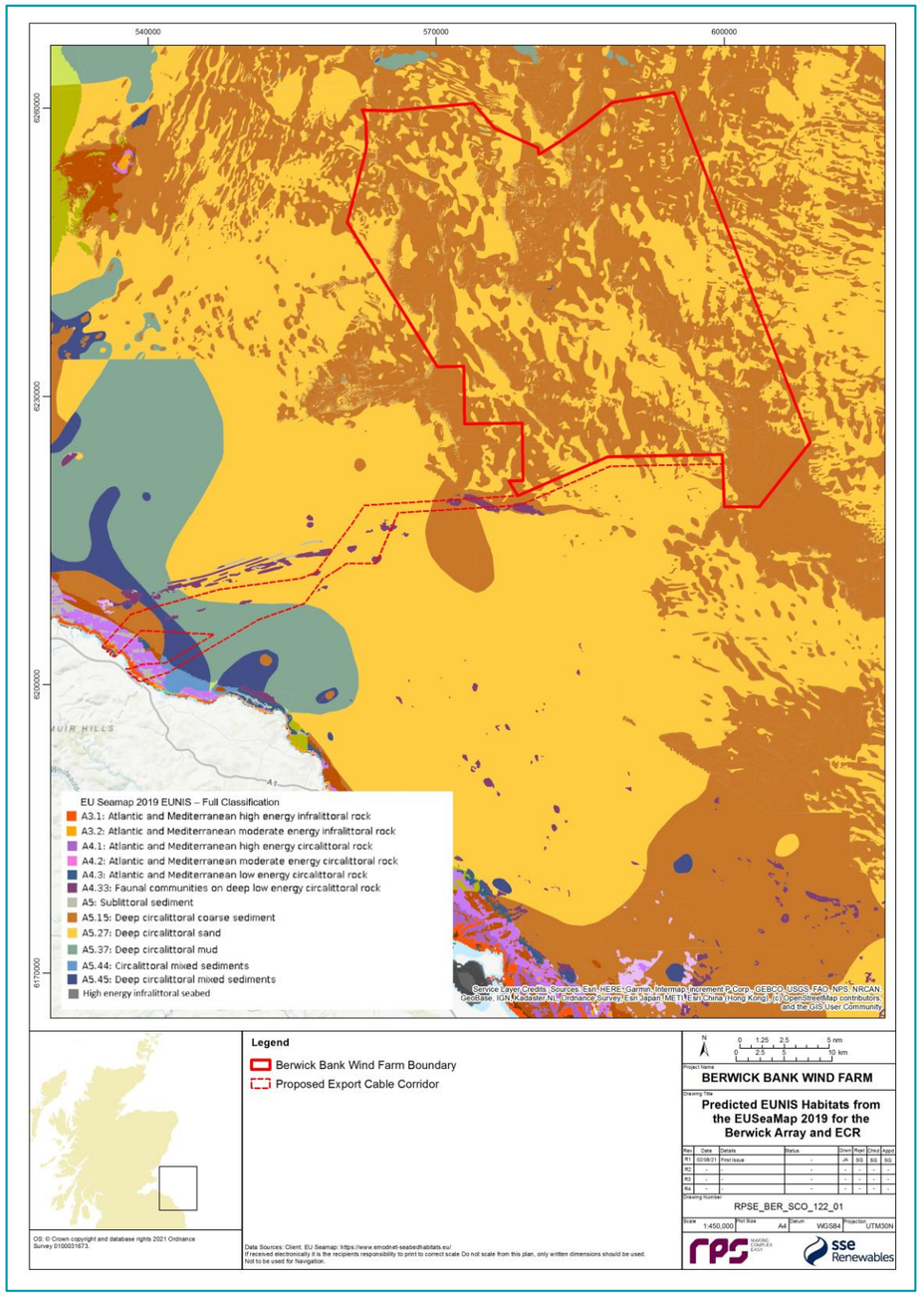
180. The Proposed Development Array Area overlaps with the Firth of Forth Banks Complex ncMPA, designated for offshore subtidal sands and gravels, shelf banks and mounds, and moraines representative of the Wee Bankie Key Geodiversity Area (JNCC, 2020a). The ncMPA is comprised of the large-scale morphological bank features Berwick, Scalp and Montrose Banks and the Wee Bankie. The area is described as strongly influenced by water currents with a mosaic of different types of sand and gravels present which create a unique range of habitats (JNCC, 2020a). Although these sediments are relatively common around Scotland, the dynamic currents in the Firth of Forth Banks area influence the distribution of the sands and gravels (JNCC, 2014a). A large proportion of the Wee Bankie moraine formation is located within the Wee Bankie (including Scalp Bank) part of the ncMPA and is considered to be a key geodiversity area in Scotland's seas. This formation is a series of prominent (20 m high) submarine glacial ridges, composed of poorly sorted sediments (boulders, gravels, sands and clays) (JNCC, 2020a).

181. The surveys conducted in 2011 to support the EIA benthic baseline characterisation for Seagreen Alpha/Bravo (located immediately to the north of the Proposed Development Proposed Development Array Area) also provide an overview of the sedimentary habitats present within the immediate vicinity of the Proposed Development. The sediments present across the Seagreen Project Alpha Proposed Development Array Area ranged from cobbles with sand and gravelly sand in the west, to sandy gravel in the east. There was a greater predominance of fine sediments recorded across the Seagreen Project Bravo array compared with Seagreen Project Alpha Proposed Development Array Area, with sediments ranging from slightly gravelly sand in the west, sandy gravel in the central section and gravelly sand in the east of the Seagreen Bravo offshore wind farm (Seagreen, 2012a).

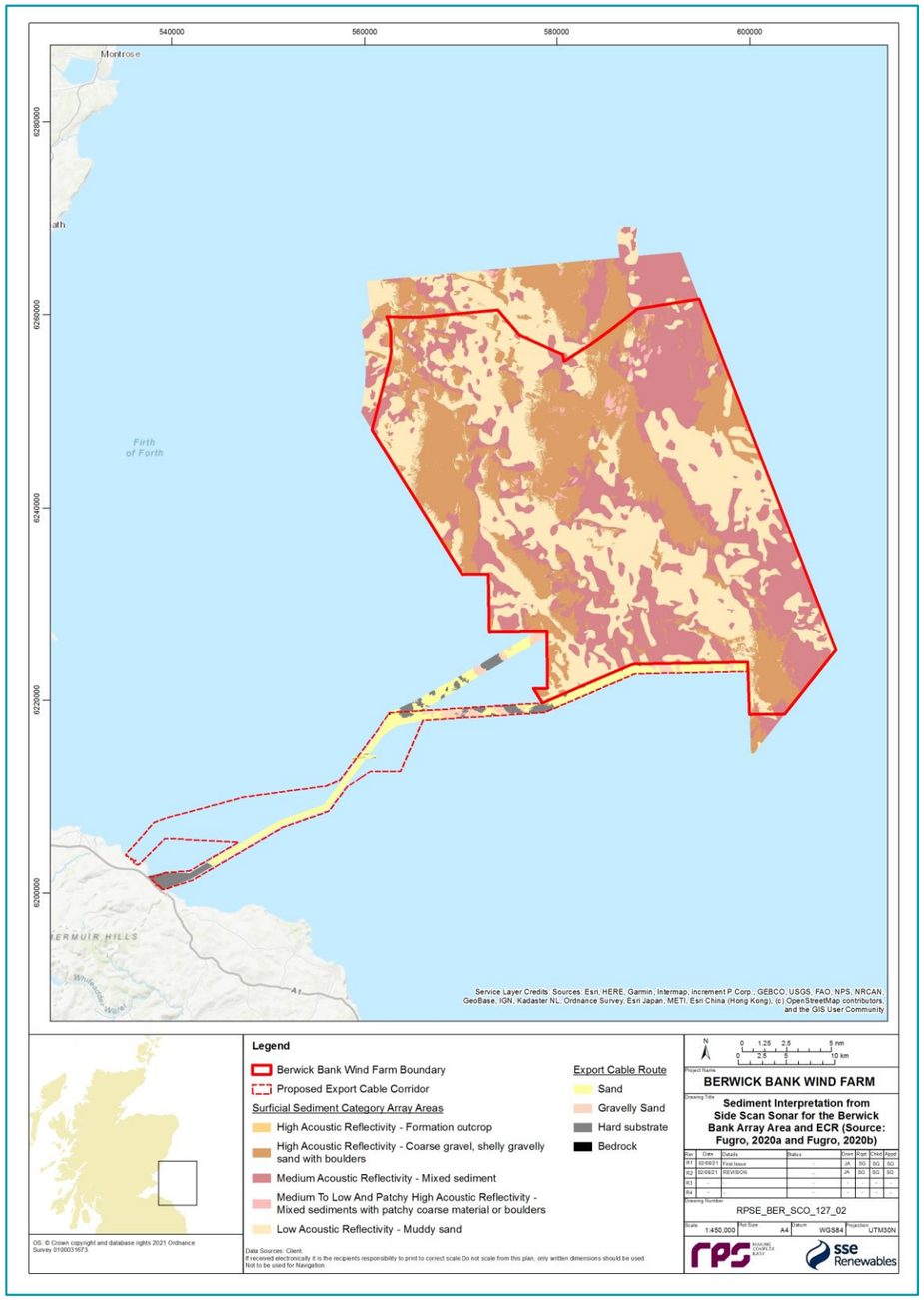
182. A site-specific geophysical survey campaign was conducted across the Proposed Development in 2019 (Fugro, 2020a and Fugro 2020b). The SSS data collected has been correlated to the European University Information Systems (EUNIS) Classification data available from EMODnet (Apx. Figure 7. 3). The data indicates a heterogenous sediment across the Proposed Development Array Area with coarse and cobbly sediments on topographic highs, and sand to gravelly sand in the topographic lows and flanks of the banks. There are also extensive boulder fields present across the broad topographic highs and the banks. Hard substrates are present in the nearshore area of the proposed ECC for the Thortonloch landfall, with sand sediments in the central section grading into more gravelly sands and areas of hard substrate.

183. This geophysical data also show that the majority of the seabed is ‘featureless’, however the southern and north-western extent of the Proposed Development Array Area are dominated by megaripples, sandwaves, ribbons and bars. Boulders are also prevalent across the area and are either represented as isolated boulders or as clusters (Apx. Figure 7. 4).

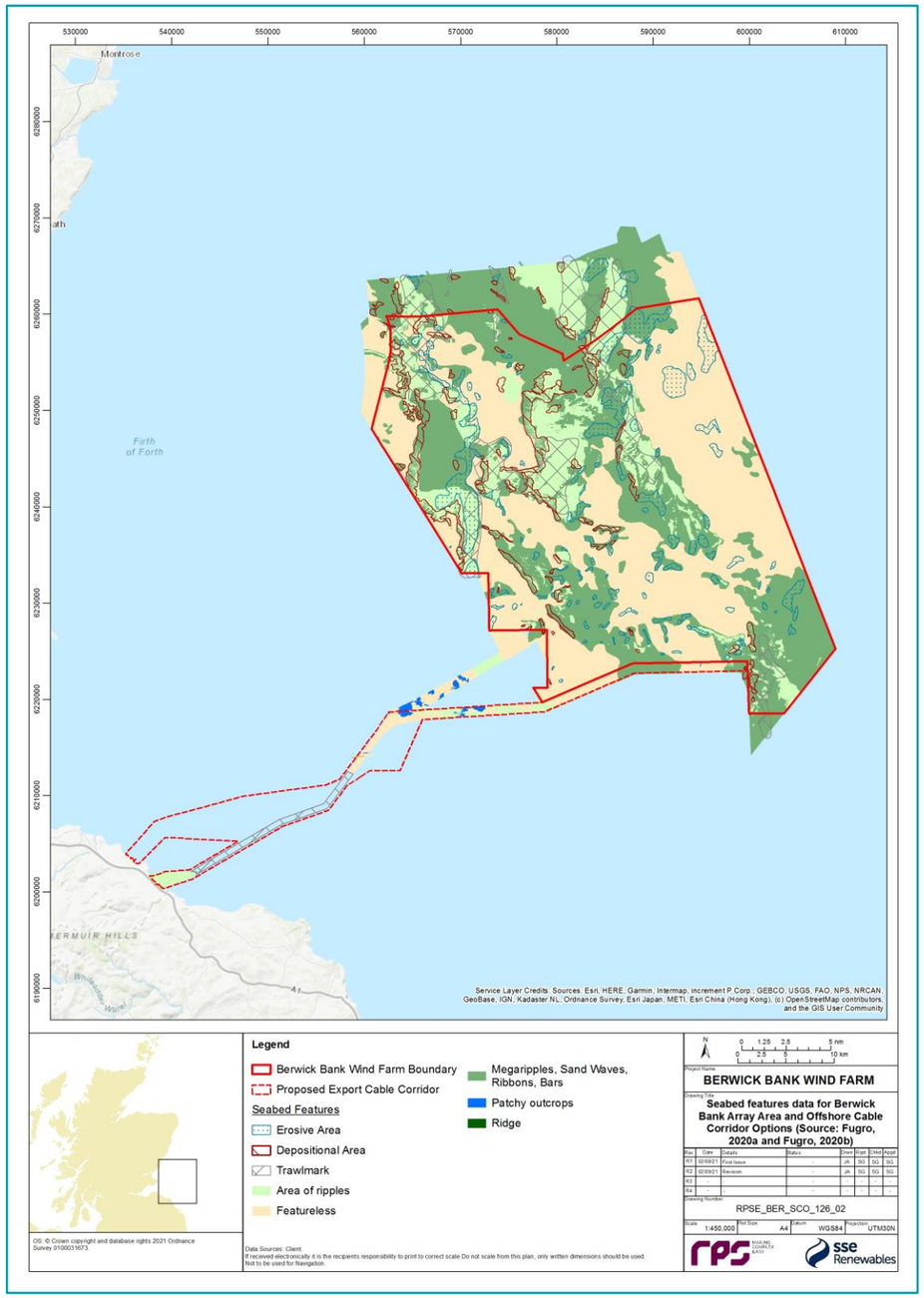
184. An additional geophysical survey has been undertaken in 2021 to collate additional data to support the baseline characterisation for the Offshore EIAR.



Apx. Figure 7. 2: Predicted EUNIS Habitats from the EUSeaMap for the Proposed Development Array Area and Proposed ECC (Source: EMODnet, 2014)



Apx. Figure 7. 3: **Sediment Interpretation from Side Scan Sonar for the Proposed Development Array Area and Proposed ECC (Source: Fugro, 2020a and Fugro 2020b)**



Apx. Figure 7. 4: **Seabed Features Data for Proposed Development Array Area and Proposed ECC (Source: Fugro, 2020a and Fugro 2020b)**

7.3.2 SUBTIDAL BENTHIC COMMUNITIES

185. The site-specific surveys across the Proposed Development benthic subtidal and intertidal ecology study area recorded 15 infaunal biotopes. The west of the Proposed Development Array Area was dominated by mixed sediment, fine sand and sandy mud biotopes (SS.SMu.CSaMu.AfilMysAnit in the south, SS.SSa.CFiSa.EpusOborApri in the north and SS.SMx.OMx.PoVen and SS.SSa.CFiSa.ApriBatPo). The east of the Proposed Development Array Area was dominated by sandy mud and find sand biotopes (SS.SMu.CSaMu.AfilMysAnit and SS.SSa.CFiSa.EpusOborApri). The Proposed Development ECC was dominated by mixed sediment and sandy mud biotopes (SS.SMu.CSsMu.ThyNten, S.SMx.OMx and SS.SMuCSaMuAfilNten).

186. The site-specific surveys across the Proposed Development benthic subtidal and intertidal ecology study area recorded five epifaunal biotopes based on the DDV survey and the epifaunal components of the grab samples. The biotope SS.SCS.CCS was recorded across the eastern section of the Proposed Development Array Area with a small area of SS.SSa.IFiSa in the north of the eastern section of the Proposed Development Array Area and a small area of SS.SSa.CMuSa in the centre of the eastern section of the Proposed Development Proposed Development Array Area. The Proposed Development ECC was also dominated by SS.SCS.CCS with areas of CR.MCR.ECcR and SS.SSa.IFiSa in the nearshore subtidal area.

187. The site-specific surveys across the Proposed Development benthic subtidal and intertidal ecology study area recorded three epifaunal biotopes based on the epibenthic trawls. The epibenthic trawls within the eastern section of the Proposed Development Array Area were classified as SS.SCS.CCS with two trawls within the western section of the Proposed Development Array Area classified as SS.SMx.CMx.FluHyd. The epibenthic trawls in the central section of the Proposed Development ECC were characterised as SS.SSa.CMuSa [*C. crangon*].

188. The infaunal biotopes were taken forward to the combined biotope map as they were derived from more detailed data with the epifaunal data providing further context. The seapen and burrowing megafauna assessment classified much of the central and inshore parts of the Proposed Development ECC as the SS.SMu.CFiMu.SpnMeg habitat. The *S. spinulosa* Annex I reef assessment assigned all sample stations analysed 'Not a Reef'. The nearshore area of the Proposed Development ECC recorded medium and low potential Annex I cobble reef. The Proposed Development Array Area recorded areas classified as 'Not a Reef' and two sample stations which were low potential reef. One sample station in the nearshore area of the Proposed Development ECC was classified as medium potential rock reef.

189. The marine ecology surveys conducted for Seagreen Alpha/Bravo found that the benthic habitats were characterised by patchy communities of polychaete worms and shellfish (Seagreen, 2012a). The benthic communities identified for each site are described in Apx. Table 7. 2.

190. The distribution of the epifauna from these surveys was related to the sediment type with the sandy gravels and gravelly sands supporting a rich epifauna, while the slightly gravelly sands were generally low in epifauna. The majority of species recorded were opportunistic species, with bryozoans / hydroid turfs, tube worm *Hydroides norvegica*, pea urchin *Echinocyamus pusillus* and sea squirt *Ascidiella scabra*. High species richness was recorded in association with areas of the *Sabellaria* habitat, although no evidence from the DDV surveys suggests extensive or well-developed aggregations of *Sabellaria* in the Seagreen Alpha/Bravo Proposed Development Array Area. The benthic communities present were considered typical of the outer Firth of Forth and northwest North Sea (Seagreen, 2012a).

Apx. Table 7. 2: Benthic Ecology Community Overview from Seagreen Project Alpha and Seagreen Project Bravo Survey Data (Seagreen, 2012a)

Project	Community Overview
Seagreen Project Alpha	• Western area: '*Sabellaria*', 'sparse polychaetes and bivalves' and 'faunal turf'; • Central and eastern areas: dominated by the sabellid polychaete classes 'dense Chone' and 'sparse Chone'.
Seagreen Project Beta	• Western area: '*Sabellaria*', 'rich polychaetes and bivalves' and 'epifauna with polychaetes'; • Eastern area: 'dense Chone' and 'rich polychaetes'

191. As discussed in the previous sub-section 'Section 5.3.1 Subtidal Sediments', the Proposed Development Array Area overlaps with the Firth of Forth Banks Complex ncMPA. The ncMPA is described as strongly influenced by water currents with a mosaic of different types of sand and gravels present which create a unique range of habitats and species such as the common brittlestar *Ophiothrix fragilis*, soft coral Dead man's fingers *Alcyonium digitatum*, hornwrack (colonial bryozoan) *Flustra foliacea* and ocean quahog *Arctica islandica* (JNCC, 2020a).

192. Still image survey data collected to support the designation of the ncMPA around Berwick Bank indicate the presence of the SS.SMx.CMx.FluHyd (*Flustra foliacea* and *Hydrallmania falcata* on tide-swept circalittoral mixed sediment) biotope to the east and north of the area, with areas of circalittoral mixed sediments and circalittoral muddy sand (JNCC, 2014b). However, the infaunal communities recorded from grab samples in the Berwick Bank area of the ncMPA did not fit within the standard Marine Habitat Classification of Britain & Ireland and were allocated new biotope proposals (Pearce *et al.,* 2014):

- SS.SSa.OSa.[Sbom] - *Spiophanes bombyx* aggregations in offshore sands. This proposed biotope falls under the EUNIS Level 4 habitats offshore coarse (JNCC, 2014b).

193. The biotopes identified around the Wee Bankie area (including Scalp Bank) and Montrose Bank also indicated the presence of SS.SMx.CMx.FluHyd (*Flustra foliacea* and *Hydrallmania falcata* on tide-swept circalittoral mixed sediment). The infaunal communities sampled at these two areas of the ncMPA also did not fit within the standard Marine Habitat Classification of Britain and Ireland and were allocated new biotope proposals (Pearce *et al.,* 2014):

194. Wee Bankie:

- SS.SSa.OSa.[Sbom] - *Spiophanes bombyx* aggregations in offshore sands; and
- SS.SMx.OMx.[PoGintBy] - Polychaete-rich *Galathea* community with encrusting bryozoans and other epifauna on offshore circalittoral mixed sediment.

195. Montrose Bank:

- SS.SCS.OCS.[PoGintBy] - Polychaete-rich *Galathea* community with encrusting bryozoans and other epifauna on offshore coarse sediment;
- SS.SCS.OCS.[Sbom] - *Spiophanes bombyx* aggregations in offshore coarse sands;
- SS.SSa.OSa.[Sbom] - *Spiophanes bombyx* aggregations in offshore sands; and
- SS.SMx.OMx.[PoGintBy] - Polychaete-rich *Galathea* community with encrusting bryozoans and other epifauna on offshore circalittoral mixed sediment.

196. As part of the Regional Seabed Monitoring Programme (RSMP), Cooper and Barry (2017) describe the results of a baseline assessment of the UK's macrobenthic infauna. Although the aggregates industry was the focus of the study, a "big data" approach was taken which collated data from across UK waters,

including in proximity to the Proposed Development (see Apx. Figure 7. 6), from various industries including offshore wind farms, oil and gas, nuclear and port and harbour sectors.

197. Data points coinciding with the Proposed Development Array Area were predominantly characterised by slightly muddy sands with a small gravel component, and associated benthic infaunal communities of polychaetes (*Spionidae*, *Nephtyidae*, *Lumbrineridae*, *Oweniidae*, *Cirratulidae*, *Capitellidae* and *Ampharetidae*), echinoderms (*Amphiuridae*) and nemerteans (Cooper and Barry, 2017). There were also records of gravelly sands with a small mud fraction characterised by communities of polychaetes (*Spionidae*, *Glyceridae*, *Terebellidae*, *Capitellidae* and *Phyllodocidae*) and nemerteans. The only samples coinciding with the proposed ECC are located in the inshore part of Skateraw Landfall and correlate with slightly gravelly slightly muddy sand and species rich communities of polychaetes (*Spionidae*, *Nephtyidae*, *Capitellidae*, *Cirratulidae*, *Oweniidae* and *Pholoidae*), bivalve molluscs (*Montacutidae, Semelidae* and *Nuculidae*) and nemerteans (Cooper and Barry, 2017).

198. The baseline benthic communities within the Proposed Development benthic subtidal and intertidal ecology study area will be described in depth following the completion of analysis of site-specific survey data, and the results of these surveys and analyses will be presented within the Benthic Subtidal and Intertidal Ecology Technical Report.

7.3.3 INTERTIDAL ECOLOGY

199. The proposed landfall locations are located at Thortonloch and Skateraw near to Torness, on the East Lothian coast. The following biotopes, recorded at both the Skateraw Landfall and Thortonloch Landfall, are part of the Annex I Habitats Directive habitat – *1140 Mudflats and sandflats not covered by seawater at low tide*:

- *LS.LSa.St.Tal Talitrids on the upper shore and strand-line;*
- *LS.LSa.MoSa, Barren or amphipod dominated mobile sand shores* (recorded at Thorntonloch landfall only)*;*
- *LS.LSa.MuSa.MacAre, Macoma balthica and Arenicola marina in littoral muddy sand;*
- *LS.LSa.MuSa.Lan, Lanice conchilega in littoral sand* (recorded at Skateraw Landfall only)*;* and
- *LS.LSa.MuSa.MacAre, Macoma balthica and Arenicola marina in littoral muddy sand*. This biotope is also part of the Intertidal Mudflats habitat listed on the Scottish Biodiversity List and is a UK Priority Biodiversity Action Plan (see Apx. Figure 7. 5).

200. The following sections presents a summary of the site-specific survey data collected during intertidal surveys of each landfall.

7.3.3.1 Thortonloch Landfall

The Thorntonloch Landfall rock platform is predominantly covered by sediments. A sandy bay is present at Thorntonloch beach which was mainly composed of fine and medium grained sand which becomes muddier at the lower shore. A small proportion of gravel was also present within the lower shore sands. Occasional strips of shingle (cobbles and pebbles) were present at the beach head. High cliffs occurred to the south of Thorntonloch beach abutting a sedimentary rock platform with overlying large mobile sediments (pebbles, cobbles and boulders). Large areas of the bedrock remained exposed and contained a mosaic of deep pools cut into the rock platform by wave action. Rockpools also occurred frequently in other rocky areas between and under seaweeds and stones.

7.3.3.2 Skateraw Landfall

201. The Skateraw Landfall rock platform is predominantly covered by sediments. A sandy bay is present at Skateraw beach which was mainly composed of fine and medium grained sand which becomes muddier at the lower shore. A small proportion of gravel was also present within the lower shore sands. Larger mobile sediments (pebbles, cobbles and boulders) covered the rest of the rock platform with exposed areas of bedrock occurring in places. Rockpools frequently occurred in the rocky zone.

Apx. Figure 7. 5: LS.LSa.MuSa.MacAre at Thorntonloch Landfall

7.3.4 DESIGNATED SITES

202. A number of sites of nature conservation importance, which are designated for benthic subtidal and/or intertidal features, have been identified as overlapping with, or occurring in close proximity to, the Proposed Development (Apx. Table 7. 3).

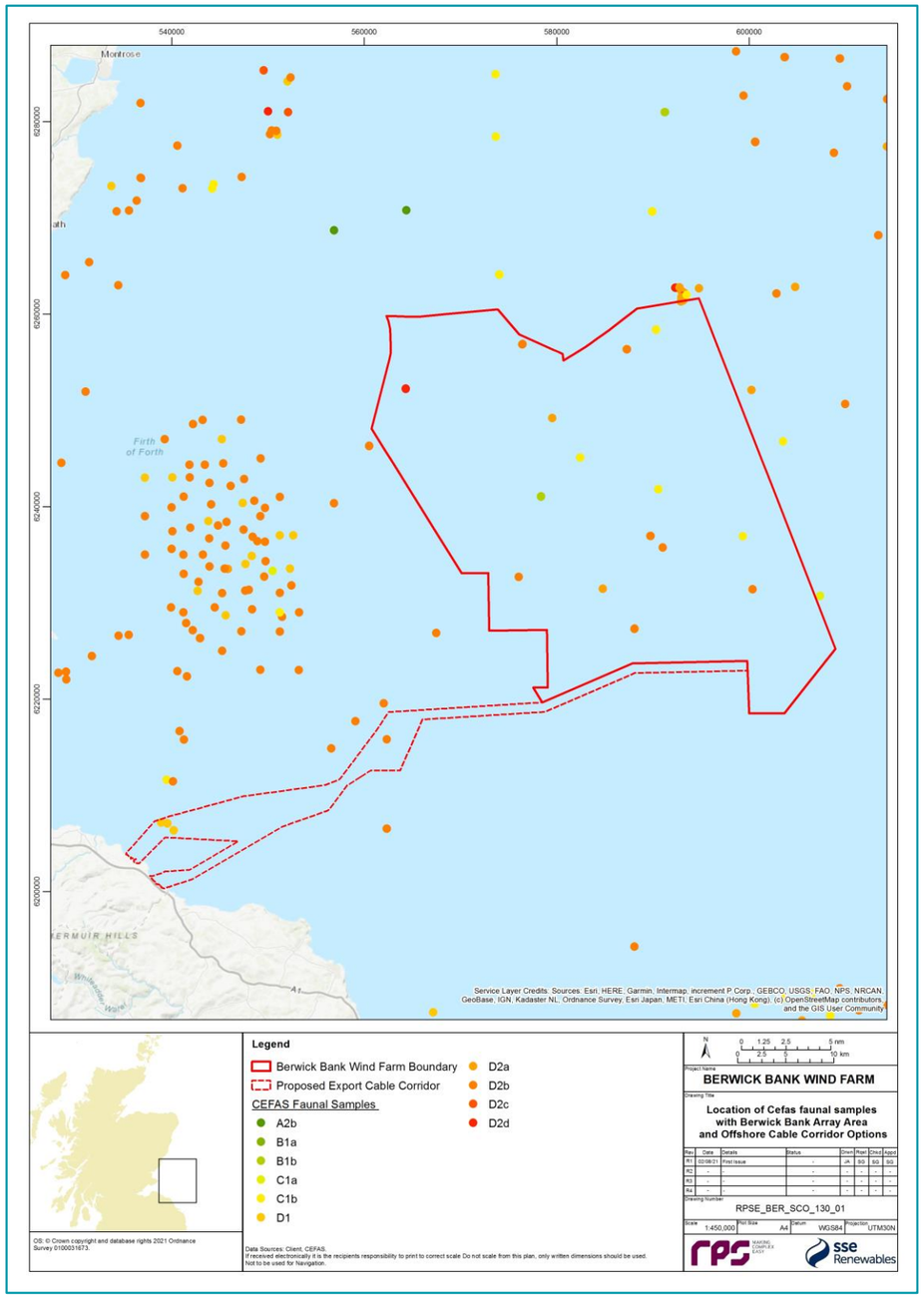
203. A full screening of European designated sites with qualifying benthic interest features will be undertaken in the LSE Screening Report for the Proposed Development. Relevant Annex I habitats of Natura 2000 sites screened into the benthic subtidal and intertidal ecology assessment will be fully considered and assessed in the benthic subtidal and intertidal ecology Offshore EIAR section, with the assessment on the Natura 2000 site itself deferred to the Report to Inform Appropriate Assessment (RIAA).

204. The screening to be undertaken in the benthic subtidal and intertidal ecology Offshore EIAR section will also include national designations (i.e. SSSIs, MPAs and Marine Conservation Zones (MCZs)). Nationally designated sites and the relevant qualifying benthic features screened into the assessment will also be fully considered and assessed in the benthic subtidal and intertidal ecology Offshore EIAR section.

Apx. Table 7. 3: Summary of Designated Sites with Relevant Benthic Ecology Features in Proximity to the Proposed Development

Designated Site	Distance to Proposed Development Array Area (km)	Distance to Proposed ECC (km)	Features
Firth of Forth Banks Complex MPA	0.0	0.0	• Ocean quahog (*Arctica islandica*); • Offshore subtidal sands and gravels;

Designated Site	Distance to Proposed Development Array Area (km)	Distance to Proposed ECC (km)	Features
			• Shelf Banks and Mounds; and • Moraines representative of the Wee Bankie Key Geodiversity Area.
Berwickshire and North Northumberland Coast Special Area of Conservation (SAC)	30.1	3	• Mudflats and sandflats not covered by seawater at low tide (1140); • Large shallow inlets and bays (1160); • Reefs (1170); and • Submerged or partially submerged sea caves (8330).
Berwickshire coast (intertidal) SSSI	33.3	4.7	• Rocky Shore; and • Sea caves
Firth of Forth SSSI	37.6	5.9	• Mudflats; and • Saline lagoon.
Isle of May SAC	38.6	21	• Reefs (1170).
Montrose Basin RAMSAR Ramsar site and SSSI	39	72.1	• Intertidal mudflats and sandflats
Pease Bay Coast SSSI	42.3	0.2	• Maritime cliff.
Firth of Tay and Eden Estuary SAC	42.5	45.3	• Estuaries (1130); • Sandbanks which are slightly covered by sea water all the time (1110); and • Mudflats and sandflats not covered by seawater at low tide (1140).
Tayport Tentsmuir Coast SSSI	43.2	50.7	• Mudflats
Barns Ness Coast SSSI	43.4	0.0	• Lower Carboniferous [Dinantian-Namurian (part)]; • Saltmarsh; • Shingle; and • Sand dune.



Apx. Figure 7. 6: Location of Faunal Samples from Cooper and Barry (2017) within the Proposed Development Array Area and Proposed ECC

Appendix 8 FISH AND SHELLFISH ECOLOGY – BASELINE ENVIRONMENT

8.1 DESKTOP STUDY

205. An initial desk-based review of literature and data sources to support this Offshore EIA Scoping Report has identified a number of data sources which provide coverage of the Proposed Development Array Area and proposed ECC. These are summarised in Apx. Table 8. 1.

Apx. Table 8. 1: Summary of Key Desktop Reports for Fish and Shellfish Ecology

Title	Source	Year	Author
Seagreen Phase 1 (Seagreen Alpha and Seagreen Bravo): Natural Fish and Shellfish Resource Environmental Statement section for the original project.	Section 12, Seagreen Environmental Statement Volume 1	2012	Seagreen
Sandeel Surveys in the East Coast	Marine Scotland	2019	Marine Scotland
Seagreen Phase 1 (Seagreen Alpha and Seagreen Bravo): Natural Fish and Shellfish Resource Environmental Statement section for the optimised project.	Section 9, Seagreen Environmental Statement Volume 1	2018	Seagreen
International Bottom Trawl Surveys	International Council for the Exploration of the Sea (ICES)	2018	ICES
Scallop Stock Assessment	Marine Scotland	2018b	Marine Scotland
Neart na Gaoithe Proposed Offshore Wind Farm Fish and Shellfish Ecology	Section 7, Neart na Gaoithe EIA Fish and Shellfish Ecology	2018	GoBe Consultants Ltd.
2018 landings data by ICES rectangle.	Marine Scotland	2018	Marine Scotland
International Herring Larvae Survey	Wageningen Marine Research, IJmuiden	2006-2016	Wageningen Marine Research, IJmuiden
Mapping the spawning and nursery grounds of selected fish for spatial planning.	Cefas	2012	Ellis *et al*.
Review of migratory routes and behaviour of Atlantic salmon, sea trout and European eel in Scotland's coastal environment: implications for the development of marine renewables.	Scottish Marine and Freshwater Science	2010	Malcolm *et al*.
Marine renewables SEA environmental report. Section C7 Fish and shellfish.	Scottish Government	2007	Faber Maunsell
British sea fishes.	Underwater World Publications Ltd.	2001	Dipper
Fisheries sensitivity maps in British Waters.	United Kingdom Offshore Operators Association (UKOOA) Ltd.	1998	Coull *et al*.
Fish and shellfish sensitivity reports.	https://www.marlin.ac.uk/activity/pressures_report	n/a	Various
Salmon fishery statistics, including rod catch data	Marine Scotland	2019 (latest dataset)	Marine Scotland
Salmon smolt trawl surveys in Moray Firth and Firths of Forth and Tay	Marine Scotland	2018c	Marine Scotland
Data on rod catches from District fisheries boards and Fisheries Management Scotland	Fisheries Management Scotland	TBC via consultation	Fisheries Management Scotland

8.2 SITE-SPECIFIC SURVEY DATA

206. In 2020, epibenthic 2m beam trawling at 15 sampling locations distributed across representative sediment types was undertaken to characterise epifaunal communities and inform the benthic subtidal and intertidal ecology baseline characterisation. The results of the epibenthic beam trawl survey, which include records of small demersal fish species present in the Proposed Development fish and shellfish study area, will be used to enhance the existing data for fish and shellfish. Epibenthic sampling was undertaken using a standard 2 m scientific beam trawl (Lowestoft design) fitted with a knotless 5 mm cod end liner.

207. Other various papers on fish migration are also referenced as key reports such as Newton *et al.,* 2017; Gardiner *et al.,* 2018; Godfrey *et al.,* 2015; Malcolm *et al.,* 2015; Lothian *et al.,* 2017; Malcolm *et al.,*2010.

8.3 BASELINE CHARACTERISATION

8.3.1 FISH AND SHELLFISH DESIGNATED SITES

208. The Proposed Development does not overlap with any European designated sites but there are several protected areas for fish in East Scotland. Apx. Table 8. 2 provides an early indication of the designated sites (international and national) that may be considered within the EIA and HRA. This list will be refined in the EIA to also include sites that fall within the potential ZOI of the Proposed Development, which will be determined as part of the EIA process to include consideration of migratory fish species.

209. A full screening of European sites with qualifying fish features will be undertaken in the LSE Screening Report for the Proposed Development. Relevant Annex II fish species of European designated sites screened into the fish and shellfish ecology assessment will be fully considered and assessed in the fish and shellfish Offshore EIAR section with the assessment on the European designated sites itself deferred to the RIAA.

210. The screening to be undertaken in the fish and shellfish ecology Offshore EIAR section will also include nationally designated sites (i.e. SSSIs, MPAs, recommended and designated MCZs). Nationally designated sites and the relevant qualifying features screened into the assessment will also be fully considered and assessed in the fish and shellfish ecology Offshore EIAR section.

Apx. Table 8. 2: Summary of Designated Sites for Fish and Shellfish in Proximity to the Proposed Development

Protected Area	Distance from Proposed Development Array Area (km)	Distance from Proposed ECC (km)	Relevant Qualifying Features
River Tweed SAC	43.6	9.2	• Atlantic salmon (*Salmo salar*) • Sea lamprey (*Petromyzon marinus*)

Protected Area	Distance from Proposed Development Array Area (km)	Distance from Proposed ECC (km)	Relevant Qualifying Features
			• River lamprey (*Lampetra fluviatilis*)
River South Esk SAC	43.4	74.6	• Freshwater pearl mussel (*Margaritifera margaritifera*) • Atlantic salmon
River Tay SAC	56.3	68.0	• Atlantic salmon • Sea lamprey • River lamprey
River Dee SAC	63.4	99.8	• Atlantic salmon • Freshwater pearl mussel
Turbot Bank MPA	96.2	132.0	• Sandeels (*Ammodytes americanus*)
River Spey SAC	110.0	137.0	• Freshwater pearl mussel • Atlantic salmon • Sea lamprey
River Teith SAC	122.0	94.9	• Sea lamprey • River lamprey

8.3.2 FISH ASSEMBLAGE

211. Distribution of fish is determined by a range of factors including abiotic parameters such as water temperature, salinity, depth, local-scale habitat features and substrate type, and biotic parameters such as predator-prey interactions, competition and anthropogenic factors such as infrastructure and commercial fishing intensity.

212. The fish assemblage of the northern North Sea fish and shellfish study area includes demersal, pelagic, migratory and elasmobranchs fish species. Demersal species include sandeel, whiting, lemon sole, ling, plaice, with pelagic species including herring, sprat and saithe likely to be found in the vicinity of the Proposed Development.

213. In August 2020, 15 epibenthic beam trawls were collected across the Proposed Development Array Area and ECC options during the benthic subtidal surveys (as per Apx. Figure 7. 1). A total of 21 bony fish taxa representing 553 individuals were recorded from these epibenthic trawls undertaken across the Proposed Development benthic subtidal and intertidal ecology study area. The most abundant fish recorded in the trawls were common dab (167 individuals), long rough dab, lesser sandeel and gobies. This was consistent with the infaunal data collected which also recorded lesser sandeels. Lesser sandeel, common dab and long rough dab were recorded in trawls across the Proposed Development, while *Pomatoschistus* sp. was only recorded in trawls within the Proposed Development ECC. Two four-bearded rockling and angler fish were recorded across all trawls.

214. To inform the fish and shellfish baseline characterisation for the Seagreen Alpha/Bravo EIA (Seagreen, 2012b), a total of 53 epibenthic trawls were conducted during the benthic surveys in 2011. Several species were observed including pogge, dab, goby, lesser sandeel, butterfish, plaice, whiting and cod. Of these species, dab, goby, and lesser sandeel were generally the most abundant and with up to 588 individuals recorded in a single trawl. Commercial species such as plaice, whiting and cod were also observed.

215. In addition, elasmobranchs (sharks and rays) have been found distributed throughout the east coast of Scotland (Coull *et al.,* 1998; Ellis *et al.,* 2012; Baxter *et al.,* 2011).

8.3.3 DIADROMOUS FISH SPECIES

216. There is the potential for diadromous fish species to migrate to and from Scottish rivers in the vicinity of the Proposed Development and, therefore, they may migrate through the Proposed Development fish and shellfish study area to rivers during certain periods of the year (SNH, 2017a and National Biodiversity Network (NBN) Atlas, 2019).

217. The fish and shellfish ecology assessment for Seagreen Alpha/Bravo (SSE Renewables, 2012) observed seven migratory species of relevance. These species include Atlantic salmon, sea trout, sea lamprey, river lamprey, European eel, Allis and twaite shad and sparling (European smelt). The species which were considered as having the greatest potential to be present within the vicinity of the Seagreen Alpha/Bravo were Atlantic salmon, sea trout, eels and the lampreys.

218. For the purposes of the impact assessment, it will be assumed that the aforementioned species are likely to be present within the Proposed Development Array Area and/or proposed ECC, during key migration periods (e.g. adult migration to spawning rivers and smolt migration from natal rivers in the vicinity of the development). With respect to migratory fish species, the aim of the impact assessment will be to determine whether construction, operation and maintenance or decommissioning activities have the potential to lead to disruption to migration, e.g. construction noise potentially creating an effective barrier to fish migration. The timing of fish migration will therefore be an important element of the baseline characterisation and this will be collected through desktop data sources, including rod catch data from rivers on the east coast of Scotland (e.g. Tweed, Forth, Tay, Esk and Dee), recent papers (e.g. Newton *et al.,* 2017; Gardiner *et al.,* 2018; Godfrey *et al.,* 2015; Malcolm *et al.,* 2015) and Marine Scotland smolt survey data from the east coast of Scotland (Marine Scotland, 2018c).

8.3.4 SHELLFISH ASSEMBLAGE

219. Commercial landing data provides an overview of species present within the northern North Sea fish and shellfish study area. Species most frequently caught include the brown crab, European lobster, great scallop, velvet swimming crab and squid. Other species caught in the area include green crab and whelks (ICES, 2018).

220. The River South Esk, River Dee and River Spey SACs have primarily been designated as SACs due to the presence of the freshwater pearl mussel. The freshwater pearl mussel, whilst not present in the marine environment, is dependent on the Atlantic salmon smolting population (JNCC, undated). Should the Atlantic salmon population be adversely affected by the Proposed Development, this may have an indirect effect on freshwater pearl mussel populations.

221. During the epibenthic trawls conducted for Seagreen Alpha/Bravo, several shellfish species were observed including great scallop and queen scallop (Seagreen, 2012b). *Nephrops* was also recorded during site-specific surveys for the Berwick Bank Wind Farm (including epibenthic beam trawls and seabed imagery). Underwater video survey data provided by Marine Scotland also showed that *Nephrops* abundance was high in the inshore waters of the southern parts of the spawning and nursery grounds (Seagreen, 2012b). Other species such as brown crab, lobster, velvet swimming crab, whelk and squid were either recorded in very low abundances or not observed at all in the in the benthic surveys but are all recognised as important commercial shellfish species within the northern North Sea fish and shellfish study area (Seagreen, 2018).

8.3.5 SPAWNING AND/OR NURSERY GROUNDS

222. Potential nursery and spawning areas in the North Sea for a range of species were identified by Coull *et al.* (1998), based on larvae, egg and benthic habitat survey data. Ellis *et al.* (2012) reviewed this data for

several fin fish species in the North Sea, including herring, providing an updated understanding of areas of low and high intensity nursery and spawning grounds.

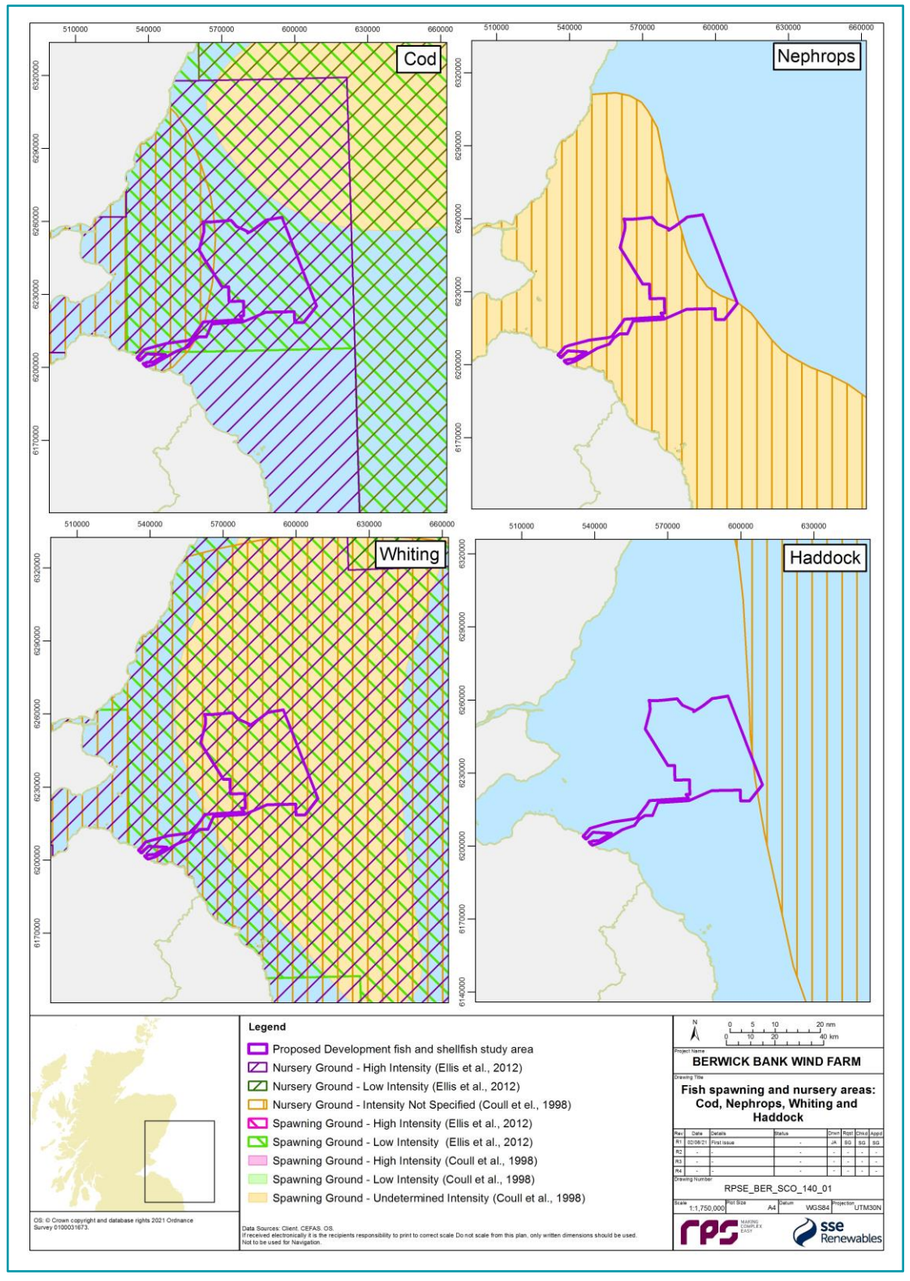
223. Based on this data, spawning areas for several species overlap the Proposed Development fish and shellfish study area, including low-intensity spawning for cod and plaice, non-specified spawning for *Nephrops*, sprat, whiting, lemon sole and herring, and high-intensity for sandeel. Species with known spawning periods and nursery habitats identified within the Proposed Development fish and shellfish study area have been summarised in Apx. Table 8. 3, and illustrated in Apx. Figure 8. 1 to Apx. Figure 8. 3.

224. Herring nursery grounds are widespread along the Scottish and Northumberland coastlines (Ellis *et al.,* 2012), with post-larvae juveniles up to sub-adults that are yet to reach sexual maturity feeding here until migrating to feeding grounds further offshore where they remain until reaching sexual maturity (ICES, 2016). Herring are a commercially and ecologically important pelagic fish species and are common across much of the North Sea and is listed as a Scottish Priority Marine Feature (PMF) (Fauchald *et al.,* 2011 and Casini *et al.,* 2004). Herring utilise specific benthic habitats during spawning, which increases their vulnerability to activities impacting the seabed. Further, as a hearing specialist, herring are vulnerable to impacts arising from subsea noise.

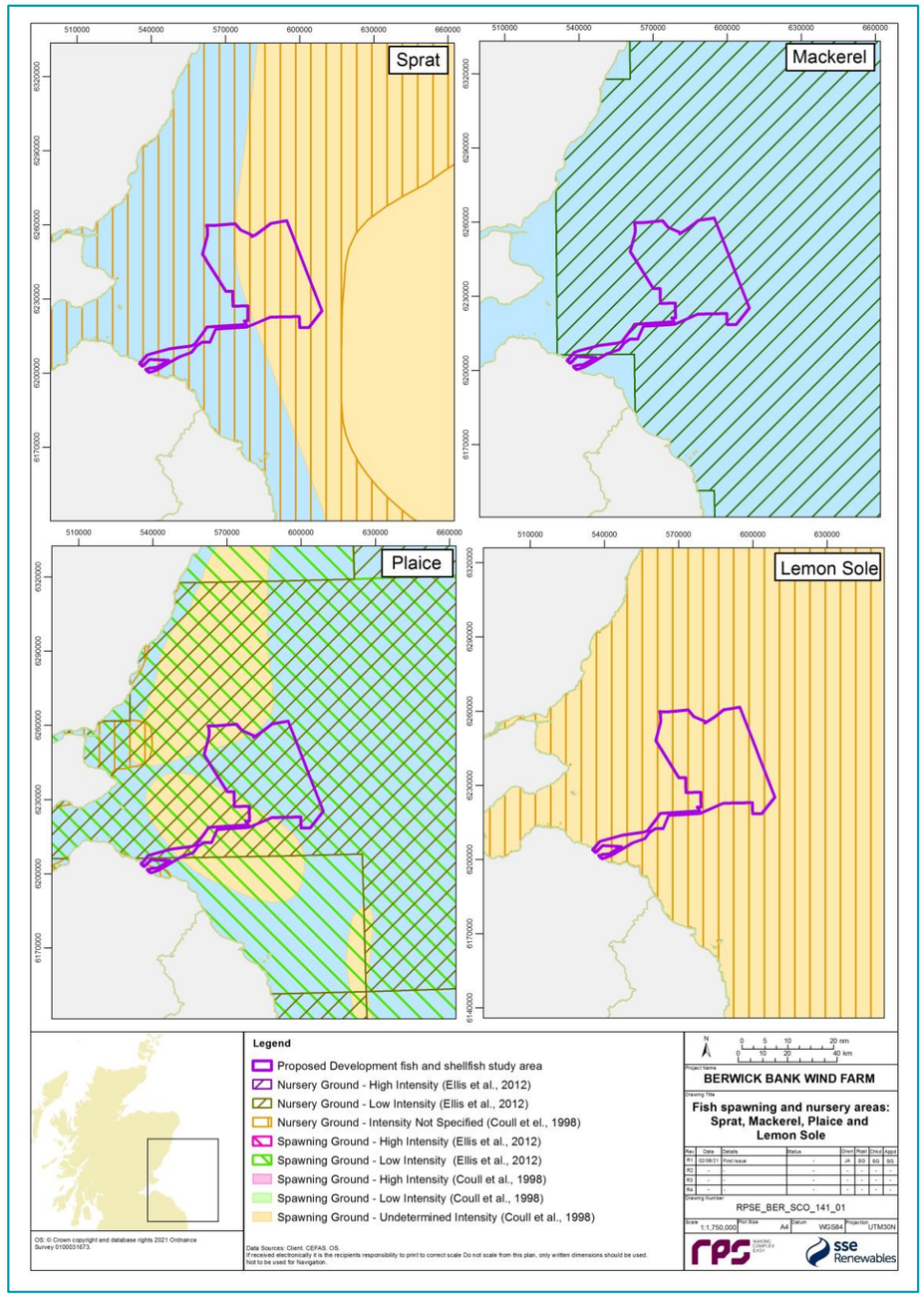
225. A review of spawning grounds suggests there is an overlap of the Proposed Development fish and shellfish study area with herring nursey grounds. This overlap occurs along the Proposed Development ECC towards landfall and is non-specified in intensity. A further review of the herring spawning and nursery grounds will be undertaken to support the fish and shellfish ecology assessment following guidelines set out by Boyle and New (2018) considering seabed sediment type and records of herring larvae from the IHLS over the past decade.

Apx. Table 8. 3: Key Species with geographic Spawning and Nursery Grounds Overlap with the Proposed Development (Coull *et al.*, 1998 and Ellis *et al.*, 2012)

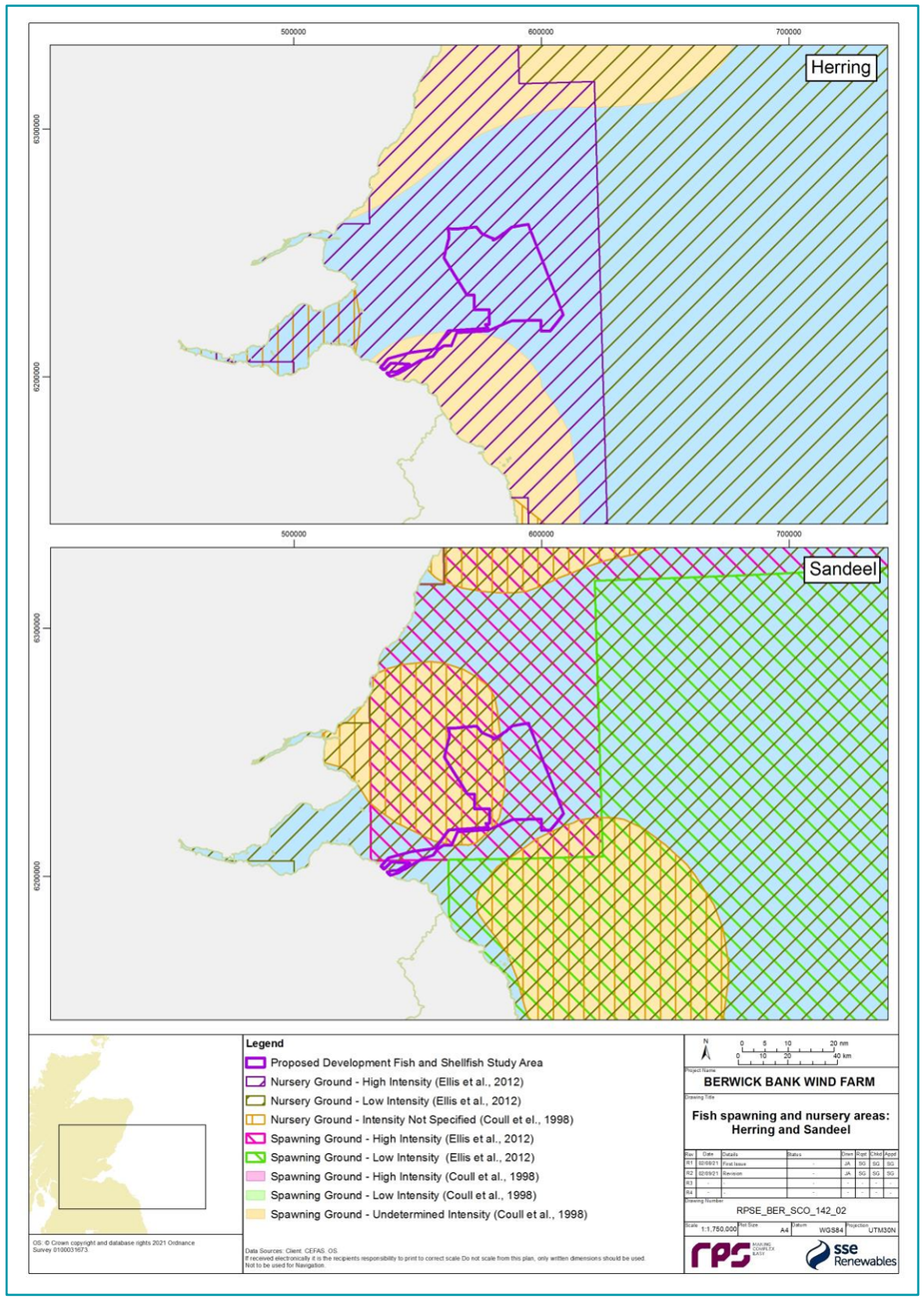
Common Name	Species	Proposed Development Array Area		ECC	
		Spawning	Nursery	Spawning	Nursery
Anglerfish	*Lophius piscatorius*		✓		✓
Blue Whiting	*Micromesistius poutassou*		✓		✓
Cod	*Gadus morhua*	✓	✓	✓ (partial)	✓
European hake	*Merluccius merluccius*		✓		✓ (partial)
Herring	*Clupea harengus*		✓	✓ (partial)	✓
Ling	*Molva molva*		✓		✓
Mackerel	*Trachurus trachurus*		✓		✓
Plaice	*Pleuronectes platessa*	✓	✓	✓	✓
Sandeel	*Ammodytidae*	✓	✓	✓ (partial)	✓
Spotted ray	*Raja montagui*		✓		✓
Spurdog	*Squalus sp.*		✓		✓ (partial)
Tope shark	*Galeorhinus galeus*		✓		✓ (partial)
Whiting	*Merlangius merlangus*	✓	✓	✓	✓
Haddock	*Melanogrammus aeglefinus*		✓		
Nephrops	*Nephrops norvegicus*	✓ (partial)	✓ (partial)	✓	✓
Sprat	*Sprattus sprattus*	✓	✓	✓ (partial)	✓
Lemon sole	*Microstomus kitt*	✓	✓	✓	✓



Apx. Figure 8. 1: **Cod, Nephrops, Whiting and Haddock Spawning and Nursery Grounds and Overlaps with the Proposed Development**



Apx. Figure 8. 2: **Sprat, Mackerel, Plaice and Lemon Sole Spawning and Nursery Grounds and Overlaps with the Proposed Development**



Apx. Figure 8. 3: Herring and Sandeel Spawning and Nursery Grounds and Overlaps with the Proposed Development

Appendix 9 MARINE MAMMALS – BASELINE ENVIRONMENT

9.1 DESKTOP STUDY

226. An initial desk-based review of literature and data sources to support this Offshore EIA Scoping Report has identified a number of baseline datasets. These are summarised in Apx. Table 9. 1.

Apx. Table 9. 1: Summary of Key Desktop Reports to Inform Marine Mammals Scoping Assessment

Source	Survey/Data Years	Reference
Bottlenose dolphin Photo ID surveys	May-Sept 2009 - present	Quick *et al.* (2014) Cheney *et al.* (2013) Arso Civil *et al.* (2019)
East Coast Marine Mammal Acoustic Study (ECOMMAS) PAM data	2013 - present	Marine Scotland Science
Marine Ecosystems Research Program cetacean density surfaces	1980 - 2018	Waggitt *et al.* (2020)
Seal haul-out counts	2019	Data provided by SMRU
Seal telemetry	1990 - 2018	Data provided by SMRU
Seagreen Phase 1 boat-based surveys	May - Aug 2017	
SCANS III	Jul 2016	Hammond *et al.* (2017) and Hammond *et al.* (2021)
Seal habitat preference maps	Telemetry: 114 grey seals and 239 harbour seals Count: 2015-2020	Carter *et al.* (2020)
Forth and Tay Offshore Wind Developers Group cetacean survey data analysis report	2009 - 2011	Mackenzie *et al.* (2012) King and Sparling (2012)
Seagreen Firth of Forth Round 3 Zone Marine Mammal Surveys	2009 - 2011	Sparling (2012)
JNCC Report 544: Harbour Porpoise Density	May 2010 - Nov 2011	Heinänen and Skov (2015)
Analysis of The Crown Estate aerial survey data for marine mammals for the Forth and Tay Offshore Wind Developers Group		
Joint Cetacean Protocol Phase III	May 2009 - Mar 2010	Paxton *et al.* (2016)
Cetacean Baseline Characterisation for the Firth of Tay: Bottlenose dolphins	Photo ID: 2009 & 2010 PAM: 2006 - 2009	Quick and Cheney (2011)
SCANS II	Jul 2005	Hammond *et al.* (2006)
SCANS I	Jul 1994	Hammond *et al.* (2002)

9.2 SITE-SPECIFIC SURVEY DATA

227. This report does not contain a detailed summary of the site-specific survey collected to support the development of the EIA Report, however has been issued to relevant consultees as a Marine Mammals Interim Data Report. The following section provides a detailed overview of other sources of data available for the Proposed Development. Details of site-specific data will be presented in the offshore EIA report.

9.3 BASELINE CHARACTERISATION

9.3.1 PROTECTED AREAS

228. There are several protected areas for marine mammals in east Scotland. Apx. Table 9. 2 provides an early indication of key designated sites that may occur in proximity to the Proposed Development and which may require consideration within the EIA and HRA. This list will be refined in the EIA to also include sites that fall within the potential zone of influence of the Proposed Development, which will be determined as part of the EIA process. A full screening of European sites with qualifying marine mammal interest features will be undertaken in the LSE Screening Report for the Proposed Development. Relevant marine mammal notified interest features of European sites screened into the marine mammal assessment will be fully considered and assessed in the ES section with the assessment on the European site itself deferred to the Report to Inform Appropriate Assessment (RIAA).

229. The screening to be undertaken in the marine mammal ES section will also include national designations, including designated seal haul out sites, Sites of Special Scientific Interest (SSSIs) and Nature Conservation Marine Protected Areas (MPAs).

Apx. Table 9. 2: Summary of Marine Mammal Protected Areas Nearest to the Proposed Development

Site	Type	Species	Minimum Distance from Proposed Development Array Area (km)	Minimum Distance from ECC (km)
Berwickshire and North Northumberland Coast	SAC	Grey seals	~40	~3
Isle of May	SAC	Grey seals	~59	~21

Site	Type	Species	Minimum Distance from Proposed Development Array Area (km)	Minimum Distance from ECC (km)
Firth of Tay and Eden Estuary	SAC	Harbour seals	~62	~49
Southern Trench	pMPA	Minke Whale	99	145
Southern North Sea	SAC	Harbour porpoise	144	167
Moray Firth	SAC	Bottlenose dolphin	>200	>200

9.3.2 BELOW MLWS

9.3.2.1 Harbour Porpoise

230. The most recent assessment of harbour porpoise in UK waters concluded that the overall trend in Conservation Status was Unknown, highlighting that there was insufficient data to establish a trend for the population size nor potential future prospects for the population (JNCC 2019b). The Proposed Development is located within the North Sea MU for harbour porpoise (IAMMWG, 2021), which is estimated to have an abundance of 346,601 porpoise (CV: 0.09, 95% CI: 289,498 – 419,96) based on estimates from the Small Cetaceans in the European Atlantic and North Seas (SCANS) III survey (Hammond *et al.,* 2017;, Hammond *et al.,* 2021). The SCANS III density estimate for the relevant survey block (Block R) was estimated to be 0.599 porpoise/ km^2 (CV: 0.287).

231. Given the sightings recorded thus far during the ongoing site specific aerial surveys, and from previous surveys in the Firth of Forth Round 3 Zone (Apx. Figure 9. 1), harbour porpoise are therefore considered likely to occur year round within the Proposed Development zone of potential impact.

9.3.2.2 Minke Whale

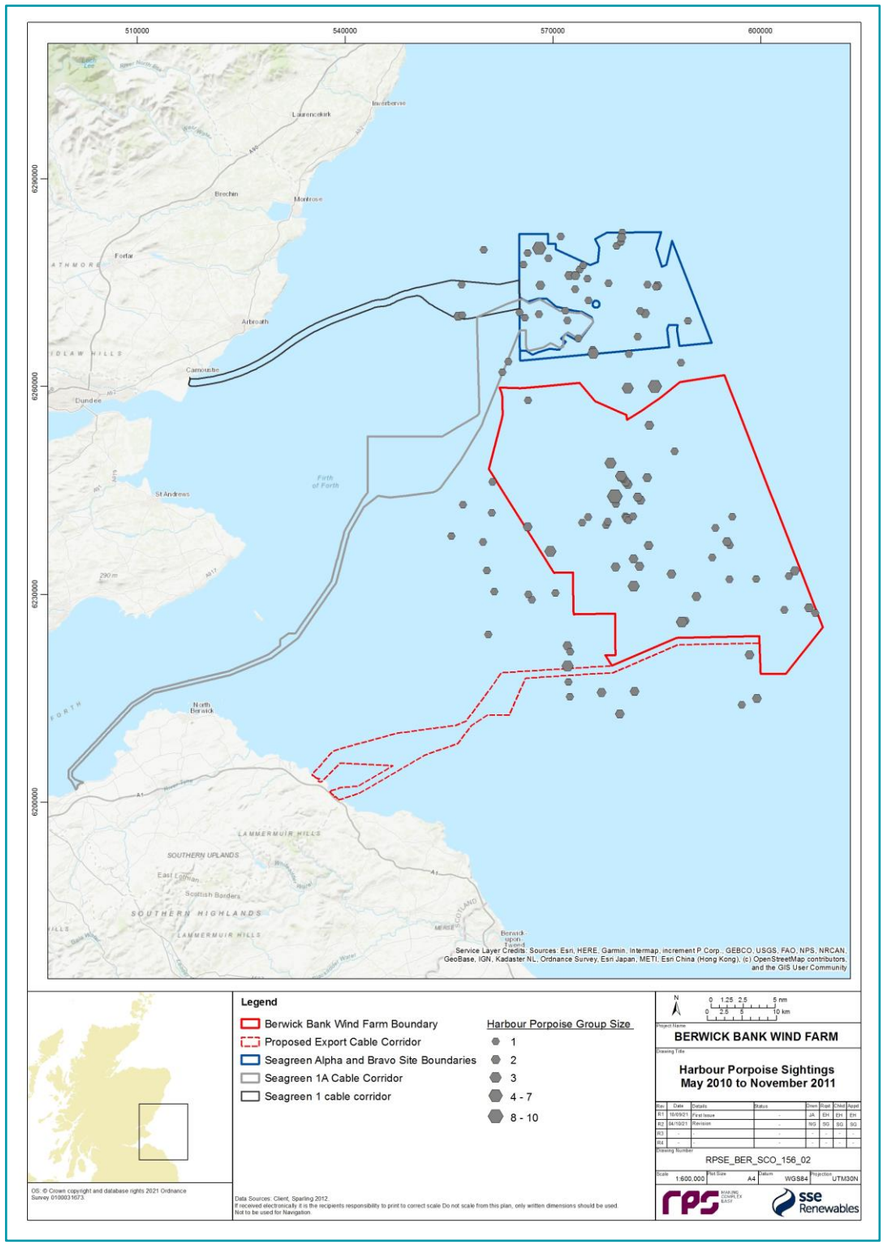
232. The most recent assessment of minke whales in UK waters concluded that the overall trend in Conservation Status was Unknown, highlighting that there was insufficient data to establish a trend for the population size nor potential future prospects for the population (JNCC, 2019f). All minke whales in UK waters are considered to be part of the Celtic and Greater North Seas MU (IAMMWG, 2021), which is estimated to have an abundance of 20,118 whales (CV: 0.18, 95% CI: 14,061 – 28,786) based on estimates from the SCANS III survey (Hammond *et al.,* 2017; Hammond *et al.,* 2021) and the ObSERVE survey (Rogan *et al.,* 2018). The SCANS III density estimate for the relevant survey block (Block R) was estimated to be 0.0387 whales/ km^2 (CV: 0.614).

233. Given the sightings recorded thus far during the ongoing site specific aerial surveys, and from previous surveys in the Firth of Forth Round 3 Zone (Apx. Figure 9. 2), minke whales are considered likely to occur in the summer months within the Proposed Development zone of potential impact.

9.3.2.3 White Beaked Dolphin

234. The most recent assessment of white-beaked dolphins in UK waters concluded that the overall trend in Conservation Status was Unknown, highlighting that there was insufficient data to establish a trend for the population size nor potential future prospects for the population (JNCC, 2019e). All white-beaked dolphins in UK waters are considered to be part of the Celtic and Greater North Seas MU (IAMMWG, 2021), which has an estimated population size of 43,951 dolphins (CV: 0.22, 95% CI: 28,439 – 67,924) based on estimates from the SCANS III survey (Hammond *et al.,* 2017; Hammond *et al.,* 2021) and the ObSERVE survey (Rogan *et al.,* 2018). The SCANS III density estimate for the relevant survey block (Block R) was estimated to be 0.243 dolphins/ km^2 (CV: 0.484).

235. Given the sightings recorded thus g the site specific aerial surveys, and from previous surveys in the Firth of Forth Round 3 Zone (Apx. Figure 9. 3), white-beaked dolphins are considered likely to occur year round (with increased numbers in the summer months) within the Proposed Development zone of potential impact.



Apx. Figure 9. 1: Harbour Porpoise Sightings from the Firth of Forth Round 3 Zone Vessel Surveys May 2010 to November 2011 (Sparling 2012). Yellow Area Denotes the Original Phase 1 Area, Pink Area Denotes the Original Phase 2 and 3 Areas

9.3.2.4 Bottlenose Dolphin

236. The most recent assessment of bottlenose dolphins in UK waters concluded that the overall trend in Conservation Status was Unknown, highlighting that although the population size appears to be stable, there were too few datapoints to confidently conclude on the current and future population trends (JNCC, 2019a).

237. The Moray Firth population of bottlenose dolphins is the only known remaining resident population in the North Sea and it was for this reason that the Moray Firth SAC was established in order to protect this population. The current population estimate of bottlenose dolphin abundance for the Coastal East Scotland MU population is 195 individuals (95% Highest Posterior Density Intervals (HPDI): 162 to 253) based on photo-ID counts between 2006 and 2007 (Cheney *et al.,* 2013). The results of further surveys suggest that the east coast Scotland population has continued to increase in size since 2007 (Cheney *et al.,* 2018).

238. The SCANS III density estimate for the relevant survey block (Block R) was estimated to be 0.0298 dolphins/ km^2 (CV: 0.861). Within the Moray Firth SAC, bottlenose dolphins are generally found close to shore (within 3 km) and in shallow water (<20 m) (NatureScot, 2021). Their distribution outside of the SAC, along the of the Tayside and Fife coast, is similar, with dolphins mainly encountered in waters less than 20 m deep and within 2 km from the coast (Quick *et al.,* 2014). Given the presence of bottlenose dolphins within coastal waters in east Scotland, they are considered likely to occur year-round in the coastal waters of the Proposed Development zone of potential impact.

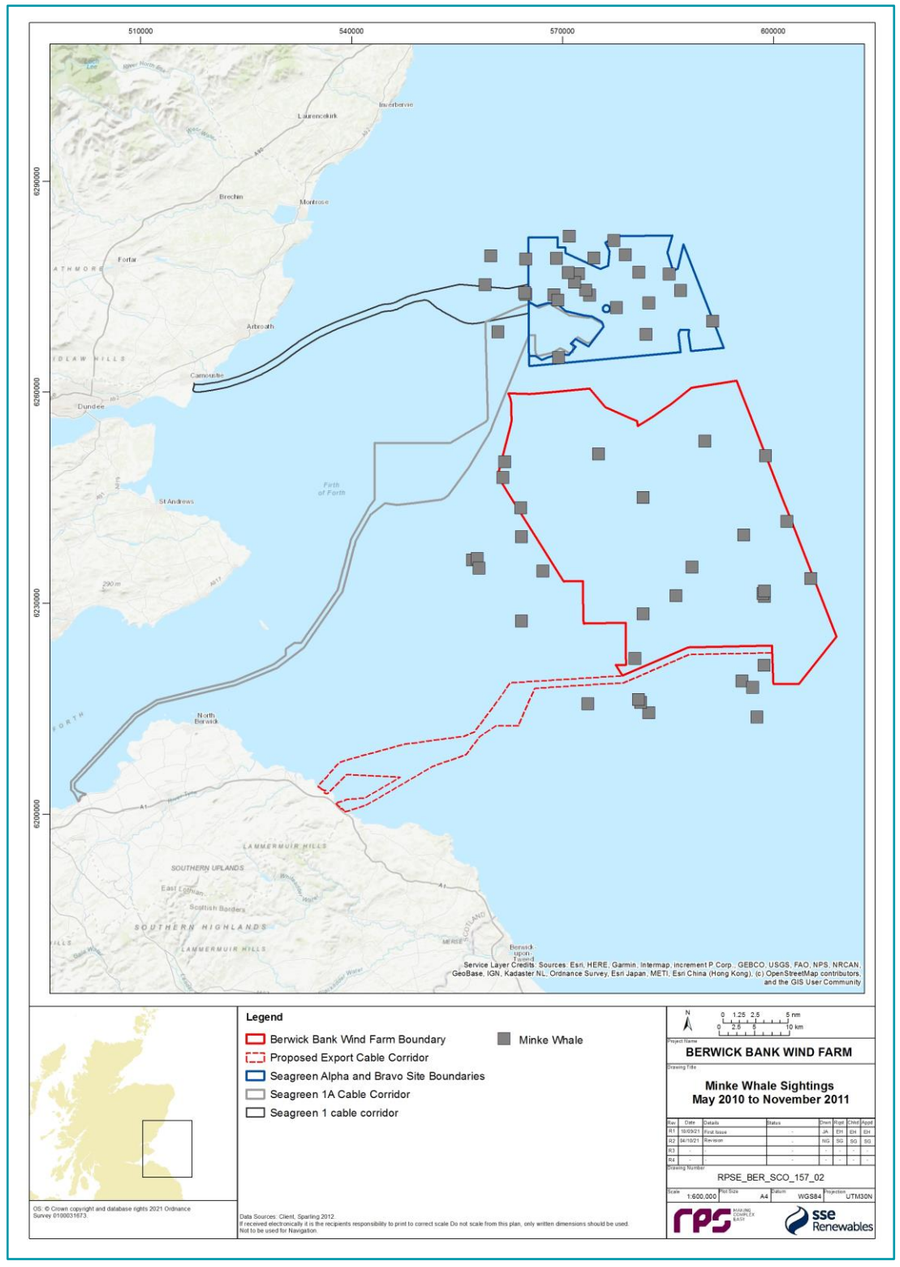
9.3.2.5 Grey Seals

239. The most recent assessment of grey seals in UK waters concluded that the overall trend in Conservation Status was Favourable, with an overall trend in Conservation Status assessed as Improving (JNCC 2019c).

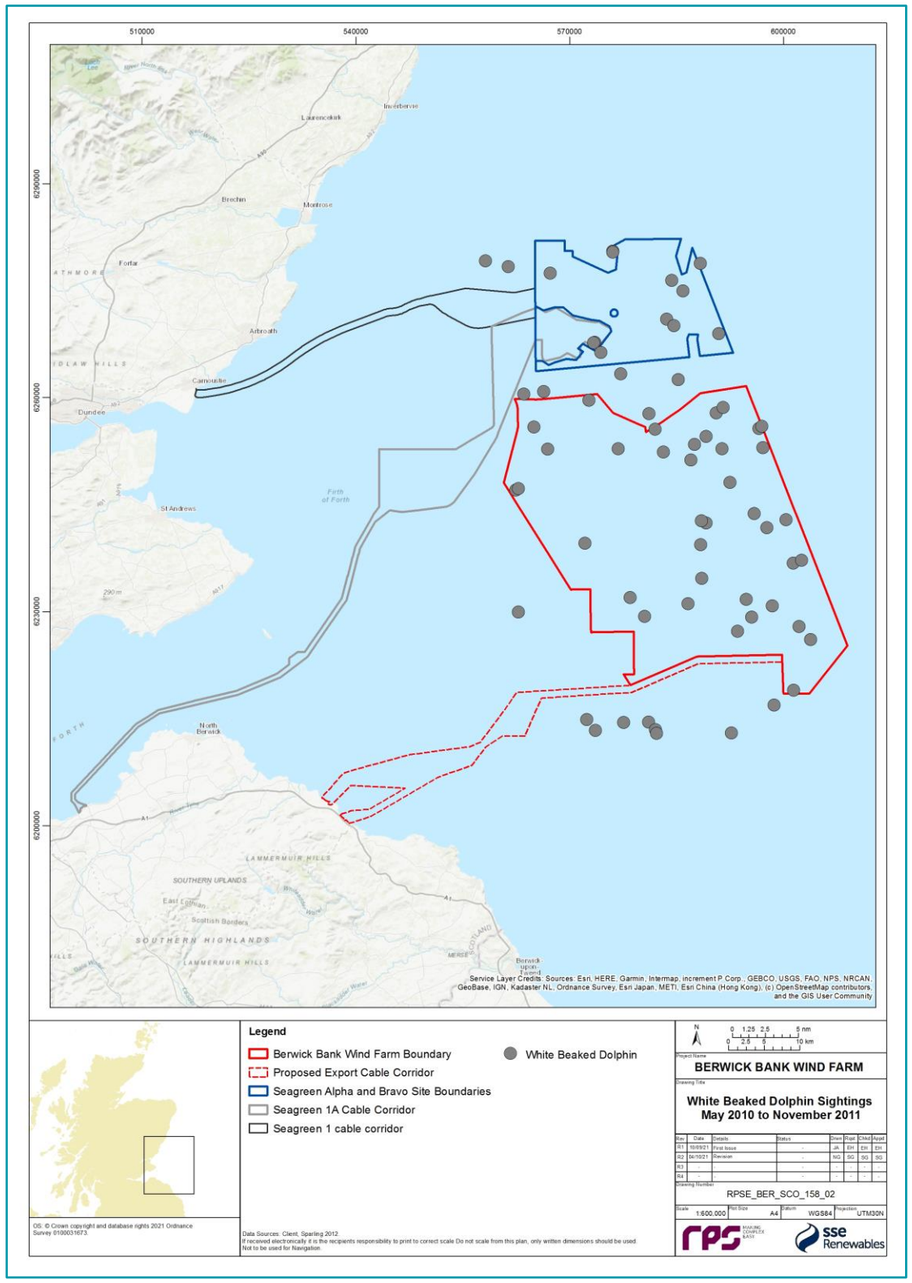
240. Grey seal August haul-out counts in the East Scotland MU have been much higher than harbour seal counts. Though surveyed less frequency, overall counts for the East Scotland MU have shown an increase in grey seals from 2,328 in the 1996-1997 period to 3,683 in the 2016-2019 period. The counts at the East Scotland MU therefore account for 9% of the grey seals hauled-out in Britain and 14% of the grey seals hauled-out in Scotland between 2016-2019. In the Northeast England MU, grey seals are primarily present in the Northumberland area. While counts of this area are infrequent, they do show a significant increase in counts from 613 grey seals in the 1996-1997 period to 6,501 in the 2016-2019 period (SCOS, 2021). The total August haul-out count grey seals in the Northeast England MU in the count period 2016-2019 was 6,501 grey seals, which accounts for 15% of the grey seals hauled-out in Britain between 2016-2019 (SCOS, 2021).

241. Telemetry data have shown that grey seals travel further to forage and between haul-out sites than harbour seals. Grey seals typically forage within 100 km of a haul-out site and foraging trips can last for 30 days; however, individual tracks have shown that some grey seals can make trips several hundred kilometres offshore (SCOS, 2021). In total, 46 adult grey seals have been tagged in the East Scotland MU between 1990 and 2013, and a further 23 have been tagged in the Northeast England MU between 1991 and 2008. Grey seals tracks have been recorded throughout the Study Area. The data show wide ranging behaviour, with individual grey seals tagged in the East Scotland MU and recording telemetry data within the Study Area, also recording telemetry tracks as far as the Outer Hebrides and Denmark (Apx. Figure 9. 6). The 59 adult grey seals with telemetry track data within the Study Area also showed connectivity with several UK grey seal SACs: the Berwickshire and North Northumberland Coast SAC, the Isle of May SAC, the Faray and Holm of Faray SAC, the Humber Estuary SAC, the North Rona SAC and the Monach Islands SAC.

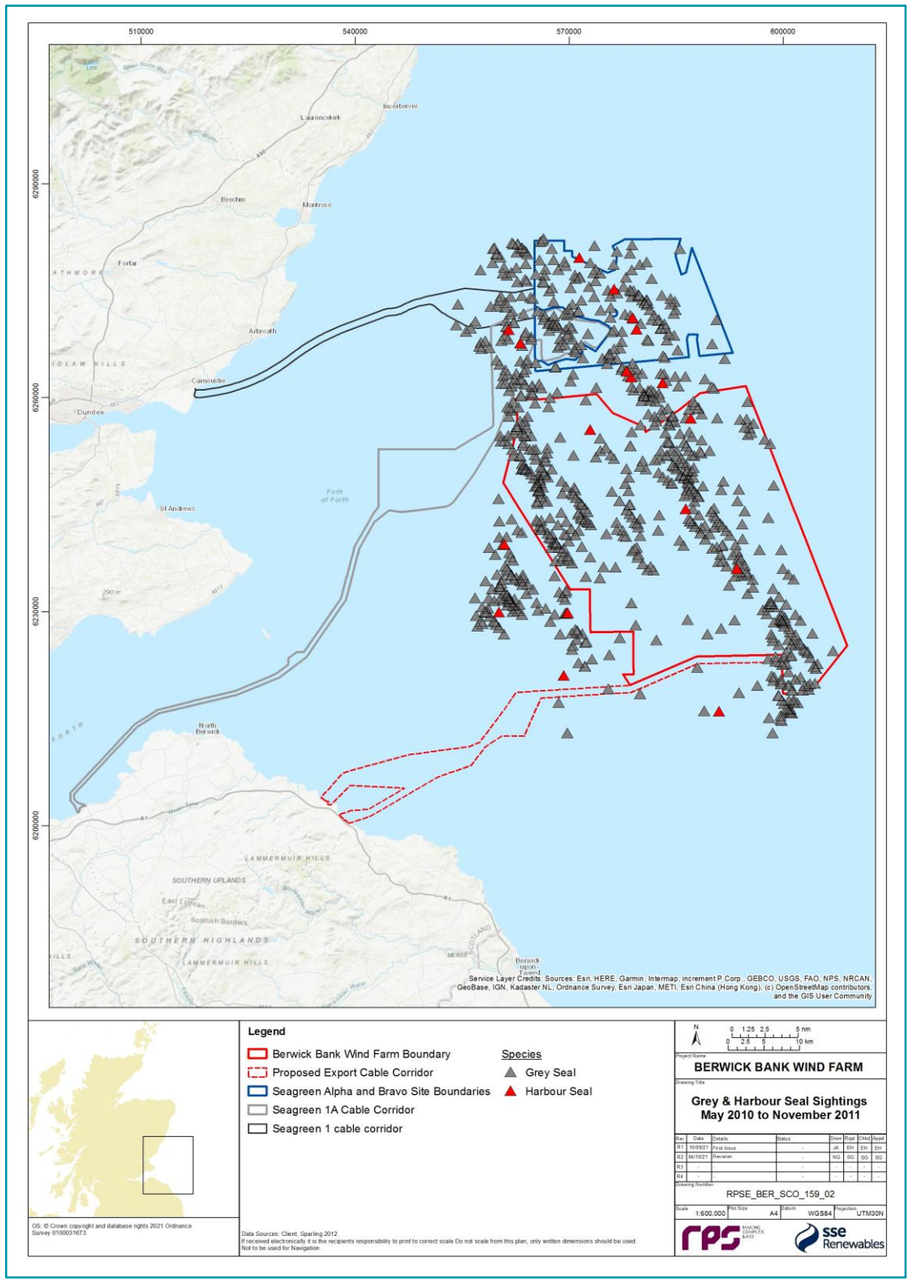
242. Given the sightings recorded thus far during the ongoing site specific aerial surveys, from previous surveys in the Firth of Forth Round 3 Zone (Apx. Figure 9. 4), from the seal habitat preference map (Apx. Figure 9. 5) and the telemetry data (Apx. Figure 9. 6), grey seals are considered likely to occur year round within the Proposed Development zone of potential impact.



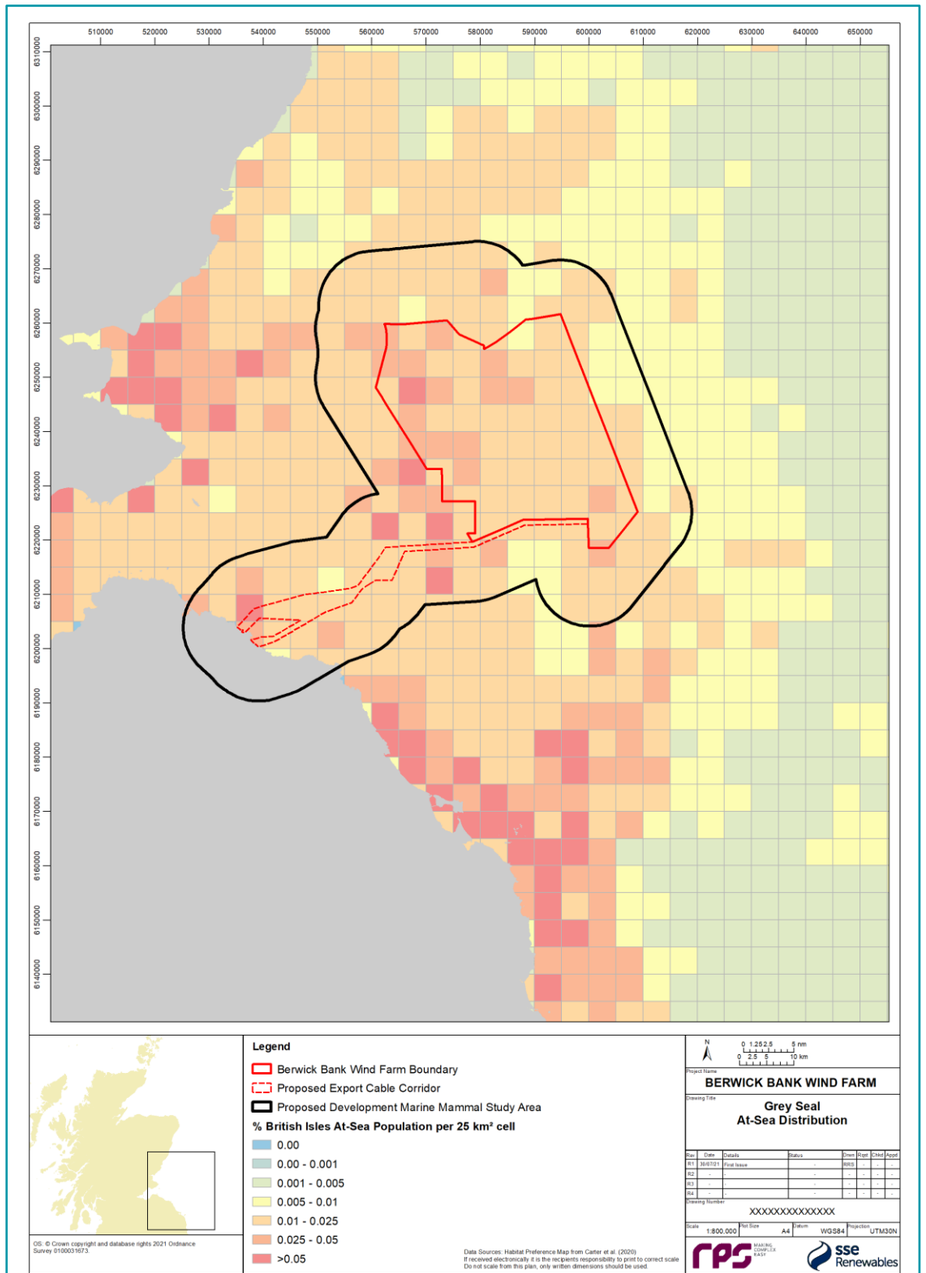
Apx. Figure 9. 2: Minke Whale Sightings from the Firth of Forth Round 3 Zone Vessel Surveys May 2010 to November 2011 (Sparling, 2012). Yellow Area Denotes the Original Phase 1 Area, Pink Area Denotes the Original Phase 2 and 3 Areas



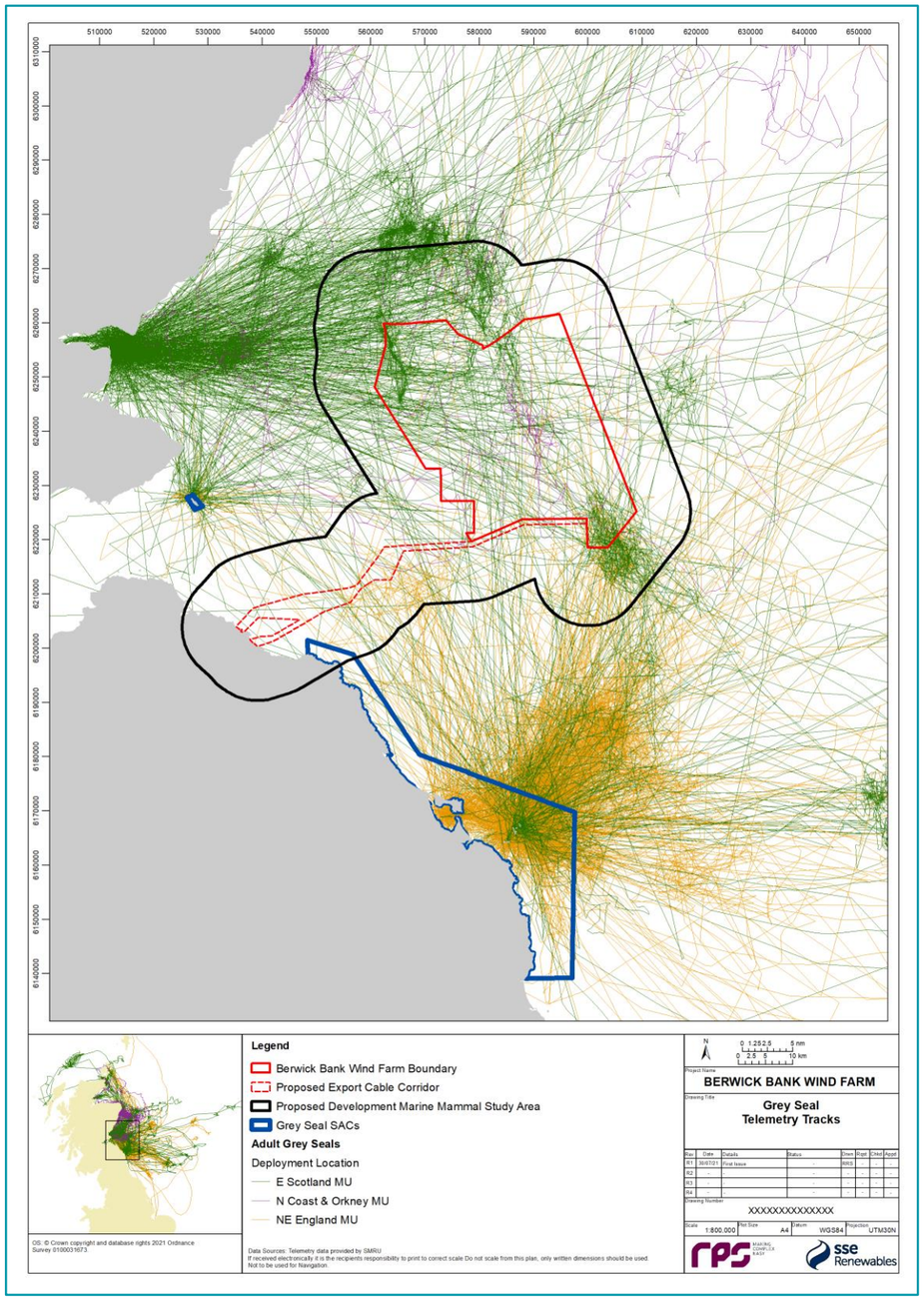
Apx. Figure 9. 3: White-beaked Dolphin Sightings from the Firth of Forth Round 3 Zone Vessel Surveys May 2010 to November 2011 (Sparling, 2012). Yellow Area Denotes the Original Phase 1 Area, Pink Area Denotes the Original Phase 2 and 3 Areas



Apx. Figure 9. 4: Grey and Harbour Seal Sightings from the Firth of Forth Round 3 Zone Vessel Surveys May 2010 to November 2011 (Sparling, 2012). Yellow Area Denotes the Original Phase 1 Area, Pink Area Denotes the Original Phase 2 and 3 Areas



Apx. Figure 9. 5: Grey Seal at-Sea Distribution (from Carter *et al.*, 2020)



Apx. Figure 9. 6: **Telemetry Tracks for all 59 adult Grey Seals that entered into the Proposed Development Marine Mammal Study Area**

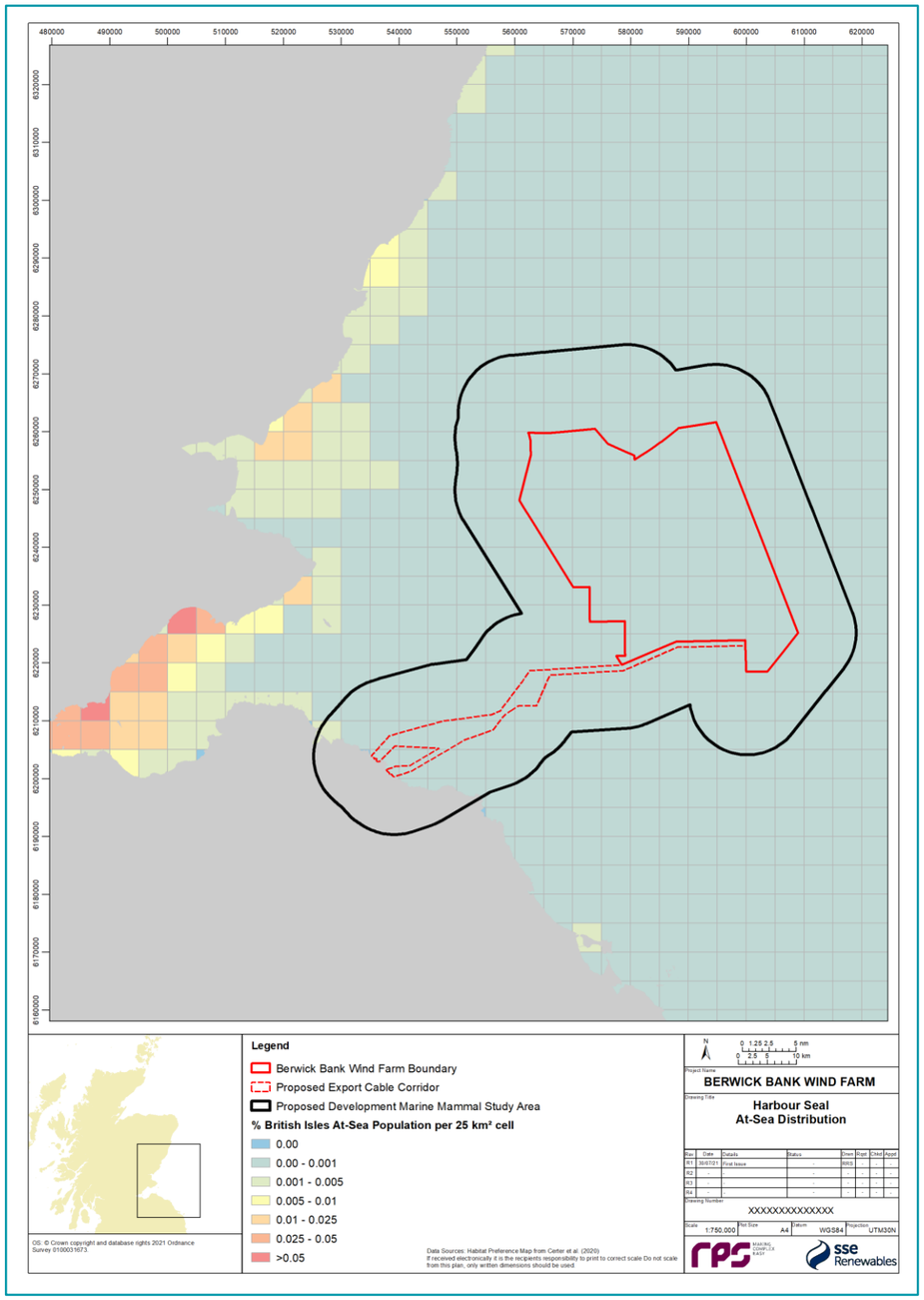
9.3.2.6 Harbour Seals

243. In the UK, harbour seals have been assessed as having an Unfavourable – Inadequate conservation status (JNCC 2019d). The assessment concluded Unfavourable – Inadequate for population size as the short-term trend is unknown and the current population size is below the Favourable Reference Range. In addition, the future prospects were assessed as Unfavourable – Inadequate because the future prospects of the population are poor.

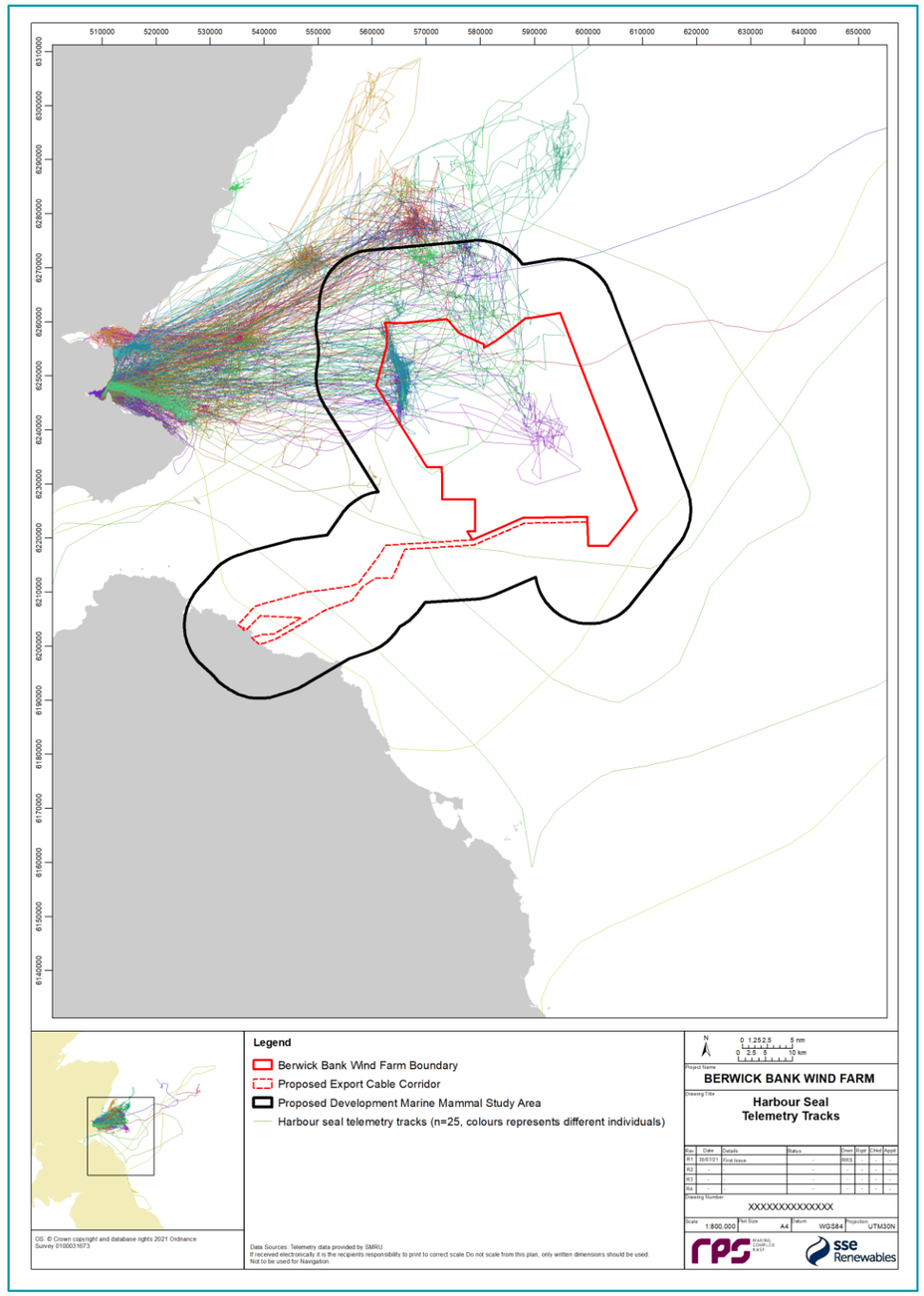
244. The Project is located within the East Scotland seal MU. Not all sites within the East Scotland MU are surveyed annually, however annual counts have been conducted in the Firth of Tay and Eden Estuary SAC on an annual basis since 2005. The SAC counts were stable between 1990 and 2002; however, after the 2002 PVD epidemic, counts declined rapidly and monotonically between 2002 and 2017 at a rate of -18.6% p.a. (Thompson *et al.,* 2019) with no signs of recovery in recent years. Though surveyed with less frequency, overall counts for the East Scotland MU have also shown a decline since the 1996-1997 count period from 764 seals to 343 in the 2016-2019 count period (SCOS, 2021). All sites within the Tees Estuary (Northeast England MU) have been surveyed annually between 1996 and 2019 by the Industry Nature Conservation Agency (INCA), and, additionally, SMRU have carried out surveys in the wider MU in 1997, 2005, 2007, 2008, 2015, 2016 and 2018. Harbour seal August haul-out counts in the Northeast England MU are low, with annual counts ranging between 38 and 91. The most recent haul-out count is 79 harbour seals for the 2016-2019 count period (SCOS, 2021).

245. Harbour seals typically forage within 40-50 km from their haul-out sites (compared to >100 km for grey seals) (SCOS, 2021). In total, 46 adult harbour seals have been tagged in the East Scotland MU between 2001 and 2017. Of the 46 adult harbour seals tagged in East Scotland, 25 had telemetry track data recorded within the Study Area (Apx. Figure 9. 8). All 25 of these harbour seals also showed connectivity with the Firth of Tay and Eden Estuary SAC. Only two of the 25 harbour seals tagged in the East Scotland MU recorded telemetry data out with the East Scotland MU, with both seals recording telemetry tracks within the Northeast England MU. No harbour seals have been tagged in the Northeast England MU.

246. Given the sightings recorded during the site-specific aerial surveys, from previous surveys in the Firth of Forth Round 3 Zone (Apx. Figure 9. 4), from the seal habitat preference map (Apx. Figure 9. 7), and the telemetry data (Apx. Figure 9. 8), harbour seals are considered likely to occur year round (primarily in coastal waters) within the Proposed Development zone of potential impact.



Apx. Figure 9. 7: **Harbour Seal at-Sea Distribution (from Carter *et al.*, 2020)**



Apx. Figure 9. 8: **Telemetry Tracks for all 25 Harbour Seals that entered into the Proposed Development Marine Mammal Study Area**

9.3.3 ABOVE MLWS

247. The only marine mammal receptors that are at risk of impacts above MLWS are seals at hauled-out sites. Seal haul-out sites will be important to consider in terms of the potential impacts from landfall activities.

248. There are three grey seal haul-out sites that are located within 10 km from ECC landfall locations: Long Craigs (~7 km), Scart Rock (~6 km), and Black Bull (~7 km). In the East Scotland MU there are three designated seasonal haul-out sites for grey seals: Fast Castle, Inchkeith and Craigleith. The closest of these designated seasonal haul outs is Fast Castle, which is located within 3 km of the landfall.

249. There are no harbour seal haul-out sites near the ECC landfall locations, the nearest harbour seal haul-out site is Eastern Craigs, Black Rocks, Leith, which is located ~50 km swimming distance from the nearest ECC landfall location There are also two designated haul-out sites for harbour seals: Kinghorn Rocks and Inchmickery and Cow and Calves, both of which are located >40 km from ECC landfall location.

Appendix 10 OFFSHORE AND INTERTIDAL ORNITHOLOGY – BASELINE ENVIRONMENT

10.1 DESKTOP STUDY

250. An initial desk-based review of literature and data sources to support this Offshore EIA Scoping Report has identified a number of baseline datasets in the form of pre-existing, site-specific and non site-specific datasets. These are summarised in Apx. Table 10. 1. Other relevant sources of data will be sought as the assessment progresses and all such sources of information will be referenced appropriately in the Offshore EIA Report.

Apx. Table 10. 1: Summary of Key Desktop Reports to Inform Ornithology Scoping Assessment

Source	Survey/Data Years	Reference
Special Protection Areas, proposed Special Protection Areas, Sites of Special Scientific Interest, RAMSAR sites.	2021	NatureScot website
Seabirds Count national colony census data	2015 - 2021	BTO Seabird Monitoring Programme website
Berwick Bank Ornithology Interim Baseline Report	March 2019 to April 2021	SSE 2021
2018 Seagreen 1 (Alpha and Bravo) Environmental Statement, Addendum and associated technical reports.	2018, 2019	Seagreen online library
Visual aerial surveys of Firth of Forth	2009 - 2010	Kober *et al*. 2010
Desk-based revision of seabird foraging ranges used for HRA screening.	-	Woodward *et al*. 2019
Seagreen Ornithology Monitoring Strategy	-	Seagreen, 2019
Marine Ecosystems Research Program seabird density surfaces	1980 - 2018	Waggitt et al. (2020)

10.1.1 SITE-SPECIFIC SURVEY DATA

251. The primary data source used to inform the offshore and intertidal ornithology EIAR Assessment for the Proposed Development will be the 25 monthly digital aerial transect surveys conducted between March 2019 and April 2021.

252. The aerial survey area encompasses the Proposed Development Proposed Development Array Area, plus a 16 km buffer, which makes up the Offshore Ornithology Study Area, and covers nearly 5,000 km^2 (Apx. Figure 10. 1). The aerial surveys are carried out using multiple aircraft in a single day to reduce potential variation associated with movement of birds between different days.

253. The surveys follow the standard HiDef digital video aerial survey method for recording birds, conforming with guidance of Thaxter and Burton (2009) and updated in Thaxter et al. (2016).

254. Surveys are targeted at times of day that excludes 1.5 hours of sunrise and sunset in summer and 1 hour in winter. The dawn and dusk periods are excluded because the sun angle is too low for digital imagery and often the light levels are too low at this time of the day. The surveys are randomised with respect to state of tide.

255. Thirty seven transects across the Offshore Ornithology Study Area are spaced 2 km apart. The aircraft carries four cameras recording continuously across the survey area transects, each surveying a strip width of 125 m. Data from two of the cameras are analysed, with the other two providing back up data in case of failure, or to provide additional spatial coverage where necessary. The survey therefore achieves 12.5% coverage of the survey area.

256. The aerial survey methods were discussed and agreed with MS and NS following meetings held on 18 December 2019 and 26 February 2020.

257. During April 2019 poor weather stopped any surveys from being undertaken that month. In April 2020, restrictions in place due to Covid-19 meant no survey could be undertaken that month. Following advice received from Marine Scotland Science and Nature Scot an additional two surveys were undertaken in April 2021, ensuring that two separate sets of survey data are available for the month of April, albeit obtained within the same year. The use of the data from these two April surveys has been agreed through the Road Map process.

258. In January 2020, poor weather again meant that no flights were able to be undertaken during that month. A survey was undertaken as soon the weather allowed, on 5 February, and these data will be used as the January data. At this time of year there is not expected to be any significant changes in the spatial distribution or density of seabirds within the five days between the end of January and when the survey was undertaken. A later survey was undertaken on 19 February and will be used as February data. The use of the early February survey data as January data has been agreed through the Road Map process.

259. During some of the surveys, logistical issues prevented full coverage of the survey transects. To account for 'missing transects' within the data set, two remedial measures are used: (i) additional data from the extra cameras on other transects near the missed area are analysed to improve the spatial coverage of the survey sample and (ii) for key species present in sufficient abundance, the MRSea model is used to predict the surface density of birds in the survey area. As the time of writing, the use of the MRSea model was proving problematic due to the size of datasets involved and bugs in the programming which were yet to be resolved. Should the MRSea model prove unsuitable, design-based abundance estimates would be used instead.

260. Consideration is being given to appropriate modelling and statistical analyses to help take account of aerial survey data gaps, and the approaches being considered will be the subject of on-going consultations with Marine Scotland, NatureScot and the RSPB.

261. For each bird detected, a record is made of the observation time and location, species group, species (where identification can be made to species level), number of individuals, age class, behaviour, flight direction and association (e.g. with fishing vessels).

262. The aerial survey data extending out to 16 km from the Proposed Development Array Area will be used to generate density estimates for the most frequently recorded bird species within the Offshore Ornithology Study Area using either the MRSea modelling application or design-based abundance estimates.

263. Seagreen, NnG and Inch Cape also commissioned combined aerial surveys from May 2019 to September 2020 (as well as separate surveys at the three sites in April 2019 and surveys at Seagreen and NnG in March 2019) as part of their pre-construction baseline, with a survey area that overlaps part of the Berwick Bank Offshore Ornithology Study Area. Having been carried out by the same contractor (HiDef) and utilising the same survey design and transect orientation, these data are directly comparable and complementary to the Berwick Bank aerial surveys and may be used to provide wider context to the

Berwick Bank survey data, by comparing the density/abundance of seabirds in the overlapping areas of survey. Use of data from the combined developments at Seagreen, NnG and Inch Cape may also be used in the approach to cumulative impact analysis.

264. The following secondary data sources will be used to provide relevant supplementary contextual information on the Proposed Development and surrounding buffer area:

- boat-based transect survey data from July and August 2020 and between April and May 2021 within the Proposed Development Array Area targeted at recording seabird flight height and behaviour and collecting associated environmental variable data;
- boat-based transect survey data of the Firth of Forth Round 3 Zone from December 2009 to November 2011;
- seabird colony data and seabird tracking data collected between 2010 and 2019; and
- intertidal bird surveys at the landfall locations on the North Berwick coast between September 2020 to March 2021.

Boat-Based Seabird Surveys (2020 to 2021)

265. Additional boat-based surveys were undertaken in July and August 2020 and between April and June 2021 to specifically obtain site-specific flight height (and behavioural) data to inform collision risk modelling (CRM) for the Proposed Development.

266. This programme of surveys was originally planned for 2020, however commencement was delayed due to the COVID-19 pandemic. As a result, a revised programme of surveys was undertaken across the 2020 and 2021 breeding seasons.

267. The survey method broadly followed Embling *et al.* (2012). This included repeatedly sampling locations along a continuous transect route to assess the effect of variable factors (e.g. tidal state) on bird density, or utilisation of a specific area. In a deviation from Embling *et al.* (2012), four spatially independent sites in the Proposed Development Array Area, each separated by at least 5 km, were surveyed using two parallel 15 km line transects separated by a 3 km gap. Each of the four sites were surveyed over a day during suitable weather conditions, once per month (in July and August 2020 and in April, May and June 2021). During each one-day survey the transect routes were repeatedly surveyed between sunrise and sunset to cover the daytime component of the diel cycle when birds can be surveyed visually. Each transect was repeated four times during each survey, with repeats being spread throughout the day at dawn, mid-morning, mid-day, mid-afternoon and ending at dusk. The time between runs was used to collect additional flight height data using a rangefinder.

268. Flight height data collection followed the methods applied during surveys of the Seagreen Phase 1 Wind Farm in 2017 (Seagreen 2018) and published by Harwood *et al.* (2018). All surveyors visually estimated flight heights of all birds seen in snapshots or line transect in 5 m bands (i.e., >0-5, >5-10, >10-15, etc). Surveyors also utilised optical laser rangefinders (Nikon Forestry Pro) to provide more detailed measurements when they were not surveying the line transect or if very few birds were present. The rangefinder records form the basis of the flight height distribution dataset, whilst the visual height assessments provide a larger pool of data for comparison. All surveyors received training in the correct use of the rangefinders prior to the start of the surveys.

269. The survey team included a dedicated surveyor tasked with collecting as many rangefinder flight height observations as possible. To increase the capacity for rangefinder flight height observations, two additional laser rangefinders were used opportunistically by the other observers in the survey team. However, surveyors always prioritised the basic line transect survey to ensure that no birds were missed. Where possible, a GPS waypoint was associated with records to allow spatial referencing and linking with environmental data collected at the time of the measurements.

270. The dedicated rangefinder operator continually scanned for potential seabird targets. As soon as a potential target bird appeared, attempts were made to measure its flight height. The rangefinder operator aimed to take a measurement of every bird that came into range of the instrument. Due to discrepancies in size, the range at which larger species such as gannet or great black-backed gull can be measured is greater than that for smaller species such as kittiwake. When a range of species were present, preference was given to kittiwake and gannet, the key species to be assessed using CRM. However, due to those species occurring so frequently and being well represented in the data, different species (e.g. terns and skuas) were also selected if the opportunity arose. Typically, there were relatively few potential targets available at any one time, so data was collected for most birds that came within range. However, when swamping occured the primary objective was to acquire as many verified flight heights as possible and targets deemed most likely to yield data were selected (i.e. that can be easily targeted with the rangefinder).

271. Following Cook *et al*. (2018), Normal, log-normal, gamma, normal-mixture and gamma-mixture distribution were fitted to the rangefinder data using the mixtools (Benaglia *et al*. 2009) and fitdistrplus (Delignette-Muller and Dutang, 2015) packages in the R statistical package (R Core Team, 2021). The best fitting distribution was selected based on visual appraisal to derive flight height distribution curves.

272. From the visual observation height estimates, the proportion of records in each 5 m height band were categorised, which will allow an overall estimate of the proportion of birds deemed to be below and at rotor-swept height for use in the Band CRM.

273. Based on preliminary analysis derived from the surveys in July and August 2020, it was found that Kittiwake flight height distribution differed considerably from the Johnston *et al*. (2014) fit but found reasonable agreement with the distribution derived from aerial survey data. However, the Gannet fit from the rangefinder data mainly differed from the Johnston *et al.* (2014) and digital aerial fits in the first 5 m above the sea, possibly due to Johnston *et al*. (2014) data being lumped in categories and due to possible errors at that height associated with digital aerial surveys.

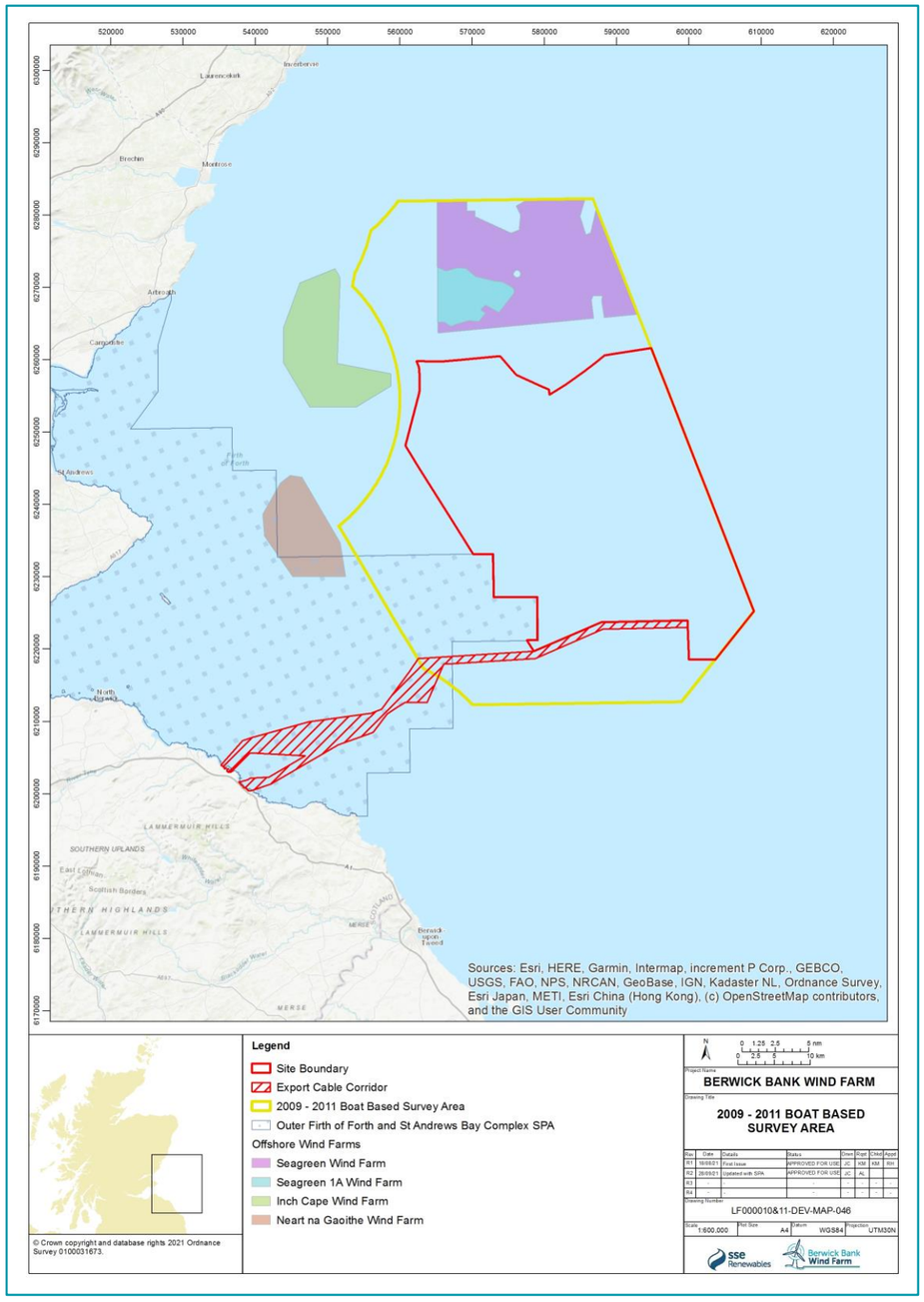
274. The survey methods for the boat-based surveys undertaken in 2020 and 2021 were agreed with ornithological advisors at MS and NS at meetings held on 26 February 2020 and 28 April 2020.

275. As the data were obtained primarily for the specific purpose of obtaining flight height data over a very defined period of time and were collected using a different survey platform, the data will not be combined with the aerial survey data for wider assessment purposes. However, densities of seabirds recorded during these surveys, along with the additional information recorded, will be used as supplementary contextual information.

Boat-Based Transect Surveys (2009 to 2011)

276. The original 2009 to 2011 boat-based surveys were carried out for the first phase of baseline data collection for the former Firth of Forth Zone. As this dataset is now over ten years old and the abundance of seabirds may have changed since the data were collected, it will be used to provide contextual information to support the primary data source, which is the digital aerial surveys undertaken between March 2019 and April 2021.

277. A total of 23 monthly boat-based transect surveys were undertaken between December 2009 and November 2011, covering the former Firth of Forth Zone (Apx. Figure 10. 1), which includes the boundary of the Proposed Development. Transects were spaced 3 km apart and oriented northwest to southeast to intercept the likely predominant flight lines from major breeding colonies in the Firth of Forth.



Apx. Figure 10. 1: Boat-based Survey Area 2009 to 2011

Seabird Colony and Tracking Data

278. Relevant recent counts of breeding seabirds at UK colonies will be used as reference populations in the EIAR assessment. These will be sourced from the online Seabird Monitoring Programme website (BTO, 2021). In addition, the assessment will also refer to relevant data from ongoing tracking studies that are being undertaken by the Centre for Ecology and Hydrology (CEH) and University of Leeds as part of the monitoring proposals for the combined Forth and Tay developments: Seagreen 1, Neart na Gaoithe and Inch Cape along with Berwick Bank, under advice from the Forth and Tay Regional Advisory Group Ornithology subcommittee. It is anticipated that relevant data from these studies collected between 2010 to 2019 will be made available to inform the Proposed Development ornithology EIA. Species for which GPS tracking data are available include guillemot, razorbill and kittiwake from both the Isle of May and from Fowlsheugh and St Abb's Head. Gannet tracking data is available from breeding birds on the Bass Rock. While data was collected in 2020 and 2021, it is considered that this data will not be analysed in time to be included in the EIAR assessment for the Proposed Development.

279. In addition to the above tracking studies, a programme to track breeding kittiwakes using Global Positioning System (GPS) tags was due to commence in 2020 to provide colony-specific data on seabird movements from the colonies at St Abb's Head to Fast Castle SPA and Fowlsheugh SPA. Due to the impact of the COVID-19 pandemic however, this tagging programme did not commence until 2021 It is considered that this data will not be analysed in time to be included in the EIAR assessment for the Proposed Development.11. Apx. Table 10. 2 summarises the recent tracking data for the Forth and Tay region.

Apx. Table 10. 2: Seabird Tracking Studies in the Forth and Tay Region.

Key Species	Year	Colony
Gannet	2015 – 2019	Bass Rock
Kittiwake	2010	Isle of May
	2011, 2021	Fowlsheugh
	2011, 2021	St Abb's Head
	2012 – 2014	Isle of May
	2018 - 2021	Isle of May
Guillemot	2010	Isle of May
	2012 – 2014	Isle of May
	2018 – 2021	Isle of May
Razorbill	2010	Isle of May
	2012 – 2014	Isle of May
	2018 – 2021	Isle of May
Puffin	2010	Isle of May
	2018 – 2021	Isle of May

Non-Breeding Season Intertidal Surveys (2020 to 2021)

280. The programme of monthly intertidal and nearshore coastal bird surveys was conducted over a period of 12 months between July 2020 and June 2021 inclusive. Surveys covered the non-breeding season when the largest numbers of birds were expected to be present (approximately September to March, covering the autumn migration period as well as the winter months), as well as the breeding and post-breeding periods.

281. In order to cover the two potential cable landfall sites, the Intertidal and Nearshore Coastal Bird Survey Area covered two separate sections of coast covering a total of approximately six kilometres. Each section consisted of two count sectors, extended out to 1.5 km from the MHWS mark. To identify the distribution of birds, the count sectors were segregated into three distance bands; 0 - 500 m, 500 m - 1 km and 1 km - 1.5 km (Apx. Figure 10. 1).

282. During each survey the birds present along the foreshore and nearshore coastal waters were counted and ascribed to one of the three distance bands. Surveys covered a range of different tidal conditions throughout the survey programme. Survey methods were based on the high tide (core count) methodology of the BTO/JNCC/RSPB/WWT WeBS scheme. This involved the surveyor counting birds from vantage points along the coast using binoculars and a telescope. Weather conditions were also recorded during surveys.

10.1.2 DESIGNATED CONSERVATION SITES

283. A number of sites of nature conservation importance for birds have been identified as occurring in close proximity to the Proposed Development. Apx. Table 10. 3 provides an early indication of the key designated SPAs for breeding seabirds that are within closest proximity to the Proposed Development, and therefore where there is likely to be the greatest potential for effect. These SPAs will require consideration within the EIA and HRA. In addition, this list will be refined in the EIA to include all SPA sites that are within mean maximum foraging range (+1S.D.) based on foraging ranges presented in Woodward *et al.*, 2019). A full screening of Natura 2000 sites with qualifying seabird interest features will also be undertaken in the LSE Screening Report for the Proposed Development. Relevant seabird notified interest features of Natura 2000 sites screened into the ornithology assessment will be fully considered and assessed in the ES section with the assessment on the Natura 2000 site itself deferred to the Report to Inform Appropriate Assessment (RIAA). Most recently available colony counts for the key species from the Seabird Monitoring Programme website will be used in these assessments.

284. The screening to be undertaken in the ornithology EIA Report section will also include national designations, including Sites of Special Scientific Interest (SSSIs) and Nature Conservation Marine Protected Areas (MPAs).

Apx. Table 10. 3: Summary of Protected Areas for Seabirds Nearest to the Proposed Development

Site	Recent Colony Counts for Key Species	Year	Minimum Distance from Proposed Development Array Area (km)	Minimum Distance from ECC (km)
Forth Islands SPA	Gannet – 75,259 AON Kittiwake – 3,514 AON Guillemot – 26,099 birds Razorbill – 5,466 birds Puffin – 43,525 AOB	2014 2018 2018 2018 2017-18	35.55	13.72
Fowlsheugh SPA	Kittiwake – 9,444 AON Guillemot – 61,416 birds Razorbill – 11,750 birds	2018 2018 2018	47.23	87.77
St Abb's Head to Fast Castle SPA	Kittiwake – 4,902 AON Guillemot – 43,198 birds Razorbill -2,761 birds	2020 2018 2018	32.16	3.70
Outer Firth of Forth and St Andrews Bay Complex SPA	Designated interest: Gannet, Manx shearwater, shag, kittiwake, herring gull, common tern, Arctic tern, guillemot, razorbill, puffin	-	0	0

10.1.3 SUMMARY OF SURVEY RESULTS

Summary of Interim Analysis of Aerial Survey Data

285. Interim analysis of the aerial survey data collected between March 2019 and September 2020 indicated that the five most frequently recorded species occurring within the survey area over this period were guillemot, kittiwake, razorbill, gannet and puffin. A further three species (Arctic tern, herring gull and lesser black-backed gull were recorded regularly but in lower numbers between March 2019 and September 2020. A similar suite of species were recorded on boat-based surveys in the study area in July and August 2020, when guillemot, kittiwake, gannet, Arctic tern, razorbill, puffin, herring gull and fulmar were the most frequently recorded species.

286. A summary of the five most frequently recorded species based on recent surveys in the Offshore Ornithology Study Area is presented below. Further analysis of density and abundance results using the full 25 month aerial survey dataset is currently being undertaken.

287. During 2019 and 2020 aerial surveys, guillemots were recorded in the Offshore Ornithology Study Area in all survey months, with lowest numbers recorded between September and December inclusive. Interim analysis of this aerial survey data showed that following the winter period when numbers were lowest, guillemot numbers increased in early spring as adult birds returned to the nearby breeding colonies to re-establish pair bonds and territories. Although there were fluctuations, numbers recorded in the Offshore Ornithology Study Area remained high for the breeding season, and post-breeding period, when both adults and juveniles move away from the colonies. Density maps for the survey period showed that guillemots were distributed throughout the Offshore Ornithology Study Area in the breeding season, with lower, more patchy densities recorded during the non-breeding season (SSE, 2021).

288. During 2019 and 2020 aerial surveys, kittiwakes were recorded in the Offshore Ornithology Study Area in all survey months, although numbers fluctuated considerably between months, seasons and years. Lowest numbers were recorded during the mid-winter period (November/December) when kittiwakes tend to be widely dispersed in the North Atlantic and North Sea (Mitchell et al., 2004). Numbers increased from

January onwards, with peak densities occurred during the early spring (2019) and in the post-breeding period in August and September (2020). Density maps for the survey period showed that although kittiwakes were widely distributed throughout the Offshore Ornithology Study Area in both the breeding and non-breeding seasons, there were hotspot areas where higher densities were recorded. These hotspots were potentially linked to areas of shallower bathymetry and may have been feeding areas, although this is still being analysed (SSE, 2021).

289. Aerial surveys recorded razorbill density fluctuating considerably across months and between years, although numbers between November and February were consistently low, as razorbills are dispersed along the Atlantic coast of Europe in the winter months (Merne, 2002). Recorded numbers increased from March onwards, as adult razorbills returned to the colonies for the breeding season. Numbers fluctuated in both the 2019 and 2020 breeding seasons but showed peaks in both post-breeding periods in August and September, as adult and young razorbills moved away from the colonies. Density maps for the survey period showed that razorbills were widely distributed at predominantly low densities throughout the Offshore Ornithology Study Area in both the breeding and non-breeding seasons, with some localised areas where higher densities were recorded. These hotspots were potentially linked to areas of deeper bathymetry, and may indicate feeding areas, although this is still being analysed (SSE, 2021).

290. Aerial survey data for gannet showed relatively consistent seasonal and inter-annual variation in densities, with very low numbers recorded between December and February inclusive. In both the 2019 and 2020 breeding seasons, numbers in the Offshore Ornithology Study Area increased from March onwards, as breeding adults returned to the Bass Rock. Numbers peaked in July and August, before decreasing again from September. Density maps for the survey period showed that gannets were widely distributed at predominantly low densities throughout the Offshore Ornithology Study Area in both the breeding and non-breeding seasons, with higher densities in the breeding season, although no obvious hotspot areas (SSE, 2021).

291. Aerial surveys recorded puffin density fluctuating considerably across months and between years, although birds were recorded on all surveys. Lowest numbers were recorded in November and December, with numbers increasing again from January onwards. Numbers were fairly consistent across all months of the 2019 breeding season and post-breeding season, but showed larger peaks in March, August and September of 2020. The drivers behind these differences are not presently clear but will be considered during the analysis of the full aerial survey dataset. Density maps for the survey period showed that puffins were widely distributed at low to moderate densities throughout the Offshore Ornithology Study Area in both the breeding and non-breeding seasons, with some localised areas where higher densities were recorded (SSE, 2021).

292. The aerial survey data identified relatively small numbers of Arctic tern but did include a greater number of terns categorised as either common or Arctic terns. Based on results from the 2020 boat-based surveys in July and August it was considered that the post-breeding movement is likely to relate to Arctic tern. Further analysis of Arctic tern density and abundance results using the full aerial survey dataset is currently being undertaken (SSE, 2021).

293. Initial results from the aerial surveys indicate herring gull were present in relatively low numbers predominantly in the breeding season. The 2020 boat-based surveys also confirmed relatively low herring gull presence on surveys in July and August. Further analysis of herring gull density and abundance results using the full aerial survey dataset is currently being undertaken (SSE, 2021).

294. During aerial surveys lesser black-backed gulls were present in relatively low numbers, while the July and August 2020 boat-based surveys further confirmed this at this time of year. However, lesser black-backed gull populations at the Forth Islands Special Protection Area (SPA) have the potential for connectivity with the Berwick Bank project. Further analysis of density and abundance results using the full aerial survey dataset is currently being undertaken (SSE, 2021).

Summary of Intertidal Surveys

295. A total of 54 species were recorded within the Intertidal and Nearshore Survey Area during the survey programme (RPS, 2021). Eider were recorded in every survey month, with typical sightings involving up to 30 birds within 1km of the shore. Common scoter and red-breasted merganser were recorded infrequently, with other wildfowl species recorded intermittently.

296. Oystercatcher was the most abundant and regularly present wader species throughout the Intertidal and Nearshore Survey Area, with birds recorded in almost every month of the survey programme. Numbers typically ranged between approximately 10 and 60 individuals. Turnstone, curlew, dunlin, redshank and ringed plover were also recorded regularly in lower numbers. Other wader species including greenshank, purple sandpiper, bar-tailed godwit, grey plover, knot, lapwing and golden plover were recorded infrequently.

Appendix 11 COMMERCIAL FISHERIES – BASELINE ENVIRONMENT

11.1 DESKTOP STUDY

297. An initial desk-based review of literature and data sources to support this Offshore EIA Scoping Report has identified a number of baseline datasets. These are summarised below:

- fisheries datasets available from Marine Scotland's MAPS NMPi (National Marine Plan interactive);
- up to date publicly available fisheries landings and effort from Marine Scotland and the Marine Management Organisation (MMO);
- fisheries surveillance sightings;
- fishing activity data for UK vessels over 15 m and over available from the MMO (Vessel Monitoring System (VMS) data combined with logbook data).

11.2 SITE-SPECIFIC SURVEY DATA

298. No site-specific surveys have been undertaken to inform the Offshore EIA Scoping Report for commercial fisheries. However, extensive consultation with fisheries stakeholders is planned to be undertaken to help inform the commercial fisheries baseline within the Offshore EIAR. In addition, where relevant, the findings of site-specific surveys which may be undertaken for other topics (e.g. benthic subtidal and intertidal ecology (Appendix 7) and shipping and navigation (Appendix 12)) will be reviewed and integrated in the characterisation of the commercial fisheries baseline, as appropriate.

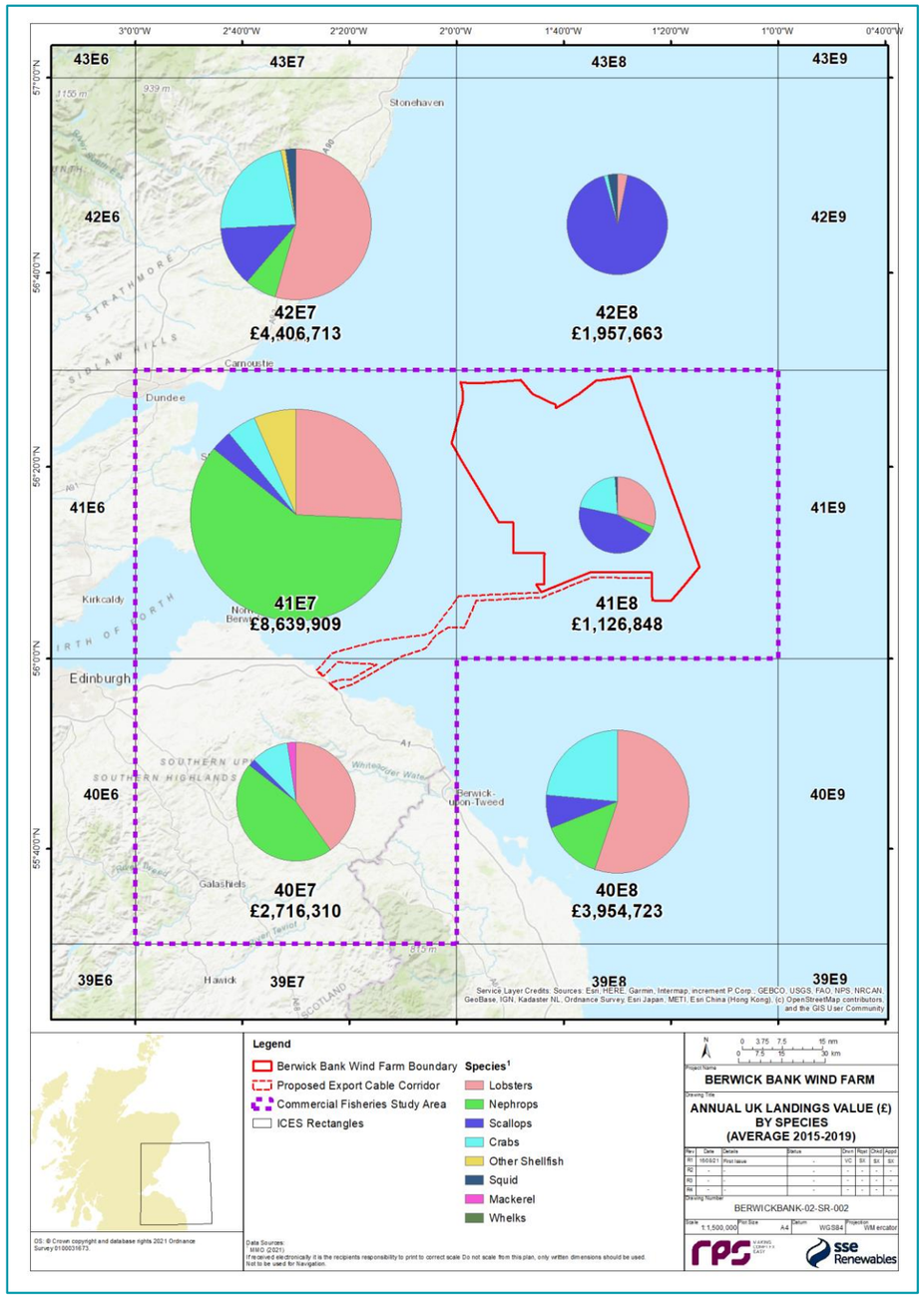
11.3 BASELINE CHARACTERISATION

299. This section provides an overview of the baseline for commercial fisheries, established through analysis of landings values (£) by species and fishing method (annual average 2015 to 2019).

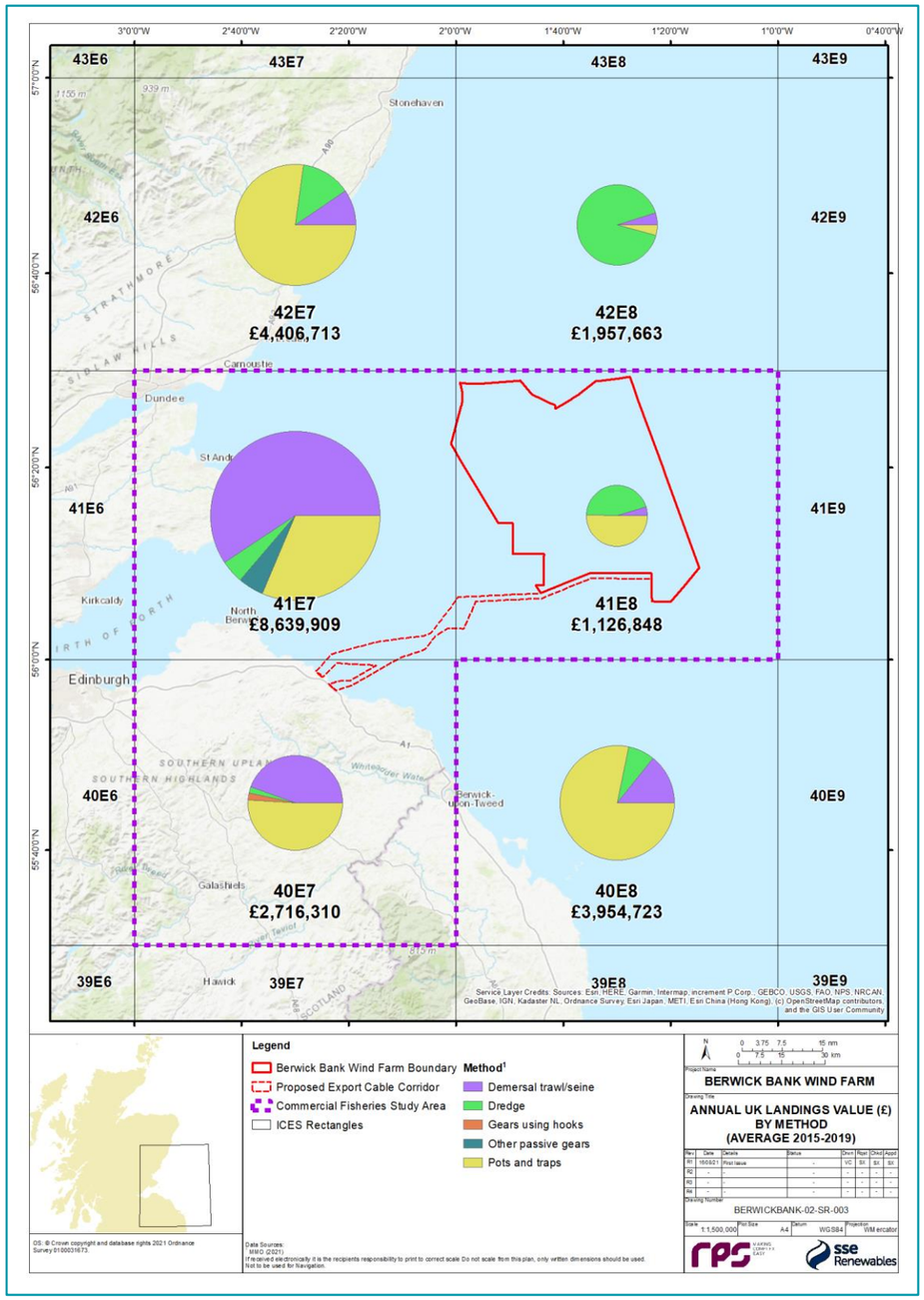
300. Scallop dredging makes up the majority of the landings in ICES rectangle 41E8 (where the Berwick Bank Wind Farm Proposed Development Array Area and a section of the ECC are located). Other activities of importance in this rectangle include potting for lobster and crab, and to a much lesser extent, demersal trawling for *Nephrops* (Apx. Figure 11. 1 and Apx. Figure 11. 2).

301. In inshore rectangles 41E7 and 40E7 (where the inshore section of the offshore ECC is located) demersal trawling for *Nephrops* represents the main fishing activity, followed by potting for lobster and crabs and, to a lesser extent, scallop dredging. In addition, in rectangle 41E7, razor clams contribute significantly to landings values (Apx. Figure 11. 1 and Apx. Figure 11. 2).

302. As it is apparent from Apx. Figure 11. 1 and Apx. Figure 11. 2, overall, within the commercial fisheries study area, landings values are considerably higher in rectangle 41E7 than in the rest of rectangles.



Apx. Figure 11. 1: Landings (£) by Species (Annual Average 2015 – 2019)



Apx. Figure 11. 2: Landings (£) by Method (Annual Average 2015 – 2019)

Appendix 12 SHIPPING AND NAVIGATION – BASELINE ENVIRONMENT

12.1 DESKTOP STUDY

303. An initial desk-based review of literature and data sources has been undertaken to establish the baseline environment. The data sources considered are summarised at Apx. Table 12. 1.

Apx. Table 12. 1: Summary of Key Desktop Data Sources

Title	Summary	Year(s)	Author
14 days Automatic Identification (AIS) data (summer)	AIS data recorded from shore-based receivers covering 14 days in July 2019 within the shipping and navigation study area	2019	Anatec
14 days AIS data (winter)	AIS data recorded from shore-based receivers covering 14 days in December 2019 within the shipping and navigation study area	2019	Anatec
Admiralty Charts 160, 175, 190, 210, 734, 1407, 1409 and 1481	Latest United Kingdom Hydrographic Office (UKHO) Admiralty Charts covering the Proposed Development Array Area and ECC	2020/2021	UKHO
Admiralty Sailing Directions North Sea (West) Pilot NP54	Provides essential information to support port entry and coastal navigation.	2016	UKHO
Marine Accident Investigation Branch (MAIB) incident data	Maritime incidents reported to the MAIB within the shipping and navigation study area.	2010 to 2019	MAIB
Royal National Lifeboat Institution (RNLI) Incident Data	Maritime incidents responded to by the RNLI within the shipping and navigation study area.	2010 to 2019	RNLI
Royal Yachting Association (RYA) Coastal Atlas of Recreational Boaring	Geographical Information System (GIS) dataset of recreational boating activity around the UK.	2019	RYA

304. It should be noted that AIS carriage is not compulsory for fishing vessels less than 15 metres (m) length, or vessels of less than 300 Gross Tonnage (GT) (notably this includes most recreational vessels). It is therefore considered that such traffic may be underrepresented within the assessment undertaken for this Offshore EIA Scoping Report; however, it is noted that smaller vessels are increasingly observed to utilise AIS voluntarily given the associated safety benefits. It is also noted that the site is some distance offshore which will mean AIS tracking from shore is not comprehensive for the entire shipping and navigation study area. Taking into account these limitations, AIS data, supported by the other data sets, is considered suitable for the high-level baseline assessment provided in this Offshore EIA Scoping Report, noting that site-specific survey data, including coverage of vessels not broadcasting on AIS, has been collected for use in the EIA Report and NRA.

12.2 SITE-SPECIFIC SURVEY DATA

305. A requirement of MGN 654 is for a minimum of 28 days of seasonally varied data which is usually collected during two, 14-day surveys, in summer and winter. The survey was undertaken in accordance with the superseded MGN 543 which was relevant at the time of survey; however the survey specifications and methodology remains valid as there have been only minor changes between the two MGN guidance notes. On-site vessel traffic surveys have therefore been undertaken during two 14-day periods, in July 2020 and January 2021, following agreement with key stakeholders including the Maritime and Coastguard Agency (MCA) and the Northern Lighthouse Board (NLB).

306. It is acknowledged that COVID-19 has had a global effect on shipping movements and therefore the vessel traffic surveys may not be fully comprehensive, particularly the summer survey. This has been discussed with key stakeholders and an additional 12-month AIS dataset (covering 2019) will be used to validate the vessel traffic survey data in the NRA. Other data sources will also be used to validate the vessel traffic survey data including Vessel Monitoring System (VMS) data, the RYA Coastal Atlas (RYA, 2019) and further consultation with RYA Scotland and local clubs.

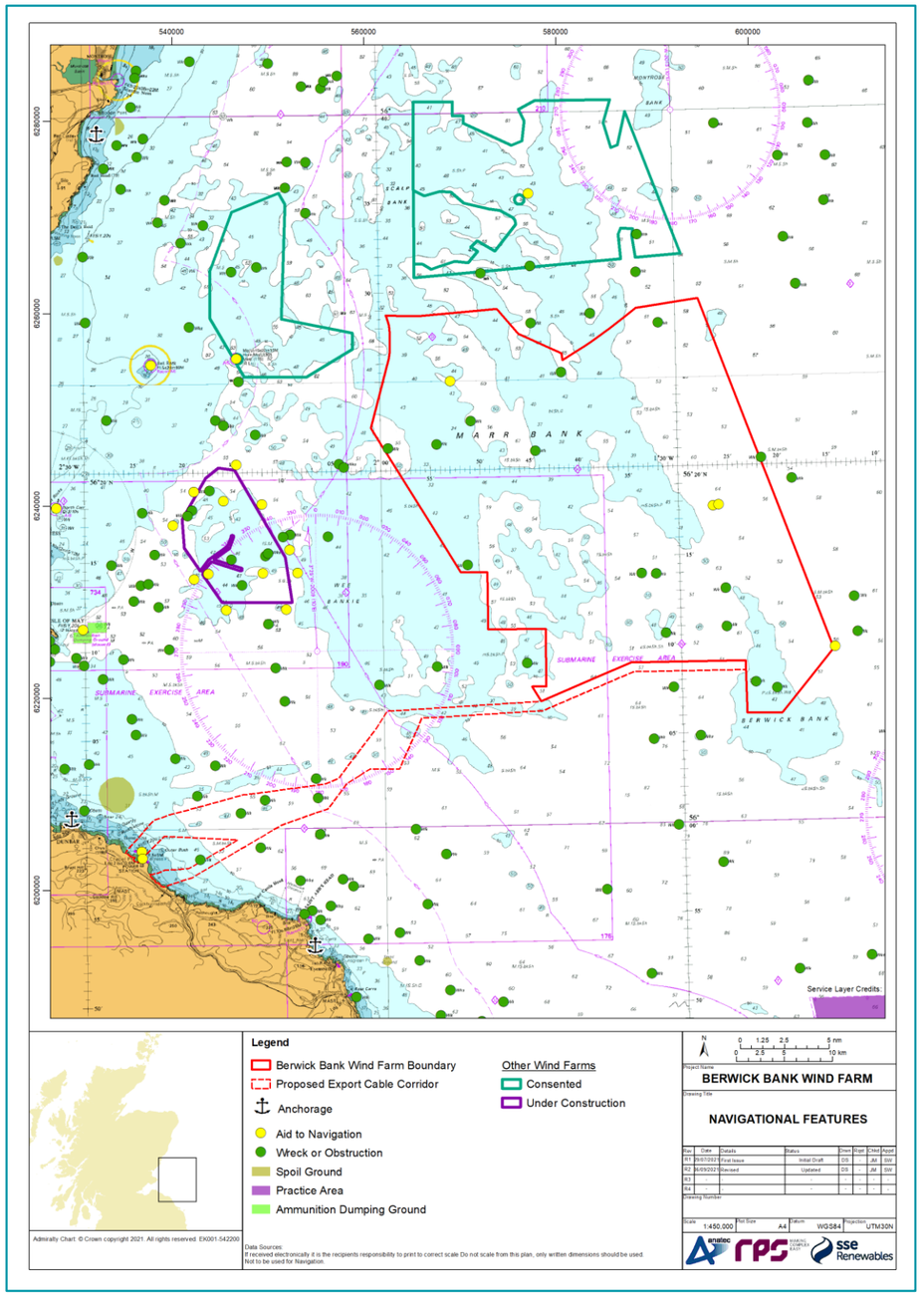
12.3 BASELINE CHARACTERISATION

307. This section provides an overview of the baseline for shipping and navigation established through the desktop data sources summarised in Apx. Table 12. 1 and site-specific surveys.

12.3.1 NAVIGATIONAL FEATURES

308. Navigational features have been identified via a review of Admiralty Charts and the local Admiralty Sailing Directions (UKHO, 2016) as per Apx. Figure 12. 1.

309. The key navigational features in proximity to the Proposed Development are several other planned offshore wind farms, Ministry of Defence (MoD) practice areas, ammunition dumping grounds, spoil grounds and anchorage areas. Numerous charted wrecks and aids to navigation are also present in proximity to the Proposed Development. A plot of these key navigational features is provided in Apx. Figure 12. 1.



Apx. Figure 12. 1: Navigational Features

310. There are three other planned offshore wind farms located in proximity to the Proposed Development. The Seagreen Offshore Wind Farm is located approximately 2.2 nm north of the Proposed Development Array Area and has been consented with construction expected to commence in 2021. Inch Cape and Neart na Gaoithe (NnG) are located approximately 2.2 nm and 7.8 nm west of the Proposed Development Proposed Development Array Area, respectively. Both are consented with offshore construction of NnG ongoing (including a buoyed construction area).

311. Two MoD practice areas are located in proximity to the Proposed Development. The D513 practice firing area is located approximately 16 nm south east of the Proposed Development Proposed Development Array Area. The D604 practice firing range is located approximately 23 nm west of the Proposed Development Proposed Development Array Area. Both firing practice areas are operated using a clear range procedure.

312. A number of anchorage areas are located to the west of the Proposed Development Array Area towards the coast primarily within the Firth of Forth. Two disused ammunition dumping grounds are located approximately 20 nm west of the Proposed Development Proposed Development Array Area.

313. Fourteen charted wrecks are located within the Proposed Development Proposed Development Array Area, with the shallowest at a depth of 35 m below Chart Datum (CD). Three buoys are also located within the Proposed Development Proposed Development Array Area; two in the east and one in the west. All three are special marks.

12.3.2 VESSEL TRAFFIC

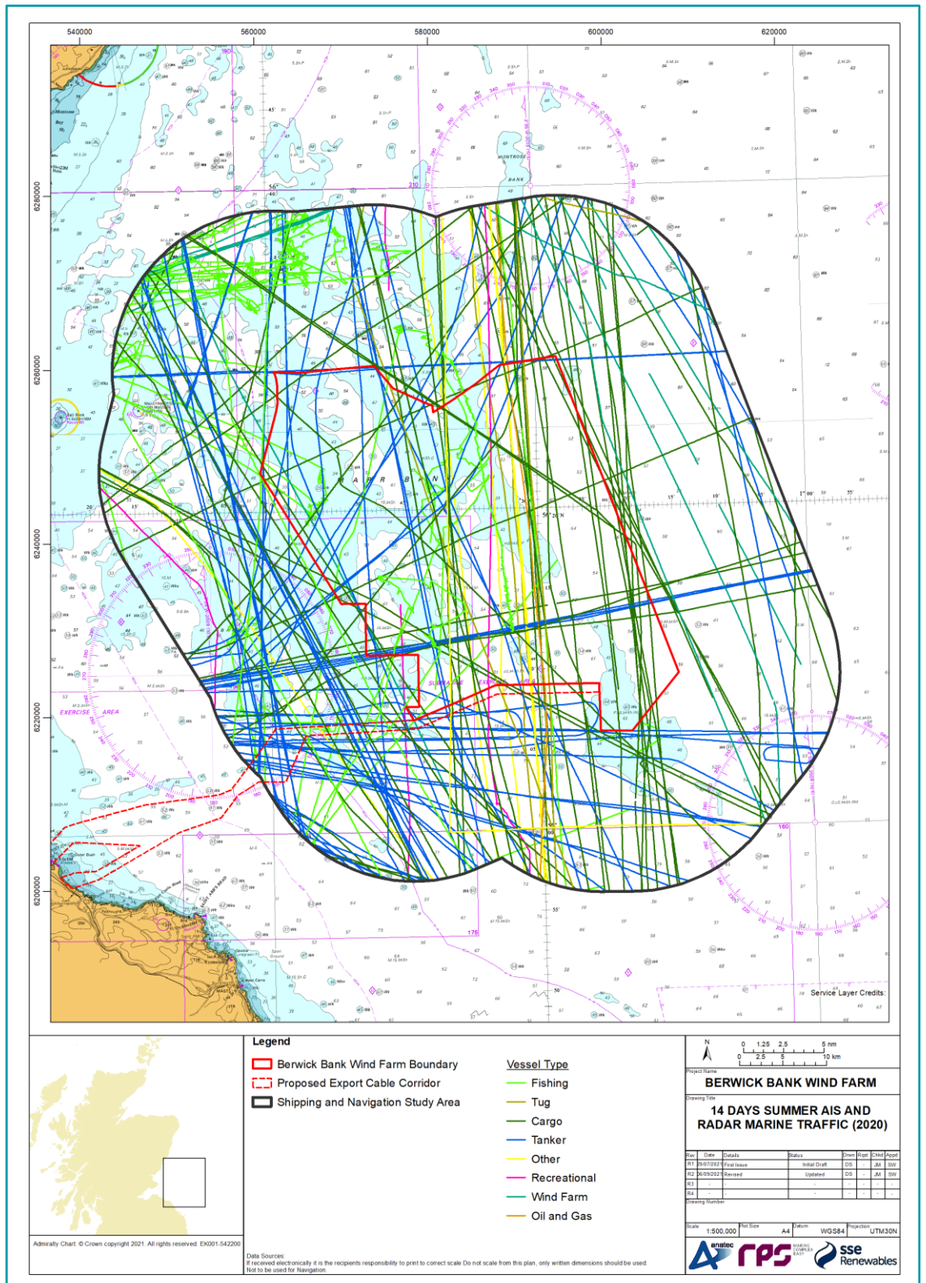
314. Fourteen days of AIS and Radar vessel traffic data within the shipping and navigation study area, collected during summer 2020, as per section 7.2.3, is shown in Apx. Figure 12. 2. Following this, 14 days of AIS and Radar vessel traffic data within the shipping and navigation study area, collected during winter 2021, as per section 7.2.3, is shown in Apx. Figure 12. 3). It is noted that vessels involved in temporary, non-routine activities (e.g. vessels engaged in surveys) have been removed. This includes vessels visiting planned nearby offshore wind farm developments since these developments were not operational at the time of the surveys and this traffic is not considered representative of future operational traffic associated with these offshore wind farms.

315. An average of 14 unique vessels were recorded per day within the shipping and navigation study area during summer 2020, with an average of approximately six unique vessels per day intersecting the Proposed Development Proposed Development Array Area. An average of 16 unique vessels were recorded per day within the shipping and navigation study area during winter 2021, with an average of approximately six unique vessels per day intersecting the Proposed Development Proposed Development Array Area.

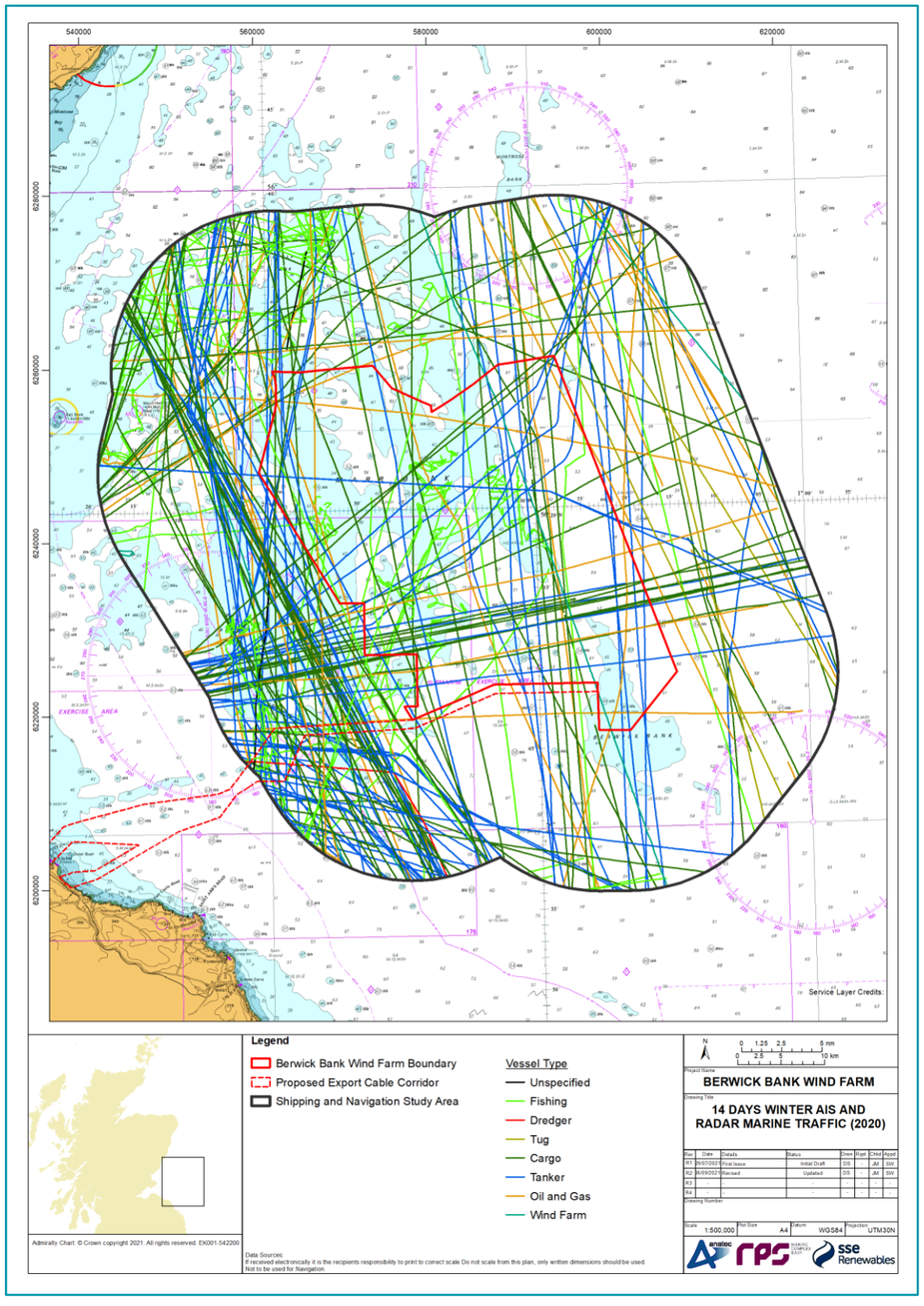
316. The main vessel types recorded during summer 2020 were tankers (34%), cargo vessels (30%) and fishing vessels (18%). The main vessel types recorded during winter 2021 were cargo vessels (36%), tankers (31%) and fishing vessels (15%).

317. The most regular destinations for vessels within the shipping and navigation study area were all UK east coast ports including Aberdeen (11%), Grangemouth (7%) and Immingham (5%).

318. Anchoring was also assessed for the 28 days of AIS and Radar vessel traffic data (excluding temporary activities) based on the navigational status broadcast on AIS and a manual check for patterns characteristic of anchoring activity. No anchoring was observed during either the summer or winter periods within the Proposed Development Array Area or the Proposed Development ECC. It is noted that further anchoring activity assessment will be undertaken in the NRA using a speed analysis, in which vessels travelling at under one knots for more than 30 minutes are flagged as possible anchoring activity.



Apx. Figure 12. 2: 14 Days Summer 2020 AIS and Radar Marine Traffic



Apx. Figure 12. 3: 14 Days Winter 2021 AIS and Radar Marine Traffic

12.3.3 MARINE INCIDENTS

319. An analysis of the MAIB incident data from 2010 to 2019 indicated that a total of four incidents were recorded within the shipping and navigation study area, but all occurred outside the Proposed Development Proposed Development Array Area; a summary of each incident is provided:

- In July 2011 approximately 7 nm south of the Proposed Development Proposed Development Array Area, a fishing vessel experienced a machinery failure with no damage or injury to persons reported.
- In July 2014 approximately 5 nm south west of the Proposed Development Proposed Development Array Area, a fishing vessel was involved in an accident to person incident with no damage incurred although one person sustained injuries.
- In December 2014 approximately 9.6 nm south west of the Proposed Development Proposed Development Array Area, a fishing vessel experienced a machinery failure with no damage or injury to persons reported.
- In May 2018 approximately 7.4 nm north of the Proposed Development Proposed Development Array Area, a fishing vessel experienced a loss of control with minor damage but no injury to persons reported.

320. A further four incidents, involving four fishing vessels and one tanker (one of the incidents involved two vessels), were reported to the MAIB within the Proposed Development ECC, all within the northern landfall option. Three were "*machinery failures*" and one was a "*hazardous incident. No damage or injuries were reported*."

321. An analysis of the RNLI incident data from 2010 to 2019 indicated that a total of 20 incidents were recorded within the shipping and navigation study area, with two of these occurring within the Proposed Development Proposed Development Array Area. Incidents either involved recreational vessels (75%) or fishing vessels (25%). More detailed descriptions of the two incidents within the Proposed Development Array Area are given:

- In August 2012 a person onboard a powered recreational vessel was considered to be in danger and a lifeboat from Anstruther attended the incident.
- In August 2016 a recreational vessel with two people onboard was considered to be in trouble and a lifeboat from Eyemouth attended the incident.

322. A further 18 incidents were recorded within the Proposed Development ECC; five of these incidents were recorded within the southern landfall option, and 13 within the northern landfall option. The main incidents recorded within the Proposed Development ECC were "*vessel may be in trouble*" (22%), "*person in danger*" (22%) and "*machinery failure*" (11%).

Appendix 13 MARINE ARCHAEOLOGY– BASELINE ENVIRONMENT

13.1 DESKTOP STUDY

323. An initial desk-based review of literature and data sources to support this Offshore EIA Scoping Report has identified a number of baseline datasets. These are summarised at Apx. Table 13. 1.

Apx. Table 13. 1: Summary of Key Desktop Reports

Title	Source	Year	Author
Records of Wrecks and Obstructions	UKHO	Ongoing	UKHO
NRHE	HES	Ongoing	HES
Records of MPAs	HES online portal	Ongoing	HES
Technical Report for SEA of North Sea Area SEA5	Flemming, N	2004	Flemming, N
Archaeological Review of Geophysical and Hydrographic Data (see more detail below in 16.2)	Project specific report commissioned by RPS	2021	MSDS Marine Ltd

13.2 SITE SPECIFIC SURVEY DATA

324. A geophysical survey was undertaken across the Offshore Wind Farm Proposed Development Array Area and part of the ECC. Magnetometer, Sidescan Sonar (SSS), Sub-Bottom profiler (SBP) and Multibeam Bathymetry (MBES) survey data were collected by Fugro between August and October 2019 (Fugro 2019, Fugro 2020a and 2020b), the primary purpose of which was to provide baseline information to inform the EIA (Figure 3.3). The data collected varied in specification however is considered comparable and appropriate to allow for the characterisation of the marine archaeological potential of the development sites.

325. Line spacing within the two survey areas varied: within the Proposed Development Array Area the specification was set at 200 m for mainlines (running NNW/SSE) with crosslines (running WSW/ENE) at 1000 m; whilst within the proposed ECC mainlines were specified at 75 m with crosslines at 1000 m.

326. The data was collected to a specification appropriate to achieve the following interpretation requirements:

- magnetometer: identification of contacts > 5 nT;
- SSS: ensonfication of contacts > 0.3 m;
- SBP: penetration > 10 m; and
- MBES: ensonification of contacts < 1.0m.

327. Following data delivery, an initial review of the dataset was undertaken to gain an understanding of the geological and topographic make-up of the survey area. Within the survey area, the potential for variations in the seabed are high and can affect the interpretation of contacts. However, the towed sensors, SSS and magnetometer, used an Ultra Short Baseline (USBL) positioning system to ensure positional accuracy of the sensors throughout the survey. Positional accuracy is further increased through the correlation of SSS and Magnetometer datasets with the MBES dataset.

328. SSS is considered the best tool for the identification of anthropogenic contacts on the seabed through its ability to ensonify small features and so forms the basis of any archaeological data assessment.

329. Magnetometer data indicate the presence of ferrous and thus usually anthropogenic material both on, and under the seabed, and where line spacing allows. The survey line spacing for the Proposed Development offshore wind farms geophysical surveys ranges between 75 m and 200 m which is too great for the accurate positioning of magnetic anomalies, but can indicate areas of archaeological potential. A magnetic anomaly position can only be determined from directly below the sensor, or where lines are run close together to position an anomaly seen on two, or more lines. Where possible, significant magnetic anomalies were correlated with contacts visible on the seabed.

330. Whilst SBP and MBES are useful tools for archaeological assessment, their primary use, outside of seabed and palaeo-landscape characterisation, is in the corroboration of contacts identified in the SSS and magnetometer data. As such, all contacts of potential anthropogenic origin were assessed for archaeological potential, primarily alongside the magnetometer data, with SBP and MBES data used to corroborate identified contacts.

331. The archaeological potential was assigned to each contact based on the criteria outlined in Apx. Table 13. 2. Where uncertainty existed as to the identification or archaeological potential of a contact the provided dataset was imported into point cloud visualisation software such as Cloud Compare in order to view the un-gridded data.

Apx. Table 13. 2: Criteria for Assigning Archaeological Potential

Potential	Criteria
Low	A contact potentially of anthropogenic origin but that is unlikely to be of archaeological interest.
Medium	A contact believed to be of anthropogenic origin but that would require further investigation to establish its archaeological potential.
High	A contact almost certainly of anthropogenic and with a high potential of being of archaeological significance

332. Contacts assessed as having low, medium and high archaeological potential were then compiled into a gazetteer and a shapefile created for further assessment alongside known features such as wrecks, mooring buoys, third party assets such as cables and pipelines, and other seabed structures. The data was subsequently assessed against known anomalies of no archaeological interest to remove contacts of no archaeological importance.

333. As well as identifying surface contacts of potential archaeological interest the geophysical and hydrographic survey data was reviewed to assess the potential survival of palaeo-landscapes within the limits of the Proposed Development.

334. Sub-surface data acquired from SBP and seismic surveys is key to understanding the palaeo-landscape potential of the study area. Sedimentary horizon grids and geological maps derived from the interpretation of sub-surface data and the current seabed derived from MBES data were assessed. Sedimentary deposits were correlated with geological formations, and the depositional context and make-up of the deposits presented. The results inform the characterisation of the palaeo-environmental and archaeological potential included in this report.

13.3 BASELINE CHARACTERISATION

335. The MASA was submerged during the late glacial/early Holocene and prior to this it was covered in a succession of ice sheets. During periods of glaciation the MASA would have been uninhabitable but during inter-glacial periods there is a potential for periglacial occupation at times when the seabed would have formed dry land. The zones of highest potential for the survival of archaeological material are likely to be those on the edges of channels and floodplains, where old ground surfaces and organic remains are most likely to survive. These deposits often lie beneath relatively thin layers of seafloor sediment and may be vulnerable to exposure.

336. However, based on the available evidence whilst potential palaeo-landscape features have been recorded within the limits of the Proposed Development including kettle holes, palaeo-channels, incised valleys and relict glacial lakes, the proglacial environments in which they are likely to have been formed are not likely to have been attractive locations for human habitation. In other areas such features would have formed foci for human activity following climatic amelioration, however, sea level rises are likely to have submerged these features within the site relatively rapidly further demonstrating the limited archaeological potential of the area.

337. Consequently, it is considered unlikely that evidence of in situ Palaeolithic and Mesolithic activity will be found within the limits of the Offshore Wind Farm Proposed Development Array Area due to the effects of repeated glaciations, marine transgressions and associated fluvial activity. There is however some paleoenvironmental potential within the Aberdeen Ground Formation. Within the ECC there is some potential for late Palaeolithic/Mesolithic deposits in the near shore area although due to the effects of erosion redeposited material is more likely than in situ evidence. In addition, the localised presence of peat buried in the Quaternary deposits within the ECC could suggest a good palaeo-environmental potential and where these sediments are present there is a good potential for organic preservation of remains such as fish traps, associated with prehistoric exploitation of the coastal margins. The future archaeological assessment of the results of pre-construction geotechnical investigations within the limits of the offshore development will provide further information on the presence or absence of peat and the palaeo-environmental and archaeological potential of this area.

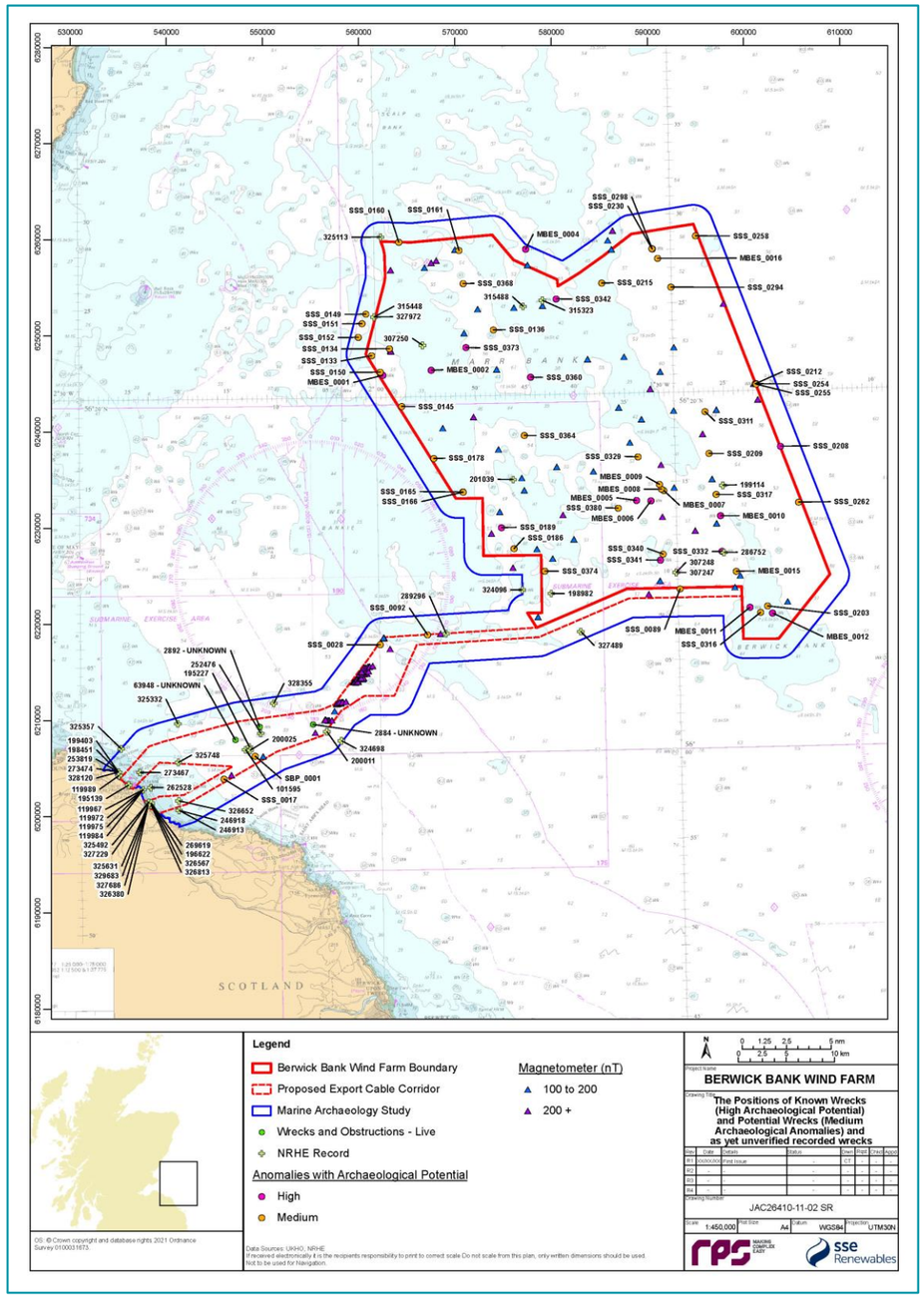
338. A summary of the known archaeological features is provided below:

- there are no protected areas or statutory designations in relation to submerged landscapes within the limits of the Proposed Development;
- there is one designated wreck within the limits of the Proposed Development (U 12 SSS_2020_0165 – a designated war grave, Apx. Figure 13. 1) which falls within the protection of the Protection of Military Remains Act.
- A total of 20 wrecks have been recorded by the project specific geophysical survey within the limits of the Offshore Wind Farm Proposed Development Array Area, 4 of which are known; Oswin, Kitty, Burnstone and U12 (discussed above). Of the remaining 16 wrecks, 14 are also recorded as UKHO data. The remaining 2 wrecks may represent one of the 16 wrecks recorded on the NRHE as potentially lying within the Proposed Development Array Area (although none of their positions have been verified). In addition 10 wrecks included within the UKHO data were not identified during the survey and their positions have been recorded as 'Dead (Apx. Figure 13. 1).
- No wrecks were recorded within the limits of the ECC during the project specific geophysical survey (although the survey did not cover the full extent of the ECC). There are eight wrecks and obstructions recorded on the UKHO that lie beyond the extent of the survey and so their locations must still be assumed at this stage (UKHO 2873, UKHO 2875 Sharon Vale, UKHO 2884, UKHO 2890, UKHO 2892, UKHO2904 Cradock, UKHO 3101 Obstruction, UKHO 63948) (Apx. Figure 13. 1).
- • In addition 43 unconfirmed anomalies of medium archaeological potential and 119 large magnetic anomalies of archaeological potential were recorded within the limits of the proposed development. Some of these anomalies may be associated with wrecks recorded on the UKHO or NRHE that have no known position or they could represent anomalies of as yet unknown archaeological interest (Apx. Figure 13. 1).

339. There is also an absence of charted wrecks pre-dating the 19th century within the limits of the offshore Proposed Development. The known shipwrecks are predominantly iron and steel vessels dating from the 19th and 20th centuries. The preponderance of iron and steel wrecks in the record could potentially mask the presence of earlier shipwrecks, which are of potentially greater archaeological interest. Compared to iron and steel wrecks, wooden shipwrecks tend to be older, smaller and to have carried less ferrous material. They also tend to break up more quickly than iron and steel wrecks and are thus more likely to be scattered, dispersed and have a generally lower physical profile on the seabed. Consequently, they are less likely to be located by geophysical survey

340. These earlier wrecks are potentially the most archaeologically important and there will be an on-going recognition of the potential to encounter currently unknown or unrecorded shipwrecks, and mechanisms put in place to ensure the prompt reporting and avoidance of undue damage to any such discoveries.

341. There is therefore a generally moderate to good potential for unexpected remains to be discovered within the limits of the Proposed Development.



Apx. Figure 13. 1: The Position of UKHO and NRHE Records with the Proposed Development

Appendix 14 SEASCAPE, LANDSCAPE AND VISUAL RESOURCES– BASELINE ENVIRONMENT

14.1 DESKTOP STUDY

342. This section outlines the literature and data sources that will be used to support the SLVIA. An overview of the key data sources is provided in Apx. Table 14. 1.

Apx. Table 14. 1: Key Sources of Information for Seascape, Landscape and Visual

Source	Summary	Spatial Coverage
Aberdeenshire Council (2017)	Aberdeenshire Local Development Plan 2017 – Special Landscape Areas.	Aberdeenshire
Campaign to Protect Rural England (CPRE) (2016)	Interactive maps of the UK's light pollution and dark skies as part of a national mapping project (LUC/CPRE, 2016). Open Source data used to understand and illustrate baseline lighting levels. (available online: https://www.nightblight.cpre.org.uk/)	Full coverage of SLVIA study area.
East Lothian Council (2018)	East Lothian Local Development Plan 2018 - East Lothian Special Landscape Areas.	East Lothian
English Heritage (2020)	Any specific visitor attractions / tourist destinations (available online: https://www.english-heritage.org.uk/visit/places	SLVIA study area within England.
Fife Council (2017)	Fife Local Development Plan 2017 – Fife Local Landscape Areas.	Fife
Forth and Tay Offshore Windfarm Developer Group (2011)	Scottish Offshore Wind Farms – East Coast Regional Seascape Character Assessment Aberdeen to Holy Island	SLVIA study area within Scotland.
Google Earth Pro (2020)	Aerial photography.	Full coverage of SLVIA study area.
Historic England (2020)	Registered Parks and Gardens and UNESCO World Heritage Sites (available online: https://historicengland.org.uk/listing/the-list/)	SLVIA study area within England.
Historic Environment Scotland	Inventory of Gardens and Designed Landscapes (available online: https://www.historicenvironment.scot/advice-and-support/listing-scheduling-and-designations/gardens-and-designed-landscapes/)	SLVIA study area within Scotland.
Inch Cape	Inch Cape Offshore Wind Farm Section 36 Consent Variation Application Supporting Report	Inch Cape Offshore Windfarm
Kincardine Offshore Wind Farm	Development Specification and Layout Plan Kincardine Offshore Wind Farm, April 2019. Available online: https://marine.gov.scot/sites/default/files/kowl-pl-0004-011_-_development_specification_and_layout_plan_rev_c3_redacted_0.pdf	Kincardine Offshore Wind Farm
Long Distance Walkers Association (2020)	Overview map for Long Distance Paths and Walks (available online: https://www.ldwa.org.uk/ldp/public/ldp_overview_map.php)	Long Distance Walkers Association (2020)
Met Office (2010-2020)	Visibility Data. Visibility bands every 1 km up to 30 km, then every 5 km up to 50 km, then every 10 km up to 70 km, and >70 km.	Met Office weather stations within SLVIA study area.
MMO (2018)	Seascape Character Assessment for the North-East Inshore and Offshore Marine Plan Areas	SLVIA study area within England.
National Trust (2020)	Any specific visitor attractions / tourist destinations (available online: https://www.nationaltrust.org.uk/days-out)	SLVIA study area within England.
Natural England (2014)	National Character Area profiles (available online: https://www.gov.uk/government/publications/national-character-area-profiles-data-for-local-decision-making/national-character-area-profiles)	SLVIA study area within England.
Natural England (2019)	GIS datasets for: National Parks (https://data.gov.uk/dataset/334e1b27-e193-4ef5-b14e-696b58bb7e95/national-parks-england). Areas of Outstanding Natural Beauty (AONB) (https://data.gov.uk/dataset/8e3ae3b9-a827-47f1-b025-f08527a4e84e/areas-of-outstanding-natural-beauty-england) County Parks (https://data.gov.uk/dataset/e729abb9-aa6c-42c5-baec-b6673e2b3a62/country-parks-england). Open Access Land (https://data.gov.uk/dataset/05fa192a-06ba-4b2b-b98c-5b6bec5ff638/crow-act-2000-access-layer). Heritage Coasts (https://data.gov.uk/dataset/79b3515f-b00e-419a-9c7e-1d3163555886/heritage-coasts	SLVIA study area within England
Neart na Gaoithe	Neart na Gaoithe Offshore Wind Farm Development Specification and Layout Plan June 2020. Available online: https://marine.gov.scot/sites/default/files/nng-nng-ecf-pln-0003_dev_specification_and_layout_plan_rev4.0_redacted.pdf	Neart na Gaoithe Offshore Wind Farm
Northumberland County Council	Northumberland Local Development Plan 2019 Publication Draft	Northumberland
Northumberland County Council	Northumberland Coast AONB Landscape Sensitivity and Capacity Study' (August 2013)	Northumberland
Northumberland County Council	Northumberland County Council Landscape Character Assessment (2010)	Northumberland
Northumberland Coast AONB	Northumberland Coast AONB Management Plan 2020-2024	Northumberland Coast
NatureScot	NatureScot Landscape Character Assessment 2019	SLVIA study area within Scotland.

Source	Summary	Spatial Coverage
NatureScot (2010)	NatureScot National Coastal Character Map	SLVIA study area within Scotland.
Oceanwise	Marine and coastal mapping data, ferry routes.	Full coverage of SLVIA study area.
OPEN internal dataset (2020)	Public Rights of Way.	Full coverage of SLVIA study area.
Ordnance Survey (2019)	1:50,000 scale mapping.	Full coverage of SLVIA study area.
Ordnance Survey (2019)	1:25,000 scale mapping.	Full coverage of SLVIA study area.
Ordnance Survey Open Data (2019)	OS County Region, Local Unitary Authority, Railways, Road and Settlements.	Full coverage of SLVIA study area.
Ordnance Survey (2019)	OS Terrain 50 Digital Terrain Model (DTM).	Full coverage of SLVIA study area.
Royal Yachting Association (RYA) (2013)	Cruising routes for recreational yachting.	Full coverage of SLVIA study area.
Scottish Borders Council (2016)	Scottish Borders Local Development Plan 2016 - Special Landscape Areas.	Scottish Borders
Seagreen	Seagreen Offshore Wind Farm Development Specification and Layout Plan May 2020. Available online: https://marine.gov.scot/sites/default/files/owf_dslp.pdf	Seagreen Offshore Wind Farm
Sustrans (2020)	National Cycle Network (GIS dataset) (available online: https://www.sustrans.org.uk/)	Sustrans (2020)

14.2 BASELINE CHARACTERISATION

343. This section provides an initial overview of the baseline for seascape, landscape and visual established through desk-study.

14.2.1 INTRODUCTION

344. The SLVIA takes into account definitions of seascape by NatureScot (2012) para 1.8 ‘Seascapes refers to an area, as perceived by people, from land, sea or air, where the sea is a key element of the physical environment’, and ‘the visual and physical conjunction of land and sea which combines maritime, coast and hinterland character’. It also takes account of Natural England (2012), NPS EN3 (para 2.6.203) and that set out in the UK Marine Policy Statement (UK Government, 2011), which states that ‘…references to seascape should be taken as meaning landscapes with views of the coast or seas, and coasts and the adjacent marine environment with cultural, historical and archaeological links with each other’.

345. There is a subtle transition between seascape and landscape and the importance of the interaction of sea, coastline and land as perceived by people is highlighted in definitions of seascape. The seascape impact assessment in the SLVIA therefore focuses particularly on areas of coastal onshore landscape with views of the coast or seas and marine environment, as perceived by people, on the premise that the most important effect of offshore windfarms is on the perception of seascape character from the coast.

14.2.2 SEASCAPE BASELINE

14.2.2.1 Scotland

346. At a national scale, the SLVIA study area coincides with five of the Scottish national coastal character types, as shown in Figure 7.9 to Figure 7.11:

- Type 1: Remote High Cliffs;
- Type 2: Rocky Coastline / Open Sea Views;
- Type 3: Deposition Coastline, Open Views;
- Type 4: Outer Firths; and
- Type 5: Developed Inner Firths.

347. The seascapes of the SLVIA study area are varied and interesting seascapes, which are valued natural and cultural assets. They contain important habitats, contribute to the setting of locally designated coastal landscapes; are important for recreation along the coast and as seaside resorts; and contribute to the culture and identity of local communities. The seascape is visually unified, with an expansive open character, but the character is influenced by the presence of vessels crossing these waters, to and from coastal ports within the Firth of Forth and Firth of Tay, which are often visible from the shore.

348. Offshore wind farms will also form a key characteristic in the evolving baseline character of the SLVIA study area. The Proposed Development, represents the next phase of wind farm development within the outer Firth of Forth. Phase one includes the under construction Neart na Gaoithe and two consented OWFs – Inch Cape and Seagreen Alpha/Bravo (now collectively referred to as Seagreen), which will, when constructed, introduce OWF development to the baseline seascape context.

349. The coastal character of the SLVIA study area within Scotland is also defined at the regional level within the Regional Seascape Character Assessment Aberdeen to Holy Island Suffolk (Forth and Tay Offshore Windfarm Developer Group, 2011), as shown in Figure 7.9 to Figure 7.11. The regional coastal character types identified within this coastal character assessment (Figure 7.12) will provide the baseline coastal characterisation and mapping for the SLVIA, against which the seascape effects of the Proposed Development will be assessed. This coastal character assessment was undertaken as part of a collaborative approach to impact assessment being taken by the Forth and Tay Offshore Windfarm Developer Group (FTOWDG) in discussion with NatureScot and local authorities. The use of this coastal character assessment as a common baseline will ensure consistency between SLVIAs for the Proposed Development and other OWFs in the Forth and Tay area. At a regional scale, the SLVIA study area includes several regional coastal character types:

- SA3. Cove Bay to Milton Ness;
- SA4. Montrose Bay;
- SA5. Long Craig;
- SA6. Lunan Bay;
- SA7. Lang Craig to The Deil's Heid SA8. Arbroath to Monifieth;
- SA8. Arbroath to Monifieth;
- SA9. Dundee;
- SA10. Inner Firth of Tay;
- SA11. St Andrews Bay;
- SA12. St Andrews to Fife Ness;
- SA13. East Neuk of Fife;
- SA14. Kirkcaldy & Largo Bay;
- SA16. Edinburgh to Gullane;
- SA17. Eyebroughty to Torness Point;
- SA18. Torness Point to St Abbs Head;
- SA19. St Abbs Head to Eyemouth; and
- SA20. Eyemouth to Berwick Upon Tweed.

14.2.2.2 England

350. At a national scale the MMO identified Marine Character Areas (MCA's) within the Seascape Character Assessment for the North East Inshore and Offshore Marine Plan Areas (MMO, 2018). There are four MCAs within the SLVIA study area, as shown in Figure 7.12:

- MCA 23: Rural Northumberland and Coastal Waters;
- MCA 25: Farne Deeps;
- MCA 26: Berwick Bank; and
- MCA 28: Shallow Hole Plain.

14.2.3 LANDSCAPE BASELINE

14.2.3.1 Scotland

351. NatureScot's landscape character map (NatureScot, 2019) and associated LCT descriptions will form the basis of the baseline landscape character description of the SLVIA study area and the assessment of the visual aspects of perceived character resulting from the Proposed Development. These LCTs are shown in Figure 7.11, with the key coastal landscapes in the SLVIA study area identified as follows by region:

- Aberdeenshire – 11. Fragmented Rocky Coast; and 13. Raised Beach Coast;
- Angus – 388. Beaches, Dunes and Links; and 389. Cliffs and Rocky Coast;
- Fife – 193. Coastal Terraces; 194. Coastal Cliffs; and 196. Coastal Flats;
- East Lothian – 277. Coastal Margins; and 278. Coastal Terrace; and
- Scottish Borders – 110. Coastal Farmland; 111. Coastal Pasture; and 112. Coastal Moorland.

352. The Proposed Development is located beyond the boundaries of any areas subject to international, national or regional landscape designation in Scotland intended to protect landscape quality, as shown in Figure 7.14Figure 7.12. Certain designated landscapes or defined areas found within the study area in Scotland have been designated or defined due to their scenic qualities or historic landscape qualities and are of relevance to the SLVIA as set out in Apx. Table 14. 2.

Apx. Table 14. 2: Landscape Designations in Scotland Within SLVIA Study Area

Designation	Site
Gardens and Designed Landscapes	1. Baxter Park 2. Craig House 3. Dunninald 4 Balcarres 5.Cambo 6. Charleton House 7. Lahill 8. Kinnaird Castle 9. Earlshall 10. Kellie Castle 11. Balcaskie 12.Glenbervie House 13. Arbuthnott House 14. The Burn 15. Balgone House 16. Tyninghame 17. Broxmouth Park 18. Biel 19. Whittingehame 20. Dunglass 21. Dirleton Castle 22. Leuchie 23.Netherbyres 24. Ayton Castle 25. Duns Castle 26. Manderston 27. Wedderburn 28. Paxton House 29. Marchmont 30. The Hirsel 31. The Guynd 32. Guthrie Castle 33. Craigtoun 34. Edzell Castle 35. House of Pitmuies 36. House of Dun 37. Brechin Castle 38. Fasque House 39. Ladykirk 40 Kimmerghame 41. St Andrews Links 42. St Andrews Botanic Garden
Aberdeenshire Special Landscape Area	1. Braes of the Mearns 2. South East Aberdeenshire Coast
Fife Local Landscape Area	3. Tay Coast 4. Tents Muir Coast 5. St Andrews to Fife Ness 6. The Links 7. Dura Den 8. Craigtoun 9. Tarvit and Ceres 10. Largo Law 11. East Neuk 12. East Coast 13. Isle of May
East Lothian Special Landscape Area	14. Port Seton to North Berwick Coast 15. Tantallion Coast 16. North Berwick Law 17. Kingston 18. Balgone & Whitekirk Outcrops 19. Belhaven Bay 20. Traprain 21. Biel & Bielton 22. Dunbar to Barns Ness Coast 23. Doonhill to Chesters 24. Whittingeham to Woodhall 25. Halls to Bransley Hill

Designation	Site
	26. Danskine to Whitcastle 27. Monynut to Blackcastle 28. Lammermuir Moorland 29. Thorntonloch to Dunglass Coast 30. Whiteadder
Scottish Borders Special Landscape Area	31. Lammermuir Hills 32. Berwickshire Coast

14.2.3.2 England

353. There is a hierarchy of published Landscape Character Assessments that describe the baseline landscape character of the English landscape in the SLVIA study area, at the National, County and District level.

354. The English Landscape is classified at the national level by National Character Areas (NCAs). The 159 NCAs, which cover the country, were originally identified by the Countryside Agency. This mapping and the associated descriptions have been revised and developed by NE into NCA profiles, which provide a recognised, national, spatial framework. The NCAs will be used in providing a high-level description of the landscape and its context.

355. At the National level, the SLVIA study area within England is characterised by the North Northumberland Coastal Plain NCA; the Northumberland Sandstone Hills NCA; and the Cheviot Fringe NCA. The North Northumberland Coastal Plain covers the coastal parts of the SLVIA study area in England, and formed by a narrow, windswept strip that runs from the Anglo-Scottish border south to the mouth of the River Coquet, bounded by the sea to the east and the Northumberland Sandstone Hills to the west. The gently undulating inland plain consists of arable farming, with some pasture and sparse woodland cover confined to the river valleys and the estates. The coastline is diverse, with rocky headlands and cliffs contrasting with long, sweeping sandy beaches backed by dunes, and extensive intertidal mudflats and salt marsh around Lindisfarne.

356. The landscape of the onshore parts of the study area will be informed by these NCAs, however it will be described and assessed in relation to the published Northumberland County Council Landscape Character Assessment (Northumberland County Council, 2010) that describes the associated coastal landscapes within the SLVIA study area at the regional scale. This provides a county-wide, consistent character framework as a background for more detailed assessments (such as at the district level) and is considered to be of an appropriate scale to allow assessment of the effects of the Proposed Development over the relatively wide SLVIA study area, at a sufficient level of detail. The key coastal landscape character areas in the Northumberland part of the SLVIA study area form the North Northumberland Coastal Plain:

- 1a. Tweed River Mouth;
- 3a. Haggerston;
- 4a. North Tweed Coast; and
- 5a. Holy Island Coast.

357. The Proposed Development is located beyond the boundaries of any areas subject to international, national or regional landscape designation in England intended to protect landscape quality, as shown in Figure 7.14. Certain nationally designated landscapes or defined areas found within the study area in England have been designated or defined due to their scenic qualities or historic landscape qualities and are of relevance to the SLVIA as set out in Apx. Table 14. 3.

Apx. Table 14. 3: Landscape Designations in England Within SLVIA Study Area

Designation	Site
AONB	Northumberland Coast AONB
Heritage Coast	North Northumberland Heritage Coast
Parks and Gardens	43. Lindisfarne Castle 44. Tillmouth Park 45. Belford Hall

358. The SLVIA study area includes part of the area covered by the Northumberland Coast AONB designation, within the north of the County between Berwick upon Tweed and Holy Island. The Northumberland Coast AONB covers an area of 138 km2 along 64 km of coastline from just south of Berwick-upon-Tweed to the Coquet Estuary. The AONB is only 2.5 km wide at its widest point, and yet it contains a variety of features of natural, historical and cultural value. The area is best known for its sweeping sandy beaches, rolling dunes, rocky headlands and isolated islands. Within the AONB and its seascape setting, is abundant evidence of 7,000 years of human activity, conflict and spiritual pursuit, whilst a host of national and international nature conservation designations attest to the variety of important habitats and species in the AONB. The 'natural beauty' of the Northumberland Coast AONB is best expressed as the special qualities of the landscape, embracing all of these elements. These special qualities are set out in Part One of the AONB Management Plan 2020-2024, as follows:

- dramatic natural coastline of rocky headlands and cliffs contrasting with extensive sweeping sandy beaches and dynamic sand dune systems;
- coastal and riverside setting of iconic historic and cultural landmark features which provide localised vertical emphasis within a predominantly horizontal landscape and seascape;
- remote historic, cultural and spiritual qualities and ecclesiastical associations of the Holy Island of Lindisfarne Rocky Farne Islands archipelago, which features in many coastal views;
- traditional coastal fishing villages clustered around small harbours;
- views inland to the rounded sandstone hills and Cheviot Hills provide a dramatic and dynamic backdrop to the coast;
- feeling of exposure and tranquillity on the flat, low lying open coastal plain and windswept coast, with sparse tree cover, huge skies and wide seascape views; and
- dark skies.

359. The North Northumberland Heritage Coast is largely contained within the AONB (Figure 7.14) between Cocklawburn Beach in the north to the edge of the SLVIA study area at Seahouses in the south. A further area of coastline to the north is also defined within the Heritage Coast outside the AONB, consisting of the Berwickshire coastline at Berwick-upon-Tweed. The purpose of Heritage Coast designation is similar to that of an AONB. As its geographic area is largely within the AONB and its protection policies are now incorporated into the Northumberland Coast AONB Management Plan 2020-2024, the effects of the Proposed Development on the North Northumberland Heritage Coast will be considered as integral to the assessment of the AONB.

14.2.4 VISUAL BASELINE

14.2.4.1 Introduction

360. The baseline visual resource experienced from the Scottish coastline within the SLVIA study area is diverse. It ranges from the remote high cliffs at St Abbs, which afford elevated and distant views, to the rocky but more settled coastlines of East Lothian and Fife; and the lower lying deposition coasts of Fife, which retain open sea views but are less elevated; and the outer Firth of Forth and Firth of Tay, which have land to land views across the Firths.

361. From the remote high cliffs at St Abbs, there are wide elevated views directed along the coast and out to open sea, where there are exhilarating and awe-inspiring coastlines due to the height of cliffs giving

elevated and distant views. From the rocky coastlines of East Lothian and Fife the views over the North Sea are generally wide and open, but settlements and built features often appear at regular intervals providing foci along the coast, and shipping is a common feature seen out to sea. From the deposition coasts of Fife, which are low lying, views are long and expansive along sandy beaches and extend out to the North Sea. The outer Firth of Forth and Firth of Tay have land to land views across the Firths, while also retaining open views east out to sea. Views from the outer Firths often focus on distinctive islands (such as Bass Rock/Isle of May), and land on either side of the Firths is a focus s, with settlements, and often masts and other infrastructure located on ridges, forming significant features in views.

362. An initial understanding of the baseline visual resource of the Northumberland coast is provided in the Seascape Character Assessment for the North-East Inshore and Offshore Marine Plan Areas (MMO, 2018), which describes the 'Expansive undeveloped vistas out to the wider North Sea and islands, marked by distant ships and fishing vessels, as well as views from the sea and islands (recreational boat routes) back to the coast where the fortified castles form dramatic and iconic features on the skyline. Scenic views gained along, the undeveloped Heritage Coast'. It also identifies the 'High levels of intervisibility between inland high points, such as Halidon Hill or Ros Castle, low-lying sandy beaches (Goswick Sands and Budle Bay) and the Farne Islands offshore'.

363. The Berwick Bank seascape (MCA26) in which the proposed development is located covers an expansive offshore area of water located off the coast of Northumberland, where the visual baseline is described as being influenced by shipping activity (although less so than seascapes to the south), where the Northumberland coast 'is visible from the westernmost parts of the MCA, with coastal landmarks providing orientation for seafarers' and forming 'part of the wider maritime setting to the Northumberland Coast AONB and North Northumberland Heritage Coast' (MMO. 2018).

14.2.4.2 Zone of Theoretical Visibility (ZTV)

364. The visual baseline is largely defined by the ZTV shown in Figure 7.15. The ZTV shows the main area in which the Proposed Development would theoretically be visible, highlighting the different groups of people who may experience views of wind turbines located within the Proposed Development Array Area and assisting in the identification of viewpoints where they may be affected. The ZTVs shown in Figure 7.15 are based on wind turbines of 355 m to blade tip (above LAT) and represents the MDS for the SLVIA considered in the scoping assessment. The blade tip ZTV illustrates where there would be no visibility of these wind turbines, as well as areas where there will be lower or higher numbers of wind turbines theoretically visible.

365. The ZTV illustrates the 'bare ground' situation based on an Ordnance Survey (OS) terrain model and does not take into account the screening effects of vegetation, buildings, or other local features that may prevent or reduce visibility. By using a bare ground elevation model, the results will be an over-representation of maximum visibility, as many could, in reality, be blocked by surface features not included in the model.

366. The blade tip ZTV shows the areas of highest theoretical visibility of the Proposed Development will be from the North Sea within the Proposed Development Array Area and from the surrounding areas of the North Sea extending out to approximately 40 km, beyond which visibility experienced by users of the sea decreases with the influence of the earth's curvature, which reduces visibility of the wind turbines at longer distances and from the low-lying seascape.

367. The blade tip ZTV also illustrates the main coastal landscapes of the SLVIA where there is theoretical visibility of the Proposed Development. These areas of visibility have the potential to extend over relatively wide terrestrial areas extending from Aberdeenshire in the north to Northumberland in the south, along the coastlines of the outer Firth Forth and Firth of Tay, with the closest areas of visibility from terrestrial areas being:

- Aberdeenshire coastline between Stonehaven and St Cyrus, at distances from 40.1 km at the closest point (Milton Head near Johnshaven);
- Angus coastline between Montrose Bay, Lunan Bay, Arbroath, Carnoustie, Budden Ness, and the outer Firth of Tay at distances from 34.1 km at the closest point (near Red Head);
- Fife coast between Tentsmuir, Fife Ness and St Monan's at distances from 36.6 km at the closest point (Fife Ness);
- East Lothian coastline between North Berwick, Dunbar and Torness at distances from 42.7 km at the closest point (where East Lothian meets Scottish Borders near Cove);
- Scottish Borders from Cockburnspath extending along the elevated cliffs between Cove / Pease Bay to St Abbs Head and Eyemouth at distances of 33.3 km at the closest point at St Abbs Head; and
- Northumberland coast between Berwick-upon-Tweed, Holy Island and Seahouses on the southern edge of the SLVIA study area, at distances from 38.5 km at the closest point near Lamberton.

368. The area of theoretical visibility of the Proposed Development become more fragmented from the hinterland and inland areas of the SLVIA study area, where views of the sea become increasingly screened either by adjacent rising land or coastal landforms. Theoretical visibility does extend into some of the more elevated coastal farmlands of Aberdeenshire, Angus and Fife, and parts of the East Lothian coastal plain. Actual visibility from these hinterland and inland areas also becomes increasingly screened by vegetation, such as woodland and hedgerows, and / or built development and settlement. Visibility from streets, open spaces and low storey buildings within coastal, urban areas will typically be contained within the urban environment by surrounding built form, with most visibility of the Proposed Development likely to be greatest at the coastal edge and sea front. There are a number of elevated landscapes affording very distant views of the sea from inland areas of the SLVIA study area, generally at much longer distances of 50 km to 60 km from the Proposed Development, including the Mounth uplands of Aberdeenshire; the Lammermuir Hills of East Lothian and the Scottish Borders; and the Kyloe Hills of Northumberland.

14.2.4.3 Visibility

369. Atmospheric conditions will affect visibility and therefore the ability of observers to see the Proposed Development from areas where theoretical visibility is indicated in the ZTV. A range of visibility conditions prevail in the SLVIA study area, at different locations, times of day/year and in different weather, ranging from the *'Windswept coast with frequent 'haar', or coastal fog, caused by warmer moist air moving over the relatively cooler North Sea'* noted in MMO (2018) to the *'northern quality of light often gives intense clarity in views'* described in NatureScot 2005.

370. The Met Office defines visibility as *'the greatest distance at which an object can be seen and recognised in daylight, or at night could be seen if the general illumination were raised to a daylight level'* (Met Office, 2000). Met office visibility data will be used to inform the assessment of the likelihood (or frequency) of effects in the SLVIA, based on data form the closest Met Office weather stations to the coastal parts of the SLVIA study area. The likelihood of the seascape, landscape and visual effects arising will be described in the SLVIA relation to the Met Office definitions for the different ranges of visibility from 'very poor' to 'excellent' (Met Office, 2000), however likelihood will not be considered as a factor of significance, which will be assessed based on excellent visibility as a worst case. Due to its distance at over 33.3 km from the coast, the Proposed Development will only be visible in very good or excellent visibility and is unlikely to be visible in periods of very poor, poor, moderate or good visibility (less than 20 km).

371. Met Office visibility data has been analysed at the national level as part of the Offshore Energy Strategic Environmental Assessment (SEA) (White Consultants, 2020). Averaging visibility data from UK coastal stations, the visual range recorded was just under 24 km around 50% of the time, just under 30 km 33% of the time, around 34 km for 20% of the time, and 40 km 10% of the time.

372. Data analysed in the OESEA 2009 report on patterns of seasonal variations on visibility. These illustrate a clear pattern within the visual ranges on a monthly basis. The summer months (June–September) experience a much larger 'maximum percentage' visual range in comparison to the winter months (November–February) which experience a much lower visual range. It is likely that more people will be viewing the seascape in the summer, and for more prolonged periods, due to holidays and weekend trips, and more equable weather conditions. There is a case that this should be weighted in consideration of frequency of visibility.

14.2.4.4 Visual Receptors

373. The principal visual receptors in the SLVIA study area are likely to be found along the closest sections of the Aberdeenshire, Angus, Fife, East Lothian, Scottish Borders and Northumberland coastlines. These include people within settlements, driving on roads, visitors to tourist facilities or historic environment assets, and people engaged in recreational activity such as those using walking and cycle routes. A detailed assessment will be undertaken in the SLVIA for those visual receptors that are most susceptible to changes, which may experience significant visual effects as a result of the Proposed Development and will focus on visual receptors where the sea is a strong influence in the baseline view, along the coastline and immediate hinterland, including:

- coastal settlements – including Montrose, Arbroath, St Andrews, St Abbs, settlements around the East Neuk of Fife, North Berwick, Dunbar, Cockburnspath, Coldingham, Eyemouth, Burnmouth and Berwick-Upon-Tweed.
- recreational routes - including walkers, equestrians and cyclists using the public rights of way network including long-distance trails such as the Fife Coastal Path, John Muir Way, Southern Uplands Way, Berwickshire Coastal Path and Northumberland Coast Path;
- main transport routes - such as the A92, A917, A1, A1107 and the East Coast Mainline Railway.
- visitors to tourist facilities - such as beaches, public open space, common land, coastal caravan and camping sites;
- visitors to historic environment assets - such as Dunnottar Castle, Tantallon Castle, Fast Castle, Lindisfarne Castle, Bamburgh Castle and Holy Island; and
- nearshore recreational receptors – including motor cruising areas extending to the east towards the Proposed Development Array Area, as well as day boat trips to offshore islands such as the Isle of May and Bass Rock, and other recreation activities, such as kayaking and surfing that can be found along the coast.

14.2.4.5 Viewpoints

374. Viewpoints have been compiled based on the ZTV for the Proposed Development, the landscape and visual receptors described above and informed by other projects and feedback from stakeholders contained in the Berwick Bank Scoping Opinion (Marine Scotland, March 2021). In particular, Appendix I to the Scoping Opinion (Marine Scotland, 2021), including Consultation Representations and Advice from NatureScot, East Lothian Council, Scottish Borders Council and Northumberland County Council relating specifically to viewpoint locations for the SLVIA.

375. Representative and illustrative viewpoints proposed for the visual assessment are identified in Table 7.16 and mapped in Figure 7.15.

- Representative viewpoints – are selected to represent the experience of different types of visual receptor within an area where larger numbers of viewpoints cannot all be included. A combination of baseline panorama, cumulative wireline and full photomontage visualisations will be produced. Detailed assessment of the visual effects from these viewpoints that may experience significant visual effects will be undertaken in the SLVIA, while others may be scoped out during the preliminary assessment, if no potential for significant effects is identified; and
- Illustrative viewpoints – are chosen specifically to demonstrate a particular effect or specific issue (including restricted visibility). A baseline panorama and wireline visualisation (90 degrees field of view) will be produced, but a written assessment of the visual effects from these viewpoints will not be included in the SLVIA.

376. Wireline visualisations showing the Proposed Development from each of the viewpoints listed in Apx. Table 14. 4

Apx. Table 14. 4: Proposed Viewpoints to be Included in SLVIA

ID	Viewpoint	Geographic Region	Distance (km)
Representative Viewpoints			
1	Johnshaven (NCN1)	Aberdeenshire	41.0
2	Montrose	Angus	38.4
3	St Andrews Cathedral	Fife	47.7
4	Cambo Sands	Fife	39.7
5	Fife Ness	Fife	36.9
6	Crail	Fife	40.3
7	North Berwick Law	East Lothian	55.8
8	Tantallon Castle	East Lothian	52.1
9	Tyninghame (Ravensheugh Sands)	East Lothian	51.1
10	Dunbar	East Lothian	48.0
11	Skateraw	East Lothian	44.1
12	Cockburnspath (A1/SUW)	Scottish Borders	43.2

ID	Viewpoint	Geographic Region	Distance (km)
13	Fast Castle	Scottish Borders	36.7
14	Tun Law	Scottish Borders	35.2
15	St Abb's Head	Scottish Borders	33.6
16	Eyemouth	Scottish Borders	34.7
17	Berwick-upon-Tweed	Northumberland	41.7
18	Cocklawburn Beach	Northumberland	45.3
19	Holy Island (near Lindisfarne Castle)	Northumberland	49.2
20	Bamburgh Castle	Northumberland	56.4
Illustrative viewpoints			
A	Dunnottar Castle	Aberdeenshire	53.5
B	Lunan Bay	Angus	37.3
C	Arbroath	Angus	37.9
D	Bell Rock Lighthouse	Fife	23.9
E	St Monan's	Fife	49.3
F	Isle of May	Isle of May	39.5

ID	Viewpoint	Geographic Region	Distance (km)
Representative Viewpoints			
1	Johnshaven (NCN1)	Aberdeenshire	41.0
2	Montrose	Angus	38.4
3	St Andrews Cathedral	Fife	47.7
4	Cambo Sands	Fife	39.7
5	Fife Ness	Fife	36.9
6	Crail	Fife	40.3
7	North Berwick Law	East Lothian	55.8
8	Tantallon Castle	East Lothian	52.1
9	Tyninghame (Ravensheugh Sands)	East Lothian	51.1

ID	Viewpoint	Geographic Region	Distance (km)
10	Dunbar	East Lothian	48.0
11	Skateraw	East Lothian	44.1
12	Cockburnspath (A1/SUW)	Scottish Borders	43.2
13	Fast Castle	Scottish Borders	36.7
14	Tun Law	Scottish Borders	35.2
15	St Abb's Head	Scottish Borders	33.6
16	Eyemouth	Scottish Borders	34.7
17	Berwick-upon-Tweed	Northumberland	41.7
18	Cocklawburn Beach	Northumberland	45.3
19	Holy Island (near Lindisfarne Castle)	Northumberland	49.2
20	Bamburgh Castle	Northumberland	56.4
Illustrative viewpoints			
A	Dunnottar Castle	Aberdeenshire	53.5
B	Lunan Bay	Angus	37.3
C	Arbroath	Angus	37.9
D	Bell Rock Lighthouse	Fife	23.9
E	St Monan's	Fife	49.3
F	Isle of May	Isle of May	39.5

377. An initial ‘simple’ assessment of the potential effects of the Proposed Development on viewpoints will be undertaken as part of the first stage of the EIA process, initially using desk-based information, wirelines and ZTV analysis, with the aim of scoping out certain viewpoints and receptors where significant effects are unlikely to occur, in consultation with stakeholders. A detailed assessment will focus on those viewpoints and receptors that are identified as requiring further assessment, particularly those representative viewpoints where the combination of their sensitivity and potential magnitude of change resulting from the Proposed Development may give rise to significant effects.

378. In preparing photomontages for the SLVIA, the photographs for all viewpoints will, where possible, be taken in good visibility conditions, seeking to represent a maximum visibility scenario when the offshore elements of the Proposed Development may be most visible.

379. Night time viewpoint photomontages showing a representation of the appearance of visible aviation and marine navigation lighting will also be produced from up to six viewpoints (one from the coastline of each local authority area in the SLVIA study area), with the locations to be agreed in consultation with stakeholders. The Applicant proposes further discussion on a likely lighting scenario in consultation with Northern Lighthouse Board, the Civil Aviation Authority and Marine Scotland.

Appendix 15 INFRASTRUCTURE AND OTHER USERS – BASELINE ENVIRONMENT

15.1 DESKTOP STUDY

380. An initial desk – based review of literature and data sources to support this Offshore EIA Scoping Report has identified a number of baseline datasets, summarised in Apx. Table 15. 1.

Apx. Table 15. 1: Summary of Key Desktop Reports

Title	Source	Year	Author
Scottish Marine Recreation and Tourism Survey	Marine Scotland	2015	Marine Scotland
UK Coastal Atlas of Recreational Boating	RYA	2019a	RYA
Webmap service – Offshore Wind Farms	C4Offshore	Compiles a series of data	N/A
Webmap service – Various layers including offshore cables and disposal sites	National Marine Plan Interactive (NMPi)	N/A	N/A
Webmapping Service – Infrastructure	Oil and Gas	N/A	N/A
Scotland tourism board	VisitScotland	N/A	N/A
Neart na Gaoithe Offshore Wind Farm EIA Report	Marine Scotland Information	2019	Mainstream Renewable Power Ltd

15.2 SITE-SPECIFIC SURVEY DATA

381. No site-specific surveys have been undertaken to inform the Offshore EIA Scoping Report for infrastructure and other users. Due to availability of suitable data throughout the Forth and Tay; new data or modelling studies will not be required to characterise the infrastructure and other users baseline for the Offshore EIAR.

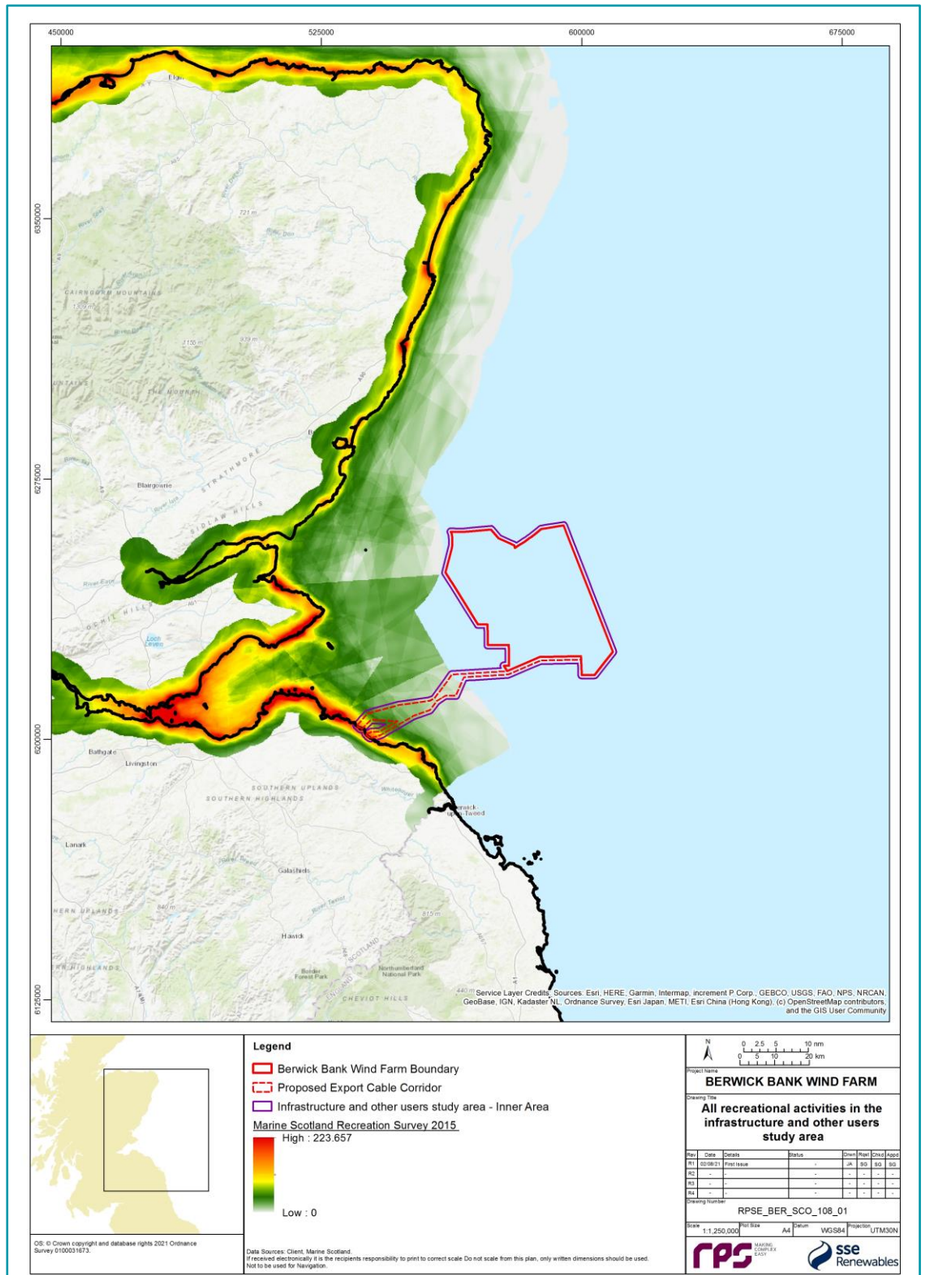
15.3 BASELINE CHARACTERISATION

382. This section provides an overview of the baseline recreational boating (including sailing and motor cruising), recreational fishing, other recreational activities, offshore energy projects, offshore cables and pipelines, carbon capture, natural gas storage and underground gasification, oil and gas, coal deposits, and marine aggregate extraction and disposal sites, within the infrastructure and other users study area (inner) (Figure 7.18).

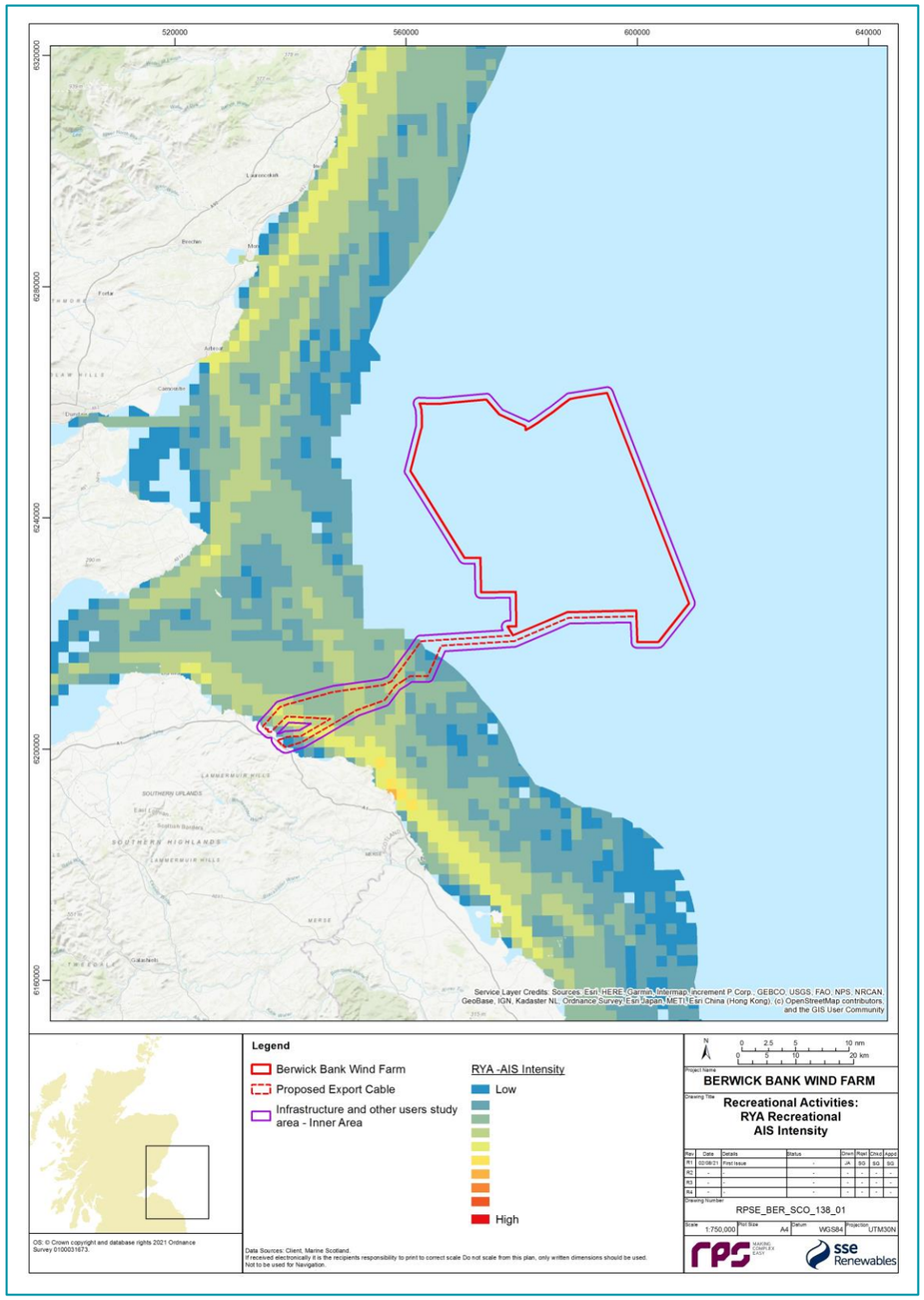
15.3.1 RECREATIONAL ACTIVITY

383. The National Marine Plan Interactive (NMPi) presents several data layers for recreational activities which provide an overview of recreational activities around the Scottish Coast. Apx. Figure 15. 1 provides a heat map of 23 different recreation and tourism activities undertaken at sea or around the coastline (Marine Scotland, 2015). Extensive recreational boating occurs in the area of sea between North Berwick, and Elie and Earlsferry, with motor cruising areas extending to the east towards the Proposed Development Array Area (Apx. Figure 15. 1 and Apx. Figure 15. 2).

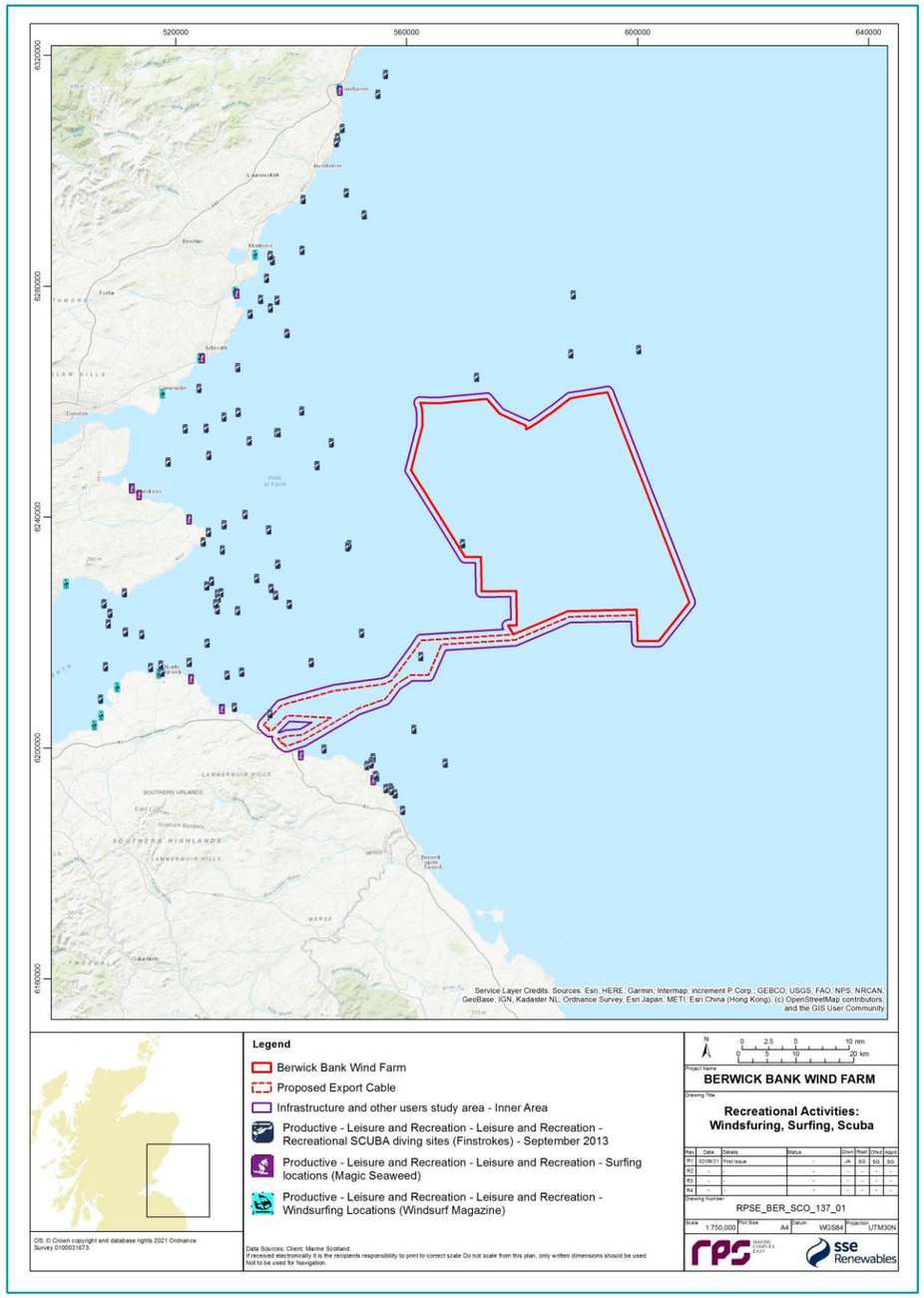
384. Activity is lower along the proposed ECC, with recreational boating expected to be more transitory in nature (NMPi, 2021).



Apx. Figure 15. 1: All Recreational Activities in the Infrastructure and Other Users Study Area



Apx. Figure 15. 2: **RYA Recreational AIS Intensity in the Infrastructure and Other Users Study Area**



Apx. Figure 15. 3: **Recreational Activities (Windsurfing, Surfing and Scuba) in the Infrastructure and Other Users Study Area**

385. Recreational sea angling occurs to the north and to the south of the Proposed Development Array Area, with an increase in effort towards the coast and near to the proposed ECC landfall (Apx. Figure 15. 1 and Apx. Figure 15. 2). High levels of shore angling can be found along the beaches where the offshore export cable is expected to make landfall (NMPi, 2021).

386. Other recreation activities, including canoeing, kayaking, windsurfing, kite surfing and scuba diving can be found along the coast with activities expected to stay within 1 km offshore (Apx. Figure 15. 1 and Apx. Figure 15. 3), with the exception of diving. Scuba diving occurs within the infrastructure and other users study area along the proposed ECC.

387. It is noted that all recreational activities are highly seasonal and dependant on certain weather conditions.

15.3.2 OFFSHORE WIND FARMS

388. Offshore energy projects within the infrastructure and other users study area (inner) include Neart Na Gaoithe (consent authorised), illustrated in Apx. Figure 15. 4. The ECC for the Neart na Gaoithe Offshore Wind Farm intersects the proposed ECC of the Proposed Development.

15.3.3 WAVE AND TIDAL PROJECTS

389. There are no wave and tidal energy projects within the infrastructure and other users study area (inner). Wave and tidal projects have therefore not been considered further within this Offshore EIA Scoping Report.

15.3.4 OIL AND GAS OPERATIONS

390. The Firth of Forth supports oil and gas activities such as those associated with the Grangemouth refinery, oil storage and tanker terminals. However, there are currently no active licence blocks located within or in close proximity to the Proposed Development.

391. There are several overlaps of non-active licence blocks with the Proposed Development Array Area, these include: 25/20; 26/16; 26/17; 26/18; 26/21; 26/22; 26/23; 26/24; 26/27; 26/28; and 26/29.

392. The closest active licence block, Block 27/9 - North Sea Natural Resources Ltd, is located approximately 67 km from the Proposed Development Array Area and 84 km from the ECC.

393. In July 2019, the Oil and Gas Authority (OGA) launched the 32nd Offshore Licensing Round with 768 blocks or part-blocks on offer across the main producing areas of the UKCS. In March 2020, the OGA announced a 'temporary pause' on offshore licencing rounds in March 2020, with no 33rd round to be launched in 2020/2021. Given the lack of existing activity in the area, it is likely that there is limited potential for exploration in this area of the North Sea.

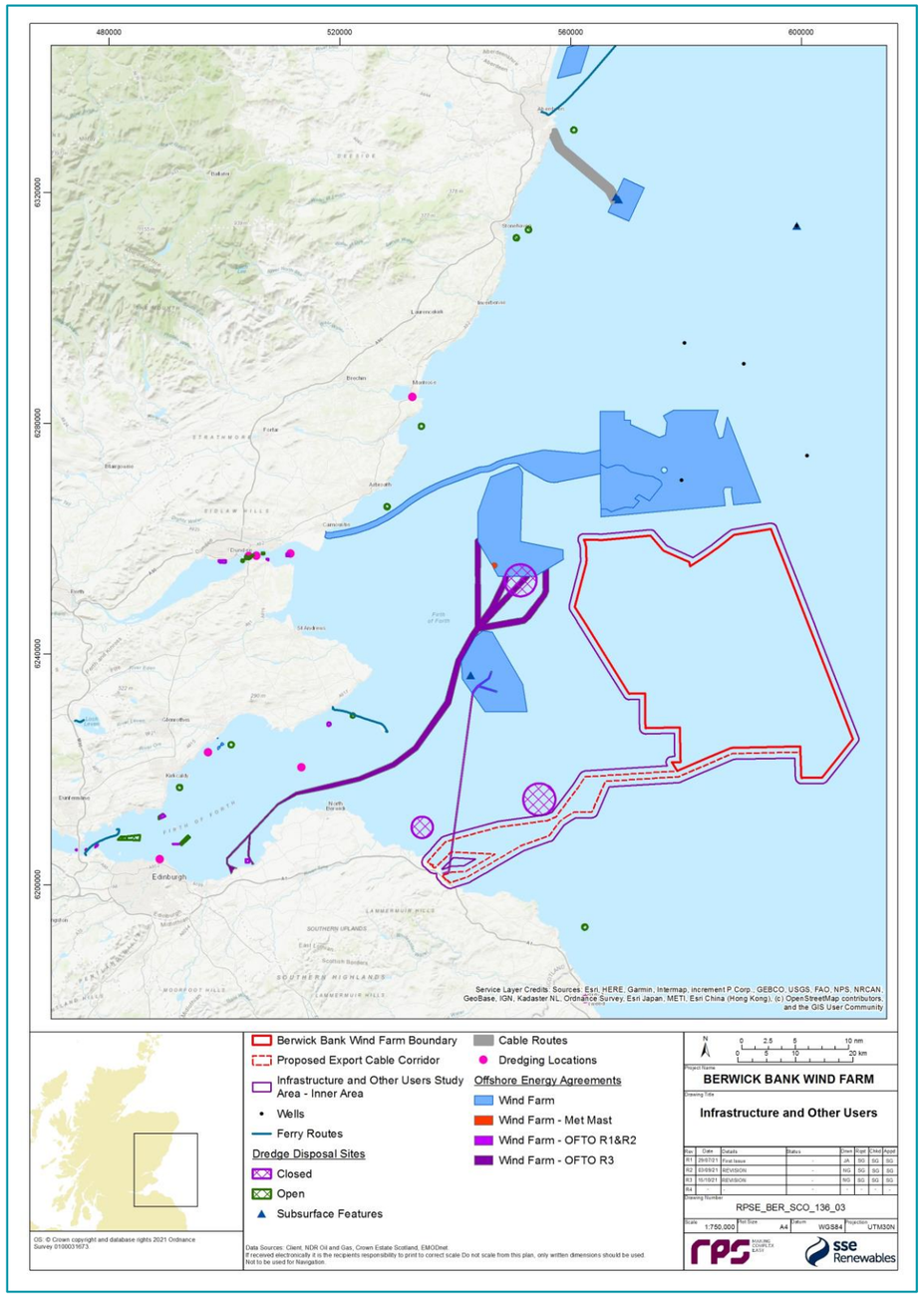
394. There are no oil and gas pipelines located within the infrastructure and other users study area (inner). The closest pipeline (Everest To Teeside (Cats Trunkline) gas pipe) is located approximately 99 km from the Proposed Development Array Area.

395. The following services are associated with the oil and gas industry:

- helicopters: the oil and gas industry relies on helicopters for personnel transfer and emergency evacuation. Helicopter and associated aviation considerations are addressed separately in section 7.3; and
- vessels: the oil and gas industry require supply or support vessels for its operations. Vessels and associated navigational considerations are addressed separately in section 7.2.

15.3.5 CARBON CAPTURE, NATURAL GAS STORAGE, UNDERGROUND GASIFICATION AND COAL DEPOSITS

396. There is no carbon capture, natural gas storage, underground gasification or coal deposits located within the infrastructure and other users study area (inner). Carbon capture, natural gas storage, underground gasification and coal deposits have therefore not been considered further within this Offshore EIA Scoping Report.



Apx. Figure 15. 4: Key Infrastructure and Other Users in the Vicinity of the Proposed Development

15.3.6 SUBSEA TELECOMMUNICATION CABLES

397. A review of the active and disused subsea cables has identified no telecommunication cables in the infrastructure and other users study area (inner). The nearest active cable is located approximately 40 km from Thorntonloch Landfall area, located between mainland and Holy Island. Subsea cables have therefore not been considered further within this Offshore EIA Scoping Report.

15.3.7 MARINE DISPOSAL SITES

398. A review of potential active or closed marine disposal sites identified no active or closed disposal sites within the infrastructure and other users study area (inner) (Apx. Figure 15. 4). The closest site is a closed disposal site, located approximately 1 km from the Skateraw Landfall area, bordering the infrastructure and other users study area, and an open disposal site approximately 16.5 km from the Thorntonloch Landfall area.

399. Although there is a disposal site bordering the infrastructure and other users study area, this site is closed and therefore marine disposal sites have therefore not been considered further within this Offshore EIA Scoping Report.

15.3.8 MARINE AGGREGATE EXTRACTION SITES

400. Although Scotland has a considerable marine sand and gravel resource, the marine aggregate industry has historically been very small due to more readily accessible land supplies. Marine aggregate licences have historically been issued to two sites in Scotland, one site in the Firth of Forth and the second site in the Firth of Tay (Scottish Government, 2015) which do not overlap the infrastructure and other users study area. There are currently no active licences for marine aggregate extraction in the Forth and Tay marine region. Marine aggregate extraction sites have therefore not been considered further within this Offshore EIA Scoping Report.

Appendix 16 OFFSHORE SOCIO-ECONOMICS AND TOURISM – BASELINE ENVIRONMENT

16.1 DESKTOP STUDY

401. An initial desk-based review of literature and data sources to support this Offshore EIA Scoping Report has identified a number of baseline datasets in the form of both pre-existing, non- Proposed Development specific datasets. Information on population within the socio-economics study area and the regional socio-economics study area will be collected through a detailed desktop review of existing studies and datasets. Key reports and datasets include, but are not limited to:

- A review of East Lothian tourism for 2018 (Scottish Tourism Alliance, 2019);
- Scotland's Labour Market: People, Places and Regions Annual Population Survey 2019 (Scottish Government, 2020);
- Mid-2020 Population Estimates Scotland (National Records of Scotland, 2020);
- Business Register and Employment Survey (ONS, 2020);
- Regional gross value added (balanced) by industry (ONS, 2021);
- Scotland's Marine Economic Statistics (Scottish Government, 2018); and
- Scottish Marine Recreation & Tourism Survey (Scottish Government, 2015).

16.2 SITE-SPECIFIC SURVEY DATA

402. No site-specific surveys have been undertaken to inform the Offshore EIA Scoping Report for socio-economics and tourism and will not be undertaken to support the development of the Offshore EIAR. This is because sufficient secondary data is available for the development of a baseline from which the potential impacts can be assessed.

8.6. BASELINE CHARACTERISATION

403. While the Proposed Development occurs offshore, the socio-economic impacts and those associated with recreation value will also occur onshore. The socio-economic and tourism baseline environment will provide an overview of the following topic areas within the onshore and offshore environment:

- population;
- employment and economic activity;
- productivity and GVA;
- income;
- skills and education;
- house prices
- transport and commuting; and
- tourism and leisure.

16.2.1 SOCIO-ECONOMICS OVERVIEW

404. Based on a review of the associated socio-economic baseline developed to support the assessment of impacts associated with Seagreen Alpha/Bravo (Seagreen Wind Energy, 2018), the majority of the open coastline between Aberdeen and Eyemouth is sparsely populated with major population centres present within the Firths of Forth and Tay (Dundee and Edinburgh).

405. An overview of the population counts and demographic structure of the coastal settlements within the Regional Study Area are presented in Apx. Table 16. 1. In mid-2020, the median age across the local authorities within the Regional Study Area ranged from 36.7 years of age in the City of Edinburgh, to 47.4 years of age in Angus (National Records of Scotland, 2020). The percentage of the population in the working age group varied from 61% of the population of Angus and Perth and Kinross, to 71% of the City of Edinburgh. These percentage contributions were also reflected within the pensionable age demographics, with the City of Edinburgh having the lowest total percentage within the pensionable age category (14%) compared to the highest in Perth & Kinross and Angus (23%) (National Records of Scotland, 2020).

Apx. Table 16. 1: Estimated Mid-2020 Population of the Coastal Settlements Associated with the Regional Study Area (National Records of Scotland, 2020)

Local Authority	Population Count	Median Age	Under 16 (%)	Working Age (%)	Pensionable Age (%)
Local Authorities within Local Socio-Economics Study Area					
East Lothian	107,900	44.8	18	62	19
Fife	374,130	43.9	17	63	20
Dundee City	148,820	37.1	16	67	17
Angus	115,820	47.4	16	61	23
Scottish Borders	115,240	49.4	16	58	25
Other Local Authorities					
Aberdeen City	229,060	37.6	16	69	15
Aberdeenshire	260,780	44.4	19	62	19
Perth & Kinross	151,910	47.3	16	61	23
Falkirk	160,560	43.6	17	65	18
West Lothian	183,820	41.1	19	65	16
City of Edinburgh	527,620	36.7	15	71	14
Midlothian	93,150	41.6	19	63	18
Scotland	5,466,000	42.1	17	64	19

406. A review of Scotland's labour market (Scottish Government, 2020) suggests that in 2019 there was a record high level of employment across Scotland, with a total of 2,663,900 people (aged 16 and over) in employment with an employment rate (16 to 64) of 74.8%. Further, the second highest employment rate across Scotland was in Perth and Kinross with 83.4% employment. Comparatively, the lowest employment rate across Scotland was observed in Dundee City with an employment rate of 68.6%. (Scottish Government, 2020). Across Scotland, the employment rate has increased in 28 local authorities and decreased in 4 over the past ten years. Young people (16 to 24 years old) make up a comparatively high concentration of the workforce in the accommodation and food services, and wholesale, retail, repair of vehicles sectors. Meanwhile, workers aged 50 and over make up a comparatively high concentration of the workforce in the agriculture, forestry and fishing and transport and storage sectors (Scottish Government, 2020).

407. The renewable energy sector has grown steadily in Scotland over the past few years, with an annual capacity increase of 880 MW since the end of 2009 (Scottish Renewables, 2021). Renewable energy output in Scotland was £5,649 million in 2019, of which £889 million was related to the offshore wind sector (Scottish Renewables, 2021). In relation to renewable sector construction, £9,258 million GVA was recorded in 2019 for Scotland (Office for National Statistic, 2021). A survey in 2017 suggest that around 17,700 full-time employees in the Scottish renewable energy sector, of which 3,400 were within the offshore wind segment (Office for National Statistics, 2019).

408. GVA is a key indicator used to measure economic performance. Total GVA in the UK is £1,820 billion, and in Scotland is £138 billion. Annual GVA growth of 3.6% and 3.2% has been recorded in the UK and Scotland, respectively (Office for National Statistics, 2018). The GVA per head in the UK was estimated at £27,555 compared to £25,485 in Scotland (Office for National Statistics, 2018). Statistics on GVA per head provide an overview of the value added by production activity in an area to the resident population of that area. However, these stats can be subject to distortion due to the effects of commuting and variations in the age distribution of the population.

409. In 2016, approximately 30% of Scotland's GVA was generated in its two largest cities: Glasgow (£41.37 billion or 15.2%) and Edinburgh (£19.94 billion or 14.9%). The GVA data for the other local authorities included within the socio-economics and tourism Regional Study Area are presented in Apx. Table 16. 2. The percentage of total Scottish GVA in these local authorities ranges from 1.1% (Midlothian) to 14.9%

(City of Edinburgh), with GVA per head ranging from £16,790 in Midlothian to £46,151 in Aberdeen City (The Scottish Parliament, 2018). The percentage of total Scottish GVA for the Local Authorities within Local Socio-Economics Study Area ranges from 1.3% (East Lothian) to 5.6% (Fife) (Apx. Table 16. 2).

Apx. Table 16. 2: 2016 GVA Statistics for the Local Authorities within the Socio-Economics and Tourism Regional Study Area (The Scottish Parliament, 2018)

Local Authority	Total GVA (£ millions)	Percentage of Total Scottish GVA (2016)	GVA per Head (£)
Local Authorities within Local Socio-Economics Study Area			
East Lothian	1,765	1.3	16,957
Fife	7,509	5.6	20,276
Dundee City	3,574	2.7	24,104
Angus	2,167	1.6	18,597
Scottish Borders	2,096	1.6	18,298
Other Local Authorities			
Aberdeen City	10,607	7.9	46,151
Aberdeenshire	6,931	5.2	26,433
Perth & Kinross	3,882	2.9	25,765
Falkirk	3,260	2.4	20,457
West Lothian	3,784	2.8	21,005
City of Edinburgh	19,942	14.9	39,321
Midlothian	1,488	1.1	16,790

16.2.2 TOURISM OVERVIEW

410. Due to the offshore nature of the Proposed Development boundary, it is unlikely to support recreational or tourism activities. The western boundary of the Proposed Development Array Area is approximately 33.5 km from the nearest coastline and approximately 16.4 km from the closest recognised RYA sailing area. There are several wrecks located within the Proposed Development Array Area and proposed ECC, but the depths of these wrecks exceed those which attract recreational divers. Likewise, the seabed within the Proposed Development Array Area and proposed ECC is relatively featureless and does not contain notable features which typically attract recreational divers. The nearshore and inshore waters which the proposed ECC crosses may also support recreational sea angling.

411. The coastline around Scotland supports popular activities such as walking, wildlife and birdwatching, gold, beach activities, wild-fowling, horse-riding, camping, sailing, recreational angling, bathing, water and jet skiing, canoeing and motor boarding activities (LUC, 2007). Coastal paths of particular importance include the John Muir Way and the Fife Coastal Path.

412. A review of the tourism in the region associated within the landfall locations (Thorntonloch and Skateraw, in East Lothian) suggests approximately 62% of tourists visit the beach and approximately 55% undertake sightseeing and tours (Scottish Tourism Alliance, 2019). In 2018, nearly half (48%) of all visitors undertook some kind of sporting activity, and hiking / walking / rambling remains the most popular sporting activity amongst visitors, especially overseas visitors (36%), whilst golf and birdwatching are undertaken by around one-tenth of all visitors, outdoor water sports only 5% and fishing only 2% (Scottish Tourism Alliance, 2019).

413. Impacts to tourism and recreational receptors will be based on the outputs of the assessments undertaken within physical and human topic chapters.

Appendix 17 MARINE PROTECTED AREA (MPA) SCREENING

17.1 INTRODUCTION

414. The Marine (Scotland) Act 2010 and the Marine and Coastal Access Act 2009 introduced provisions to support the management of Nature Conservation (NC) Marine Protected Areas (MPAs). Under section 126 of the Marine and Coastal Access Act 2009 ("the 2009 Act") and section 83 of the Marine (Scotland) Act 2010, the Marine Scotland Licensing and Operations Team (MS-LOT), as the public authority, is required to consider whether a licensable activity is capable of affecting (other than insignificantly) a protected feature in a NC MPA or any ecological or geomorphological process on which the conservation of any protected feature in a NC MPA is dependant.

415. MS-LOT must not grant authorisation for the activity unless the person applying for the authorisation satisfies MS-LOT that there is no significant risk of the activity hindering the achievement of the conservation objectives for the NC MPA. If MS-LOT believe that there is or may be a significant risk of the proposal hindering the achievement of the conservation objectives then they must notify the appropriate statutory conservation bodies (NatureScot for MPAs within 12 nautical miles ("nm") or the Joint Nature Conservation Committee (JNCC) for MPAs out with 12 nm) of that fact.

416. If the person seeking the authorisation is not able to satisfy MS-LOT that there is no significant risk of the licensable activity hindering the achievement of the conservation objectives then a licence will only be granted if:

i. MS-LOT is satisfied that there is no other means of proceeding with the licensable activity which would create a substantially lower risk of hindering the achievement of those objectives (to include proceeding in another manner or at another location);

ii. MS-LOT is satisfied that the benefit to the public of proceeding with the licensable activity clearly outweighs the risk of damage to the environment that will be created by proceeding with it; and

iii. MS-LOT is satisfied that the person seeking the authorisation will undertake, or make arrangements for the undertaking of, measures of equivalent environmental benefit to the damage which the activity will or is likely to have in or on the MPA concerned.

417. It was highlighted by MS-LOT and NatureScot in their Scoping Response for the initial Berwick Bank Wind Farm Proposal, that the Environmental Impact Assessment Report (EIAR) must make a full and clear assessment of the potential impacts on all the designated features of the Firth of Forth Banks Complex MPA. The Applicant confirmed during a Benthic Ecology, Fish and Shellfish Ecology and Physical Processes Road Map meeting on 3 September 2021 that they anticipate that this would be presented as a separate standalone document within the Berwick Bank Wind Farm EIA.

418. This appendix therefore provides a summary of the approach to the MPA assessment that is proposed for the Berwick Bank Wind Farm (the Proposed Development) and which will be presented, in full, in the EIAR. This report also presents the results of a preliminary initial screening of designated MPAs which it is proposed are carried forward for consideration in the MPA Main Assessment in the EIAR.

419. The following sections describe the approach to the initial screening and main assessment stages of the process, as outlined in Marine Scotland's Nature Conservation Marine Protected Areas: Draft Management Handbook (Marine Scotland, 2013).

17.1.1 SCREENING

420. In the first instance, the draft MPA Management Handbook outlines that an initial screening stage should be undertaken to focus on what can reasonably be predicted as a consequence of the proposal and whether it is '*capable of affecting (other than insignificantly)*' a protected feature of a NC MPA. This screening should use information that is currently available on the licensable activities and consider aspects such as the scale, timing and duration of Proposed Development. These considerations should include proposals for developments or activities out with the boundary of a NC MPA.

421. Firstly, consideration of 'capable of affecting' should result in removing from further consideration all proposals / functions which are not in any way connected to the protected feature(s). A capability that is both remote (in terms of likelihood of occurrence) and hypothetical should not be the basis of a conclusion that further assessment is required. This can be determined by considering whether the activity will exert pressures which the protected feature(s) are sensitive to (Marine Scotland, 2013).

422. Secondly, if the conclusion is that there is 'capability of affecting', the focus should then be on considering whether the proposed development or activity will affect the protected features of a NC MPA, other than insignificantly. Consideration of the degree of pressure that could be exerted by the activity on a spatial basis should help to establish what level of effect might occur. Where it is concluded that the act or function is capable of affecting (other than insignificantly) the protected features of a NC MPA then a main assessment must be carried out considering the conservation objectives (see section 17.1.2).

423. The Applicant proposes that, in order to determine the 'nearness' of the activities associated with the Proposed Development, the same screening criteria is used for the MPA assessment as is proposed for the Habitats Regulations Appraisal (HRA) screening. These are as follows for the different protected features of MPAs:

- **Benthic habitats/species and geodiversity features** - there is the potential for indirect effects to sites designated for benthic features, as well as geodiversity features, as a result of impacts associated with increased suspended sediment concentrations (SSC) arising from construction activities or from changes to the hydrodynamic regime as a result of the presence of offshore infrastructure associated with the Proposed Development. The extent of these impacts is considered likely to extend beyond the boundaries of the Proposed Development. The zone of influence (ZOI) for such indirect effects is typically defined from the outputs of physical processes modelling to determine, for example, the fate of sediments resuspended during the construction process. Physical processes modelling will be undertaken for the Proposed Development to inform the EIA, however this has not been carried out at the Scoping stage. Therefore, a buffer of one mean tidal excursion has been used to inform this area, with a reasonable level of precaution applied. One mean tidal excursion in the vicinity of the Proposed Development equates to approximately 6.5 km, as derived from the Atlas of UK Marine Renewable Energy Resources (ABPmer, 2008). For the purposes of MPA screening, a precautionary approach has been adopted and this buffer has been increased to 20 km. This buffer is considered to be sufficiently precautionary to capture all sites likely to be in the ZOI from direct and indirect effects associated with construction activities. This buffer has also been applied for geodiversity features of MPAs;
- **Fish species** – the HRA screening doesn't propose a screening distance for fish, as all European sites with migratory species with the potential to be affected have been considered. Therefore, for the purposes of this MPA assessment (which does not consider migratory fish) a precautionary buffer of 100 km has been adopted to screen in MPA sites, on the basis that this is sufficiently precautionary to capture the ZOI from the project from key impacts such as underwater noise. This will however be refined in the EIA on the basis of the outputs of the subsea noise assessment and physical processes modelling; and
- **Marine mammals** – the HRA screening considers sites with cetaceans as qualifying interest features within a buffer that equates to the regional marine mammal study area, as defined in section 6.3 of the EIA Scoping Report. For seals, all sites within the East Scotland Management Unit (MU) have been considered. These buffers are considered to be sufficiently precautionary to capture all sites likely to be in the ZOI from indirect effects associated with construction activities but they will however be refined in the EIA on the basis of the outputs of the subsea noise assessment and physical processes modelling.
- **Ornithology** - Ornithology – the HRA screening considers sites with breeding seabirds as qualifying interest features within a buffer that equates to the offshore ornithological regional study area, as defined in section 6.4 of the EIA Scoping Report. For seabirds in the non-breeding season, the ZOI is based on Furness (2015) which presents Biologically Defined Minimum Population Scales (BDMPS). These buffers are considered to be sufficiently precautionary to capture all sites likely to be in the ZOI from indirect effects associated with construction and operational activities but they will however be refined in the EIA on the basis of the outputs of the collision risk, displacement and Population Viability Analysis assessments.

424. It is proposed that determining the 'insignificance' will be determined for the Proposed Development through the assessments made in the EIAR chapters

17.1.2 MAIN ASSESSMENT

425. The main assessment which will be presented as a standalone report in the EIAR, will consider the extent of the potential impact of the Proposed Development, on the MPAs screened in to the assessment in more detail. The main assessment stage focuses on determining whether there is, or may be, a significant risk of the Proposed Development hindering the achievement of the conservation objectives.

426. Marine Scotland's Nature Conservation Marine Protected Areas: Draft Management Handbook states that the consideration of whether there may be a 'significant risk of hindering' the achievement of the conservation objectives of the protected features of a NC MPA must be carried out on a case-by-case basis.

427. As with the initial screening process described in section 17.1.1, aspects such as scale, timing and duration of the proposed activities or developments will all need to be considered. However, whilst the initial screening focuses on the protected features, this main assessment will focus on the potential impact on the achievement the conservation objectives of the protected features. Therefore, this stage will also include consideration of the scale of the potential impact. Consideration of cumulative effects with other activities and functions should also be undertaken.

428. The conservation objectives for MPA features are high level criteria describing the desired condition of the MPA feature. There are two objectives for features within an MPA which are that the protected features:

- so far as already in favourable condition, remain in such condition; and
- so far as not already in favourable condition, be brought into such condition, and remain in such condition.

429. The MPA Main Assessment for the Proposed Development will therefore consider whether the Proposed development could potentially affect these objectives for each of the MPAs screened into the assessment. An assessment will be made of whether the Proposed Development could potentially impact the site so that the features are no longer in favourable condition, or prevent the features from recovering to a favourable condition.

17.2 PRELIMINARY SCREENING FOR BERWICK BANK

430. On the basis of the methodology and screening buffers described above in section 17.1.1, the Applicant has undertaken a preliminary MPA screening exercise. Noting that this is a *preliminary exercise* which will be revisited once the results of the EIA assessments are available (e.g. physical processes modelling, subsea noise modelling), the following MPAs have been identified for initial inclusion on the basis that the Proposed Development is deemed to be potentially capable of affecting (other than insignificantly) a protected feature of the site:

- Firth of Forth Banks Complex Nature Conservation MPA (ncMPA) – which partially overlaps with the Proposed Development (Apx. Figure 17. 1);
- Turbot Bank ncMPA – which is located approximately 96 km to the north east of the Proposed Development Array Area (Apx. Figure 17. 1); and
- Southern Trench ncMPA (minke whale only) – which is located approximately 99 km to the north of the Proposed Development Array Area (Apx. Figure 17. 1).

17.2.1 FIRTH OF FORTH BANKS COMPLEX MPA

431. The Firth of Forth Banks Complex ncMPA is located off the east coast of Scotland, and partially overlaps with the Proposed Development (see Apx. Figure 17. 1). The ncMPA is a composite site and the boundaries of each of the three areas were determined by the presence and extent of the important features contained within them: the Berwick, Scalp and Montrose Banks, and the Wee Bankie shelf banks and mounds. The site covers an area of 2,130 km^2 and was designated by Marine Scotland as a Nature Conservaion MPA in 2014. The designated features of the Firth of Forth Banks Complex ncMPA and their overarching conservation objectives are outlined in Apx. Table 17. 1.

432. This site has been designated to protect Offshore subtidal sands and gravels and Ocean quahog (*Arctica islandica*) aggregations. The site is also designated for the protection of Shelf banks and mounds as a large-scale feature, which is considered to be significant to the health and biodiversity of wider Scottish seas, and Wee Bankie Key Geodiversity Area, a series of prominent submarine ridges marking an ice limit during the retreat of the British-Irish ice sheet. Both Berwick Bank and Wee Bankie support habitats suitable for sandeels. As such, the Firth of Forth shelf banks and mounds have been identified as critical foraging habitat for seabirds and grey seals.

Apx. Table 17. 1: Sites Proposed to be Screened into the MPA Assessment for the Proposed Development on the basis of the Preliminary Screening, their designated features and conservation objectives.

Site Name	Protected Features	Type of feature	Conservation Objective	View of Condition
Firth of Forth Banks Complex ncMPA	Offshore subtidal sands and gravels	Habitat	Recover to favourable condition. – extent is stable or increasing; and – structures and functions, quality, and the composition of characteristic biological communities (which includes a reference to the diversity and abundance of species forming part of or living within the habitat) are such as to ensure that they remain in a condition which is healthy and not deteriorating; Any temporary deterioration in condition is to be disregarded if the habitat is sufficiently healthy and resilient to enable its recovery from such deterioration. Any alteration to that feature brought about entirely by natural processes is to be disregarded.	Unfavourable (JNCC, 2020a)
	Ocean quahog aggregations	Low or limited mobility species	Recover to favourable condition. – the quality and quantity of its habitat and the composition of its population in terms of number, age and sex ratio are such as to ensure that the population is maintained in numbers which enable it to thrive. Any temporary reduction of numbers is to be disregarded if the population of ocean quahog aggregations is sufficiently thriving and resilient to enable its recovery. Any alteration to that feature brought about entirely by natural processes is to be disregarded.	Unfavourable (JNCC, 2020a)
	Shelf banks and mounds large-scale feature	Large scale feature	Maintain in favourable condition. – the extent, distribution and structure is maintained; – the function is maintained so as to ensure that it continues to support its characteristic biological communities (which includes a reference to the diversity of any species associated with the large-scale feature) and their use of the site for, but not restricted to, feeding, courtship, spawning, or use as nursery grounds; and – the processes supporting that feature are maintained. Any alteration to that feature brought about entirely by natural processes is to be disregarded	Favourable (JNCC, 2020a)

Site Name	Protected Features	Type of feature	Conservation Objective	View of Condition
	Wee Bankie key geodiversity area	Geomorphological	Maintain in favourable condition. – its extent, component elements and integrity are maintained; – its structure and functioning are unimpaired; and – its surface remains sufficiently unobscured for the purposes of determining whether the above criteria are satisfied. Any obscuring of that feature entirely by natural processes is to be disregarded. Any alteration to that feature brought about entirely by natural processes is to be disregarded.	Favourable (JNCC, 2020a)
Turbot Bank ncMPA	Sandeels	Mobile Species	Maintain in favourable condition. The quality and quantity of its habitat and the composition of its population are such that they ensure that the population is maintained in numbers which enable it to thrive. Any temporary reduction of numbers is to be disregarded if the population of Sandeels is thriving and sufficiently resilient to enable its recovery from such reduction. Any alteration to that feature brought about entirely by natural processes is to be disregarded.	Favourable (JNCC, 2020b)
Southern Trench ncMPA	Minke whale*	Mobile Species	Maintain in favourable condition. – Minke whale in the Southern Trench MPA are not at significant risk from injury or killing. – Conserve the access to resources (e.g. for feeding) provided by the MPA for various stages of the minke whale life cycle. – Conserve the distribution of minke whale within the site by avoiding significant disturbance. – Conserve the extent and distribution of any supporting feature upon which minke whale is dependent. – Conserve the structure and function of supporting features, including processes to ensure minke whale are healthy and not deteriorating.	Favourable (NatureScot, 2020)

* The Southern Trench MPA is also desingated for three other biodiversity features: burrowed mud, fronts and shelf deeps; as well as two geodiversity features: Submarine Mass Movement and Quaternary of Scotland. However, these are all outside the respective screening ranges applied in the preliminary screening (see section 17.1.1).

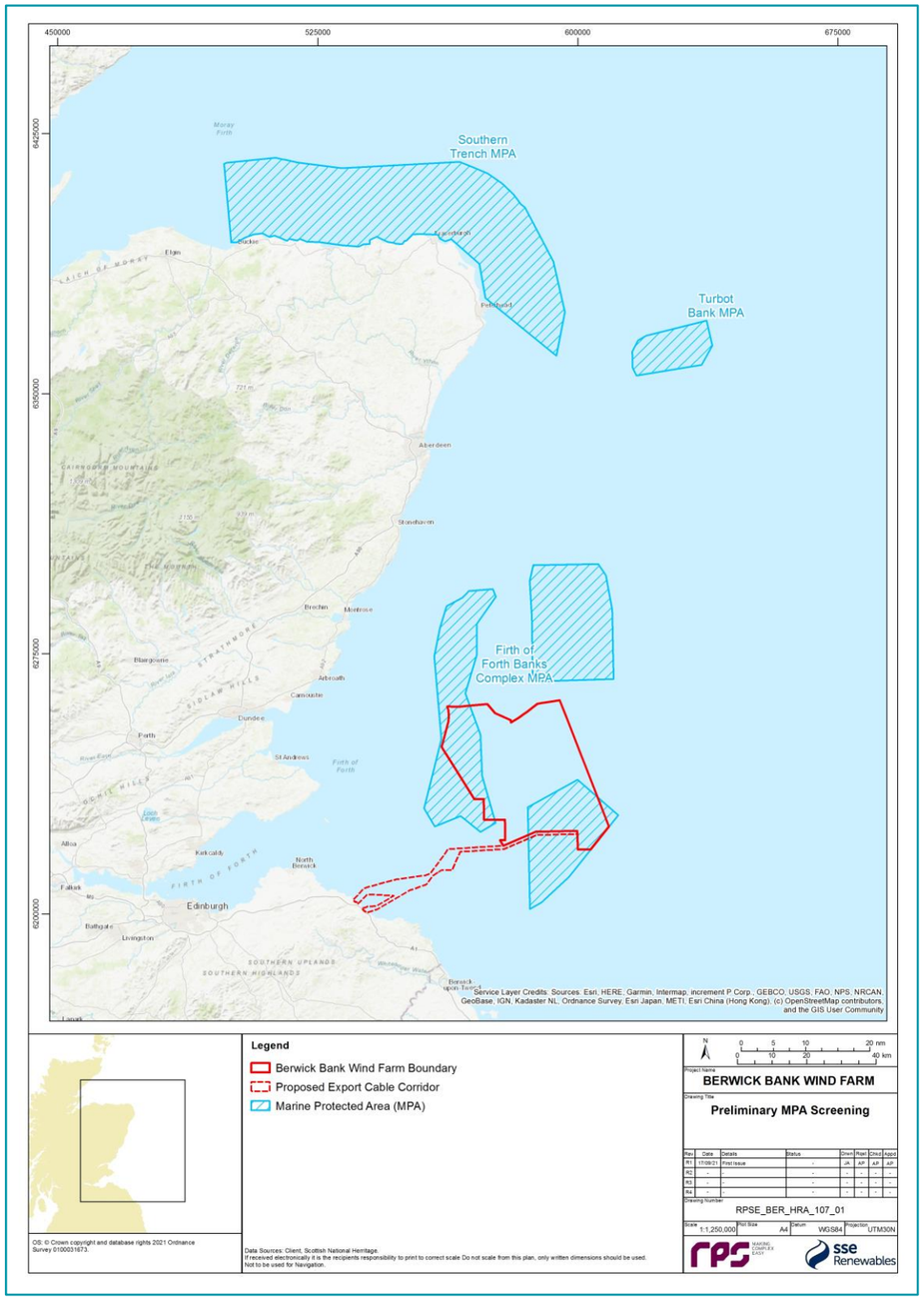
17.2.2 TURBOT BANK MPA

433. Turbot Bank MPA is located off the east coast of Scotland, approximately 96 km to the north east of the Proposed Development Array Area (see Apx. Figure 17. 1). The site lies within an area of sandy sediment, including part of the shelf bank and mound feature known as 'Turbot Bank'. The site covers an area of 251 km^2 and was designated by Marine Scotland as a Nature Conservation MPA in 2014. The designated features of the Turbot Bank ncMPA and their overarching conservation objectives are outlined in Apx. Table 17. 1.

434. Turbot Bank is important for, and designated for, sandeels which are closely associated with sand habitats, living buried in the sand for months at a time. The Turbot Bank ncMPA encompasses areas where high numbers of sandeels have been found. Sandeels play an important role in the wider North Sea ecosystem, providing a vital source of food for larger fish, seabirds and marine mammals. Turbot Bank has the potential to act as a source of young sandeels for maintaining and restocking surrounding areas (JNCC, 2014).

8.6.2. SOUTHERN TRENCH MPA

435. The Southern Trench ncMPA is located off the Aberdeenshire coast of Scotland, stretching from Buckie in the west to Peterhead in the east, and is approximately 99 km to the north of the Proposed Development Array Area (see Apx. Figure 17. 1). The site covers an area of 2,536 km^2 and was designated by Marine Scotland as a Nature Conservation MPA in 2020. The ncMPA features a dynamic front that attracts shoals of fish including herring, mackerel and cod to the area. The soft sands covering much of the seabed also provide abundant habitat for sandeels. The presence of these key prey species in turn attracts minke whale. The Southern Trench ncMPA has been selected to protect four biodiversity features: burrowed mud, fronts, minke whale and shelf deeps; as well as two geodiversity features (NatureScot, 2020). However, on the basis of the screening methodology outlined in section 17.1.1, only minke whale are proposed to be carried through to the MPA assessment. The relevant designated features of the Southern Trench ncMPA and their overarching conservation objectives are outlined in Apx. Table 17. 1.



Apx. Figure 17. 1: Sites Proposed to be Screened into the MPA Assessment for the Proposed Development on the basis of the Preliminary Screening.

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