Cenos Offshore Windfarm EIA Scoping Report - Volume I

Document Code:	CEN001-FLO-CON-ENV-RPT-0001	
Contractor Document Number:	70109407-WSPE-ZZ-XX-RP-OE-00001_S3_P01	
Version Number:	6.0	Final for Issue
Date:	6 April 2024	
Prepared by:	WSP Environment & Infrastructure Solutions UK Limited	
Checked by:	WSP Environment & Infrastructure Solutions UK Limited	
Approved by:	Cenos Offshore Windfarm Ltd	

Document History

Version Number	Reason for Issue / Major Changes	Date of Change
1.0	Final for Issue	6 April 2024

Table of Contents

List of Tables

List of Figures

List of Plates

List of Acronyms and Abbreviations

Acronym	Definition
AA	Appropriate Assessment
AARA	Air-to-Air Refuelling Area
ABPMer	Associated British Ports Marine Environmental Research Ltd
AC	Alternating Current
ADD	Acoustic Deterrent Device
AEoI	Adverse Effect on Integrity
AfL	Area for Lease
AIP	Aeronautical Information Publication
AIS	Automatic Identification System
ALARP	As Low As Reasonably Practicable
ALDFG	Abandoned, Lost, or Discarded Fishing Gear
ASA	Acoustical Society of America
ASL	Above Sea Level
ATC	Air Traffic Control
AtN	Aids to Navigation
BDMPS	Biologically Defined Minimum Population Scales
BEIS	Department for Business, Energy and Industrial Strategy
BESS	British Energy Security Strategy
BGS	British Geological Survey
BODC	British Oceanographic Data Centre
BWM	International Convention for the Control and Management of Ships' Ballast Water and Sediment
CA	Cruising Association
CAA	Civil Aviation Authority
CaP	Cable Plan
CBA	Cost Benefit Analysis
CBRA	Cable Burial Risk Assessment
CCA	Coastal Character Assessment
CCC	Climate Change Committee
CCME	Canadian Council of Ministers of the Environment
CCR	Climate Change Resilience
CCRA	Climate Change Resilience Assessment
CCS	Carbon Capture Storage
CD	Chart Datum
CDM	Construction, Design and Management
CEA	Cumulative Effects Assessment
CEF	Cumulative Effects Framework
Cefas	Centre for Environment, Fisheries and Aquaculture Science
CEMP	Construction Environmental Management Plan
CES	Crown Estate Scotland
CfD	Contract for Difference
CIEEM	Chartered Institute of Ecology and Environmental Management

Acronym	Definition
CIfA	Chartered Institute for Archaeologists
CLV	Cable Laying Vessel
CMS	Construction Method Statement
CNSE	Central North Sea Electrification
CO2	Carbon Dioxide
CO2e	Carbon dioxide equivalent
COLREG	International Regulations for Preventing Collisions at Sea
COMAH	Control of Major Accident Hazards
COP21	21st United Nations Climate Change Conference of the Parties
COP26	26th United Nations Climate Change Conference of the Parties
COWRIE	Collaborative Offshore Wind Research Into the Environment
CPC	Counterfactual (ratio) of Population Growth-Rate
CPS	Counterfactual (ratio) of Final Population Size
CRI	Climate Risk Indicators
CRM	Collision Risk Modelling
CSACs	Candidate Special Area of Conservation
CSM	Continental Shelf Model
CSOV	Commissioning Service operation vessel
DAS	Digital Aerial Surveys
DAS	Distributed Acoustic Sensing
DATRAS	Database of Trawl Surveys
Defra	Department for Environment, Food and Rural Affairs
DGC	Defence Geographic Centre
DIO	Defence Infrastructure Organisation
DoB	Depth of Burial
DSFB	District Salmon Fishery Boards
DTI	Department of Trade and Industry
EC	European Commission
ECC	Export/Import Cable Corridor
EcIA	in Ecological Impact Assessment
ECOMMAS	East Coast Marine Mammal Acoustic Study
EEA	European Economic Area
EEZ	Exclusive Economic Zone
EFT	Emissions Factors Toolkit
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EMF	Electromagnetic Field
EMODnet	European Marine Observation and Data Network
EMP	Environmental Management Plan
EPS	European Protected Species
EQS	Environmental Quality Standard
ERCOP	Emergency Response and Cooperation Plan
ES	Environmental Statement
Espoo convention	Convention on Environmental Impact Assessment in a Transboundary Context

Acronym	Definition
ETAP	Eastern Trough Area Project
EU	European Union
EVA	Extreme Value Analysis
FAD	Fish Aggregation Device
FeAST	Feature Activity Sensitivity Tool
FID	Financial Investment Decision
FIR	Flight Information Region
FL	Flight Level
FLO	Fisheries Liaison Officer
FOCI	Feature of Conservation Interest
FPSO	Floating Production Storage and Offloading
FPSO vessel	Floating production storage and offloading vessel
FSA	Formal Safety Assessment
FTU	Floating Turbine Unit
GEBCO	General Bathymetric Chart of the Oceans
GES	Good Environmental Status
GeMS	Geodatabase of Marine Features
GHG	Greenhouse Gas
GLVIA3	Guidelines for Landscape and Visual Impact Assessment, 3rd Edition (GLVIA3)
GPS	Global Positioning System
GSD	Ground Sample Distance
GVA	Gross Value Added
GW	Gigawatts
H&S	Health and Safety
HDD	Horizontal Directional Drilling
HER	Historic Environment Record
HES	Historic Environment Scotland
HMPA	Historic Marine Protected Areas
HMRI	Helicopter main routing indicators
HMWB	WFD designated heavily modified water body
HPAIV	Highly Pathogenic Avian Influenza Virus
HRA	Habitats Regulations Appraisal
H_S	Significant Wave Height
HSE	Health and Safety Executive
HVAC	High Voltage Alternating Current
HVDC	High Voltage Direct Current
IALA	International Association of Marine and Lighthouse Authorities
IAMWWG	Inter-Agency Marine Mammal Working Group
ICCI	In-Combination Climate Impacts
ICE	Inventory of Carbon and Energy
ICES	International Council for Exploration of the Sea
IEMA	Institute of Environmental Management and Assessment
IMMA	Important Marine Mammal Area
IMO	International Maritime Organisation

Acronym	Definition
INNS	Invasive Non-Native Species
INTOG	Innovation and Targeted Oil and Gas
IPCC	Intergovernmental Panel on Climate Change
IPF	Initial Plan Framework
IROPI	Imperative Reasons of Overriding Public Interest
ISQG	Interim sediment quality guideline (set by CCME)
IUCN	International Union for the Conservation of Nature
JNCC	Joint Nature Conservation Committee
km	kilometre
KPI	Key Performance Indicator
LAT	Lowest Astronomical Tide
LDP	Local Development Plan
LEE	Leading Edge Erosion
LMP	Lighting and Marking Plan
LSE	Likely significant effects
M&E	Mechanical and Electrical
MA&D	Major Accidents and Disasters
MAA	Military Aviation Authority
MAIB	Marine Accident Investigation Branch
MarESA	Marine Evidence-based Sensitivity Assessment
MarLIN	Marine Life Information Network
MARPOL	The International Convention for the Prevention of Pollution from Ships
MAU	Marine Analytical Unit
MBES	Multi-beam echo sounder
MCA	Maritime and Coastguard Agency
MCAA	Marine and Coastal Access Act 2009
MCEU	Marine Consents and Environmental Unit
MCP	Marine and Coastal Processes
mCRM	migratory Collision Risk Model
MCZ	Marine Conservation Zone
MD- LOT	Marine Directorate Licensing Operations Team
MD-MAU	Marine Directorate Marine Analytical Unit
MD-SEDD	Marine Directorate Science, Evidence Data and Digital
MDS	Maximum Design Scenario
MEP	Marine Environmental Policy
MGN	Marine Guidance Note
MHWS	Mean High Water Springs
MI&OU	Marine Infrastructure And Other Users
MLWS	Mean Low Water Springs
m	Metres
MM	Mean Max
MMMP	Marine Mammal Mitigation Protocol
MMMU	Marine Mammal Management Unit
MMO	Marine Management Organisation
MMO	Marine Mammal Observer

Acronym	Definition
MNCR	Marine Nature Conservation Review
MOD	Ministry of Defence (UK)
MOW	MetOceanWorks
MPA	Marine Protected Area
MPCP	Marine Pollution Contingency Plan
MPI	Multi-Purpose Interconnector
MRSea	Marine Renewables Strategic Environmental Assessment
MSFD	Marine Strategy Framework Directive
MSL	Mean Sea Level
MSP	Mean Seasonal Peak
MSS	Marine Scotland Science
MW	Megawatt
NBN	National Biodiversity Network
NCMPA	Nature Conservation Marine Protected Area
NE	Natural England
NERC	Natural Environment Research Council
NLB	Northern Lighthouse Board
NM	Nautical Miles
NMFS	National Marine Fisheries Service
NMP	National Marine Plan
NMPi	National Marine Plan interactive
NOAA	National Ocean and Atmospheric Administration
NOTAM	Notice to Airmen
NPF	National Planning Framework
NPL	National Physical Laboratory
NPS	National Policy Statement
NRA	Navigational Risk Assessment
NRDC	National Resources Defence Council
NRW	Natural Resource Wales
NSIP	Nationally Significant Infrastructure Projects
NSN	National Site Network
NSP	Navigational Safety Plan
NSTA	North Sea Transition Authority
NtM	Notice to Mariners
NUI	Normally Unmanned Installation
O&M	Operation and Maintenance
OCP	Onshore Converter Platform
OEM	Original Equipment Manufacturer
OEMP	Outline Environmental Management Plan
OESEA	Offshore Energy Strategic Environmental Assessment
OMR	Offshore marine region
ONR	Office of Nuclear Regulation
OREI	Offshore Renewable Energy Installations
ORJIP	Offshore Renewables Joint Industry Programme
OSCP	Offshore Substation and Converter Platform

Acronym	Definition
OSPAR	Oslo and Paris Convention for the protection of the environment of the North-East Atlantic (may also refer to the convention's administrative body, the Oslo and Paris Commission)
OSPAR Convention	Convention for the Protection of the Marine Environment of the North-East Atlantic ('OSPAR Commission' refers to the convention's administrative body)
OWF	Offshore Wind Farm
PAC	Pre-Application Consultation
PAD	Protocol of Archaeological Discovery
PAM	Passive Acoustic Monitoring
PAN	Planning Advice Note
PAS	Publicly Available Standard
PDE	Project Design Envelope
PEL	Probable effects level (set by CCME)
PEMP	Project Environmental Monitoring Programme
PMF	Priority Marine Feature
PSA	Particle Size Analysis
PSD	Particle Size Distribution
PSR	Primary Surveillance Radar
PSU	Practical salinity unit
PTS	Permanent Threshold Shift
PVA	Population Viability Analysis
QSR	Quality Status Report
RADAR	Radio Detection and Ranging
RBD	River basin district
RBMP	River Basin Management Plan
ReCon	Reducing Uncertainty in Underwater Noise Assessments
REZ	Renewable Energy Zone
RIAA	Report to Inform Appropriate Assessment
RICS	Royal Institution of Chartered Surveyors
RIFG	Regional Inshore Fisheries Group
RLOS	Radar Line of Sight
rms	Root Mean Square
RNLI	Royal National Lifeboat Institution
ROV	Remotely Operated Vehicle
RSPB	Royal Society for the Protection of Birds
RYA	Royal Yachting Association
SAC	Special Area of Conservation
SAR	Search and Rescue
SBP	Sub-bottom Profiling
SBL	Scottish Biodiversity List
SCADA	Supervisory Control and Data Acquisition
SCANS	Small Cetaceans in European Atlantic Waters and the North Sea
SCOS	Special Committee on Seals
sCRM	stochastic Collision Risk Model
SD	Standard Deviation

Acronym	Definition
SDM	Species Distribution Models
SEA	Strategic Environmental Assessment
SEL	Sound Exposure Level
SEPA	Scottish Environment Protection Agency
SFF	Scottish Fishermen's Federation
SLR	Sea Level Rise
SLVIA	Seascape, Landscape and Visual Impact Assessment
SMA	Seal Management Area
SMP	Sectoral Marine Plan
SMP-OWE	Sectoral Marine Plan for Offshore Wind Energy
SMR	Scottish marine region
SNCB	Statutory Nature Conservation Body
SNH	Scottish Natural Heritage
SOLAS	International Convention for the Safety of Life at Sea
SOPEP	Shipboard Oil Pollution Emergency Plans
SOV	Service operation vessel
SPA	Special Protection Area
SPM	Suspended Particulate Matter
SPP	Scottish Planning Policy
SSCs	Suspended Sediment Concentrations
SSS	Side Scan Sonar
SSSI	Site of Special Scientific Interest
SWFPA	Scottish Whitefish Producers Association
s.36	Section 36
TEPCO	Tokyo Electric Power Company
TLP	Tension Leg Platform
TOG	Targeted Oil and Gas (Onward Development Area)
TSO	Transmission System Operator
TTS	Temporary Threshold Shift
UAV	Unmanned Aerial Vehicle
UK	United Kingdom
UKBAP	United Kingdon Biodiversity Action Plan
UKCOS	United Kingdom Chamber of Shipping
UKCP18	UK Climate Projections 2018
UKHO	United Kingdom Hydrographic Office
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
UWN	Underwater Noise
UXO	Unexploded Ordnance
VMP	Vessel Management Plan
VMS	Vessel Monitoring System
WFD	Water Framework Directive
WoE	Weight of Evidence
WRI	World Resources Institute
WSI	Written Scheme of Investigation

Acronym	Definition
WTG	Wind Turbine Generator
WWI	First World War
WWII	Second World War
ZoI	Zone of Influence
ZTV	Zone of Theoretical Visibility

Glossary

Term	Definition
(Major) Accident	In the context of the Project, an event that threatens immediate or delayed serious damage to human health, welfare and/or the environment and requires the use of resources beyond those of the Applicant or their contractor(s) to respond. Serious damage includes the loss of life or permanent injury, and/or permanent or long-lasting damage to a receptor that cannot be restored through minor clean-up and restoration efforts. The significance of this effect will take into account the extent, severity and duration of harm and the sensitivity of the receptor.
2023 Scoping Opinion	Scoping Opinion received in June 2023, will be superseded by the 2024 Scoping Opinion.
2023 Scoping Report	EIA Scoping Report submitted in 2023, superseded by the 2024 Scoping Report.
2024 Scoping Report	EIA Scoping Report submitted in [month] 2024, superseding the 2023 Scoping Report.
Aberdeenshire Council	One of 32 divisions of Scotland, designated as a Council area for the purposes of local government, covering Aberdeenshire.
Adaptive capacity	Ability of systems, institutions, humans, and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences.
ALARP	ALARP stands for "as low as reasonably practicable". Reasonably practicable involves weighing a risk against the trouble, time and money needed to control it. Thus, ALARP describes the level to which the Health & Safety Executive (HSE) expect to see workplace risks controlled.
Allision	Contact between a moving object and a stationary object.
Anadromous	Species that spend much of adult life at sea returning to freshwater to spawn e.g., Atlantic salmon.
Annex I (of the Habitats Directive)	Part of the Habitats Directive 92/43/EEC that identifies habitat types that require conservation through the designation of Special Areas of Conservation (SACs).
Annex II (of the Habitats Directive)	Part of the Habitats Directive 92/43/EEC that identifies species that require conservation through the designation of SACs.
Applicant	Term to describe Cenos Offshore Windfarm Ltd.
Appropriate Assessment	An assessment to determine the implications of a plan or project on relevant national site network (NSN) sites in view of that site's conservation objectives. An Appropriate Assessment forms part of the Habitats Regulations Appraisal (HRA) and is required when a plan or project (either alone or in-combination with other plans or projects) is likely to have a significant effect on a NSN. Where there are adverse impacts, it also includes an assessment of the potential mitigation for those impacts.
Archaeology	The material remains of the past.
Array Area	Term to describe the area within which the wind turbine generators, floating substructures, moorings and anchors, offshore substation and converter platforms, and inter-array cables will be present.
Aspect	An individual environmental topic that is considered within EIA.

Term	Definition
Automatic Identification System (AIS)	A system by which vessels automatically broadcast their identity, key statistics including location, destination, length, speed and current status. Most commercial vessels and European Union fishing vessels over 15m in length are required to carry AIS.
Baleen whale	Baleen whales, also known as whalebone whales, are marine mammals which use keratinaceous baleen plates (or "whalebone") in their mouths to sieve planktonic creatures from the water.
Barrier effect	Barrier effect is experienced by bird species which intend to forage beyond or migrate past the array but due to avoidance behaviour, have to navigate around the array. Barrier effect is often not discernible from displacement behaviour.
Baseline	Conditions, typically current conditions but can be future conditions, as represented by the latest available data, whether from literature or survey, and used as a benchmark for making comparisons to assess the impact of a development or project.
Baseline conditions	The environment as it appears (or would appear) immediately prior to the implementation of a project, together with any known or foreseeable future changes.
Bathymetry	Topography of sea or estuary bed as measured from a fixed vertical datum.
Bedforms	Features on the seabed (e.g. sand waves or ripples) resulting from the movement and deposition of sediment.
Benthic ecology	The study of the organisms living in and on the sea floor, the interactions between them and their impacts on the surrounding environment.
Benthos / Benthic species	Species that live on or in the seafloor.
Carbon Budget	A carbon budget places a restriction on the total amount of greenhouse gases the UK can emit over a 5-year period. These legally binding budgets serve as stepping stones toward achieving the UK's long-term emission reduction commitments, including the goal of net-zero emissions by 2050. Each carbon budget provides a statutory cap on total greenhouse gas emissions, which must not be exceeded.
Carbon dioxide equivalent	unit that expresses the total global warming potential of all greenhouse gases by comparing their impact to an equivalent amount of carbon dioxide. It allows for a standardized assessment of different greenhouse gases based on their warming effects.
Catadromous	Catadromous fish spend most of their lives in fresh water migrating to the sea in order to spawn.
Cenos Offshore Windfarm	The name of the project.
Cenos Offshore Windfarm Ltd.	The Applicant, a joint venture between Flotation Energy and Vårgrønn As (Vårgrønn).
Centre for Environment, Fisheries and Aquaculture Science (Cefas)	An executive agency of Defra providing advice to UK Government on marine and freshwater science.
Cephalopod	A group of animals comprising squids, octopuses and their allies.
Cetacean	Whales, dolphins and porpoises.
Circalittoral	The zone below low tide that is dominated by animal communities, where lack of light limits the growth of seaweeds.
Climate change	A long-term trend in the variation of the climate resulting from changes in the global atmospheric and ocean temperatures and

Term	Definition
	affecting mean sea level, wave height, period and direction, wind speed and storm occurrence.
Climate Change Act	Legislation enacted in 2008 by the UK Parliament to establish a framework for the reduction of greenhouse gas, which includes a target for the year 2050 emissions, a system of carbon budgeting, establishing the Committee on Climate Change, carbon trading schemes and other provisions.
Climate change impacts	An effect on natural and human systems caused by climate change.
Climate change resilience	The capacity to prepare for, respond to, and recover from the impacts of hazardous climatic events while incurring minimal damage to societal wellbeing, the economy and the environment.
Climate change risks	The effect of uncertainty e.g. the adverse consequences of climate change impacts. Risk results from the interaction of vulnerability of the affected system, its exposure over time to the climate impact, as well as the likelihood of the impact occurring.
Climate projections	Simulations of Earth's climate for future decades based on assumed 'scenarios' for the concentrations of greenhouse gases, aerosols, and other atmospheric constituents that affect the planet's radiative balance.
Clupeid	Fish of the Clupeidae family (e.g. herring and sprat).
Collision	Contact between moving objects.
Construction effects	Term used to describe both temporary effects that arise during the construction phases as well as permanent existence effects that arise from the physical existence of development.
Construction Environmental Management Plan (CEMP)	A plan that sets out the standards and procedures to which developers and contractors must adhere when undertaking construction of major projects. This will assist with managing the environmental impacts and will identify the main responsibilities and requirements of developers and contractors.
Consultation Zone	The Office for Nuclear Regulation (ONR) and the HSE set consultation distances around nuclear installations, major hazard sites and major accident hazard pipelines after assessing the risks and likely effects of major accidents at the nuclear installation/major hazard site/pipeline. The area enclosed within the consultation distance is referred to as the consultation zone (CZ). The local planning authority is notified of this consultation distance and has a statutory duty to consult the ONR/HSE on certain projects within that consultation zone.
Crustacean	A very diverse group of mostly marine animals with a hard jointed external skeleton, including shrimps, crabs, water fleas and barnacles.
Cumulative effects	The effect of the Project taken together with similar effects from a number of different projects, on the same single receptor/resource. Cumulative impacts are those that result from changes caused by other past, present or reasonably foreseeable actions together with the Project.
Cumulative Effects Assessment	Assessment of effects as a result of the incremental changes caused by other present and reasonably foreseeable human activities and natural processes together with the Proposed Development.

Term	Definition
Cumulative impact	Impacts that result from incremental changes caused by other past, present or reasonably foreseeable actions together with the Proposed Development.
Decibels (dB)	A unit used to measure the intensity of a sound or the power level of an electrical signal by comparing it with a given level on a logarithmic scale.
Decommissioning	The period during which a development and its associated processes are removed from active operation.
Delphinid	Any marine mammal of the family Delphinidae, including the dolphins.
Demersal Fish	Demersal fish, also known as groundfish, live and feed on or near the bottom of seas.
Demersal species	Species that occupy the lower level of the water column, near the sea floor.
Demersal Trawl	A fishing net used by towing the trawl along or close to the seabed.
Diadromous species	Species that migrate between freshwater and marine environments to compete their lifecycle.
Digital Aerial Surveys (DAS)	Digital surveys carried out by aeroplane.
Direct effects	Those effects that result directly from the Project, i.e. effects that are made directly to a receptor. An example would habitat loss as a result of clearance activities during construction.
Disaster	In the context of the Project, a naturally occurring phenomenon such as an extreme weather event (for example storm, flood, temperature) or ground-related hazard events (for example, submarine landslide, earthquake, volcanic eruptions, seafloor scour) with the potential to cause an event or situation that meets the definition of a (Major) Accident, as defined above.
Drop Down Video (DDV)	A survey method in which imagery of habitat is collected, used predominantly to survey marine environment.
Ecotype	A distinct form or race of a plant or animal species occupying a particular habitat.
eDNA	DNA that accumulates in the environment (e.g. through excretions or secretions), rather than through direct sampling of an organism.
Effect	The changes resulting from an action.
EIA Regulations	Terminology used in this Scoping Report refer to three sets of 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.
EIA Regulations 2017	The EIA Regulations require that the effects of a project, where these are likely to have a significant effect on the environment, are taken into account in the decision-making process for the project.
Elasmobranch species	Cartilaginous fish, that include skates, rays and sharks.
Elasmobranchs	Cartilaginous fishes such as sharks, rays, and skates.
Electromagnetic field (EMF)	An electric and magnetic force field that surrounds a moving electrical charge.

Term	Definition
Embedded mitigation	Mitigation measures that are an inherent part of the Project design (primary mitigation) or implemented in accordance with industry standard practice that would occur with or without the input from the environmental assessment feeding into the process (tertiary mitigation).
Enhancement	A measure that exceeds what is required to mitigate the adverse effects of a project.
Environment Impact Assessment (EIA)	The statutory process of evaluating the likely significant environmental effects of a proposed project or development. Assessment of the potential impact of the proposed Project on the physical, biological and human environment during construction, operation and decommissioning.
Environment Impact Assessment Report (EIAR)	The Environmental Impact Assessment (EIA) is reported within a document called an EIA Report.
Epibenthic species	Flora or fauna that live on the seabed.
Epibenthos	Organisms living on the surface of the sediment or encrusting rocks, shells and seaweeds.
European Commission (EC)	The European Union's (EU's) politically independent executive division. It is responsible for preparing proposals for new European legislation, and it implements the decisions of the European Parliament and the Council of the EU.
European Protected Species (EPS)	Species of plants and animals (other than birds) listed in Annex IV (a) of the Habitats Directive that are protected by law.
European Site	European sites are those that are designated through the Habitats Directive and Birds Directive (via national legislation as appropriate). Within Scotland additional sites designated through international convention are given the same protection through policy - overall all of these are referred to as European sites. European sites in Scotland are considered to be SPAs, SACs, candidate SACs and Sites of Community Importance (SCI). Potential SPAs, possible SACs, Ramsar sites (designated under international convention) and proposed Ramsar sites.
Exclusive Economic Zone (EEZ)	An exclusive economic zone is an area of the ocean, generally extending 200 nautical miles (230 miles) beyond a nation's territorial sea , within which a coastal nation has jurisdiction over both living and non-living resources.
Export/Import Cable Corridor (ECC)	Term to describe the area within which the export/import cable will be laid, from the perimeter of the Array Area to Mean High Water Springs (MHWS).
Exposure	Presence of people, livelihoods, species or ecosystems, environmental functions, services, resources, infrastructure, or economic, social or cultural assets in places and settings that could be affected by climate change impacts.
External Influencing Factor	A factor that occurs beyond the Project Area that may present a risk to the Project, for example, if an external major event occurred (for example, earthquake, oil and gas platform or a Control of Major Accident Hazards (COMAH) site major accident) it would increase the risk of serious damage to a receptor associated with the Project.
Feature	Ecological feature is the term used to refer to biodiversity/ecological receptors. This term is taken directly from Ecological Impact

Term	Definition
	Assessment guidance from the Chartered Institute of Ecology and Environmental Management (2018).
Fish larvae	The developmental stage of fish that have hatched from the egg and receive nutrients from the yolk sac until the yolk is completely absorbed.
Fish stock	Any natural population of fish that is an isolated and self-perpetuating group of the same species.
Fisheries Liaison Officer (FLO)	The role of the Fisheries Liaison Officer is to work in close association with the Applicant and the fishing industry to minimize the potential impact of the project on fishing activities in the area; The objective being to facilitate as far as possible an arrangement that is based upon co-existence.
Fishing ground	An area of water or seabed targeted by fishing activity.
Fleet	A physical group of vessels sharing similar characteristics (e.g. nationality).
Floating Turbine Unit (FTU)	Term to describe the equipment associated with electricity generation comprising the Wind Turbine Generator (WTG), the floating substructure which supports the WTG, mooring systems and the dynamic and static section of the Inter-Array Cable.
Flotation Energy	Joint venture partner in Cenos Offshore Windfarm (the Project).
Formal Safety Assessment (FSA)	A structured and systematic process for assessing the risks and costs (if applicable) associated with shipping activity as defined by the International Maritime Organization (IMO).
Future baseline	Refers to the baseline situation in future years without the implementation of the Project.
Gadoid	Fish of the cod family (Gadidae) for example cod, haddock, hake, whiting, bib and ling.
Generation assets	Include the Floating Turbine Units (FTUs) (inclusive of substructure, wind turbine generators (WTGs), moorings systems), and dynamic and static portions of the inter-array cables.
Geophysical survey	Activities to obtain data on the distribution and nature of geophysical properties of the seabed (e.g. bathymetry, surficial sediment type and bedforms, sub surface geology). Geophysical survey outputs typically include multibeam bathymetry, side scan sonar and sub bottom profiler data.
Gigawatt (GW)	A unit of electrical power equivalent to one billion Watts.
Grab sample	A technique used to sample benthic flora and fauna.
Greenhouse gases	Greenhouse gases are gases in Earth's atmosphere that trap heat, contributing to the greenhouse effect and global warming. They include carbon dioxide, methane, nitrous oxide, and other gases that absorb and emit infrared radiation.
Habitats Regulations	The Habitats Directive (Directive 92/43/ECC) and the Wild Birds Directive (Directive 2009/147/EC) were transposed into Scottish Law by the Conservation (Natural Habitats &c) Regulations 1994 ('Habitats Regulations') (up to 12 nm); by the Conservation of Offshore Marine Habitats and Species Regulations 2017 ('Offshore Marine Regulations') (beyond 12 nm); the Conservation of Habitats and Species Regulations 2017 (of relevance to consents under Section 36 of the Electricity Act 1989); the Offshore Petroleum Activities (Conservation of Habitats) Regulations 2001; and the Wildlife and Countryside Act 1981. The Habitats Regulations set out

Term	Definition
	the stages of the Habitats Regulations Appraisal (HRA) process required to assess the potential impacts of a proposed project on European Sites (Special Areas of Conservation, Special Protection Areas, candidate SACs and SPAs and Ramsar Sites).
Habitats Regulations Appraisal (HRA)	The assessment of the impacts of implementing a plan or policy on a European Site, the purpose being to consider the impacts of a project against conservation objectives of the site and to ascertain whether it would adversely affect the integrity of the site.
Hazard	Anything with the potential to cause harm, including ill-health and injury, damage to property or the environment; or a combination of these.
Hazard Workshop	A key consultation aspect of the Navigational Risk Assessment (NRA) process where local and national stakeholders identify and discuss hazards which may arise for a given development in a group setting.
Hazardous waste	Waste which displays one or more of the hazardous properties listed in the Waste Framework Directive.
Horizontal Directional Drill (HDD)	An engineering technique for laying cables that avoids open trenches by drilling between two locations beneath the ground's surface.
ICES statistical rectangles	The International Council for the Exploration of the Sea (ICES) standardises the division of sea areas to enable statistical analyses of data. Each ICES statistical rectangle is '30 min latitude by 1 degree longitude' in size (i.e. approximately 30 x 30 nautical miles). A number of rectangles are amalgamated to create ICES statistical areas.
Impact pathway	A change descriptively assessed by one topic, and describes a pathway between an impact and a receptor.
In-combination effects	Effects resulting from the combined impacts of the Project with other projects / plans on European Sites within the NSN. These are discussed in the Cenos Offshore Windfarm HRA Screening Assessment.
Indirect effects and secondary effects	Those effects that are not caused directly by the Project but arise as a consequence of it.
Inert waste	Waste which does not undergo any significant physical, chemical or biological transformation; does not dissolve, burn or react in a way to give rise to environmental harm; where any pollutant content will not endanger surface or groundwater.
Infauna	Animals living in the sediment.
Infralittoral	The shallower zone below low tide dominated by algal communities.
Innovation and Targeted Oil and Gas (INTOG)	In November 2022, the Crown Estate Scotland (CES) announced the Innovation and Targeted Oil and Gas (INTOG) Leasing Round, to help enable this sector-wide commitment to decarbonisation. INTOG allows developers to apply for the rights to construct offshore windfarms for the purpose of providing low carbon electricity to power oil and gas installations and help to decarbonise the sector. Cenos is an INTOG project and part of the INTOG leasing round. This project is not part of the ScotWind process.
Inter-array cable	The cables which connect the Wind Turbine Generators (WTG) to the Offshore Substation and Converter Platform (OSCP). WTGs may be connected in a series along a single inter-array cable as a

Term	Definition
	'string' such that these WTGs connect to the OSCP via a single cable.
Internal Influencing Factor	A factor which occurs within the Project Area that may present a risk to the Project.
Inter-related effects	Effects resulting from two or more Project impacts acting together, to result in a new or changed effect on a single receptor.
Iterative design	A process by which the design is progressed to make improvements, solve problems, include environmental measures and engage local communities and statutory stakeholders.
Jewellery	Items connected along the length of the mooring line (such as clump weights, buoyancy elements and load reduction devices).
Joint Nature Conservation Committee	JNCC is the public body that advises the UK Government and devolved administrations on UK-wide and international nature conservation.
Joint Venture (JV)	Term used to describe the commercial partnership between Flotation Energy and Vårgrønn, the shareholders which hold the Lease Exclusivity Agreement with Crown Estate Scotland to develop the Cenos site as an INTOG project.
Keystone species	Species of fundamental importance within a community, either as a prey item or predator; or a species capable of maintaining or manipulating a habitat or ecosystem.
Landfall	Term to describe where the cables within ECC are brought ashore at MHWS to connect the offshore and onshore infrastructure.
Landfill capacity	The known, forecast or estimated remaining landfill void space.
Lease Agreement	A legal agreement from Crown Estate Scotland whereby an area of foreshore or seabed is occupied by a third party (a 'tenant') for an agreed purpose, such as renewable energy, and which gives consent for the tenant to develop on the lease site(s), if other required permissions are gained.
MA&D Category	A set of values used to categorise events within a related parent MA&D Group.
MA&D Group	A MA&D which can be grouped as either a Natural Hazard (Disaster) or Technological or Manmade Hazard (Major Accident).
MA&D Type	A set of values used to sub-categorise events within a MA&D Category.
Magnitude	The magnitude of an impact is typically defined by the following factors: • Extent - the area over which an effect occurs; • Duration - the time for which the effect occurs; • Frequency - how often the effect occurs; and • Severity - the degree of change relative to existing conditions.
Marine Directorate	Civil service directorate for Scotland, which is responsible for the integrated management of Scotland's seas.
Marine Directorate Licensing Operations Team (MD-LOT)	The regulator for determining marine licence applications on behalf of the Scottish Ministers in the Scottish inshore region (between 0 and 12 nautical miles) under the Marine (Scotland) Act 2010, and in the Scottish offshore region (between 12 and 200 nautical miles) under the Marine and Coastal Access Act 2009.
Marine Guidance Note (MGN)	A system of guidance notes issued by the UK Maritime and Coastguard Agency (MCA) which provide significant advice relating

Term	Definition
	to the improvement of the safety of shipping at sea, and to prevent or minimise pollution from shipping.
Marine licence	Licence required for certain activities in the marine environment and granted under either the Marine and Coastal Access Act 2009 or the Marine (Scotland) Act 2010.
Marine Mammal Mitigation Protocol (MMMP)	A programme of measures to minimise the risk of injury (in the form of a permanent change in hearing referred to as a permanent threshold shift (PTS)) in marine mammals.
Marine Policy Statement (MPS)	The framework for preparing Marine Plans and taking decisions affecting the marine environment in the UK.
Marine Protected Area (MPA)	Marine sites protected at the national level under the Marine (Scotland) Act 2010. In Scotland, MPAs are areas of sea and seabed defined so as to protect habitats, wildlife, geology, undersea landforms, historic shipwrecks and to demonstrate sustainable management of the sea.
Marine Protected Area Assessment	A three-step process for determining whether there is a significant risk that a proposed development could hinder the achievement of the conservation objective(s) of an MPA.
Marine Strategic Framework Directive	The European Union Directive (2008/56/EC) seeking to achieve good environmental status (GES) in Europe's seas.
MARPOL	International Convention for the Prevention of Pollution from Ships.
Materials	Substances and objects which may be used during the Project.
Maximum Design Scenario (MDS)	The worst-case scenario based on the Project Design Statement which varies by receptor and/or impact pathway identified.
Mean High Water Springs (MHWS)	The height of Mean High Water Spring is the average throughout the year, of two successive high waters, during a 24-hour period in each month when the range of the tide is at its greatest.
Mean Low Water Springs (MLWS)	The height of Mean Low Water Springs (MLWS) is the average throughout the year, of two successive low waters, during a 24-hour period in each month when the range of the tide is at its greatest.
Megafauna	Large animals; conventionally animals of a mass comparable to or greater than humans (for instance over 100 lb /46 kg in weight).
Megawatts (MW)	Unit of electrical power equal to one million Watts.
Metocean	Relating to meteorology and oceanography.
Marine Guidance Notes (MGN)	Marine Guidance Notes (MGN) released by the Maritime and Coastguard Agency (MCA) for the purposes of providing advice relating to the improvement of the safety of shipping and of life at sea.
Mitigation	Mitigation measures are embedded within the assessment at the relevant point in the EIA (e.g. at Scoping).
Mooring system	Mechanism by which the substructure of the wind turbine generators are fixed to the seabed, comprising both mooring lines, anchors, connectors and jewellery.
MRSea	Statistical modelling of Bird and Cetacea Distributions in Offshore Renewables Development Areas.
Natal water	Water in which an individual was born.
National Policy Statement (NPS)	National Policy Statements are statutory documents published in accordance with the Planning Act 2008. They set out the UK government's policy on, and the national need for specific types of nationally significant infrastructure projects.

Term	Definition
National Site Network (NSN)	A network of core breeding and resting sites for rare and threatened species and habitats within the UK. Post Brexit this has been adapted from Natura 2000 network of sites to only include UK sites.
Nature Conservation Marine Protected Area (NCMPA)	MPA designated by Scottish Ministers in the interests of nature conservation under the Marine (Scotland) Act 2010
NatureScot	Formerly known as Scottish Natural Heritage, NatureScot is a public body and government advisor responsible for Scotland's natural heritage, in particular for its natural, genetic and scenic diversity.
Nautical mile (NM)	A unit used in measuring distances at sea, equal to 1,852 metres.
Navigational Risk Assessment (NRA)	The process of evaluating the likely significant navigational effects of a proposed project or development.
National Marine Plan interactive (NMPi)	An interactive mapping system prepared for Marine Scotland to support Scotland's National Marine Plan.
Non-hazardous waste	Waste which is neither hazardous nor inert.
NorthConnect	Term to describe the proposed NorthConnect interconnector project with a designed capacity of 1400 MW, approximately 665 km in length to provide an electrical link between Scotland and Norway.
NorthConnect Cable Corridor	Term to describe the cable route associated with the NorthConnect interconnector project, which aims to connect Scotland and Norway and is currently consented in Scottish inshore and offshore waters (out to the edge of the UK Exclusive Economic Zone).
Notifications to Mariners	A release of navigational information and advice to assist mariners navigating in a particular region.
Nursery ground	An area that provides suitable habitat for young fish to live and grow.
Offshore	The offshore elements of the Proposed Development refer to works seaward of Mean High Water Springs (MHWS).
Offshore Substation and Converter Platform (OSCP)	A fixed structure located within the Windfarm Site, containing electrical equipment to aggregate the power from the WTGs, act as a power distribution substation for the Oil & Gas platforms, and convert power between high-voltage alternating current (HVAC) and high-voltage direct current (HVDC) for export/import via the export/import cable to/from the shore.
Offshore Wind Farm (OWF)	An offshore wind farm is a group of wind turbine generators in the same location (offshore) in the sea, which are used to produce electricity.
Ongoing grid connection	From landfall at MHWS the transmission connection continues to an HVDC onshore converter platform located at the Four Fields site, and subsequent grid connection to the transmission system operator substation in Peterhead.
Onshore	Pertaining to the landward side of Mean Low Water Spring.
OSPAR	Oslo-Paris Convention for the Protection of the Marine Environment of the Northeast Atlantic; resulting from the unification in 1992 of the Oslo Convention 1972 and the Paris Convention 1974.
Outline Environmental Management Plan (OEMP)	A consolidated document which includes the various environmental commitments during the construction and operation and maintenance phases of the Project, ensuring the efficient management and dissemination of these commitments. This OEMP will be updated between construction and operation and maintenance to produce the Construction environmental

Term	Definition
	Management Plan (CEMP) to encompass the environmental commitments associated with each phase.
Pelagic	Of or relating to the open sea.
Pelagic Fish	Species partially living their life in the water column above.
Pelagic species	Species of fish that inhabit the water column (not near the bottom or the shore).
pH	A measure of the hydrogen ion concentration in water. A pH value of 7 is neutral, pH values less than 7 indicate acidic conditions and pH values greater than 7 indicate alkaline conditions.
Pinniped	Seals, sea lions and walruses.
Piscivorous	Feeding on fish.
Pockmarks	Depressions in the sediment caused by gas escaping from beneath the seafloor.
Potential Significant Effects (PSE)	It is a requirement of Environmental Impact Assessment Regulations to determine the likely potential significant effects of the Project on the environment which should relate to the level of an effect and the type of effect.
Pots/creels	Traps normally used to capture crustaceans.
Primary Mitigation	Measures that are made during the pre-application phase and that are an inherent part of the project (i.e. do not require additional action, including assessment, to be taken).
Project	Term that should be used to describe Cenos Offshore Windfarm. The Project is a floating offshore windfarm located in the North Sea, with a generating capacity of up to 1,350 Megawatts (MW).
Project Area	Term to use to describe the areas within the consenting red line boundary.
Project Description	Chapter 3 of the 2024 Scoping Report that describes key parameters of the Project infrastructure. It includes optionality in relation to some design parameters where the design evolution of the Project is ongoing.
Project Design Envelope (PDE)	A description of the range of possible elements that make up the Project design options under consideration. The Project Design Envelope, or 'Rochdale Envelope' is used to define the Project for Environmental Impact Assessment (EIA) purposes when the exact parameters are not yet known but a bounded range of parameters are known for each key project aspect.
Ramsar site	A site listed under the Ramsar Convention 1972 for the protection of wetlands of international importance especially as waterfowl habitat.
Representative Concentration Pathway	Scenarios used in climate projections representing emissions pathways. For example RCP8.5 is considered a possible, but conservative, emission scenario, representing a future which is slow to transfer to low-carbon energy provision.
Resource sterilisation	Preventing the future extraction of a material or resource.
Risk	The likelihood of an impact occurring, combined with effect or consequence(s) of the impact on a receptor if it does occur.
Risk Event	An identified, unplanned event, which is considered relevant to the Project and has the potential to be a MA&D subject to assessment of its potential to result in a significant adverse effect on a receptor.

Term	Definition
SACFOR scale	The SACFOR scale is an abundance scale developed by the Marine Nature Conservation Review (MNCR), where S = Superabundant, A = Abundant, C = Common, F = Frequent, O = Occasional, R = Rare.
Safety zones	An area around a structure associated with an Offshore Renewable Energy Installation where entry is prohibited under the Energy Act 2004.
Scallop Dredge	A method to catch scallop using steel dredges with a leading bar fitted with a set of spring loaded, downward pointing teeth. Behind this toothed bar (sword), a matt of steel rings is fitted. A heavy net cover is laced to the frame, sides and after end of the mat to form a bag.
Scoping Opinion	An opinion adopted by the Scottish Ministers as to the scope and level of detail of information to be provided in the EIA Report for a proposed project.
Scoping Report	A report that presents the findings of an initial stage in the Environmental Impact Assessment process and outlines the information proposed to be included within the EIA Report.
Scottish Environment Protection Agency	A non-departmental public body of the Scottish Government, responsible for environmental regulation. This includes ensuring that the environment and human health are protected, and that Scotland's natural resources and services are used as sustainably as possible and contribute to sustainable economic growth.
Scottish Ministers	The devolved government of Scotland.
Scour	A localised sediment erosion feature caused by local enhancement of flow speed and turbulence due to interaction with an obstacle.
Seabed Infrastructure	The elements of the Project that will be connected to or set within the seabed (including mooring anchors, cables, jacket piles, etc.).
Seascape	Landscapes with views of the coast or seas, and coasts and adjacent marine environments with cultural, historical and archaeological links with each other.
Secondary mitigation	Mitigation measures to manage environmental effects that will require further activity in order to achieve the anticipated outcome. These may be imposed as part of the planning consent or Marine Licence conditions.
Section 36 Consent	Consent that can be granted under section 36 of the Electricity Act 1989 for the construction or extension, and operation, of an electricity generating station.
Sediment deposition	Settlement of sediment in suspension back to the seabed, causing a localised accumulation.
Sediment transport	The movement of a mass of sedimentary material (e.g. silts, muds, sands and gravels) by the forces of currents and waves. Potential sediment transport is the full amount of sediment that could be expected to move under a given combination of waves and currents, i.e. not supply limited.
Seine Net	Seine fishing is a method of fishing that employs a surrounding net, called a seine, that hangs vertically in the water with its bottom edge held down by weights and its top edge buoyed by floats. Seine nets can be deployed from the shore as a beach seine, or from a boat.
Sensitivity	A term applied to specific receptors, combining judgements of the susceptibility of the receptor to the specific type of change or development proposed and the value associated to that receptor.

Term	Definition
Significance	A measure of the importance of the environmental effect, defined by criteria specific to the environmental aspect.
Significant effects	It is a requirement of the EIA Regulations 2017 to determine the likely significant effects of the development on the environment, which should relate to the level of an effect and the type of effect. Where possible significant effects should be mitigated. The significance of an effect gives an indication as to the degree of importance (based on the magnitude of the effect and the sensitivity of the receptor) that should be attached to the effect described. Whether or not an effect should be considered significant is not absolute and requires the application of professional judgement. Significant – 'noteworthy, of considerable amount or effect or importance, not insignificant or negligible' (The Concise Oxford Dictionary).
Site of Special Scientific Interest (SSSI)	Sites notified at the national level under the Nature Conservation (Scotland) Act 2004. They are a series of sites that are designated to protect the best examples of significant natural habitats and populations of species.
Spatial scope	The area over which changes to the environment are predicted to occur as a consequence of a project.
Spawning	The release or deposition of eggs and sperm, usually into water, by aquatic animals.
Special Area of Conservation (SAC)	International designation implemented under the Habitats Regulations for the protection of habitats and (non-bird) species. Sites designated to protect habitats and species in Annexes I and II of the Habitats Directive and sufficient habitat to be conserved to maintain favourable Directive and sufficient habitat to be conserved to maintain favourable conservation status of designated features.
Special Protection Area (SPA)	Sites designated under EU Directive (79/409/EEC) to protect habitats of migratory birds and certain threatened birds under the Birds Directive.
Special waste	In Scotland, hazardous waste is referred to as special waste,
Stakeholder	Person or organisation with a specific interest (commercial, professional or personal) in a particular issue.
Study area	Area where potential impacts from the Project could occur, as defined for each aspect.
Sublittoral	The area below low tide.
Subsea Infrastructure	The elements of the Project which will be within the water column (mooring lines, anchors, and inter-array cables, export cables, and any associated equipment on the sea-bed, etc.).
Suspended sediment concentration	The mass concentration (mass/ volume) of sediment in suspension.
Swim bladder	Gas filled sac present in teleost fish.
Targeted Oil and Gas (TOG) Onward Development Area	Term to describe the area of search within which connection to oil and gas platforms will be located.
Temporal Scope	The temporal scope refers to the time periods over which impacts and effects may be experienced by sensitive receptors.
Temporary or permanent effects	Effects may be considered as temporary or permanent within a timeframe of relevance to the aspect or receptor in question.

Term	Definition
Temporary Threshold Shift (TTS)	Reversible and temporary hearing loss.
Tertiary measures	Actions that would occur with or without input from the EIA process. These include actions that will be taken to meet legislative requirements, or those considered to be standard practice and used to manage commonly occurring environmental effects. These are also referred to as 'good practice measures'.
The Crown Estate Scotland (CES)	The public corporation of the Scottish government that is responsible for the management of land and property in Scotland, as owned by the monarch "*in right of the Crown*".
The Project	Cenos Offshore Windfarm.
Tidal excursion ellipse	The path followed by a water particle in one complete tidal cycle.
Transboundary / transboundary effects	When the impacts from developments in one country significantly affect the interest or environment of another country.
Transmission assets	Include the OSCP and the offshore export/import cables. The OSCP will provide the connection point for the inter-array cables, bringing the power from the wind turbine generators (WTGs) to the OSCP; the connection points for the transmission cables connecting the oil and gas assets to the OSCP; the connection point for the high voltage direct current (HVDC) export/import cables; power transformers, HVDC converter and associated equipment including metering and control systems. The OSCP HVDC converter, converts high voltage alternating current (HVAC) to HVDC power and vice versa to allow export and import of power from shore. Whilst excluded from this application, the transmission assets also include the onward grid connection.
Type or Nature of effect	Whether an effect is direct or indirect, temporary, short-term, medium-term or long-term or permanent, positive (beneficial), neutral or negative (adverse) or cumulative.
Unexploded Ordnance (UXO)	Explosive weapons (e.g. bombs, shells, grenades, naval mines) that did not explode when they were employed or discarded and still pose a risk of detonation, potentially many decades later.
United Kingdom (UK)	The United Kingdom of Great Britain and Northern Ireland, comprising England, Scotland, Wales and Northern Ireland.
United Nations	The United Nations is an international organisation founded in 1945 to maintain global peace and security.
Vårgrønn As (Vårgrønn)	Joint venture partner in Cenos Offshore Windfarm (the Project).
Vessel Monitoring System (VMS)	A system used in commercial fishing to allow environmental and fisheries regulatory organisations to monitor, minimally, the position, time at a position, and course and speed of fishing vessels.
Vulnerability	The propensity or predisposition of a system or receptor to be adversely affected. This encompasses the sensitivity of the system or receptor and its capacity to cope and adapt.
Waste	Any substance or object which the holder discards or intends or is required to discard.
Waste Hierarchy	Establishes an order of preference for the management of waste to minimise the prevention whist maximising disposal.
Wind Turbine Generator (WTG)	Term to describe the equipment associated with electricity generation from available wind resource, comprising the surface components located above the substructure which supports them

Term	Definition
	(for instance, tower, nacelle, hub, blades, and any necessary power transformation equipment, generators, and switchgears).
Ziphiid	A beaked whale; a group of poorly studied marine mammals superficially similar to dolphins (but much larger).
Zone of Influence	The area surrounding the Project within which potential significant effects could occur.

1. INTRODUCTION

1.1 Purpose of this Scoping Report

1.1.1.1 In February 2023, Cenos Offshore Windfarm Ltd ('the Applicant') submitted an Environmental Impact Assessment (EIA) Scoping Report (hereafter referred to as the '2023 Scoping Report')[1] for Cenos Offshore Windfarm (the 'Project'), a floating offshore windfarm development project located in the Central North Sea. The 2023 Scoping Report was prepared to support the request for a Scoping Opinion[2] for the Project from Scottish Ministers. The advice received in the 2023 Scoping Opinion (detailed below) led to the Applicant's decision to submit a revised Offshore EIA Scoping Report (hereafter referred to as the '2024 Scoping Report'), which is this document.

1.1.1.2 On 28 June 2023, the Applicant received the 2023 Scoping Opinion from the Marine Directorate on behalf of the Scottish Ministers. The Scottish Ministers provided valuable feedback which has been taken on board by the Applicant. The Project has evolved over the past year since submission of the 2023 Scoping Report. The 2024 Scoping Report reflects refinements to both project design and definition, advice received through scoping and *ad hoc* consultation, and now provides for a complete offshore consenting strategy which has been developed in consultation with the Marine Directorate Licensing Operations Team (MD-LOT).

1.1.1.3 The 2023 Scoping Opinion advised that the information provided in the 2023 Scoping Report lacked sufficient detail on the project design and proposed methods of assessment to enable a detailed statutory scoping response from MD-LOT and their advisors. The Applicant acknowledges the Scottish Ministers' views on the proportionality of the advice provided in the 2023 Scoping Opinion in relation to the level of detail presented in the 2023 Scoping Report. The Applicant's primary aim is to ensure that the EIA process is both effective and transparent, respecting both Scotland's environment and its valuable natural resources, and therefore has provided this report to ensure detailed and robust consultation with the Scottish Ministers and consultees during the pre-application period.

1.1.1.4 In response to the advice received, this 2024 Scoping Report has been prepared to supersede the 2023 Scoping Report and address any deficiencies contained therein by providing the following:

- A more refined project description, including a detailed design envelope;
- A thorough review of impacts to be Scoped in and out which considers the refined project description and provides thorough justification and reasoning for either taking an impact forward to full assessment within the EIA Report (EIAR) or scoping out impact pathways or receptors from EIA at this stage and
- A thorough review of the impact assessment methodology proposed for the EIA and details of the proposed approach. This review aims to ensure a robust EIA process has been undertaken to best inform the decision-making process.

1.1.1.5 The 2024 Scoping Report intends to:

- Identify the environmental aspects that should be addressed within the EIAR;

- Refine the scope of the assessments undertaken as part of the EIA to allow focus on the key issues;
- Establish the people and environmental resources likely to be significantly affected by the Project;
- Outline the work required to take forward the assessment of potentially significant effects. Impacts that are unlikely to have a significant effect on relevant receptors are identified and proposed to be scoped out of the EIA where there is clear justification for doing so;
- Develop the approach to the assessment of cumulative, inter-related and transboundary effects;
- Summarise key legislation and policy relevant to the EIA; and
- Provide stakeholders with information on the Project to allow for engagement on the scope, key topics to be addressed and the assessment methodologies to be used in the EIAR.

1.2 Project background

1.2.1.1 The North Sea Transition Deal, established in March 2021, is a sector deal between the United Kingdom (UK) Government and the oil and gas industry which aims to facilitate the decarbonisation of the oil and gas sector. Key commitments of the deal include setting early emission reduction targets and investing up to £16 billion by 2030 to reduce sector carbon emissions[3]. The Project aligns with the North Sea Transition Deal by helping drive decarbonisation efforts through the electrification of offshore oil and gas installations, whilst providing surplus power to the UK grid.

1.2.1.2 In November 2022, Crown Estate Scotland (CES) announced the Innovation and Targeted Oil & Gas (INTOG) Leasing Round, to help enable this sector-wide commitment to decarbonisation. INTOG allows developers to apply for the rights to construct offshore windfarms for the purpose of providing low carbon electricity to power oil and gas installations and help to decarbonise the sector.

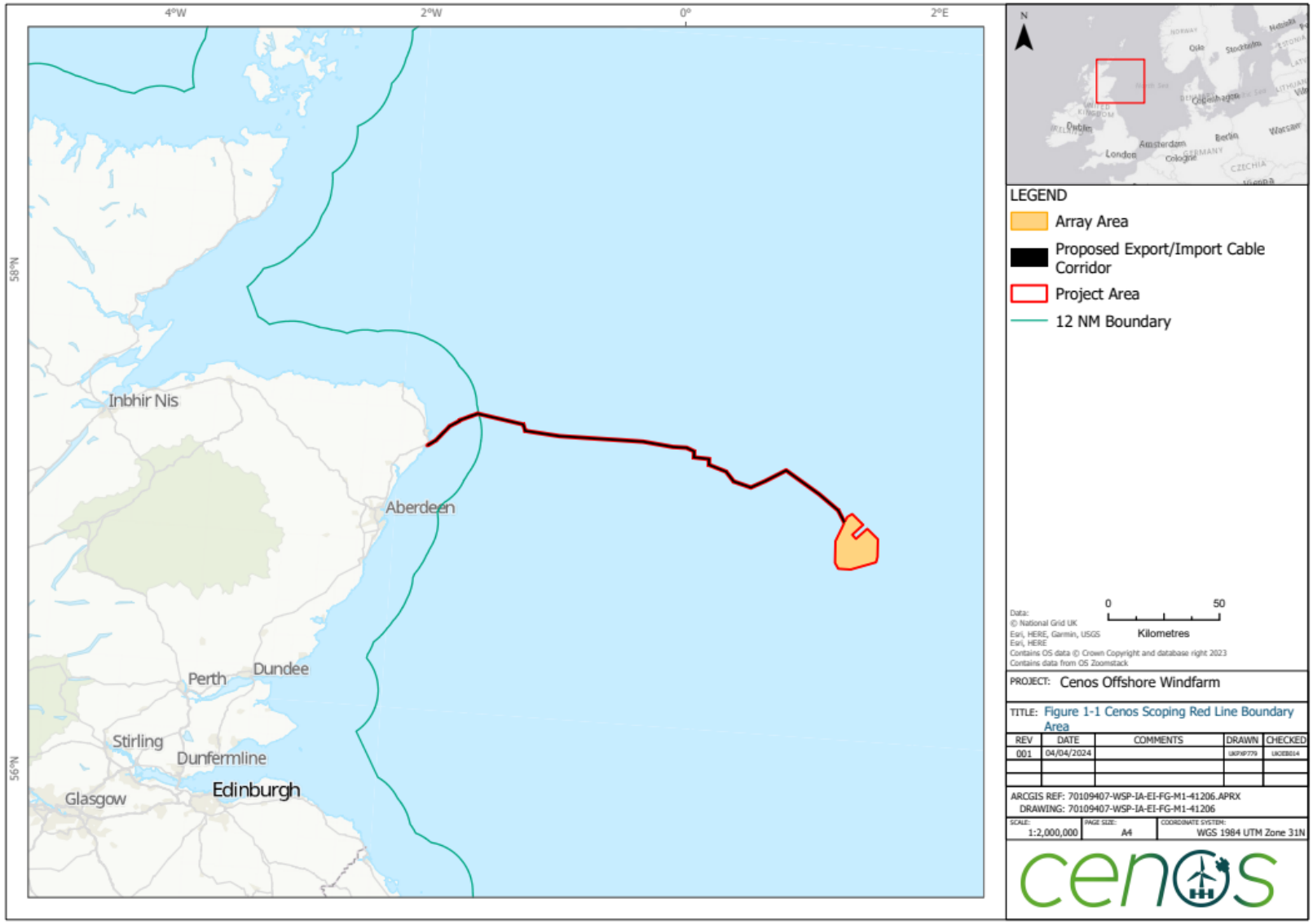
1.2.1.3 The Applicant submitted a leasing application under the INTOG Leasing Round and was awarded an Exclusivity Agreement to develop the Project in November 2023. The Project is wholly located in the area INTOG ‘Ea’ as defined in the Initial Plan Framework (IPF) which was published to set the planning framework and the areas of seabed that will form the spatial footprint for the CES leasing process.

1.2.1.4 **Figure 1-1** illustrates the Project Area, outlining the area considered in this 2024 Scoping Report.

1.2.1.5 As discussed in **Chapter 3: Project Description**, the Project comprises of:

- The Array Area, including 68 – 95 Wind Turbine Generators (WTG); and
- Export/Import Cable Corridor (ECC), extending for approximately 230 kilometres (km), from Mean High Water Springs (MHWS) to the Array Area.

Figure 1-1: Cenos Scoping Red Line Boundary Area



1.3 Consenting strategy

1.3.1.1 The Applicant has identified the opportunity to coordinate with the NorthConnect Interconnector project to facilitate import and export of power to and from shore to support energy offtake by the surrounding oil and gas assets (i.e. platforms, Floating Production Storage and Offloading (FPSOs) and other production facilities) the Project aims to decarbonise. As such the Applicant is working collaboratively with NorthConnect Ltd.

1.3.1.2 The consent applications covered by the 2024 Scoping Report will be for the offshore activities associated with the Project. At the time of the 2023 Scoping Report submission, it was considered that the existing consents for NorthConnect's infrastructure within the 12 nautical miles (NM) limits would be varied to allow use as a Multi-Purpose Interconnector (MPI), with the Project as one of its connection points. However, this consenting strategy has been revised for the forthcoming EIA and consent application, to cover all offshore infrastructure required for the Project. The consent application will include the ECC from the landfall point, from MHWS to the Array Area, and all generation assets.

1.3.1.3 Coordination between the Applicant and NorthConnect ensures that only one set of infrastructure will be required within the overlapping marine licence redline boundary within the inshore marine environment (MHWS to 12 NM). As such, there will not be any cumulative effects between the two projects within the inshore area, because there will only be a single set of infrastructure within 12 NM. The Applicant now intends to apply for a marine licence which overlaps with NorthConnect within 12 NM as, since the original 2023 Scoping Report was submitted, it is now the case that the Applicant may proceed before NorthConnect, and it may be the Applicant which constructs the infrastructure within 12 NM. Therefore, the Applicant is now seeking consent for all the offshore infrastructure, including those located within the inshore area between 12 NM and MHWS.

1.3.2 Requirement for EIA

1.3.2.1 The 2024 Scoping Report has been prepared in accordance with the following EIA Regulations (hereafter collectively referred to as the EIA Regulations):

- The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017[4] as amended by The Environmental Impact Assessment (Miscellaneous Amendments) (Scotland)[5] (applies to all applications for Section 36 (s.36) consent in Scottish waters out to 200 NM from shore).
- The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (as amended) (Scotland) (applies to applications that require an EIA for a marine licence from 0 and 12 NM from shore).
- The Marine Works (Environmental Impact Assessment) Regulations 2007[6] (as amended) (applies to applications that require an EIA, for a marine licence from 12 and 200 NM from shore).

1.3.3 Key consents

1.3.3.1 Due to the potential generating capacity of the Project of up to 1,350 Megawatts (MW), the Project will require the following key consents:

- A s.36 consent under the Electricity Act 1989[7];
- A marine licence under the Marine and Coastal Access Act (MCAA) 2009[8] (Between 12 NM and 200 NM); and
- A marine licence under the Marine (Scotland) Act 2010[9] (Between 0 and 12 NM).

1.3.3.2 Compliance with the associated underpinning legislations is also required.

1.3.3.3 As discussed in Section 1.3, the onward grid connection will be implemented based on the NorthConnect project which obtained consent in 2019 and hence no further consents are required for the onshore aspects of the Project.

Section 36 Consent

1.3.3.4 The Project is an offshore renewable energy installation with a capacity greater than 50 MW located in Scottish offshore waters (between 12 NM and 200 NM from the Scottish coastline) within the Scottish Renewable Energy Zone (REZ). It therefore requires consent under Section 36 (s.36) of the Electricity Act 1989[4] (as amended). This consent will allow for installation, operation and maintenance (O&M) of wind turbines and Inter-Array Cables associated with the generation of power by the Project.

Marine Licences

1.3.3.5 The MCAA 2009[8] (as amended) applies to Scottish waters out with the 12 NM territorial limit. Under the MCAA a marine licence must be obtained prior to the construction, alteration, or improvement of any works, or depositing any object in or over the sea, or on or under the seabed. As such, the renewable energy installation (wind turbines, cables, offshore electricity hub and associated infrastructure) will be subject to marine licence.

1.3.3.6 Section 12 of the MCAA provides the Marine Management Organisation (MMO) (delegated to MD-LOT on behalf of Scottish Ministers in Scottish Waters) the power to determine certain consents under s.36 of the Electricity Act 1989. Under Section 79 of the MCAA, where applications for both a marine licence under the MCAA and consent under s.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. In this case, the two related applications may be considered at the same time.

1.3.3.7 The Marine Scotland Act 2010 applies to Scottish waters up to 12 NM from the coast. The Act introduces a duty to protect and enhance the marine environment within Scottish territorial waters (from MHWS out to 12 NM), including measures to help boost economic investment and growth in areas such as marine renewables. Key measures included within the Act include marine planning, marine licensing, marine conservation, and enforcement.

1.3.3.8 A Marine Scotland Act 2010 marine licence will be required to undertake prescribed marine licensable activities for the Project, including deposition of cables or other objects on or within the seabed, installation of any necessary cable protection, installation of mooring lines and anchors, and the installation of any wider infrastructure or substructures required.

1.3.3.9 At the time of writing, the specific details of the oil and gas assets (and the associated cable routes) that may benefit from exported power from the Project are yet to be finalised. This information may not be available in finality at the time of consent application for the Project; however, the best available information will be provided to support the consent application. Any required transmission cables and associated infrastructure will be subject to separate licence applications which will be accompanied by detailed environmental and socio-economic impact assessment.

1.3.3.10 To support the application a Targeted Oil and Gas (TOG) Onward Development Area will be considered on the basis of available knowledge and within the bounds of commercial confidentiality within the EIA to inform the worst case assessment of potentially significant cumulative environmental effects.

1.4 The Applicant and EIA project team

1.4.1 The Applicant

1.4.1.1 The Applicant, Cenos Offshore Windfarm Ltd., is a Joint Venture between Flotation Energy and Vårgrønn As (Vårgrønn).

1.4.1.2 Flotation Energy has a 13 GW portfolio covering both fixed and floating developments globally. Flotation Energy has a growing project pipeline of offshore wind projects with more than 13 GW in the UK, Ireland, Taiwan, Japan, and Australia. Now part of the Tokyo Electric Power Company (TEPCO) Group, with its accumulated technology and experience and aim of fostering environmental improvements, Flotation Energy holds a strong position in offshore wind development.

1.4.1.3 Vårgrønn is an agile, Norway-based offshore wind company powering the energy transition through the development, construction, operation, and ownership of offshore wind projects. Vårgrønn's pipeline of projects and prospective projects spans England, Scotland, Ireland, and Norway, in addition to early-stage initiatives in the Baltics. Vårgrønn holds a 20 percent share in Dogger Bank, the world's largest windfarm under construction. Vårgrønn is a joint venture between the energy company Plenitude (Eni) and the Norwegian energy entrepreneur and investor HitecVision.

1.4.2 The EIA project team

1.4.2.1 Following submission of the 2023 Scoping Report, the Applicant appointed WSP Environment & Infrastructure Solutions UK Limited (hereafter referred to as 'WSP') to lead the EIA for the Project.

1.4.2.2 WSP is registered with the Institute of Environmental Management and Assessment (IEMA) and its Environmental Impact Assessment Quality Mark scheme. The scheme allows organisations that lead the co-ordination of EIAs in the UK to make a

commitment to excellence in their EIA activities and have this commitment independently reviewed.

1.4.2.3 A number of specialist consultancies are also providing expert input into the EIA, as indicated in **Table 1-1**. Pursuant to the EIA Regulations, the EIAR will be prepared by competent experts and outline the relevant expertise or qualifications.

1.5 Scoping Report structure

1.5.1.1 The structure of the 2024 Scoping Report is detailed in **Table 1-1**.

Table 1-1: 2024 Scoping Report structure

Chapter number	Title	Prepared by (lead)	Overview
1	**Introduction**	WSP	Introduction to the 2024 Scoping Report.
2	**Legislative and Policy Context**	WSP	Overview of the relevant legislative and policy context for EIA.
3	**Project Description**	WSP	Outline description of the Project taking a Project Design Envelope (PDE) approach for assessment of the Project and summary of the key design components.
4	**Site Selection and Consideration of Alternatives**	WSP	Outline description of the site selection process for the Project, as well as setting out the alternatives considered for the Project and the main reasons for selecting particular options, taking into consideration environmental sensitivities, technical feasibility and the overall objectives of the Project.
5	**Approach to Scoping and EIA**	WSP	Describes the approach to Scoping and EIA methodology, specifically describing the approach used to identify any potential significant effects on physical, biological, and human environment receptors during the construction, O&M, and decommissioning phases of the Project.
6	**Consultation Process**	WSP	Brief overview of the consultation requirements and the proposed approach to consultation as the EIA process continues throughout the pre-application phase for the Project.
7	**Marine and Coastal Processes**	WSP (with Cooper Marine Associates)	Considers the potential significant effects on marine and coastal processes of the Project.
8	**Marine Water and Sediment Quality**	WSP	Considers the potential significant effects on marine water and sediment quality of the Project.
9	**Benthic Ecology**	WSP	Considers the potential significant effects on benthic ecology of the Project.

Chapter number	Title	Prepared by (lead)	Overview
10	**Marine Mammals**	WSP (with Seiche)	Considers the potential significant effects on marine mammals of the Project.
11	**Ornithology**	WSP (with HiDef)	Considers the potential significant effects on ornithology of the Project.
12	**Fish Ecology**	WSP	Considers the potential significant effects on fish ecology of the Project.
13	**Commercial Fisheries**	Brown and May Marine	Considers the potential significant effects on commercial fisheries of the Project.
14	**Shipping and Navigation**	Anatec	Considers the potential significant effects on shipping and navigation of the Project.
15	**Marine Cultural Heritage and Archaeology**	WSP (with COARS Ltd)	Considers the potential significant effects on marine cultural heritage and archaeology of the Project.
16	**Seascape, Landscape and Visual Impact Assessment**	WSP	Considers the potential significant effects on seascape, landscape and visual Impact assessment of the Project.
17	**Marine Infrastructure and Other Users**	WSP	Considers the potential significant effects on marine infrastructure and other users of the Project.
18	**Military and Civil Aviation**	Mackenzie Renewables	Considers the potential significant effects on military and civil aviation of the Project.
19	**Socio-economics**	WSP	Considers the potential significant effects on socio-economics of the Project.
20	**Materials and Waste**	WSP	Considers the potential significant effects on materials and waste of the Project.
21	**Major Accidents and Disasters**	WSP	Identifies, describes, and assesses the vulnerability of the Project to major accidents and/or disasters.
22	**Climate Change Resilience**	WSP	Considers of the effect of the Project on climate change and the impact of climate change on the Project.
23	**Carbon and Greenhouse Gases**	WSP	Considers the potential significant effects on carbon and greenhouse gases of the Project.
24	**Summary and Next Steps**	WSP	Summary of the 2024 Scoping Report and next steps to submission of the EIAR.

1.5.1.2 This 2024 Scoping Report is supported by Appendices, which are referenced throughout this Scoping Report.

2. LEGISLATIVE AND POLICY CONTEXT

2.1 Introduction

2.1.1.1 This Chapter provides an overview of the relevant legislation and policy for the Project. This Chapter supports a policy led approach to EIA by providing an overview of the applicable consenting legislative framework, identifying the strategic policy context relevant to the Project, and outlining the applicable policy framework to guide proportionate technical assessments**.**

2.1.1.2 The purpose of this Chapter is to help inform the scope of the EIA and demonstrate how the Project will comply with legislative and policy requirements. The EIA will be progressed taking account of all applicable legislation, policy, guidance, and best practice. At this stage, relevant legislative and policy frameworks will guide the scope of the EIA and help to inform the types of receptors, potential significant effects and environmental issues that should be assessed. Where specific legislation, policy or guidance requirements inform the proposed scope of assessment for technical areas within the EIA, this is set out in the relevant sections of **Chapters 7** to **23** of this Scoping Report. The implications of relevant statutory and policy requirements, as identified below, will subsequently be considered in further detail within the EIAR and associated consenting applications for the Project.

2.1.2 Need for the Project

2.1.2.1 The Project provides an opportunity to decarbonise current oil and gas facilities located in the Targeted Oil and Gas (TOG) Onward Development Area (see **Figure 3-3**), making a positive contribution towards carbon dioxide (CO_2) emissions reauction targets (discussed below) and ensuring a sustainable supply of renewable energy. As a signatory to the Kyoto Protocol[10] which commits state parties to reduce greenhouse gas emissions, the UK is committed to this with commitments having been transposed into UK law by the Climate Change Act 2008[11]. In June 2019, the Climate Change Act 2008 (2050 Target Amendment) Order 2019[12] amended this to legally bind the UK to achieving net-zero greenhouse gas emissions by 2050. In Scotland the Climate Change (Scotland) Act 2009[13] was introduced seeking a reduction of at least 80% from the 1990 baseline year by 2050, in line with the UK target. This was however amended by the Climate Change (Emissions Reduction Targets) (Scotland) Act 2019[14] seeking net zero by 2045, with revisions to the interim and annual targets. The ambitious targets reflecting the country's dedication to mitigating climate change and transitioning towards a more sustainable and low-carbon economy.

2.1.2.2 In March 2021, the North Sea Transition Deal was established (see **Chapter 1: Introduction**), encouraging the UK to harness power of the UK offshore oil and gas industry to deliver the 2050 net-zero target. Resultantly, the UK oil and gas industry has committed to reductions of; 10 percent CO_2 reduction by 2025; 25 percent CO_2 reduction by 2027 and 50 percent CO_2 reduction by 2030. It is acknowledged that platform electrification is a key component of the North Sea Transition Authority's (NSTA) vision for an integrated energy basin. Outcome 3 of the North Sea Transition Deal is for investment and deployment of new technologies that allow for a step-change in emissions reductions, in particular platform electrification.

2.1.2.3 The Draft Energy Strategy and Just Transition Plan[15], published in January 2023, reiterates a strong dedication to the oil and gas sector. The Plan showcases a heightened endorsement of the industry's contribution to achieving net-zero emissions while concurrently emphasising the urgency of a just transition. It aims to facilitate a swift and equitable shift, specifically directing efforts towards transforming the North Sea energy sectors to prioritise renewable energy sources.

2.1.2.4 Amongst the context of the oil and gas sector, the UK and Scottish Government have also identified offshore wind development as an important contribution towards energy security, with a target of 50 gigawatts (GW) of new offshore wind capacity to be installed by 2030, with 5 GW from floating offshore wind.

2.1.3 International legislation

Table 2-1: International legislation

Legislation	Summary
United Nations Framework Convention on Climate Change (UNFCCC), 1992[16]	At the international level, action to tackle climate change is informed by the Intergovernmental Panel on Climate Change and underpinned by the UNFCCC. The UNFCCC aims to stabilise atmospheric greenhouse gas (GHG) concentrations at a level sufficiently low "*to prevent dangerous anthropogenic interference with the climate system*" (Article 2).
The Kyoto Protocol[10], 1997	The Kyoto Protocol was adopted on 11 December 1997 and came into force in 2005. There are 192 parties to the Kyoto Protocol at present. The Kyoto Protocol commits industrialised countries and economies in transition to limit and reduce GHG emissions in accordance with agreed individual targets The Doha Amendment was adopted on 8 December 2012, lasting until 2020. The Amendment includes new commitments for Annex I Parties to the Kyoto Protocol, a revised list of GHG to be reported on by Parties and amendments to several articles of the Kyoto Protocol. The UK is a signatory to the Kyoto Protocol and its commitments were transposed into UK law by the Climate Change Act 2008.
The Paris Agreement[17] - 21st United Nations Climate Change Conference of the Parties (COP21), 2015	The Paris Agreement is a legally binding international treaty on climate change. It was adopted by 196 countries at COP21 on 12 December 2015 and entered into force on 04 November 2016. The Agreement sets out a target to limit global warming to well below 2° Celsius above pre-industrial global average temperature levels, with the preferable aim of limiting global warming to 1.5° Celsius. In accordance with the Paris Agreement, on 12 December 2020, the UK communicated its Nationally Determined Contribution. The current Nationally Determined Contribution commits the UK to reducing economy-wide greenhouse gas emissions by at least 68% by 2030, compared to 1990 levels.
The Climate Change Act 2008[11], amended by the 2050 Target Amendment Order 2019[12]	The Climate Change Act 2008 is the basis for the UK's approach to tackling and responding to climate change. It establishes the framework to deliver on these requirements.

Legislation	Summary
	The Act was amended in 2019 so that the minimum percentage by which the net UK carbon account for the year 2050 must be lower than the 1990 baseline is increased from 80% to 100%.
The Climate Change (Scotland) Act 2009[13], amended by the Climate Change (Emissions Reduction Targets) (Scotland) Act 2019[14]	The Climate Change (Scotland) Act 2009 is an act of the Scottish Parliament creating the statutory framework for greenhouse gas emissions reductions in Scotland. The Climate Change (Scotland) Act 2009 was amended by the Climate Change (Emissions Reduction Targets) (Scotland) Act 2019, and shortly after the Scottish Government declared a Climate Emergency in April 2019. The amended Act placed climate change at the heart of all policy decisions and actions and increased the ambition of Scotland's statutory renewable energy targets to net zero by 2045 and revised interim and annual emissions reduction targets as follows: • 56% from baseline values by 2020; • An emissions reduction of 75% by 2030; and • An emissions reduction of 90% by 2040. The objective of this Act is to contribute appropriately to the world's efforts to deliver on the Paris Agreement reached at the 21st COP of the UNFCCC.
The Climate Change Plan, Third Report on Proposals and Policies (2018-2032)[18], Updated 2020	This Climate Change Plan is the Scottish Government's third report on proposals and policies for meeting its climate change targets. It sets out how Scotland can deliver its target of 66% emissions reductions, relative to the baseline for the period 2018–2032. Part 1 of the plan shows the emissions reductions pathway to 2032, and states that "*by 2032, Scotland's energy system will be largely decarbonised and be increasingly important as a power source for heat and transport*."
26th United Nations Climate Change Conference of the Parties (COP26)[19], 2021	The COP26 summit brought parties together to accelerate action towards the goals of the Paris Agreement and the UNFCCC. COP26 marked a step forward in global effort to address climate change, and an increase in ambitions to reduce emissions across the world. 197 countries agreed to a new climate deal 'The Glasgow Climate Pact', and the Paris Rulebook was finalised. The 2018 Paris Rulebook governs how the world's communities must pledge emissions reduction targets in the Paris Agreement.

2.1.4 European Parliament and Council Directives

2.1.4.1 The UK officially departed from the European Union (EU) on 31 January 2020 by invoking article 50 of the Lisbon Treaty (EU Exit).

2.1.4.2 Following its exit, the UK Government has pledged, at the very least, to uphold international environmental obligations aligned with the EU (Withdrawal) Act 2018[20]. Additionally, the commitment extends to preserving environmental pledges and legislation enacted post-UK departure from the EU.

2.1.4.3 Consequently, the existing EU renewable energy targets for the UK, will remain in effect. However, any new EU legislation or modifications to existing directives will not necessitate transposition into UK law. The ensuing sections delineate the EU renewable energy targets.

2.1.4.4 It is of note that the Renewable Energy Directive EU/2018/2001[21] was revised in 2023 and the amending Directive EU/2023/2413[22] entered into force on 20 November 2023 as regards the promotion of energy from renewable sources, and repealing Council Directive (EU) 2015/652.

2.1.4.5 In November 2021, the Environment Act 2021[23] (hereafter referred to as "the Environment Act") received legislative approval, establishing a framework for environmental governance post-EU Exit. Whilst majority of the provisions within the Act are applicable to England, it does include clauses that extend its impact to Scotland, Wales, and Northern Ireland. Specifically, the legislation grants delegated powers for the regulation of devolved environmental policy areas at a UK-wide level, subject to the consent of Scottish Ministers. Additionally, certain provisions within the Bill are relevant to Scotland due to their classification as reserved areas.

2.1.4.6 Where specific EU Exit legislation has been implemented to ensure legislative instruments continue to operate in a similar way after EU Exit Day.

2.1.5 Scottish Legislation and Policy

2.1.5.1 The need for a secure energy supply in the face of climate change has led to the development of legislation and policies to tackle both climate change and support renewable energy deployment at place and scale. This is of relevance to the consenting process for the Project and therefore this Scoping Report and subsequent EIA.

Scotland's Energy Strategy

2.1.5.2 The Scottish Energy Strategy: The Future of Energy in Scotland[24] sets out the Scottish Government's vision for the future energy system, focusing on a vision for Scotland by the year 2050. The Strategy states that *"a diverse, well balanced energy supply portfolio or 'energy mix' will remain essential as Scotland decarbonises, providing the basis for secure and affordable heat, mobility, and power in future decades".*

2.1.5.3 The Strategy sets two new targets for the Scottish energy system by 2030:

- The equivalent of 50 percent of the energy for Scotland's heat, transport, and electricity consumption to be supplied from renewable sources; and
- An increase by 30 percent in the productivity of energy use across the Scottish economy.

2.1.5.4 The Energy Strategy: Position Statement, published in March 2021 reinforces a commitment to remain guided by the key principles set out in Scotland's Energy Strategy, and sets out a number of key priorities for the short to medium-term.

2.1.5.5 On 10 January 2023, the Draft Energy Strategy and Just Transition Plan as published which acknowledges the important role the oil and gas industry has played towards the Scottish economy and identity. This draft Strategy sets out policy positions on oil

and gas, both offshore and onshore. It demonstrates support for the fastest possible just transition for the oil and gas sector, in order to secure "*a bright future for a revitalised North Sea energy sector focused on renewables".*

Scotland's Emission Reduction Targets

2.1.5.6 The Climate Change (Scotland) Act 2009[13] is an act of the Scottish Parliament creating the statutory framework for greenhouse gas emissions reductions in Scotland. It was 2009 was amended by the Climate Change (Emissions Reduction Targets) (Scotland) Act 2019[14], and shortly after the Scottish Government declared a Climate Emergency in April 2019.

2.1.5.7 In accordance with the Climate Change (Emissions Reduction Targets) (Scotland) Act 2019[14], Scotland has established its own objectives for diminishing greenhouse gas emissions. The Act aim to ensure that Scotland makes a meaningful contribution to global commitments outlined in the Paris Agreement[17], reached at the 21st Conference of the Parties of the United Nations Framework Convention on Climate Change. The emissions reduction targets encompass achieving net-zero greenhouse gas emissions by no later than 2045. Additionally, the Act stipulates interim targets, including a reduction of at least 56 percent by 2020, 75 percent by 2030, and 90 percent by 2040.

National Planning Framework IV

2.1.5.8 National Planning Framework IV (NPF4)[25] was adopted by the Scottish Government on 13 February 2023. NPF4 provides the spatial strategy for Scotland to 2045 and takes account of the target of net zero emissions by 2045 set by the Scottish Government. It forms part of the statutory Development Plan for the determination of planning applications, with a statutory requirement for it to be taken into account by planning authorities when preparing Local Development Plans.

2.1.5.9 NPF4 provides a strong framework for the deployment of renewable energy developments and identifies the need for strategic scale renewable energy developments, including offshore windfarms.

Scotland's Offshore Wind Commitments

2.1.5.10 The commitment to offshore wind targets was established in the Offshore Wind Sector Deal agreed between the Government and the offshore wind industry in 2019 and updated in March 2020[26]. Originally targeting 30 GW of operating capacity by 2030, this figure was increased to 40 GW in the Energy White Paper published in 2020[27], as part of the plan for the green industrial revolution. In its Sixth Carbon Budget[28], published in 2020, the Climate Change Committee (CCC) recommended that offshore wind should become the backbone of the whole UK energy system, growing from 40 GW of capacity in 2030 to 100 GW or more by 2050. In October 2021, the UK Government committed to decarbonise the UK's electricity system by 2035[29].

2.1.5.11 Scotland is committed to ensuring secure, reliable, and affordable energy supplies, within the context of long-term decarbonised energy generation. In October 2020, the Sectoral Marine Plan for Offshore Wind Energy (SMP-OWE) was published providing the spatial framework for commercial scale offshore wind through the

ScotWind leasing round. Within the SMP-OWE there was optionality for the Scottish Ministers to explore the demand for future leasing rounds aimed at decarbonisation of the oil and gas sector in Scotland.

Innovation and Targeted Oil and Gas (INTOG) Leasing Round

2.1.5.12 In August 2021, the Scottish Government confirmed it would be undertaking a spatial planning exercise for INTOG projects. This was followed by the Planning Specification and Context Report in August 2021 which identified a number of proposed areas of search in which oil and gas decarbonisation project will be considered. The Project is wholly located within proposed area of search 'Ea'. In February 2022, the Initial Plan Framework (IPF) was published, it sets out the planning framework and details the areas of seabed forming the spatial footprint for the CES leasing process.

2.1.5.13 Through the INTOG leasing process, the Applicant successfully secured an Exclusivity Agreement as a TOG project in November 2023.

2.1.5.14 It is acknowledged that the outcome of the planning process by the Marine Directorate will be a new Sectoral Marine Plan (SMP) for INTOG offshore wind, in which projects included within the final plan will be awarded Option Agreements. Projects which progress will still require to accord with applicable consenting legislation (Section 2.2). Adoption of the final INTOG SMP is anticipated for Q1 2024, but this is subject to change. The final INTOG SMP will be accounted for during the EIA if available at the time.

2.1.5.15 It is anticipated that the Project will provide onward connection to oil and gas assets located in the waters surrounding the Array Area within the Targeted Oil and Gas Onward Development Area (see **Figure 3-3**).

2.1.5.16 It is anticipated that static subsea alternating current (AC) power cables (Oil and Gas Export / Import Cables) will provide AC power, and communications, from the high voltage alternating current (HVAC) Offshore Substation and Converter Platform (OSCP) to oil and gas assets located within the Onward Development Area.

2.1.5.17 These will be considered as part of the EIA, albeit not part of the marine licence application. This assessment is included within the cumulative effects assessment. Marine licences for these cables will be applied for separately in the future.

2.2 Consenting Legislation

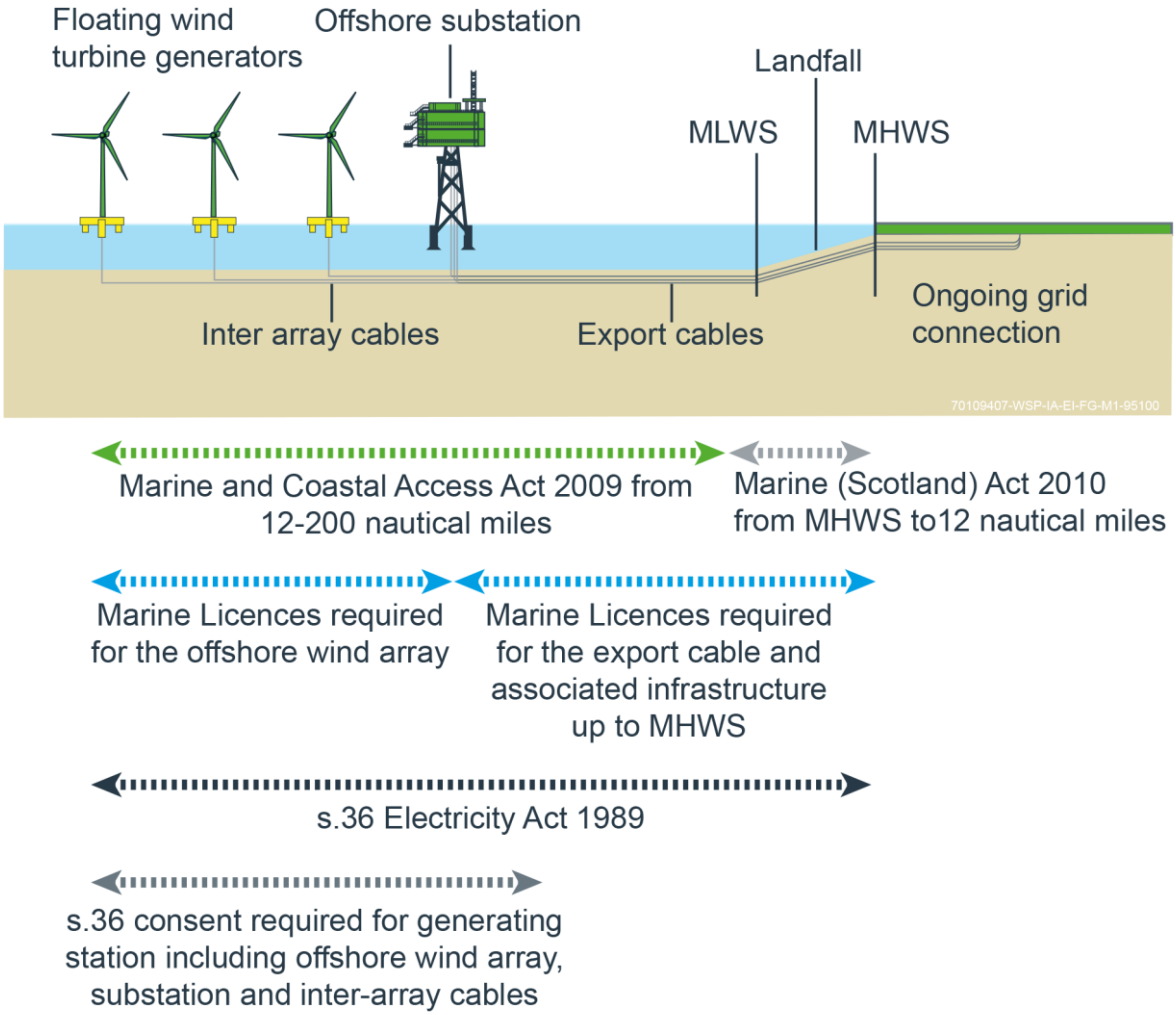
2.2.1.1 The following key consents will be required for the construction, O&M and decommissioning of the Project. **Plate 2-1** illustrates the applicable consenting regimes and jurisdictions across the marine-terrestrial interface of relevance to the Project.

- A s.36 Consent Under the Electricity Act 1989[30]; and
- A marine licence under the MCAA 2009[31] (Between 12 and 200 NM); and
- A marine licence under the Marine (Scotland) Act 2010[32] (Between 0 and 12 NM).

2.2.1.2 The consultation requirements of relevance to these legislative requirements are discussed in **Chapter 6: Consultation Process.**

2.2.1.3 It is of note that Town and Country Planning permission is applicable for onshore development only, and therefore not applicable to this offshore 2024 Scoping Report. A description of the Project is provided in **Chapter 3: Project Description**.

Plate 2-1: Offshore consenting regime



2.2.2 Section 36 Consent under the Electricity Act 1989

2.2.2.1 Scottish Ministers are responsible for determining applications under s.36 of the Electricity Act 1989[30] for offshore generating stations with an installed capacity exceeding one MW in Scottish territorial waters, and over 50 MW in the Scottish REZ. Such applications are processed on behalf of Scottish Ministers by MD-LOT. The Electricity Act 1989 imposes specific obligations on electricity companies in respect of the preservation of amenity and fisheries through Section 38 and Schedule 9. S.36A covers the public rights of navigation with s.36B sets out duties in relation to navigation.

2.2.2.2 S.36 consent is required for the generating station and ancillary infrastructure, including the offshore wind array and inter-array cables.

2.2.2.3 The application be supported by an EIAR, prepared in accordance with the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017[33], as

amended (see Section 2.4). S.36 consent will allow for the installation, O&M of the Project.

2.2.3 Marine and Coastal Access Act 2009 and the Marine (Scotland) Act 2010

2.2.3.1 The Marine and Coastal Access Act (MCAA) 2009[31] (the 2009 Act) provides a statutory framework for sustainable management of the UK seas, including around Scotland, beyond 12 NM. The requirement for a marine licence to undertake certain licensable activities was introduced under the 2009 Act.

2.2.3.2 The Marine (Scotland) Act 2010[32] (the 2010 Act) introduces a duty to protect and enhance the marine environment within Scottish territorial waters (from MHWS out to 12 NM), including measures to help boost economic investment and growth in areas such as marine renewables. Key measures included within the Act include marine planning, marine licensing, marine conservation, and enforcement.

2.2.3.3 The Project requires to undertake prescribed marine licensable activities within and outwith 12 NM, therefore requiring marine licenses under both the 2009 Act and the 2010 Act. Prescribed marine licensable activities include the deposition or installation of any necessary infrastructure such as mooring lines, anchors, cables, cable protection and any Unexploded Ordnance (UXO) removal that may be required to be carried out during the pre-construction phase.

2.2.3.4 Scottish Ministers, as the determining authority, may issue a note to the Applicant stating that both the marine license applications and s.36 application will be subject to the same administrative procedure. Where that is the case, the two related applications may be considered at the same time.

2.3 EIA Regulations

2.3.1.1 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 s.36 consent, a marine licence or planning permission, an EIAR 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.

2.3.1.2 Three sets of EIA Regulations are applicable to the Project. Where relevant, these are collectively referred to as the 'EIA Regulations' in this 2024 Scoping Report:

- The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017[33] as amended by The Environmental Impact Assessment (Miscellaneous Amendments) (Scotland)[34] (applies to all applications for s.36 consent in Scottish waters out to 200 NM);
- The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (as amended)[35] (applies to applications that require an EIA for a marine licence from 0-12 NM), as amended by The Marine Environment (EU Exit) (Scotland) (Amendment) Regulations 2019[48]; and
- The Marine Works (Environmental Impact Assessment) Regulations 2007 (as amended)[32] (applies to applications that require an EIA, for a marine licence from 12-200 NM).

2.3.1.3 The EIA Regulations set out procedures for assessing, consulting upon and informing decision-making for projects that are likely to have significant environmental effects. The EIA Regulations require the provision of an EIAR alongside the applications for the s.36 consent and marine licences (**Chapter 5: Approach to Scoping and EIA** for further details). In addition to the EIA Regulations, a range of environmental legislation at international and national level will apply to the EIA, as summarised in Section 2.2**,** and Section 2.3.

2.3.2 The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017

2.3.2.1 The requirement for an EIA for electricity generation projects requiring consent under s.36 of the Electricity Act 1989[30] is provided for in Scotland by the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017[33] (hereafter referred to as 'Electricity Works EIA Regulations 2017'). These regulations set out the statutory process and minimum requirements for EIA.

2.3.2.2 The Electricity Works EIA Regulations 2017 identify that certain developments will be, or may be, subject to EIA. An offshore windfarm falls under Schedule 2 of the Electricity Works EIA Regulation 2017 as 'a generating station'. Where a Schedule 2 project is likely to have significant effects on the environment by virtue of factors such as its nature, size or location, an EIA is required. Due to the location and scale of the Project, the Applicant accepts that it could have significant effects on the environment and therefore an EIAR will be prepared under the Electricity Works EIA Regulations 2017.

2.3.2.3 The Electricity Works EIA Regulations 2017 also make provision for a written request to be submitted to the Scottish Ministers (in this case through MD-LOT) for an opinion as to the scope of the information to be provided within the EIAR (a Scoping Opinion).

2.3.3 The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017 and the Marine Works (Environmental Impact Assessment) Regulations 2007

2.3.3.1 The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017[36] (hereafter referred to as the 'Marine Works EIA Regulations 2017') are relevant to the marine licences to be applied for in respect of the offshore works, including the cable connection, on or under the seabed within the 12 NM limit of Scottish territorial waters.

2.3.3.2 The Marine Works (Environmental Impact Assessment) Regulations 2007 (hereafter referred to as the 'Marine Works EIA Regulations 2007') are relevant for the marine licences to be applied for the offshore works on or under the seabed in Scottish offshore waters beyond 12 NM.

2.3.3.3 The Marine Works EIA Regulations 2017 identify that an EIA is required for certain developments likely to have significant effects on the environment by virtue of factors such as its nature, size or location. The Project will need two marine licences as discussed in Section 2.3. Due to the location and scale of the Project, the Applicant accepts that it could have significant effects on the environment and therefore an EIAR will be prepared under the Marine Works EIA Regulations 2017.

2.3.3.4 An offshore windfarm falls under Schedule 2 of the Electricity Works EIA Regulations[33] 2017 regulations as "a generating station" and under Schedule 2 as offshore element of the Marine Works EIA Regulations 2017. Where a Schedule 2 project is likely to have significant effects on the environment by virtue of factors such as its nature, size or location, an EIA is required. Due to the location, size and nature of the Project, the applicant accepts that it could have significant effects on the environment and therefore an EIA will be prepared under the Electricity Works EIA Regulations 2017 and Marine Works EIA Regulations 2017.

2.3.3.5 Similar to the Electricity Works EIA Regulations 2017, the Marine Works EIA Regulations 2017 and the Marine Works EIA Regulations 2007 make provision for a written request to be submitted to the Scottish Ministers (through MD-LOT) for an opinion as to the scope of the information to be provided within the EIAR (a Scoping Opinion).

2.4 Other Legislative Consenting Requirements

2.4.1 Habitats Regulations Appraisal (HRA)

2.4.1.1 The Habitats Regulations Appraisal (HRA) considers the potential for likely significant effects (LSE) to arise as a result of a plan or project, which may affect the integrity of the national site network (NSN) and their associated qualifying features.

2.4.1.2 The Habitats Directive (Directive 92/43/EEC[37]) and the Wild Birds Directive (Directive 2009/147/EC[38]) were transposed into Scottish Law by the following regulations:

- The Conservation (Natural Habitats &c) Regulations 1994[39] ('Habitats Regulations') (up to 12 NM);
- The Conservation of Offshore Marine Habitats and Species Regulations 2017[40] ('Offshore Marine Regulations') (beyond 12 NM);
- The Conservation of Habitats and Species Regulations 2017[41] (of relevance to consents under S. 36 of the Electricity Act 1989); and
- The Wildlife and Countryside Act 1981[42].

2.4.1.3 The Habitats Regulations set out the stages of the HRA process required to assess the potential impacts of a proposed project on European Sites (Special Areas of Conservation (SAC), Special Protection Areas (SPA), candidate SACs and SPAs and Ramsar Sites). If the Project is not directly connected with or necessary for site management for nature conservation of the European Site and, either alone or in-combination with other projects or plans, is likely to have a significant effect on the qualifying interests of a European Site, the relevant decision-making authority (or competent authority) must carry out an Appropriate Assessment (AA).

2.4.1.4 In accordance with the HRA Regulations, an HRA is being undertaken for the Project. The HRA documentation will be co-ordinated with the EIA but reported separately to support compliance with all relevant statutory requirements guidance and best practice. Marine Directorate, as the competent authority, must determine whether the Project will adversely affect the integrity of any relevant marine or terrestrial European Site. A HRA Screening Report has been submitted alongside this 2024 EIA Scoping Report.

2.4.2 Marine Protected Areas (MPA)

2.4.2.1 There are currently over 200 Nature Conservation Marine Protected Areas (NCMPAs) in Scottish waters, covering approximately 108,000km^2. Whilst many of these MPAs are aligned with existing SACs, SPAs, Ramsar sites or Sites of Special Scientific Interest (SSSI), a number have been designated directly under Marine Protect Areas (MPA) legislation, through the 2010 Act[32], and the 2009 Act[31], for Scottish territorial, and offshore waters, respectively.

2.4.2.2 The EIA will assess the potential for impacts on MPAs, informed by engagement with Marine Directorate, as the competent authority and any other relevant information deemed appropriate.

2.4.2.3 A MPA Screening Assessment is being undertaken for the Project and has been submitted with this 2024 EIA Scoping Report (see **Appendix 5E**).

2.4.3 Water Framework Directive (WFD)

2.4.3.1 The Water Framework Directive (WFD) (Directive 2000/60/EC[43]) aims to '*prevent deterioration and enhance the status of aquatic ecosystems, including groundwater, promote sustainable water use, reduce pollution and contribute to the mitigation of floods and droughts*.' These aims are to make sure that the water environment will be improved and protected on a catchment scale. The WFD was transposed into Scottish legislation by the Water Environment and Water Services (Scotland) Act 2003[44] and the Water Environment (Controlled Activities) (Scotland) Regulations 2011[45], with Scottish Environment Protection Agency (SEPA) being the competent authority, having the responsibility to consider whether proposals for developments have the potential to:

- Cause a deterioration of a WFD water body from its current status or potential; and/or
- Prevent future attainment of good status or potential where not already achieved.

2.4.3.2 The WFD seeks to ensure Good Environmental Status (GES) within designated water bodies, covering coastal waters up to 3 NM. Within the EIAR, the Project will be screened under WFD to identify WFD designated water bodies that have potential to be at risk from the installation, operation or decommission of the Project in relation to their GES status. The WFD screening will be used by the competent authorities in determining whether a full WFD assessment is required.

2.4.4 Marine Strategy Framework Directive (MSFD)

2.4.4.1 The Marine Strategy Framework Directive 2008/56/EC[46] (MSFD) of the European Parliament and the Council was published on 17 June 2008. The MSFD establishes a framework for community action in the field of marine environmental policy (the MEP) adopted in 2008, with the overall aim of protecting the marine environment across Europe. The MSFD is transposed for the whole of the UK by the Marine Strategy Regulations 2010. The UK has made amendment to the Marine Strategy Regulations 2010[47], under the Marine Environment (Amendment) (EU Exit) Regulations 2018[48], which transpose the requirement into domestic law, so that MSFD can continue to be effective now the UK is no longer part of the EU.

2.4.4.2 Marine Directorate, as the competent authority, will carry out the assessment to determine whether the Project has the potential to influence GES of the UK's marine water and therefore the UK Government's ability to uphold its responsibilities under the MSFD. The MSFD Screening assessment will be provided with the EIAR.

2.4.5 Decommissioning of Offshore Renewable Energy Installations

2.4.5.1 Sections 105 to 114 of the Energy Act 2004[49] 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 2004, Scottish Ministers may require a person who is responsible for these installations or lines in Scottish Waters or in a Scottish part of an REZ to prepare (and carry out) a costed decommissioning programme for submission to and approval by Scottish Ministers[50].

2.4.5.2 Responsibilities and powers associated with decommissioning for OREI within Scottish Waters transferred from the Secretary of State to Scottish Ministers in 2017. Before this the Department for Business, Energy & Industrial Strategy (BEIS) was responsible for requiring decommissioning programmes[51]. Marine Directorate are seeking to establish robust policies and procedures covering decommissioning. The Guidance Note for Decommissioning of Offshore Renewable Energy Installation in Scottish Waters[52] or in the Scottish Part of the Renewable Energy Zone, under the Energy Act 2004[50], was finalised in August 2022.

2.4.5.3 Scottish Ministers have the power to determine specific approaches to decommissioning, including stipulating the form, timing and size of financial securities are required. The expected content of a decommissioning programme includes decommissioning standards, financial security, residual liability and industrial cooperation and collaboration.

2.4.5.4 Section 5 of the draft Guidance Note states 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.*"[50]

2.4.5.5 The decommissioning requirements in Scotland relate to the area between the MHWS mark and the seaward limits of the territorial waters, including coastal water and the Scottish part of the REZ. The Energy Act 2004[49] does not cover the intertidal waters.

2.5 Other Consents and Licences

2.5.1.1 **Table 2-2** presents an outline of other consents and licences that may be required for the Project.

Table 2-2: Other consents and licences that may be required

Licence/permit/consent	Regulatory body	Consent requirements
Marine licence or Exemptions	MD-LOT	For carrying out site investigations, buoy deployment, surveys and UXO inspection.
European Protected Species (EPS) licence applications (under the Conservation (Natural Habitats, &c.) Regulations 1994[39], Conservation of Habitats and Species Regulations 2017[41] and the Offshore Marine Regulations 2017[53])	NatureScot / MD-LOT	For carrying out activities that could result in the disturbance of EPS, such as site investigation, buoy deployment, surveys and UXO inspection, or disturbance identified as part of the EIA.
Protected Species licences (under the Wildlife and Countryside Act 1981[42] (as amended) (for example for basking shark, grey seal) and Wildlife and Natural Environment (Scotland) Act 2011)[54]	NatureScot / MD-LOT	For carrying out site investigations, buoy deployment, surveys and UXO inspection, or disturbance identified as part of the EIA.
Safety Zone applications (under the Energy Act 2004[49])	MD-LOT	To be established for any phase of an offshore renewable energy project but are normally applied for the construction or aspects of operations and maintenance phases.
Decommissioning Programmes (Sections 105 to 114 under the Energy Act 2004[49])	MD-LOT	Decommissioning Programme will be required prior to construction.
Controlled activities licence (under the Water Environment (Controlled Activities) (Scotland) Regulations 2011[45]	SEPA	Licences for coastal water environments for pollution prevention and / or waste.

3. PROJECT DESCRIPTION

3.1 Introduction

3.1.1.1 This chapter provides an outline description of the Project and summarises the key design components. It also describes the key activities that will be undertaken during construction, O&M, and decommissioning, in addition to key parameters and indicative timescales.

3.2 Project Overview

3.2.1.1 The Project is a floating offshore windfarm which shall supply electricity to the UK Grid and pioneer large-scale floating wind in the UK. Additionally, the Project shall facilitate decarbonisation of the UK Oil & Gas industry by provision of electrical power to offshore oil and gas installations, delivering emissions reductions on the UK continental shelf. It is part of the INTOG leasing process currently being undertaken by CES.

3.2.1.2 The connection to shore will provide electricity to the oil and gas assets if power is not available from the windfarm, this will provide certainty to the Oil & Gas operators to fully undertake the major modifications required to achieve electrification and achieve tangible, substantive, emissions reductions. The majority of the power from the Project will be exported to the UK grid to support overall UK decarbonisation targets. The windfarm lifetime is expected to significantly exceed that of the Oil & Gas assets and will continue to produce renewable electricity after those assets are decommissioned. The operational lifetime of the Project is assumed to be a minimum of 30 years.

3.2.1.3 The benefit of undertaking the Project in this way is to enable the electrification of Oil & Gas assets which otherwise may not be electrified for economic reasons while at the same time providing renewable energy to the grid via an offshore windfarm.

3.3 Site Overview

3.3.1.1 As shown in **Figure 1-1** the Project is located in the Central North Sea. The Array Area is located 185 km offshore east of Aberdeen. **Figure 3-1** shows the Project Area in the context of the INTOG Project Area and other offshore windfarms. **Figure 3-2** shows broadly uniform water depths of approximately 90-100 m across the area; this exceeds the depth possible for fixed wind solutions but is suitable for floating wind.

3.3.1.2 The Floating Turbine Units (FTUs) will each have a WTG and a floating substructure and will be anchored to the seabed to maintain station-keeping within the Array Area.

3.3.1.3 Dynamic subsea AC power cables will provide electricity from the WTGs to the OSCP located within the Array Area. These cables are referred to as the Inter-Array Cables.

3.3.1.4 The HVDC transmission assets include the onshore converter platform (OCP) and the OSCP. The OCP and OSCP are connected by the HVDC export/import cables. In the marine environment the export/import cables will be installed within the ECC. The proposed ECC route length extends approximately 230 km from the north western boundary of the Array Area and proceeds north westerly/westerly to landfall

at Long Haven between the villages of Boddam and Longhaven on the Aberdeenshire Coast. From landfall at MHWS the transmission connection continues to an HVDC OCP located at the Four Fields site, and subsequent grid connection at the transmission system operator (TSO) substation in Peterhead (hereafter referred to as “ongoing grid connection”).

3.3.1.5 Static subsea HVAC power cables will provide electricity from the OSCP to oil and gas assets located within the Onward Development Area.

Figure 3-1: INTOG Lease site selection

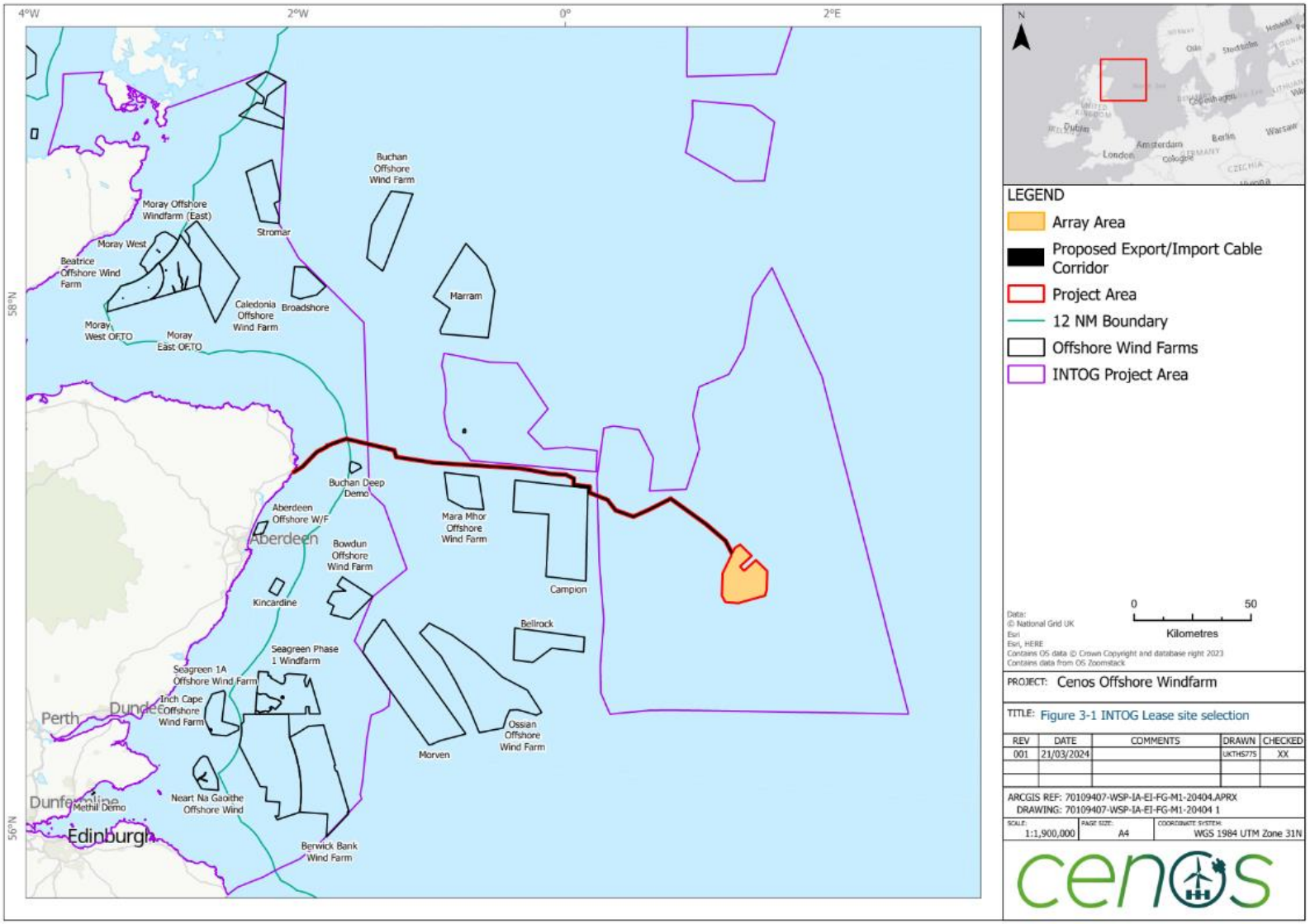
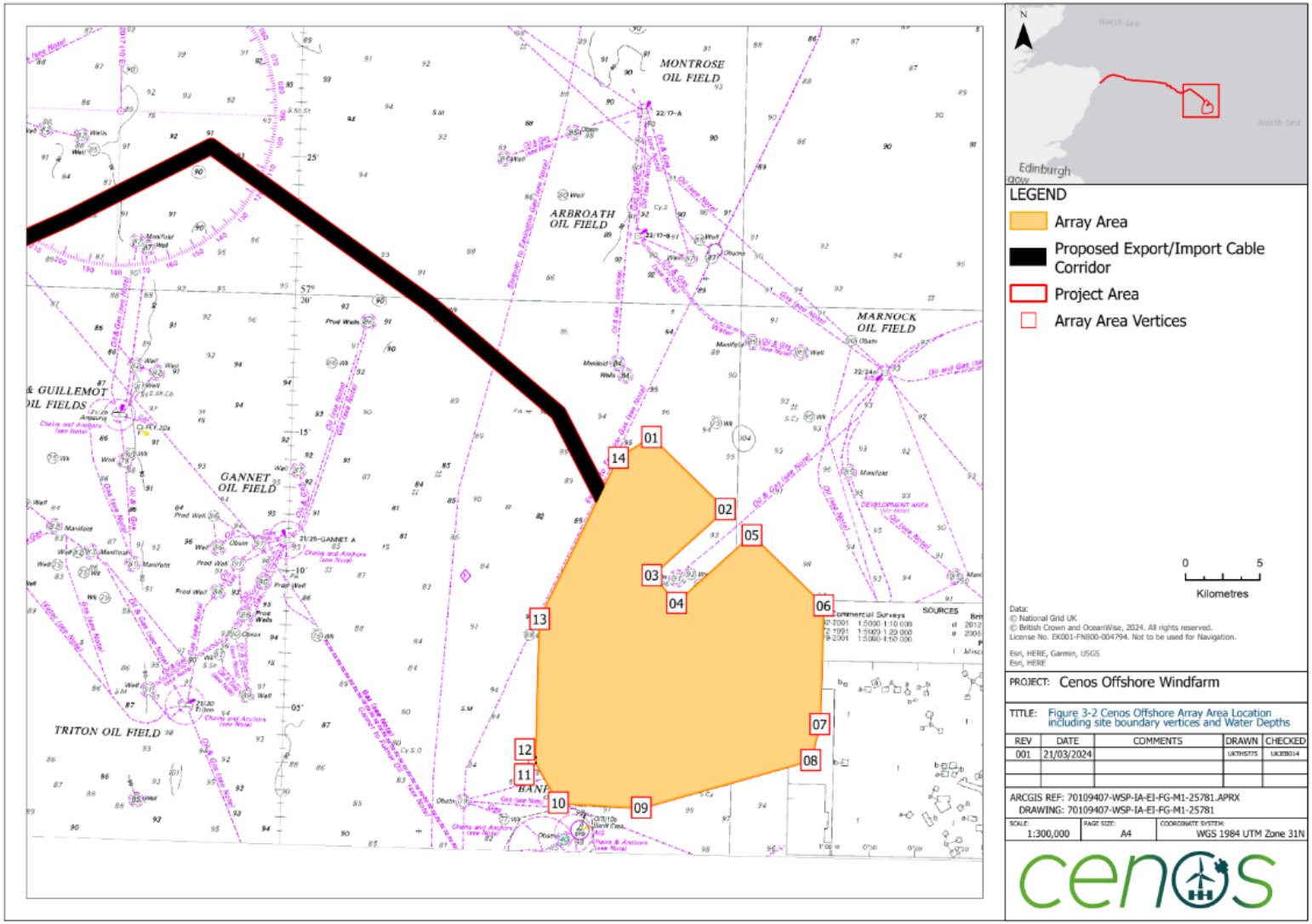


Figure 3-2: Cenos Offshore Array Area Location including site boundary vertices and Water Depths



3.4 Project Design Envelope Approach

3.4.1.1 The Project Design Envelope (PDE) approach, also known as the Rochdale Envelope approach, will be adopted for the assessment of the Project, in accordance with current good practice and with the latest Marine Directorate published guidance[55] and other guidance where appropriate. The PDE concept allows some flexibility in project design options, particularly for foundations and WTG type, where the full details are not known at the consenting stage.

3.4.1.2 The PDE will provide maximum and minimum parameters where appropriate to ensure that the realistic maximum design scenario (MDS) can be quantified and assessed in the EIAR and Report to Inform Appropriate Assessment (RIAA).

3.4.1.3 The MDS assessed for each topic, will be based on the design envelope detailed within this chapter. The relevant MDS will be identified and explained within the chapters in the EIAR.

3.4.1.4 The Project description, including the design envelope, is detailed in this section to provide an overview of proposed infrastructure. The design envelope presented in this report may be refined or amended further through engineering design development and consultation with relevant stakeholders. Any changes will be reported within the EIAR and RIAA.

3.5 Project description

3.5.1 Overview

3.5.1.1 The Array Area encompasses approximately 333 km^2, within which the generation assets are located along with certain elements of the transmission assets (e.g. OSCP).

3.5.1.2 The generation assets include: the FTUs (inclusive of substructure, WTGs, moorings systems), and dynamic and static portions of the inter-array cables.

3.5.1.3 The transmission assets include: the OSCP and the offshore export/import cables. The OSCP will provide the connection point for the inter-array cables, bringing the power from the WTGs to the OSCP; the connection points for the transmission cables connecting the oil and gas assets to the OSCP; the connection point for the HVDC export/import cables; power transformers, HVDC converter and associated equipment including metering and control systems. The OSCP HVDC converter, converts HVAC to HVDC power and vice versa to allow export and import of power from shore.

3.5.1.4 There are two options being considered for OSCP design and configuration. Option number one shall be considered as the base case. The base case is to install a fully integrated HVDC OCSP that includes provision for all HVDC and HVAC equipment needed to connect the HVDC converters to the UK grid and HVAC equipment needed to connect both the WTGs and oil and gas assets to the OSCP. Option number two will be composed of a single fully integrated HVDC platform and one smaller HVAC platform which is adjacent, and bridge linked to the main platform, separating HVAC equipment onto one platform and the HVDC converter equipment onto another.

3.5.1.5 The ECC is approximately 230 km in length, it runs from the HVDC converter that will be located on the OSCP, located within the Array Area, to MHWS at the landfall location.

3.5.1.6 For the purposes of electrification, it is anticipated there will be several onward connections to oil and gas assets located in the waters to the north, west and southeast of the Array Area. These assets will be located within the Targeted Oil and Gas Onward Development Area (see **Figure 3-3**). These onward connections will be considered as part of the environmental assessment within the cumulative effects assessment (CEA) but will not form part of the Project consent application. Marine licences for these cables will be applied for separately in the future.

3.5.1.7 In the instance where the windfarm cannot provide enough power to oil and gas production assets, the oil and gas assets will draw electricity from the UK grid via an onshore converter substation, the HVDC export/import cable, OSCP, and HVAC distribution system (which as per the base case shall both be housed on the OSCP).

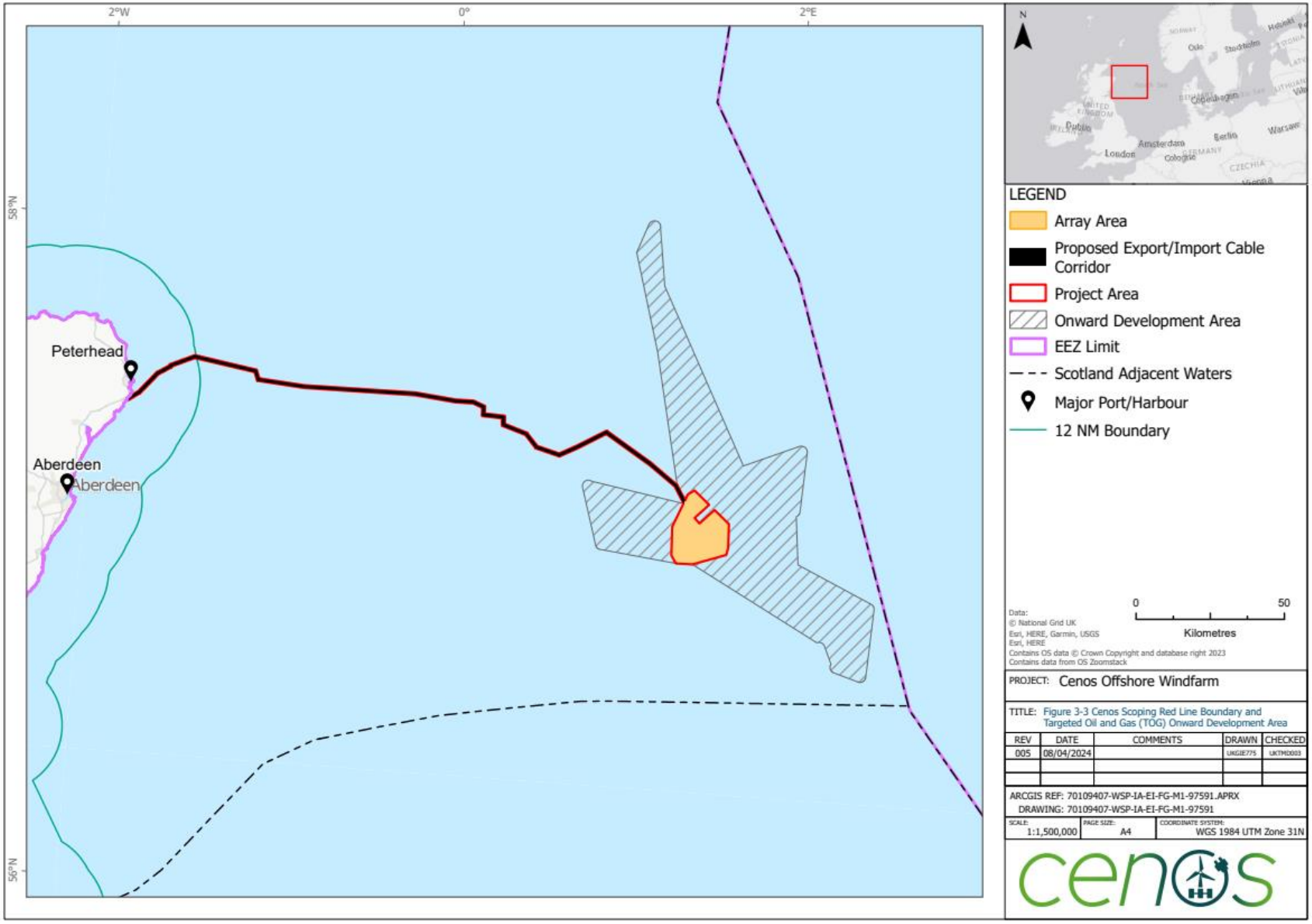
3.5.2 Array Area

3.5.2.1 The WTGs will be installed on floating substructures which are held in station by a mooring system (comprising mooring lines, anchors, connectors, and jewellery). There are several substructures and mooring system design options available that are currently under consideration. These are included within the design envelope and further details are provided in this section.

3.5.2.2 HVAC electricity generated by the WTGs, the power from each FTU will be exported via the inter-array cables to the OSCP which will be located on a bottom-fixed jacket platform.

3.5.2.3 Each component of the Array Area is described in more detail below.

Figure 3-3: Cenos Scoping Red Line Boundary and Targeted Oil and Gas (TOG) Onward Development Area



Wind Turbine Generators (WTGs)

3.5.2.4 The WTG supplier has not been selected yet and specific WTG details cannot be provided at the time of writing. Furthermore, is it is assumed that WTG capacity will continue to increase over time, and WTGs larger than 15 MW are likely to be available by the time construction starts. Higher capacity WTGs are preferred as this reduces the number of WTGs required to meet the overall windfarm capacity.

3.5.2.5 **Table 3-1** provides the design envelope for the WTGs. The design envelope considers the maximum potential dimensions of a higher capacity WTG while also considering the maximum quantity of lower capacity (15 MW) WTGs required to achieve the maximum windfarm capacity.

Table 3-1: WTG design envelope

Design parameter	Design envelope
WTG Type	3-blade Horizontal Axis Wind Turbine (HAWT)
Minimum and maximum number of WTG	68 to 95
Minimum and maximum WTG hub height (to centre line of hub) (meters above lowest astronomical tide (LAT))	140 m to 180 m (above LAT)
Maximum WTG rotor diameter	Up to 280 m
Maximum blade tip height above LAT for Tension Leg Platform	Up to 320 m (above LAT)
Maximum blade tip height above LAT for Semi-Sub	Up to 310 m (above LAT)
Minimum Blade clearance – Lowest blade tip height above mean sea level (MSL)	22 m in operational conditions.
Maximum rotor swept area (based on 95 15 MW turbines with a maximum rotor diameter of 236 m)	4,369,626 m^2
Navigation and aviation lighting	As per regulatory authority requirements: **Navigation:** (marine lighting) – see **Table 3-2.** **Aviation:** Civil Aviation Authority (CAA) and Search and Rescue (SAR) requirements MGN645 Annex 5[56]: Perimeter WTGs should have a single red aviation hazard light on each nacelle, flashing Morse "W" in unison if the WTGs are more than 900 m apart. Other WTGs require a steady red aviation hazard light. Additionally, in winching areas, a low-intensity green status light indicates safe winching, and floodlighting is needed for night operations (if allowed). Consultation with the Ministry of Defence is required to understand military aviation requirements.

3.5.2.6 The final layout of the windfarm shall be determined post consent and will be influenced by environmental, technical, maritime, commercial and safety factors. Design considerations include:

- Seabed characteristics;
- Metocean characteristics;
- Avoiding existing oil and gas infrastructure left on the seabed following decommissioning;
- Avoiding existing subsea cabling;
- Geotechnical conditions and measured/modelled metocean conditions;
- Foundation type, and installation options;
- Constraints on the Array Area that will influence the overall layout as a result of surveys and consultations;
- Guidelines or requirements stemming from MGN 654; and
- Consideration of relevant stakeholders.

WTG Floating Substructures

3.5.2.7 A floating substructure will support each of the WTGs. A single WTG shall be mounted on each substructure. Floating substructures are a developing technology, and the Applicant is considering several designs which could be suitable (see **Plate 3-1**). The main types of floating substructure under consideration are semi-submersible and Tension Leg Platform (TLP) designs, and the primary material to be used for the floating substructure will be steel (as opposed to concrete which is not under consideration for the project).

3.5.2.8 Semi-submersible floating substructure designs are buoyancy stabilised with the stability provided by the semi-submerged buoyant columns (typically 3 or 4 columns) positioned around the periphery of the substructure and connected with trusses. The primary function of the mooring system for buoyancy stabilised designs is to maintain station-keeping of the FTU. There are several mooring system types under consideration for the semi-submersible floating substructure.

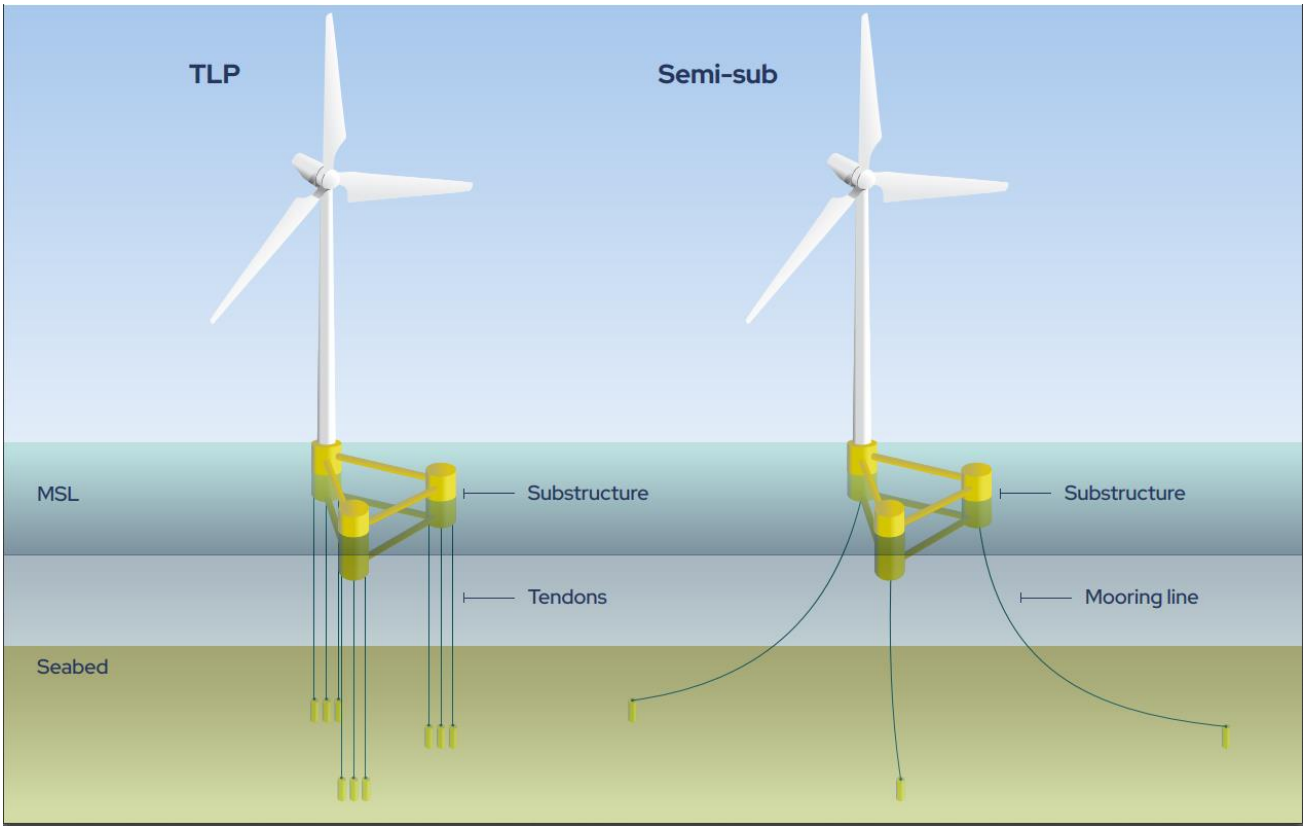
3.5.2.9 TLP designs are mooring stabilised, meaning that the stability of the FTU is provided by the tension in the mooring system. The floating substructure for a TLP is over-buoyant by design and would topple over without the stability provided by the tension in the mooring system. The mooring lines used in a TLP design are typically referred to as tendons. The substructure for a TLP design may also consist of buoyant columns and trusses but may instead consist of trusses arranged in a tetrahedral or star shape, depending on the specific design.

3.5.2.10 **Table 3-2** provides the design envelope for floating substructures.

Table 3-2: WTG floating substructures

Design parameter	Design envelope
Sub structure type	Buoyancy stabilised type (for example, Semi-submersible); Mooring stabilised type (for example, TLP)
Elevation above waterline	Will depend on the design and overall height of the FTU selected
Geometry	Triangular, rectangular, or cylindrical
Primary material	Steel
Overall Length of platform (m)	Up to approximately 115 m
Overall Breadth of platform (m)	Up to approximately 100 m
Overall height (draft & freeboard) of platform (m)	Up to approximately 40 m
Maximum number of Mooring lines	Up to 9 mooring lines per platform
Colour	RAL1023 Traffic Yellow
Navigational lighting	All navigational aids will be installed in accordance with R0139 (O-139) guidelines.

Plate 3-1: Substructure types



Mooring Systems

3.5.2.11 Floating substructures are attached to the seabed via mooring systems. A mooring system includes mooring lines (steel chain, steel tubes, steel rope, or polymer rope or a combination of different types), anchors, associated connectors (to the substructure, to the anchors, or between distinct sections of mooring lines) and other items connected along the length of the mooring line (such as clump weights, buoyancy elements and load reduction devices (jewellery)). Example mooring system arrangements are shown in **Plate 3-3** and **Plate 3-4** for a semi-submersible floating substructure and shown in **Plate 3-5** for a TLP.

3.5.2.12 When selecting a substructure design, compatible mooring system designs will be a key consideration. The mooring system must be suitable to withstand the substructure design loads whilst ideally reducing the number and extent of mooring lines and anchor attachment points on the seabed.

Mooring Lines

3.5.2.13 The mooring line designs under consideration include:

- **Catenary**, a free hanging line, which forms a catenary curve, one end of the mooring line is connected to the FTU, and the other end is fixed at an anchor point on the seabed. This system can adapt to harsh marine environments. **Plate 3-2**, **Plate 3-3**, **Plate 3-6** shows its application on a semi-submersible substructure.
- **Taut moorings**, typically made of synthetic fibre rope which have a smaller mooring radius than catenary lines. The taut mooring line reaches the anchor at an angle to the seabed and therefore there is a vertical force component requiring an anchor with high vertical loading capacity. **Plate 3-2**, **Plate 3-4,** and **Plate 3-6** shows its application on a semi-submersible substructure.
- **Semi-taut moorings**, a hybrid of catenary and taut mooring lines that typically consists of a combination of steel chain, steel wire rope and/or synthetic rope sections, and typically has a mooring footprint smaller than catenary but greater than taut.
- **Tension moorings**, (for TLP substructures only) tendons typically made of steel tube or synthetic material run vertically (or near-vertically) from the substructure to the anchors directly below, but other options are being developed, as shown in **Plate 3-5**. The tension mooring system has a much smaller mooring radius than the other three mooring arrangements, as demonstrated in **Plate 3-2**, **Plate 3-6,** and **Plate 3-7**.

3.5.2.14 All four mooring system types will be considered during the design process. These have been included in the design envelope to ensure all potential options and alternatives are considered, when identifying the MDS.

Plate 3-2: Primary mooring system design concepts

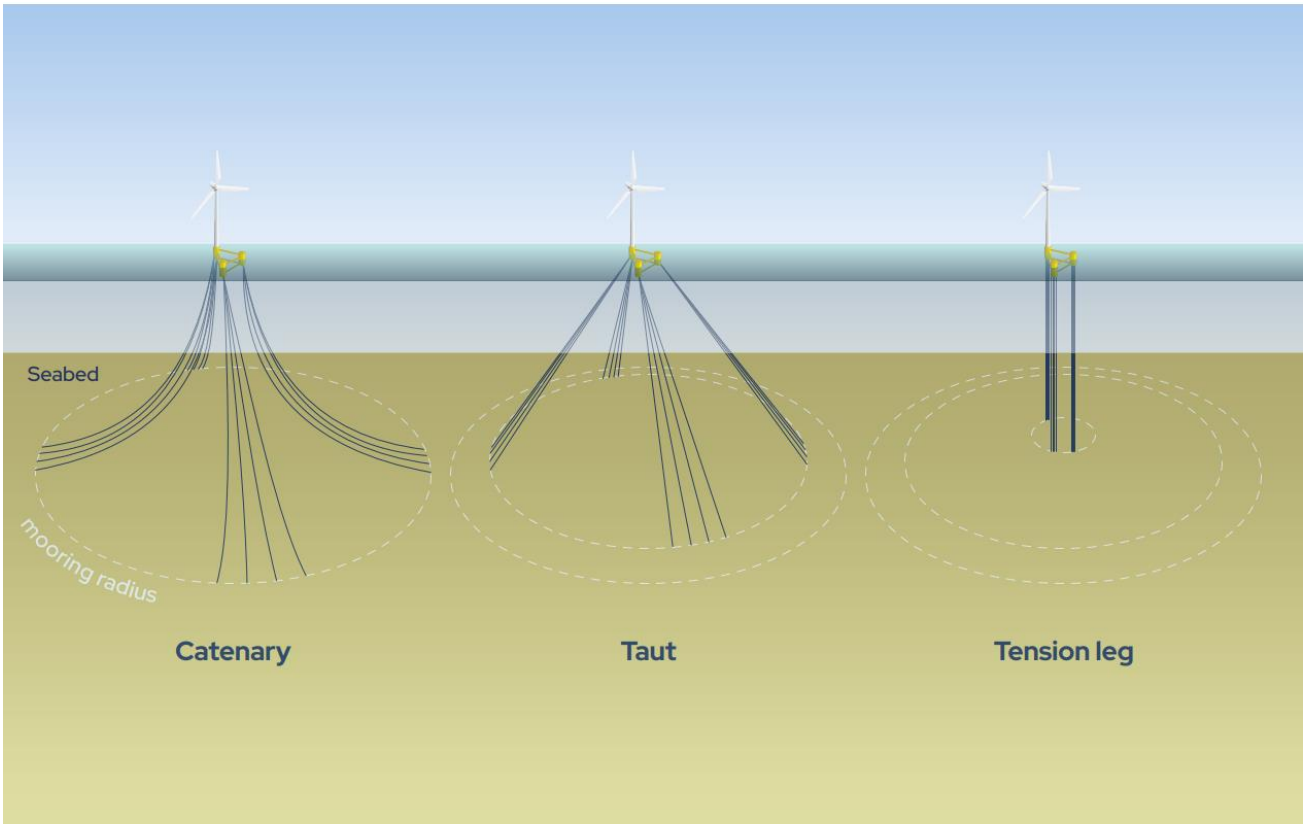


Plate 3-3: Semi-submersible with one of its catenary moorings

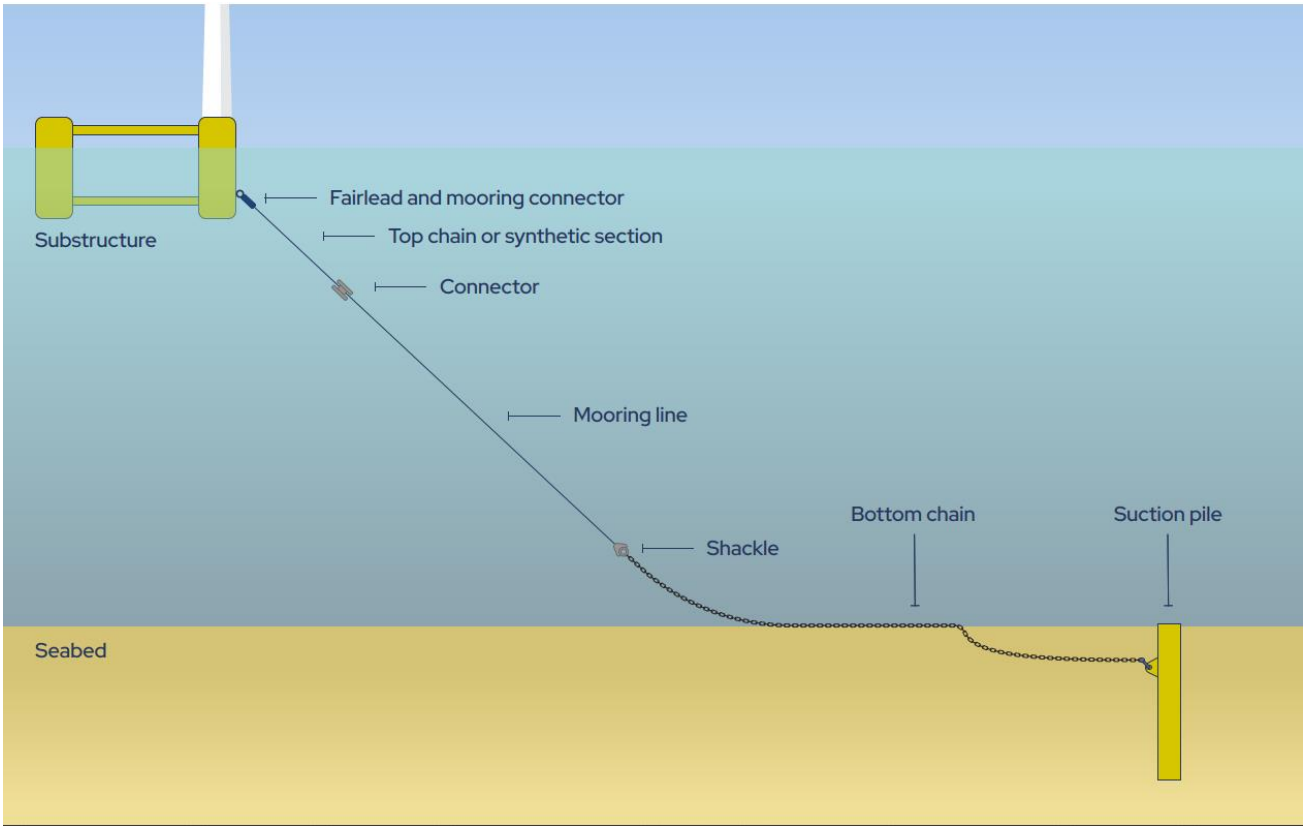


Plate 3-4: Semi-submersible with a taut mooring system

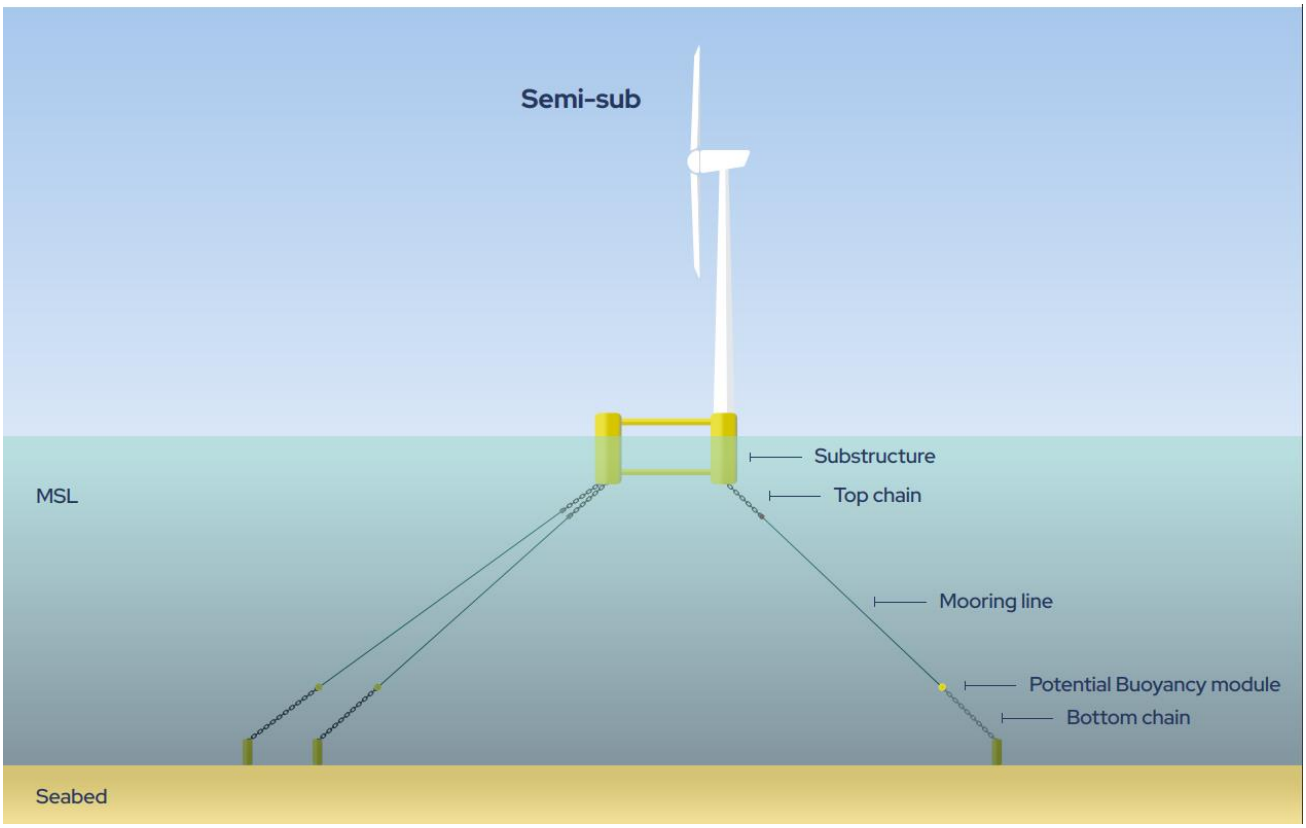


Plate 3-5: Tension mooring on a Tension-Leg Platform

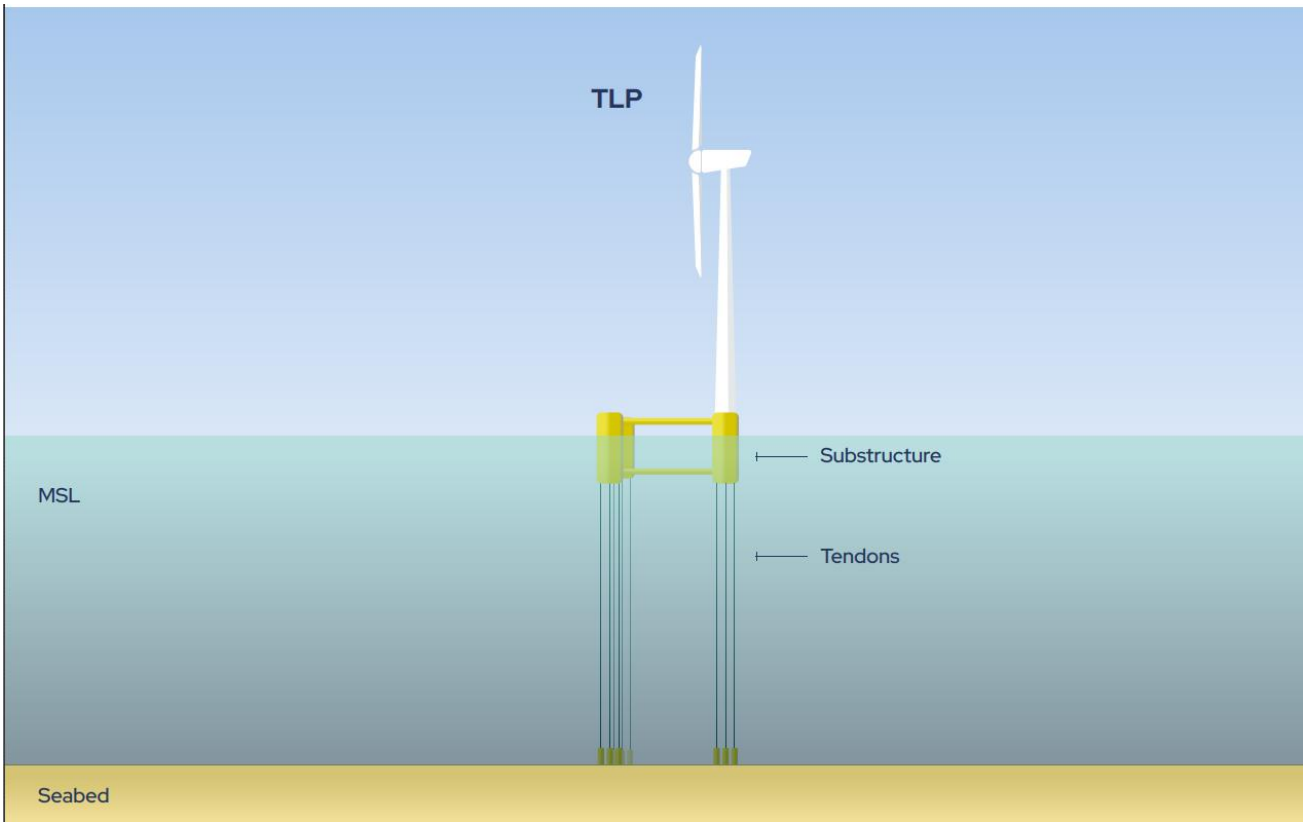


Plate 3-6: Semi-sub mooring spread

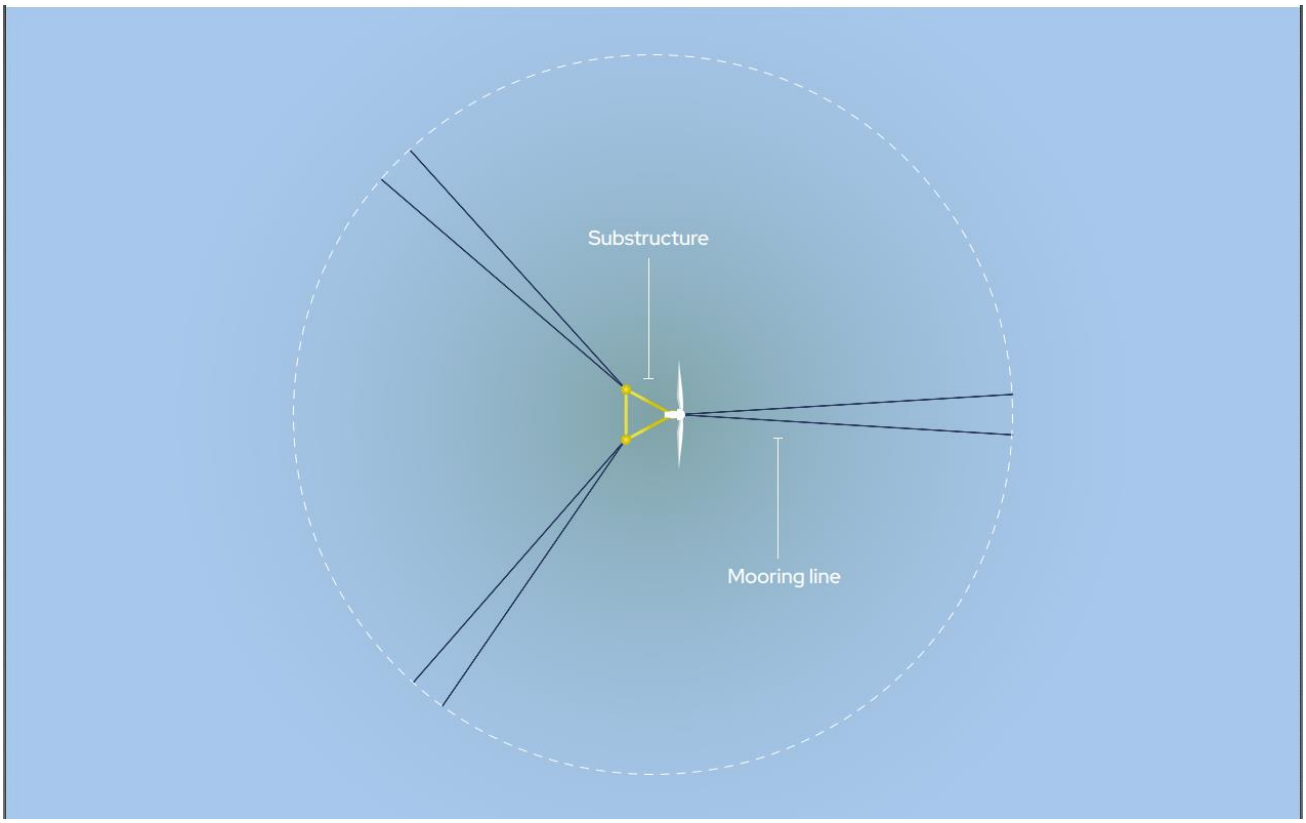
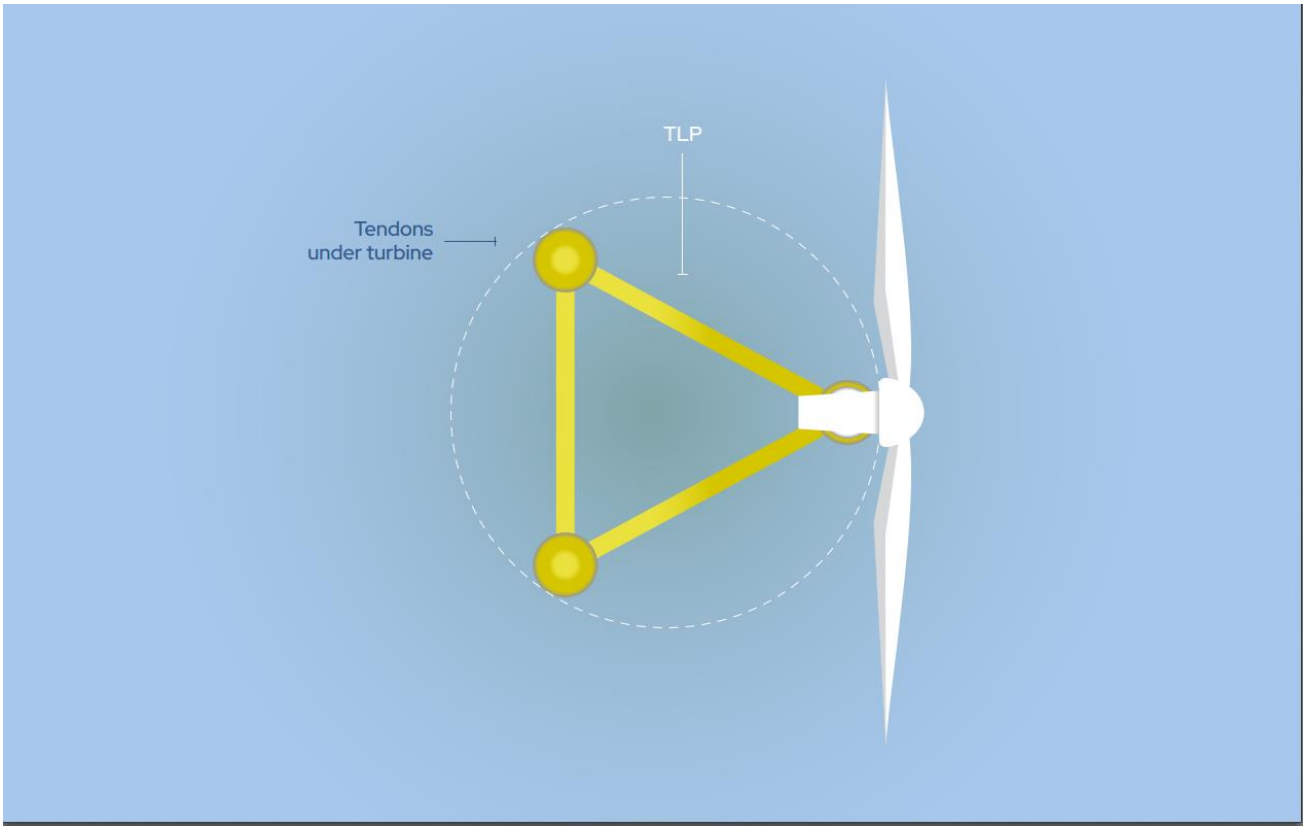


Plate 3-7: Tension-Leg Platform mooring spread



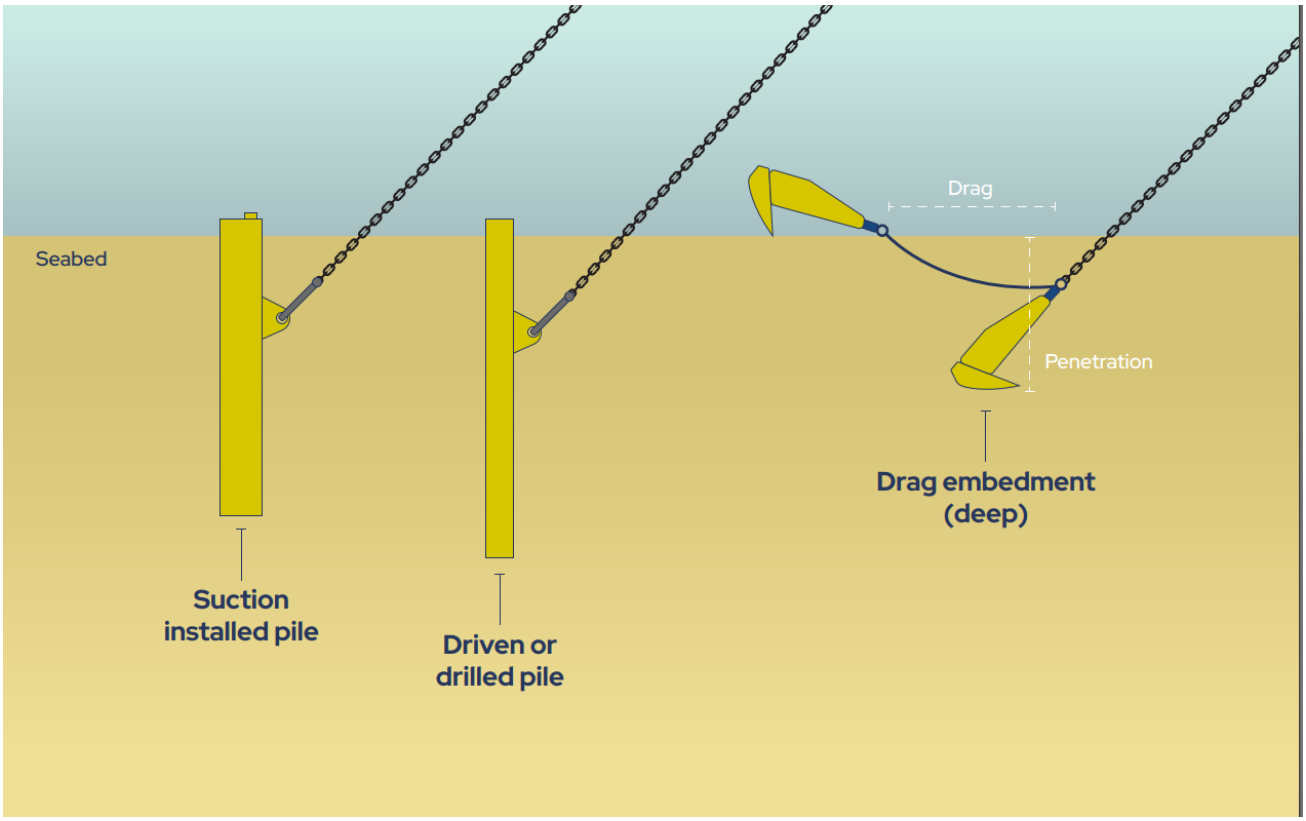
Anchor types

3.5.2.15 The anchor types being considered for the Project include:

- **Driven or drilled piles** are tubular piles which are small in diameter relative to their length. They achieve their holding capacity from the frictional force created during embedment. They are designed to withstand horizontal, vertical or multi-directional load, and are therefore suitable to use with a range of mooring line options. They can be used in a wide range of seabed conditions, including where there is hard ground that is less suitable for other anchor types. To install, they are lowered to the seabed and partially sink into the seabed under their own weight. They are then driven (or drilled) to their final embedment depth using an impact or vibro-hammer. Removal of driven or drilled piles is difficult, and therefore they may be left in field (see **Plate 3-8**).
- **Suction piles**, are tubular piles with a top cap and controllable valve which are larger in diameter and shorter in length compared to driven or drilled piles. They achieve their holding capacity from the frictional force created during embedment. They are designed to withstand horizontal, vertical or multi-directional load, and are therefore suitable to use with a range of mooring line options. They require seabed conditions that are firm enough to hold suction but not so firm that penetration is impeded. To install, they are lowered to the seabed, open end first, and partially sink into the seabed under their own weight (with the valve open) to around 60% of their length. Final embedment is achieved by suction, the water trapped in the top of the pile is pumped out, lowering the rest of the pile into the seabed. To remove suction anchors during decommissioning, the installation processes is reversed. (see **Plate 3-8**).
- **Drag embedment anchors** are made from fabricated steel and are installed by dragging the anchor through the seabed until the anchor is fully embedded to a desired depth. The holding capacity is achieved through the resistance of the sediments in front of the anchor. To install, the mooring line is pre-installed to the anchor and as the installation vessel drags the mooring line and anchor across the seabed, the anchor embeds further into seabed until the desired burial depth is achieved. They are designed to withstand horizontal loading only and are therefore only suitable to use on a limited range of mooring line types, mainly catenary and, in some cases, semi-taut. They are not suitable for vertical or multi-directional loading and are therefore not suitable for taut moorings or tendons (see **Plate 3-8**).

3.5.2.16 Although more novel anchors cannot be wholly ruled out at this stage due to emerging technology development.

Plate 3-8: Anchor concepts

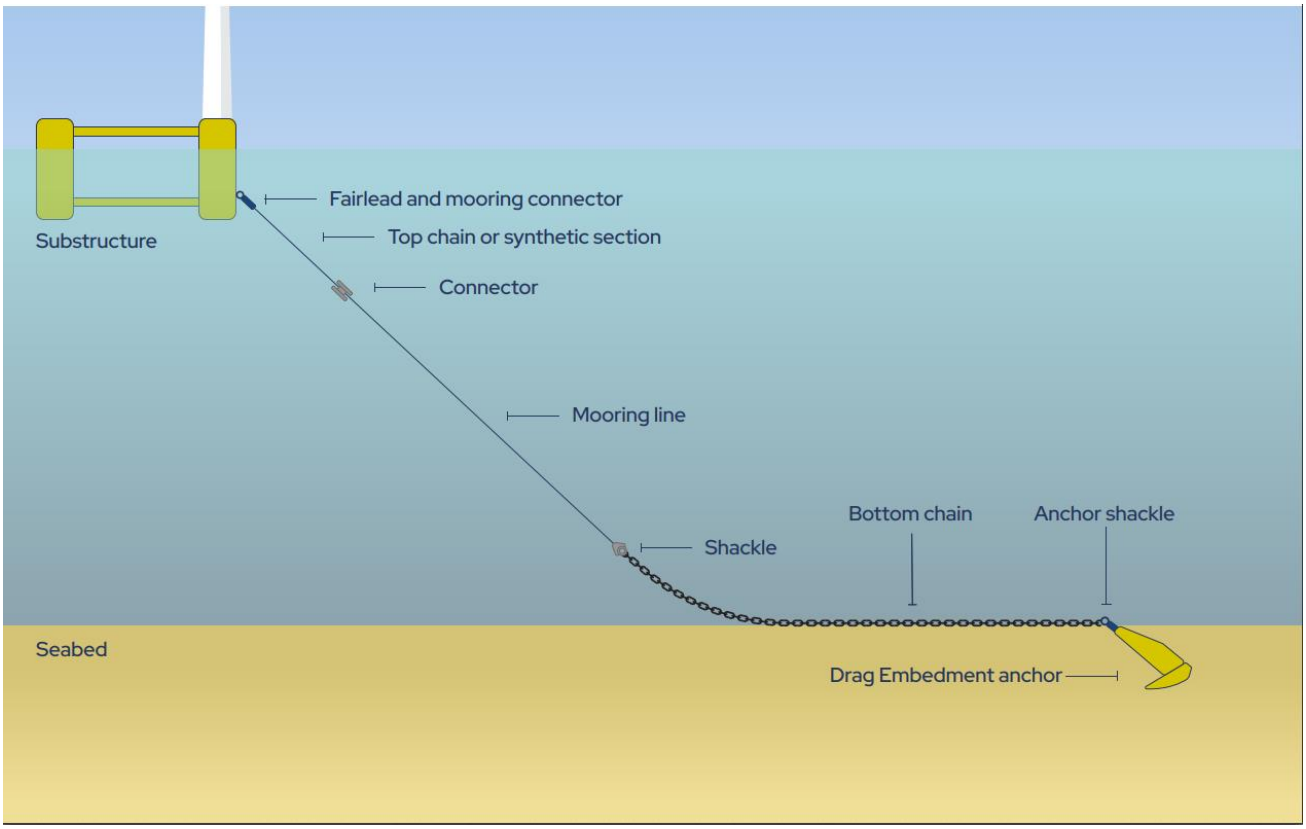


3.5.2.17 A typical elevation sketch of a single mooring line with a corresponding suction pile is shown in **Plate 3-3**. A typical elevation sketch of a single mooring line with a corresponding drag embedment anchor is shown in **Plate 3-9**.

3.5.2.18 The type and number of anchors and moorings required will be subject to refinement upon selection of the substructure and a review of loading conditions.

3.5.2.19 The location of the project in waters in excess of 90 m which are not subject to tidal currents or wave action limits the potential for seabed movement and scour around subsea infrastructure. Therefore, the risk of sediment scour around the anchors for the FTUs is anticipated to be low and scour protection is unlikely to be required.

Plate 3-9: Mooring components with drag embedment anchor



3.5.2.20 **Table 3-3** provides the design envelope for the mooring and anchor system.

Table 3-3: Mooring and anchor design envelope

Design parameter	Design envelope
Number of mooring lines per WTG	Up to 9
Mooring types	Catenary, Taut or Semi-Taut, and Tension Leg
Anchor types	Driven piles, Suction piles or Drag embedment
Pennant wires/buoys	If anchors installed ahead of mooring system, then temporary submerged buoy may be used to indicate anchor position for Remotely Operated Vehicles (ROV's) for mooring hook-up. Surface buoys are not anticipated.
Mooring line radius (m)	Up to approximately 850 m
Mooring line materials	Steel chain/Steel wire rope/Synthetic fibre rope/steel tubes
Anchors	Up to 9

Inter-Array Cables

3.5.2.21 Inter-array cables are required to allow power to be supplied to WTGs during start-up, for power generated by the WTGs to be exported, and to facilitate communications to allow WTG operations to be monitored and controlled.

3.5.2.22 Typically, an offshore windfarm is organised in a “hub-and-spoke” arrangement with the OSCP as the central point within the Array Area. From this point, strings of three to six WTGs extend radially like spokes on a wheel. The inter-array cables channel energy toward the OSCP. The precise arrangement for the Project is subject to turbine size and electrical design.

3.5.2.23 The final arrangement of the FTUs and inter-array cables is determined through detailed analysis which includes consideration for WTG yield, inter-array cable length, avoiding seabed constraints and other site constraints such as compliance with MGN 645 and its annexes[57] where applicable. A consideration particular to floating wind of the inter-array cabling is to provide redundancy, in the case of cable failure or breakdown. Further studies will be undertaken post consent and during detailed design to optimise the cable array as the FTU system is developed.

3.5.2.24 For floating wind, the inter-array cable will be composed of ‘dynamic’ and ‘static’ sections. Dynamic inter-array cables have additional armour layers inside the cable to provide protection against loading regimes induced by the FTU dynamic motion.

3.5.2.25 The dynamic inter-array cable configuration comprises the section of cable in the water column between the FTU and the seabed touchdown, and includes ancillaries such as buoyancy modules, bend stiffeners, hold-back tethers, and other forms of cable protection. A typical dynamic cable configuration uses buoyancy modules to form a ‘lazy-wave' shape to reduce hang-off load and to decouple the FTU dynamic motion from the static section of the cable on the seabed, resulting in less movement and interaction between the cable at the touchdown and burial location. During the design process, the dynamic cable configuration will be optimised in conjunction with the design of the floating substructure and mooring system.

3.5.2.26 The static portions of the inter-array cables are on the seabed from touchdown to the OSCP, the depth of burial (DoB) required to ensure cables are protected will be determined by a Cable Burial Risk Assessment (CBRA) during detailed design. The preference is to bury cables wherever practicable, but rock protection may be required for asset crossings and where DoB cannot be achieved. **Table 3-4** provides a summary of the expected design envelope for the inter-array cables.

Table 3-4: Inter-array cables design envelope

Design parameters	Design envelope
Maximum potential length of inter-array cables	Approximately 330 km (inter-array cables only)
Cable outer diameter	Up to 500 mm diameter
Number of WTGs per inter-array cable string	between 3 and 6, subject to design
Rated capacity	66 kV or 132 kV for HVAC
Installation methodology for static sections on seabed	Trenching, dredging, jetting, ploughing, controlled/mass flow excavation, rock cutting, backfilling or other burial technique.
Indicative Maximum burial depth (m)	2 m (target burial depth no more than 1.5m)

Design parameters	Design envelope
Indicative Minimum burial depth (m)	0.5 m if buried (0 m if protection system required)
Indicative maximum trench width	2 m
Non-Buried Installation Technique	Rock placement, concrete mattresses, CPS, Gabions, Uraduct, Cast Iron shells. Remedial rock protection/mattresses will likely need to be deployed where minimum cable depth burial is not achieved.
Existing cables/pipeline crossing protection	Rock placement and/or mattresses

Offshore Substation and Converter Platform (OSCP)

3.5.2.27 The OSCP as a base case is expected to be a single integrated platform incorporating both HVAC and HVDC equipment needed to connect the HVDC equipment to the UK grid and HVAC equipment needed to connect both the WTGs and the oil and gas assets to the OSCP.

3.5.2.28 Where these cannot be integrated two adjacent bridge-linked platforms may be required, these two platforms will jointly act as the electrical hub for the Project:

- One smaller HVAC OSCP will transfer power from the WTGs via dedicated static subsea HVAC power cables, to the oil and gas assets (i.e. platforms, FPSOs and other production facilities) located within the Onward Development Area (see Section 3.5.4). This smaller platform will be connected via a bridge link to the larger HVDC OSCP, the two platforms will be connected via HVAC interconnecting cabling; and
- One larger HVDC OSCP will convert energy generated by the WTGs from HVAC to HVDC to allow power to be efficiently exported via the export/import cable from the HVDC OSCP to MHWS for ongoing grid connection. When there is insufficient power from the WTGs to supply all the power needed for the oil and gas assets demand the HVDC system will act as a power from shore system, and power will be imported from the UK Grid where it is converted within the HVDC converters from HVAC to HVDC at the OCP and then back to HVAC at the OSCP for onward transmission to the oil and gas assets.

3.5.2.29 Both the HVAC and HVDC OSCPs will be fixed jacket structures which will require small scale pin piles (circa 3.5 m diameter) to secure the jacket to the seafloor.

3.5.2.30 **Table 3-5** and **Table 3-6** present the expected HVDC OSCP and HVAC OSCP parameters under consideration where these cannot be integrated and are separate platforms, which will likely be bridge linked. It is anticipated that the HVAC OSCP dimensions will be smaller than the HVDC OSCP, this is to still be refined and further details will be included within the EIAR.

Table 3-5: HVDC OSCP design envelope

Design parameters	Design envelope
Maximum topside dimensions based on largest 1350 MW topside design (LxWxH) (m)	Up to 75 m (Length) Up to 40 m (Width) Up to 35 m (Height)
Structure type and method of fixing	Jacket with driven piles, drilled or suction bucket piles.
Topside weight (tonnes)	Approximately 12,500 tonnes
Jacket Weight (tonnes)	Approximately 10,000 tonnes
Pin piles (number)	Up to 12
Pin pile diameter	Up to 3.5 m
Maximum hammer energy (kJ)	Up to 4400 KJ

Table 3-6: HVAC OSCP platform design envelope

Design parameters	Design envelope
Maximum topside dimensions based on largest 1350 MW topside design (LxWxH) (m)	Up to 75 m (Length) Up to 40 m (Width) Up to 35 m (Height)
Structure type and method of fixing	Jacket with driven piles, drilled or suction bucket piles.
Topside weight (tonnes)	Approximately 4,000 tonnes
Jacket Weight (tonnes)	Approximately 3,200 tonnes
Pin piles (number)	Up to 8
Pin pile diameter	Up to 3.5 m
Maximum hammer energy (kJ)	Up to 4400 KJ

3.5.3 Offshore Export/Import Cable

3.5.3.1 The offshore export/import cable will be approximately 230 km in length and will be sited within a 1 km wide cable corridor (the export/import cable corridor, referred to as the ECC). The HVDC export/import cable will carry power from the HVDC component of the OSCP, located within the Array Area, landward to MHWS, as seen in **Figure 1-1**.

3.5.3.2 The HVDC cables will be bi-directional, enabling the transmission of electrical power from the UK grid to the HVDC OSCP, WTGs, and oil and gas assets when required.

3.5.3.3 There will be two HVDC cables laid in up to two trenches (either bundled and laid in one trench or laid separately in two trenches). The fibre-optic cable will be laid in the same trench as one of the HVDC cables (or both if bundled).

3.5.3.4 The export/import cables are to be laid on the seabed, within the ECC as part of an engineered cable routing design, from MHWS to the touchdown to the OSCP. The DoB required to ensure cables are protected will be determined by a Cable Burial Risk Assessment (CBRA) during detailed design. The preference is to bury cables

wherever practicable, but rock protection may be required for asset crossings and where DoB cannot be achieved.

3.5.3.5 The Applicant is coordinating with NorthConnect Limited regarding the inshore portion of the ECC (the 28 km section of cable from the 12 NM territorial boundary to MHWS). The ECC will be assessed from the Array Area to MHWS. The section of the ECC from MHWS to 12 NM is the same as the NorthConnect Cable Corridor. NorthConnect Interconnector and the Project will only require one set of infrastructure, within the overlapping marine licence Project Area from 12 NM to MHWS.

3.5.3.6 The section of the ECC from MHWS to 12 NM has previously been assessed within the EIAR submitted for NorthConnect Limited[58] and judged acceptable through the consenting of NorthConnect. The previous EIA work for NorthConnect will be considered in assessing the ECC from MHWS to 12 NM, updated by any other readily available information and surveys undertaken.

3.5.3.7 **Table 3-7** presents the expected ECC parameters under consideration.

Table 3-7: Offshore export/import cable design envelope

Design parameters	Design envelope
Number of cables	Up to 3 (two HVDC and one fibre optic)
Length of each individual cable (km)	Approximately 230 km (from HVDC OSCP to landfall)
Trench Width per cable (m)	Approximately 2 m (in up to 2 trenches)
Target burial depth (m)	Approximately 0.5 m to 1.5 m
Cable protection if Depth of Burial not achieved	Concrete mattresses, rock placement, grout bags, cement bags, sandbags, uraducts, articulated pipes, cast iron shells, bend restrictors, filter units/gabion bags (rock bags).
Rated capacity (kV)	320 or 525 kV HVDC (export cables)
Installation method offshore	Pre-Lay Trenching, Simultaneous Lay and Burial, Post-lay Burial (see Section 1.1 for further details)

3.5.4 Targeted Oil and Gas Onward Development

3.5.4.1 It is anticipated that static subsea HVAC power cables will provide HVAC power, and communications, from the OSCP to the prospective oil and gas assets targeted for electrification which are located within the Onward Development Area. See **Figure 3-3**.

3.5.4.2 Marine licences for these cables will be applied for separately in the future. The indicative parameters given in **Table 3-8** will be used for the CEA (see **Chapter 5: Approach to Scoping and EIA**, for further details).

Table 3-8: Oil and gas cable design envelope

Design parameter	Design envelope
Number	Up to 10
Length (m)	Various cable lengths: 20 km, 31 km, 35 km, 37 km, 75 km, 115 km (Additional cable lengths between the max and min, to be allowed for reflecting maximum realistic distance from the asset)
Max cable outer diameter (mm)	300 mm
Rated capacity (kV)	66 kV
Components	Three phase HVAC and Fibre Optic (co-axial with power cable)

3.5.5 Landfall

3.5.5.1 The onshore aspects for ongoing grid connection (above MHWS), including the landward exit point and cable pull through, have already been consented through the NorthConnect HVDC Cable Planning Consent (Planning Application Reference Number APP/2015/1121 and APP/2018/1831). Therefore, these will not be assessed as part of the Project.

3.5.5.2 NorthConnect Limited has separately submitted applications for the ongoing grid connection and approval has been granted by Aberdeenshire Council and Marine Directorate:

- An EIAR and separate planning and marine licence application (06771 & 06870) was submitted for the HVDC buried cabling from the edge of the UK Exclusive Economic Zone to the OCP at Fourfields located near Peterhead, Aberdeenshire. Planning approval was granted in February 2019 by Aberdeenshire Council, and MD-LOT licences were issued in February 2019.
- An Environmental Statement (ES) and separate planning application (APP/2015/1121) was submitted for the onshore HVAC cable burial from Peterhead Substations to the UK Converter Stations and the construction of an OCP at Fourfields located near Peterhead, Aberdeenshire. Planning approval was granted in September 2015 by Aberdeenshire Council.

3.5.5.3 The cable installation at landfall will be via Horizontal Directional Drilling (HDD) and the exit point in the marine area is in water in excess of 25 m deep and approximately 190 m offshore. The HDD activity and punch out of three separate boreholes and its impacts on the marine environment will be assessed as part of this application (see Section 1.3 for further details).

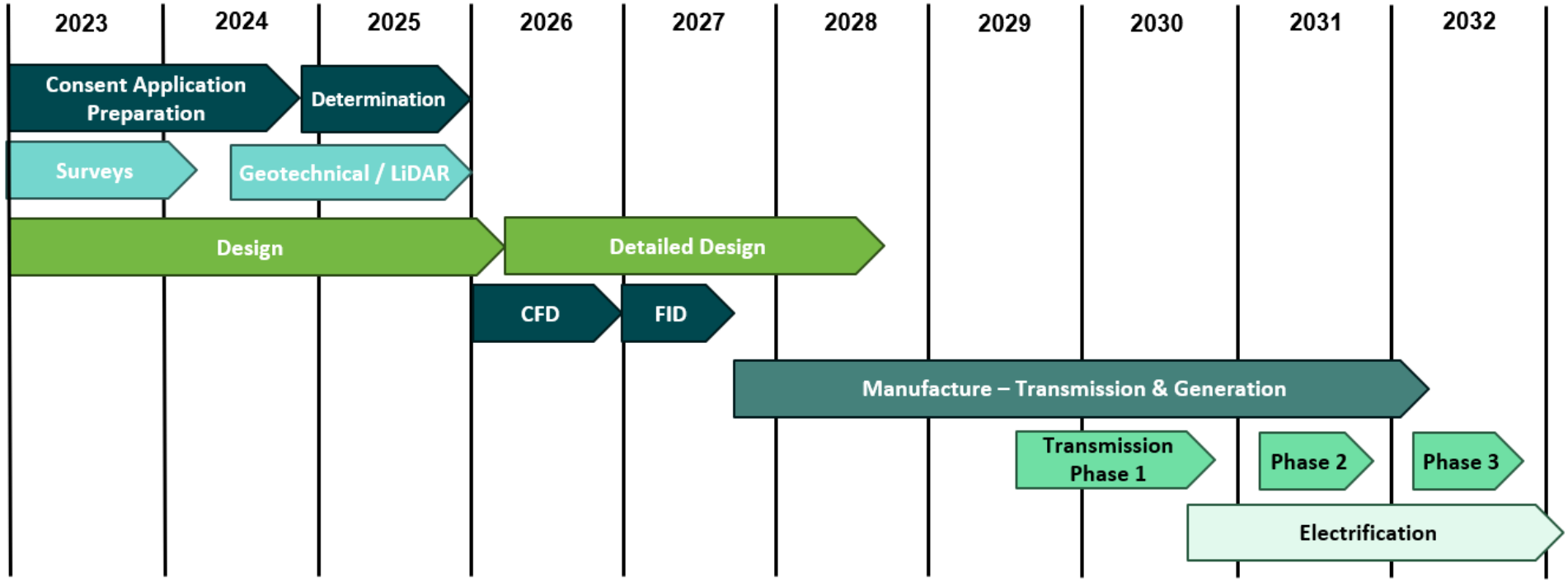
3.6 Indicative Project Timelines

3.6.1.1 The overarching aim of Project is to facilitate decarbonisation of the oil and gas industry through the electrification of offshore oil and gas installations, whilst also providing surplus renewable power to the UK grid. The timeline for the completion of this development project is summarised as follows and illustrated in **Plate 3-10**:

- 2024 Scoping Report (this report) – submission early Q2 2024;

- Offshore consents applications (s.36, offshore and inshore marine licences) – submission Q4 2024;
- Offshore consents awarded – anticipated Q4 2025;
- Contract for Difference (CfD) – application and award 2026;
- Final Investment Decision (FID) 2027;
- Manufacturing of all generation and transmission components – 2027 to 2032;
- Offshore construction – 2029 to 2033
- Transmission: OSCP and Export Cables installed between 2029 and 2030;
- Generation: windfarm constructed over 3 seasons between 2030 and 2033;
- First power (will prioritise oil & gas customers – transmission phase 1) – 2030;
- Windfarm completion – 2033.

Plate 3-10: Indicative Project timeline



3.7 Construction, Operations & Maintenance (O&M), and Decommissioning Works

3.7.1 Construction

3.7.1.1 The following sections outline the offshore construction schedules based on what is known at this stage of the Project.

3.7.1.2 The likely maximum duration of the offshore construction phase of the Project is up to five years. The three elements requiring installation are the:

- HVDC and HVAC OSCPs;
- FTUs including the mooring systems, substructure, and WTGs; and
- Cables including the:
  - Inter-array cables between FTUs and the HVDC and HVAC OSCP; and
  - DC export/import cable from the HVDC OSCP, located within the Array Area to MHWS (including the full extent of the ECC).

3.7.1.3 Five years is premised on installation of the OSCP in year one with three subsequent years of FTU and array cable installation with a year of potential overrun. Potential overrun cannot be discounted at this stage given scale of the project and nascency of the technology.

3.7.1.4 The OSCP and Export Cable are expected to be installed and commissioned prior to installation of FTU's in order to provide power to FTU's for commissioning. Prior to installation or any infrastructure, pre-construction surveys and activities (including UXO inspection (and any required clearance), geophysical and geotechnical surveys and seabed preparations will be undertaken.

3.7.1.5 A construction and marshalling and Operations and Maintenance port(s) has not yet been identified for the Project and may not be known prior to finalisation of the EIAR and is subject to commercial agreement. The Applicant is however committed to the development of Scotland and as such, for the purpose of the EIA, it is proposed to assume that both the construction and marshalling and O&M ports are located on the East Coast of Scotland.

3.7.1.6 The wet storage of turbines outside of the Array Area in close proximity to a port is linked to a decision on construction and marshalling port(s) and as such potential impacts associated with wet storage are proposed to be scoped out of this assessment.

Floating Turbine Unit (FTU)

3.7.1.7 The mooring systems will be pre-laid and stored temporarily on the seabed. The Floating Turbine Unit (FTU) is expected in the base case to be towed to the Project Area from a suitable construction port. Alternately an FTU may be brought to field by heavy lift vessel for installation.

3.7.1.8 The pre-installation of the mooring system allows the FTU to arrive and be rapidly installed on location using the pre-installed mooring system. The installation method is specific to the anchor type chosen.

3.7.1.9 Substructures and WTGs are typically fabricated separately, potentially at different locations. The WTGs are typically installed onto the substructures at a port and, after pre-commissioning checks, the fully assembled unit is towed out to the Array Area and hooked up to pre-laid moorings.

3.7.1.10 Alternatively, with advancement of major offshore construction technologies, the floating substructure (without WTG) may be towed out to the Array Area and hooked up to the mooring system before the WTGs are installed onto the floating substructure on Site by means of a heavy lift vessel or other offshore crane solution.

3.7.1.11 The FTU will be connected to the inter-array cables as soon as practicable to allow them to be fully checked and commissioned prior to operation.

Offshore Substation and Converter Platform (OSCP)

3.7.1.12 The OSCP jacket will be loaded in harbour onto a vessel or barge and taken to the Windfarm Site. It will be launched or lifted from the vessel and placed into position by a crane. Mudmats may be required to stabilise the structure on the seabed prior to pile installation. Piles (driven, drilled, or suction) will then be installed to hold it in place. The specifics of the piles will be determined during detailed design once the local geology has been confirmed.

3.7.1.13 Once the jacket is piled into position the topside will be delivered by vessel and lifted by cranes onto the jacket and secured into position to allow it to be commissioned. Once in place, cable connections can be made to bring the systems online.

Cable Installation

3.7.1.14 Inter-array cables can be laid before or after the installation of the FTUs. Post-laid inter-array cables, which are laid and connected after the FTU installation, are on the critical installation path. Pre-laid inter-array cables are laid prior to FTU installation and are then retrieved and connected once the FTU is installed. Pre-laying inter-array cables removes the cable lay activity from the critical installation path but requires wet storage of the dynamic section of the inter-array cable on the seabed or in the water column.

3.7.1.15 Cables will be laid by a suitable cable installation vessel. They will be transported to site in either carousels or reels. Remotely operated vehicles (ROV) and cranes will be used to connect the cable to the FTU. The specific methodology will be determined during the design process.

3.7.1.16 Various cable lay and burial techniques are available, their suitability is being determined in relation to the substrates present and depth of burial required. The specific technique to be proposed will be determined during detailed design, the options available include:

- **Pre-lay trenching (with and without active back fill)** – using a plough to create a trench for the cable to be placed into. It can then be left to naturally back fill, or the plough can be used to push material back into the trench.

- **Post-lay jet trenching** – where the seabed under the cable is fluidised to allow the cable to sink into the seabed.
- **Cable Protection -** Where cables cannot be sufficiently buried due to hard substrate(s) or where there are crossings over existing infrastructure (pipelines, cables), protective cover will be placed on top of the cables (e.g. rock berm, concrete mattresses, etc.). Where this is necessary, concrete mattresses are considered preferential to rock dumping as the mattresses are lower impact and are more easily removeable.

Horizontal Directional Drilling (HDD)

3.7.1.17 As the cable makes landfall at a seacliff, HDD will be utilised for the landfall. The intent is to drill three holes one for each of the HVDC cables, and one for the fibreoptic cable. All three will be drilled to a diameter suitable for HVDC cables to provide a level of redundancy. The HDD will be drilled from a point approximately 100-120 m inland from the cliffs, popping out approximately 190 m offshore, where water depths are in excess of 25 m.

3.7.1.18 HDD installation will include the drilling of pilot holes, drilling will stop prior to reaching the seabed surface, holes will then be reamed to achieve the appropriate diameter. The drilling utilises drilling fluids the primary purpose of which is to create a thick gel to suspend soil and rock cuttings and carry them out of the hole. Drilling fluids are treated and recycled onshore. Despite the drilling muds being non-toxic, prior to the hole being extended to the seabed, excess drilling fluid is removed to minimise losses of the muds to sea at the point of pop out.

3.7.1.19 Ducts are pushed into the holes from land and temporary protection placed over the seaward end, awaiting cable installation. Once ready to install the cables, preparations will be made including installation of a bellmouth on the seaward end of each duct. The cables will be pulled from the cable lay vessel through the ducts to shore. Once the cables are in place a cap will be installed to isolate the duct from the sea, protection will then be placed to protect the HDD marine exit point. Bentonite is pumped into the landward end of the duct to fix the cable in place in the duct.

3.7.1.20 The HDD works and cable pull will be timed as per the NorthConnect proposals laid out in their EIAR to specifically avoid disturbance of breeding birds (see **Chapter 11: Ornithology**).

3.7.1.21 Full details of HDD and cable pull are included in the NorthConnect HVDC Cable Infrastructure UK Construction Method Statement[59]. The onshore element of the works are subject to separate existing consents and are not considered within this scoping report.

3.7.2 Operations & Maintenance (O&M)

3.7.2.1 Once operational, the Project will supply power to oil and gas assets and to the national grid (see Section 3.5.4). The Project will be managed, monitored, and operated from an onshore facility which will have remote access to the OSCP and individual FTUs, such that it can control which WTG is operational and monitor their efficiency.

3.7.2.2 During the operational period, scheduled and unscheduled monitoring and maintenance of offshore infrastructure will be required. During the project life, it is likely that some refurbishment or replacement of offshore infrastructure will be required. All offshore infrastructure, including WTGs, floating substructures and mooring systems, cables and fixed-bottom OSCP(s) will be included in monitoring and maintenance programmes.

3.7.2.3 Maintenance can be generally separated into three categories:

- **Planned maintenance:** Servicing of components in line with the maintenance schedule, which will take account of the lifespan of the various components such that they are replaced prior to failure. It will be including inspection and testing, fluid (oils and hydraulics) top-ups and part refurbishment/replacement.
- **Unplanned maintenance:** this applies to defects occurring that require rectification outwith the planned maintenance periods. The scope of such maintenance would range from small defects on non-critical systems to failure or breakdown of main components potentially requiring them to be repaired or replaced.
- **Periodic overhauls:** these will be carried out in accordance with equipment manufacturer's warranty and specifications.

3.7.2.4 Planned maintenance activities and the majority of unplanned maintenance activities will be carried out in situ. Maintenance and inspection activities shall be undertaken throughout the year. More intensive maintenance is likely to take place during the spring and summer months when weather is more workable. Due to the distance from shore, onsite maintenance will be carried out from a maintenance vessel stationed in the Windfarm Site. This will return to port for crew change and resupply periodically.

3.7.2.5 During periods of intensive maintenance or periodic inspection additional vessels may be mobilised.

3.7.2.6 The ability to attend site in the winter months for unplanned maintenance will be retained.

3.7.2.7 In general, all maintenance shall be undertaken in-situ without tow-back to shore. During instances of periodic overhauls or significant malfunctions which cannot be rectified offshore, the FTU will be detached from the inter-array cable and mooring system. Subsequently, it will be towed back to shore for necessary maintenance procedures to be conducted within a port facility. The system shall be designed to enable this and for tow-back to a UK port where feasible to do so. Detached mooring lines or cables will be laid on the seabed with appropriate markers for retrieval. No surface buoy is required. This strategy ensures that upon the FTUs return, the mooring cables can be efficiently retrieved and reconnected to the substructure.

3.7.2.8 It should be noted that the use of deepwater jack-up platforms may be considered as a potential strategy during the overhaul process or in the event of a major breakdown. This approach is currently under evaluation and may be incorporated into the maintenance plan if deemed beneficial.

3.7.3 Decommissioning

3.7.3.1 Decommissioning requirements are set out in the Energy Act 2004 (as amended)[60] and latest Decommissioning of Offshore Renewable Energy Installation Guidance[61]. These will influence the design of the Project and be a key requirement under the CES lease agreement.

3.7.3.2 A decommissioning programme will be prepared prior to construction, in line with the requirements of the Energy Act 2004 (as amended). However, for the purpose of this report, the following has been assumed:

- FTU substructure components will be removed and towed to port;
- Mooring lines will be removed, and where possible anchors will be removed or cut a suitable distance below the mudline with the upper portion removed;
- Cables no longer required will be removed where safe to do so; where they cross live assets, they may be cut and left in situ to prevent damage to other infrastructure; and
- The offshore substation(s) will be decommissioned with the jacket and topside(s) removed and brought to shore. The piles holding the jackets in place will be cut a suitable distance below the mudline to allow the jacket to also be brought to shore for decommissioning.

3.7.3.3 If any of the infrastructure, moorings, cabling or offshore substations and converter stations are suitable for repowering then they will be retained for reuse in the updated system. All materials brought to shore will be decommissioned and waste managed in accordance with the waste hierarchy (Waste (Scotland) Regulations 2012)[62] for instance, reused or recycled rather than disposed of to land. All the steel elements will be recyclable.

3.7.3.4 The approach to decommissioning, including cable decommissioning, will be reviewed as part of the decommissioning programme. It is expected that decommissioning will require similar vessels to those used in construction and take a similar period of time.

4. SITE SELECTION AND CONSIDERATION OF ALTERNATIVES

4.1 Introduction

4.1.1.1 This Chapter provides an outline description of the site selection process for the Project, including for both the Array Area and ECC.

4.1.1.2 Additionally, this Chapter will set out the alternatives considered for the Project within the context of government planning and CES leasing processes.

4.1.1.3 Specifically, the EIA Regulations require that the Project's EIAR includes;

- Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017[63], Section 5(2) "*An EIAR is a report prepared in accordance with this regulation by the developer which includes (at least) (d) a description of the reasonable alternatives studied by the developer, which are relevant to the development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the development on the environment*."
- Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017[64] Schedule 4, Section 2 "*A description of the reasonable alternatives (for example in terms of project 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*."

4.1.1.4 The consideration of alternatives and site selection is an iterative process undertaken as part of project development and maturation, which forms an integral part of the EIA process. The EIAR will provide a full description of the site selection process including alternatives considered, including any refinements made that occur as a result of the EIA process and/or in response to the statutory consultation process and stakeholder feedback.

4.2 Siting of Array Area

4.2.1 Innovation and Targeted Oil and Gas (INTOG) Leasing Round

4.2.1.1 INTOG is a leasing round for offshore wind projects targeted at directly reducing emissions from offshore oil and gas production and boosting innovation to help achieve the targets of the North Sea Transition Sector Deal (see **Chapter 2: Legislative and Policy Context** for further details).

4.2.1.2 Developers were able to apply for seabed rights to build two types of offshore wind project:

- IN - Small scale, innovative projects, of less than 100 MW; or
- TOG - Projects connected directly to oil and gas infrastructure, to provide electricity and reduce the carbon emissions associated with production.

4.2.1.3 The Project is a TOG project under the INTOG leasing round. The aim of this project is to meet the North Sea Transition Deal target of decarbonisation by 2030 through electrification of oil and gas facilities in the Central North Sea. As such, a site was selected for offshore wind development within a region of densely packed oil and gas facilities and prospective developments, which falls within the INTOG area of search "E-a". The INTOG plan and leasing process was set up to facilitate commercial relationships to form and aid identification of feasible development locations to ensure delivery as outlined below.

4.2.2 Array Area Constraints Mapping

4.2.2.1 Since the aim of the Project is to decarbonise offshore oil and gas extraction, the location to current oil and gas infrastructure needs to be considered in offshore Array Area selection.

4.2.2.2 As previously described in the 2023 Scoping Report, oil and gas installations to be decarbonised must be located no more than 100 km from the Cenos windfarm offshore electricity hub location. The oil and gas installations must be able to receive wind power from Cenos for a minimum of five years in line with requirements set out by CES INTOG leasing process. Since the target date of first power date from the Project is 2029, only oil and gas installations with an expected life beyond 2032 have been considered for electrification by Cenos.

4.2.2.3 **Figure 4-1** below shows the Central North Sea oil and gas facilities with expected life beyond 2032 and have a case for electrification through the Cenos Project. **Figure 4-1** shows 100 km and 50 km radius rings which capture the maximum number of facilities. The centre of this ring is just east of the Madoes subsea oil field. Consequently, the area of search shown in **Figure 4-1** maximises the potential for decarbonisation of oil and gas facilities in the Central North Sea area. This is the primary purpose and focus of the Project.

4.2.2.4 Key constraints were mapped in and around the search area to inform more detailed siting of the Array Area, these included:

- Safe helicopter zones (6 NM radius from oil and gas assets) (see **Figure 4-2**);
- Oil and gas subsea assets and pipelines with 500 m buffers (see **Figure 4-2**);
- Oil and gas licence blocks (licenced or likely to be auctioned) (see **Figure 4-2**);
- Areas of high vessel use density;
- Wrecks; and
- Minimising impact on commercial fishing activities.

4.2.2.5 As can be seen in **Figure 4-2**, the remaining area where a windfarm can feasibly be constructed that meets the objectives of decarbonisation whilst avoiding key constraints has resulted in a site within the East of Gannet and Montrose Field NCMPA. Information available at the time of initial site selection (2020) was utilised to avoid sub littoral mud areas of the NCMPA.

4.2.2.6 The search resulted in the identification of a 440 km^2 area which was taken forward for initial survey works. **Figure 4-1** shows the survey area identified, in relation to

various oil and gas assets and the benthic habitat types present based on European Marine Observation and Data Network data[65].

4.2.2.7 The maximum area available to lease through INTOG is limited to 333 km^2. Hence, prior to lease application submission the survey area had to be refined to identify an area to meet the INTOG requirements. The survey area included the Madoes field which cannot be built upon and hence that area was removed, optimisation was then carried out for wind energy yield, to minimise inter-array cable length and distances to oil and gas assets.

4.2.2.8 Overall initial selection of the Array Area was driven by Seabed leasing for offshore renewable energy generation which is managed through a plan-led process. As planning authority for Scottish seas, the Scottish Ministers developed a sectoral marine planning programme to facilitate smaller innovation, and larger oil and gas decarbonisation offshore wind projects to gain access to seabed in locations identified in a planned manner. The INTOG Project Specification and Context Report[66] identified Areas of Search that formed the basis of the next planning processes. These areas were identified through a detailed opportunity and constraint analysis considered technical, social, and environmental constraints.

4.2.2.9 Based on consultation responses, The INTOG Initial Plan Framework (INTOG IPF)[67] provided the final Areas of Search. E-a, the Area of Search in which the Project is located was not altered during the refinement process. These Areas of Search have therefore been assessed and considered suitable for offshore wind development.

4.2.2.10 As per the INTOG planning and leasing programme, a plan level SEA and HRA is now in progress by Scottish Government.

4.2.2.11 Amongst the information considered by the Scottish Government in developing the INTOG IPF was seabird usage distribution data produced by the Royal Society for the Protection of Birds (RSPB). These data align with the RSPB's own Indicative Area of Opportunity for floating wind (per The RSPB's 2050 Energy Vision report[68]).

4.2.2.12 This INTOG IPF process, combined with the work on Oil and Gas proximity and platform suitability along with a review of more specific environmental constraints has led to the identification of the current Array Area to be taken forward for more detailed assessment in the final EIAR.

Figure 4-1: Oil and gas assets within 100 km of the Array Area

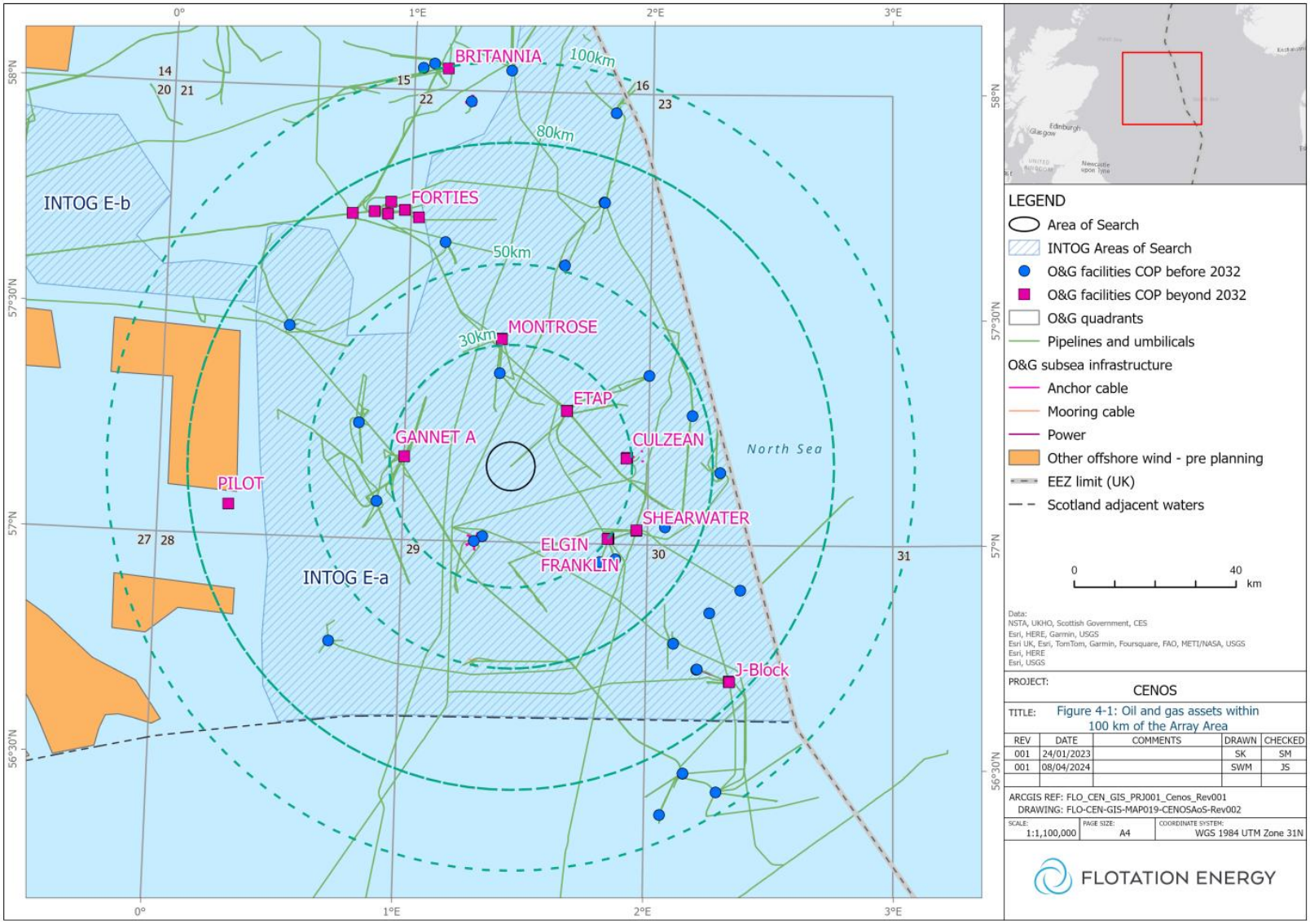
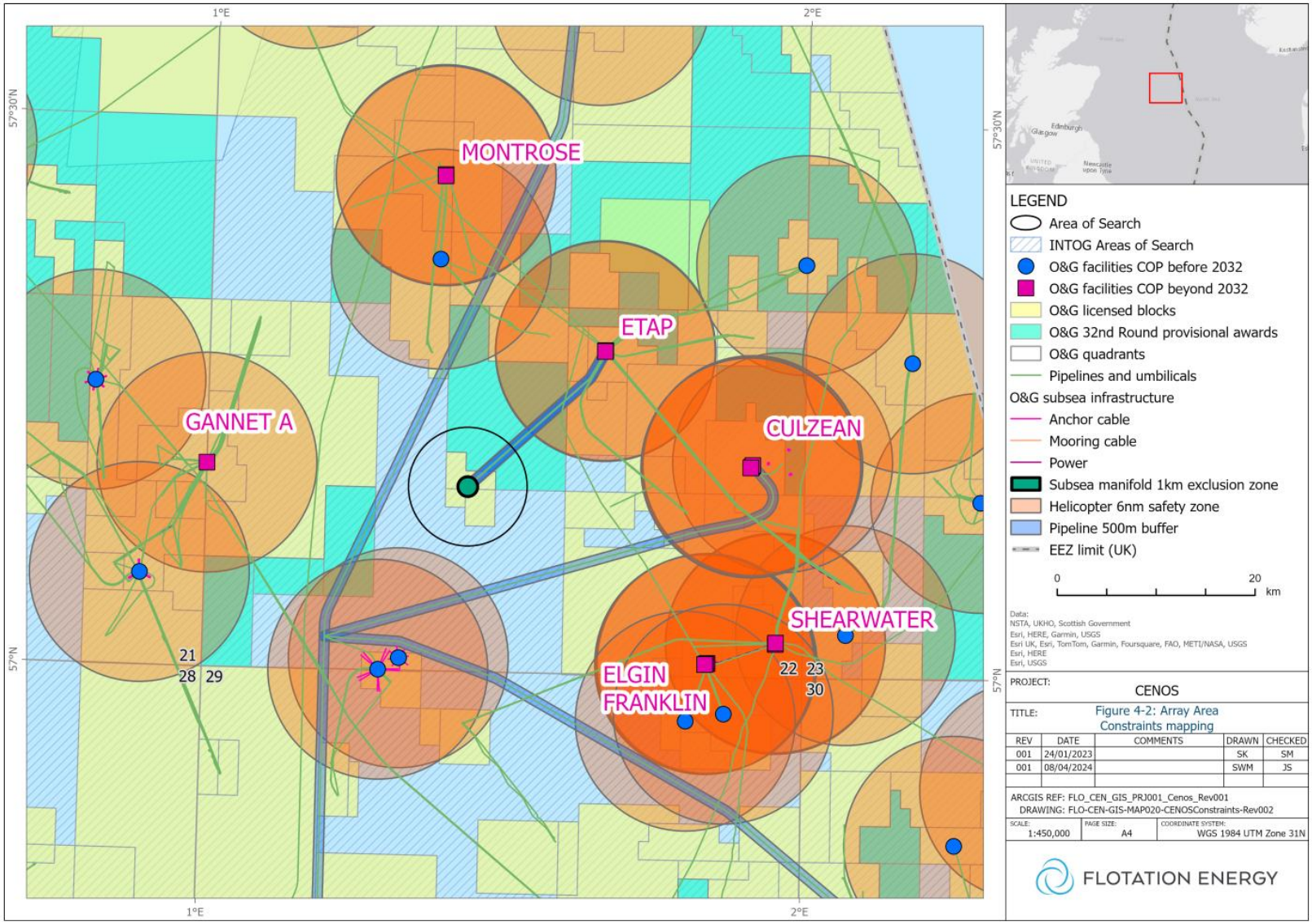


Figure 4-2: Array Area constraints mapping



4.2.3 Onward Development Area Identification

4.2.3.1 Cenos is currently discussing onward connections to several key oil and gas assets which operate as local hubs in the waters surrounding the Array Area for the purposes of electrification. An area of search of 100 km, which is roughly the limits for electricity transmission via an AC cable system, was utilised to first identify potential candidate oil and gas assets which could be electrified by Cenos (referred to as the 'Area of Opportunity').

4.2.3.2 The Area of Opportunity was then pared down to a Constrained Area of Search which considered environmental and technical constraints within the surrounding environment. This exercise limited the prospective area for connection to oil and gas assets via HVAC cable infrastructure to a region which reflected early optimisation of potential cable routes to oil and gas assets within electrification distance.

4.2.3.3 Following this, in consultation with the NSTA, consideration has been given to the role of these oil and gas assets as production hubs and their anticipated remaining production timelines to narrow down the list of prospective assets being considered for electrification. These prospective assets are included in the Onward Development Area surrounding the Scoping Red Line Boundary. The project continues to engage operators within this area, working towards commercial agreements to support their asset electrification, following consent award.

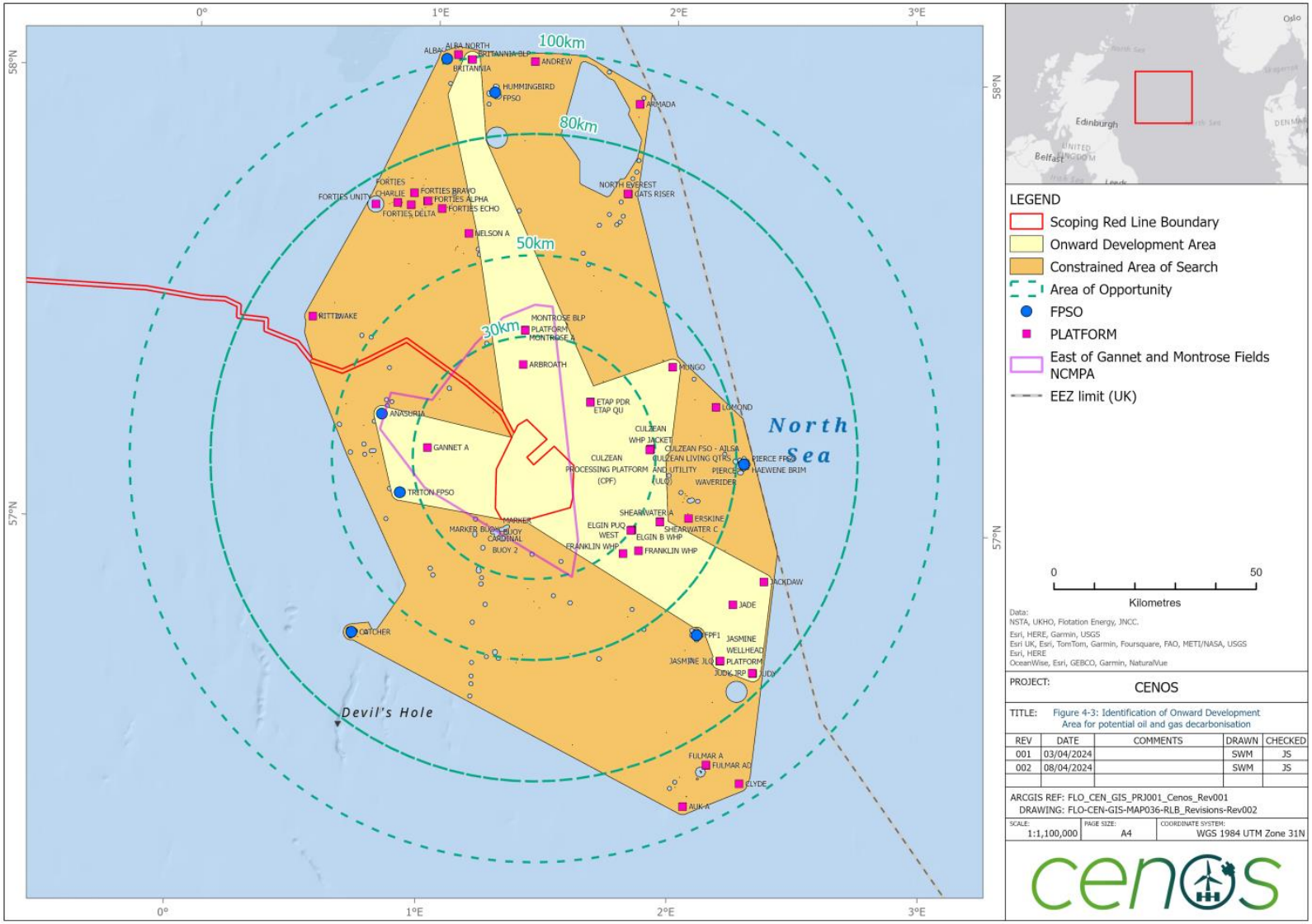
4.2.3.4 See **Figure 4-3** for details on the phased approach to identification of the Onward Development Area.

4.2.3.5 Cenos intends to consider potential cable routes for connection to individual assets in the forthcoming EIAR. It is proposed that potential routes to the candidate oil and gas production assets will be mapped and approximately quantified to identify the environmental sensitivities within an optimised candidate area of seabed for cable laying.

4.2.3.6 These potential onward HVAC connections will be considered as part of the environmental assessments, albeit not as part of the marine licence application for the transmission of electricity to and from the UK grid via the HVDC cable infrastructure within the ECC. Rather, potential onward oil and gas connections will be considered in the inter-project effects assessment, as part of the cumulative effects assessment, and will be preliminary but as full as possible based on the information available at the time of consent application.

4.2.3.7 Marine licences for these cables will be applied for separately in the future by the applicant(s) developing the transmission infrastructure connecting the oil and gas assets and the OSCP. Any such applications will be subject to further consultation with MD-LOT to ensure they align with current guidance and legislation.

Figure 4-3: Identification of Onward Development Area for potential oil and gas decarbonisation



4.3 Offshore Export/Import Cable Corridor (ECC) route optioneering

4.3.1.1 The proposed offshore ECC extends for 230 km from MHWS to the centre of the Array Area, wherein the OSCP is anticipated to be located. The portion of the ECC extending from MHWS to the 12 NM limit for Scottish territorial waters follows the consented NorthConnect cable route emanating from the Aberdeenshire coastline. As outlined in **Chapter 3: Project Description**, the landfall site is located at Long Haven, just south of Boddam, Peterhead.

4.3.1.2 The section of the ECC from MHWS to 12 NM encompasses the consented NorthConnect cable route. A wider corridor has been provided by the Applicant within the 2024 Scoping Report and so the sensitivities identified and assessed by the NorthConnect project (Marine Licence reference numbers 06771 & 06870) can be re-assessed in the forthcoming Cenos Offshore EIAR.

4.3.1.3 The Applicant is coordinating with NorthConnect Limited to share a single set of infrastructure within the overlapping consent boundary between MHWS and 12 NM. This coordination with the NorthConnect Interconnector project provides a strategic approach to electricity transmission to the UK power grid. Moreover, the use of a single set of cabling infrastructure minimises the potential for adverse effects on the inshore marine environment, including potential impacts to sensitive seabed and geomorphological features and species which utilise these waters intermittently (e.g. seabirds).

4.3.1.4 Transmission losses in HVAC cables increase with distance. The Cenos windfarm cable route is 230 km, as such HVDC technology which has much lower transmission losses is required. The use of HVDC cabling however requires the power generated by the wind turbines to be converted from AC to DC for transmission and for transmitted power to be converted back to AC to be exported onto the onshore grid. To justify the converter stations at either end there is a need for a minimum capacity in the system of 900 MW.

4.3.1.5 A comprehensive offshore cable route optioneering exercise was conducted to identify ECC routes which connect to landfall via the consented NorthConnect ECC that are not technically or commercially constrained, and which consider environmental sensitivities and known hazards. Two offshore routes were identified through this process which could supply electricity to/from the offshore array to the onshore connection point at landfall, via the inshore segment of the consented NorthConnect cable route (**Figure 4-4**). Both routes retain the option for future onward connection to Norway for NorthConnect via the offshore OSCP.

4.3.1.6 All routes considered known seabed conditions and environmental sensitivities (including protected sites), and wrecks and hazards, alongside existing offshore infrastructure (e.g. oil and gas platforms, oil pipelines, gas pipelines, cables and all associated subsea assets) and planned infrastructure associated with offshore wind.

4.3.1.7 This review has resulted in two routes being taken forward for further consideration as shown by on **Figure 4-4**.

4.3.1.8 Overall, the corridors have been designed taking account of available data to:

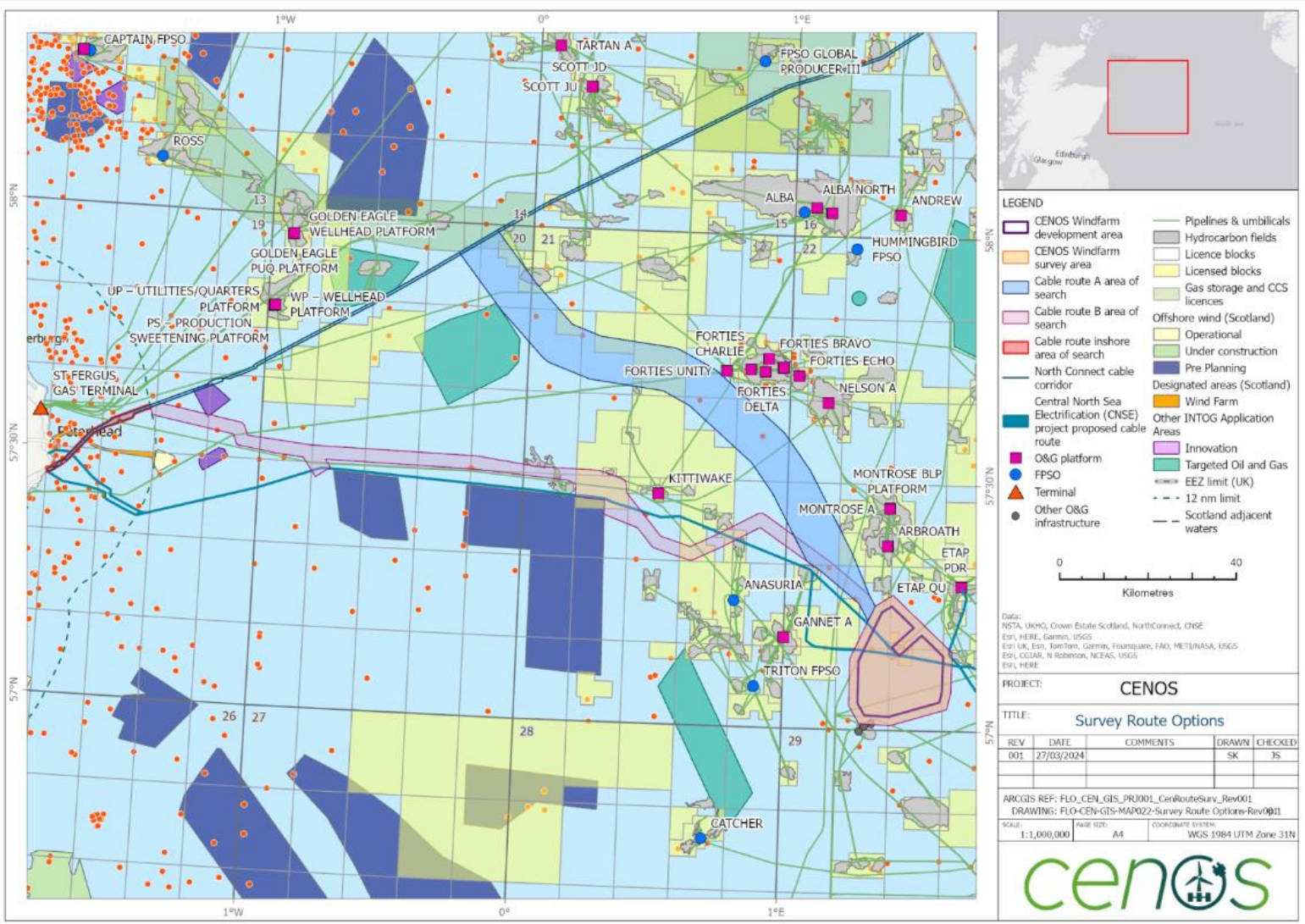
- Minimise cable route length as far as practicable;

- Minimise the number of cable, pipeline, oil and gas lease area crossings;
- Avoid oil and gas assets including a safety exclusion zone;
- Avoid offshore wind energy plan areas;
- Avoid known wreck locations;
- Avoid all designated sites excluding the East of Montrose and Gannet Fields Nature Conservation MPA (NCMPA) which the windfarm is located within;
- Maximise the benefits of coordinated transmission within 12 NM by utilising the NorthConnect cable corridor route, and landfall location which connects to NorthConnect existing onshore infrastructure; and
- To provide synergy with a conceptual future export cable to Norway.

4.3.1.9 Cable Route A had a total length of 254 km and included 7 asset (i.e. pipeline or cable) crossings, whereas Cable Route B had a total length of 227 km and included 6 asset crossings. Cable Route A was designed with the intention of minimising the need for new marine licenses and route engineering by utilising the consented NorthConnect cable corridor out to roughly 100 km offshore. However, the projects have been advised that Cenos would be required to apply for separate marine licences (both offshore and inshore - see Section 1.3) for the proposed ECC irrespective of existing concurrent consents. For this reason, Route A became much less attractive due to the compounding impacts to costs associated with manufacture, installation and maintenance associated with a 12% longer cable.

4.3.1.10 Cable Route B was therefore selected as the best option and the resultant ECC has been further informed by the Applicant's offshore environmental and geophysical survey campaign which supported the identification of the Scoping Boundary for the ECC, as presented in this report. Consequently, the original Cable Route B has been varied slightly to account for additional sensitivities identified during the offshore geophysical survey campaign. This has increased the route length by 3km to 230km.

Figure 4-4: Offshore Export/Import Cable Corridor (ECC) route optioneering



4.4 Next Steps

4.4.1.1 The final EIAR will set out the options considered for the Project and the main reasons for selecting particular options, taking into consideration environmental sensitivities, technical feasibility and the overall objectives of the Project. In addition, the EIAR will also consider a 'no development option', which will outline the scenario without the implementation of the Project.

4.4.1.2 The EIAR will provide further detail on the iterative design process, including how the design, routes and locations have evolved over time and any refinements that take place. Refinements made as a result of the EIA process, taking into account environmental sensitivities and the application of the EIA mitigation hierarchy; and in response to stakeholder feedback as part of the pre-application consultation will be described. Alternative Project infrastructure that has been considered and discounted will also be described in the EIAR.

5. APPROACH TO SCOPING AND EIA

5.1 Introduction

5.1.1.1 This Chapter of the Scoping Report describes the approach to Scoping, the principles of the EIA and the approach used to identify any potential significant effects of the Cenos Offshore Windfarm (hereafter the 'Project') on the physical, biological and human environmental receptors during the construction, O&M, and decommissioning phases of the Project. The broad principles relating to the establishment of baseline conditions, embedded mitigation and the methodology for the assessment of effects that will be adopted for EIA are presented. The proposed scope and methodologies for CEA and transboundary assessment are also provided.

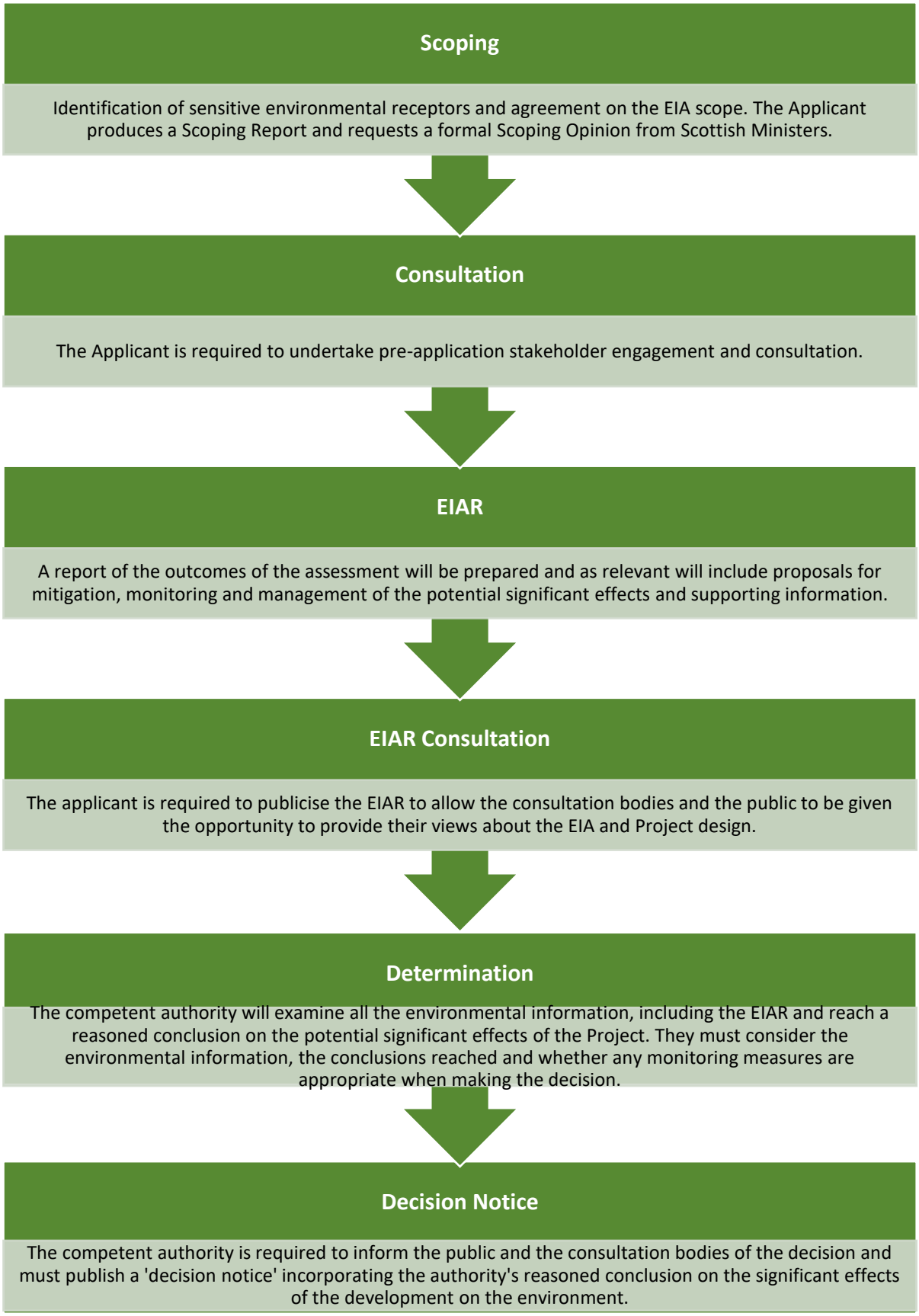
5.1.1.2 Additionally, this chapter provides an overview of related environmental assessments namely the HRA process and the MPA Assessment.

5.1.1.3 Where the assessment methodology for a receptor deviates from the assessment methodology presented in this chapter (due to guidance or legislation), the receptor specific methodology is presented within the receptor's technical chapter.

5.2 Overview of the EIA Process

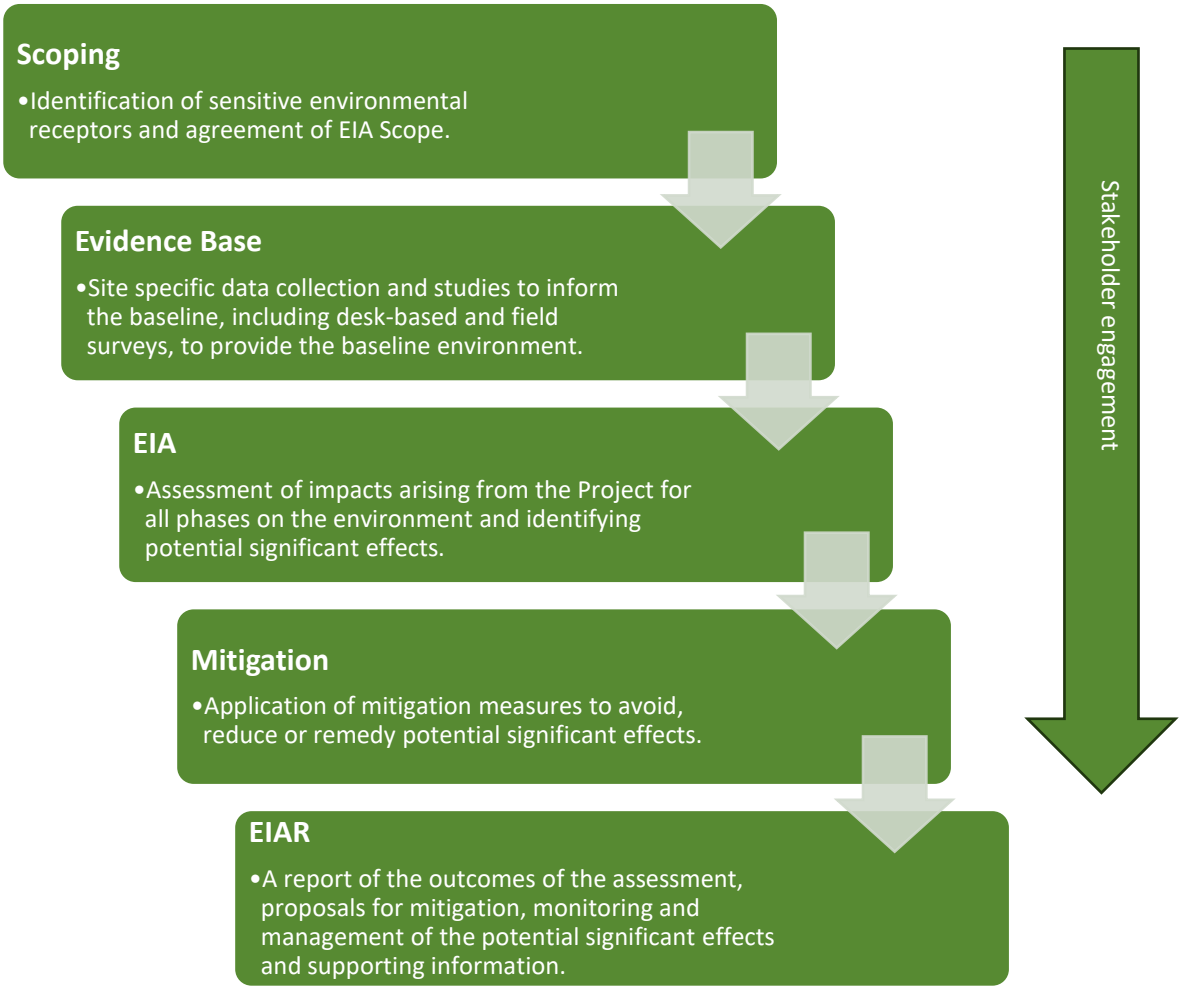
5.2.1.1 The general stages of the EIA process are summarised in **Plate 5-1.**

Plate 5-1: The EIA Process



5.2.1.2 The Applicant is in the Scoping stage of the process and working towards EIAR preparation. Within this stage the applicant is identifying the baseline environment to then identify and assess the impacts of the Project and provide appropriate mitigation as shown in **Plate 5-2,** noting that many of the activities will run in parallel rather than entirely sequentially (for example baseline data gathering is underway at the time of this Scoping exercise).

Plate 5-2: EIA Process from Scoping to EIAR



5.3 EIA Scoping

5.3.1.1 As discussed in **Chapter 1: Introduction**, in February 2023, the Applicant submitted an EIA Scoping Report (2023 Scoping Report)[69]. On 28 June 2023 the Applicant received the 2023 Scoping Opinion[70] from the Scottish Ministers.

5.3.1.2 The Scottish Ministers provided valuable feedback in the 2023 Scoping Opinion which has been taken onboard by the Applicant. Since this time the Project has evolved and notably, the entire length of the cable corridor from the Array Area to landfall is now being included in the application up to MHWS. **Figure 1-1** shows the new Project Area and Scoping Boundary for the Project. This evolution has provided an opportunity to provide a new Scoping Report (2024 Scoping Report) which provides a comprehensive Project update and detailed Project Description. This

Scoping Report also considers all feedback provided by MD-LOT and other stakeholders in the previous Scoping Opinion. A summary of the key issues raised during consultation to date (including the 2023 Scoping Opinion) is provided in each technical topic chapter (**Chapters 7 – 23** of this 2024 Scoping Report) alongside commentary on how these issues have been addressed by the 2024 Scoping Report or will be considered in the production of the EIAR.

5.3.1.3 The objectives of the 2024 Scoping Report are to:

- Present updated Project information;
- Address any concerns identified in the 2023 Scoping Opinion[70]; and
- Enable agreement to be reached on the proposed approach to EIA and to invite Scottish Ministers, statutory and non-statutory consultees to engage in the process and provide relevant information.

5.3.1.4 The Applicant believes that interaction with stakeholders strengthens the assessment base and allows for active participation in decision making. This can ensure that a robust and proportionate EIAR is submitted in support of the consent applications.

5.3.1.5 Under the EIA Regulations, once a request for a Scoping Opinion has been issued to the Scottish Ministers for consideration, they are required to consult with the consultation bodies (as defined under Regulation 12(4) of the Electricity Works EIA Regulations (Scotland) 2017[71]; Regulation 14(4) of the Marine Works EIA Regulations (Scotland 2017[72]); Regulation 13 and Schedule 4 of the Marine Works EIA Regulations 2007[73]).

5.4 EIA Legislation, Guidance, and Best Practice

5.4.1.1 The EIA process culminates in the provision of an EIAR written in accordance with:

- The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017[71] as amended by The Environmental Impact Assessment (Miscellaneous Amendments) (Scotland) Regulations 2017[74] (applies to all applications for Section 36 (s.36) consent in Scottish waters out to 200 NM).
- The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017[72] (as amended) (Scotland) (applies to applications that require an EIA for a marine licence from 0-12 NM).
- The Marine Works (Environmental Impact Assessment) Regulations 2007[73] (as amended) (applies to applications that require an EIA, for a marine licence from 12-200 NM).

5.4.1.2 Collectively these are referred to as the EIA Regulations.

5.4.1.3 The following Regulations will also be considered in the production of the EIAR, in addition to the EIA Regulations described above:

- The Conservation (Natural Habitats & c) Regulations 1994[75] (up to 12 NM).
- The Conservation of Habitats and Species Regulations 2017[76] (applies to applications for consent under the Electricity Act 1989, Section 36).

- The Conservation of Offshore Marine Habitats and Species Regulations 2017[77] (applies to marine licences and s36 applications within the Scottish Offshore region beyond 12 NM).

5.4.1.4 The assessment of potential impacts will use the below guidance to assist with the production of a robust and proportionate EIA, in particular:

- Guidelines for Ecological Impact Assessment (EcIA) in the UK and Ireland – Terrestrial, Freshwater, Coastal and Marine[78].
- Guidelines for data acquisition to support marine environmental assessments of offshore renewable energy projects[79].
- Institute of Environmental Management and Assessment Delivering Proportionate EIA[80].
- NPF4[81].
- Planning Advice Note Seventeen: Cumulative effects assessment relevant to nationally significant infrastructure projects (NSIPs) (Version 2)[82].

5.4.2 Guidance on EIA for Offshore Wind Projects

5.4.2.1 The EIA will be undertaken in line with relevant legislation and policy and specifically in accordance with the requirements of the EIA Regulations. In addition, the EIA will take into consideration a range of up-to-date key guidance documents. The list below of key guidance documents provides a general overview of important documents that will help to inform the EIA process which include (but are not limited to):

- A Review of Assessment Methodologies for Offshore Wind Farms (Collaborative Offshore Wind Research In the Environment[83].
- Guiding Principles for Cumulative Impacts Assessment in Offshore Wind Farms[84].
- Environmental Impact Assessment Guide to: Shaping Quality Development[85].
- Delivering Proportionate EIA. A Collaborative Strategy for Enhancing UK Environmental Impact Assessment Practice[86].
- Environmental Impact Assessment Handbook. Guidance for competent authorities, consultation bodies, and others involved in the Environmental Impact Assessment process in Scotland[87].
- Guidance for Applicants on Using the Design Envelope for Applications under Section 36 of the Electricity Act 1989[88].
- Planning Advice Note (PAN) 1/2013 Environmental Impact Assessment[89].
- Planning Circular 1/2017: Environmental Impact Assessment regulations[90].
- Offshore Wind Farms: Guidance Note for Environmental Impact Assessment in Respect of Food and Environment Protection Act 1985 and Coast Protection Act 1949 Requirements (Version 2)[91].
- Decommissioning of Offshore Renewable Energy Installations in Scottish Waters or in The Scottish Part of the Renewable Energy Zone under the Energy Act 2004: Guidance Notes for industry in Scotland[92].

- Marine Scotland Consenting and Licensing Guidance: Offshore Wind, Wave and Tidal Energy Applications: Consenting and Licensing Manual[93].
- The Cumulative Effects Framework, which is under development by MD-LOT and NatureScot will be considered for use in the EIAR when available.

5.4.2.2 The list will be reviewed and updated throughout the EIA process, up to submission of the EIAR. Each individual environmental topic chapter refers to relevant topic-specific guidance, where appropriate.

5.4.2.3 A full list of relevant legislation and guidance considered as part of the EIA process will be provided in the EIAR. An overview is provided in each topic chapter of this Scoping Report.

5.4.2.4 Further details on the requirement for EIA are presented in **Chapter 2: Legislative and Policy Context**.

5.5 Approach to EIA

5.5.1 Overview

5.5.1.1 The purpose of the EIAR is to help the decision maker, consultees, other stakeholders, and the public properly understand the potential significant effects (positive and negative) before a decision is made as to whether to permit development.

5.5.1.2 The Scoping phase involves a process to identify the anticipated content of the EIAR including receptors and proposed methodologies that will be used for the assessment. This content has been discussed with stakeholders prior to Scoping submission (including at a Scoping Workshop, see Section 6.3.3**, Chapter 6: Consultation Process**).

5.5.1.3 The assessment of effects and production of the EIAR is the next phase after Scoping, within the EIAR each topic will provide:

- Identification of the Study Area for the topic-specific assessments;
- Description of the legislation, policy and guidance context;
- Summary of stakeholder engagement, including comments receptor and PAC;
- Description of the environmental baseline conditions;
- Presentation of impact assessment, which includes:
  - Identification of the MDS for each impact assessment; and
  - Identification of likely impacts and assessment of the significance of identified effects, taking into account any embedded mitigation adopted as part of the Project.
- Identification of any further secondary mitigation measures required in respect of potential significant effects (in addition to those measures adopted as part of the Project), 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);
- Assessment of any transboundary effects (i.e. effects on other European Economic Area (EEA) states); and
- Inter-related effects (i.e. inter-relationships between environmental topic areas).

5.5.2 Project Design

5.5.2.1 The EIA process aims to be systematic, analytical, impartial, consultative and iterative allowing opportunities for environmental concerns to be addressed in the design and evolution of the Project. Typically, throughout the evolution of the design, a number of design iterations take place in response to environmental constraints identified during the EIA process prior to the final design being submitted for approval. This iterative design process is a fundamental element of the EIA and for the Project and has developed following feedback via the 2023 Scoping Opinion[70] and other engagement with key stakeholders. This design process will continue to evolve and develop via ongoing stakeholder engagement and upon receipt of the 2024 Scoping Opinion.

5.5.2.2 The iterative design process will continue to be developed for the EIAR. Statutory and non-statutory engagement will take place to provide opportunities for stakeholders to provide feedback and to understand and influence the design as it progresses.

5.5.2.3 The iterative design process also integrates the advice and experience of the EIA team during Scoping and provides for the impact assessment process to be undertaken in regular liaison with the Project's engineering team. This ensures that design evolution is informed by a development-wide understanding of environmental sensitivities such that the mitigation hierarchy is adhered to throughout the design process.

5.5.2.4 From the outset, the environment has been central to the design of the Project, and this is demonstrated in **Chapter 4: Site Selection and Consideration of Alternatives** and through the development of the embedded mitigation presented within the topic chapters (**Chapters 7 – 23**) of this Scoping Report. With this approach to design, the Applicant is seeking to achieve a sustainable and environmentally appropriate design for the Project, being one that will meet operational requirements at the same time as limiting and mitigating the environmental effects of the Project.

5.5.2.5 The design evolution process and activities undertaken to date are described in, **Chapter 3: Project Description** and **Chapter 4: Site Selection and Consideration of Alternatives**. This process has included a combination of engagement, EIA surveys and other technical studies to define the Project Area and the PDE.

Project Design Envelope (PDE)

5.5.2.6 The EIA for the Project will adopt a parameter-based design envelope approach. The provision of a design envelope is intended to identify key parameters enabling the

EIA to be carried out whilst retaining sufficient flexibility to accommodate further refinement during detailed design. The design envelope approach is widely used and accepted for major infrastructure projects in the UK, including for recent applications for offshore windfarms. The approach is recognised by Marine Directorate and the Energy Consents Unit in their guidance on how the design envelope assessment approach may be applied in the context of applications received for generating stations under s.36 of the Electricity Act 1989[94]. This states:

"*in some instances, the nature of the proposed development and evolving technology mean that some topics of the final project are yet to be settled in precise detail at the time that the application is submitted (such as the precise location of certain types of infrastructure, the foundation type, the size of certain structures or the turbine model). Where that is the case and some details are still the be finalised, the design envelope approach can be employed for such applications to enable a degree of flexibility and address these uncertainties. Through the design envelope approach, the application can set out parameters for the proposal including the maximum extents of the proposal and can assess on that basis what the likely worst case effects of the proposal may be. The detailed design of the project can then vary within this 'envelope' to ensure that the project as-constructed has been properly assessed*".

5.5.2.7 There is also UK guidance for the design envelope approach, including within the UK National Policy Statement for Renewable Energy Infrastructure[95] and in the Planning Inspectorate's Advice Note Nine: Rochdale Envelope[96]. Both of these closely align with the Marine Directorate and the Energy Consents Unit guidance.

5.5.2.8 The assessment will consider a MDS, this will enable a meaningful and comprehensive assessment of the Project on a reasonable worst-case scenario basis, whilst maintaining flexibility for refinements to the design as it continues to evolve in ways that cannot be predicted at the time of submission of the consent and licence applications. The reasonable worst-case scenario defined for any given parameter may vary by technical topic, depending on how the parameter can be expected to interact with the receptor being considered. How the PDE has been applied will be clearly described in each of the topic chapters of the EIAR.

5.5.3 Proportionate EIA

5.5.3.1 Scoping is intended to inform a proportional and robust approach to assessment through initial evaluation and reporting of identified potential significant effects in a Scoping Report.

5.5.3.2 In accordance with guidance and legislation, this 2024 Scoping Report seeks to ensure that the EIA and resultant EIAR are robust and focused to help inform the decision-making process. This means that where appropriate, this 2024 Scoping Report seeks to scope out environmental disciplines and specific effects from further assessment with suitable justification and evidence provided. This will focus the assessment on key potential significant effects and ensure the EIA for the Project is proportionate in accordance with PAN 1/2013and IEMA's Delivering Proportionate EIA guidance document.

5.5.3.3 A proactive Scoping process is a way of ensuring that the EIA process and the EIAR are robust whilst suitably focused on aspects of the environment likely to be subject to significant effects. Where more certainty in relation to information exists, this 2024

Scoping Report aims to focus the scope of the proposed assessments on material issues to ensure the EIA is appropriate and proportionate.

5.5.3.4 Proportionality for the EIA process will be achieved by adopting several key themes:

- Proposing an appropriate scope for the EIA;
- Through the assessment approach undertaken for each topic and the analysis required to determine the potential, or otherwise, for potential significant effects;
- By making the EIA as accessible and useful as possible;
- Through engagement with stakeholders on the scope of the assessments for each receptor and potential impact;
- Through use of the existing evidence base; and
- Through inclusion of embedded mitigation (informed by the site selection exercise, and in line with best EIA practice).

Evidence Base

5.5.3.5 The existing baseline environment will be characterised to describe the relevant aspects of the receiving environment in which the Project will be set. Baseline characterisation will be undertaken for topic-specific Study Areas and will comprise available data from existing desk-top resources and, where available, site-specific data sources. The proposed approach for each topic is set out in **Chapters 7 to 23**.

5.5.3.6 Existing data and evidence have been collated and drawn upon for the purposes of this 2024 Scoping Report and it will be expanded upon as the EIA progresses and further survey work, modelling and data collection undertaken as required. This data and information will be used to:

- Inform the understanding of current and baseline environment;
- Scope out matters from further consideration in the EIA where appropriate and justifiable; and
- Scope in matters for further assessment as part of the EIA.

5.5.3.7 The existing evidence base includes NorthConnect EIAR[97] and associated appendices and application documents (see Section 5.6.2).

5.5.3.8 The Applicant has undertaken further surveys in 2023 to provide sufficient data to inform the environmental consenting and engineering processes. In particular, an understanding of physical, chemical and biological receptors within the target offshore marine environment was gathered, the surveys undertaken to date include:

- Digital Aerial Surveys;
- Vessel Traffic Survey (Summer);
- Dropdown Video (300 m transects);
- Benthic macrofauna;
- Particle Size Analysis (PSA);

- Sediment Chemical Samples- standard parameters;
- Sediment Chemical Samples – with additional parameters;
- Water Sampling Station (three depths; surface, middle, bottom;
- eDNA (sediment); and
- Marine Geophysical Survey.

5.5.3.9 An outline of the surveys carried out by the Applicant in support of this application is provided in **Appendix 5A: Survey Summary.**

5.5.3.10 The existing evidence base will continue to be expanded as the EIA progresses and as further data collection and environmental survey and modelling work is carried out in 2024. The evidence base will be discussed with relevant stakeholders to ensure that it is appropriate.

5.5.3.11 For each topic, a step-by-step approach is being adopted which may be summarised as follows:

- Determine the proposed Study Area (typically defined by the area that might be potentially affected by the impacts arising from the Project – otherwise known as the Zone of Influence (ZoI));
- Undertake a preliminary desk top study of available information; and
- Where the existing information is deemed insufficient to provide an adequate baseline, undertake further information or data gathering.

5.5.4 Embedded Mitigation

5.5.4.1 To enable refinement of the potential significant effects of the Project to be taken forward and assessed as part of the EIA, embedded mitigation will be implemented into the design.

5.5.4.2 The incorporation of these measures within the design demonstrates commitment to their implementation. By using this approach, the significance of effect presented in the EIAR is considered to be representative of the maximum residual effect the Project.

5.5.4.3 Embedded mitigation will evolve whilst the EIA is in progress and in response to stakeholder engagement and will be documented in the EIAR.

5.5.4.4 Primary and Tertiary mitigation measures are defined as embedded mitigation measures. All mitigation will be captured within the Commitments Register being prepared for the EIAR. For further information on embedded mitigation please refer to Section 5.7.5.

5.6 Technical, Spatial, and Temporal Scope

5.6.1 Technical Scope

5.6.1.1 The technical scope of assessment for each environmental topic is detailed in **Chapters 7-23** and has been informed by the 2023 Scoping Opinion[70] and subsequent consultation including the Scoping Workshop held in February 2024.

5.6.1.2 Justification is provided for the individual approach and Scoping of matters to be considered in the assessment for each environmental aspect. The technical scope also details the approach to baseline data collection and assessment methodologies.

5.6.1.3 In reviewing **Chapters 7-23**, consideration should also be given to the following:

- **Human health** - Schedule 4 of the EIA Regulations 2017 outlines that 'human health' needs to be taken into consideration in the EIA. It is anticipated that the main interactions of the Project with human health will likely be through marine water quality and socio-economic effects during construction, O&M, and decommissioning. In the 2023 Scoping Report[69], the Scottish Ministers confirmed;

  "*The Scottish Ministers are content for human health to be scoped out of the EIAR as a standalone chapter on the basis that the knock-on social impact to human health is fully considered in the SEIA and direct the Developer to MAU advice to this regard*."

  Therefore, human health will not have a standalone chapter and human health aspects related to socio-economic impacts are detailed in an addendum to the Socio-economic chapter (**Appendix 19A: Human Health Effects).** For the EIAR human health will also form an appendix to the socio-economic EIA chapter.

- **Electromagnetic fields (EMF**) - The potential effects of EMF caused by Project infrastructure is considered in **Chapter 9: Benthic Ecology, Chapter 10: Marine Mammals,** and **Chapter 12: Fish Ecology**. Further supporting information is presented in a Technical Note (**Appendix 5F: Approach to EMF and Heat as potential impacts**).

  - Benthic ecology: EMF may have localised effects on benthos. EMF may have a variety of sublethal effects on benthic invertebrates, both physiological and behavioural.

  - Marine mammals: Direct impacts from EMF on dolphins and harbour porpoises are low and can be credibly scoped out as their highly mobile nature allows them to avoid unfavourable stimuli. However, there are potential indirect impacts through prey that should be assessed.

  - Fish ecology: EMF should be considered for specific species on a case-by-case basis including their relevant sensitivities and current baseline to understand species presence.

- **Heat -** The potential effects of Heat caused by Project infrastructure is considered in **Chapter 9: Benthic Ecology, Chapter 10: Marine Mammals**, and **Chapter 12: Fish Ecology**. Further supporting information is presented in a Technical Note (**Appendix 5F: Approach to EMF and Heat as potential impacts**).

- Benthic ecology: Heat may have localised effects on benthos. Buried cables may increase the sediment temperature above levels suitable for adult and juvenile quahogs.
- Marine mammals: Though the likelihood of direct impacts to these species is minimal, indirect effects through their prey is possible. This impact is addressed in **Chapter 9: Benthic Ecology** and **Chapter 12: Fish Ecology**.
- Fish ecology: Heat should be considered for specific species on a case-by-case basis including their relevant sensitivities and current baseline to understand species presence.

- **Entanglement** -The potential effects of entanglement caused by Project infrastructure is considered **in Chapter 10: Marine Mammals, Chapter 11: Ornithology** and **Chapter 12: Fish Ecology**. Further supporting information is presented in a Technical Note (**Appendix 5G: Approach to secondary entanglement as a potential impact**).
  - Marine mammals: To date, there have been no recorded instances of marine mammal entanglement from mooring systems in terms of tension, rigidity and cable diameter preclude the possibility of forming any entangling loops, there is negligible potential for primary entanglement for the subsea mooring systems. The risk of secondary entanglement is considered low due to the type of fishing activity in the surrounding ICES rectangles.
  - Ornithology: Primary entanglement (direct entanglement with mooring lines or cables etc.) is scoped out as the nature of the mooring lines in terms of tension, rigidity and cable diameter preclude the possibility of forming any entangling loops. Secondary entanglement is therefore scoped out with respect to diving birds, based on the likely fishing gear types around the Array Area, and the lack of evidence of secondary entanglement from similar industries.
  - Fish ecology: Given the number, size and physical characteristics of mooring lines associated with offshore wind turbines it is considered highly unlikely that any fish species with potential to occur in the Study Area would be of greater enough size to become directly entangled in the mooring lines or associated structures. Based on the fishing gear type used within the Array Area, historic evidence and the risk-based adaptive management approach which will be applied to the Project the risk of secondary entanglement to all fish is considered low and has been scoped-out from further assessment.
- **Underwater noise (UWN) -** The potential effects of UWN are considered in **Chapter 9: Benthic Ecology, Chapter 10: Marine Mammals, Chapter 11: Ornithology and Chapter 12: Fish Ecology.**
- **Shellfish ecology -** The potential effects on shellfish is considered in **Chapter 9: Benthic Ecology.**
- **Basking sharks –** Basking sharks (*Cetorhinus maximus*) may occasionally occur in the North Sea, discussed in **Chapter 12: Fish Ecology.**
- **Migratory bats -** As part of the 2023 Scoping Opinion[70], The Norwegian Environment Agency requested the Project consider potential impacts on

migratory bats and the potential cumulative effects of wind power both on land and at sea. The Applicant has conducted a desk-based review of potential bat migrations offshore and any potential overlap with the Project, detailing the outcome of the evidence based on the literature review, drawing on the latest experiences from international projects, including any engagement with projects that has been possible. Whilst there is now evidence of bat migration in the southern North Sea between the UK and The Netherlands and Belgium and between Denmark, Germany and Sweden over the Baltic Sea there is no confirmed evidence of a more northern migration over the North Sea. Eurobats has published a possible migratory route between Norway and Scotland for Nathusius' pipistrelle, but this is speculative – based on the migratory capability of the species and land-based distributions. Therefore, potential impacts to migratory bats are scoped out from the EIA as a consequence of there being no confirmed evidence of a migratory route between Norway and Scotland and significant effects being unlikely. The Bat Migration Desk Review is contained in **Appendix 5B: Approach to Migratory Bats.**

- **Marine turtles -** Marine turtles are occasionally observed in the North Sea. Leatherback turtle is the most commonly seen species in the UK waters, with 86 percent of UK turtle sightings being of this species. It is the only species considered part of the UK fauna. A clear spatial pattern can be observed from UK sightings with most records being from the west and south coasts of Ireland, south-west England, south and north-west Wales and the Irish Sea. Sightings in the North Sea are thought to occur when individuals travel up the west coast of Britain and Ireland and enter the North Sea from the north, passing between Scotland and Norway. Loggerhead turtle (*Caretta caretta*) and Kemp's ridley (*Lepidochelys kempii*), travel along the North Atlantic Gyre and on rare occasion individuals pass through the English Channel towards the North Sea. Isolated records also exist of green turtles (*Chelonia mydas*) and hawksbill turtles (*Eretmochelys imbricata*) but these are extremely rare. All these species usually only occur as stray juveniles in the UK and are considered vagrants in UK waters.

  Ten sightings of leatherback turtle have been recorded from the Scottish North Sea between 2000 and 2011 and five sightings at sea and one stranding have been recorded off the east coast of Scotland between 2009-2019. No turtles were recorded near the Project area in the aerial surveys from 2021-2023 or observed during the geophysical survey campaign.

  Given their extreme scarcity in the region, it is proposed to scope marine turtles out of further assessment.

  Impacts to marine turtles are scoped out, on the basis that they are only rare vagrants within the project area and many of the mitigation measures for marine mammals can also be applied in the exceptional circumstances of turtles being present.

- **Offshore air quality -**The primary source of offshore atmospheric emissions is likely to be from vessels emitting nitrogen oxides, sulphur dioxide and particulate matter. It is proposed that the offshore air quality effects during the construction, O&M and decommissioning of the Project are scoped out of the assessment. The contribution to atmospheric emissions will be very localised and at a small scale. This increase is likely to be insignificant and there are limited receptors likely to

be impacted by this negligible effect. The Array Area is over 185 km at its closest point from the Scottish coastline and vessel activities will be limited in both duration and scale, including during inshore cable installation activities. An Environmental Management Plan (EMP) will be developed during the EIA and will be added to the Commitments Register. A Vessel Management Plan will also be implemented ensuring compliance with relevant national and international maritime air quality standards including the International Convention for the Prevention of Pollution from Ships (MARPOL) Annex VI Regulations. Greenhouse gas emissions will be considered in **Chapter 23: Carbon and Greenhouse Gases.**

- **Offshore airborne noise and vibration:** It is proposed that airborne noise and vibration effects are scoped out of the assessment. Airborne noise and vibration from the construction, O&M and decommissioning phases of the Project may arise from piling, cable installation or other construction activities that may impact on receptors. This airborne noise will be of short duration, localised and transient. Vessels being transient in nature may only be in the vicinity of construction activities for short periods of time and will be required to maintain a safe minimum passing distance, thereby minimising direct noise impacts to passing receptors. The cable installation at landfall will be via HDD and the exit point in the marine area is in water 26 m deep and approximately 190 m offshore. Any noise associated with this will be short term and localised and there is no identified pathway potential for significant effect.
- **Onshore noise, affected by offshore activities –** Helicopter flights to and from the Project will take place over onshore receptors including local communities. Helicopter flights will be from existing airfields and the increase in air traffic noise over that of the baseline is not considered to be significant. Therefore, onshore noise as a result of helicopter transit over land will be scoped out of the assessment. Vessel activity in the inshore environment may also result in minor, temporary increases to onshore noise levels. However, given the location of the proposed inshore activities, they considered to not have the potential to generate significant impacts to onshore receptors and therefore will be scoped out of the assessment.

5.6.2 Spatial Scope

5.6.2.1 The geographical context within which the Project site is shown in **Figure 1-1** of **Chapter 1: Introduction**. The Project Area has developed as a result of the iterative project design process, Scoping and consultation feedback and will continue to evolve during the EIA process.

5.6.2.2 The spatial scope for each topic assessment is dependent on the nature of the potential effects and the location of receptors that could be affected. Relevant topic Study Areas are described for each of the each of the topic chapters (see **Chapters 7-23**). For the majority of the environmental topics the Study Area is the Project Area, however for environmental topics that are required to take account of wider ZoI a wider Study Area has been used. Where environmental topics have considered a wider Study Area, this is specified in the ‘spatial scope and study area’ section of the topic chapter. The spatial scope of the technical assessments have therefore taken account of:

- The physical area of the Project;
- The nature of the baseline environment; and
- The manner and extent to which environmental effects may occur.

5.6.2.3 The ECC will be assessed from the Array Area to MHWS. The section of the ECC from MHWS to 12 NM is the same as the NorthConnect Cable Corridor. The Applicant is coordinating with NorthConnect Limited. NorthConnect Interconnector and the Project will only require one set of infrastructure, within the overlapping marine licence Project Area from 12 NM to MHWS.

5.6.2.4 The section of the ECC from MHWS to 12 NM has previously been assessed within the EIAR submitted for NorthConnect Limited[98] (application reference number 06771 & 06870) and judged acceptable through the consenting of NorthConnect. The previous EIA work for NorthConnect will be considered in assessing the ECC from MHWS to 12 NM, updated by any other readily available information and surveys undertaken.

5.6.2.5 The EIA for the Project will be established on a baseline consisting of the collation of existing desk top information, supplemented where necessary by the collection of site-specific information and/or using data collected from surveys undertaken in 2023 (**Appendix 5A: Survey Summary**).

5.6.2.6 The MCAA 2009[99] and the Marine (Scotland) Act 2010[100] have a landward jurisdictional limit of MHWS. All onshore infrastructure to be located above Mean Low Water Springs (MLWS) has been consented under the Town and Country Planning (Scotland) Act 1997[101] for NorthConnect (Planning Application Reference Number APP/2015/1121 and APP/2018/1831). The Project will be utilising this application and connection. Since marine licencing covers the marine area up to MHWS and terrestrial planning control extends down to MLWS, there is an overlap of consenting regimes in the intertidal zone. The intertidal zone is defined as the area between MLWS and MHWS.

5.6.2.7 The term ‘offshore’ refers to environmental features located on the seaward side of MHWS. The approach to the assessment of the intertidal zone is indicated as appropriate within each topic section in the Study Area description.

5.6.2.8 The relationship across the land-water interface is also of importance with regards to assessments of potential effects under the WFD and MSFD (see **Chapter 2: Legislative and Policy Context**). Due to their consideration of potential effects on the aquatic environment, there is an element of overlap between the two Directives’ jurisdictions and objectives. The MSFD includes coastal waters, but not transitional waters as defined by the WFD, such as estuaries, sea lochs or coastal lagoons. The line between the two Directives is taken as the ‘bay closing line’, or the seaward limit of transitional waters, as defined under the WFD.

Targeted Oil and Gas Onward Development

5.6.2.9 The main driver of the Project is to support the electrification of oil and gas exploration in the North Sea through the provision of renewable electricity to oil and gas platforms. The Applicant is currently in commercial discussions with targeted oil and gas companies to agree connections to the Project. Such connections will be consented separately from the Project.

5.6.2.10 It is recognised that the EIA Regulations require an EIA to assess a 'project' and not just the topics of a project covered by a particular consent/licence application. In the absence of details on future connections to oil and gas platforms, the Applicant and EIA team will consider a likely scenario for connections to oil and gas platforms to enable the potential significant effects to be determined and reported in the EIA.

5.6.2.11 It is anticipated that the Project will provide onward connection to oil and gas assets located in the waters to the north, west and southeast of the proposed Array Area within the Targeted Oil and Gas Onward Development Area (see **Figure 3-3**).

5.6.2.12 It is anticipated that static subsea AC power cables (Oil and Gas Export / Import Cables) will provide AC power, and communications, from the HVAC OSCP to oil and gas platforms located within the Onward Development Area.

5.6.2.13 These will be considered as part of the environmental assessment, albeit not part of the marine licence application. This assessment is included within the cumulative effects assessment. Marine licences for these cables will be applied for separately in the future.

Ports & Harbours

5.6.2.14 A construction and marshalling and Operations and Maintenance port(s) has not yet been identified for the Project and may not be known prior to finalisation of the EIAR and is subject to commercial agreement. The Applicant is however committed to the development of Scotland and as such, for the purpose of the EIA socio-economic assessment, it is proposed to assume that both the construction and marshalling and O&M ports are located on the East Coast of Scotland.

Wet Storage

5.6.2.15 The requirement for the wet storage of turbines outside of the Array Area in close proximity to a port or harbour will be linked to decisions on construction and marshalling port(s) and/or harbour(s). As such potential impacts associated with wet storage are proposed to be scoped out of this assessment.

5.6.3 Temporal Scope

5.6.3.1 The temporal scope refers to the time periods over which impacts and effects may be experienced by sensitive receptors which may be permanent, temporary, long term, medium term or short term. This will be established for each topic in discussion with relevant consultees. The EIA will assess effects during the construction, O&M, and where appropriate, decommissioning phases of the Project. Further details on the different phases of the Project are provided in **Chapter 3: Project Description**.

5.7 Assessment of Effects and Deriving Significance

5.7.1 Approach to Assessment

5.7.1.1 The methodology that will be applied to assess effects during the EIA process is described below. The assessments will broadly consider the magnitude of impacts

and the value or sensitivity of receptors and features that could be affected to classify the significance of effects.

5.7.1.2 In practice, the approaches and criteria applied across different environmental aspects vary. Therefore, professional judgment in the application of standards mandated by professional bodies is applied. Where this is the case, further detail and justification will be provided. The environmental topic sections in **Chapters 7 - 23** provide greater detail on the approaches to the assessment that will be addressed in the EIA and highlight where there are any variations to the approach.

5.7.1.3 The EIAR will identify the potential significant effects of the Project taking account of any embedded and secondary mitigation measures. These effects are known as 'residual effects'.

5.7.2 Impact Assessment

5.7.2.1 The Scoping process identifies the potentially most important/significant impacts and effects (including secondary, indirect and cumulative) for the assessment to consider. This is done through a combination of:

- Looking at the nature of the Project and the impacts it may give rise to;
- Looking at the Project's environmental setting and receptors that are likely to be the most sensitive/vulnerable to impacts from the Project;
- Applying professional understanding gained from the evidence base; and
- Considering stakeholder consultation.

5.7.2.2 Decisions are then made on which impacts and effects to assess or prioritise in the EIA (scoping in and scoping out) and how to assess them.

5.7.2.3 The EIA will consider the potential for impacts during the construction, O&M, and decommissioning phases of the Project. In order to provide a consistent framework and terminology, a matrix approach will be used to frame the judgements made. This will be guided by available data, experience and expert judgement and the latest guidance and best practice will be used. As required by EIA regulations, only effects that are likely to be significant require detailed assessment.

5.7.3 Determining Receptor Sensitivity and Value

5.7.3.1 The sensitivity or value of a receptor (or 'feature' when referring to ecological receptors) is largely a product of its societal or environmental importance, as informed by legislation and policy, and as qualified by professional judgement. Receptor value considers whether, for example, the receptor is rare, has protected or threatened status, importance at local, regional, national, or international scale, and in the case of biological receptors whether the receptor has a prominent role in the function of the ecosystem.

5.7.3.2 The sensitivity of the receptor will be determined by assessing the following sorts of considerations:

- Adaptability - The degree to which a receptor can avoid or adapt to an impact;

- Tolerance - The ability of a receptor to accommodate temporary or permanent change without a significant adverse impact;
- Recoverability - The temporal scale and extent to which a receptor will recover following an impact; and
- Value - A measure of the receptor's importance, rarity and worth.

5.7.3.3 **Table 5-1** sets out the generic guidelines for the assessment of sensitivity and value of a receptor or feature. These guidelines will be adapted by each of the topic assessments to accord with relevant topic specific guidance, as set out in each topic chapter.

5.7.3.4 Expert judgement is needed when determining the sensitivity of receptors. For example, an Annex II species (under the Habitats Directives[102]) would have a high value but may be tolerant to impacts and therefore have very low sensitivity. In this case, the value or sensitivity should reflect the ecological robustness of the species and not necessarily default to its protected status.

Table 5-1: Generic guidelines for the assessment of sensitivity or value

Value or Sensitivity	Guidelines
High	Value: Feature or receptor possesses key characteristics that contribute significantly to the distinctiveness, rarity and character of the site or receptor (for example designated features of international or national importance). Sensitivity: Feature or receptor has a very low capacity to accommodate the proposed change.
Medium	Value: Feature or receptor possesses key characteristics that contribute significantly to the distinctiveness and character of the site or feature (for example designated features of regional importance). Sensitivity: Feature or receptor has a low capacity to accommodate the proposed change.
Low	Value: Feature or receptor possesses characteristics which are locally significant. Feature or receptor which is either not designated or is designated at a local or district level. Sensitivity: Feature or receptor has some tolerance to accommodate the proposed change.
Very Low	Value: Feature or receptor characteristics do not make a significant contribution to local distinctiveness and not designated. Sensitivity: Feature or receptor is generally tolerant and can accommodate the proposed change

5.7.4 Determining Magnitude of Change

5.7.4.1 The magnitude of change affecting a receptor resulting from the Project has been identified on a scale from very low to high. For certain topics, the magnitude of change is related to guidance on levels of acceptability and is therefore based on

numerical parameters. For others professional judgement has been used to determine the magnitude of change, using descriptive terminology.

5.7.4.2 The magnitude of an impact will be determined taking account of the following sorts of factors:

- Extent - The area over which an impact occurs;
- Duration - The time during which the impact occurs;
- Frequency - How often the impact occurs; and
- Severity - The degree of change relative to the baseline level.

5.7.4.3 **Table 5-2** sets out the generic criteria of the assessment of the magnitude of change. These criteria have been adapted by each of the topic assessments to accord with relevant topic specific guidance, as set out in each topic chapter.

Table 5-2: Generic criteria for the assessment of magnitude

Magnitude	Guidelines
High	Large scale changes over the whole Project area, large parts of the Project area and potentially beyond to key characteristics or features of the particular environmental topic's character or distinctiveness.
Medium	Medium scale changes over the majority of the development area and potentially beyond to key characteristics or features of the particular environmental topic's character or distinctiveness.
Low	Noticeable but small-scale changes over part of the development area and potentially beyond to key characteristics or features of the particular environmental topic's character or distinctiveness.
Very Low	Noticeable but very small-scale change or barely discernible changes over a small part of the development area and potentially beyond, to key characteristics or features of the particular environmental topic's character or distinctiveness.

5.7.5 Evaluation of Significance of Effects

5.7.5.1 In the absence of quantified standards, significance can be evaluated through considering the magnitude of an impact in combination with the value /sensitivity of the feature that is affected. Presented is the overall matrix that will be used for the EIA. The generic definitions that will be used to determine the level of significance are shown in the matrix. Reference is made to:

- 'Major' effects, which will always be determined as being significant. These are highlighted in red in the matrix;
- 'Moderate' effects can be significant, or not significant, based on specific scenarios and professional judgement. These are highlighted in orange in the matrix;
- 'Minor' or 'negligible' effects will always be deemed as not significant. These are highlighted in green in the matrix;
- 'Negligible' means no detectible change; and

- Effects can be positive or negative.

Table 5-3: Matrix for evaluating the significance of an effect

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

5.7.5.2 For many environmental topics significance can be determined by using a matrix. Variations to this matrix approach, which may be applicable to specific environmental topics are detailed within the respective sections, along with descriptions of receptor sensitivity, magnitude of change and levels of effect that are considered significant.

5.7.5.3 The identified effects may warrant re-examination to see if the magnitude of either the impact or effect can be reduced further. It may also be possible to apply mitigation that make the receptor/feature less sensitive. Different options for mitigation are discussed below.

Embedded Mitigation and Monitoring

5.7.5.4 EIA is an iterative process and opportunities for mitigation, referred to as 'embedded mitigation' have been considered throughout the design development. Where possible, these measures have been developed with input from key stakeholders together with appropriate technical standards, policies, and guidance.

5.7.5.5 Embedded mitigation is classed as primary or tertiary mitigation (as shown in **Plate 5-3**), and could consist of modifications to the location or design of the development made during the pre-application phase that are an inherent part of the Project. The EIA process will systematically identify and assess impacts and effects and take into consideration potential changes to the Project design parameters to reduce the severity of an effect, or where that is not possible, mitigation and monitoring measures that will be adopted in the development, operation and decommissioning of the Project.

5.7.5.6 These embedded mitigations include both avoidance, best practice, and design commitments, in accordance with the IEMA 'Delivering Quality Development' definitions and set out in **Plate 5-3**. Good practice consideration and application of environmental measures involves a hierarchal approach, considering avoidance of negative effects as the primary objective.

5.7.5.7 Embedded mitigation will incorporate all types of measures as set out in **Plate 5-3.** Opportunities for design measures will be identified throughout the evolution of the

design and implementation strategy for the Project and the EIA process. This allows potential significant adverse environmental effects to be fed back into the design process, to verify whether they can be avoided or otherwise mitigated in accordance with the hierarchy. In addition, relevant and proportionate opportunities for environmental enhancement and good practice measures will be identified where appropriate, in accordance with applicable statutory, policy and guidance requirements (see **Chapter 2: Legislative and Policy Context**). These design measures and good practice measures will be included within the Project plans and drawings and thus are integrated into the overall design strategy as embedded mitigation.

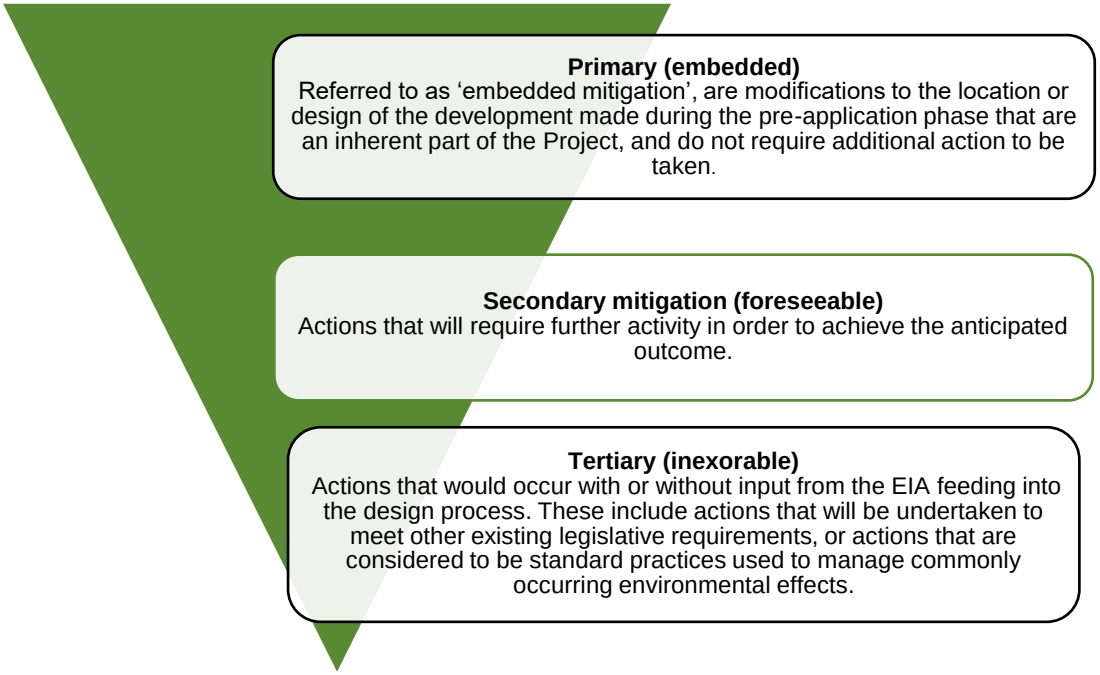
5.7.5.8 The iterative design evolution process to be followed will be driven by collaborative working between the design and environment teams, and in consultation with key stakeholders. This may be through the consideration and adoption of alternatives or through measures incorporated within the design itself.

5.7.5.9 Following assessment of the potential significant effects of the Project, any further mitigation measures, i.e. the need for secondary mitigation (as identified in **Plate 5-3**) will be outlined within the individual topic chapters of the EIAR. Examples of this could include seasonal restrictions on certain construction activities to minimise impacts on migratory species. These will be added to the Commitments Register and secured through the consenting process.

5.7.5.10 Embedded mitigation will be subject to ongoing review to ensure that the Project can be adaptive to changes or unexpected outcomes, hence the PDE approach.

5.7.5.11 A Commitments Register will be used as the primary tool to capture and agree all embedded mitigation and the mechanism of securing them. As the intention is to implement all measures as part of the Project's design, the assessment of potential significant effects is based on this assumption. The Commitments Register will be provided alongside the EIAR. Implementation of the embedded mitigation relied upon in the assessment will be secured in the marine licence conditions or s.36 Consent conditions.

Plate 5-3: Types of mitigation



5.7.5.12 The EIA Regulations require, where appropriate, the environmental monitoring measures to be put in place in relation to any potential significant adverse effects caused by the Project. Where monitoring as part of the mitigation, it will be detailed within each with topic chapter of the EIAR and the results of any monitoring will be shared with the relevant stakeholders as appropriate. The monitoring measures will also be recorded in the Commitments Register of the EIAR.

Assessment of Residual Effects

5.7.5.13 The significance of effect will then be assessed for each potential impact following the application of any necessary secondary mitigation to reduce the potential negative effects.

5.7.6 Inter-Related Effects

5.7.6.1 Regulation 4(2) of the Electricity Works (EIA) (Scotland) Regulations 2017[71], Regulation 5(2) of the Marine Works (EIA) (Scotland) Regulations 2017[72], and Schedule 3 of the Marine Works (Environmental Impact Assessment) Regulations 2007[73] require that the EIA consider the interaction of environmental effects associated with the Project.

5.7.6.2 The potential for inter-related impacts arising from the Project will also be considered as part of the EIA process. The assessment will consider:

- **Project lifetime effects:** i.e., those arising throughout more than one phase of the Project (construction, O&M, and decommissioning) to interact to potentially create a more significant effect on a receptor than if just one phase were assessed in isolation; and
- **Receptor led effects**: assessment of the scope for all effects to interact, spatially and temporally, to create inter-related effects on a receptor (or group). Receptor-

led effects might be short term, temporary or transient effects, or incorporate longer term effects.

5.7.6.3 The inter-related effects assessment only considers the effects from the Project, with effects from other projects considered within the CEA.

5.7.6.4 In the majority of cases, inter-related effects will be inherently considered within each topic chapter of the EIAR. For example, the combined impact of foraging habitat loss and underwater noise disturbance on marine mammals will be considered in the Marine Mammals chapter.

5.7.6.5 Common receptors for environmental topics will be identified, and consideration given to whether the topic effects on any common receptors are likely to combine. This consideration will look at:

- Identification of the common receptor(s) from the individual topic assessments;
- Identification of impact source pathway that each common receptor(s) may experience;
- Identification of potential effects on the identified common receptor(s); and
- The inter-related effects across the construction, O&M and decommissioning phases where appropriate.

5.7.6.6 The inter-related effects assessment will identify any significant residual inter-related effects on a common receptor or receptor groups set out in individual topic assessments, and qualitatively comment on the potential for actual or perceived significant residual effects for such receptors.

5.7.6.7 When considering the potential for impacts to inter-relate it is assumed that any residual effect determined as having no impact will not result in a significant inter-relationship when combined with other effects on receptors. However, where a series of negligible or greater than negligible residual impacts are identified they will be considered further. This will be informed by an over-arching matrix setting out where topics have reached an assessment of relevant effects per receptor or receptor group, followed by a narrative explaining the effects for each receptor.

5.8 Cumulative Effects Assessment (CEA)

5.8.1.1 A CEA will be carried out for the Project which will examine the results from the combined impacts of the Project with other projects / plans on an individual receptor. These will be assessed within the EIAR.

5.8.1.2 As noted in paragraph 5.6.1.1, the assessment of potential significant cumulative effects with future connections to targeted oil and gas platforms will be incorporated into the CEA.

5.8.1.3 Schedule 4 of the EIA Regulations (Scotland) 2017[72] and Schedule 3 of the Marine Works (Environmental Impact Assessment) Regulations 2007[73] requires that cumulative effects of the development should be described in the EIAR. Planning Circular 1/2017[90] and Planning Advice Note 1/2013[89] also sets out this requirement. There is currently no specific Scottish guidance on the methodological framework for assessing cumulative effects in general. PAN 1/2013 acknowledges that "*assessment methods for cumulative impacts and interactions vary*" and that it is a

"*matter of professional judgement to ensure the relevant projects and activities – and their environmental effects – are identified, taking into account the circumstances of the individual proposal and its location*".

5.8.1.4 As such, the approach to the CEA has been informed by several guidance documents including: the Planning Inspectorate's Advice Note Seventeen[82]; and for the offshore elements especially, the RenewableUK and the Natural Environment Research Council published guidelines[84] on the undertaking of CEA and the Marine Directorate guidance on offshore wind, wave and tidal energy applications, which provides guidance on the types of projects to include in a CEA[103]. This guidance states that '*Engagement with MS-LOT is required to identify which plans/projects/ongoing activities should be included in the in-combination element of the cumulative effects assessment (CEA).*'

5.8.1.5 At the time of writing, it is noted that MD-LOT and NatureScot are producing a cumulative effects framework (CEF) that focuses on CEA in Scotland[104]. The CEF will be drawn upon if available at the time of writing the EIAR.

5.8.1.6 The EIA Regulations require only the assessment of committed projects (i.e. projects with the necessary consents to enable construction). This requirement has been extended to fulfil the requirements of the guidance referred to in paragraph 5.8.1.3 to provide a comprehensive assessment of likely cumulative effects.

5.8.1.7 For the purposes of the CEA, the criteria of other plans or projects that are proposed for consideration include those:

- Already constructed;
- Under construction;
- Permitted application(s) but not yet implemented;
- Submitted application(s) but not yet determined; and
- Plans and projects which are 'reasonably foreseeable' including offshore renewable energy projects that have an Area for Lease (AfL) from CES or the Crown Estate.

5.8.1.8 The CEA will focus on developments in proximity to the Project that may have effects on the same receptors. Generally, only other developments where an EIA is required are considered appropriate for inclusion in the CEA. This is because these developments are most likely to result in effects of a magnitude sufficient to lead to potential significant effects either on their own or in combination with the Project, and they are also most likely to have sufficient information in order to undertake a meaningful assessment. The CEA will include other developments that may begin construction, operation or be decommissioned within the same period as the Project's construction, O&M or decommissioning timelines.

5.8.1.9 In relation to future projects, the Project will consider other plans/projects that have submitted a Scoping Report up to four months prior to application submission.

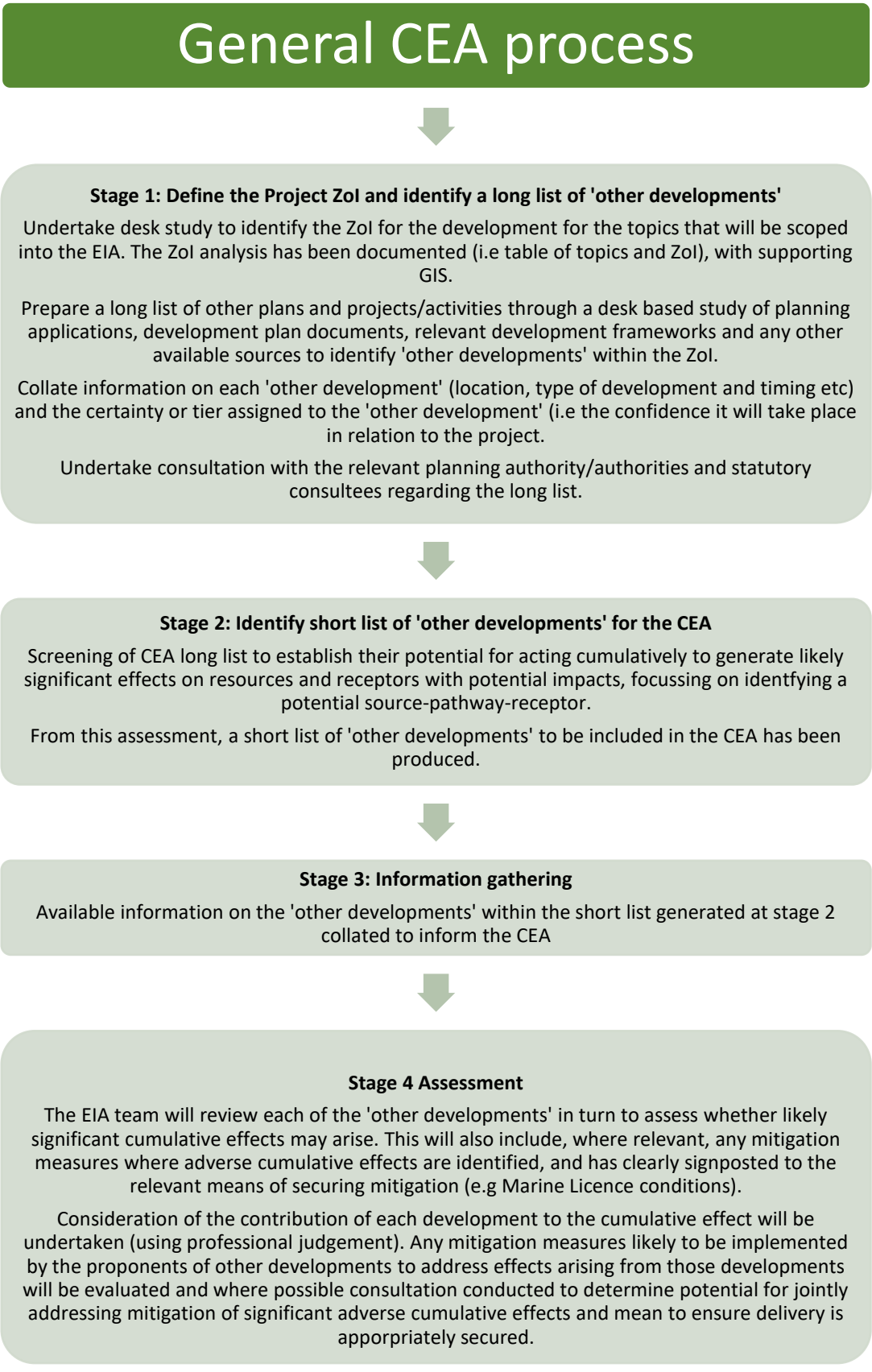
5.8.1.10 The CEA methodology presented below is divided into a screening stage and an assessment stage. The offshore screening approach follows the RenewableUK accepted guidance[84], which is specific to the marine elements of an offshore

windfarm, addressing the need to consider mobile wide-ranging species (foraging species, migratory routes etc).

5.8.1.11 The CEA methodologies, including the Zones of Influence (ZoI) for each environmental topic, are presented below to encourage stakeholder engagement and the general staged process that has been followed for the CEA is set out in **Plate 5-4**.

5.8.1.12 The Applicants position is that the offshore oil and gas cable connections within the Targeted Oil and Gas (TOG) Onward Development Area will be assessed as part of the CEA.

Plate 5-4: General CEA Process



5.8.2 Stage 1: Define the Project's Zone of Influence (ZoI) and identify a Long List of 'Other Developments'

Approach to the Long List

5.8.2.1 The first stage of the CEA is to produce a 'long list' of other relevant projects, plans, and activities ('other developments') happening within a large Study Area around the Project Area. The long list includes those in the UK and adjoining international jurisdictions and is based on publicly available information available at the time of preparation. It considers the scale of the other developments, and the potential for these to produce cumulative effects with the Project.

5.8.2.2 The search area defined in **Table 5-4** has been applied in developing the long list of other developments. It should be noted that these initial screening ranges are based on what are considered to be the maximum extents of potential impacts (based on guidance and professional experience) from those activities and are therefore considered to be highly precautionary.

5.8.2.3 Where other developments are expected to be completed before the construction of the Project and the effects of those projects are fully determined, effects arising from them will be considered as part of the baseline and may be considered as part of assessment in the construction and operational phases (noting that the assessment should clearly distinguish between other developments forming part of the baseline and those in the CEA).

5.8.2.4 Existing operational developments will only be screened into the long list if there is the potential for an ongoing impact from that development type. For most receptors, operational developments will be considered part of the existing baseline and will be assessed as part of the Project specific impact assessment and are therefore not considered within the cumulative impact assessment.

Table 5-4: Search area for long list

Offshore Elements	Search area extent	Rationale
Aggregate, dredging and disposal	Up to 50 km from the Site	This range represents a precautionary maximum distance at which effects from aggregate dredging and disposal could occur (e.g. changes to hydrodynamic regime/coastal processes).
Cables and Pipelines	Up to 50 km from the Site	This range represents a precautionary distance at which effects from cables and pipelines (e.g. increases to Suspended Sediment Concentrations (SSCs) from installation could occur).
Commercial fisheries	Up to 200 km from the Site	This range represents a precautionary maximum distance at which effects from commercial fisheries could occur and is wide enough to cover fishing

Offshore Elements	Search area extent	Rationale
		grounds off the East Coast of Scotland and off North East England.
Port and Harbour Development	Up to 200 km from the Site	This range represents a precautionary maximum distance at which effects from Port and Harbour Development could occur (Numerous receptor types for this so the search area is wide enough to cover noise impacts to marine mammals, socio-economic impacts, shipping and navigation impacts etc).
Military, aviation and radar	Up to 200 km from the Site	This range represents a precautionary maximum distance at which effects from military and civil aviation could occur (e.g impacts to other helicopter and platform operators, impacts on civil aviation radar).
Offshore energy	Up to 510 km from the Site	This range represents a precautionary maximum distance at which effects from offshore energy (e.g. collision risk to bird species with large foraging ranges) could occur.
Oil and Gas Field Developments	Up to 500 km from the Site	This range represents a precautionary maximum distance at which effects from oil and gas activities (e.g. underwater noise from piling) could occur.
Shipping	Up to 200 km from the Site	This range represents a precautionary maximum distance at which effects from shipping could occur. This range comfortably allows for a UK Chamber of Shipping routing study area of 50 NM for impacts from the Project with a 50 NM buffer for impacts from other projects.
Carbon Capture and Storage (CCS)	Up to 500 km from the Site	This range represents a precautionary maximum distance at which effects from CCS could occur (e.g. increases to noise caused by any piling activities). This distance will be considerably reduced if existing wells and platforms are used.

5.8.2.5 All other developments located within the search area as defined in **Table 5-4** will be identified through a desktop study using the following data sources:

- The Marine Directorate website including applications and the Scoping stage (https://marine.gov.scot/).
- The Crown Estate Scotland website (https://www.thecrownestate.co.uk/en-gb/what-we-do/on-the-seabed/marine-planning/).
- The Crown Estate website(https://www.thecrownestate.co.uk/en-gb/what-we-do/on-the-seabed/marine-planning/).
- European Marine Observation and Data Network (EMODnet) data (http://www.emodnet-humanactivities.eu/view-data.php).
- North Sea Transition Authority (https://www.nstauthority.co.uk/the-move-to-net-zero/interactive-energy-map-for-the-ukcs/).
- The Marine Management Organisation website (https://marinelicensing.marinemanagement.org.uk/mmofox5/fox/live/MMO_PUBLIC_REGISTER/search?area=3).
- Developers and project proponents' websites where available.

5.8.2.6 Any additional sources specific to an individual topic are outlined in the topic chapters of this Scoping Report.

5.8.2.7 The long-list of projects developed for the Project is shown in **Appendix 5C: CEA Long-List of Projects.**

5.8.3 Stage 2: Identify Shortlist (Screening) of Other Developments for the CEA

Screening of Long List - Interactions

5.8.3.1 Following creation of the long list, all other developments will be screened based on the potential for each potential impact-receptor pathway shown in **Table 5-5** interaction with the Project and on the level of detail available (tiered approach). This screening will produce EIA topic-specific short-lists of other developments which will be considered further within the CEA section of the topic chapters.

Table 5-5: Other development specific screening criteria

Term	Criteria
Conceptual - Likely impact-receptor pathway	There is the likelihood that a pathway exists whereby an impact could have a direct or indirect effect on a receptor. For example, increases to suspended sediment concentration could have an impact on fish and shellfish receptors, however there is no pathway for underwater noise to have an effect on aviation and radar receptors.
Spatial effect interaction	The impacts on a receptor from the Project and one or more other plans/projects have a geographical overlap. For example, underwater noise contours from pin piling at the Project could overlap with those of another offshore windfarm project, if it is sufficiently close to the Project. If there is no spatial interaction, there is no potential for a cumulative effect.

Term	Criteria
Temporal effect interaction	The impacts from the Project and one or more other plans/projects have the potential to occur at the same time. If there is no temporal interaction, there is no potential for a cumulative effect.

5.8.3.2 The cumulative effects screening stage will be undertaken by experienced specialists, using current guidance and best practice. Only where there is the likelihood of both spatial and temporal interaction between effects arising from the Project and from one or more of the other developments identified, will a cumulative impact be taken forward for consideration in the CEA. The screening process for the long list of other developments will provide a record of those screened in or out for further consideration within the CEA on the basis of one or more of these criteria.

Topic Specific Screening List – Impact Ranges

5.8.3.3 The topic specific screening distances that will be used to refine the screened long list into topic specific short lists (along with justifications for the distances used) are provided in **Table 5-6**.

Table 5-6 Screening extents for offshore CEA purposes

Receptor	Maximum extent of impact and justification
Aviation, military, and communications	Distance at which disturbance from the Project Area would interact with that of an 'other development' (50 km).
Benthic and intertidal ecology	Benthic receptors are sessile and therefore prone to impacts in situ, with limited ranges. The longest range potential effects are related to sediment remobilisation, transport and subsequent resettlement/smothering, as determined by water movement. Therefore it is appropriate to consider these impacts on the scale of a tidal excursion, which varies by location. Accordingly, 15 km is chosen as this encompasses the maximum tidal excursion in any part of the project area.
Commercial fisheries	Dependent on the extent of the relevant fishing grounds targeted by each fleet affected. Anticipated to cover grounds off the East Coast of Scotland and off North East England.
Fish ecology	For migratory fish the Study Area will include the North East anadromous fish region boundary which runs from East Coast of the Orkney Islands to Berwick upon Tweed. Given the extensive open ocean and near shore migrations undertaken by diadromous fish species there is the potential for activities associated with the construction, operation, maintenance, and decommissioning of both the array and the export cable to result in impacts on populations at a distance from the Project area. ZoI for non-diadromous species will be set by the spatial extent over which any potential significant effects may occur. This will be determined by modelling (e.g. underwater noise, EMF and suspended sediment) established from baseline investigations.
Infrastructure and other users	The ZoI is based on the extent of the Project Area and any development overlapping the Project Area.

Receptor	Maximum extent of impact and justification
Marine archaeology	Dependent on the archaeological receptor in question but a max of 5-10 km from the Project Area.
Marine geology, oceanography, and coastal processes	The assessment of potential impacts will be limited to the spatial extent over which any potential significant effects may occur. This extent will be based on the understanding of likely effects established from baseline investigations and assessment work. In spatial terms, this is expected to equate to up to 50 km from the Project Area (including consideration of any downstream / far-field effects).
Marine mammals and other megafauna	Dependent on the underwater noise modelling and the nature of the receptor which will determine the limit of audition and therefore the maximum extent of possible impact.
Offshore ornithology	The species-specific foraging ranges from Woodward *et al*[105] is used in the breeding season, and in the non-breeding season, the Furness BDMPS regions are used. The exception is for guillemot and herring gull, where the breeding season foraging range is used during the non-breeding season because they are assumed to not disperse widely during the non-breeding season.
Shipping and navigation	The ZoI for shipping and navigation is defined as the area within 50 NM (approximately 92.6km) from the Project Area.
Climate change	Intrinsically considered as part of the assessment of climate change
Socio-economics	Regional Study Area of Scotland, local Study Area of the local authority area of Aberdeenshire Council.
Water and Sediment Quality	The ZoI for water quality has been defined with regard to water quality impacts and effect-pathways in the offshore environment, a ZoI of 5 km for the Array Area and 15 km for ECC is being used based on tidal excursions between MHWS and 12 NM and array area respectively.

5.8.3.4 This refined short list of projects for each topic will be agreed with stakeholders and MD-LOT as part of ongoing consultation in the post Scoping phase.

5.8.4 Stage 3 and 4: Information Gathering and Assessment

5.8.4.1 At the assessment stage, information is gathered on the projects, plans or activities, to be taken forward into the CEA. Where the potential significant effects (as defined by the EIA Regulations) for the Project are assessed as negligible, or where an effect is predicted to be highly localised, these will not be considered within the Project CEA, as it is considered that there would be no potential for cumulative effects with other plans or projects.

Tiered Approach

5.8.4.2 In assessing the potential for cumulative effects from the Project, it is important to bear in mind that other developments, predominantly those 'proposed', may or may not be taken forward for development. Therefore, there is a need to build in a consideration of certainty (or uncertainty) with respect to the potential impacts which

might arise from such proposals. For example, other developments which are already under construction have a higher degree of certainty that they will contribute to cumulative effects than those other development applications that are at an early stage.

5.8.4.3 For these reasons, all of the relevant other developments will be allocated into 'Tiers', reflecting their current status within the planning and development process. This allows the CEA to present several scenarios, reflecting the varying levels of certainty of an activity proceeding and therefore the potential for impacts to arise that might act cumulatively with the impacts arising from the Project.

5.8.4.4 A tiered approach, shown in **Table 5-7,** will be used for screening and assessment of other developments. The tiers are listed in descending order of level of detail likely to be available (and certainty of effects arising), i.e. their position in the consenting phase. Appropriate weight may therefore be given to each scenario (Tier) in the decision-making process when considering the potential cumulative impacts associated with the Project. For example, it may be considered that greater weight be attributed to Tier 1 than Tier 2, where the application for consent is submitted as a minimum, therefore more detail will be available in the public domain leading to a more robust assessment.

Table 5-7: Tiers used for screening and assessment of other developments offshore

Tier	Criteria
Tier 1	• Other developments built or "under construction; • Permitted application(s), but not yet implemented or constructed; and • Submitted application(s) which are not yet determined.
Tier 2	• Other developments where a Scoping Report has been submitted up to four months prior to submission of the Project.
Tier 3	• Plans and projects that are 'reasonably foreseeable' e.g. Projects likely to come forward where an Agreement for Lease (AfL) has been granted.

5.8.4.5 The shortlist of plans and projects will be assigned a data confidence value using the criteria listed shown in **Table 5-8**.

Table 5-8: Data confidence criteria

Data Confidence	Criteria
High	Projects, plans or activities with an EIAR or equivalent document, with good level of detail to complete the CEA. Peer review and/or industry standard third party quantitative, semi-quantitative data. Detailed project parameters published in the public domain and confirmed as being accurate by the Applicant.
Medium	Projects, plans or activities with an EIAR or equivalent document, with moderate level of detail to complete the CEA. Third party data supplied to or obtained by the Applicant, which has not been subject to peer review.

Data Confidence	Criteria
	Peer reviewed and grey literature that is considered relevant.
Low	Projects, plans or activities with a lack of robust information. Projects, plans or activities that may be developed in the future, but currently lack specific information.

5.8.4.6 Where practicable, the CEA methodology follows the outline of the standalone assessment methodology described in Section 5.7.

5.8.4.7 As part of each topic's assessment, a review will be undertaken of each of the 'other developments' in turn to assess whether cumulative effects are likely to arise. This will include, where relevant, any environmental measures where negative cumulative effects have been identified and will clearly signpost to the relevant means by which required mitigation will be secured (for example, draft marine licence conditions and associated mitigation plans).

5.8.4.8 To develop potential environmental mitigation measures that may be required for the Project cumulative effects, the Project will consider mitigation measures likely to be implemented by the proponents of other developments to address effects arising from those developments. The Project will use professional judgement to ascertain the contribution of each development to the effect.

5.8.4.9 The following criteria will be applied to the screening of the long list for other developments offshore:

- Screened into the CEA:
  - Other developments which are considered as part of the baseline but the effects of which are not fully determined in the marine environment.
  - Where there is a potential for potential significant cumulative effects to occur (based upon available information and professional judgement).
  - All other relevant plans or projects that are publicly available four months prior to the submission of the Project's application.
- Screened out of the CEA:
  - Other developments which are considered as part of the topic baseline environment.
  - Where it is not possible to conduct a meaningful assessment of potential cumulative effects due to insufficient publicly available information (see **Table 5-7**).
  - Where no likely impact-receptor pathway exists (**Table 5-5**).
  - Where there is no likely spatial effect interaction (see **Table 5-5)**.
  - Where there is no likely temporal effect interaction (see **Table 5-5)**.

5.8.4.10 These criteria ensure a clear justification for screening other developments in or out.

5.8.5 Transboundary Effects Assessment

5.8.5.1 Transboundary effects may occur when impacts from a development within one European Economic Area (EEA) State affects the environment of another EEA State(s). The United Nations Economic Commission for Europe Convention on EIA in a Transboundary Context (adopted in 1991 as the 'Espoo Convention') was negotiated to enhance the cooperation between European Economic Area (EEA) States in assessing environmental effects. The Espoo Convention has been transposed into Scottish EIA law by way of Regulation 29 of the Electricity Works (EIA) (Scotland) Regulations 2017[71], Regulation 30 of the Marine Works (EIA) (Scotland) Regulations 2017[72]. These Regulations set out the processes for consultation and notification. In the event that a project is considered to cause significant transboundary effects, the EIA Regulations 2017 require Scottish Ministers to engage with the affected EEA State and invite them to participate in consultation.

5.8.5.2 Following the exit of the UK from the European Union (EU) in December 2020, the UK is no longer an EU Member State. However, for the purposes of assessing potential transboundary effects, the approach outlined above has been followed for the Project.

5.8.5.3 This assessment of potential transboundary effects is considered on a topic by topic basis and determination of their significance draws on the use of zones of influence for key categories of effect. A screening process has been undertaken in this Scoping Report to ascertain which topics will require further transboundary effects assessment in the EIAR.

5.8.5.4 The assessment of potential for transboundary effect considers the following elements:

- Characteristics of the Project.
- Location of the Project, including proximity to relevant EEA States.
- Environmental context / importance, for example any EEA protected areas which may be affected by the Project.
- Potential pathways of effect.
- The extent of potential effects.
- The scale of the potential effect, to consider magnitude, probability, duration, frequency and recoverability.
- Cumulative impacts.

5.8.5.5 Where applicable, consideration of transboundary effects will follow the standard approach to EIA, as outlined within Section 5.7, with regards to magnitude, significance etc. The assessment will be presented within each topic chapter of the EIAR where relevant.

5.8.5.6 A Transboundary Screening Matrix that summarises the potential for transboundary effects to occur in relation to each of the offshore aspects is provided in **Appendix 5D: Transboundary Screening Matrix**. The primary purpose of the Transboundary Appendix is to provide a screening assessment of potential transboundary impacts which have the potential to affect other European Economic Area (EEA) States.

5.8.5.7 As detailed in the topic chapters, the following receptors may experience transboundary impacts from the Project:

- **Chapter 10: Marine Mammals;**
- **Chapter 11: Ornithology**;
- **Chapter 12: Fish Ecology;**
- **Chapter 13: Commercial Fisheries**;
- **Chapter 14: Shipping and Navigation;**
- **Chapter 17: Marine Infrastructure and Other Users**; and
- **Chapter 21: Major Accidents and Disasters**.

5.8.5.8 Where applicable, consideration of transboundary effects will follow the standard approach to EIA with regards to sensitivity, magnitude and significance. The assessment will be presented within each topic chapter of the EIAR where relevant.

5.9 Related Environmental Assessments

5.9.1 Overview

5.9.1.1 In addition to the EIA, separate assessments are required under other legislation, as described within **Chapter 2: Legislative and Policy Context**, and these assessments will be provided with the consent application for the Project. For consistency of approach, these assessments will draw on the established evidence base, i.e. the results of site-specific surveys studies, and any third-party data and/or information collected to support the Project.

5.9.2 Habitats Regulations Appraisal (HRA)

5.9.2.1 HRA, as described within **Chapter 2: Legislative and Policy Context**, considers the potential for likely significant effects (LSE) to arise as a result of a plan or project, which may affect the integrity of the NSN and their associated qualifying features, and can involve up to four stages described in **Plate 5-5**.

Plate 5-5: Stages of HRA

Stage 1 – Screening:

This stage identifies whether a plan or project is likely to have a significant effect on a European site (either alone or in combination with other plans or projects). Where Likely Significant Effects (LSE) cannot be ruled out at this stage, the European sites will be "screened in" and assessed further.

Stage 2 – Appropriate Assessment:

Where there are LSE, this stage considers the adverse effects of the plan or project on the integrity of the relevant European Sites, either alone or 'in combination' with other projects or plans, with respect to the sites' structure and function and their conservation objectives. Where there are adverse impacts, it also includes an assessment of the potential mitigation for those impacts.

Stage 3 – Assessment of Alternative Solutions:

Where adverse impacts [on the integrity of the site] are predicted, this stage examines (whether or not there are) alternative ways of achieving the objectives of the project or Plan that avoid adverse impacts on the integrity of European Sites.

Stage 4 – Assessment Where No Alternative Solutions Exist and Where Adverse Impacts Remain:

This stage assesses compensatory measures where it is deemed that the project or plan should proceed for imperative reasons of overriding public interest (IROPI).

Stages 3 and 4 constitute the derogation provisions contained in Article 6(4) of the Habitats Directive.

5.9.2.2 An HRA is required for the Project, therefore, the Project will provide the Scottish Government with HRA reports, providing the necessary information to undertake all required stages of the HRA.

5.9.2.3 A Screening Report, addressing Stage 1, has been submitted alongside this Scoping Report.

5.9.2.4 Stage 2 of the HRA requires the findings of the EIA process to enable full assessment. A RIAA will be prepared and submitted alongside the EIAR for the Project. This will provide the Competent Authority with the necessary information to determine whether the Project will have an adverse effect on integrity (AEoI) of any European sites.

5.9.3 Water Framework Directive (WFD)

5.9.3.1 The purpose of the WFD assessment is to provide MD-LOT with sufficient information to evaluate whether the Project could cause or contribute to the deterioration of the WFD status of any water body, as described in **Chapter 2: Legislative and Policy Context**. It also provides for an evaluation of whether the Project could jeopardise the water body achieving good status, and/or whether the Project activities comply with the River Basin Management Plan (RBMP). The competent authority must also consider the objectives of any WFD Protected Areas (including SACs, SPAs, bathing waters, and shellfish waters), where relevant. Reporting will follow a standard approach:

- Stage 1: WFD Screening: Identification of the activities associated with the Project that are to be assessed, and determination of which WFD water bodies could potentially be affected through identification of a ZoI).
- Stage 2: WFD Scoping: For each water body identified in Stage 1, an assessment is carried out to identify the effects and potential risks to quality elements from all activities.
- Stage 3: WFD Impact Assessment: A detailed assessment of the water bodies and activities carried forward from the WFD Screening and Scoping stages.

5.9.3.2 The WFD assessment methodology and baseline of waterbodies that could potentially be impacted by the Project are described in **Chapter 8: Marine Water and Sediment Quality**.

5.9.3.3 With the WFD assessment requiring outputs of the EIA to be completed, the assessment will be submitted alongside the EIAR for the Project.

5.9.4 Marine Strategy Framework Directive (MSFD)

5.9.4.1 Unlike the WFD, there is no formal guidance or approach to completing an MSFD assessment for a project. As outlined within **Chapter 2: Legislative and Policy Context**, the goal of the MSFD is for an EU Member State's marine waters to reach and/or maintain Good Environmental Status (GES), through adaption of a series of measures, monitored through key indicators, under 11 high level descriptors.

5.9.4.2 The approach to MSFD assessment to be applied to the Project is therefore qualitative and narrative-based, drawing on the findings of the EIA, as applicable to the descriptors, with the objective of the assessment being to determine whether the Project has the potential to influence the UK's ability to achieve or maintain GES within its waters. Each of the 11 descriptors is broadly associated with an aspect addressed within the EIA. For example, consideration of potential effects on biodiversity relates to Descriptors 1 (Biodiversity), 2 (Non-indigenous species), 4 (Food web structures), and 11 (Energy and noise).

5.9.4.3 With the MSFD assessment requiring the outputs of the EIA to be completed, the assessment will be submitted as an appendix to the EIAR for the Project.

5.9.5 Marine Protected Areas (MPA) Assessment

5.9.5.1 An MPA assessment is required for the Project to accompany the marine licence application, to determine whether the licensable activity is taking place within, or

within the vicinity, of an area designated as an MPA or recommended for designation and then to assess whether there is a significant risk that the licensable activity hinders the conservation objectives of the MPA. Specific consideration of MPAs is required for consent applications in UK waters. The Marine (Scotland) Act 2010[100] and the Marine and the Coastal Access Act 2009[99] introduced provisions to support the management of MPAs under Section 83 and Section 126, respectively, the Competent Authority are required to consider whether the licensable activity applied for is capable of affecting (other than insignificantly) a protected feature in an MPA or any ecological or geomorphological process on which the conservation of any protected feature in an MPA is dependent.

5.9.5.2 The MPA assessment process comprises three steps:

- **Step 1: Initial Screening**: The MPA Screening Assessment is provided in **Appendix 5E: Marine Protected Area Screening Assessment**. This stage is carried out to determine whether the licensable activity is taking place within, or within the vicinity, of an area designated as an Marine Conservation Zone (MCZ) (and MPA) or recommended for designation. The screening stage also considers whether the licensable activity is capable of affecting (other than insignificantly) either:
  - (i) the protected features of an MCZ (and MPA); or
  - (ii) any ecological or geomorphological process on which the conservation of any protected feature of an MCZ (and MPA) is (wholly or in part) dependent. Should the answer to either question be 'yes', a Stage 1 Assessment must follow.
- **Stage 1 Assessment**: This stage is carried out to ensure that the Competent Authority is satisfied that there is no significant risk of the licensable activity hindering the conservation objectives for the MCZ (and MPA).
- If the Competent Authority is not satisfied regarding environmental risk to the MCZ (and MPA) and the fulfilment of their functions, they must consider whether there are other means of delivering the licensable activity with a lesser environmental impact and therefore a lower risk of hindering the conservation objectives of an MCZ (and MPA). If the answer is still 'no', a Stage 2 Assessment must follow.
- **Stage 2 Assessment**: This stage considers whether the benefit to the public clearly outweighs the environmental risk associated with the licensable activity. This stage may also involve the agreement of commitments by the Applicant to undertake measures of 'equivalent environmental benefit' to the damage which the licensable activity may have on the MCZ (and MPA).

5.9.5.3 With the MPA assessment requiring the outputs of the EIA to be completed, the assessment will be submitted alongside the EIAR for the Project. The MPA Assessment Methodology and Step 1 screening is provided in**, Appendix 5E: Marine Protected Area Screening Assessment**.

5.9.6 European Protected Species Risk Assessments

5.9.6.1 Under the Conservation (Natural Habitats & Conservation) Regulations 1994[75] and the Conservation of Offshore Marine Habitats and Species Regulations 2017[76 77], it is an offence to:

- Deliberately capture, injure or kill an EPS (including all cetaceans);
- Deliberately disturb an EPS; and
- Damage or destroy a breeding site or resting place of an EPS.

5.9.6.2 As described in **Chapter 2: Legislative and Policy Context,** EPS licence applications may be needed for the Project where activities are proposed that could result in the disturbance of EPS, such as site investigation, or buoy deployment and surveys.

5.9.6.3 If the risk of injury or significant disturbance cannot be reduced to negligible levels with mitigation, then an EPS licence is required.

5.9.6.4 The Project is responsible for providing risk assessments and supporting information to NatureScot and MD-LOT in order to facilitate their decision-making in relation to an EPS licence application.

5.9.6.5 The Project has already provided risk assessments and supporting information to MD-LOT in relation to EPS licence applications for early survey works in the marine environment. The Project will continue to engage with NatureScot and MD-LOT in the event that any further EPS licence applications are required.

5.10 Further Consideration for Consultees

5.10.1.1 The following questions refer to the EIA approach and methodology chapter and are designed to inform the Scoping Opinion and focus the Scoping Exercise.

- Do you agree with the proposed approach to EIA and methodology outlined in this chapter?
- Do you agree with the approach to proportionate EIA?
- Do you agree with the approach to cumulative effects assessment?
- Do you agree with the proposed cut off date for the cumulative assessment of four months prior to EIAR submission?
- Do you agree with the Applicant's proposed approach with the Targeted Oil & Gas (TOG) Onward Development?
- Do you have any other comments or data sources for us to consider?

6. CONSULTATION PROCESS

6.1 Introduction

6.1.1.1 This 2024 Scoping Report has been prepared to support a request for an updated Scoping Opinion in relation to the Project. Formal consultation, in advance of the submission of the EIAR, with both statutory and non-statutory consultees, is an inherent part of the process. This engagement will be carried out to give interested parties, stakeholders and members of the public, the opportunity to feedback on all aspects of the Project and to inform the scope of studies, surveys and assessments being undertaken.

6.1.1.2 This chapter provides a brief overview of the consultation requirements, consultations undertaken to date and the proposed approach to consultation as the EIA process continues throughout the pre-application phase for the Project.

6.2 Approach to Stakeholder Engagement

6.2.1.1 The Applicant recognises that effective and meaningful consultation is an integral part of its development activities and is committed to ensuring that it maintains a transparent approach to consultation and stakeholder engagement.

6.2.1.2 The main objectives for stakeholder engagement are:

- To identify and actively engage with statutory bodies, non-governmental organisations, other national and international organisations and members of the public who may be affected by the Project;
- Maintain open and honest communications with all stakeholders; and
- Recognise the interests and viewpoints of stakeholders and where appropriate, use their feedback to inform the Project including the Scoping process and EIA.

6.3 Stakeholder Engagement to Date

6.3.1 Pre-Award Agreement

6.3.1.1 Prior to CES awarding the Applicant an exclusivity agreement to develop the Project, a stakeholder mapping exercise was undertaken by the Applicant to support and inform early stakeholder engagement. Stakeholders were identified who could contribute to the site selection process, inform supply chain planning, and help shape project concept development.

6.3.2 2023 Scoping Report

6.3.2.1 In February 2023, the Applicant submitted an EIA Scoping Report (the '2023 Scoping Report') to support the request for a Scoping Opinion for the Project from Scottish Ministers. The outcomes of the 2023 Scoping Opinion, which are detailed below, has led to the Applicant's decision to submit a new Scoping Report (2024 Scoping Report), which is this document.

6.3.2.2 On 28 June 2023 the Applicant received the 2023 Scoping Opinion from the Marine Directorate[106]. The Scottish Ministers provided valuable feedback which has been taken onboard by the Applicant. As set out in **Chapter 1: Introduction**, the Project has evolved since 2023 Scoping Report. This evolution has provided an opportunity to produce a new Scoping Report (the '2024 Scoping Report') which reflects the collective updates to the Project's identity and consenting strategy, and which considers the feedback provided by MD-LOT and other stakeholders in the 2023 Scoping Opinion.

6.3.2.3 The 2023 Scoping Opinion identified that the information provided in the 2023 Scoping Report lacked sufficient detail on the project design and proposed methods of assessment to allow MD-LOT and stakeholders to provide a detailed response to the request for a Scoping Opinion. The Applicant acknowledges the Scottish Ministers' views on the proportionality of the advice provided in the 2023 Scoping Opinion in relation to the level of detail presented in the 2023 Scoping Report. The Applicant's goal is to ensure that the EIA process is both effective and transparent, respecting Scotland's environment and its valuable natural resources.

6.3.2.4 In response to these concerns, this 2024 Scoping Report has been prepared to supersede the 2023 Scoping Report[107]. The 2024 Scoping Report aims to address the deficiencies identified:

- The 2024 Scoping Report presents a more detailed and refined project description including a clear design envelope;
- A thorough review of impacts to be Scoped in and out has been undertaken in light of the new project description. Included in these sections is detailed justification behind the reasoning for either taking an impact forward to EIA or scoping out at this stage; and
- A thorough review of the impact assessment methodology proposed for the EIA has been undertaken (and details of the proposed approach are presented in this 2024 Scoping Report). This review aims to ensure the EIA process is conducted thoroughly and to the highest standards to best inform the decision-making process.

6.3.3 Scoping Workshop

6.3.3.1 In February 2024, the Applicant held a Scoping Workshop with MD-LOT and statutory advisors including Marine Directorate Marine Analytical Unit (MD-MAU), Marine Directorate Science, Evidence Data and Digital (MD-SEDD), Joint Nature Conservation Committee (JNCC), and NatureScot. The workshop provided an opportunity to present a Project update and to detail the proposed approach to scoping. Subject matter experts provided a summary of key receptors and potential impact pathways as well as an overview of proposed assessment methodologies to be utilised during the EIA. Consultees were able to offer feedback as relevant throughout the workshop and, where relevant, follow up sessions were arranged to discuss topics in more detail.

6.3.3.2 The proposed approaches for HRA Appraisal, MPA Assessment, cumulative effects and transboundary effects were also presented during the workshop.

6.3.3.3 The discussions during and since the Scoping Workshop have informed in this 2024 Scoping Report.

6.3.3.4 On 2 April 2024, the Applicant received advice from NatureScot, in consultation with JNCC where relevant, in response to the questions posed during the workshop. The Applicant's responses to the advice and where this advice has been addressed within the 2024 Scoping Report is detailed within **Appendix 6A: Cenos Offshore Windfarm Scoping Workshop - Discussion Topics and Questions.**

6.3.4 Other Consultation to Date

6.3.4.1 Since award of the exclusivity agreement, the Applicant has undertaken consultation with key stakeholders in order to introduce and provide updates in regard to the Project, to establish contacts and channels of engagement and to maintain dialogue that will support the delivery of the Scoping Report and inform the EIA process.

6.3.4.2 The Applicant will continue to engage pro-actively with key stakeholders throughout the lifecycle of the Project. To date consultation has included, but is not limited to, the following organisations:

- MD-LOT;
- MD-SEDD;
- Marine Directorate Marine Analytical Unit (MD-MAU);
- NatureScot;
- Historic Environment Scotland (HES);
- JNCC;
- Aberdeenshire Council,
- CES;
- RSPB;
- Scottish Fishermen's Federation (SFF);
- Scottish White Fish Producers Association (SWFPA);
- Northern Lighthouse Board (NLB);
- UK Chamber of Shipping (UKCOS);
- RYA Scotland;
- Cruising Association (CA); and
- Maritime and Coastguard Agency (MCA).

6.3.4.3 A summary of relevant consultation undertaken is provided in each of the technical chapters of this report, along with how the requirements of consultees are being addressed through the EIA.

6.4 Future Stakeholder Engagement

6.4.1 Scoping Response

6.4.1.1 As per the EIA Regulations, MD-LOT will consult upon the contents of this Scoping Report to gain feedback from statutory consultees. This feedback and advice will be documented in a Scoping Opinion, which the Applicant will review and use to inform the content of the EIA. The Scoping Report will be available on the Applicant's website to increase the audience for Scoping consultation.

6.4.2 Consultation During the EIA Process

6.4.2.1 Throughout the EIA process, the Applicant will continue to undertake stakeholder consultation. Details of all stakeholder activities and responses will be captured in the Project stakeholder database.

6.4.2.2 The EIAR will also include a specific chapter detailing stakeholder engagement relevant to the EIA. The chapter will present information regarding engagement that has taken place throughout the EIA process including details regarding how concerns or issues raised have been taken account of through the EIA process.

6.4.2.3 The pre-application consultation (PAC) process is the statutory requirement to undertake public consultation prior to the submission of planning and marine licence applications for certain developments. The aim of the PAC process is to "improve the quality of planning and licence applications, and to provide, where possible an early opportunity for community views to be reflected in proposals"[108]. A PAC Report will be prepared for the Project which will detail consultation that has been undertaken in support of the Project's consent application.

6.4.2.4 The statutory consultation requirements and associated guidance that are relevant for the Project are detailed below in **Table 6-1**.

Table 6-1: Legislation and regulation requirements for consultation

Legislation / regulations	Statutory requirements for consultation
Electricity Act 1989[109], s.36 consent	No statutory requirements for consultation. The Project will undertake pre-application consultation activities as required by the Marine licences under Marine (Scotland) Act 2010[110] (Part 4) .
Marine and Coastal Access Act 2009[111]	No statutory requirements for consultation. However, the Project will undertake pre-application consultation activities as expected or as required by the Marine licences under Marine (Scotland) Act 2010 (Part 4).
Marine licences under Marine (Scotland) Act 2010[110] (Part 4)	Statutory requirement for pre-application consultation. At least one pre-application consultation event which will provide statutory stakeholders and members of the public the opportunity to view and comment on the proposals. A notice

Legislation / regulations	Statutory requirements for consultation
	must be published in a local newspaper at least six weeks prior to the event taking place.
The EIA Regulations	Scottish Ministers and the Planning Authority (Aberdeenshire Council) must consult the consultation bodies and other public bodies prior to adopting Scoping Opinions and on publication of the EIAR.

6.4.2.5 It is anticipated that a Gap Analysis will be submitted alongside the consent application. The intention of which is to provide a record of stakeholder and environmental representations. The Gap Analysis aims to explain how such representations have been addressed through the EIA process.

6.4.3 Post Application Consultation

6.4.3.1 The Applicant will continue to consult with stakeholders beyond consent application submission. This will include addressing any comments or concerns raised during the determination period. Assuming successful award of Project consent, stakeholder engagement will continue in support of successful discharge of licence conditions and in the development of relevant protocols and procedures. Further public events may also occur post consent and regular Project updates will also be posted on the Applicant's website.

7. MARINE AND COASTAL PROCESSES

7.1 Introduction

7.1.1.1 This chapter of the Scoping Report considers the potential significant effects on physical marine and coastal processes (MCP) of the Project.

7.1.1.2 The MCP include the following:

- Water levels (mainly due to tidal influence);
- Extreme water levels (surges due to meteorological influence);
- Tidal current velocities;
- Wave parameters;
- Wind parameters;
- Oceanography (salinity, temperature and stratification);
- Suspended particulate matter (SPM);
- Seabed sediments (type/size, distribution, transport, and deposition);
- Seabed geomorphology (channels, banks, large scale bedforms, etc.); and
- Coastal geomorphology (cliffs, beaches, estuaries, etc.).

7.1.1.3 Specifically, this chapter considers the potential impact of the Project within the following areas:

- The HDD exit point which is located approximately 190 m from the shoreline in a water depth of approximately 26 m below LAT. The exact position will be certified at a later date;
- The ECC extending from MHWS to the Array Area; and
- The Array Area, including all aspects of the offshore array.

7.1.1.4 The potential impact of the Project considers the construction, O&M, and decommissioning phases.

7.1.1.5 The chapter provides an overview of the baseline conditions relevant to the Project Area (as defined in **Chapter 1: Introduction**), the datasets to be used to inform the EIA, sources, pathways and receptors of the potential significant effects to be considered, and how these potential significant effects will be assessed for the purpose of the EIA.

7.1.1.6 This chapter provides pertinent information that may inform the pathways and impacts to various receptors within other chapters. It should therefore be considered alongside the following chapters and documents:

- **Chapter 8: Marine Water and Sediment Quality** – Sediment mobilisation has the potential to directly impact water quality. The magnitude and impacts of mobilisation will depend on the MCP.

- **Chapter 9: Benthic Ecology** – The MCP have the potential to affect sensitive benthic, epibenthic, and intertidal ecology receptor species and habitats.
- **Chapter 10: Marine Mammals** – Marine mammal receptor species are potentially sensitive to the MCP.
- **Chapter 11: Ornithology** – There are potential pathways of effect from the MCP to potentially sensitive marine ornithological receptor species.
- **Chapter 12: Fish Ecology** – Changes to the MCP have the potential to impact fish and shellfish features directly or indirectly, during certain stages of their lifecycle.
- **Chapter 15: Marine Cultural Heritage and Archaeology** – There may be pathways of effect from the MCP on potentially sensitive marine archaeology and cultural heritage receptors.
- **Chapter 17: Marine Infrastructure and Other Users** – There is the potential of pathways of effect from the MCP on infrastructure and other marine users.

7.2 Legislation, Policy, and Guidance

7.2.1 Legislation and Policy

7.2.1.1 Legislation and policy that has been used to inform the scope of the Marine and Coastal Processes chapter is set out in **Table 7-1**. Further information on policies relevant to the EIA are set out in **Chapter 2: Legislative and Policy Context**.

Table 7-1: Legislation and policy context

Legislation/policy	Relevance to the assessment
Legislation	
The Conservation (Natural Habitats, &c.) Regulations (1994)[112] (and amendments)	Defines the species, habitats and types of sites that receive legal protection and described the protection that is afforded.
National Policy	
NPF 3[113]	Identifies Peterhead as a focus for important projects for carbon capture storage, North Sea interconnectors and offshore renewable energy development. Potential for cumulative effects.
Marine Policy	
Scotland's National Marine Plan[114] GEN 8 - Coastal Process and Flooding GEN 9 - Natural Heritage	GEN 8 requires that developments and activities in the marine environment should be resilient to coastal change and flooding, and not have unacceptable adverse impact on coastal processes or contribute to coastal flooding. GEN 9 requires development to comply with legal requirements for protected areas; not to result in significant impact on the national status of Priority Marine Features (PMFs) (which includes geodiversity features); and to protect, and, where appropriate, enhance the health of the marine area.

Legislation/policy	Relevance to the assessment
GEN 21 - Cumulative Impacts CABLES 2	GEN 21 requires for cumulative impacts affecting the ecosystem to be addressed. CABLES 2 requires the following to be considered when reaching decisions regarding cable development: • cables should be suitably routed to provide sufficient requirements for installation and cable protection; • new cables should implement methods to minimise impacts on the environment, seabed and other users; • where burial is demonstrated not to be feasible, cables may be suitably protected; and • the need to reinstate the seabed, undertake post-lay surveys and monitoring and carry out remedial action where required.
UK Marine Policy Statement[115]	Sets out high-level objectives for the marine space, including achieving a sustainable marine economy and identifies a wide range of relevant marine uses. Requires that the use of the marine environment benefits society as a whole, contributing to resilient and cohesive communities that can adapt to coastal erosion and flood risk, as well as contributing to physical and mental wellbeing. Requires use of the marine environment and its resources to maximise sustainable activity, prosperity and opportunities for all. States that offshore wind farm fixed bottom foundation designs are likely to influence hydrodynamics and consequent sediment movement.
Local Policy	
Aberdeenshire Local Development Plan (LDP) 2023[116]	Modified proposed policies of relevance to this area of technical assessment are: • Policy R1 Special rural areas • Policy E2 Landscape • Policy E1 Natural Heritage These focus on the importance of renewable energy deployment and safeguarding sites for specific uses.

7.2.2 Technical Guidance

7.2.2.1 Technical guidance that has been used to define the assessment is set out in **Table 7-2.**

Table 7-2: Relevant technical guidance

Guidance reference	Relevance to the assessment
Guidelines for Data Acquisition to Support Marine Environmental Assessments of Offshore Renewable Energy Projects[117]	These guidelines assist in the design, review and implementation of environmental data collection and analytical activities associated with all stages of offshore renewable energy developments. There is a specific section covering 'physical and sedimentary process studies', setting out guidance on data acquisition and adequacy, survey design and impact assessment techniques (including modelling).
Collaborative Offshore Wind Research Into the Environment (COWRIE), Coastal Process Modelling for Offshore Windfarm Environmental Impact Assessment: Best Practice Guide[118]	This report provides an update to existing best practice guidance on the application and use of numerical models to predict the potential impact from offshore windfarms on coastal processes. As such, it provides guidance on the scoping and design stages of the coastal processes part of an EIA
Guidelines in the use of metocean data through the lifecycle of a marine renewables development[119]	This guide has been developed to identify and recommend on uses of metocean data through the life cycle of a marine renewable energy development. It includes a review of metocean data types, data sources and identifies the importance of good data management.
Offshore Windfarms: Guidance note for Environmental Impact Assessment in Respect of FEPA and CPA requirements[120]	This guidance provides scientific guidance to those involved with the gathering, interpretation, and presentation of data within an EIA. The marine physical process parameters which require assessment are set out and divided into direct and indirect impacts, with guidance also given regarding the key parameters which need documenting in the marine processes baseline. Recommendations for mitigation and monitoring are also set out. The baseline description which will be produced as part of the EIA will comply with the above guidance, whilst the assessment will also take into consideration the full range of marine physical processes parameters set out in CEFAS[120].
Guidance on Best Practice for Marine and Coastal Physical Processes Baseline Survey and Monitoring Requirements to Inform EIA of Major Development Projects Report No 243. 2018[121]	Guidance on marine, coastal and estuarine physical processes EIA baseline survey and monitoring requirements for major development projects

Guidance reference	Relevance to the assessment
Marine Physical Processes Guidance to inform Environmental Impact Assessment (EIA) [122]	The purpose of this guidance note is to provide advice to developers to inform EIA of marine, coastal and estuarine projects with respect to physical processes. The Guidance Note refers to two Natural Resource Wales' (NRW) evidence reports. The first provides guidance on best practice for physical processes baseline survey and monitoring, and the second provides advice on numerical modelling assessments.

7.3 Study Area

7.3.1.1 The study area considers the ECC from MHWS to the Array Area, the Array Area, and the surrounding area (**see Figure 7-2**) of each element.

7.3.1.2 The ECC will be assessed from the Array Area to MHWS. The section of the ECC from MHWS to 12 NM is the same as the NorthConnect Cable Corridor. The Applicant is coordinating with NorthConnect Limited. NorthConnect Interconnector and the Project will only require one set of infrastructure, within the overlapping marine licence Project Area from 12 NM to MHWS.

7.3.1.3 The section of the ECC from MHWS to 12 NM has previously been assessed within the EIAR submitted for NorthConnect Limited (application reference number 06771 & 06870) and judged acceptable through the consenting of NorthConnect. The previous EIA work for NorthConnect will be considered in assessing the ECC from MHWS to 12 NM, updated by any other readily available information and surveys undertaken. See Section 7.5 for further details of the baseline conditions. Further details are in **Chapter 5: Approach to Scoping and EIA**.

7.3.2 Zone of Influence (ZoI)

7.3.2.1 The extent of the study area for the MCP assessment is defined by the ZoI for near-field (within the immediate vicinity of the Project) and far-field spatial scales (the wider area over which effects may spread from the near-field). The interaction between the near-field and far-field aspects follows the 'source-pathway-receptor' approach.

7.3.2.2 The far-field ZoI has been determined based on early-stage reviews of the MCP pathways, comparisons with nearby and similar projects, best judgement, and a conservative approach.

7.3.2.3 The MCP pathway approach has evaluated the variation of tidal ellipses along the ECC and across the Array Area, provided from the UK Atlas of Marine Renewable Energy Resources[123]. The tidal ellipse establishes the tidal excursion length (the distance on the long axis of the ellipse) and orientation of flow, providing the expected movement of a water particle during a single tidal cycle between flood and ebb. Inshore, the ellipse is flat and aligns closely with the coastline. Offshore the ellipse is more elliptical and aligns with a north south orientation. The ellipses are approximate to a mean spring tide, noting that this value may be 10 percent higher during larger tidal range events and does not account for wave and wind driven currents, or tidal asymmetry. The review highlighted larger inshore excursions of around 15 km and

smaller offshore excursions of around 5 km (**Figure 7-1**). The values were cross validated with UK Hydrographic Office (UKHO) Admiralty Chart tidal diamond records[124] [125], with a close match between the two approaches.

7.3.2.4 A comparison of the ZoI, or Study Areas, defined in adjacent offshore windfarm projects including Buchan Offshore and Marram Wind suggest areas of 25km and >50km respectively.

7.3.2.5 To approach the ZoI conservatively at this time, and account for the potential increases in tidal excursions under extreme conditions, the Study Area extent is defined as 30 km from the Project (**Figure 7-2**). Following further analysis within the EIA, the ZoI will be refined.

Figure 7-1: Project Area and ZoI with spring tide ellipse

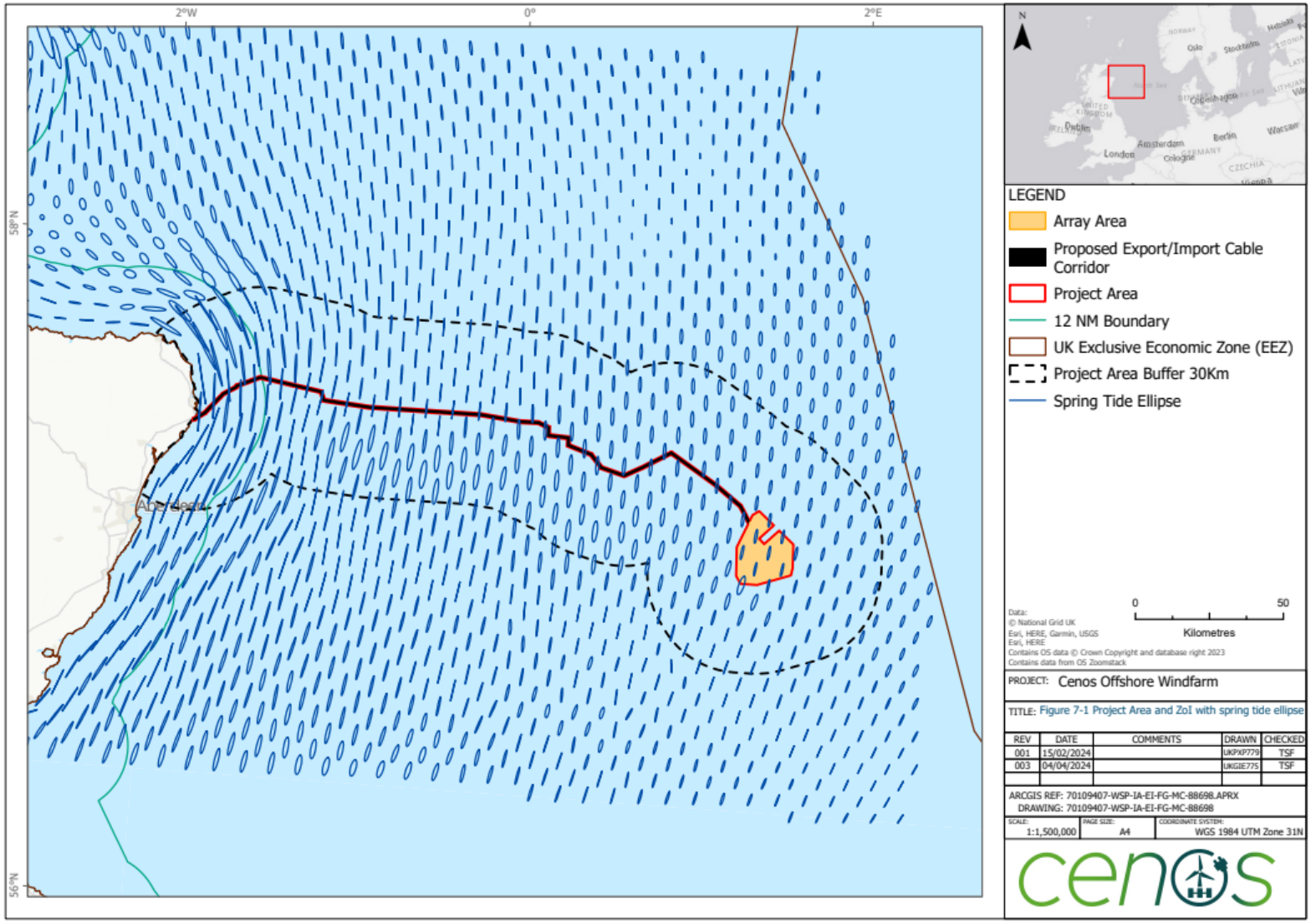
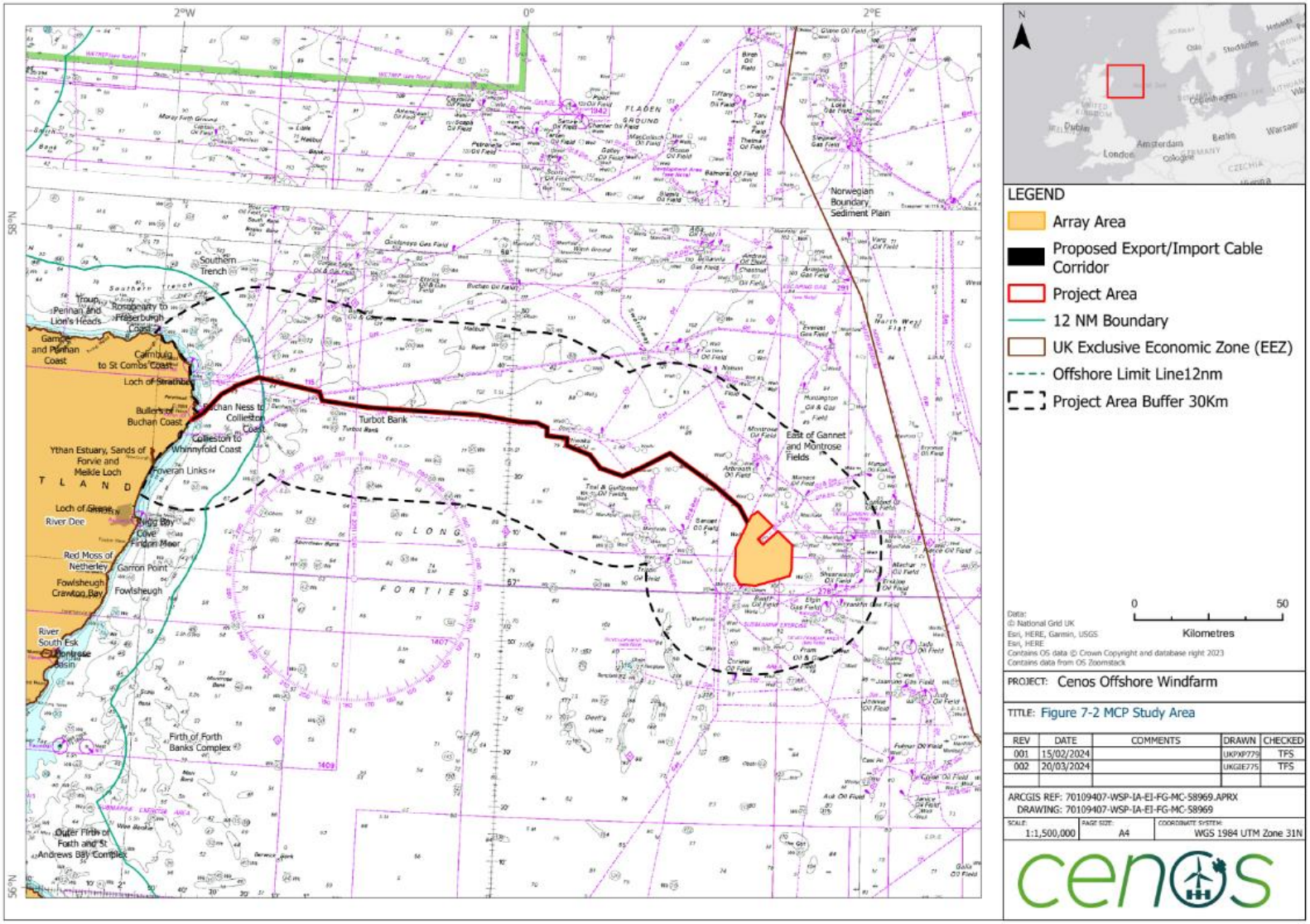


Figure 7-2: MCP Study Area



7.3.3 Marine Assets

7.3.3.1 The Central North Sea (east of Peterhead) has a variety of offshore infrastructure including planned, operational and relic assets (**Figure 7-3**) (see **Chapter 17: Marine Infrastructure and Other Users**). This includes windfarms (floating and fixed), subsea cables, pipelines, and oil and gas field equipment. Wrecks are found across the seabed (see **Chapter 15: Marine Cultural Heritage and Archaeology**) and the presence of trawling scars, pock marks and spud depressions are common.

7.3.3.2 Evaluating ongoing and planned projects is essential to determine the likelihood of cumulative effects (Section 7.9)

7.3.4 Marine Designations

7.3.4.1 Within the study area are various nationally and internationally designated nature conservation sites (**Figure 7-4**) summarised here:

- The Bullers of Buchan Coast SSSIs and Buchan Ness to Collieston Coast SPA is located along the cliffs landward of the HDD exit point. It is designated for its geological features including coastal geomorphology of Scotland and marine cliffs;
- The Collieston to Whinnyfold Coast SSSI slightly to the south is similarly designated for its marine cliffs and biodiversity;
- Approximately 15 km to the south of landfall is the Sands of Forvie and Ythan Estuary SSSI designated for its sand dunes, saltmarsh, and coastal geomorphology, along with biotic components;
- Approximately 15 km to the north is Loch of Strathbeg SSSI, designated for its sand dunes, saltmarsh, and coastal geomorphology and estuary environment, along with biotic components;
- Approximately 25 km to the north is Cairnbulg to St Combs Coast SSSI designated for its notable geology;
- Approximately 30 km to the north is Rosehearty to Fraserburgh Coast SSSI, designated for its notable geology;
- The Southern Trench MPA, crossed within the Southern extent of the site by the inshore segment of the ECC, is designated for its inshore sublittoral sediments (burrowed mud), fronts, quaternary geology and geomorphology, shelf deeps, and submarine mass movement;
- Turbot Bank, 6 km to the south of the ECC is designated for its biotic Sandel components; and
- The offshore Array Area is located in the east of Gannet and Montrose Fields MPA, designated for its offshore subtidal, sands and gravels, and offshore deep-sea muds.

Figure 7-3: Marine assets in the vicinity of the MCP Study Area

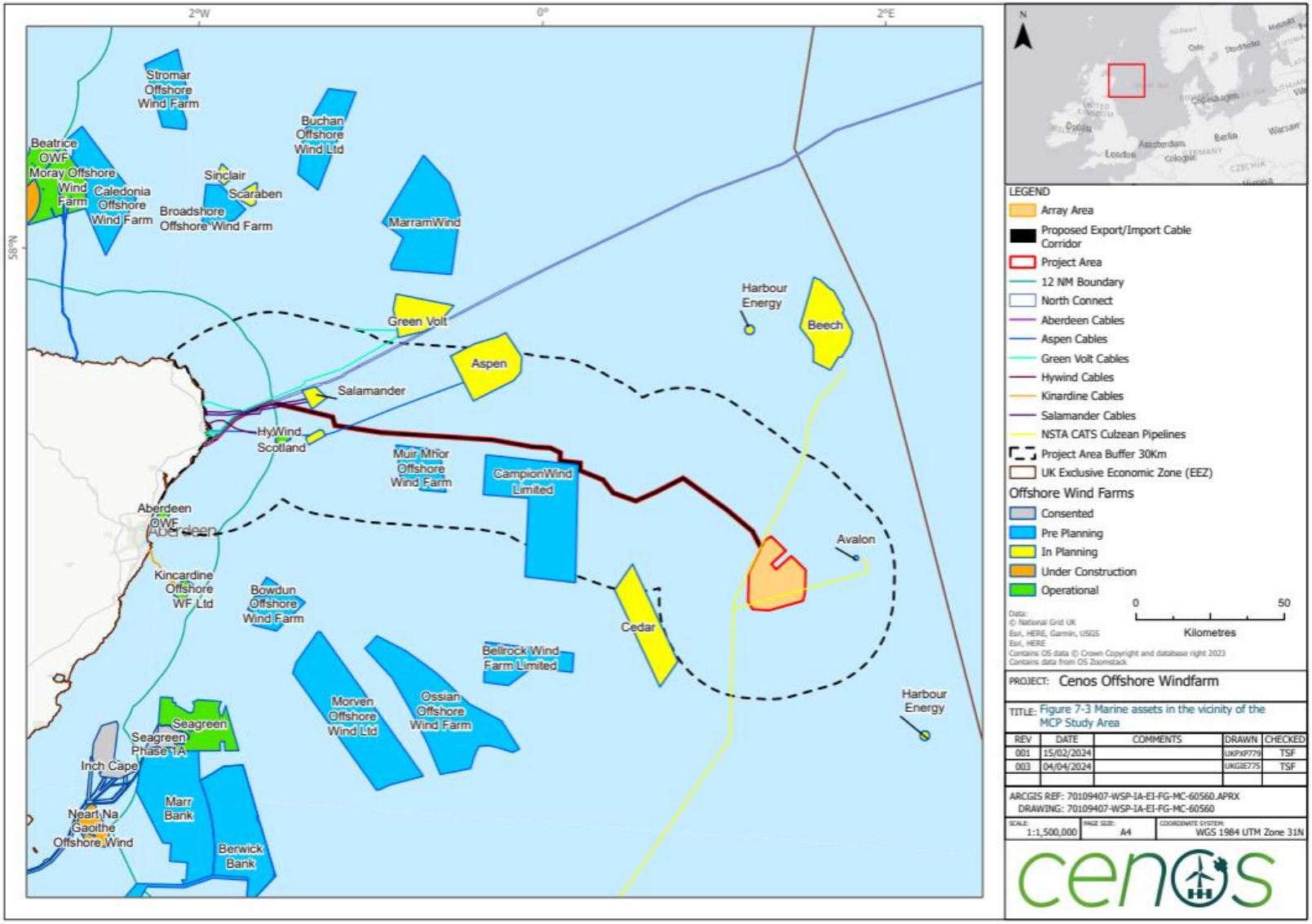
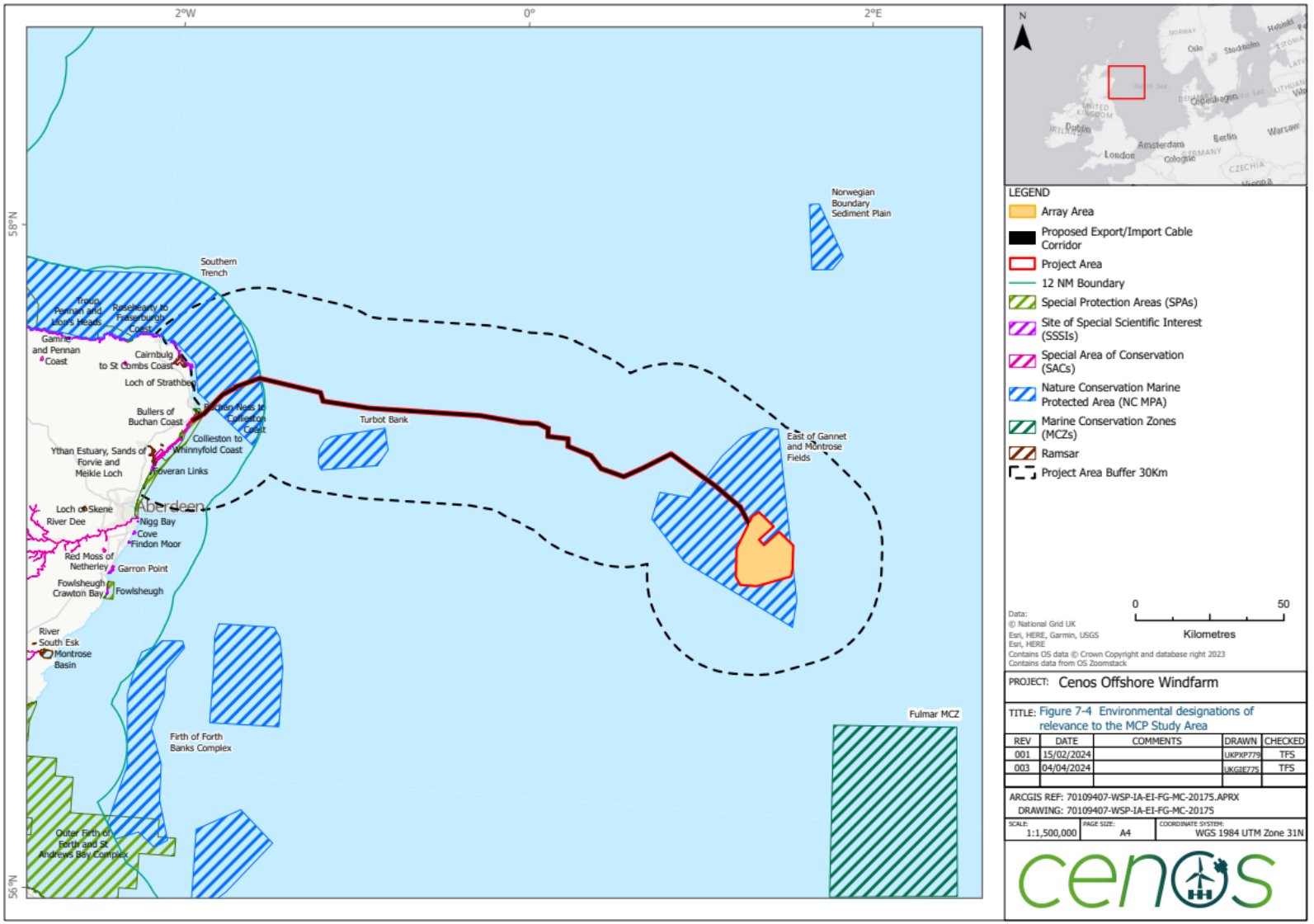


Figure 7-4: Environmental designation of relevance to the MCP Study Area



7.4 Consultation

7.4.1.1 Consultation is a key part of the application process. This assessment has been and will be informed by engagement and discussion with various stakeholders such as NatureScot and MD-LOT.

7.4.1.2 A summary of the key issues raised during consultation to date, specific to the MCP section, is outlined in **Table 7-3,** together with how these issues will be considered in the production of the EIAR.

Table 7-3: Summary of consultation relating to Marine and Coastal Processes

Date and stakeholder	Consultation and key comments	How this is accounted for
NatureScot Scoping Advice, 04 May 2023	• Not enough detail provided for majority of report; • Little information regarding how impacts will be assessed and • Conservation objective of the East of Gannet and Montrose Fields Nature Conservation MPA highlighted	• Extensive list of baseline conditions now included (see Section 7.5); • Quantitative assessment of source – pathway – receptor to now be included; and • Mapping of key designated sites and features included to determine potential significant effects from Project (see **Chapter 9: Benthic Ecology and Appendix 5E: Marine Protected Area Screening Assessment**).
MD-LOT, Scoping Opinion, June 2023[126]	No representation regarding the geology and sediment receptors included.	Further information on geology and sediments included.
Scoping Workshop, 29 February 2024	The Applicant provided details on the proposed approach for MCP assessment for the EIA. Discussions were held with MD-SEDD on Modifications to stratification and frontal features. Known frontal features are inshore, follow coastline. Stratification seasonal control, wave climate low during summer so water is not mixed up. Effects of array during summer will therefore have no impact as wave climate principal control. At the time of writing, no further consultee responses have been received.	The discussions held during the Scoping Workshop have been addressed, with Stratification scoped in during O&M phase (see **Table 7-8**). The Applicant is waiting for a Scoping Opinion for further consideration to inform the approach to assessment for EIA.

7.5 Baseline Conditions

7.5.1 Data Information Sources

Table 7-4: Key sources of data

Source	Date	Summary	Coverage of study area
Project Specific: Geophysical Surveys	2023	Bathymetry, Side Scan Sonar (SSS), Magnetometer, Target Feature List.	ECC – 100 % Array Area – 100 %
Project Specific: Sediment Sampling (to be fully analysed within the EIAR)	2023	PSA. ECC – at 5 km to 10 km intervals along ECC. Array Area – at 3 km to 5 km grid intervals throughout array area.	ECC – 100 % Array Area – 100 %
MMT Sweden AB Final Survey Report: NorthConnect – UK Nearshore, North Sea, and Norwegian Fjord Survey[127]	2017	Site Scan Sonar (SSS), Multibeam Echo Sounder (MBES), Sub-Bottom profiler (SBP), magnetometer, vibro-coring, cone penetration testing.	Between MHWS and 12 NM only
Project Specific: Metocean Wind (Measured, Hindcast and Extreme Value Analysis (EVA))[128]	Measured data: Gannet - 1997 to 2019 (23 years). Forties – 1974 to 2021 (29 years)	Dataset from Gannet and Forties oil platform. Measured at a reference height of 10 m Above Sea Level (ASL). MetOceanWorks (MOW) hindcast dataset at 10 m ASL for Gannet & Forties data calibration and applied to the Project data point. EVA calculated from MOW hindcast data and validated with measured wind data.	Point datasets: Gannet 57.185N, 0.999E Forties 57.75N, 0.90E Array Area 57.25N 1.40E.
Project Specific: Metocean Wave Spectra (Measured, Hindcast & EVA).[128]	Gannet (unknown) Forties 1974 to 1997, 2009 to 2021 Sleipner 1994 – unknown	Datasets from Gannet, Forties and Sleipner oil/gas platforms. MOW/SWAN European shelf wave model outputting wave spectra data at hourly intervals between 1979 to 2022 on 0.25° x 0.25° grid. EVA calculated from MOW hindcast data and validated with measured wind data.	Point datasets: Gannet - 57.185N, 0.999E Forties - 57.75N, 0.90E Array Area 57.25N 1.40E.
Project Specific: MIKE21 2D Current + Water Modelling	1979 to 2020	Depth averaged currents and water levels.	Array Area 57.25N 1.40E.
Project Specific:	2023 & 2024	Three water column depths (surface, mid-depth and near-bed) at six stations along	Array / ECC

Source	Date	Summary	Coverage of study area
Total Suspended Solids		the ECC and at 10 stations within the Array Area. 2 additional stations have been used to acquire samples along the inshore segment of the ECC.	
British Oceanographic Data Centre (BODC) Current Meter Series (Measured)[129]	Accessed 2024	Short period hydrodynamic data (inc. current speed & direction) recordings, for example, 15 to 50 days. https://www.bodc.ac.uk/	Various points available from windfarm, between MHWS and12 NM and near the coastline
Proudman Oceanographic Laboratory Current + Water Level Models	2023	POLPRED – site specific estimation of tidal levels and currents. Continental Shelf Model (CSM) – generates tide and surge levels and currents for offshore locations.	POLPRED - Array Area 57.25N 1.40E. CSM (PhysE's archive) – 57.167N, 1.75E
Health & Safety Executive (HSE) Offshore Technology Report, 2001/010 "Environmental Considerations"[130]	2001	Contour plots wind, waves, currents, surge, sea levels etc.	UK
HSE RR 392, 2005 "Wave Mapping in UK Waters"[131]	2005	100 year return period wave contour plot.	UK
UK Renewables Atlas[123]	Accessed 2024	Tidal Range, Tidal currents, Waves, Winds. Shapefile for download for Tides, Wind and Waves (tiles around UK). https://www.renewables-atlas.info/	UK
Associated British Ports Marine Environmental Research Ltd (ABPmer) – SEASTATES Wave Hindcast Model[132]	Accessed 2024	Significant wave height and direction. Wave and Wind Roses already available for predetermined tiles. https://www.seastates.net/explore-data/	UK
Cefas WaveNet data[133]	Accessed 2024	Significant wave height, Dominant (peak) wave period, Average (zero crossing) wave period, Dominant (peak) wave direction, Wave spread, Temperature, Spectral data.	UK

Source	Date	Summary	Coverage of study area
		https://wavenet.cefas.co.uk/map	
National Tide and Sea Level Facility[134]	Accessed 2024	Tidal water levels from point locations within the study area. https://ntslf.org/	UK
British Geological Survey (BGS) Geology of Britain viewer and Offshore GeoIndex Viewer[135]	Accessed 2024	Solid Geology, Quaternary thickness, Seabed Sediments. https://mapapps2.bgs.ac.uk/geoindex_offshore/home.html	UK
EMODNet Geology[136]	Accessed 2024	Coastal change & Bathymetry. https://emodnet.ec.europa.eu/geoviewer/	UK
General Bathymetric Chart of the Oceans (GEBCO)[137]	Accessed 2024	Bathymetry 100 m resolution https://download.gebco.net/	UK
Marine Scotland Data Portal [138]	Accessed 2024	Data layers of bathymetry, ocean climate, waves, sea level, seabed geology, surface, and subtidal sediments. https://marine.gov.scot	Scotland
Cefas Suspended Sediment Climatologies around the UK[139]	2016	Regional variations in suspended sediment concentrations. Average SPM for the period 1998-2015. https://data.cefas.co.uk/view/18133	UK
Strategic Environmental Assessment Data Portal[140]	Accessed 2024	Seabed mapping data collected on behalf of the Department of Trade and Industry (DTI) to support Strategic Environmental Assessment (SEA) in Project Area 5. https://webapps.bgs.ac.uk/data/sea/app/search	UK
United Kingdom Hydrographic Office[141]	Accessed 2024	Bathymetric data for the study area in the form of multibeam and single beam data, as well as Admiralty Charts. https://www.gov.uk/guidance/the-ukho-archive	UK
Scottish Coastal Observatory[142]	Accessed 2024	Monitoring data collected as part of the Scottish Coastal Observatory, covering a range of marine environmental variables including temperature and salinity.	Scotland

Source	Date	Summary	Coverage of study area
		https://marine.gov.scot/data/scottish-coastal-observatory-data	
Dynamic Coast: The National Overview[143]	2021	The Dynamic Coast project aims to provide the strategic evidence base on the extent of coastal erosion in Scotland. https://www.dynamiccoast.com/	Scotland
Scottish Remote Sensing Portal[144]	Accessed 2024	LiDAR datasets to inform past coastal Change. https://remotesensingdata.gov.scot/	Scotland
International Council for the Exploration of the Sea (IECS) Ocean Climatology [145]	1971 - 2000	Temperature and salinity climatology for surface and near-bed regions of the NW European shelf seas. https://www.ices.dk/data/dataset-collections/Pages/Ocean-Climatology.aspx	UK
UK Climate Projections 2018 (UKCP18) climate change projections[146]	2024	Sea level rise predictions for coastal locations within the study area.	UK

* Project Specific includes data collected directly for the CENOS or NorthConnect projects

7.5.2 Existing Baseline

7.5.2.1 The baseline conditions are evaluated for the areas of the Project and local marine physical processes.

Bathymetry & Geology

Export/Import Cable Corridor (ECC)

Mean High Water Springs to 12 Nautical Miles

7.5.2.2 The study area between MHWS and 12 NM ranges from the MHWS level, 4.4 m above LAT, considered landfall, to 90 m below LAT at the 12 NM limit (**Figure 7-5**).

7.5.2.3 The study area between MHWS and 12 NM is fronted by the Longhaven Cliffs, part of the Bullers of Buchan Coast SSSI. The seabed is characterised by a rocky seabed with very steep to steep seabed gradients, followed by a smooth seabed surface with very gentle to gentle seabed gradients. The steep seabed gradients here are in fact post glacial cliff lines, submerged since the last ice age.

7.5.2.4 Within the first 1.5 km of the survey corridor the water depth decreases from 6.7 m below LAT close to the coast, to 42 m below LAT. The surficial geology shows

outcropping bedrock adjacent to the submerged area of the coastal cliffs, followed by gravelly sand and silty fine sand further offshore.

7.5.2.5 Bedrock and glacial till are seen as an underlying units close to shore. Continuing offshore the shallow geology is characterised by loose, fine surficial sediments overlying dense, sandy sediments. Both units may locally contain pebbles, cobbles, and boulders.

7.5.2.6 At approximately 20 km along the cable corridor a maximum depth of ~90 m LAT is reached within a large bowl depression in the seabed. Following this, the seabed rises back to ~75 m LAT near the study boundary (12 NM).

7.5.2.7 The seabed morphology is dominated by gentle gradients but increase to moderate, steep, or very steep where bedrock outcrops, or where ripples, mega ripples (**Table 7-5),** or boulders are present. Boulder fields, classified as high-density boulders, dominate much of the section[147].

Table 7-5: Seabed feature sizing

Bedform type	Length (m)	Height (m)
Ripples	<5	0.01 – 0.1
Large ripples	5 – 15	0.1 - 1
Megaripples	15 – 50	1 - 3
Sandwaves	50 – 200	> 3

12 Nautical Miles to Array Area

7.5.2.8 The bathymetry along the ECC ranges from 78 m to 107 m LAT. Much of this is located around the 90 m LAT depth. The ECC crosses the northern boundary of the Buchan Deep depression at the western section, dropping to 107 m LAT. The Buchan Deep is an enclosed depression on the seabed, most likely caused by glacial erosion during periods of lower sea levels. It is recognised as a large-scale feature of functional significance[148]. Continuing east and offshore the route generally follows the 90 m contour with a gentle sloping and homogenous seabed.

7.5.2.9 The seabed geology is provided from the 'Flotation Energy UK CENOS ECC: Central North Sea Habitat Assessment Report'. The key points are discussed in paragraphs 7.5.2.10 to 7.5.2.12 below.

7.5.2.10 The ECC predominantly consists of Sand, Slightly Gravelly Sand, Gravelly Sand, and Muddy Sand seabed sediments, based on the BGS Folk classification (**Figure 7-6**).

7.5.2.11 As the ECC progresses to the east the percentage of fines increases. Areas include noticeable amounts of shell fragments demonstrating an outcropping of the underlying Fitzroy and Whitehorn formations. Other areas are typically characterised by a poorly sorted mosaic of shell fragments and pebbles overlaying the predominant muddy substrate.

7.5.2.12 A section at the western extent of the ECC contains 'Wee-Bankie' outcrops (glacial till deposit of the Wee Bankie Formation. This comprises sandy gravelly clays with frequent cobbles, occasional boulders, and thin layers of sand and silty clay, together with coarser sand and gravel deposits). Interwoven are areas delineated as sediment ribbons. Numerous boulders are present exclusively towards the western end of the ECC. Associated with this is an increased presence of sediment ribbons, sand waves and linguoid ripples.

Array Area

7.5.2.13 Located approximately 188 km offshore the Array Area is 25 km by 20 km (at its maximum point) and covers an area of 335 km^2. The bathymetry across the Array Area ranges from 90 m to 100 m. The seabed is relatively flat and uniform with troughs and gentle undulations. On site surveys performed by Rovco[149] identified trawl marks throughout the area and suggested that seabed sediments are expected to comprise of clayey, silty sand with occasional gravel and isolated to scattered cobbles and boulders. Seabed sediment thickness ranges from a few centimetres to over a metre and overlies sands and clays of Pleistocene and early Holocene age.

7.5.2.14 The Quaternary sequence, made up of the Pleistocene and early Holocene age, within the Array Area is relatively thick, at more than 50 m, and interpreted to comprise the Fisher Formation overlaying the Aberdeen Ground Formation. Within the top 100 m below seabed, Coal Pit and Forth Formations are also interpreted to be present, incising the Fisher Formation.

Figure 7-5: Bathymetry in the vicinity of the MCP Study Area

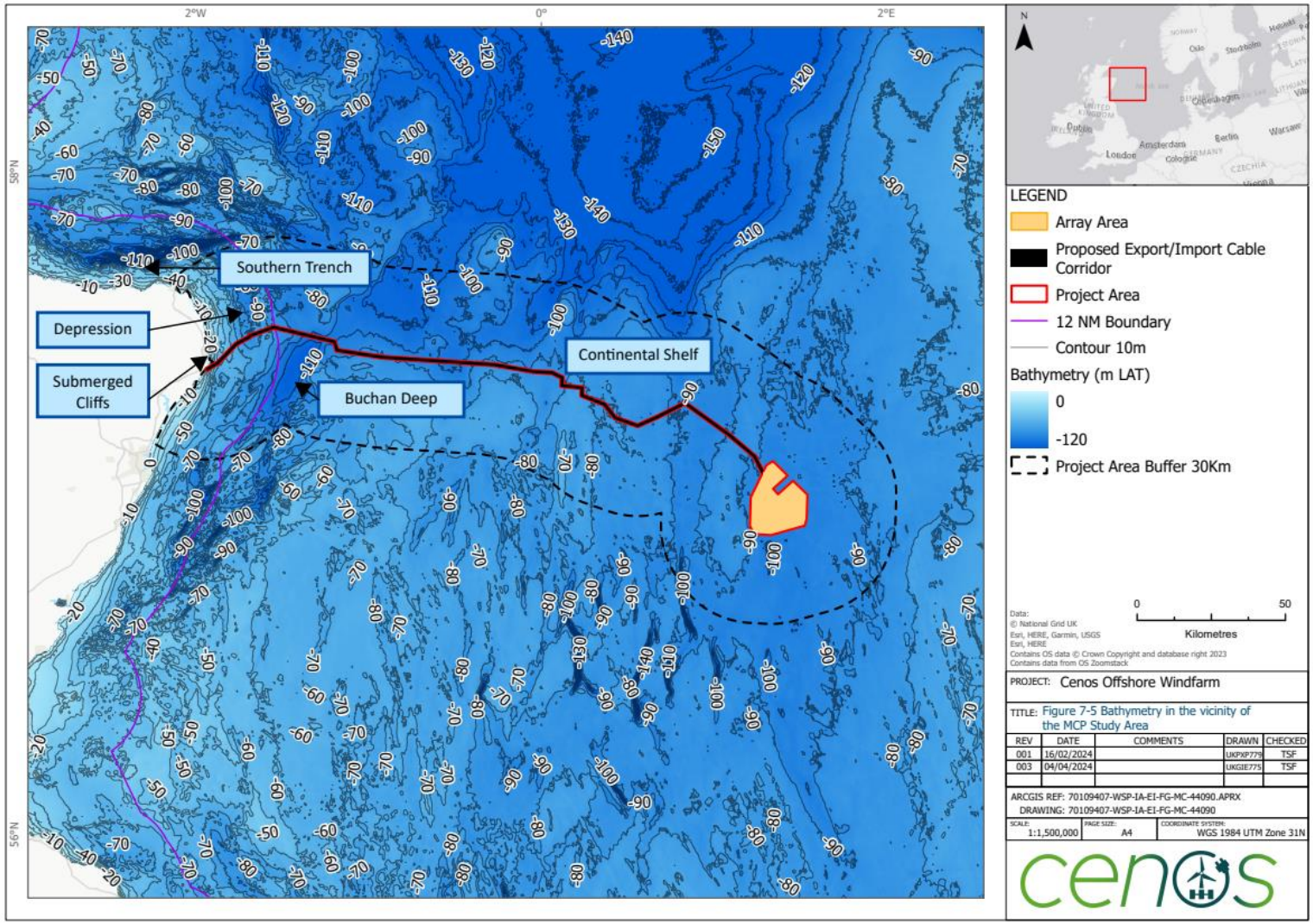
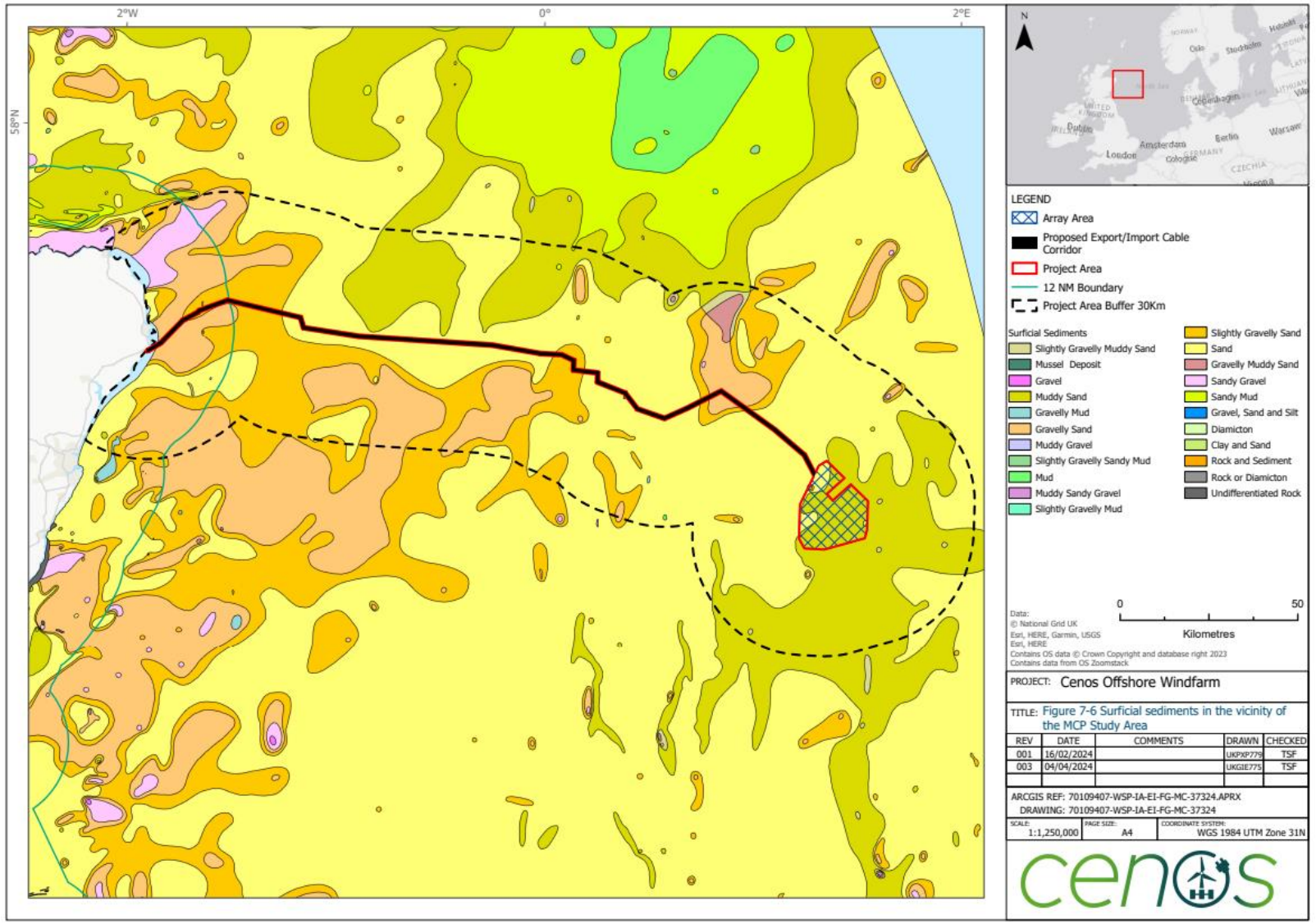


Figure 7-6: Surficial sediments in the vicinity of the MCP Study Area



Sediment Distribution

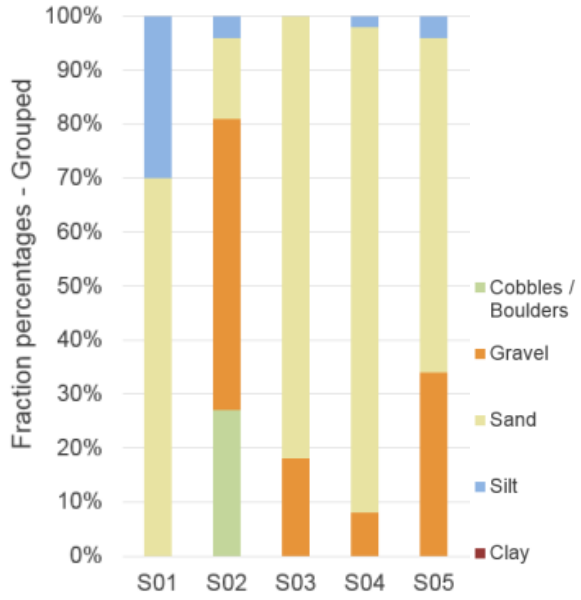
Export/Import Cable Corridor

Mean High Water Springs to 12 Nautical Miles

7.5.2.15 The Particle Size Distribution (PSD) of five samples taken between MHWS and 12 NM (S1 – S5) along the consenting corridor indicates that the PSD is dominated by sand and moderate fractions of gravel and small volumes of silt and cobbles/boulder[150].

7.5.2.16 The sediment samples (**Plate 7-1**) are dominated by sand with fractions of gravel and minor volumes of silt, except for S01, which consisted of 30 percent silt, as identified by the marine survey[42].

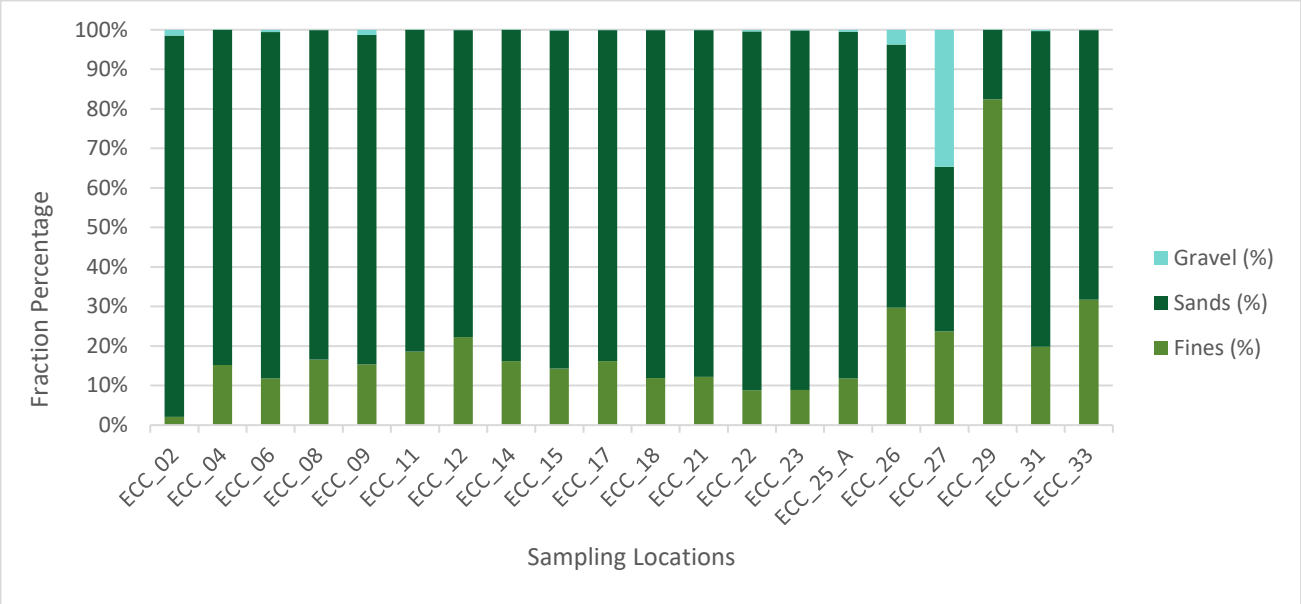
Plate 7-1: Particle size distribution in UK area between MHWS and 12 NM. Extracted from MMT[127]. Locations S01 to S05 are between MHWS and 12 NM



12 Nautical Miles to Array Area

7.5.2.17 Along the ECC, 20 grab samples were collected during the Rovco 2023 survey campaign to provide PSD information. Samples were taken at approximately 5 – 10 km intervals. The results indicate a relatively consistent sediment distribution (**Plate 7-2**). Considering the Folk classification, the seabed surface sediments are most commonly represented as muddy Sand, but ranging from sandy Mud at ECC_29, to muddy sandy Gravel at ECC_27.

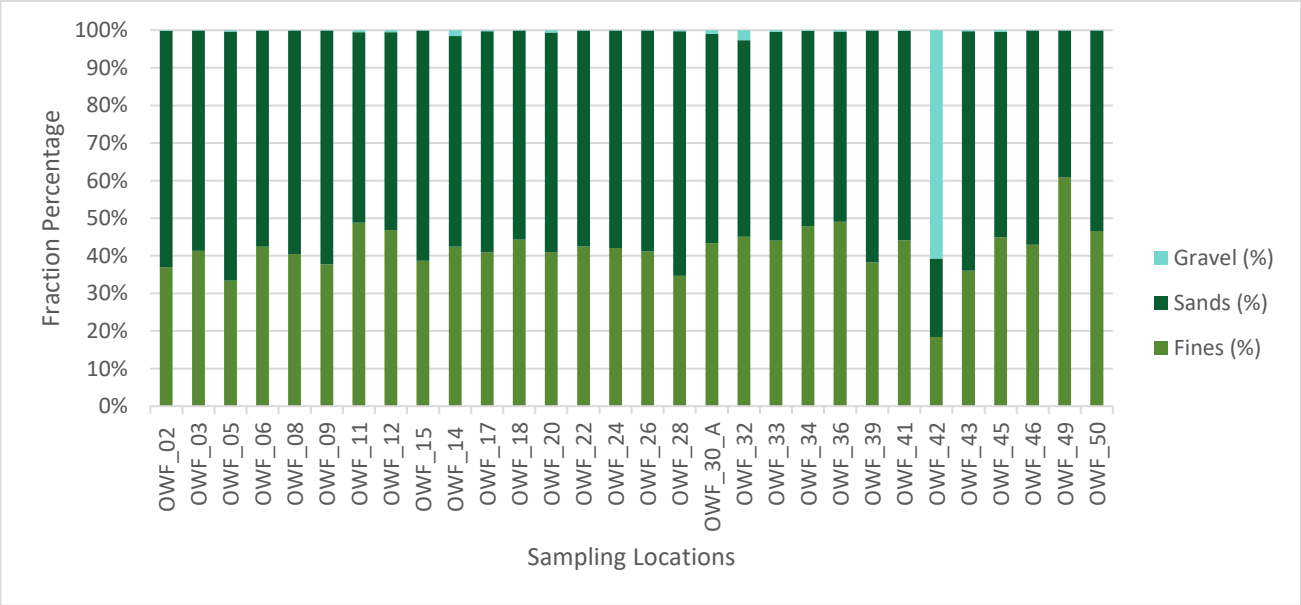
Plate 7-2: Particle size distribution along the ECC



Array Area

7.5.2.18 Across the Array Area, 30 grab samples were collected during the Rovco 2023 survey[151] campaign to provide PSD information. Samples were taken at approximate 3 km to 5 km grid intervals. The results showed a relatively consistent sediment distribution (**Plate 7-3**) with a greater silt content than witnessed along the ECC, >30 percent compared to <20 percent. Considering the Folk classification, the seabed surface sediments are most commonly represented as muddy Sand but ranging from sandy Mud at offshore windfarm_49, to muddy sandy Gravel at offshore windfarm_42.

Plate 7-3: Particle size distribution throughout the Array Area



Wind and Wave Regime

7.5.2.19 ABP SeaStates[132] provides a broad overview of the inshore (within 12 nm) and offshore (Array Area) wind and wave directional and magnitude information, as seen below in **Plate 7-4** and **Plate 7-5**. It provides information on normal conditions as well as extremes. Further detailed analysis on normal conditions will be extracted from the PhysE[21] report used to inform modelling at the Array Area.

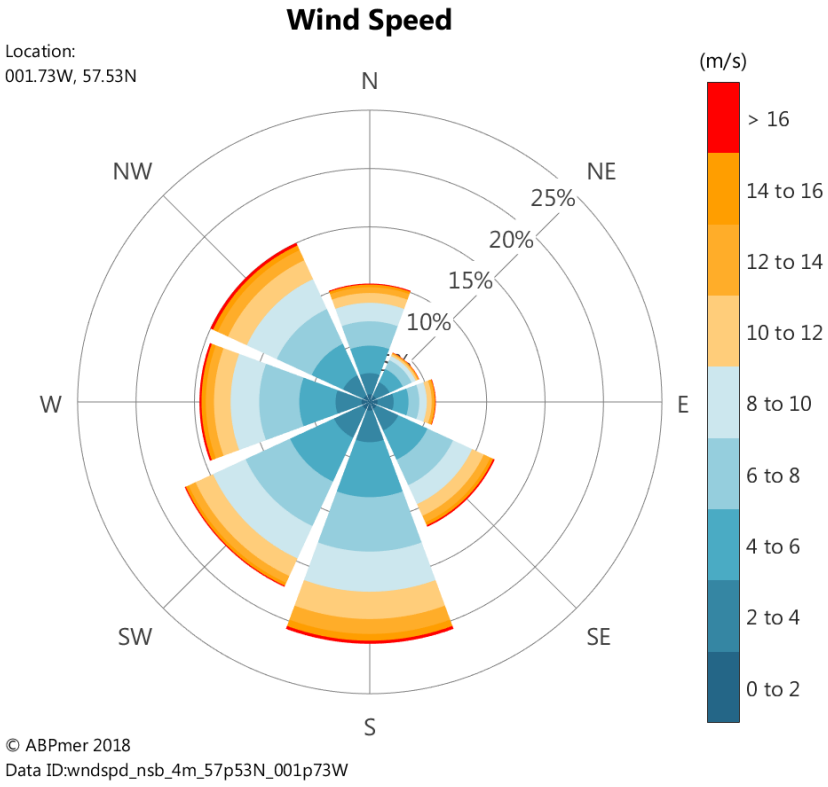
7.5.2.20 The inshore wind rose shows that the predominant wind direction is from the south, and typically from the north-northwest to south-southeast. In contrast, the inshore wave direction is from the southeast and north.

7.5.2.21 The offshore wind rose shows a similar plot as the inshore values but with greater magnitude velocities. The predominant wind direction is from the southwest, again ranging from north northwest to the south southeast. The offshore wave direction is typically from the north.

7.5.2.22 Waves approaching the coastline will interact with the seabed as water depth decreases. Close to the shoreline processes such as sheltering, and refraction will modify the orientation of incoming waves driving longshore transport.

7.5.2.23 Detailed modelling validated by offshore wave measurements for the Array Area[21] highlighted significant wave heights (H_s) of 8.8 m for the 1:1 year event, and 13 m for the 1 in 100-year event.

Plate 7-4: Rose plot of wind (top) and significant wave height direction (bottom) for the period 1979 to 2009, between MHWS and 12 NM (Source: ABPmer[132]).



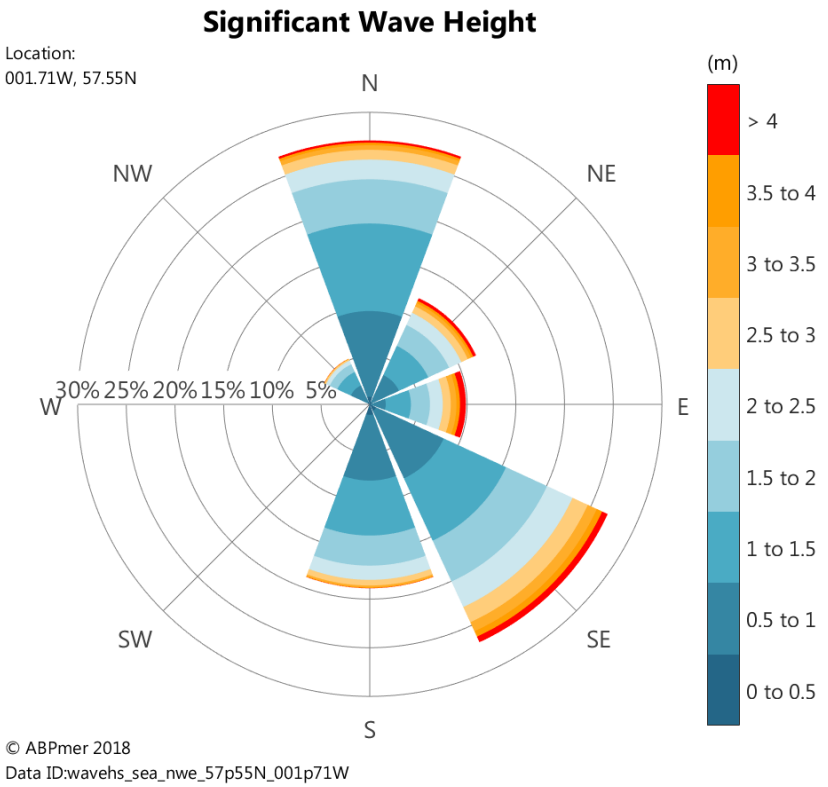
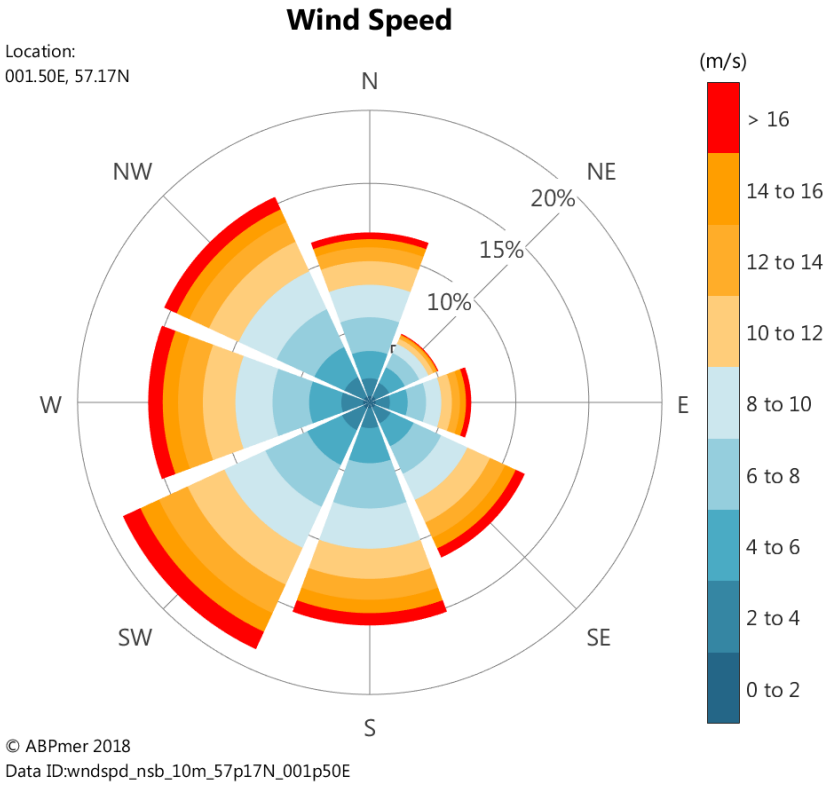
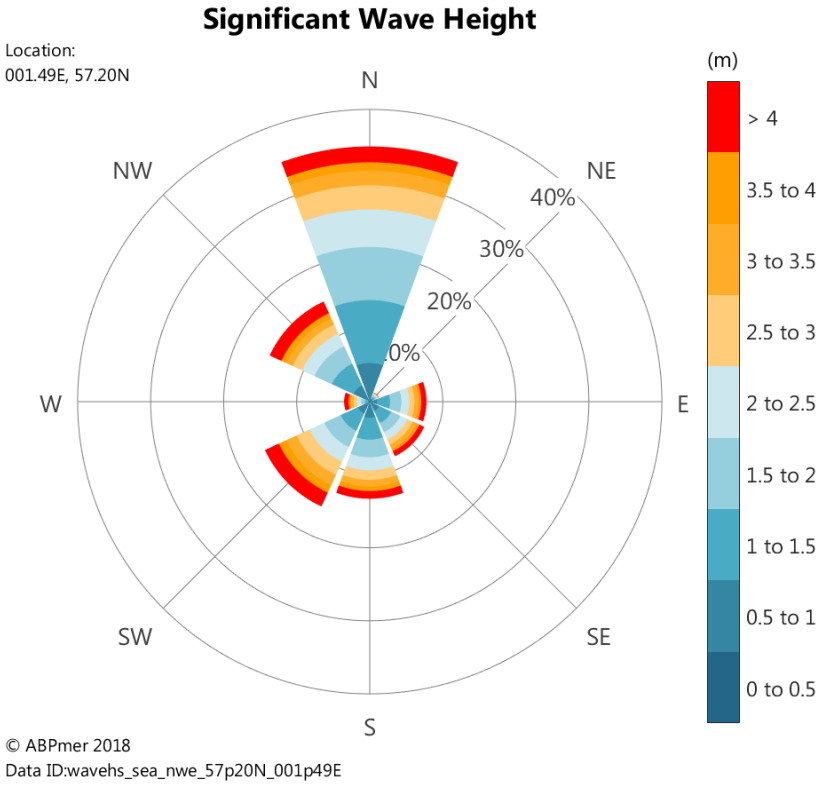


Plate 7-5: Rose plot of wind (top) and significant wave height direction (bottom) for the period 1979 to 2009, for the offshore Array Area (Source: ABPmer[132]).





Hydrodynamic Regime

7.5.2.24 The study area is characterised by semi-diurnal tides. Tidal ranges vary with distance from the shoreline, with decreased amplitudes heading offshore. The tidal ranges between MHWS and 12 NM, as measured at Aberdeen, see a mean spring range of 3.7 m (4.4 m MHWS – 0.7 m MLWS (LAT))[128]. Offshore tidal ranges, as modelled at the Array Area, see a mean spring range of 1.25 m (1.48 m MHWS – 0.23 m MLWS (LAT))[128].

7.5.2.25 Meteorological events, low pressure systems and winds further influence water-levels, providing surge levels and extreme sea levels. The coastal surge levels associated for the inshore landing area, extracted from the Environment Agency Coastal Flood Boundary dataset, are provided in **Table 7-6** and are uplifted with the UKCP18 8.5 95th percentile Representative Concentration Pathway (RCP) climate change scenarios for the future epochs.

Table 7-6: Mean High Water Springs and 12 Nautical Miles extreme sea levels (adjacent to HDD punch out)

Return Periods	2024 (m LAT)	2044 (m LAT)	2074 (m LAT)	2124 (m LAT)
t1	4.61	4.75	5.08	5.81
t2	4.69	4.83	5.16	5.89
t5	4.78	4.92	5.25	5.98
t10	4.85	4.99	5.32	6.05
t20	4.92	5.06	5.39	6.12
t50	5.01	5.15	5.48	6.21
t100	5.07	5.21	5.54	6.27
t200	5.13	5.27	5.60	6.33

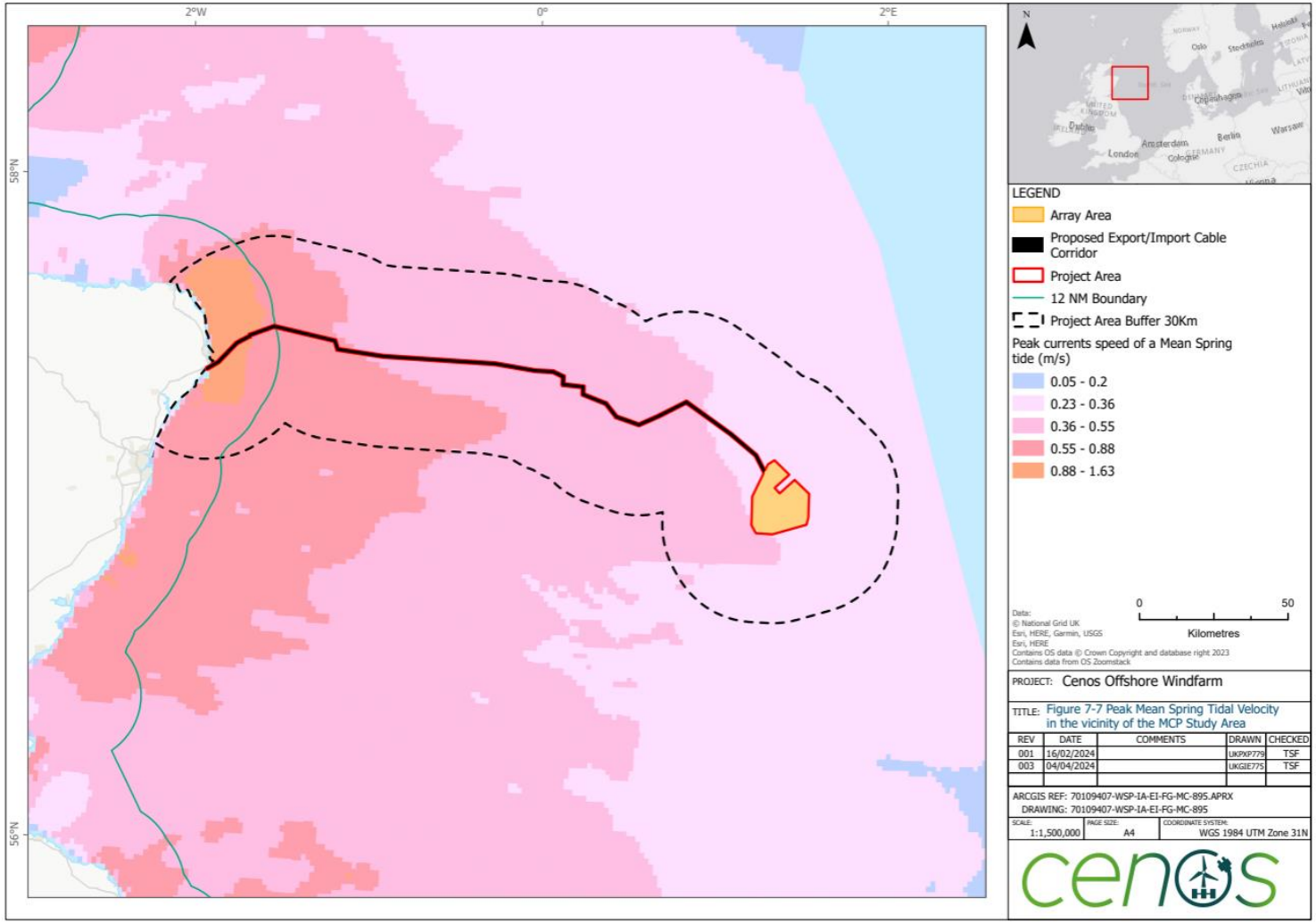
7.5.2.26 Tidal currents are strongest near the coast, with mean spring peak flow speeds reaching 1.41 m/s. further offshore the peak flow speed reduces, reaching values of 0.30 - 0.35 m/s[123] (**Table 7-7**).Previous modelling at the Array Area evaluated the total current, combining the residual tide and the surge influence for extreme events. It suggested that 1 m above the seabed (considering 90 m water depths), the 1 in 1 year event would generate currents of 0.51 m/s, whilst the 1 in 100-year event would generate currents of 0.61 m/s.

7.5.2.27 Tidal ellipses are relatively linear with a north directed ebb and south directed flood tide near to shore. Close to the coastline the ellipse more closely aligns with the topography. Tidal excursions based on mean spring values of approximately 15 km are proposed in this area, reducing to 5 km offshore[123].

7.5.2.28 Wave induced flow must be considered in conjunction with tidal flow. Between MHWS and 12 NM, wave induced flow has the capacity to magnify the flow velocity. The wave orbitals are non-directional but may be an order of magnitude higher than directional peak tidal currents during storm periods[152], potentially mobilising sediments in relatively deep water. When considering the depth limitation of wave orbitals, effects are limited to water depths equal to half of the wavelength. From the wave period provided in the PhysE[128] reporting, it is expected for the 1:1 year return period sea state (H_s = 8.8 m, T_{ass} 11.6s), a wavelength of 210 m is possible at the offshore windfarm and near-bed orbital velocities of 0.31 m/s (assuming 90 m water

depth) suggesting orbitals may interact with the seabed. For the 1 in 100-year event the near-bed orbital velocity increases to 0.88 m/s. It must however be noted that the previous mentioned velocities consider infrequent extreme conditions only present during short-term storm events. When considering normal conditions (50th percentile H_s = 1.9, T_p = 7.8s), the near-bed orbital velocity = 0.004 m/s, having no impact on the seabed.

Figure 7-7: Peak Mean Spring Tidal Velocity in the vicinity of the MCP Study Area



Coastal Morphology

7.5.2.29 The coastline landward of the HDD exit point is erosion-resistant rock and/or cliff, without loose eroded material in the fronting sea[153]. Due to presence of hard substrate at surface, the HDD is expected to be required for landfall extending between 500 and 1000 m offshore usually to exit between 10 to 30 m depth contour. This is subject to HDD design work (which requires site data).The stable cliff therefore provides little sediment input into the marine enviornment. Close to the shore, the very high current speeds have scoured the seabed, leaving exposed areas of bedrock in places[154].

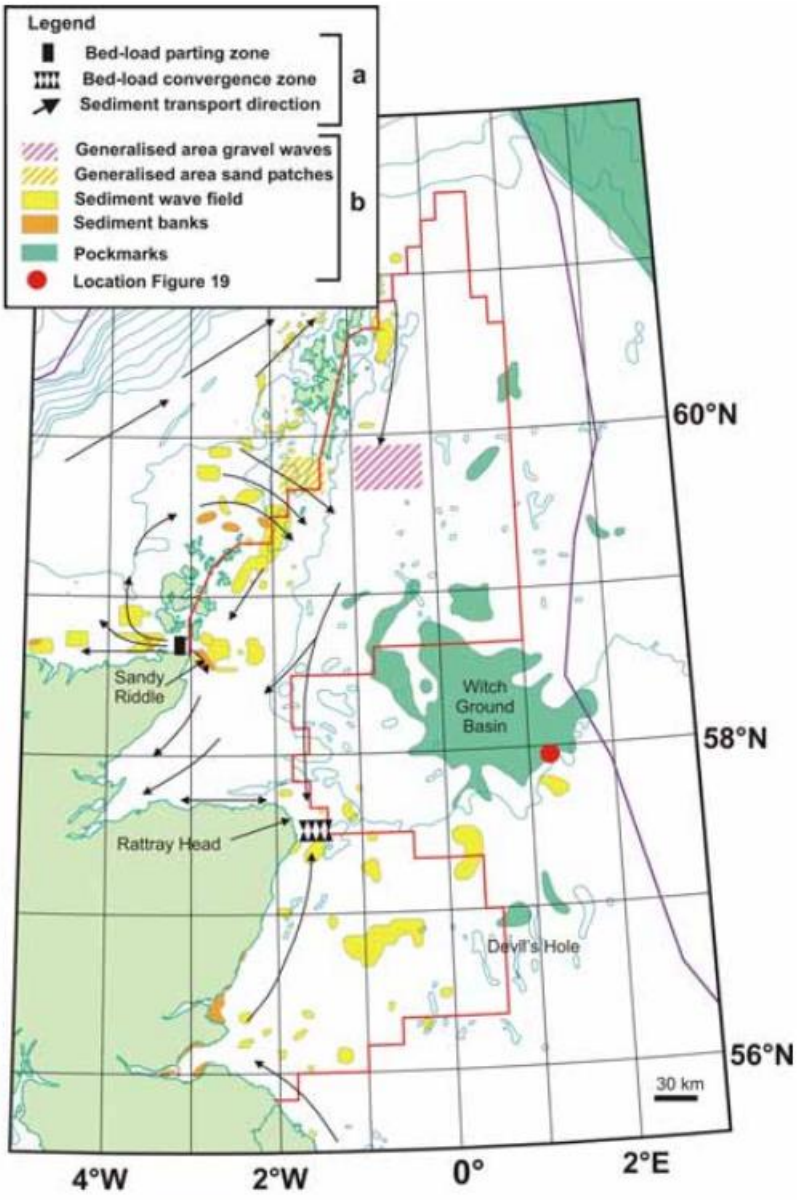
7.5.2.30 The resulting environment has provided a favourable setting for the proliferation of calcareous seabed biota meaning in places the biogenic carbonate content of the sand fraction in seabed sediments may comprise up to 50 percent[152].

7.5.2.31 To the south of the landing site, Cruden Bay has undergone moderate accretion between 1970s and modern times. The backing dune system is both high and healthy and although some trimming of the dune toe occurs during storms to reveal high and unstable sand faces, this has not resulted in any substantial migration of MHWS[143].

7.5.2.32 To the north of the landing site the coastline is armoured and stable surrounding Peterhead. North of Peterhead to Rattary Head, the coastline is sand dominated and backed by large healthy dune systmes[143].

7.5.2.33 The net direction of offshore sediment pathways, suggested by Holmes *et al* [152].[152] are shown in **Plate 7-6**. To the south of the landing site it is proposed that sediment is transported northwards. Sediment moving north converges with sediment heading south around Peterhead/Rattary Head.

Plate 7-6: Mobile bedforms and net sediment transport (Holmes et al.[152])



Suspended Particulate Inorganic Matter

7.5.2.34 Increased turbidity of marine waters has the potential to impact the productivity of photosynthetic marine organisms, by reducing the amount of light that passes through the water column. However, suspended particles may also increase the nutrient concentrations and therefore positively affect primary producers. Mixed Sediments and organic material (SPM) can be brought from land to sea by freshwater outflows (river or sewage discharge) and can also be re-suspended from the seabed into the water column by turbulent mixing (from tidal currents, waves, and wind). SPIM can also be affected by activities on the seabed, for instance dredging, trawling and marine construction. Due to these processes, shallow, coastal waters generally have higher SPIM concentrations than deep, offshore regions[155].

7.5.2.35 The long-term average for SPIM in the North Sea at the Array Area is < 1 mg/l[156]. The long-term monthly average SPIM for the Central North Sea is relatively stable and of very low concentrations[157]. Between MHWS and 12 NM considerable variation is identified throughout the year due to increased levels of tidal mixing and high energy events mobilising particulate matter from the seabed into the water column. Between MHWS and 12 NM SPIMs for January, April, July and October are highlighted in the figures below, and suggest ranges from 1 mg/l to >100 mg/l inshore.

7.5.2.36 Storms occur more frequently in the winter months compared to other seasons, giving rise to higher SPM as shown in **Figure 7-8** to **Figure 7-11**. In deeper waters storm events have less of an influence on the movement of seabed sediments and hence SPM are consistently lower.

7.5.2.37 It is discussed in literature that there appears to be a coastal process that is retaining sediment from east coast rivers in a narrow band; this may relate to a thermal front seen in this area (discussed in Section 7.5.3)[158].

Figure 7-8: Suspended Particulate Matter - January

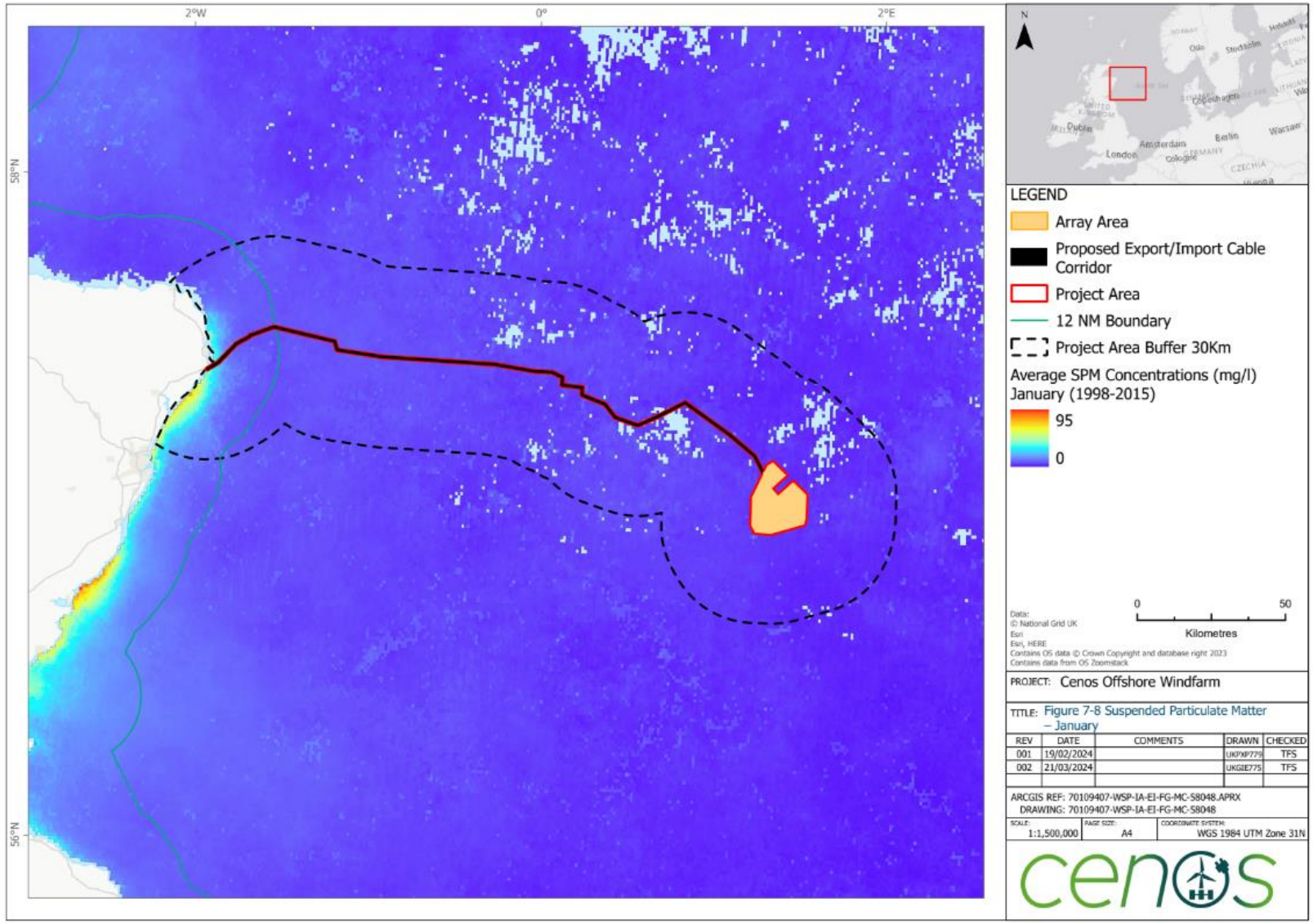


Figure 7-9: Suspended Particulate Matter - April

Figure 7-10: Suspended Particulate Inorganic Matter - July

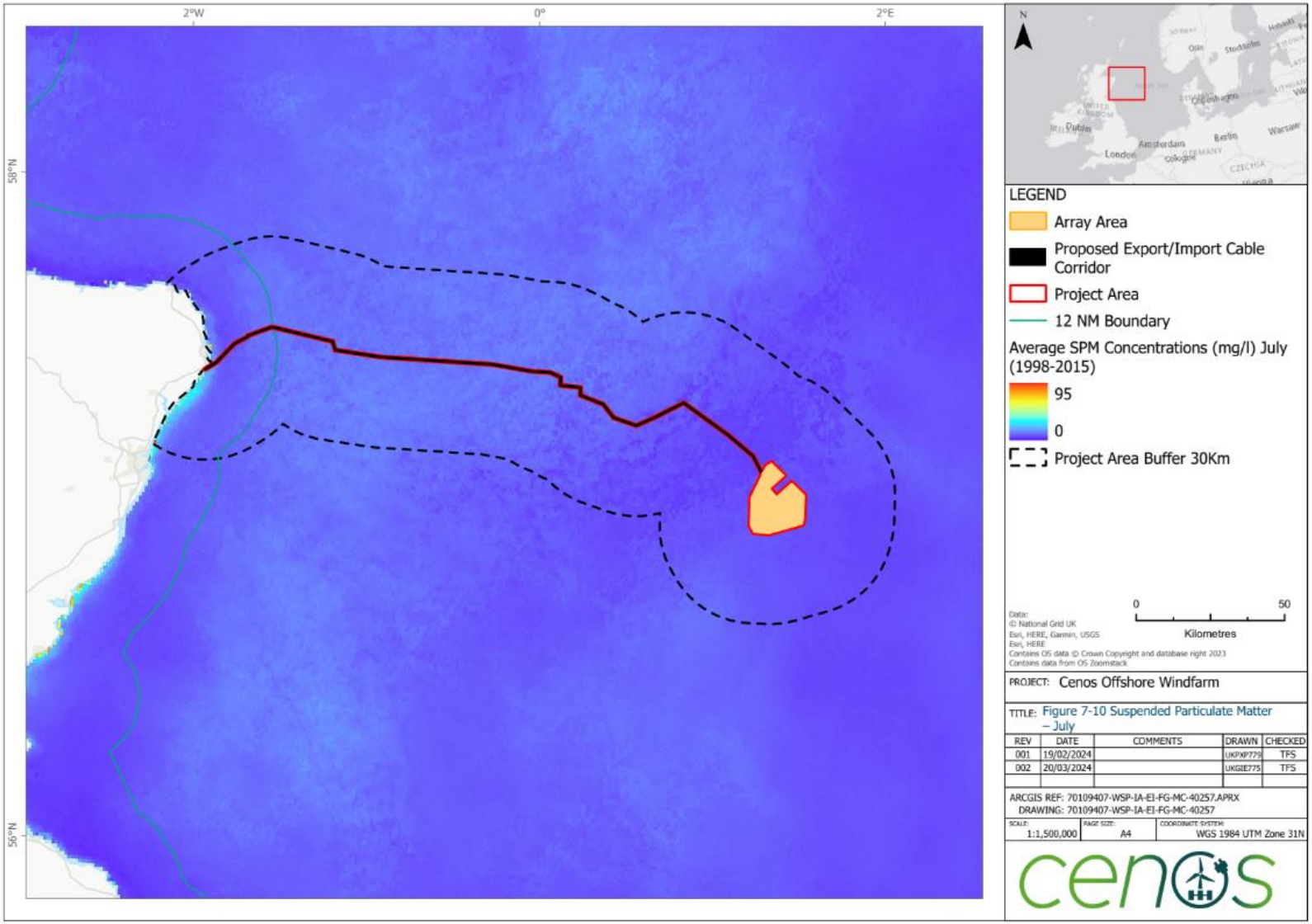
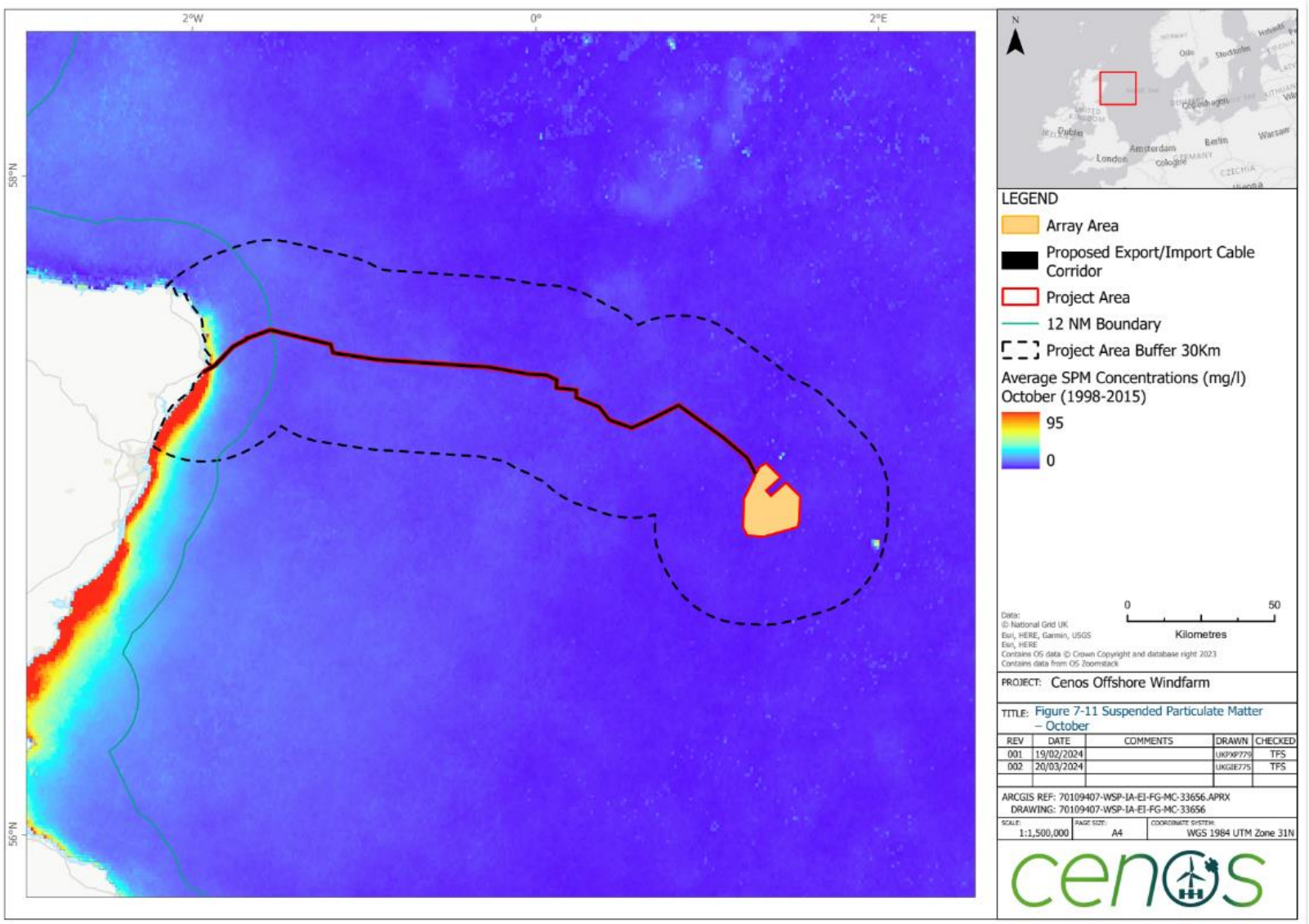


Figure 7-11: Suspended Particulate Inorganic Matter - October



7.5.3 Frontal Systems and Stratification

7.5.3.1 Fronts are distinct zones characterised by water with different properties. Fronts may be permanent or mobile. Their formation may be due to seasonal changes in weather, such as reduced wind speeds, solar warming, tidal mixing, deep water circulation etc. They are most commonly characterised by vertical stratification, with warmer (less dense) water overlaying colder (dense) water.

7.5.3.2 The IECS Ocean Climatology of the Northwest European Shelf dataset, for a location within the Array Area, highlights the seasonal variation between near-surface and near-bed temperature. This data illustrates a distinctive heating of surface waters during the spring/summer period to develop local stratification, followed by a decline in autumn towards winter with well-mixed conditions (**Plate 7-7**).

7.5.3.3 Little academic research exists currently on the effects of offshore infrastructure on the formation of stratified areas[159, 160].

7.5.3.4 Mixing at the boundary between two water bodies can lead to elevated primary and secondary production and therefore may result in aggregations of species at higher trophic levels[161] including marine mammals and birds[138].

7.5.3.5 Satellite data along the eastern Scottish shelf sea highlights several frontal systems (**Plate 7-8**)[162] including the Aberdeenshire to Firth of Forth front. The area between MHWS and 12 NM front is interpreted to be the result of stronger flows in shallow coastal water maintaining a well-mixed water column abutting with deeper water further offshore with weaker flows where the water column becomes susceptible to seasonal stratification. The junction between well-mixed and stratification establishes the front which is also associated with “upwelling” of nutrient rich bottom water leading to increased bio-productivity evidenced by increased chlorophyll.

7.5.3.6 The front locations change based on seasonality. In autumn and winter the thermal fronts are focused near the coast whilst in the spring and summer the stratification generates additional surface fronts extending further offshore.

Plate 7-7: Seasonal variation in local mean sea temperatures at the Array Area

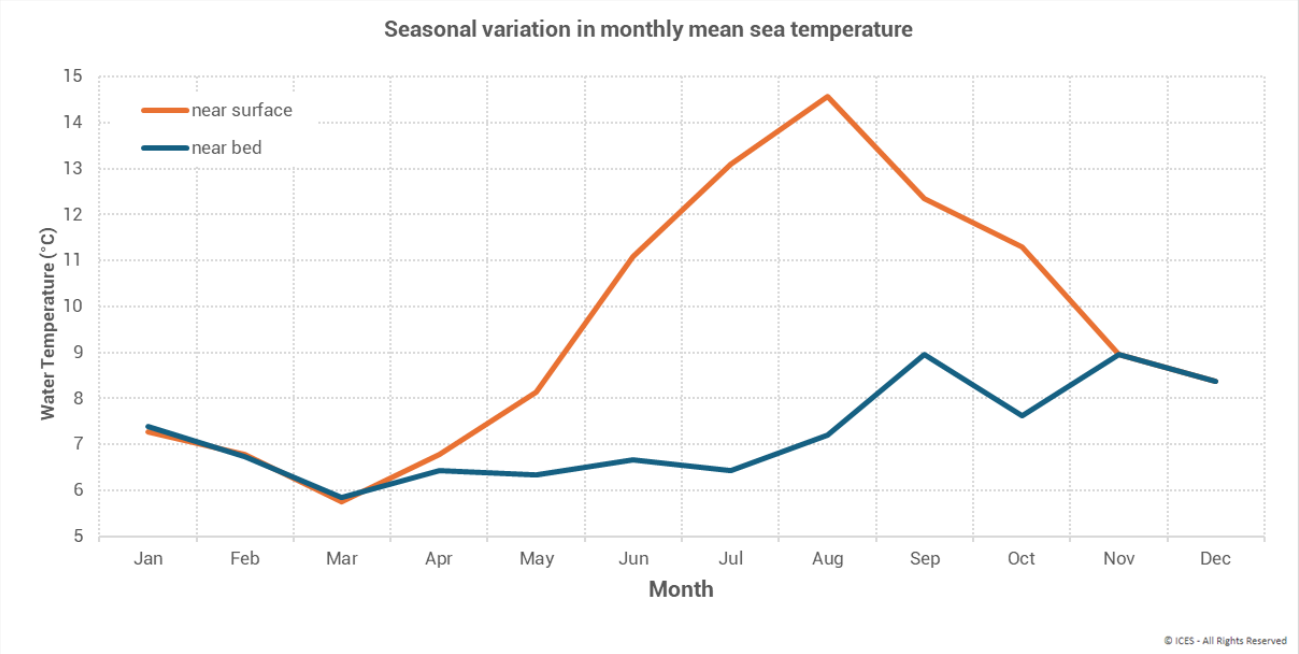
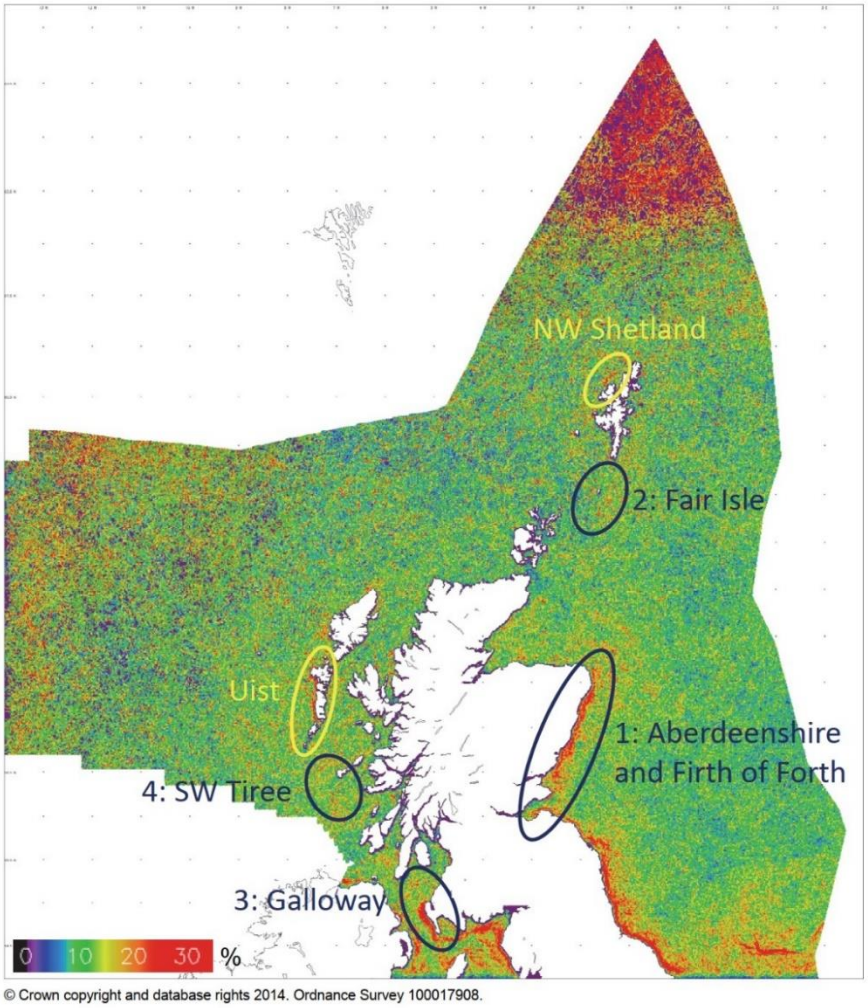


Plate 7-8: Mean all season chlorophyll front distribution



7.5.4 Future Baseline

7.5.4.1 Future changes to the baseline conditions are primarily expected to be climate change driven. This will include changes to sea levels and meteorological conditions such as wind, waves and temperatures.

7.5.4.2 The UKCP18 RCP 8.5 (high emissions) climate change scenario is considered as a conservative climate change projection, noting alternative RCP future emission scenarios with lower radiative forcing of 2.6, 4.5 and 6.0 may also apply.

7.5.4.3 As previously discussed, climate change induced sea level rise is expected to continue in the future. It is expected that by 2100 mean sea level will have increased by 0.84 m (11 mm/yr between 2024 and 2100). Scotland is however undergoing a period of isostatic rebound, causing land levels to rise following the removal of ice sheets from the last glacial period. Present crustal rise in northeast Scotland is about 0.5 mm/year[163]. In combination, sea levels are expected to rise 10.5 mm/year.

7.5.4.4 Rises in mean sea level are expected to result in increased erosion along soft coastlines (e.g. muddy and sandy) and coastal squeeze for low lying land, however, the cable landfall area is considered to be hard and erosion cliffs which is expected to be resilient to climate change over the Project lifetime.

7.5.4.5 Modification of the wind and wave regime are expected in response to changes in patterns of atmospheric circulation, although this is associated with much uncertainty[164]. A best estimation used by the Environment Agency[165] suggests increasing offshore wind speeds and offshore wave heights by 10 percent.

7.6 Basis of Assessment

7.6.1.1 The MCP scoping assessment is based on the following key assumptions, which are also set out in **Chapter 3: Project Description**:

- The array will consist of up to 95 WTGs;
- There will be up to two OSCPs;
- Scour protection may be required around the base of some, or all foundations, and cable protection may be required;
- Inter-array and import / export cables will be buried, where possible;
- Maintenance activities will be undertaken for both preventive and corrective maintenance requirements;
- The landfall will be made by HDD;
- The operational lifetime of the project is assumed to be a minimum of 30 years; and
- The decommissioning of the windfarm is anticipated to involve as close to full removal of offshore infrastructure as possible at the time of decommissioning (where safe/practicable to do so). The decommissioning works are likely to be undertaken in reverse to the sequence of construction works and involve similar levels of equipment and impact.

7.7 Relevant Embedded Mitigation Measures

7.7.1.1 Embedded mitigation measures have been identified and are proposed to be adopted as part of the Project design (primary mitigation); or implemented in accordance with industry standard practice that would occur with or without the input from the environmental assessment feeding into the process (tertiary mitigation). There is a commitment by the Applicant to implement these embedded mitigation measures and they have been considered within the 2024 EIA Scoping Report.

7.7.1.2 The requirement for additional mitigation measures (secondary mitigation) will be dependent on the significance of effects on MCP receptors and will be consulted upon with consultees throughout the EIA process. Any additional mitigation measures will be presented within the EIAR.

7.7.1.3 Those measures that are relevant to MCP are listed in **Table 7-7**.

Table 7-7: Embedded mitigation relating to Marine and Coastal Processes

ID	Embedded mitigation measures
MCP-001	A Cable Plan (CaP) will be developed and adhered to for the Project. The plan will include details of proposed installation methods and techniques based on the Project Design. It will also set out the requirement for any post-installation monitoring.
MCP-002	A CBRA will be undertaken to confirm the extent to which cable burial can be achieved for the Project. The CBRA will identify areas where adequate burial depth cannot be achieved and therefore require external protection.
MCP-003	The Applicant will develop and adhere to an EMP. An OEMP will be submitted as part of the consent application documents. Specifically, to MCP this will minimise the turbidity.

7.8 Scoping of Potential Significant Effects

7.8.1.1 The EIA for the Project will only consider those impacts where there is a risk of a potential significant effects. The following section draws on industry experience to identify effect-receptor pathways that may potentially lead to a significant impact. Where experience and available evidence indicates an effect-receptor pathway will not lead to a significant effect, the pathway is scoped out from assessment.

7.8.1.2 The potential significant effects on MCP are summarised in **Table 7-8**. The scoping assessment is based on a combination of the project design at the time of writing, embedded mitigation measures, understanding of the baseline environment at the time of writing, the evidence base for MCP effects, further consultation with consultees, and professional judgement. The approach to this assessment is set out in **Chapter 5: Approach to Scoping and EIA**.

7.8.1.3 The early identification of potential significant effects is used here as a tool aimed at delivering a proportionate approach to the EIA. In doing so, it sets out a high-level assessment of all potential effects, significant or not. The basis for scoping out certain effects, and therefore no longer considered is presented after the table, supported by the evidence base.

Table 7-8: Summary of potential significant effects for Marine and Coastal Processes scoped in (✓) or scoped out (x) of the EIAR during construction (C), O&M and decommissioning (D)

Activity and impact	Embedded mitigation	Outcome of scoping per phase			Justification	Overview of proposed assessment approach
		C	O&M	D		
Potential changes to suspended sediment concentrations	MCP-003	✓	✓	✓	Pathway of effect for other topics including smothering for benthic ecology.	Quantitative evidence-based approach on potential to mobilise sediments (shear stress) using site specific parameters (near bed tidal velocities/wave orbitals and sediment grain size)
Potential changes to coastal /seabed morphology	MCP-001	✓	✓	✓	Potential impact on seabed geology/geomorphology receptors (for example, sandbanks, sand wave areas and notable bathymetry depressions).	Qualitative assessment of expected changes to seabed features in response to activities. This includes a full review of the types of infrastructure and method of construction/decommissioning (project description) and related effects to coastal / seabed morphology.
Potential modifications to sediment transport pathways	MCP-002	✓	✓	✓	Potential impact on sediment transport due to infrastructure placed on seabed for example, sediment blocking/erosion/accretion.	Qualitative assessment of changes to sediment transport pathways in response to project. The current sediment transport pathways will be mapped following a detailed review of geophysical reports and seabed parameters. Potential significant effects to the transport pathways will be assessed in response to the project description.
Potential seabed scouring	MCP-002	✓	✓	✓	Potential impact on seabed sediments and project infrastructure.	Quantitative assessment evaluating the potential increase in velocity due to infrastructure on the seabed and risk of sediment mobilisation/erosion.
Potential changes to wave and tidal regime	n/a	X	X	X	The Array Area is approximately 185 km at its closest point from the coast / Scottish Mainland and	n/a

Activity and impact	Embedded mitigation	Outcome of scoping per phase			Justification	Overview of proposed assessment approach
		C	O&M	D		
					therefore there will be no impact. This may include acceleration of tidal velocities, and reflection and diffraction of waves around the structures. The acceleration of tidal velocities will be localised around structures. Following a brief period of acceleration, velocities will return to a similar state in the lee. The limited restriction to tidal flow imposed by the seabed and surface infrastructure in relation to the available water depths (~100 m) and spacing between installations (expected to be 1000 to 1500 m), highlights that no significant effect is expected to the tidal regime. The energy loss to waves propagating through the windfarm array is primarily expected to be due to waves reflected from the structure and divergence of waves following this. Currently little available evidence exists that quantifies these effects for floating offshore. However, the effect is not expected to be significantly increased when compared to fixed foundations permitted in the Central and Southern North Sea, and with a considerably greater distance to	

Activity and impact	Embedded mitigation	Outcome of scoping per phase			Justification	Overview of proposed assessment approach
		C	O&M	D		
					the adjacent coastline any small-scale effects would be expected to fully dissipate before reaching landfall. Similarly to the tidal aspects discussed above, within the array, spacing and depth is expected to dissipate localised effects. Items on the seabed are furthermore excluded due to their expected buried nature/minimal % when compared to the water depth.	
Modifications to stratification and frontal features	n/a	X	✓	X	Potential impacts to formation of stratified seas which drives front formation in North Sea.	Review of the elements of the floating project design. Review in detail the temporal formation of stratification using various sources including Scottish Shelf Model, CTD profiles from BODC, satellite information e.g. Copernicus. Determine the buoyancy forces associated with formation of stratified layers. Review existing literature on turbulence at offshore windfarms. Evaluate potential post consent monitoring.

7.8.1.4 The identification of potential effects on MCP presented in **Table 7-8** has taken account of key design parameters set out in **Chapter 3: Project Description**. The detailed assessment will need to take account of:

- The proposed WTG station-keeping system (anchorage system) and the method of installation, cable burial and protection techniques and installation and scour protection techniques for any fixed platforms (as these will affect the potential for mobilisation of sediments during construction and decommissioning, potential for loss of drilling muds and potential for change to sediment transport); and
- Impacts of all phases of the Project (construction, operation, and decommissioning).

7.9 Cumulative Effects

7.9.1.1 Cumulative effects on MCP resulting from the effects of the Project and other developments will be assessed in accordance with the guidance and methodologies set out in **Chapter 5: Approach to Scoping and EIA** and considering the other developments that have been screened in as part of the CEA screening exercise.

7.9.1.2 The following impacts from the Project have the potential to act cumulatively with impacts from other developments to contribute to cumulative effects, from activities such as cable crossings or other developments (e.g. oil and gas activities / the onward development area/other renewable activities) near to ECC or Array Area:

- Potential changes to sediment transport and/or erosion; and
- Potential short-term changes to suspended sediment concentrations during the construction period only.

7.10 Potential Transboundary Effects

7.10.1.1 No transboundary effects are expected due to the distance and direction away from the international boundary. The closest part of the offshore windfarm being 45 km from the UK Exclusive Economic Zone. Withing the offshore windfarm area, tidal ellipses are minimal reaching 5 km on mean spring tides. This is detailed further in **Appendix 5D: Transboundary Screening Matrix.**

7.11 Proposed Approach to the EIA

7.11.1.1 The Project-wide approach to the assessment methodology is set out in **Chapter 5: Approach to Scoping and EIA**. This will be implemented to assess the potential significant effects to the MCP from the construction, operation & maintenance, and decommissioning of the Project.

7.11.1.2 The specific guidance outlined in **Table 7-2** will also be considered in relation to the assessment, in addition to consultation with the stakeholders outlined above.

7.11.1.3 This section outlines the proposed EIA approach for MCP. This includes proposed assessment methodology, relevant embedded mitigation measures, as well as those measures scoped into and out of the assessment.

7.11.2 Proposed Assessment Methodology

7.11.2.1 The approach to EIA will follow the general approach outlined in **Chapter 5: Approach to Scoping and EIA**. The assessment methodology for the MCP section will evaluate geomorphological seabed and coastal features that form the basis of designated areas (MCP receptors), direct impacts on hydrodynamics and sediment dynamics, and the pathways that have the potential to develop indirect impacts on other types of receptors, for example benthic ecology.

7.11.2.2 The proposed method of assessment will be evidence-based, supported by simplistic analytical tools and site information, to help quantify the magnitude and extent of effects. Suitable evidence held in the Marine Data Exchange and the Offshore Wind Evidence and Knowledge Hub, amongst other sources, will be considered.

7.11.3 Assumptions and Limitations

7.11.3.1 The information and EIAR from the previously consented NorthConnect EIA will be reviewed to support the required analysis between MHWS and 12 NM.

7.12 Summary

7.12.1.1 An evaluation of the MCP and the expected Project components has identified the potential to result in some changes to baseline conditions which are expected to be small-scale and mostly temporary. The key receptors considered are geological and/or geomorphological seabed and coastal features, and fronts, however greater attention is required when considering the potential changes along impact pathways (e.g. the tidal advection of increased levels of suspended sediment), that have the potential to effect receptors of other topics, for instance benthic ecology, marine mammals, etc.

7.12.1.2 Potential changes that shall be evaluated in response to the Project include:

- Potential changes to suspended sediment concentrations;
- Potential changes to seabed morphology, for example, sandbanks, sand wave areas and notable bathymetry depressions;
- Potential changes to sediment transport and/or erosion;
- Potential seabed scouring; and
- Modifications to stratification

7.12.1.3 The potential for cumulative effects on MCP has been identified and any such effects will be assessed in the EIAR.

7.12.1.4 No potential has been identified for transboundary effects on MCP.

7.13 Further Consideration for Consultees

7.13.1.1 Please find below specific scoping questions relevant to the topic of MCP:

- Do you agree that the data sources identified, including project specific surveys, are sufficient to inform the MCP baseline for the EIAR?

- Do you agree that the impacts described in Table 7-8 can be scoped out for MCP?
- Do you agree that the embedded mitigation measures described provide a suitable means for managing and mitigating the potential effects of the Project on the MCP receptors?
- Do you have any specific requirements for the MCP assessment methodology?

8. MARINE WATER AND SEDIMENT QUALITY

8.1 Introduction

8.1.1.1 This chapter of the Scoping Report considers the potential significant effects on marine water and sediment quality of the Project.

8.1.1.2 The chapter provides an overview of the baseline conditions relevant to the Project Area (as defined in **Chapter 1: Introduction**), the datasets to be used to inform the EIA, sources, pathways and receptors of the potential significant effects to be considered, and how these potential significant effects will be assessed for the purpose of the EIA.

8.1.1.3 Marine water and sediment quality interfaces with other aspects of the Project. Therefore, this chapter of the 2024 Scoping Report should be considered alongside the following chapters:

- **Chapter 7: Marine and Coastal Processes**: A principal potential source of changes in water quality will be sediment mobilisation. The magnitude and extent of such changes will depend on physical processes and therefore the information from this chapter will be used to inform the marine water quality assessment.
- **Chapter 9: Benthic Ecology**: Changes in marine water and sediment quality have the potential to result in adverse effects on benthic and epibenthic biota through toxicity and other mechanisms. While assessment of significance of effects against established water quality and sediment quality standards, designed to be protective of biota, is included in this Marine Water and Sediment Quality Chapter, further specific assessment of effects of changes in water and sediment quality on biota is included in the Benthic Ecology Chapter.
- **Chapter 10: Marine Mammals**: Marine mammal receptor species are sensitive to accidental pollution, increased concentration of suspended solids and the leaching of toxins. The Marine Water and Sediment Quality Chapter will identify any risks relevant to Chapter 10.
- **Chapter 11: Ornithology**: The seabird receptor species are sensitive to possible changes on prey resource and habitat which may be affected by changes in marine water and sediment quality.
- **Chapter 12: Fish Ecology**: As described in relation to Chapter 9, while assessment against EQS is included in the Marine Water and Sediment Quality Chapter, further assessment of effects of specific water quality changes may need to be addressed in the Fish Ecology Chapter.
- **Chapter 22: Climate Change Resilience**: The relationship between climate resilience and marine water and sediment quality is captured in the In-Combination Climate Impacts (ICCI) assessment.

8.1.1.4 The following documents should also be read alongside this Chapter:

- **Appendix 5E: Marine Protected Areas (MPA) Screening Assessment**: The MPA Screening Assessment identifies changes that may affect relevant designated MPAs and therefore takes account of the conclusions of this chapter.

- **Habitats Regulations Appraisal (HRA) Screening Report**: The HRA Screening Report identifies changes that may affect relevant designated 'European sites' or Ramsar sites and therefore takes account of the conclusions of this chapter.

8.2 Legislation, Policy and Guidance

8.2.1 Legislation and Policy

8.2.1.1 Legislation and policy that has been used to inform the scope of the Marine Water and Sediment Quality chapter is set out in **Table 8-1**. Further information on policies relevant to the EIA are set out in **Chapter 2: Legislative and Policy Context.**

8.2.1.2 In particular, the WFD and its daughter directives are the principal source of numerical environmental quality standards (EQS) which should be met in surface water bodies to ensure protection of the environment.

Table 8-1: Legislation and policy context for marine water and sediment quality

Legislation/policy	Relevance to the assessment
Legislation	
Convention for the Protection of the Marine Environment of the North East Atlantic[166]	The OSPAR Convention will be implemented through OSPAR's North-East Atlantic Environment Strategy 2030. Contained within the OSPAR Convention is a series of annexes relevant to the marine water and sediment quality assessment: • Annex I: Prevention and elimination of pollution from land-based sources; • Annex II: Prevention and elimination of pollution from dumping or incineration; • Annex III: Prevention and elimination of pollution from offshore sources; and • Annex IV: Assessment of the quality of the marine environment.

Legislation/policy	Relevance to the assessment
EC Directive (2000/60/EC) establishing a framework for Community action in the field of water policy (the WFD)[167] EC Directive 2008/105/EC on environmental quality standards in the field of water policy, amending and subsequently repealing Council Directives 82/176/EEC, 83/513/EEC, 84/156/EEC, 84/491/EEC, 86/280/EEC and amending Directive 2000/60/EC (the EQS Directive)[168] EU Directive 2013/39/EU amending Directives 2000/60/EC and 2008/105/EC (the EQS amendment Directive)[169] The Scotland River Basin District (Standards) Directions 2014[170] The Scotland River Basin District (Status) Directions 2014[171]	These Directives (retained by subordinate legislation in UK law) set out a legislative framework for the protection of surface waters, including rivers, lakes, transitional waters and coastal waters, extending to 3 NM from the shore in Scotland (12 NM for chemical status). Requirements include: • Classification of water bodies, definition of objectives and implementation of programmes of measures to prevent deterioration and achieve good status; and • Preparation of a RBMP for the Scotland River Basin District (RBD). Classification of water bodies is undertaken by comparing water quality and biological data with environmental quality standards defined in Directive 2008/105/EC and the two Directions of the Scottish Ministers issued in 2014. Summary WFD baseline information is provided in Section 8.5.
Water Environment and Water Services (Scotland) Act 2003[172] The Environment (EU Exit) (Scotland) (Amendment etc.) Regulations 2019[173]	Set out arrangements for the protection of the water environment in Scotland. Establish RBMP for each respective river basin district (RBD).
EC Directive (2006/7/EC) concerning the management of bathing water quality and repealing Directive 76/160/EEC (the Bathing Water Directive)[174] Bathing waters (Scotland) Regulations 2008[175]	Set water quality standards for designated bathing waters and require Members States to monitor and assess the bathing water for at least two bacterial parameters. In addition, they must inform the public about bathing water quality and beach management, through bathing water profiles, which provide information to bathers on the risks to bathers' health
EC Directive (2008/56/EC) establishing a framework for Community action in the field of marine environmental policy (Marine Strategy Framework Directive - MSFD)[176] Marine Strategy Regulations 2010[177] Marine Environment (Amendment) (EU Exit) Regulations 2018[178]	Set out the objective of reaching Good Environmental Status (GES) in the marine environment. Define 11 descriptors for use in determining GES. Descriptors relevant to this technical assessment include: • Descriptor 5 – Human-induced eutrophication; • Descriptor 8 – Concentrations of contaminants; and • Descriptor 9 – Contaminants in fish and other seafood.

Legislation/policy	Relevance to the assessment
Scotland River Basin Management Plan[179]	Sets out programmes of measures for water bodies within the RBD to reach good status or good potential by 2027.
Marine Policies	
UK Marine Policy Statement, 2011[180]	Sets out a requirement to ensure that development will not cause deterioration in any waters to which the WFD applies, subject to Article 4.7, or prevent compliance with WFD obligations. Requires impacts on the quality of bathing waters to be taken into account. Requires assessment of impacts on targets, indicators or measures aimed at achieving GES under the MSFD.
Scotland's National Marine Plan, 2015[181] • GEN 12 Water Quality and Resources	Sets out the plan for Scottish territorial waters (out to 12 NM) and offshore waters (12 to 200 NM). It applies to the exercise of both reserved and devolved functions. Applicable policies regarding water quality include: • GEN 12 – Water Quality and Resources: Developments and activities should not result in a deterioration of the quality of waters to which the WFD, MSFD or other related Directives apply.

8.2.2 Technical Guidance

8.2.2.1 Technical guidance that has been used in the assessment is set out in Table 8-2.

Table 8-2: Relevant technical guidance relevant to marine water and sediment quality

Guidance reference	Relevance to the assessment
RenewableUK and NERC guidelines on Cumulative Impact Assessment Guidelines – Guiding Principles for Cumulative Impact Assessment in Offshore Windfarms[182]	This UK-wide guidance produced by RenewableUK and NERC provides advice on how to conduct a CEA and recommend that the spatial scales for individual receptors and the spatial extent of environmental changes be identified in line with the source-pathway-receptor model. The guidance will be followed in undertaking the CEA for marine water and sediment quality.

Guidance reference	Relevance to the assessment
Guidelines for data acquisition to support marine environmental assessments of offshore renewable energy project[183]	This report provides guidelines for data acquisition to support marine environmental assessments for offshore renewable energy projects. This guidance has been incorporated into the marine water and sediment quality scoping assessment on acquiring data for the study area.
Clearing the Waters for All – Environment Agency (England) guidance on WFD assessment for activities in transitional and coastal waters.[184]	This guidance is produced by the Environment Agency to provide guidance on assessing the effects of activities in transitional and coastal waters in England on WFD compliance; nevertheless, it provides useful guidance for similar assessment in Scotland.
Canadian Sediment Quality Guidelines for the Protection of Aquatic Life[185]: • Introduction – updated 2001; • Protocol 1995; and • Summary Tables updated 2002.	There are no established EQS for marine sediment quality in the UK, and the Canadian Guidelines are widely used as a substitute, being one of the few sets of such guidelines available that covers the marine environment. They define interim sediment quality guideline (ISQG) values and a probable effects level (PEL) for a wide range of chemical parameters in marine sediments.

8.3 Study Area

8.3.1.1 The study area for the marine water and sediment quality assessment within which the works for the Project may have a potentially significant effect on marine water or sediment quality is defined by considering the spring tidal excursion[186,187]. This represents the maximum distance that material (such as from disturbance of sediment or from spillages) can be transported in a single tide.

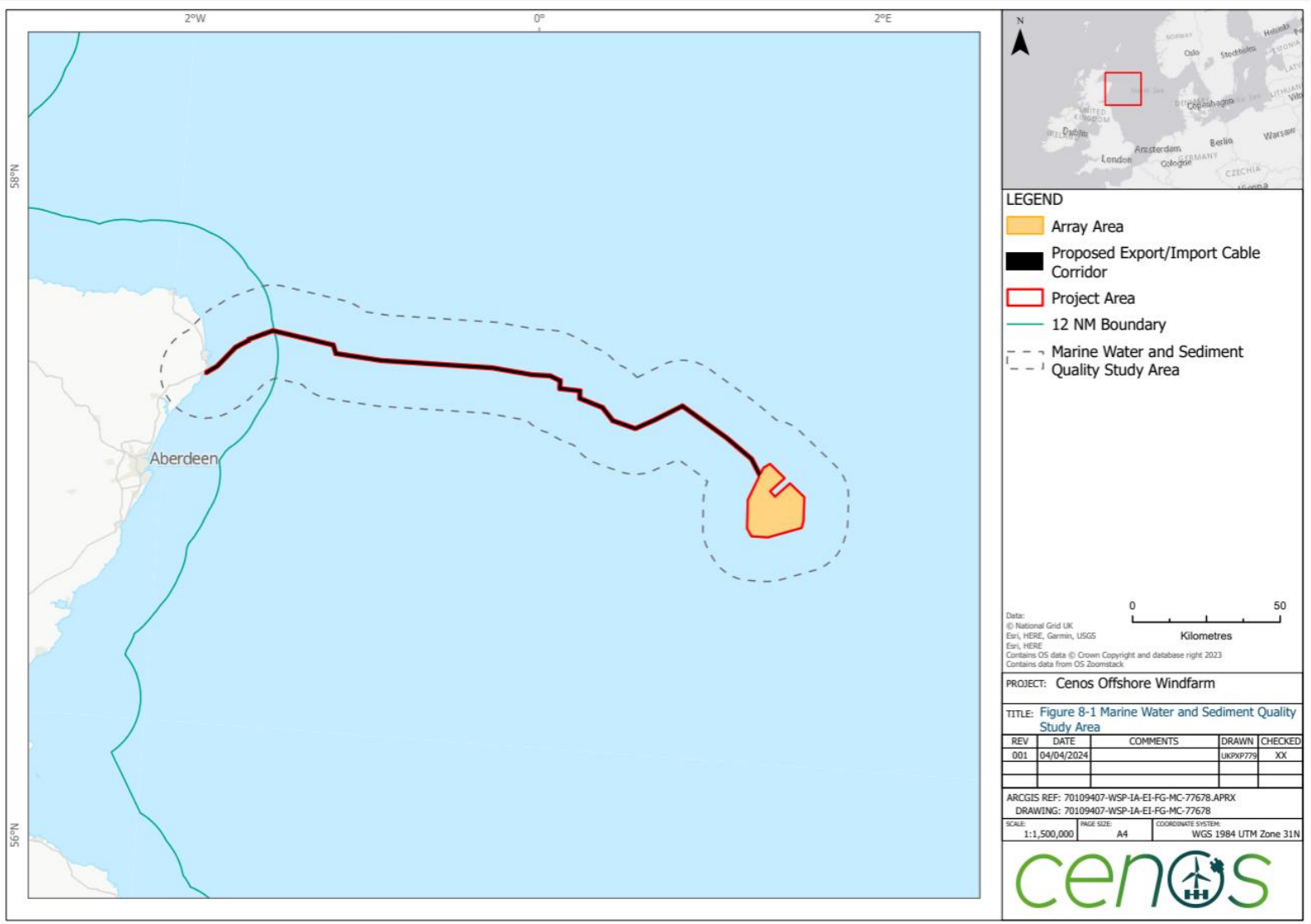
8.3.1.2 Close to shore the maximum (spring tide) tidal ellipse is narrow, extending approximately 15 km on a north-south axis. The ellipse reduces in length with distance offshore and close to the eastern end of the ECC is approximately 5 km long on a N by NE to S by SW axis, and up to 1 km wide. In the vicinity of the Array Area, the main axis of the tidal ellipse lies along a NNE to SSW axis, with a length of approximately 5 km.

8.3.1.3 On this basis, setting a study area extending 15 km to the north and 15 km to the south along the whole cable route is proposed. This will provide a precautionary approach for effects arising from activity anywhere along the cable route. Around the Array Area, it is proposed that the study area should extend to 5 km from its boundary. The complete study area is shown on **Figure 8-1**.

8.3.1.4 The ECC will be assessed from the Array Area to MHWS. The section of the ECC from MHWS to 12 NM is the same as the NorthConnect Cable Corridor. The Applicant is coordinating with NorthConnect Limited. NorthConnect Interconnector and the Project will only require one set of infrastructure, within the overlapping marine licence Project Area from 12 NM to MHWS.

8.3.1.5 The section of the ECC from MHWS to 12 NM has previously been assessed within the EIAR submitted for NorthConnect (application reference number 06771 & 06870) and judged acceptable through the consenting of NorthConnect. The previous EIA work for NorthConnect will be considered in assessing the ECC from MHWS to 12 NM, updated by any other readily available information and surveys undertaken. See Section 8.5 for further details of the baseline conditions. Further details are in **Chapter 5: Approach to Scoping and EIA.**

Figure 8-1: Marine Water and Sediment Quality Study Area



8.4 Consultation

8.4.1.1 Consultation is a key part of the application process. This assessment has been and will be informed by engagement and discussion with various stakeholders such as MD-LOT and SEPA.

8.4.1.2 A summary of the key issues raised during consultation to date, specific to marine water and sediment quality, including in the formal scoping opinion previously received from MD-LOT, is outlined in **Table 8-3** below, together with how these issues will be considered in the production of the EIAR.

Table 8-3: Summary of consultation relating to marine water and sediment quality

Date and stakeholder	Consultation and key comments	How this is accounted for
MD-LOT, 2023 Scoping Opinion, June 2023[188]	In response to a previous proposal to scope out water quality unless contaminated sediments were identified in the area, MD-LOT requested the Project scope in the topic.	The topic of marine water and sediment quality has now been scoped into the EIA process.
MD-LOT, 2023 Scoping Opinion, June 2023 [188]	The Scottish ministers stated that the EIAR must provide an estimate of expected residues and emissions, for example drill cuttings, where considered in the design envelope. Specific reference should be made to water pollution and quantities and types of waste produced during the construction and operation phases, where relevant.	The topic of marine water and sediment quality has now been scoped into the EIA process and drill cuttings and other releases have been considered in this chapter (see **Table 8-7**).
Dee District Salmon Fishery Board, 2023 Scoping Opinion, June 2023[188]	Dee District Salmon Fishery Board (response dated April 2023) noted that the Scottish Government Wild Salmon Strategy highlighted marine renewables as having the potential to impact salmon through water quality effects (among others).	The topic of marine water and sediment quality has now been scoped into the EIA process, which will identify any changes on water quality that should be taken into account in the assessment of effects on fish discussed in **Chapter 12: Fish Ecology** of this 2024 Scoping Report.
SEPA, 2023 Scoping Opinion, June 2023[188]	SEPA (response dated March 2023) stated that any operation should be cross checked to see if the proposed site is in or adjacent to (within 2 km) a bathing water designated under the Bathing Water Directive[174]. If so, all physical operations should be done outwith the Bathing Water Season (1 June to 15 September).	Potential effects on bathing waters are considered in this chapter (see **Table 8-7**).

Date and stakeholder	Consultation and key comments	How this is accounted for
SEPA, 2023 Scoping Opinion, June 2023[188]	SEPA (response dated March 2023) identified that many operations could potentially give rise to risk of pollution through silt mobilisation, silt suspension or chemical or oil spillages and highlighted the need for appropriate measures are in place to minimise the release of sediment plumes and to contain and prevent construction and waste materials from falling from a structure into the water body beneath.	Potential effects of sediment plumes and spillages have been included in this chapter (see **Table 8-7**).
Scoping Workshop, 29 February 2024	The Applicant provided details on the proposed approach for marine water and sediment quality assessment for the EIA. MD-SEDD advised that the Applicant should discuss marine water and sediment quality methodology and approach to the assessment directly with MD-SEDD	Further detail of the proposed approach can be found in **Section 8.6** and **Section 8.8**¸as well as **Chapter 5: Approach to Scoping and EIA.** The approach will be taken forward to the EIA, in direct consultation with MD-SEDD.

8.5 Baseline Conditions

8.5.1 Data Information Sources

8.5.1.1 A desk-based review of literature to support this 2024 Scoping Report has highlighted data sources that provide coverage across large parts of the Project Study Area for marine water and sediment quality and the wider region. The list of desk-based sources to be used in the assessment is provided in **Table 8-4**.

Table 8-4: Key sources of data relating to marine water and sediment quality

Source	Date	Summary	Coverage of study area
Scottish Government, (2011) - Scotland's Marine Atlas[189]	Published 2011	Contains data collected to support development of Scotland's National Marine Plan (NMP)[181]. The "Clean and safe" assessment chapter includes data on contaminants in water, sediment, and biota for the Northeast Scottish Marine Region (SMR) and the Long Forties Offshore Marine Region (OMR). https://www.gov.scot/publications/scotlands-marine-atlas-information-national-marine-plan/	Complete coverage of Study Area
Marine Scotland (2024) – National Marine Plan interactive (NMPi)[190]	Accessed 2024	Publicly available mapping showing monitoring points, administrative areas etc. https://marinescotland.atkinsgeospatial.com/nmpi/	Complete coverage of Study Area
SEPA (2024) – bathing waters data[191]	Accessed 2024	Monitoring of coastal bathing waters during the bathing season. https://www2.sepa.org.uk/bathingwaters/	Includes the four designated bathing waters within the Study Area
SEPA (2024) – WFD datasheets[192]	Accessed 2024	WFD data on coastal water bodies extending out 3 NM from the coastal baseline. https://www2.sepa.org.uk/WaterBodyDataSheets/	Includes the five WFD coastal water bodies and two WFD transitional water bodies within the Study Area
SEPA (2024) Water Classification Hub[193]	Accessed 2024	WFD quality data on coastal water bodies extending out 3 NM from the coastal baseline. https://www.sepa.org.uk/data-visualisation/water-classification-hub/	Includes the five WFD coastal water bodies and two WFD transitional water bodies within the Study Area
Cefas (2016)[194]	Accessed 2024	Provides a summary of SPM for the whole of the UK continental shelf.	Whole Study Area
NorthConnect (2018)[195]	Surveys undertaken in 2016	Grab sampling (biota, PSA and chemical analysis), seabed photography and video systems were used across the selected sample locations as part of the baseline characterisation.	Sediment quality data are available from six locations between MHWS and 12 NM of the ECC

Source	Date	Summary	Coverage of study area
Hywind (2015)[196]	Surveys undertaken in 2013	Grab sampling gear were deployed to collect sediment for analysis of particle size across the survey area and along their export cable corridor to determine levels of metals and hydrocarbons.	Pre-construction geophysical and environmental baseline survey area overlaps parts of the Project ECC
Green Volt (2021)[197]	Survey undertaken in 2021	Grab sampling was deployed to collect sediment for physio-chemical substances analysis (including contaminants) and macrofaunal identification. The survey covered Green Volt's windfarm area and two export cable routes.	One Green Volt export cable option overlaps with the Project ECC (nine sample stations and overlap area)
Water and sediment surveys undertaken on behalf of the Project	2023	See paragraphs 8.5.2.6 and 8.5.2.7.	ECC and Array Area

8.5.2 Existing Baseline

8.5.2.1 This section describes information on water and sediment quality that will be used in the EIAR to establish the baseline conditions against which to assess changes and effects on marine water and sediment quality resulting from the Project.

Marine Water Quality

8.5.2.2 Based on long term data collected between 1971 and 2000, the annual mean temperature at the surface in this region of the North Sea is between 9°C and 10°C, while the near seabed is two degrees less between 7°C and 8°C. Annual mean salinity near-seabed and at the surface is 3.5 percent or 35 practical salinity units (PSU)[190].

8.5.2.3 Data available through NMPi[190] has been used to provide a general understanding of water temperature and salinity, while information on SPM levels has been gleaned from reports by the Centre for Environment Fisheries and Aquaculture Science[194].

8.5.2.4 The long-term average for SPM in the North Sea at the Array Area is <1 mg/l (see **Plate 8-1**)[194]. The long term monthly average SPM for the northern North Sea is relatively stable and at very low concentrations, particularly in the northern North Sea, as shown in **Plate 8-2**. As shown in **Plate 8-1**, SPM levels are higher in shallow waters such as close to shore and in the southern North Sea. This is due *inter alia* to the greater influence of waves in shallow water and high energy events, such as storms, mobilising particulate matter from the seabed into the water column. Storms occur more frequently in the winter months, giving rise to higher SPM as shown in **Plate 8-2** in deeper waters storm events have less of an influence on the movement of sediments and hence SPM are consistently lower.

Plate 8-1: Average SPM for the period 1998-2015 (map)

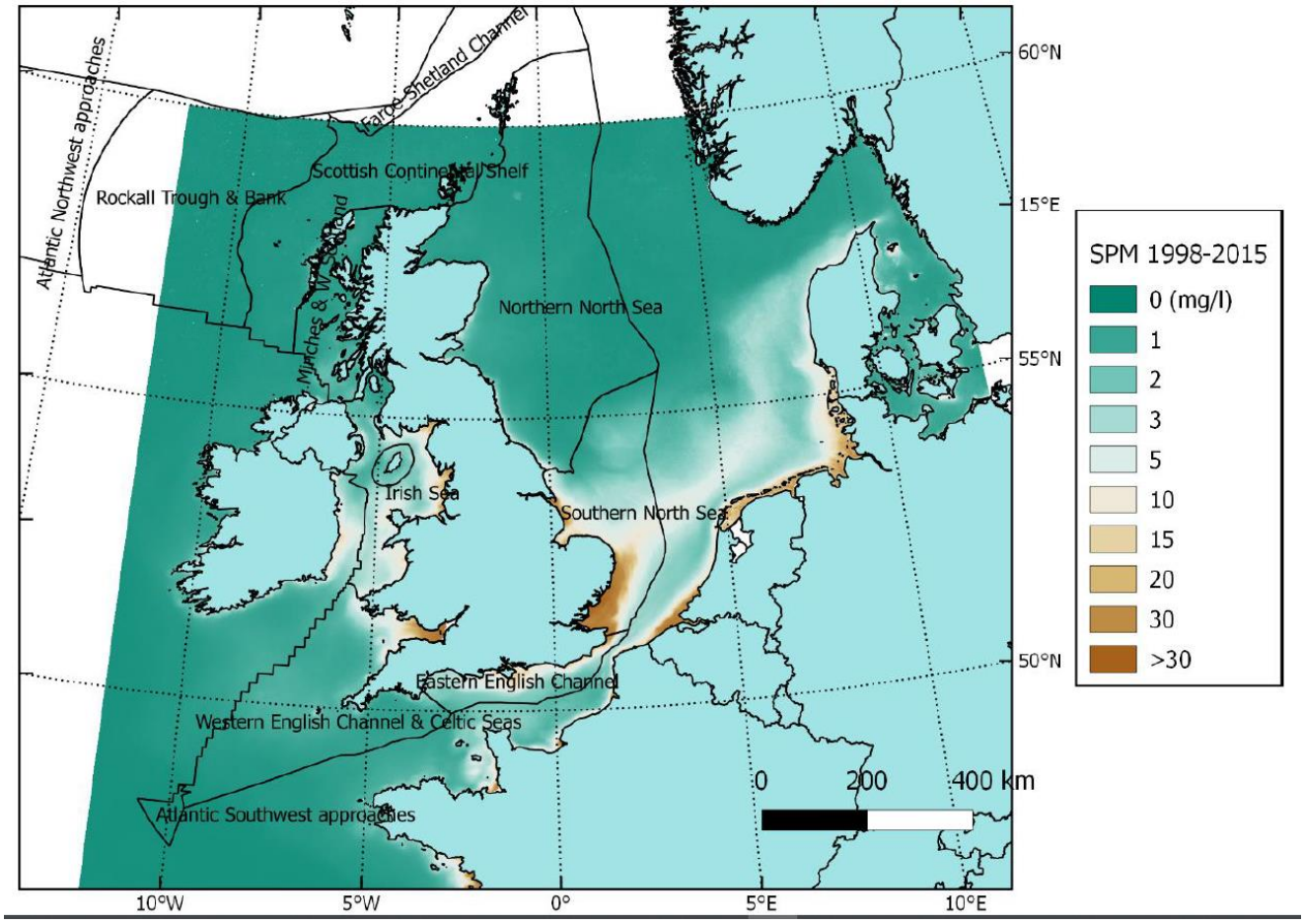
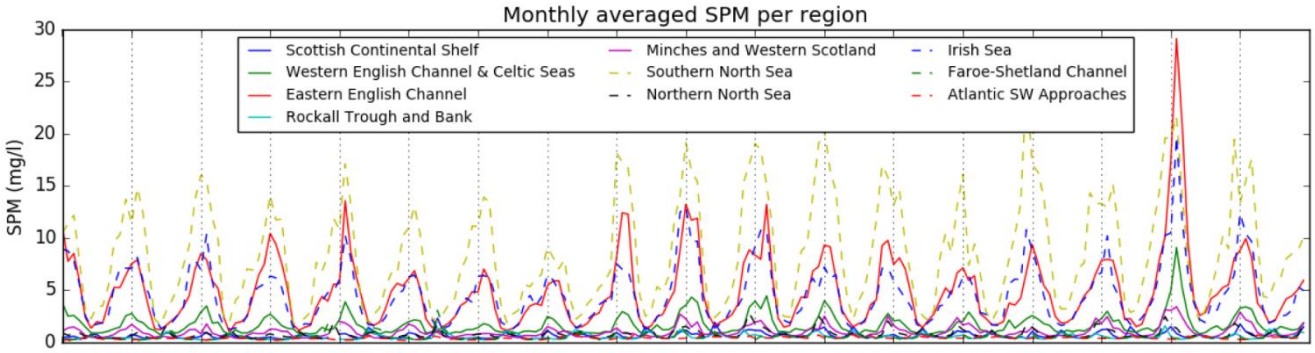


Plate 8-2: Average SPM for the period 1998-2015 (graph)



8.5.2.5 Desk-based reviews of sources detailed in **Table 8-4** have been undertaken to identify data on marine water quality that have been collected within or in close proximity to the Study Area. These data include information on water quality in the wider Scottish Marine Regions (SMR) and Offshore Marine Regions (OMR) (see **Figure 8-2**) obtained from Scotland's Marine Atlas[189].

8.5.2.6 In addition, site specific water quality surveys were undertaken in 2023 at three water column depths (surface, mid-depth, and near-bed) at six stations along the ECC and at 10 stations within the Array Area. The results and the final report from this survey

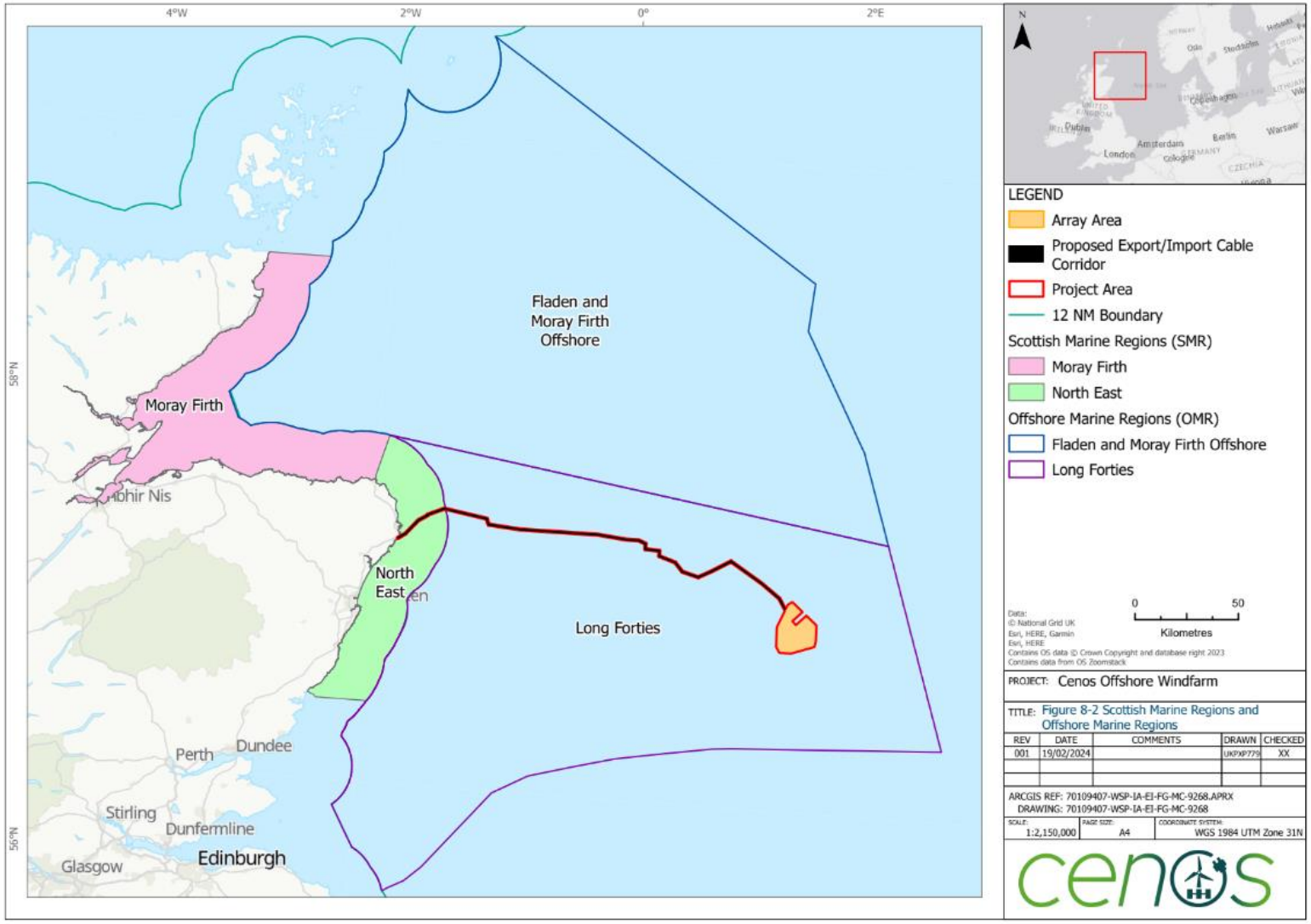
were not available at the time of writing this 2024 Scoping Report and will be used to inform the baseline for the EIA and incorporated into the EIAR.

8.5.2.7 Seabed surface sediment samples were also collected for chemical analysis at 24 locations within the Array Area and six locations along the ECC and analysed for parameters listed in **Table 8-5**.

Table 8-5: Parameters measured in offshore water and sediment quality surveys in 2023

Survey	Parameters measured
Water sampling at three water depths ECC - 6 stations Array Area - 10 stations	Total suspended solids Salinity pH Sodium, potassium, magnesium, calcium Bicarbonate, sulphate, fluoride Chlorophyll a Silicate (dissolved) Nitrogen (total), ammoniacal nitrogen, nitrate, nitrite Orthophosphate (dissolved), phosphate (total) Total hydrocarbon content (THC), Total petroleum hydrocarbons (TPH), Polycyclic aromatic hydrocarbons (PAH) Metals (Al, As, Ba, Cd, Cr, Cu, Fe, Hg, Ni, Pb, Sr, Zn)
Seabed surface sediment sampling Dual Van Veen/Mini Hamon grab ECC - 20 stations Array Area - 30 stations	Total Organic Carbon (TOC) Total Organic Matter (TOM) Dibutyltin (DBT)/ Tributyltin (TBT) Total hydrocarbon content (THC) Total petroleum hydrocarbons (TPH) Polycyclic aromatic hydrocarbons (PAH) Metals (Al, As, Ba, Cd, Cr, Cu, Fe, Hg, Ni, Pb, Zn) *Plus the following additional parameters at selected sites potentially affected by oil and gas infrastructure (3 in ECC, 6 in Windfarm Area):* Organohalogens, Polychlorinated biphenyls (PCBs)(ICES7) α-hexachlorocyclohexane β-hexachlorocyclohexane γ-hexachlorocyclohexane Dieldrin Hexachlorobenzene DDT/DDE/TDE BDEs

Figure 8-2: Scottish Marine Regions and Offshore Marine Regions



8.5.2.8 Currently the overall status of each of the designated WFD coastal water bodies which overlap the marine water and sediment quality Study Area, based on latest available (2021) data, is as follows (designated heavily modified water bodies are denoted HMWB):

- Cairnbulg Point to the Ugie Estuary (reference 200142) (high status);
- Ugie Estuary to Buchan Ness (Peterhead) (reference 200131) (good potential) (HMWB (intersected by ECC));
- Buchan Ness to Cruden Bay (reference 200125) (high status) (intersected by ECC);
- Cruden Bay (reference 200118) (high status); and
- Cruden Bay to the Don Estuary (reference 200117) (high status).

8.5.2.9 As of 2021 the status of each of the following WFD transitional water bodies within the marine water and sediment quality Study Area is as follows:

- Ugie Estuary (reference 200129) (high status). Protected areas under Article 7 of the WFD present in these WFD water bodies include designated bathing waters, as well as the Buchan Ness to Collieston SPA, the Ythan Estuary, Sands of Forvie and Meikle Loch SPA and the Ythan Estuary and Meikle Loch Ramsar site. There are no other WFD protected area types present.
- The bacteriological quality of the designated coastal bathing waters within the study area in 2023 was 'excellent' at Peterhead Lido, Cruden Bay and Balmedie and 'good' at Collieston[191].

8.5.2.10 The baseline conditions of WFD protected areas that are European and Ramsar sites are discussed further in **Chapter 9: Benthic Ecology** and the potential for effects due to changes in water quality is addressed in the submitted **Habitats Regulations Appraisal (HRA) Screening Report**.

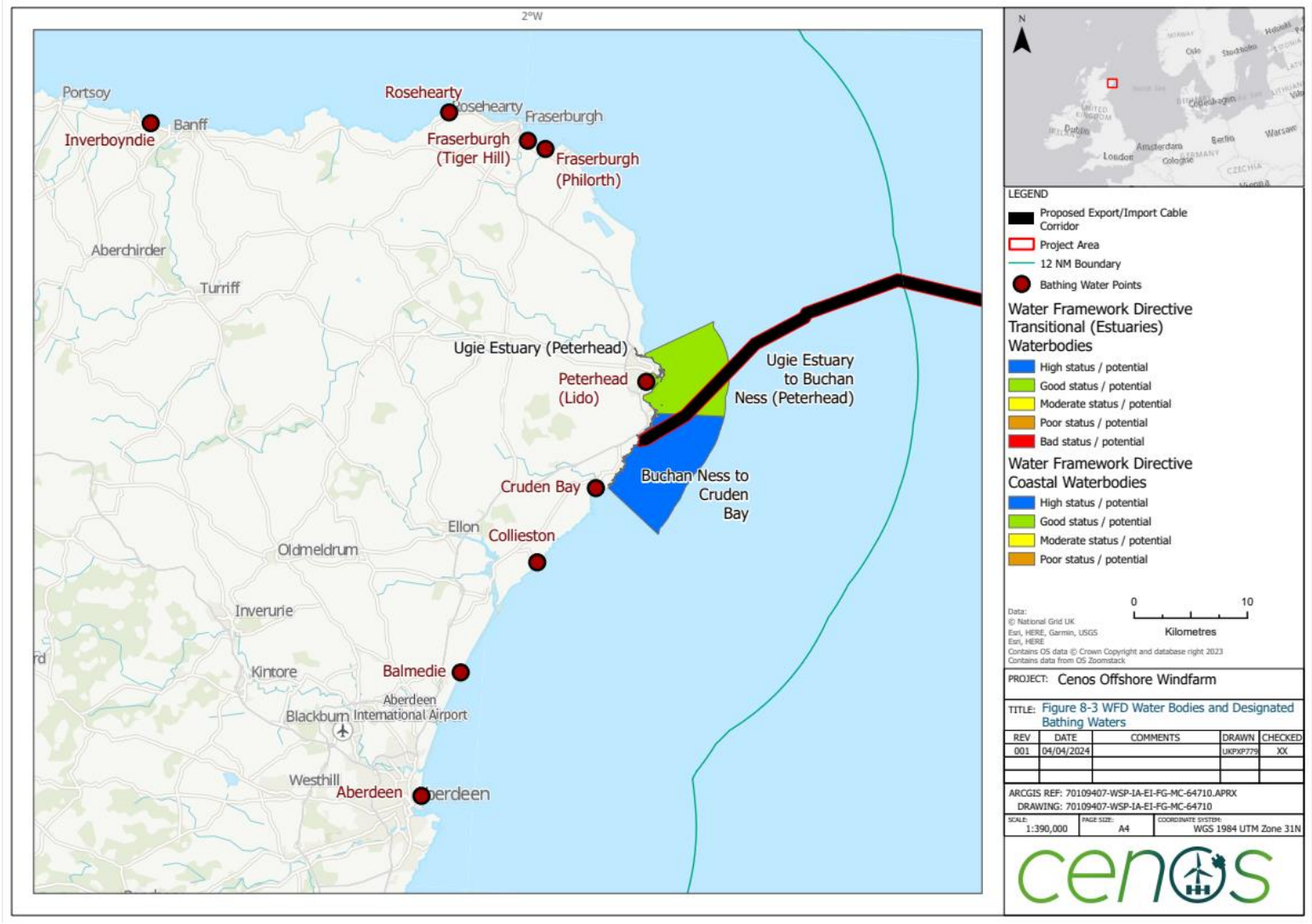
8.5.2.11 The WFD water bodies and bathing waters are shown in **Figure 8-3.**

8.5.2.12 There are also protected areas outside WFD water bodies but which overlap the Study Area that have the potential for direct effects from water quality changes. These include:

- Southern Trench NCMPA;
- Turbot Bank NCMPA; and
- East of Gannet and Montrose NCMPA.

8.5.2.13 The baseline conditions of these sites are discussed further in **Chapter 9: Benthic Ecology** and the potential for effects due to changes in water quality are addressed in **Appendix 5E: Marine Protected Areas (MPA) Screening Assessment**.

Figure 8-3: WFD Water Bodies and Designated Bathing Waters



Marine Sediment Quality

8.5.2.14 Desk-based reviews of sources detailed in Section 8.5.1 have been undertaken to identify data on marine sediment quality that have been collected within or in close proximity to the Study Area. These data include information on sediment quality in the wider SMR and OMR (see **Figure 8-2**) obtained from Scotland's Marine Atlas[189].

8.5.2.15 In addition, site specific surveys of seabed surface sediments were undertaken by the Project in 2023 using grab sampling at 20 stations along the ECC and at 30 stations within the Array Area. The results and the final report from this survey were not available at the time of writing this 2024 Scoping Report and will be used to inform the baseline for the EIA and incorporated into the EIAR.

8.5.2.16 Data from the NorthConnect EIAR[195] will be utilised in describing the baseline for the inshore part of the ECC. This includes sample results for seabed surface sediment collected in 2016 from six grab sample sites. Parameters measured included metals (As, Cd, Cr, Cu, Hg, Ni, Pb, Sn, Se, V and Zn), polycyclic aromatic hydrocarbons (PAH) and total petroleum hydrocarbons (TPH).

8.5.2.17 Although there are no formally adopted sediment quality standards in the UK. ISQG and probable effects levels (PEL) have been established by the Canadian Council of Ministers of the Environment (CCME)[185] and these are widely used. Sediment quality data from the NorthConnect between MHWS and 12 NM of the ECC show exceedances of Canadian ISQG concentrations for four samples for arsenic, one for copper and two for nickel, although no concentrations exceeded the PEL. No ISQG exceedances were recorded for any PAH or TPH.

8.5.2.18 Data relevant between MHWS and 12 NM are also available from EIA studies undertaken for the Green Volt project[197] and the Hywind project[196] and these will also be referenced as appropriate.

8.5.3 Future Baseline

8.5.3.1 Determining the future baseline draws upon information about the likely future use and management of the Project sites in the absence of development, climate change and any other proposed developments that may act cumulatively with the Project.

8.5.3.2 Sea temperatures are predicted to increase due to climate change, but this is not anticipated to have a marked effect on the presence of contaminants in seabed sediments. Increased storminess may also increase baseline SPM concentrations but using the existing baseline regarding sediment mobilisation will thus represent a 'worst case' assessment. Based on available evidence, in the absence of the Project, any future baseline for marine water and sediment quality over the lifetime of the Project is unlikely to be markedly different from the current baseline in terms of compliance with water quality standards (note that there are no formal standards for SPM in UK marine waters). Therefore, it is considered appropriate to use the current baseline for the purpose of this assessment.

8.6 Basis of Assessment

8.6.1.1 The marine water and sediment quality scoping assessment is based on the following key assumptions, which are also set out in **Chapter 3: Project Description**.

- The array will consist of up to 95 WTGs;
- There will be up to two offshore substations;
- Scour protection may be required around the base of some or all foundations and cable protection may be required along cable routes;
- Inter-array and export cables will be buried, where possible;
- Maintenance activities will be undertaken for both preventive and corrective maintenance requirements;
- The operational lifetime of the project is assumed to be a minimum of 30 years; and
- The decommissioning of the windfarm is anticipated to involve as close to full removal of offshore infrastructure as possible at the time of decommissioning (where safe/practicable to do so). The decommissioning works are likely to be undertaken in reverse to the sequence of construction works and involve similar levels of equipment and impact.

8.7 Relevant Embedded Mitigation Measures

8.7.1.1 Embedded mitigation measures have been identified and are proposed to be adopted as part of the Project design (primary mitigation); or implemented in accordance with industry standard practice that would occur with or without the input from the environmental assessment feeding into the process (tertiary mitigation). There is a commitment by the Applicant to implement these embedded mitigation measures and they have been considered within the 2024 EIA Scoping Report.

8.7.1.2 The requirement for additional mitigation measures (secondary mitigation) will be dependent on the significance of effects on marine water and sediment quality receptors and will be consulted upon with consultees throughout the EIA process. Any additional mitigation measures will be presented within the EIAR.

8.7.1.3 Those measures that are relevant to marine water and sediment quality are listed in **Table 8-6**. General mitigation measures, which would apply to all parts of the Project, are set out first. Thereafter mitigation measures that would apply specifically to marine water and sediment quality issues associated with the phases of the Project, are described separately.

Table 8-6: Embedded mitigation relating to marine water and sediment quality

ID	Embedded mitigation measures
General	
MWQ-001	In accordance with The International Convention for the Prevention of Pollution from Ships (MAPROL) convention[198] requirements a Marine Pollution Contingency Plan (MPCP) will be developed for the Project and will detail the procedures to be actioned in the event of a pollution event.

ID	Embedded mitigation measures
MWQ-002	A Project Environmental Monitoring Programme (PEMP) will be developed and adhered to for the Project. It will detail commitments to environmental monitoring.
MWQ-003	IMO International Convention on the Control of Harmful Anti-Fouling Systems on Ships 2001[199] will be adhered to minimise the potential for toxic effects to the wider environment
Construction	
MWQ-004	A Construction Environmental Management Plan (CEMP) will be developed and adhered to for the Project. The CEMP will detail how environmental commitments will be attained during the construction phase of the Project.
MWQ-005	The Applicant will develop and adhere to an EMP. An OEMP will be submitted as part of the consent application documents.
O&M	
N/A	The relevant mitigation is captured under "General" above
Decommissioning	
MWQ-006	A Decommissioning Programme will be developed for the Project in line with industry good practice, guidance and legislation.

8.8 Scoping of Potential Significant Effects

8.8.1.1 In line with the EIA Regulations 2017[200][201], the EIA for the Project will only consider those impacts where there is a potential significant effect of the Project.

8.8.1.2 The following section draws on industry experience to identify those source-receptor pathways that may potentially lead to a significant impact. Where experience and available evidence indicates a source-pathway-receptor will not lead to a significant effect with regards to the EIA Regulations 2017[200] the pathway is scoped-out from assessment.

8.8.1.3 The potential significant effects on marine water and sediment quality, as well as anticipated changes in marine water and sediment quality that may provide a pathway to potential significant effects on other receptors, are summarised in **Table 8-7.** The scoping assessment is based on a combination of the Project design at the time of writing, embedded mitigation measures, understanding of the baseline environment at the time of writing, the available evidence base for effects on marine geology, oceanography and coastal processes effects, the evidence base for marine water and sediment quality effects, further consultation with consultees, and

professional judgement. The approach to this assessment is set out in **Chapter 5: Approach to Scoping and EIA.**

8.8.1.4 The early identification of potential significant effects is used here as a tool aimed at delivering a proportionate approach to the EIA. In doing so, it sets out a high-level assessment of all potential effects, significant or not. The basis for scoping out certain effects and therefore no longer considered is presented in **Table 8-7**, supported by an evidence base.

Table 8-7: Summary of potential significant effects for marine water and sediment quality scoped in (✓) or scoped out (x) of the EIAR during construction (C), O&M and decommissioning (D)

Activity and impact	Embedded measures	Outcome of scoping per phase			Justification	Overview of proposed assessment approach
		C	O&M	D		
Accidental spills to the marine environment	MWQ-001 MWQ-006 MWQ-005 MWQ-002	X	X	X	There is a risk of water pollution caused by accidental release of polluting materials during all phases from sources including vessels and equipment. However, accidental pollution events are not considered likely to result in a significant effect on marine water and sediment quality features. The magnitude of an accidental spill will be limited by the size of chemical or oil inventory on construction vessels. The likelihood of an incident will be reduced as all vessels involved in the Project will be required to comply with good practice, applying strict environmental controls through the implementation of the MPCP (embedded measure MWQ-001), supported by the PEMP (embedded measure MWQ-002), which will be approved by the relevant stakeholders and secured through s.36 conditions, marine licence conditions and the EMP (embedded measure MWQ-005). These plans will include planning for accidental spills, address all potential contaminant releases and include key emergency contact details. The EMP will also set out industry good practice and	None

Activity and impact	Embedded measures	Outcome of scoping per phase			Justification	Overview of proposed assessment approach
		C	O&M	D		
					OSPAR and MARPOL guidelines for preventing pollution at sea. Due to the implementation of control measures and small quantities of hydrocarbons and chemicals on board vessels, it is concluded that there will be no potential significant effects on marine water quality, therefore it is proposed to scope this impact out of further consideration within the EIAR.	
	MWQ-003 MWQ-005 MWQ-002	X	X	X	All vessels and infrastructure will have anti corrosion treatment. In line with MAPROL convention requirements a Marine Pollution Contingency Plan (MPCP) will be developed for the Project and will detail the procedures to be actioned in the event of a pollution event. All chemicals which are in the contact with the water will be approved by MD-LOT in the construction phase including all paints.	None
	MWQ-005	X	X	X	Any platform or vessel supplying offshore accommodation for a workforce and present in the ECC or Array Area for a significant period may generate a discharge of treated sewage, which has the potential to result in an effect on marine water quality, particularly bacteriological quality. Such operations will only be needed offshore and concentrated	None

Activity and impact	Embedded measures	Outcome of scoping per phase			Justification	Overview of proposed assessment approach
		C	O&M	D		
					in the Array Area, 185km offshore at its closest point. It is assumed that Project activity close to the shore will not require accommodation vessels. In any case, MARPOL Annex IV requires sewage discharges made within 12 NM of the coast to be disinfected and prohibits such discharges within 4 NM of the coast. With the small population involved and the distance from the nearest bathing water, taking into account typical die-off rates of bacteria in the sea and the fact that the main tidal flow in the Study Area runs in a generally north-south direction parallel to the shore rather than towards the shore, significant effects on bacteriological compliance at the bathing waters are extremely unlikely. Therefore, these can be scoped out.	
Potential changes to suspended sediment concentrations	MWQ-004 MWQ-006 MWQ-005 MWQ-002	✓	✓	✓	Sediment disturbance may be caused during construction by installation of anchor systems or burying cables and during operation by sweeping of the seabed by catenary mooring lines, if present. Disturbance may occur during decommissioning as a result of infrastructure removal and will be of similar origin to that during the construction phase. These activities may lead to	Assessment approach described in Section 8.11, based on outputs from **Chapter 7: Marine and Coastal Processes**. Outputs will feed into **Chapter 9: Benthic Ecology**

Activity and impact	Embedded measures	Outcome of scoping per phase			Justification	Overview of proposed assessment approach
		C	O&M	D		
					turbidity resulting from increased concentrations of total suspended solids in the water column	
	MWQ-004 MWQ-006 MWQ-005 MWQ-002	✓	X	✓	Sediment disturbance during cable laying near to the shore has potential to generate plumes that may extend up to 15km north or south during a single spring tide, thus potentially interfering with migratory fish accessing rivers.	Assessment approach described in Section 8.11, based on outputs from **Chapter 7: Marine and Coastal Processes.** Outputs will feed into **Chapter 12: Fish Ecology**
Mobilisation of sediment contaminants	MWQ-004 MWQ-006 MWQ-005 MWQ-002	✓	✓	✓	Mobilisation of sediment contaminants may be caused during construction by cable laying and WTG foundation installation and during operation by sweeping of the seabed by catenary mooring lines, if present. Disturbance during decommissioning will be of similar origin to that during the construction phase.	Assessment approach described in Section 8.11, based on outputs from **Chapter 7: Marine and Coastal Processes** and 2023 survey results. Outputs will feed into **Chapter 9: Benthic Ecology**
Loss of drilling muds and cuttings into the sea from the subtidal exit of HDD undertaken beneath the littoral zone.	MWQ-005	✓	X	X	HDD requires drilling of the pilot hole and subsequent reaming to full size for most of the bore before the pilot hole is finally extended the short distance to the marine exit, thus minimising loss of drilling fluid and cuttings on breakthrough. Although losses will be mimimised, effects cannot be excluded until data are available on the muds and additives to be used.	Assessment approach described in Section 8.11 but may be scoped out at a later stage, depending on confirmation of details of drilling muds (and additives) to be used.

8.8.1.5 The identification of potential effects on marine water and sediment quality presented in **Table 8-7** has taken account of key design parameters set out in **Chapter 3: Project Description**. In particular, the detailed assessment of effects scoped-in will need to take account of:

- The proposed WTG station-keeping system (anchorage system) and the method of installation, cable burial and protection techniques and installation and scour protection techniques for any fixed platforms (as these will affect the potential for mobilisation of sediments during construction and decommissioning, potential for loss of drilling muds and potential for leaching of substances during operation);
- The nature of the materials to be placed in the sea, including the characteristics of any coatings (as these may affect the potential for leaching of toxic substances into the water during operation); and
- The composition of the drilling muds used for HDD at the landfall; Impacts of all phases of the Project (construction, operation and decommissioning).

8.9 Cumulative Effects

8.9.1.1 Cumulative effects on marine water and sediment quality resulting from the effects of the Project and other developments will be assessed in accordance with the guidance and methodologies set out in **Chapter 5: Approach to Scoping and EIA** and considering the other developments that have been screened in as part of the CEA screening exercise, see **Appendix 5C: Long List of Projects.**

8.9.1.2 The principal potential for cumulative effects is in relation to sediment mobilisation from concurrent construction activities relating to different projects, particularly export cables for other offshore windfarm developments close to or crossing the ECC or export cables from the Project to nearby oil and gas installations. It may be possible to avoid such adverse cumulative effects by cooperation on timing of specific construction activities.

8.9.1.3 All potential effects of the Project on marine water and sediment quality identified in **Table 8-7** could act cumulatively with effects from similar projects in the same area (closer than 2x the dimension of the spring tide ellipse in any direction).

8.9.1.4 The following projects have the potential to cause effects that may act cumulatively with effects of the Project and will require assessment of cumulative effects if their construction activity overlaps temporally and spatially with construction activity for the Project:

- Onward electrical connections to nearby oil and gas installations as part of the INTOG leasing arrangements, which clearly will include cabling within the Study Area; and
- Green Volt Offshore Windfarm, for which one export cable option overlaps the ECC.

8.10 Potential Transboundary Effects

8.10.1.1 The potential effects from construction, operation (including maintenance) and decommissioning on marine water and sediment quality receptors are considered in

Appendix 5D: Transboundary Screening Matrix. Due to the localised and small-scale nature of the expected impacts on marine water and sediment quality, largely governed by the small extent of tidal transport of sediments (spring tide ellipse limited to 5 km), significant transboundary impacts are unlikely. It is, therefore, proposed that transboundary impacts on water and sediment quality are scoped-out from further consideration within the EIAR.

8.11 Proposed Approach to the EIA

8.11.1.1 The Project-wide approach to the assessment methodology is set out in **Chapter 5: Approach to Scoping and EIA**. This will be implemented to assess the potential significant effects on marine water and sediment quality receptors from the construction, O&M, and decommissioning of the Project.

8.11.1.2 The specific technical guidance outlined in **Table 8-2** will also be considered in relation to the assessment, in addition to results of consultation with the stakeholders outlined above.

8.11.1.3 This section outlines the proposed specific EIA assessment methodology for marine water and sediment quality.

8.11.1.4 To enable the potential impact of the Project to be assessed, the baseline water and sediment quality will be described, as indicated in Section 8.5.

8.11.1.5 Potential impacts on marine water and sediment quality that may occur as a result of the planned construction, O&M, and decommissioning of the Project will then be identified, paying particular attention to parameters affecting compliance with the WFD[167] standards for water quality elements supporting ecological status within 3 NM (5.56 km) of the shore and for chemical status within 12 NM of the shore. Further offshore, assessment will pay particular attention to parameters relevant to compliance with MSFD[176] descriptors (8) and (9).

8.11.1.6 In the event that the Project is predicted to have a direct impact on compliance with water or sediment environmental quality standards these will be assessed in the Marine Water and Sediment Quality Chapter of the EIAR. Where there is potential for changes in water or sediment quality to affect other receptors, links will be made with other chapters, as described in paragraph 8.1.1.3. Where appropriate, measures will be proposed to mitigate the impacts.

8.11.1.7 Cumulative impacts will be assessed by taking into consideration any other relevant developments, proposed or under construction, which are in the vicinity of the Project, and which have the potential to affect the same features.

Scales for the sensitivity/value of existing water and sediment quality characteristics and for the magnitude of impact specific to marine water and sediment quality are provided in the following sections.

8.11.2 Proposed Assessment Methodology

8.11.2.1 The approach to the assessment of changes to and effects on marine water and sediment quality will follow the general approach outlined in **Chapter 5: Approach to Scoping and EIA** in this Scoping Report.

8.11.2.2 The Project-wide approach to the assessment methodology is set out in **Chapter 5: Approach to Scoping and EIA**. This will be implemented to assess the potential significant effects to marine water and sediment quality from the construction, operation & maintenance, and decommissioning of the Project. Significance of indirect effects of changes in water or sediment quality on other receptors will be assessed under the chapters dealing with those other receptors.

8.11.3 Assumptions and Limitations

8.11.3.1 For the inshore section of the ECC, it is proposed to rely on sediment quality data collected by NorthConnect in 2016 as part of their EIA baseline studies[195]. The likelihood of changes since this date has been reviewed and no recent developments or changes in coastal discharge arrangements that would be likely to affect coastal sediment quality has been identified. It has been assumed, therefore, that these data are representative of the current baseline.

8.12 Summary

8.12.1.1 The Project has the potential to cause changes and effects on marine water and sediment quality which may, in turn, lead to effects on other receptors, including natural biota and human recreational use of the sea. Therefore, the marine water and sediment quality topic has been included in this 2024 Scoping Report.

8.12.1.2 Initial baseline assessment shows that between MHWS and 12 NM the coastal water bodies have overall high status or good potential when assessed against WFD quality elements. Water and sediment quality surveys have been conducted further offshore, which will allow the baseline conditions to be characterised further.

8.12.1.3 Potential impacts have been identified during the different phases of the Project and will be assessed in the EIA. The following potential impacts are scoped out based on implementation of embedded mitigation measures or the lack of a realistic impact pathway being identified:

- Pollution caused by accidental spillages of chemicals or fuel; and
- Effects of offshore sewage discharges on compliance with bacteriological standards at designated bathing waters.

8.12.1.4 Other potential effects identified in **Table 8-7** will be assessed in the EIAR.

8.12.1.5 The potential for cumulative effects on marine water and sediment quality has been identified and any such effects will be assessed in the EIAR. No potential has been identified for transboundary effects on marine water and sediment quality.

8.13 Further Consideration for Consultees

8.13.1.1 Please find below specific scoping questions relevant to the topic of marine water and sediment quality.

- Do you agree that the data sources identified are sufficient to inform the marine water and sediment quality baseline for the EIAR?

- Can MD-LOT and their advisors advise whether any other receptors should be considered?
- Are you aware of any point sources of contaminants within the Study Area which may be of concern? If so, are any data available for these?
- Have all potential impacts resulting from the Project been identified for marine water and sediment quality receptors?
- Do you agree that the impacts described in **Table 8-7** can be scoped out?
- For those impacts scoped-in do you agree that the methods described are sufficient to inform a robust impact assessment? Do you agree that the embedded mitigation measures described in **Table 8-7** provide a suitable means for managing and mitigating the potential adverse effects of the Project on marine water and sediment quality pathways and receptors?
- Do you have a preference for the presentation of information to support WFD and MSFD assessments – separate technical appendices or embedded within the EIAR chapter?

9. BENTHIC ECOLOGY

9.1 Introduction

9.1.1.1 This chapter of the Scoping Report considers the potential significant effects on the benthic ecology of the Project. This chapter covers the ecology of benthic habitats, infaunal, and epibenthic species, including some species of commercial interest. Commercial aspects of shellfish fisheries are discussed in **Chapter 13: Commercial Fisheries**.

9.1.1.2 The chapter provides an overview of the baseline conditions relevant to the Project Area (as defined in **Chapter 1: Introduction**), the datasets to be used to inform the EIA, sources, pathways and receptors of the potential significant effects to be considered, and how these potential significant effects will be assessed for the purpose of the EIA.

9.1.1.3 Benthic ecology interfaces with other aspects of the Project. Therefore, this section of the Scoping Report should be read alongside the following sections:

- **Chapter 7: Marine and Coastal Processes**: Changes to marine geology, oceanography and coastal processes have the potential to affect sensitive benthic ecology receptor features and habitats. The information from this assessment will be used to inform the benthic ecology assessment.
- **Chapter 8: Marine Water and Sediment Quality**: Changes in marine water and sediment quality have the potential to result in adverse effects on benthic and epibenthic biota through toxicity and other mechanisms. The assessment against established water and sediment quality standards, designed to be protective of biota is included in the marine and sediment quality section. Further specific assessment of effects of changes in water quality, particularly where no environmental quality standard (EQS) is available, will be included in this technical assessment.
- **Chapter 11: Ornithology**: Some seabird species are sensitive to possible changes on prey resource and habitats. Therefore, the benthic ecology section will inform the offshore and intertidal ornithology assessment.
- **Chapter 12: Fish Ecology**: The benthic ecology assessment covers habitats that may be used by fish, thus contributes to the understanding of potential secondary effects e.g. those arising from changes in predator-prey relationships.
- **Appendix 5A: Survey Summary**: A variety of surveys have been carried out to provide benthic characteristics of the Array Area and ECC via habitat mapping and grab sampling. These also served to corroborate historic JNCC sampling within the MPA, fill in gaps, and collect non-invasive data of potentially sensitive benthic features.
- **Appendix 5E: Marine Protected Area Screening Assessment (MPA)**: The MPA Screening Assessment, which accompanies this application, assesses the potential significant effects the protected features or processes on which the conservation of protected features of the screened in MPAs depend upon. Whilst this assessment does not form part of the EIA, the benthic ecology chapter

informs the MPA screening assessment, and reciprocally, the MPA screening assessment will identify if the Project is likely to hinder the achievement of the conservation objectives of the MPAs.

9.2 Legislation, Policy, and Guidance

9.2.1 Legislation and Policy

9.2.1.1 There is no specific legislation, beyond those set out in **Chapter 2: Legislative and Policy Context,** that relates specific to the benthic ecology assessment. Further information on policies relevant to the EIA and their status is set out in **Chapter 2: Legislative and Policy Context.**

9.2.2 Technical Guidance

9.2.2.1 Technical guidance that has been used to define and inform this Scoping chapter and the proposed assessment is set out in **Table 9-1**.

Table 9-1: Relevant technical guidance

Guidance reference	Relevance to the assessment
Centre for Environment, Fisheries and Aquaculture Science (Cefas) Guidelines for data acquisition to support marine environmental assessments of offshore renewable energy projects[202]	Guidelines to assist in the design, review and implementation of environmental data collection and analytical activities associated with all stages of offshore renewable energy developments.
OSPAR (Oslo and Paris Commission) Guidance on Environmental Considerations for Offshore Windfarm Development [203]	Assist in the identification and consideration of the environmental effects of offshore windfarm developments.
Chartered Institute of Ecology and Environmental Management (CIEEM) Guidelines for Ecological Impact Assessment in Britain and Ireland – Terrestrial, Freshwater, Coastal and marine[204];	Guidance for determining if the impacts arising from the Project are likely to have significant effects on the benthic habitats and species considered in the assessment.
Defining and managing *Sabellaria spinulosa* reefs[205]	Guidance for determining the reefiness of Annex I features identified within the project Study Area.
The identification of the main characteristics of Annex I stony reef habitats under the Habitats Directive[206]	Guidance for determining the reefiness of Annex I features identified within the project Study Area.
Refining the criteria for defining areas with a 'low resemblance' to Annex I stony reef[207]	Guidance for determining the reefiness of Annex I features identified within the project Study Area.
Cefas Chemical Action Levels[208]	In the absence of in situ Environmental Quality Standards for UK sediments, used to inform a 'Weight of Evidence' (WoE) approach to the assessment of the potential impacts of the Marine Scheme on benthic receptors

Guidance reference	Relevance to the assessment
Canadian Sediment Quality Guidelines[209] (applied to contaminants where no other regional threshold value is available) and the Canadian Sediment Quality Guidelines for the Protection of Aquatic Life	In the absence of in situ Environmental Quality Standards for UK sediments, used to inform a WoE approach to the assessment of the potential impacts of the Marine Scheme on benthic receptors

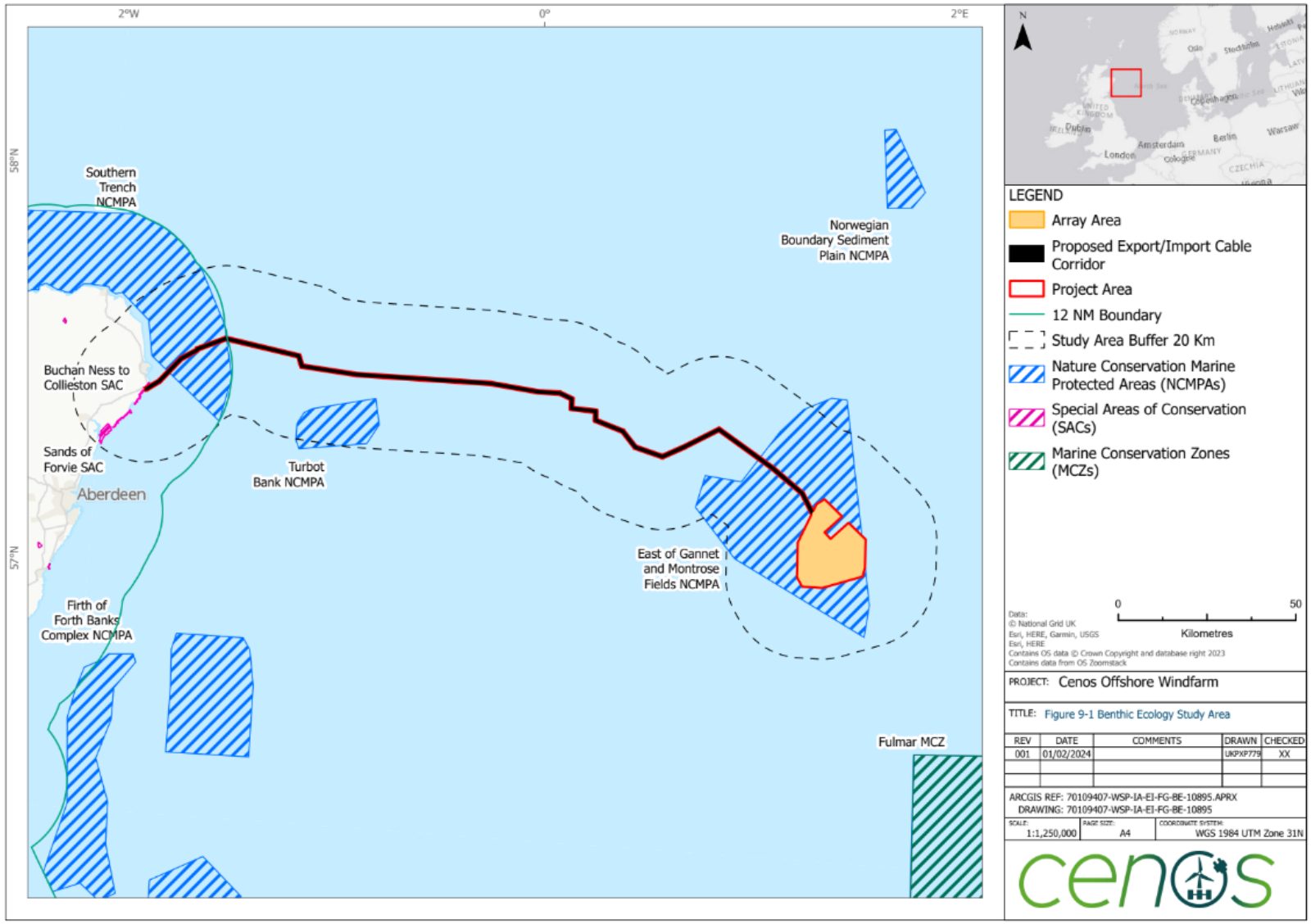
9.3 Study Area

9.3.1.1 The Study Area for the benthic ecology assessment is defined as the Project boundary together with the area that may experience impacts known as the ZoI, as shown in **Figure 9-1.** This has been defined as the approximate extent of two mean tidal excursions, which applies a reasonable level of precaution. This equates to a maximum extent of 15 – 20 km in a northwest to a southeast direction offshore along a north to south axis closer to the shore (up to MHWS). Accordingly, a conservative ZoI of 20 km around all facilities has been assumed. The Study Area therefore encompasses a total of 11,587 km^2.

9.3.1.2 The ECC will be assessed from the Array Area to MHWS. The section of the ECC from MHWS to 12 NM is the same as the NorthConnect Cable Corridor. The Applicant is coordinating with NorthConnect Limited. NorthConnect Interconnector and the Project will only require one set of infrastructure, within the overlapping marine licence Project Area from 12 NM to MHWS.

9.3.1.3 The section of the ECC from MHWS to 12 NM has previously been assessed within the EIAR submitted for NorthConnect Limited (application reference number 06771 & 06870) and judged acceptable through the consenting of NorthConnect. The previous EIA work for NorthConnect will be considered in assessing the ECC from MHWS to 12 NM, updated by any other readily available information and surveys undertaken. See Section 9.5 for further details of the baseline conditions. Further details are in **Chapter 5: Approach to Scoping and EIA**.

Figure 9-1: Benthic Ecology Study Area



9.4 Consultation

9.4.1.1 Consultation is a key part of the application process. This assessment has been, and will continue to be, informed by engagement and discussion with various stakeholders such as NatureScot, MD-LOT, JNCC, Natural England, and relevant fisheries organisations.

9.4.1.2 A summary of the key issues raised during consultation to date, specific to benthic ecology, is outlined in **Table 9-2** below, together with how these issues will be considered in the production of the EIAR.

Table 9-2: Summary of consultation relating to benthic ecology

Date and stakeholder	Consultation and key comments	How this will be addressed
MD-LOT, 2023 Scoping Opinion, June 2023[210]	"*The Scottish Ministers advise that the Developer should consider the Natural England response regarding the Berwickshire and North Northumberland Coast SAC. The Scottish Ministers cannot provide any further, detailed advice in regards to this receptor.*"	The Project will scope the Berwickshire and North Northumberland Coast SAC into the assessment. Detailed impact assessment of this site will additionally be carried through the HRA process via the HRA Screening Report and RIAA.
MD-LOT, Scoping Opinion, June 2023[210]	"*The Developer proposes in section 10.2.5 of the Scoping Report to scope in benthic ecology for all phases of the Project. The Scottish Ministers agree with this approach*."	Potential impacts on benthic ecology will be assessed for all life cycle phases of the Project.
Natural England, 2023 Scoping Opinion, June 2023[210]	"*For completeness, there are additional protected sites in the North of English waters that we advise the applicant considers going forward (including) Berwickshire and North Northumberland Coast SAC – designated for grey seal (Halichoerus grypus) and benthic features."*	The Project will include this site for consideration in the HRA Screening Report, which will address potential connectivity with and therefore their potential inclusion in the EIAR.
Natural England, 2023 Scoping Opinion, June 2023[210]	"*We would like to direct the applicant to our advice on the environmental considerations and use of data and evidence to support offshore wind and cable projects in English waters. We recognise this will not all be applicable for all aspects of the project but will provide a guide for assessments concerning England. Environmental considerations and use of data and evidence to support offshore wind and cable projects in English waters: https://defra.sharepoint.com/ sites/WorkDelivery2512/SitePages/Home.asp*"	The Project will review Natural England's advice in relation to environmental considerations and use of evidence to support offshore wind projects in English waters and use it as a guide to assess potential impacts on English sites.
NatureScot, 2023 Scoping	"*As the Project is entirely within the East of Gannet and Montrose Fields NCMPA, a*	The East of Gannet and Montrose Fields NCMPA will be

Date and stakeholder	Consultation and key comments	How this will be addressed
Opinion, June 2023	*comprehensive, standalone assessment will be needed, which considers the features of the site and their conservation objectives.*"	scoped into the Project EIAR, where potential impacts to receptors will be considered in relevant assessments. Additionally, a standalone MPA Screening Assessment will accompany the EIA.
NatureScot, 2023 Scoping Opinion, June 2023	*"The standalone NCMPA assessment against the conservation objectives for the site needs to consider all relevant activities (e.g. turbines, anchors, cables and export cables etc) and should ensure all relevant ecological information is included in that assessment. Cross referencing between chapters should be limited or, if used exceptionally, clearly stated. It also must consider cumulative aspects for the site."*	The MPA Screening Assessment will consider impacts from all Project activities. Data from literature review and site-specific surveys will be used to establish the baseline. Cross referencing (in the MPA Screening Assessment) will only be used where necessary to avoid repetitions within the same chapter or to refer to another chapter within the assessment. Cumulative impacts on the NCMPA will also be assessed.
NatureScot, 2023 Scoping Opinion, June 2023	"*JNCC provide formal Conservation Advice on NCMPAs which provide background information on the site, features for which the site is designated and conservation objectives for those features.*"	JNCC's Conservation Advice on NCMPAs will be used to assess impacts against the conservation objectives of the site.
NatureScot, 2023 Scoping Opinion, June 2023	"*This document provides useful information on conservation advice packages and how to use them: East of Gannet and Montrose Fields MPA Background Document.*"	The Background Document will be used to assess impacts against the features and conservation objectives of the site.
NatureScot, 2023 Scoping Opinion, June 2023	*"The Supplementary Advice on Conservation Objectives (SACO) provides detailed information for each of the attributes of the features for which the site is designated and should be used to consider the potential effects of the proposal*."	The Supplementary Advice on Conservation Objectives for the East of Gannet and Montrose Fields NCMPA from JNCC will be used to assess impacts against the features and conservation objectives of the site.
NatureScot, 2023 Scoping Opinion, June 2023	*"The Advice on Operations provides details on human activities that could impact the site and hinder achievement of the Conservation Objectives. This is presented in the form of activities and pressures, and we would expect all pressures related to the proposed activities to be scoped in, and justification provided*	The Advice on Operations will be used to assess impacts against the features and conservation objectives of the NCMPA.

Date and stakeholder	Consultation and key comments	How this will be addressed
	where a pressure will be scoped out. The Advice on operations provides justification as to why a pressure is listed for a particular feature and activity, with related references."	
Scottish Fisherman's Federation, 2023 Scoping Opinion, June 2023	"*Looking closer at the East of Gannet and Montrose Fields NCMPA, it is the only MPA designated in the northern North Sea region for the protection of offshore deep sea muds. The deep sea muds occur across the south-east half of the MPA, approximately 100 m deep. Not only that but the enormously rare Ocean quahog are distributed across the entire site, with the supporting habitat for this feature occurring across the north-west, which should mean the only activity allowed in the area would by default the North East section? The SFF would insist on this being scoped in, in order to verify that the development is not interfering negatively with the MPA.*"	JNCC's Conservation Advice on NCMPAs will be used to assess impacts against the conservation objectives of the NCMPA.
Scoping Workshop, 29 February 2024	The Applicant provided details on the proposed approach for benthic ecology assessment for the EIA. NatureScot advised the Applicant to scope in electromagnetic fields (EMF), heat and invasive non-native species (INNS). The inclusion of INNS in the scope of assessment was supported by JNCC. JNCC also advised to scope in Turbot Bank NCMPA to understand impacts of sediment transport on benthic features of the site. It was recommended to ensure sedimentation rates are considered to provide justification for scoping out this site. NatureScot confirmed that pollution events are not necessary for the scope of assessment. It was agreed that INNS need to still be considered. NatureScot also noted the need for a clear narrative justifying the use of original data data previously collected between MHWS and 12 NM for intertidal habitats and species in the assessment.	The comments provided within the Scoping Workshops from NatureScot and JNCC have been considered and are addressed in this 2024 Scoping Report. **Table 9-6** provides justification for the effects scoped in and scoped out of the assessment. INNS, EMF and heat have been scoped in to the assessment based on advice from NatureScot and JNCC. Further information on EMF and heat is detailed within **Appendix 5F: Approach to EMF and Heat as potential impacts**. Additionally, a robust justification for scoping out impacts to non-designated benthic features of Turbot Bank NCMPA (supporting habitats to sandeels) is included in **Table 9-6**. Based on the advice from NatureScot, pollution events

Date and stakeholder	Consultation and key comments	How this will be addressed
	NatureScot outlined that they will provide guidance on MPA Assessment requirements in Scottish Waters.	have been scoped out of the assessment. The Applicant has provided a justification for use of using the data previously collected between MHWS and 12 NM is in Section 9.5. Additionally, based on the advice from NatureScot, the Applicant is awaiting a new JNCC Conservation Advice Package to inform the MPA Assessment.

9.5 Baseline Conditions

9.5.1 Data Information Sources

9.5.1.1 Desk-based reviews have been undertaken using data collected within or in close proximity to the Study Area, as described in the 2023 Scoping Report[211] and are summarised herein as appropriate. These data have been supplemented with information on benthic ecology of the wider region, including information collected in support of other offshore developments, including oil and gas projects. Historical information on the East of Gannet and Montrose Fields NCMPA has been included due to the Project being located within the NCMPA.

9.5.1.2 Publicly available data will be reviewed to further inform the environmental assessment. A list of the main data sources used in scoping is provided in **Table 9-3.**

9.5.1.3 The desk study has been supplemented by site-specific surveys conducted in 2023 covering the Array Area and the ECC. The surveys included multibeam echosounder and sidescan sonar acquisition, underwater video transects, and grab sampling. The full results of these surveys will be included in the EIAR, and preliminary results are considered within this Scoping Report.

Table 9-3: Key sources of data

Source	Date	Summary	Coverage of Study Area
Habitat Assessment Report[212]	2023	Mapping of the habitats and seabed conditions in the Study Area	Covers entire Study Area.
Environmental Benthic Survey Report[213]	2023	Environmental reporting from the site-specific surveys	Covers entire Study Area.

Source	Date	Summary	Coverage of Study Area
Cenos Offshore Windfarm Scoping Report (the "2023 Scoping Report")	2023	Initial scoping study of the Project, including literature review of benthic environment	Covers the whole Study Area and the majority of the ECC, though alignment has been refined since publication.
OSPAR QSR 2023[214]	2023	Thematic assessments of the status of the marine environment in the OSPAR area	Covers entire Study Area and surrounding area.
MAGIC[215]	2023	Interactive map including benthic habitats	Covers entire Study Area and surrounding area.
OSEA4[216]	2022	High level benthic baseline	Covers entire study area and surrounding area.
East of Gannet and Montrose Fields MPA Monitoring Report[217]	2020	Provides a benthic baseline overview of East of Gannet and Montrose Fields NCMPA	Covers the Array Area and surrounding area.
EMODnet[218]	2021	Updated regional information and maps of seabed habitats	Covers entire Study Area and surrounding area.
Southern Trench NCMPA Conservation Advice Package[219]	2020	Provides a benthic baseline overview of Southern Trench NCMPA	Covers the ECC between MHWS and 12 NM
NorthConnect EIAR[220]	2018	EIA of the NorthConnect Interconnector Project	Covers the ECC between MHWS and 12 NM and the northern part of the Study Area of the Project
CEND19x12: Cruise report for Braemar Pockmarks candidate Special Area oonservation (cSAC), Scanner Pockmark cSAC and Turbot Bank NCMPA proposal[221]	2017	Provides a benthic baseline overview of Turbot Bank NCMPA	Covers the surrounding area of the ECC
Buchan Ness to Collieston SAC Conservation Advice Package	2016	Provides a benthic baseline overview of Buchan Ness to Collieston SAC	Covers the landfall area.

9.5.2 Existing Baseline

Characteristics of the Study Area

9.5.2.1 Based on EMODnet data[218], the wider Study Area comprises three principal EUNIS habitat types characteristic of the Central North Sea. These are:

- A5.37: Deep circalittoral mud (covering most of the Array Area);
- A5.27: Deep circalittoral sand (along most of the ECC); and
- A5.15: Deep circalittoral coarse sediment (in patches along the ECC) .

9.5.2.2 Geodatabase of Marine features adjacent to Scotland (GeMS) data were used to verify any PMFs across the Study Area. There is the potential for *S.spinulosa* reefs to occur in some locations, as this biogenic reef forming species is known to be present in this region. Biogenic reefs are of conservation value and listed under OSPAR and in Annex I of the European Union Council Directive 92/43/EEC (Habitats Directive)[222].

9.5.2.3 Ocean quahog (*Arctica islandica*) is an OSPAR listed threatened and declining species, a PMF and a designated feature of the East of Gannet and Montrose Fields MPA and is present in variable numbers across the wider area. Three species of seapens, *Pennatula phosphorea*, *Virgularia mirabilis* and *Funiculina quadrangularis*, are also reported as common species found within the Array Area. *F. quadrangularis* is a PMF, is listed on the Scottish Biodiversity List (SBL) and is also a Priority Species listed on the UK Biodiversity Action Plan (UK BAP). It is also listed as an English and Welsh Feature of Conservation Interest (FOCI). 'Seapens and burrowing megafauna' is also a PMF as well as an OSPAR listed threatened and declining habitat.

Benthos in the Array Area

9.5.2.4 The Array Area is located within the East of Gannet and Montrose Fields NCMPA which is designated for 'Offshore deep sea muds' and 'Ocean quahog aggregations (including sands and gravels as their supporting habitat)'.

9.5.2.5 **Table 9-4** provides a summary of the biotopes identified through the desk-based study during the Scoping Report 2023[211].

Table 9-4: Summary of the main biotopes and qualifying species identified within the East of Gannet and Montrose Fields NCMPA[217.1]

Biotope name	Biotope code	Species associated
Paramphinome jeffreysii, Thyasira spp. and Amphiura filiformis in offshore circalittoral sandy mud*	SS.SMu.OMu.PjefThyAfil	*Paramphinome jeffreysii* - Annelid (polychaete worm) *Thyasira* spp.- Mollusc (bivalve) *Amphiura filiformis* - Echinoderm (brittle star)
Owenia fusiformis and Amphiura filiformis in offshore	SS.SSa.OSa.OfusAfil	*Owenia fusiformis* - Annelid (polychaete worm)

[1] Infaunal biotope*, and epifaunal biotope**

Biotope name	Biotope code	Species associated
circalittoral sand or muddy sand*		*A.filiformis*- Echinoderm (brittle star)
Sea pens and burrowing megafauna in circalittoral fine mud**	SS.SMu.CFiMu.SpnMeg	-
Circalittoral sandy mud**	SS.SMu.CSaMu	-
Circalittoral mixed sediment**	SS.SMx.CMx	-
Virgularia mirabilis and Ophiura spp. with Pecten maximus on circalittoral sandy or shelly mud**	SS.SMu.CSaMu.VirOphPmax	*V.mirabilis* - Cnidaria (Virgularia) *Ophiura* spp. - Echinoderm (Ophiuroidea) *Pecten maximus* – Mollusc (bivalve)

9.5.2.6 The site-specific surveys undertaken in Q4 2023 and in-situ analysis confirm that the seabed across the Array Area mainly comprises offshore circalittoral mud (JNCC/EUNIS habitat SS.SSa.OSa/MD62/A5.37) with smaller areas of offshore circalittoral coarse sediment (SS.SMx.OMx/MD32/A5.15) and offshore circalittoral sand (SS.SSa.Osa/MD52/A5.27). Some areas of the circalittoral mixed sediment identified within the survey area could also be considered to represent the subtidal sands and gravel broad-scale habitat.

9.5.2.7 A reef assessment was undertaken to establish whether any Annex I stony reefs occurred within the Array Area, in areas where low reefs have previously been identified. The “reefiness” analysis[206] assessed whether the detected features met the reef biotope / species characteristics outlined by Golding *et al*[207]. This area was then classified as a ‘Possible Low Reef’ with no strong justification for Annex I protection. The EIAR will detail the process of determining these habitats in more detail and append the methodology used for the decision-making process.

9.5.2.8 Sponges were also recorded across the Array Area, primarily associated with areas of cobbles/boulders in both subcategories of the mixed sediment. An assessment of the 'deep-sea sponge aggregations' PMF and OSPAR habitat against the criteria outlined by the JNCC[223] concluded that the ‘deep-sea sponge aggregations’ habitat is not present. The EIAR will detail the process of determining these habitats in more detail and append the methodology used for the decision-making process.

9.5.2.9 The SACFOR abundance scale[2] was used for the areas where the presence of burrowing megafauna (e.g., Norway lobster) and sea pens was observed. As such, there is a degree of conformance to the OSPAR ‘Seapen and Burrowing Megafauna Communities’ and that this habitat type is characteristic to the Array Area.

9.5.2.10 No live specimens of ocean quahog were observed during the habitat survey, nor was there any evidence of their distinct siphons following review of the acquired video and photographic stills. The presence and distribution of juvenile specimens (shell

[2] The SACFOR scale is an abundance scale developed by the Marine Nature Conservation Review (MNCR), where S = Superabundant, A = Abundant, C = Common, F = Frequent, O = Occasional, R = Rare

diameter <5 cm) will be better understood once detailed macrofaunal data from the grab samples become available.

Export/Import Cable Corridor (ECC)

Mean High Water Springs to 12 Nautical Miles

9.5.2.11 In 2017, environmental surveys were conducted on behalf of NorthConnect within the survey corridor (as reported in NorthConnect 2018). The NorthConnect landfall area at Long Haven was unable to be accessed and therefore the intertidal area was characterised through vessel observation. The observations indicated a relatively impoverished community of barnacles, limpets, chitons, and other encrusting species, with some more sheltered areas potentially populated by fucoid algae.

9.5.2.12 The sediment between MHWS and 12 NM varied between bedrock, sand, mud and mixed sediments with gravel and boulders. The seabed between MHWS and 12 NM was predominantly bedrock overlaid with small areas of rippled gravel. Beyond this point, the sediment became predominantly sand and further offshore included large proportions of gravel and some cobbles/boulders. The cable corridor crosses the Southern Trench NCMPA, designated for, amongst other features, burrowed mud.

9.5.2.13 Possible Annex I habitats of conservation importance between MHWS and 12 NM include bedrock and stony reefs with the presence of *S. spinulosa* (both as a characterising species and as biogenic reef) and pockmarks. NMPi[224] show that there is the potential for kelp beds, which are a PMF in Scotland, to be present within the Project Area where suitable substrate occurs in shallow water. The presence of bedrock in the photic zone means that seaweed dominated biotopes (i.e. SS.SMp.KSwSS), which are also a PMF in Scotland, may occur in isolated areas along the ECC.

9.5.2.14 In 2016/17 NorthConnect undertook geophysical, geotechnical, and environmental surveys that included the inshore ECC (landfall to 12 NM). The Project has since undertaken a desktop study to review time-series data within the inshore ECC[225] to compare the NorthConnect data with MCA 2009 bathymetric survey data. This review assessed the suitability of the NorthConnect data to support the Cenos EIA and identify significant changes to habitats.

9.5.2.15 The review concluded that the NorthConnect ECC is situated in an area of benign seabed, and areas of Annex I reef (which are avoided by the NorthConnect ECC) appear localised, stable, and relatively unchanged over many years. An additional MBES survey was recommended to re-validate the time-series data assessed to date.

9.5.2.16 The Project is undertaking an inshore survey in 2024 to re-validate the existing data supporting baseline characterisation of the inshore ECC, covering landfall to 12 NM within a 500 m corridor. The survey will employ hull mounted MBES to assess changes to the seabed, and drop-down video transects to assess changes to key habitats and species. The survey has taken into consideration impacts to the local fishing fleets and was designed to minimise disruption, whilst collecting sufficient data to validate existing data and inform the EIA.

12 Nautical Miles to Array Area

9.5.2.17 The main habitat identified during the site-specific survey of the ECC is offshore circalittoral sand (JNCC/EUNIS classification of SS.SSa.Osa/MD52/A5.27). In the eastern part of the ECC, a higher percentage of fine sediment is present, mainly comprising offshore circalittoral mud (SS.Smu.Omu/MD62/A5.37), with some smaller areas of offshore circalittoral mixed sediment (SS.SMx.Omx/MD42/A5.45) and offshore circalittoral coarse sediment (SS.SMx.Omx/MD32/A5.15).

9.5.2.18 The eastern part of the ECC lies within the north-west part of the East of Gannet and Montrose NCMPA, and the benthic habitats are similar to those within the Array Area. Although ocean quahog are distributed across the entire NCMPA, monitoring surveys of the site conducted in 2015[217] showed that the supporting habitat for this species occurs across mainly in the northwest half.

9.5.2.19 No live adult specimens of ocean quahog were recorded along the ECC and there were no observations of their distinctive siphons from the video footage and photographs. Details on the occurrence of juveniles (shell diameter <5 cm) will be reported in the EIAR once the analysis of infaunal samples along the ECC is completed.

9.5.2.20 Turbot Bank NCMPA intersects the Study Area along the western part of the ECC. The site is designated for the protection of sandeels and features an area of important sandy benthic habitat, including a shelf bank and mound feature (the 'Turbot Bank' itself). The site is important for sandeels which prefer sand habitats. Further information on this site is provided in **Chapter 12: Fish Ecology**.

9.5.2.21 Several species of seapen have been recorded in the sandy parts of the ECC, including the tall sea pen (*F. quadrangularisis*) that is of conservation importance as described previously.

9.5.2.22 Habitats recorded during the spatially continuous surveys conducted in Q4 2023, such as 'Circalittoral Sand' and 'Circalittoral Mixed Sediment', are considered as types of 'Subtidal Sands and Gravel' which is listed as a Marine Habitat under the SBL and is a Scottish PMF.

9.5.2.23 Isolated areas of *S. Spinulosa* observed along the ECC during site specific surveys were subject to a 'reefiness assessment' and deemed not to resemble potential Annex I biogenic reef habitat. The EIAR will detail the process of "*reefiness assessment*" used in determining the extent of Annex I *Sabellaria* reef habitats.

9.5.3 Future Baseline

9.5.3.1 In the absence of the Project, the future benthic ecology and environment in the Study Area is likely to experience changes associated with natural variation, climate change and non-climatic factors. Studies in the North Sea have demonstrated that long-term changes are likely to result from a combination of climatic (e.g. rising sea temperatures, ocean acidification) and non-climatic factors (e.g. changes in fishing patterns and contamination), which may affect the responses of benthos to climate change[226] [227]. The nature of this response will likely be dependent on species' life-history traits[227].

9.5.3.2 Given the anticipated lifetime of the Project, species populations or ranges may alter due to climate change. Studies showed that with rising sea temperatures, species

will move out of the North Sea or into deeper water[228]. Similarly, the *ICES status report on climate change in the North Atlantic*[229] shows that species from the south will move into the North Sea, resulting in more biodiversity in the region. It is unlikely that these changes will occur over the course of the Project installation, so no effects are expected on these receptors during this phase.

9.5.3.3 Within this context, the operation of the Project is not predicted to materially alter the populations or distribution of benthic habitats or species. Baseline verification may be required prior to decommissioning if any substantially intrusive methods prove necessary.

9.6 Basis of Assessment

9.6.1.1 The benthic ecology scoping assessment is based on the following key assumptions, which are also set out in **Chapter 3: Project Description**:

- The array will consist of up to 95 WTGs;
- There will be up to two offshore substations;
- Scour protection may be required around the base of some or all foundations and cable protection may be required along cable routes;
- Inter-array and export/ import cables will be buried, where possible;
- ECC parameters as set out in **Chapter 3: Project Description**;
- Maintenance activities will be undertaken for both preventive and corrective maintenance requirements;
- The operational lifetime of the project is assumed to be a minimum of 30 years; and
- The decommissioning of the windfarm is anticipated to involve as close to full removal of offshore infrastructure as possible at the time of decommissioning (where safe/practicable to do so). The decommissioning works are likely to be undertaken in reverse to the sequence of construction works and involve similar levels of equipment and impact.

9.7 Relevant Embedded Mitigation Measures

9.7.1.1 Embedded mitigation measures have been identified and are proposed to be adopted as part of the Project design (primary mitigation); or implemented in accordance with industry standard practice that would occur with or without the input from the environmental assessment feeding into the process (tertiary mitigation). There is a commitment by the Applicant to implement these embedded mitigation measures and they have been considered within the 2024 EIA Scoping Report.

9.7.1.2 The requirement for additional mitigation measures (secondary mitigation) will be dependent on the significance of effects on benthic ecology receptors and will be consulted upon with consultees throughout the EIA process. Any additional mitigation measures will be presented within the EIAR.

9.7.1.3 Measures relevant to benthic ecology are listed in **Table 9-5**. General mitigation measures, which will apply to all parts of the Project, are set out first. Thereafter

mitigation measures that will apply specifically to benthic ecology issues associated with the various phases of the Project are described separately.

Table 9-5: Benthic ecology embedded mitigation measures

ID	Embedded mitigation measures
General	
BEN-01	In line with MAPROL convention requirements an MPCP will be developed for the Project and will detail the procedures to be actioned in the event of a pollution event
BEN-02	The Applicant will develop and adhere to an EMP. An OEMP will be submitted as part of the consent application documents.
BEN-03	An INNS Management Plan will be developed and adhered to for the Project. It will set out methods for minimising the potential for the introduction of INNS. The plan will include, but may not be limited to, measures to facilitate vessel compliance with the International Maritime Organisation (IMO) ballast water management guidelines (International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004) and adherence to the IMO guidelines for the control and management of ships' biofouling to minimise the transfer of invasive aquatic species (Biofouling Guidelines).
BEN-04	A PEMP will be developed and adhered to for the Project. It will detail commitments to environmental monitoring. IMO Convention on the Control of Harmful Anti-Fouling Systems on Ships will be adhered to minimise the potential for toxic effects to the wider environment.
BEN-06	Cables will be buried as standard. Where adequate burial depth cannot be achieved, external cable protection methods will be utilised. This will be minimised as far as practicable. Cable burial will be informed by a CBRA and will be implemented utilising a CaP.
Construction	
BEN-06	The offshore export cable will be installed at the landfall using trenchless construction (HDD) avoiding impacts to intertidal benthos.
BEN-07	Key sensitive habitats, where known, will be avoided through pre-construction surveys and micro-siting of the proposed offshore infrastructure.
BEN-08	The Applicant will develop and adhere to an EMP. An OEMP will be submitted as part of the consent application documents.
O&M	
N/A	Potential operational impacts are limited, and the relevant mitigation is captured under "General" above.
Decommissioning	
BEN-09	A Decommissioning Programme will be developed for the Project in line with industry good practice, guidance and legislation.

9.8 Scoping of Potential Significant Effects

9.8.1.1 The EIA for the Project will only consider those impacts where there is a credible risk of a potential significant effects. The following section identifies effect-receptor pathways that may potentially lead to a significant impact on benthic habitats and species, either directly or as a secondary impact. Where experience and available

evidence indicates that a habitat or species is not susceptible to impact, or that an activity will not result in potential significant effects, it is scoped out from further assessment. The pathways identified are based on the project parameters defined in **Chapter 3: Project Description**.

9.8.1.2 The early identification of potential significant effects is aimed at delivering a proportionate EIA. The potential significant effects on benthic ecology are summarised in **Table 9-6**. The scoping assessment is based on a combination of the Project design parameters at the time of writing (including embedded mitigation measures), the key benthic habitats and species identified, the evidence base for benthic ecological effects, further consultation, and professional judgement. The approach to this assessment is set out in **Chapter 5: Approach to Scoping and EIA. Table 9-6** summarises all the identified potential significant effects relating to benthic ecology and indicates which of these have been scoped into or out of the EIA, according to project phase.

Table 9-6: Summary of potential significant effects for benthic ecology scoped in (✓) or scoped out (x) of the EIAR during construction (C), O&M and decommissioning (D)

Activity and impact	Embedded mitigation	Outcome of scoping per phase			Justification	Overview of proposed approach
		C	O&M	D		
Temporary impacts to the seabed and benthic habitats.	BEN-05 BEN-07	✓	X	✓	A limited area of seabed habitat will be lost to the footprint of the mooring structures, offshore substation and cables.	Source-pathway-receptor model using updated benthic fauna and habitats data from site-specific surveys.
Long term impacts to the seabed and benthic habitats.	BEN-05 BEN-07	X	✓	X	A limited area of seabed habitat will be lost to the footprint of the mooring structures, offshore substation and cables.	Source-pathway-receptor model using updated benthic fauna and habitats data from site-specific surveys.
	BEN-05 BEN-07	X	✓	X	Non-rigid moorings will flex and may sweep areas of the seabed, potentially damaging fragile species. Upright sessile forms such as seapens are particularly vulnerable.	Source-pathway-receptor model using updated benthic fauna and habitats data from site-specific surveys; ongoing monitoring.
Potential changes to suspended sediment concentrations.	BEN-05 BEN-06 BEN-07	✓	X	✓	Seabed works (including pre-installation activities, construction and decommissioning) within array and ECC will remobilise sediment, increasing turbidity and ultimately leading to resettlement and possible smothering. This may affect feeding and respiration mechanisms of some species. In addition, sediment associated contaminants may be remobilised. Similar impacts will arise as a result of removal of structures and cables during decommissioning.	Source-pathway-receptor model using updated benthic fauna and habitats data from site-specific surveys.

Activity and impact	Embedded mitigation	Outcome of scoping per phase			Justification	Overview of proposed approach
		C	O&M	D		
Landfall works may disturb intertidal habitats and species.	BEN-06	X	X	X	Impacts to intertidal habitats and species are scoped out because the landfall will be trenchless and tunnelled under the intertidal area. This means that no surface works will take place in the intertidal zone between MHWS and MLWS and no intertidal habitats will be disturbed.	
Accidental spills to the marine environment	BEN-01 BEN-02	X	X	X	The potential for accidental spills from Project vessels will be managed and minimised through the preparation and adherence to an EMP which will include measures compliant MARPOL convention, as well as best practice for works in the marine environment (including individual vessel Shipboard Oil Pollution Emergency Plans (SOPEP)). The magnitude of any accidental spill will be limited by the small chemical or fuel inventory on vessels. Any spill would be subject to a high level of dispersal and therefore any potential interaction with marine receptors will be minimised. This impact is therefore scoped out of the EIA.	
Introduction of hard substrate in a predominantly sedimentary environment.	BEN-01	X	✓	X	Introduction of hard substrate will alter the benthic habitat and the communities of associated organisms, with associated ecological effects.	Source-pathway-receptor model using updated benthic fauna and habitats data from site-specific surveys.
Increased predation	BEN-02	X	✓	X	Congregation of fish in the Array Area may increase predation pressure on benthos. For	Source-pathway-receptor model using updated benthic

Activity and impact	Embedded mitigation	Outcome of scoping per phase			Justification	Overview of proposed approach
		C	O&M	D		
					example, cod are known to congregate around offshore structures, and as demersal predators, may feed extensively on benthos.	fauna and habitats data from site-specific surveys; ongoing monitoring and referring to fish ecology assessment.
Potential effects from EMF and heat generated by cables	BEN-02 BEN-05 BEN-07	X	✓	X	Heat and EMF may have localised effects on benthos. EMF may have a variety of sublethal effects on benthic invertebrates, both physiological and behavioural. Buried cables may increase the sediment temperature above levels suitable for adult and juvenile quahogs. For further details see **Appendix 5F: Approach to EMF and Heat as potential impacts.**	Source-pathway-receptor model using updated benthic fauna and habitats data from site-specific surveys.
Removal of hard structures during decommissioning resulting in loss of colonised surfaces	BEN-02 BEN-09	X	X	X	Removal of introduced hard substrates represents a return to pre-impact conditions and will promote re-establishment of the soft substrate communities characteristic of the area that support notable species such as seapens and quahog.	
Introduction of INNS	BEN-02 BEN-03 BEN-04 BEN-09	✓	✓	✓	INNS may be carried on the hulls or in the ballast water of vessels associated with all phases of the Project. In addition, introduction of areas of hard substrate along the ECC (as a result of cable protection) may create “stepping stones” for their dispersal. INNS may affect communities and individual species through competition, predation, parasitism or disease.	Source-pathway-receptor model using updated benthic fauna and habitats data from site-specific surveys; ongoing monitoring.

9.9 Cumulative Effects

9.9.1.1 Cumulative effects on benthic ecology resulting from the interaction of the Project and other developments will be assessed in accordance with the guidance and methodologies set out in **Chapter 5: Approach to Scoping and EIA** and considering the other developments that have been screened in as part of the CEA screening exercise.

9.9.1.2 Few impacts from the Project have the potential to act cumulatively with impacts from other developments to contribute to cumulative effects on benthos. These are largely limited to seabed disturbance and consequent effects on benthos within the ECC if nearby cable or pipeline routes are identified (within 20 km), and the cumulative footprint of development within the East of Gannet and Montrose Fields NCMPA.

9.10 Potential Transboundary Effects

9.10.1.1 No effects on benthic ecology receptors are likely to be transboundary and therefore will not be considered as part of the EIA. This is detailed further in **Appendix 5D: Transboundary Screening Matrix**.

9.11 Proposed Approach to the EIA

9.11.1.1 The Proposed Project-wide assessment methodology is set out in **Chapter 5: Approach to Scoping and EIA**. This will be implemented and adapted as appropriate to assess the potential significant effects on benthic ecology from the Project.

9.11.1.2 This section outlines the proposed EIA approach for benthic ecology. This includes proposed assessment methods, relevant embedded mitigation measures, as well as those aspects scoped into and out of the assessment.

9.11.1.3 The potential impacts of the Project will be assessed based on the existing benthic communities with a particular focus on any areas or features of conservation interest. This includes features that are protected, are the basis for a designation or are fundamentally ecologically linked to another FOCI (e.g. a key prey item for a protected fish or bird species).

9.11.1.4 This assessment is conducted with reference to *Guidelines for Ecological Impact Assessment in the UK and Ireland – Terrestrial, Freshwater, Coastal and Marine*[204]. Potential direct and indirect impacts as a result of the various phases of the Project will then be assessed based on the sensitivity/value of the receptor and the magnitude of impacts (i.e. the degree of change caused by the Project) using a matrix approach as illustrated in **Chapter 5: Approach to Scoping and EIA**.

9.11.1.5 Assigning an overall sensitivity to benthic ecological receptors requires consideration of several different aspects, including their resistance to change, ability to adapt to change and ability to recover. The Scottish Government's Feature Activity Sensitivity Tool (FeAST) and the Marine Life Information Network (MarLIN) Marine Evidence–based Sensitivity Assessment (MarESA) will be used to assist in determining receptor sensitivity of benthic ecological receptors for the assessment. FeAST has developed a sensitivity matrix of marine habitats and species to specific pressures in

the marine environment[230] and MarESA sets out a four-point scale for the resistance and resilience of benthic species and habitats[231] as set in **Table 9-7.**

Table 9-7: Summary of MarESA criteria for resistance and tolerance of benthic receptors

	Resistance	Resilience
High	No significant effects on the physicochemical character of the habitat and no effect on population viability of key/characterising species but may affect feeding, respiration and reproduction rates.	Full recovery (return to baseline levels) within two years.
Medium	Some mortality of species (can be significant where these are not keystone structural/functional and characterising species) without change to habitats relates to the loss of <25 % of the species or habitat component.	Full recovery (return to baseline levels) within 2 – 10 years.
Low	Significant mortality of key and characterising species with some effects on the physicochemical character of habitat. A significant decline/reduction relates to the loss of 25 – 75 % of the extent, density or abundance of the selected species or habitat component, e.g., loss of 25 – 75 % of the substratum.	Full recovery (return to baseline levels) within 10 – 25 years.
Very Low/ None	Key functional, structural, characterising species severely decline and/or physicochemical parameters are also affected e.g., removal of habitats, causing a change in habitat types. A severe decline/reduction relates to the loss of 75 % of the extent, density or abundance of the selected species or habitat component, e.g., loss of 75 % substratum (where this can be sensibly applied).	Negligible or prolonged recovery possible, at least 25 years to recover structure and function.

9.11.1.6 Another concept relating to the overall sensitivity of a receptor is its value, whether in terms of conservation importance, socioeconomic importance, or provision of ecosystem functions and services. High value and high sensitivity are not necessarily linked. A feature could be of high value (e.g. an Annex I habitat) but have a low or negligible physical/ecological sensitivity to a specific impact (e.g. underwater noise). It is important not to inflate impact significance on the account that a feature is 'valued'. Therefore, the narrative behind the assessment is important; the value can be used where relevant as a modifier for the sensitivity assigned to the feature, based on professional judgement.

9.11.1.7 It is important to note that throughout the development of the Project design, environmental constraints and sensitivities have been considered and the design parameters have been developed to reduce impacts on the environment, and therefore on the designated features of the East Gannet and Montrose Fields NCMPA which overlaps the Project Area. Where relevant additional measures will be proposed to mitigate the wider impacts from the Project, as relevant.

9.11.1.8 An MPA Screening Assessment will be undertaken in line with the published guidance by the MMO[232]. The MMO guidelines recommend a staged approach to assessment, involving three sequential stages: screening, stage 1 assessment and stage 2 assessment. If particular sites, activities or impacts are screened into the MPA screening assessment process, these are taken forward to consideration within the stage 1 assessment. If significant risks to the achievement of an MPA's conservation objectives are identified in the stage 1 assessment, these are then taken forward to stage 2 assessment. **Appendix 5E: Marine Protected Area Screening Assessment** outlines the approach to the MPA Screening Assessment for the Project and presents the findings of the initial screening.

9.11.1.9 The Project is not anticipated to have a direct impact on any sites designated at the NSN level (SAC or SPA) or international level (Ramsar) that have benthic habitats or species as qualifying features.

9.11.1.10 Cumulative effects will be assessed by taking into consideration any other relevant developments, proposed or existing, that are in the vicinity of the Project, and which have the potential to affect benthic habitats and key species, including those of nature conservation and /or commercial interest (see Section 9.9).

9.11.2 Assumptions and Limitations

9.11.2.1 The sources used for the desktop study (described in Section 9.5) represent the most up-to-date information on the benthic ecology of the Study Area. Additional comprehensive site-specific surveys were conducted to complement the desktop study. The limitations and uncertainties relating to the surveys are outlined in the survey programme (**Appendix 5A: Survey Strategy**).

9.11.2.2 The desktop study between MHWS and 12 NM will be informed by the NorthConnect EIAR[220], the historical information from the designations crossed by the cable route as well as other publicity available data These data will be subject to validation by targeted surveys in 2024 to verify their accuracy and applicability to the Project EIA. The mitigation measures for the ECC between MHWS and 12 NM will be largely the same as those previously proposed (and accepted) for the NorthConnect cable, given that the locations of the coincide and the broad characteristics of the benthic environment between MHWS and 12 NM are as previously described. It is acknowledged that small scale variations may have occurred in the intervening period since NorthConnect's assessment, and these minor changes will require management through micro siting the cable route. The requirement for micro siting will be determined by pre-construction surveys and reported prior to construction commencing.

9.11.2.3 Therefore, this assessment reflects the conditions recorded at the time of the project-specific surveys and most recent desk study data available, as well as consideration of existing knowledge on the potential trends in the baseline in the future. The habitat mapping is assumed to be representative of the conditions within the Study Area and provides a suitable basis for the EIA.

9.12 Summary

9.12.1.1 The seabed in the Study Area is predominantly circalittoral sediment, with muds in the east and becoming sandier to the west. A wide variety of benthic habitats and

associated species are represented within the Array Area and along the ECC. These include several features of nature conservation interest either confirmed or thought to be present including:

- PMF subtidal sands and gravel;
- PMF burrowed mud;
- OSPAR "*seapen and burrowing megafauna communities*" including the tall sea pen (*F. quadrangularis*);
- The NCMPA designated feature ocean quahog (*A. islandica*); and
- Potential Annex I habitat *S. spinulosa* and stony reefs.

9.12.1.2 The benthic ecology Study Area intersects with three NCMPAs, namely Turbot Bank NCMPA, Southern Trench NCMPA and East of Gannet and Montrose Fields NCMPA. Other key benthic features observed in the Array Area and along the ECC include species of commercial interest such as scallops and Norway lobster.

9.12.1.3 Key potential impacts include (but are not limited to):

- Direct habitat loss due to the footprint of the proposed facilities;
- Effects from remobilisation and resettlement of disturbed sediment;
- Changes to the character of the benthic environment through the introduction of hard surfaces;
- Changes in predation patterns through the congregation of fish within the Array Area; and
- EMF and heat from operational cables.

9.12.1.4 The decommissioning phase of the Project will include removal of Project infrastructure from the marine environment. There is the potential that some of this infrastructure may have been utilised as habitat during the Project lifetime. However, the removal of these features is to return the Project Area to its pre-construction baseline. Given that the impacts of the Project are assessed against baseline conditions, returning the Project Area to its baseline means that the effects of removing these features are inherently not significant. As such the removal of seabed features is scoped out of the EIA.

9.12.1.5 Impacts to the NCMPAs will be distinguished from more general impacts as appropriate (including quantification of footprint within NCMPA), overall impacts to the NCMPA will be presented in the MPA Screening Assessment which will be appended to the EIAR.

9.12.1.6 The following impacts are scoped out based on the lack of a realistic impact pathway being identified, and the implementation of embedded mitigation measures:

- Impacts to intertidal habitats and species (including the Buchan Ness to Collieston SAC); and
- Impacts from accidental pollution events.

9.12.1.7 Cumulative impacts to benthic ecology may arise if future cable or pipeline corridors are identified in close proximity to the ECC. There is no identified scope for transboundary impacts to benthic ecology.

9.13 Further Consideration for Consultees

9.13.1.1 Please find below specific scoping questions relevant to benthic ecology:

- Do you agree that the approach is robust enough and sufficient for the purposes of mitigating impacts to benthic ecology, given the technical and environmental constraints on the Project?
- Do you agree that the data sources identified, including the project specific geophysical and benthic surveys, are sufficient to inform the ecology baseline for the EIAR?
- Have all potential impacts resulting from the Project been identified for benthic receptors?
- Do you agree that the impacts described can be scoped out (**Table 9-6**), specifically intertidal habitats and species and accidental pollution events from sources vessels and equipment?
- For those impacts scoped in (**Table 9-6**), do you agree that the methods described are sufficient to inform a robust impact assessment?
- Do you agree that the embedded mitigation measures described provide a suitable means for managing and mitigating the potential effects of the Project on benthic ecology receptors?

10. MARINE MAMMALS

10.1 Introduction

10.1.1.1 This chapter of the Scoping Report considers the potential significant effects on marine mammals of the Project.

10.1.1.2 The chapter provides an overview of the baseline conditions relevant to the Project Area (as defined in **Chapter 1: Introduction**), the datasets to be used to inform the EIA, sources, pathways and receptors of the potential significant effects to be considered, and how these potential significant effects will be assessed for the purpose of the EIA.

10.2 Legislation, Policy, and Guidance

10.2.1 Legislation and Policy

10.2.1.1 Legislation and policy that has been used to inform the scope of the Marine Mammals chapter is set out in **Table 10-1**. Further information on policies relevant to the EIA are set out in **Chapter 2: Legislative and Policy Context**.

Table 10-1: Legislation and policy context

Legislation/policy	Relevance to the assessment
The Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR) 1992[233]	Establishes an international network of MPAs and sets out management and status targets.
The Conservation (Natural Habitats, &c.) Regulations 1994[234] (and amendments)	Transposes protection afforded to marine mammals under the European Habitats Directive into Scottish law. Conserves biodiversity through measures for protection of habitats listed in Annex I and species listed in Annex II of the Directives through the establishment of a UK network of protected sites.
Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019[235] referred to as the 2019 Regulations	Provides for the retention of protections contained in EU nature directives in UK Law following the UK's exit from the EU.
Marine (Scotland) Act 2010[236]	Provides a framework which will help balance competing demands on Scotland's seas. The Act introduces a duty to protect and enhance the marine environment including designation of seal conservation areas.
Nature Conservation (Scotland) Act 2004[237] (as amended)	Transposes protection afforded to marine mammals under the European Habitats Directive and the Bern Convention on the Conservation of European Habitats and Wildlife into Scottish law.
Protection of Seals (Designation of Haul-out Sites) (Scotland) Order 2014[238]	Protects seals in Scotland from reckless and intentional disturbance at haul-out sites.

Legislation/policy	Relevance to the assessment
The Conservation of Offshore Marine Habitats and Species Regulations 2017[239]	Implements the species protection requirements of the EU Habitats and Birds Directives and subsequent UK regulations following EU exit, offshore (more than 12 NM from the coast).

10.2.2 Technical Guidance

10.2.2.1 Technical guidance that has been used to define and inform the assessment is set out in **Table 10-2**.

Table 10-2: Relevant technical guidance

Guidance reference	Relevance to the assessment
Chartered Institute of Ecology and Environmental Management (CIEEM) Guidelines for Ecological Impact Assessment in Britain and Ireland – Terrestrial, Freshwater, Coastal and marine[240]	An overarching methodological guidance for assessing impacts to ecological receptors.
JNCC Statutory Nature Conservation Agency Protocol for Minimising the Risk of Injury to Marine Mammals from Piling Noise[241]	A protocol for the mitigation of potential underwater noise impacts arising from pile driving during offshore windfarm construction.
JNCC Guidelines for Minimising the Risk of Injury to Marine Mammals from Geophysical Surveys[242]	Provides guidance on minimising the impact of geophysical surveys, which have been scoped into the assessment.
JNCC Guidelines for Minimising the Risk of Injury to Marine Mammals from Using Explosives[243]	Provides guidance on reducing the risk of explosives, in this instance referring to potential UXO clearance work.
National Oceanic and Atmospheric Administration (NOAA) Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing[244]	Provides guidance on the assessment of underwater noise of marine mammals, hearing thresholds and weighting functions.
The protection of marine European Protected Species (EPS) from injury and disturbance: Guidance for the marine area in England and Wales and the UK offshore marine area[245]	Provides guidance to for marine users who are planning to carry out activity which has the potential to kill, injure or disturb and EPS in offshore UK waters.
The protection of marine European Protected Species from injury and disturbance. Guidance for Scottish inshore waters [246]	Provides guidance to for marine users who are planning to carry out activity which has the potential to kill, injure or disturb and EPS in Scottish territorial waters.
Guidance: harassment at seal haul-out sites[247]	Guidance on harassment at designated seal haul-out sites around Scotland.
Department for Business, Energy and Industrial Strategy (BEIS) Policy Statement-Marine Environment: Unexploded Ordnance (UXO) Clearance Joint Interim Position Statement[248]	Provides guidance on minimising the impact of UXO clearance activities, which have been scoped into the assessment.
The Carbon Trust in collaboration with the Offshore Renewables Joint Industry Programme (ORJIP)	Investigates the uncertainty in the assessments of underwater noise, with the

Guidance reference	Relevance to the assessment
'Reducing Uncertainty in Underwater Noise Assessments (ReCon)'[249]	aim of reducing unnecessary conservativism.
Marine Directorate (MD) commissioned report 'Energy Conversion Factors in Underwater Radiated Sound from Marine Piling: Review of the Method and Recommendations'[250]	A review of underwater noise modelling methodologies and recommendations for best practice.
UK dolphin and porpoise conservation strategy: high level strategy[251]	A high-level strategy summarising the existing management measures and proposals for future action.

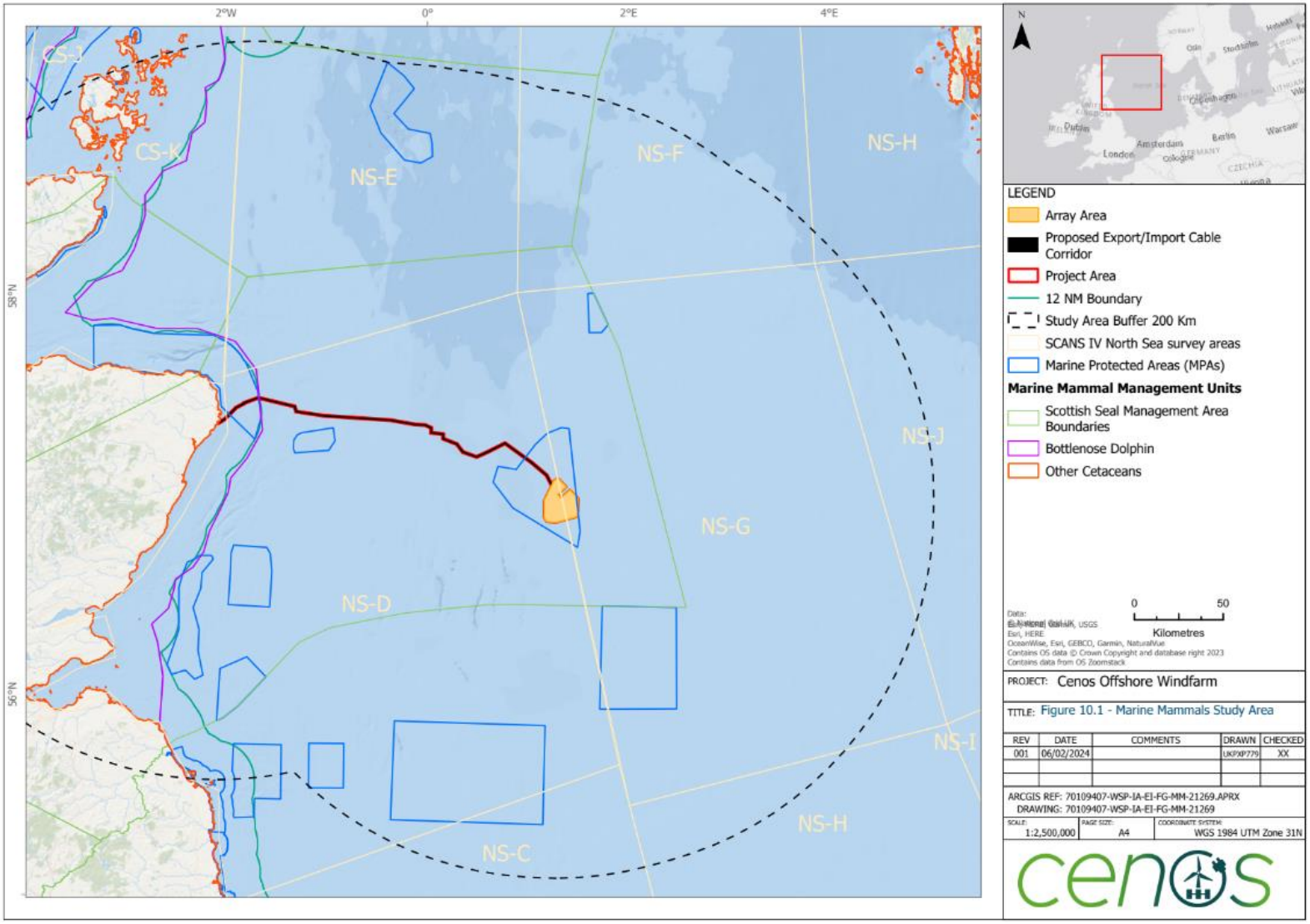
10.3 Study Area

10.3.1.1 The study area (see **Figure 10-1**) encompasses all marine components of the Project seaward of MHWS. Because of the highly mobile nature of marine mammals, the study area extends well beyond the footprint of the Project to include the wider waters of the North Sea, based on UK marine mammal management units (MMMUs) as defined by the Inter-Agency Marine Mammal Working Group (IAMMWG). These MMMUs have been defined based on current understanding of the geographical range of populations and sub-populations, in order to provide advice on impacts at the most appropriate spatial scale[252]. An indicative area of 200 km around the Project has been applied for the purposes of this scoping report, noting that with highly mobile species, interconnectivity with the wider area may also need to be considered based on species-specific MMMUs. This area is sufficiently large to encompass any potential ZoI of project activities.

10.3.1.2 The ECC will be assessed from the Array Area to MHWS. The section of the ECC from MHWS to 12 NM is the same as the NorthConnect Cable Corridor. The Applicant is coordinating with NorthConnect Limited. NorthConnect Interconnector and the Project will only require one set of infrastructure, within the overlapping marine licence Project Area from 12 NM to MHWS.

10.3.1.3 The section of the ECC from MHWS to 12 NM has previously been assessed within the EIAR submitted for NorthConnect Limited (application reference number 06771 & 06870) and judged acceptable through the consenting of NorthConnect. The previous EIA work for NorthConnect will be considered in assessing the ECC from MHWS to 12 NM, updated by any other readily available information and surveys undertaken. See Section 10.5 for further details of the baseline conditions. Further details are in **Chapter 5: Approach to Scoping and EIA**.

Figure 10-1: Marine Mammals Study Area



10.4 Consultation

10.4.1.1 The Applicant is fully committed to a thorough engagement process with regulators, marine stakeholders and local communities. The aim of this engagement is to ensure that stakeholders are consulted and informed of developments during, and beyond, the EIA process for the Project.

10.4.1.2 The Applicant has engaged in early discussions with MD-LOT, NatureScot, and JNCC to discuss the Project and to support the development of the 2023 Scoping Report[253]. In addition, the East of Gannet and Montrose Fields NCMPA has been specifically discussed as it is a known sensitivity, and it was recognised that JNCC held survey data that would add to the baseline understanding of the Project.

10.4.1.3 A summary of the key issues raised during consultation to date, specific to marine mammals, is outlined in **Table 10-3** below, together with how these issues will be considered in the production of the EIAR.

Table 10-3: Summary of consultation relating to marine mammals

Date and stakeholder	Consultation and key comments	How this is accounted for
NatureScot, 2023 Scoping Opinion, June 2023	*"The scoping report suggests the potential for marine mammals to be scoped out of further consideration but, in the absence of completed baseline data, we advise these should be included for further consideration for now."*	We agree that marine mammals are taken forward for further consideration in the EIA.
NatureScot, 2023 Scoping Opinion, June 2023	*"There is still a high level of uncertainty around many of the potential impacts (for example, construction and operational noise, entanglement risk, barrier effects) and also the design envelope that is to be taken forward."*	These impact pathways have been characterised in greater detail in this report and entanglement has been scoped out for further impact assessment with robust justification provided. The degree of uncertainty will be accommodated in the EIA by assessing an envelope of design options that includes a realistic worst case. Further information on entanglement is detailed within **Appendix 5G: Approach to secondary entanglement as a potential impact.**
NatureScot, 2023 Scoping Opinion, June 2023	*"There is not enough information about noisy activities and the likely predicted noise levels or mitigation to be able to scope out underwater noise."*	Underwater noise will not be scoped out of the assessment. A realistic worst-case design will be used to generate noise contours which will underpin the assessment of

Date and stakeholder	Consultation and key comments	How this is accounted for
		underwater noise impacts to marine mammals in the EIA.
NatureScot, 2023 Scoping Opinion, June 2023	*"For marine mammals, we advise that cumulative impact will be considered and this should be done through the Cumulative Effects Framework (CEF) which is due to be published imminently by MD-LOT."*	Cumulative impacts to marine mammals will be considered in the EIA. If the CEF is available at the time of writing, this will be used. Proposed approach is detailed in Section 10.2.6.
Natural England, 2023 Scoping Opinion, June 2023	*"For completeness, there are additional protected sites in the North of English waters that we advise the applicant considers going forward. (including) Berwickshire and North Northumberland Coast Special Area of Conservation (SAC) – designated for grey seal (Halichoerus grypus) and benthic features."*	The Project will review Natural England's advice in relation to environmental considerations and use of evidence to support offshore wind projects in English waters and use it as a guide to assess potential impacts on English sites.
MD-LOT, 2023 Scoping Opinion, June 2023[254]	*"The Scottish Ministers agree with the Developers proposal to further consider the impact of EMF and heat and advise it must be scoped into the EIAR for the operational phase of the Project."*	Direct impacts from EMF are proposed to be scoped out, in line with other recent applications such as Pentland Floating Offshore Windfarm and supported by scientific literature as described in Section 10.2. It is considered unlikely that the Project has the potential to bring about perceptible physiological or behavioural changes to the marine mammal receptors identified in the region. Indirect impacts will be addressed through the fish and benthic ecology assessments. Further information on EMF and heat is detailed within **Appendix 5F: Approach to EMF and Heat as potential impacts.**
MD-LOT, 2023 Scoping Opinion, June 2023[254]	*"The Scottish Ministers advise that the Developer should consider the Natural England response regarding the Berwickshire and North Northumberland Coast SAC. The Scottish Ministers are*	At Natural England's request, seals in the Berwickshire and North Northumberland coast will be considered as part of the Habitats Regulation Appraisal (HRA) screening report review.

Date and stakeholder	Consultation and key comments	How this is accounted for
	unable to provide further, detailed advice in regards to this receptor."	
Scoping Workshop, 29 February 2024	NatureScot confirmed the assessment approach for marine mammals was acceptable. *The following key agreements made in relation to the scope of the EIA:* - *No additional data collection or data sources requested to be included;* - *No other marine megafauna to be considered and that turtles could be scoped out;* - *Additional explanation and justification for scoping out collision risk with vessels is required including details of proposed mitigation actions; and* - *Additional evidence on the reasoning for scoping out secondary entanglement.*	The Applicant has included the agreed approaches in the Scoping Report (see Section 10.11). Further details on the other marine megafauna to be scoped out are detailed in Chapter 5: Approach to Scoping and EIA. Justification on the aspects scoped out, including collision risk with vessels, is detailed within **Table 10-8**. **Appendix 5G: Approach to secondary entanglement as a potential impact** sets out the Applicant's approach and justification to entanglement.

10.5 Baseline Conditions

10.5.1 Data Information Sources

10.5.1.1 The baseline presented in this scoping report has been compiled from a variety of sources comprising the following:

- The 2023 Scoping Report[253].
- Scientific literature.
- Two-year monthly Digital Aerial Surveys (DAS) survey from April 2021 to March 2023, covering a sea area of (835.9 km^2) and extending 4 km from the Array Area boundary (see **Appendix 10A: Benthic Marine Mammal Observation and Passive Acoustic Monitoring Report**).

- Additional published data sources including the UK Offshore Energy Strategic Environmental Assessment 4 (OESEA4[255]), the Oslo and Paris Convention for the protection of the environment of the North-East Atlantic (OSPAR) Quality Status Report 2023[256],the Small Cetaceans in European Atlantic Waters and the North Sea study (SCANS IV[257] and SCANS III[258,259]), regional baseline across the North Sea and Atlantic areas of Scottish waters[260] and distribution maps in the North-East Atlantic[261].
- Updated abundance estimates for cetacean Management units in UK waters from the Inter-Agency Marine Mammal Working Group[262] (IAMMWG).
- Pinniped abundance and density from Special Committee on Seals (SCOS) annual reporting of scientific advice on matters related to the management of seal populations[263] and habitat-based distribution estimates[264].
- Marine mammal observer and passive acoustic monitoring (PAM) records collected during the geophysical surveys of the Array Area and ECC in 2023 (see **Appendix 10A: Benthic Marine Mammal Observation and Passive Acoustic Monitoring Report**).

10.5.1.2 Additional sources are currently under review and will be presented in the EIA baseline, including, but not limited to, published data sources on bottlenose dolphin movements along the east coast of Scotland[265], seal at-sea distributions[266] and the East Coast Marine Mammal Acoustic Study (ECOMMAS)[267].

10.5.1.3 A list of the main data sources used is provided in **Table 10-4**.

Table 10-4: Key sources of data

Source	Date	Summary	Coverage of study area
Cenos Offshore Windfarm Scoping Report (the "2023 Scoping Report"[253])	2023	Initial scoping study of the Project, including literature review of benthic environment	Covers the whole project area and the majority of the ECC, though alignment has been refined since publication.
OESEA 4[268, 269]	2022	High level baseline	Covers entire project and surrounding area
OSPAR Quality Status Report[256]	2023	Thematic assessments of the status of the marine environment in the OSPAR area	Covers entire project and surrounding area
SCANS IV[257]	2023	Cetacean abundance estimates in European Atlantic waters	Covers entire project and surrounding area
Scientific Advice on Matters Related to the Management of Seal Populations: 2022263	2022	Current status of UK seal populations	Covers entire project and surrounding area
Digital Aerial Surveys[270]	2023	Two years of monthly digital aerial survey data collected	Array Area and 4 km buffer

Source	Date	Summary	Coverage of study area
		within the array area and surrounding waters	
Marine mammal observer and PAM observations[271]	2023	Marine mammal observer and PAM observations of the Array Area and ECC collected during the benthic survey campaign	Array Area and ECC
SCAN III (modelled-based[259] and design-based estimates[258])	2021 2022	Cetacean abundance estimates in European Atlantic waters	Covers entire project and surrounding area
Regional baselines for marine mammal knowledge across the North Sea and Atlantic areas of Scottish waters[260]	2020	Complied information exploring all known abundance and distribution estimates for marine mammal species across the North Sea and Atlantic areas of Scottish waters	Covers entire project and surrounding area

10.5.2 Existing Baseline

Overview

10.5.2.1 A wide variety of cetacean species have been recorded historically from the northeast region of Scotland. According to the literature summarised in the OESEA4[248], harbour porpoise (*Phocoena phocoena*) and white-beaked dolphin (*Lagenorhynchus albirostris*) are the most widespread and frequently encountered species, occurring regularly throughout most of the year. Northern (or common) minke whales (*Balaenoptera acutorostrata*) are regularly recorded as frequent seasonal visitors. The coastal waters of the Moray Firth and the east coast of Scotland support an important resident population of bottlenose dolphins (*Tursiops truncatus*), while orcas (*Orcinus orca*) are more commonly seen towards the north of the Array Area near Orkney/Shetland or the west of Scotland (known as the West Coast Community)[260]. Atlantic white-sided dolphin (*Lagenorhynchus acutus*), Risso's dolphin (*Grampus griseus*), common dolphin (*Delphinus delphis)* and long-finned pilot whale (*Globicephala melas*) can be considered occasional visitors to the North Sea.

10.5.2.2 This is supported by OSPAR's 2023 Quality Status Report (QSR)[256] that summarised the status of cetaceans in the seas of Western Europe, based on collated data from 2010 to 2020 and regional baselines for the North Sea compiled by Hague *et al.* (2020)[260].

10.5.2.3 A series of surveys for Small Cetaceans in European Atlantic Waters and the North Sea (SCANS) have been conducted to estimate cetacean abundance in North Sea and adjacent waters, the most recent of which are SCANS III conducted in 2016[258] and SCANS IV Conducted in 2022[257]. SCANS IV subdivided the North Sea into a series of blocks. The block within which the Project is largely situated is designated NS-D (shown in **Figure 10-1**).

10.5.2.4 Two species of seal are present in the area, namely the common or harbour seal (*Phoca vitulina*) and the grey seal (*Halichoerus grypus*).

10.5.2.5 The North Sea coast between the Humber Estuary and the Moray Firth has also recently been identified as an Important Marine Mammal Area (IMMA) for bottlenose dolphin, minke whale, harbour seal and grey seal.

Cetaceans

Harbour porpoise

10.5.2.6 The harbour porpoise is widespread throughout the cold and temperate seas of Europe, including the North Sea, the Irish Sea, seas west of Ireland and Scotland, northwards to Orkney and Shetland. Over 90 percent of the European global population is found in UK waters[272]. Harbour porpoises are generally solo foragers but have been known to hunt in small groups, feeding on a variety of fish, squid and crustaceans[275]. The calving season is usually in the early summer, and at this time porpoises may move inshore to shallower water[273]. Calves typically stay with their mothers for 16-21 months.

10.5.2.7 The OSPAR 2023 QSR[256] concludes that the status of the harbour porpoise population from 1994 to 2016 was stable in the greater North Sea assessment unit, with a southward shift in distribution noted.

10.5.2.8 The overall estimate of porpoise abundance for the North Sea in 2022 was 339,000 animals. This is very similar to the estimates for 2016 (345,000, CV = 0.18) and 2005 (355,000, CV = 0.22), and slightly higher than the estimate from 1994 (289,000, CV = 0.14). Because the data only has sufficient power to detect a decline of around 1 percent per year, SCANS IV concluded there is no evidence for a change in harbour porpoise abundance in the North Sea[257].

10.5.2.9 SCANS IV[257] estimated the abundance of harbour porpoise in block NS-D at 38,577 individuals (961-10,586), with a typical group size of 8 animals and a density of approximately 0.6 animals/km^2. This is slightly higher than the average density for the North Sea as a whole (0.55 animals/km^2) and significantly lower than the peak density (1.04 animals/km^2) in the central North Sea to the east of the Project.

10.5.2.10 Harbour porpoise was the most common marine mammal in the Project area based on monthly aerial surveys conducted 2021-2023. They were recorded throughout the survey period with numbers peaking in November 2021. A total of 152 harbour porpoises were recorded in the DAS survey area between April 2021 and March[274].

White-beaked dolphin

10.5.2.11 The white-beaked dolphin is the most common dolphin species in the central and northern North Sea, around Shetland, Orkney, and north-west Scotland[257]. They are relatively social animals, though in UK waters most sightings are of groups of less than ten individuals. Schools of 20-100 have been reported in late summer with occasional larger aggregations seen[275]. In the North Sea they are thought to feed predominantly on gadoid fish but also take other fish species, cephalopods and some crustaceans[276]. Calving usually occurs from May to August, though some may be born as late as October[277].

10.5.2.12 Both Scans IV[257] and the OSPAR 2023 QSR[256] concluded that the current distribution of white-beaked dolphins in UK waters is broadly similar to that observed previously. The highest densities (up to 0.3 animals/km^2) were estimated north of the Project, around northwest Scotland, the Shetland Islands and in the northern North Sea. Predicted densities are estimated to be higher in the vicinity of the Project during summer months[261].

10.5.2.13 Based on SCANS IV, the abundance of white-beaked dolphin in block NS-D is estimated at 5,149 (18,017-76,361), with a typical group size of 4.3 animals and a density of approximately 0.08 animals/km^2.

10.5.2.14 White beaked dolphins were the most observed species during geophysical surveys of the Project Area, with a total of 109 individuals documented throughout eight separate occasions[271]. In addition, 21 were recorded in the DAS survey area between April 2021 and March 2023.

Bottlenose dolphin

10.5.2.15 Two ecotypes of bottlenose dolphin are recognised in UK waters; a wide-ranging offshore type and an inshore coastal type that have populations with limited interchange between them. The closest coastal population to the Project area occurs around eastern Scotland and northeast England, with a historic population centre in the inner Moray Firth (now designated as the Moray Firth SAC)[278].

10.5.2.16 European Atlantic waters are at the edge of a wider North Atlantic range for bottlenose dolphin. Bottlenose dolphins were not detected in block NS-D during SCANS IV surveys, though the population in the East Coast Scotland is showing some signs of increase and range expansion over recent years. Bottlenose dolphins were not observed in the proposed Array Area over the course of two years of monthly aerial surveys[270].

10.5.2.17 Bottlenose dolphins were not identified within the Project area either during aerial surveys conducted from 2021-2023 or during the geophysical survey campaign, though some of the unidentified vocalisations recorded by PAM may have been of this species (Rovco, 2023)[271].

Northern minke whale

10.5.2.18 The northern minke whale is a small baleen whale with a wide distribution throughout the northern hemisphere. The majority of UK sightings occur in Scotland in waters shallower than 200 m[279]. They exhibit a complex social structure, with some indication that groups may be segregated by sex, age, and reproductive condition. They are generally seen in small groups of between 1-3 individuals, except in rich foraging areas where aggregation of up to 15 individuals may occur.

10.5.2.19 Minke whales have a varied diet, feeding on smaller fish, krill, and other plankton. They are commonly seen around shelf banks and submarine mounds or near fronts where their prey is concentrated near the surface. They also frequent the strong currents around headlands and small islands, where they can come close inshore, entering estuaries, bays, and inlets. In the Moray Firth, minke whales are typically found offshore between May and June, after which they move inshore to feed in areas of upwelling where prey is abundant, such as the Southern Trench. Minke whales have been recorded from May to November along the Scottish east coast,

with most detections in the central and northern Moray Firth[280]. A large proportion of the whales feeding in the Moray Firth are juvenile.

10.5.2.20 Waggit *et al.*[281] showed high predicted densities for minke whale in summer months compared to that of winter throughout the Array Area and ECC.

10.5.2.21 The SCANS IV data, when considered alongside earlier datasets, do not indicate any overall population trends for minke whales in the North Sea. This supports the conclusion of the OSPAR QSR[256]. However, the distribution of minke whales in the North Sea may be changing. Numerous sightings further south than previously recorded suggest the range of this species may be extending southwards in summer months[257].

10.5.2.22 The abundance of northern minke whales in block NS-D is estimated at 2,702 (547-7,357), with a typical group size of 1.1 animals and a density of approximately 0.04 animals/km^2. This block has the highest estimated density of minke whale in the North Sea. This is probably due to the population associated with the Southern Trench MPA that lies within this Block257.

10.5.2.23 A single minke whale was detected during the aerial surveys conducted between 2021 and 2023, and four individuals were sighted during the geophysical survey programme[271].

Other cetaceans

10.5.2.24 SCANS data show that Atlantic white-sided dolphins are present in the wider area. SCANS III (conducted in 2016) indicate and abundance of 644 animals (with a density of 0.01 per km^2) in block R, through which the ECC route passes with most recorded to the West of Scotland[259]. SCANS IV did not record white beaked dolphins in the equivalent area (block NS-D) but recorded individuals in blocks closer to Orkney and the Shetlands and further east in the North Sea. The Project is outside the main predicted distribution of this species.

10.5.2.25 Unidentified delphinid sightings and acoustic detections were made during the geophysical survey programme, some of which may have been Atlantic white- sided dolphin[257].

10.5.2.26 One sighting of a suspected ziphiid (beaked whale) was made during the geophysical survey campaign, but this could not be identified to species level[271].

10.5.2.27 Risso's dolphins are typically found in to the west of Scotland[261] with SCANS III and IV only recording individuals in the North Sea near Orkney and the Shetlands [258,257]. Common dolphins are not frequently sighted within the North Sea [258,260,261], with highest estimated densities in Scottish waters around the Hebrides[282].

10.5.2.28 A summary of key cetacean populations and densities estimates are shown in **Table 10-5.**

Table 10-5: Summary of key cetacean populations and densities

Year	Area	Population	Density (per km^2)	Source
Harbour porpoise	North Sea MU	346,601		IAMMWG
	Block NS-D	38,557	0.6	SCANS IV
White beaked dolphin	Celtic and Gt.North Sea MU	42,951		IAMMWG
	Block NS-D	5,149	0.08	SCANS IV
Bottlenose dolphin	Coastal East Scotland MU	224		IAMMWG
	Greater North Sea MU	2,022		IAMMWG
Minke whale	Celtic and Gt.North Sea MU	20,118		IAMMWG
	Block NS-D	2,702	0.04	SCANS IV

Pinnipeds

Harbour (common) seal

10.5.2.29 Harbour seals have relatively small ranges in comparison to grey seals, and are typically more coastal in habit, generally within 50 km of the coast. Harbour seals tend to make relatively short foraging trips from haul out sites and typically forage at distances of 40 km to 50 km from haul out sites with highest at-sea densities occurring near their haul out sites[299]. However, some tracking studies have shown that they occasionally travel 200 km between haul-out sites. The range of these trips varies depending on the location and surrounding marine habitat (Lowry *et al.,*and Sharples *et al*.)[283,284].

10.5.2.30 It is currently observed that the population of harbour seals in the Moray Firth and East Scotland seal management areas (SMAs) is declining[263], based on low counts recorded in 2021.

10.5.2.31 Harbour seals were not recorded in the Project area during aerial surveys between 2021 and 2023[270] and were not seen by MMOs during the geophysical survey campaign, though there was one sighting of an unidentified seal[271].

Grey Seal

10.5.2.32 Grey seals are wide ranging, and can forage at some distance from their haul out sites and often move large distances between haul out sites. Although many seals breed and forage in the same region, this is not always the case and degree of range-fidelity varies amongst different regions[285299].

10.5.2.33 Grey seals exhibit two contrasting foraging behaviours and will either conduct long trips from one haul-out site to another or repeated local trips to discrete foraging areas. Foraging areas can be up to 100km offshore though they can travel up to several hundred kilometres offshore to forage[299]. Foraging areas are connected to haul-out sites by prominent high-usage corridors.

10.5.2.34 Approximately 84 percent of the UK grey seal population breeds in Scotland, largely in the Hebrides and Orkney. Major colonies are also present on Shetland and along the east coast of Scotland including the Isle of May and Fast Castle. This pattern of distribution is reflected in the at-sea distribution data. Relatively high densities of grey seals are observed off the West coast of Scotland, with localised hotspots on the

east coast patchily distributed offshore out to approximately 100 km from the coast, predominantly in the Firths of Forth, Tay and Moray. They tend to have localised regions (within 20 km of haul out sites) of higher density generally concentrated closer to the breeding season[286]. Individual mature grey seals of both sexes are usually faithful to a particular breeding site and may return to within 10 – 100 m of previous visits[264].

10.5.2.35 Recent population estimates, summarised in OESEA4, show a general increase in grey seal pup production in the East of Scotland. Overall summer abundance (on land) has also increased as shown in **Table 10-6**. SCOS[263] states that the population in the North Sea is continuing to increase rapidly and shows no sign of density dependent constraint.

Table 10-6: Status of grey seals in the East of Scotland (after BEIS 2022)

Year	Pup production	Summer count
2006	2,793	
2008	3,382	1,630
2010	4,300	
2012	5,218	
2014	5,860	2,111
2016	6,426	

10.5.2.36 Six grey seals were recorded within the proposed Array Area in monthly aerial surveys conducted between 2021-2023[270]. Grey seals were observed twice by MMOs in the Project area during the geophysical survey campaign[271].

10.5.3 Future Baseline

10.5.3.1 As the Project has several phases over many years, the future baseline of marine mammals will be considered. The future baseline represents changes likely to occur at the Site in the absence of the Project or in the period before development commences.

10.5.3.2 Natural changes in distribution of marine mammals in the North Sea are likely to occur due to climate change and attendant effects on temperature and ocean acidification. Even where direct effects do not occur, climate change may affect prey resources which will in turn drive changes in mammal distribution[287]. There are indications, for example, that the range of northern minke whales is already extending southwards in summer months[288].

10.5.3.3 However, such changes are inherently not predictable or quantifiable. Further, given the long-term nature of such processes, such changes are not likely to be significant between now and the commencement of the Project. It is therefore considered that an assessment based on the current baseline would be adequately representative of any conditions pertaining at the commencement of construction activities.

10.6 Basis of Assessment

10.6.1.1 The marine mammals scoping assessment is based on the following key assumptions, which are also set out in **Chapter 3: Project Description**:

- The array will consist of up to 95 WTGs;
- There will be up to two offshore substations;
- Inter-array and export cables will be buried, where possible;
- The operational lifetime of the project is assumed to be a minimum of 30 years; and
- The decommissioning of the windfarm is anticipated to involve as close to full removal of offshore infrastructure as possible at the time of decommissioning (where safe/practicable to do so). The decommissioning works are likely to be undertaken in reverse to the sequence of construction works and involve similar levels of equipment and impact.

10.7 Relevant Embedded Mitigation Measures

10.7.1.1 Embedded mitigation measures have been identified and are proposed to be adopted as part of the Project design (primary mitigation); or implemented in accordance with industry standard practice that would occur with or without the input from the environmental assessment feeding into the process (tertiary mitigation). There is a commitment by the Applicant to implement these embedded mitigation measures and they have been considered within the 2024 EIA Scoping Report.

10.7.1.2 The requirement for additional mitigation measures (secondary mitigation) will be dependent on the significance of effects on Marine Mammal receptors and will be consulted upon with consultees throughout the EIA process. Any additional mitigation measures will be presented within the EIAR.

10.7.1.3 Those measures that are relevant to marine mammals are listed in **Table 10-7**. General mitigation measures, which would apply to all parts of the Project, are set out first. Thereafter mitigation measures that would apply specifically to marine mammals during various project phases are described separately.

10.7.1.4 Additional secondary mitigation, for example noise abatement technologies or acoustic deterrents, may be identified as the environmental assessment progresses and will be set out as required in the EIAR.

Table 10-7: Embedded mitigation relating to marine mammals

ID	Embedded mitigation measures
General	
MM-001	Turbines will be spaced with a target distance of approx. 1 km.
MM-002	Mooring lines will be sufficiently taut and rigid to prevent formation of loops, preventing primary entanglement
MM-003	Marine mammal observers s and PAMs will be deployed for percussive piling, UXO and seismic surveys in line with JNCC 2010 and 2017 guidance.
MM-004	A Piling Strategy will be developed and adhered to for the Project. It will detail noise mitigation measures to be implemented during piling activities (pre-piling search, soft start and ramp up methods)[289]
MM-005	A Vessel Management Plan (VMP) will be developed and adhered to for the Project. The VMP will detail types and numbers of vessels to be utilised by the Project.

ID	Embedded mitigation measures
Construction	
MM-006	A Marine Mammal Mitigation Plan (MMMP) will be developed and adhered to for the Project.
Decommissioning	
MM-007	A Decommissioning Programme will be developed for the Project in line with industry good practice, guidance and legislation.

10.8 Scoping of Potential Significant Effects

10.8.1.1 In line with the EIA Regulations 2017, the EIA for the Project will only consider those impacts where there is a risk of a potential significant effects. The following section draws on industry experience to identify those effect-receptor pathways that may potentially lead to a significant impact. Where experience and available evidence indicates an effect-receptor pathway will not lead to a significant effect with regards to the EIA Regulations 2017, the pathway is scoped out from assessment.

10.8.1.2 The potential significant effects on marine mammals are summarised in **Table 10-8**. The scoping assessment is based on consideration of:

- The project design at the time of writing (including embedded mitigation measures);
- Available baseline information at the time of writing;
- The existing evidence base for effects on marine mammals;
- Feedback from consultees; and
- Professional judgement.

10.8.1.3 The early identification of potential significant effects is aimed at delivering a proportionate approach to the EIA. In doing so, it sets out a high-level assessment of all potential effects, significant or not. The basis for scoping out certain effects presented after the table.

Table 10-8: Summary of potential significant effects for marine mammals scoped in (✓) or scoped out (x) of the EIAR during construction (C), O&M and decommissioning (D)

Activity and impact	Embedded mitigation	Outcome of scoping per phase			Justification	Overview of proposed approach
		C	O&M	D		
Underwater noise	MM-003 MM-004 MM-006	✓	X	X	Underwater noise from pile driving has the potential to impact marine mammal species. This impact is scoped in for further assessment and the results from the site-specific underwater noise modelling will inform appropriate mitigation measures.	Source-pathway-receptor model Site-specific baseline data will be used to create marine mammal density estimates
	MM-003 MM-006	✓	NA	NA	Clearance of UXO during the preconstruction phase will generate underwater noise with the potential to cause mortality, injury (PTS and TTS), behavioural impacts and changes in distribution to marine mammal Underwater noise modelling will be carried out on the worst-case scenarios for potential UXO clearance work. This impact is scoped in for further assessment and the results from the underwater noise modelling will inform appropriate mitigation measures, if required.	Source-pathway-receptor model Site-specific baseline data will be used to create marine mammal density estimates
	MM-003 MM-006	✓	✓	✓	Geophysical and geotechnical surveys will generate underwater noise with the potential to cause mortality, injury (PTS and TTS), behavioural impacts and changes in distribution to marine mammal	Source-pathway-receptor model

Activity and impact	Embedded mitigation	Outcome of scoping per phase			Justification	Overview of proposed approach
		C	O&M	D		
					This impact is scoped in for further assessment and the results from the site-specific underwater noise modelling will inform appropriate mitigation measures.	
	N/A	X	✓	X	Operational noise (including mooring noise, for example cable “snap”) has the potential to cause displacement and disturbance to marine mammals. The potential impacts from operational noise will be assessed qualitatively, including a review of all available literature.	Source-pathway-receptor model
	N/A	✓	✓	✓	Offshore vessels have the potential to increase underwater noise resulting in disturbance and/or displacement of marine mammals. This impact is scoped in for further assessment and the results from the underwater noise modelling will inform appropriate mitigation measures, if required. However, impacts are considered to be temporary and spatially restricted.	Source-pathway-receptor model
	MM-007	X	X	✓	The removal of offshore structures during decommissioning may generate underwater noise. Due to the potential impact this will be scoped in for further assessment.	Source-pathway-receptor model Updated mammal distribution data at the time of decommissioning

Activity and impact	Embedded mitigation	Outcome of scoping per phase			Justification	Overview of proposed approach
		C	O&M	D		
Offshore vessels interaction with marine mammals resulting in injury and / or mortality	MM-005	X	X	X	The likelihood for vessel interactions during the Project is extremely low. Avoidance behaviour by cetaceans is often associated with unpredictable boats transiting at higher speeds[290,291,292,293]. Slower vessels following a consistent trajectory allow marine mammals the opportunity to avoid collisions. The probability of collision is estimated to decrease to <50% when large vessels reduce speeds to 10 knots[294] and fatal collisions are more likely when vessels are transiting at higher speeds[295,296]. The risk of collision increases in areas of high animal density and with species that are more likely to spend time close to the surface[297], such as baleen whales. Species such as harbour porpoise, which are the most frequently sighted species within the Array Area, have been recorded to dive deeper in the presence of vessels[298] reducing the potential for collision. With embedded mitigation, the risk to the more susceptible species (minke whale) is negligible. Given the extremely low likelihood of interaction between any project vessels and marine mammal receptors, it is proposed to scope physical vessel interactions out. Information that will form the Vessel Management Plan will include the following, but is not limited to: • Vessel transit speeds;	

Activity and impact	Embedded mitigation	Outcome of scoping per phase			Justification	Overview of proposed approach
		C	O&M	D		
					• Predetermined routes whereby transiting through the Outer Trench MPA is avoided, where possible; • Vessels follow a consistent predictable trajectory with high powered manoeuvres limited, where possible and safe to do so; • Ensuring animals are avoided to a safe distance (100 m or more) where possible; • Marine mammals will not be intentionally pursued; • Contact will not be instigated with marine mammals; and • Vessel masters will be actively scanning the path of transit.	
Potential changes to suspended sediment concentrations	N/A	X	X	X	Water quality changes such as increased turbidity caused by seabed works may impact the ability of marine mammals to locate prey and may also impact fish prey species presence and distribution. Such changes are expected to be localised and short lived hence there will be no noticeable effect on marine mammals' ability to locate prey and limited to the base of the 110 m water column where material may be resuspended, and this is unlikely to propagate to the upper levels of the water column.	
Changes to prey resources	N/A	✓	X	✓	Secondary effects via changes in prey distribution from construction activities are scoped in and discussed in **Chapter 12: Fish Ecology**.	Source-pathway-receptor model

Activity and impact	Embedded mitigation	Outcome of scoping per phase			Justification	Overview of proposed approach
		C	O&M	D		
					The removal of offshore structures during decommissioning means the loss of some hard structures around which fish may have congregated. This may, in turn, alter the local distribution of some potential prey species. However, this represents a return to pre-construction conditions and it is therefore proposed to scope this aspect out, though other impacts of decommissioning (e.g. underwater noise) will be assessed.	Updated mammal distribution data at the time of decommissioning
Accidental spills to the marine environment	N/A	X	X	X	Pollution from accidental events could impact on marine mammals both directly and indirectly (via prey species availability or contamination), however no significant pollution scenarios are expected with appropriate vessel management in place in place and standard construction measures (e.g. IMO MARPOL guidelines), hence no significant effects on marine mammals are predicted. It is proposed to scope out accidental pollution impacts to marine mammals. The potential for accidental spills from Project vessels will be managed and minimised through the preparation and adherence to an EMP which will include measures compliant with MARPOL convention, as well as best practice for works in the marine environment (including individual vessel SOPEP). The magnitude of any accidental spill will be limited by the small chemical or fuel inventory on vessels. Any spill would be subject to a high level of dispersal and therefore any potential interaction with marine receptors will be minimised. This impact is therefore scoped out of the EIA.	

Activity and impact	Embedded mitigation	Outcome of scoping per phase			Justification	Overview of proposed approach
		C	O&M	D		
Subsea mooring systems may cause entanglement resulting in injury and/or mortality	MM-001 MM-002	X	X	X	To date, there have been no recorded instances of marine mammal entanglement from mooring systems of renewable devices[299] , or for anchored FPSO vessels in the oil and gas industry[300] which have similar or more complex mooring systems compared to those proposed for the Project's floating turbine structures. As the nature of the mooring lines in terms of tension, rigidity and cable diameter preclude the possibility of forming any entangling loops, there is negligible potential for primary entanglement for the subsea mooring systems.	
	N/A	X	X	X	Fishing gear has been identified as an entanglement risk for marine mammals[301] and it is possible that lost or abandoned fishing gear may get caught in the mooring lines, posing a risk to marine mammals from secondary entanglement. Though the scale of the proposed Array Area is large in comparison to floating oil and gas structures in the area (both in areal extent and number of lines), it is important to consider the amount and type of Abandoned, Lost or discarded Fishing Gear (ALDFG) in the area rather than solely the scale of the Array Area. The type of fishing activity in the surrounding ICES rectangles means that there is unlikely to be a significant amount of problematic ALDFG that could be snagged on the WTG moorings, therefore the Project is unlikely to	

Activity and impact	Embedded mitigation	Outcome of scoping per phase			Justification	Overview of proposed approach
		C	O&M	D		
					substantially increase the risk of secondary entanglement. Fishing activity, within the ICES rectangle in which the Array Area sits (43F1), occurs at low levels and is dominated by demersal trawling for *Nephrops*. Low levels of demersal seine netting and pelagic trawling also take place. There is no reported gill or trammel netting with the ICES rectangles adjacent to the Array Area and lost nets from these fisheries are typically recovered in the location in which they were lost[302]. The risk of demersal trawl and seine nets being lost or fouled within the Array Area is exceptionally low due to the fact that these are weighted nets which would sink should they become ensnared. Pelagic trawl nets are unweighted, but the scale and material used in these nets still makes them heavy and it is not anticipated that they would remain within the water column for an extended period, should they be lost by a fishing vessel. Additionally, safety zones around project infrastructure will prohibit fishing vessels from occupying areas where interactions with the array infrastructure would occur. A Fisheries Liaison Officer (FLO) will allow engagement with fishermen to record lost/snagged gear in relation to the Project. Early consultation and research conducted by the Natural Resources Defence Council (NRDC) indicate that marine debris is more likely to entangle at depths	

Activity and impact	Embedded mitigation	Outcome of scoping per phase			Justification	Overview of proposed approach
		C	O&M	D		
					between 0-5 m below the sea surface[303].In the semi-submersible design, the keel of the floating substructure will be submerged to approximately 10 – 20 m depth from where a chain will connect it to catenary mooring lines. This reduces the potential for entanglement at the top of the water column where it would pose the greatest risk of secondary entanglement. For the TLP design, the angle and material of the mooring lines suggests it is likely that ALDFG will slide down the lines rather than hang in the water column. A build-up of marine debris at the bottom of the mooring lines is only likely for heavy fishing gear, such as demersal trawling nets, which would be too heavy to remain suspended in the water column, even when snagged on a mooring line. Marine debris accumulating at the seabed is less likely to ensnare baleen whales as they do not spend a large amount of time at the seabed. Species such as dolphins, seals and porpoises will feed along the seabed, but are not found in large numbers in the Array Area as outlined in Section 10.3. Fishing gear/debris that becomes wrapped around offshore windfarm infrastructure will have a reduced surface area and thus a reduced catch potential for fish. It is thus unlikely to attract marine mammals to feed on ensnared prey.	

Activity and impact	Embedded mitigation	Outcome of scoping per phase			Justification	Overview of proposed approach
		C	O&M	D		
					For further information see **Appendix 5G: Approach to secondary entanglement as a potential impact.**	
Presence of offshore structures creating a physical barrier effect	MM-001	X	X	X	While marine structures may theoretically form barriers to movement and migration of marine biota, the wide spacing of (target of at least 1 km) between turbine structures at the surface and a minimum of 500 m between submarine structures will allow passage of marine mammals through the area unimpeded. There will be a maximum of 9 mooring lines per WTG with a mooring radius of approximately 850 m. The footprint of these infrastructures is minimal compared to the available space within the Array Area, allowing mammals to travel through the area unaffected. There are no significant migration routes identified that pass through the proposed Array Area, though some species (e.g. grey seal) are known to occasionally travel across the central North Sea on a broad front[304.] Accordingly, there is no realistic mechanism for the Project to act as a physical barrier for mammal movements.	
Electromagnetic Fields (EMF) and heat from energised cables		X	X	X	Marine mammals are not known to possess specialist electro- or magneto-receptive organs. There is, however, evidence of magnetoreception in a range of cetacean species (e.g. humpback whales, bottlenose dolphin, harbour porpoise)	

Activity and impact	Embedded mitigation	Outcome of scoping per phase			Justification	Overview of proposed approach
		C	O&M	D		
					meaning the B-field component of EMF can affect these species[305,306] It is considered that many cetaceans and some pinnipeds use the Earth's GMF to navigate and particularly during long migrations, with implications that EMF may interfere with the navigational cues. Modelling conducted by Tricas and Gill (2011)[307] on bottlenose dolphins indicated that they could detect B-fields from a subsea cable up to 50 m away when directly above the cable, causing alteration to the direction of travel. However, due to the high mobility of marine mammal species and capability to move away from the EMF influence, it is not considered that they would experience long-term impacts. The risk of direct impacts to marine mammals is minimal and therefore has been scoped out of further assessment. Further information on EMF is detailed within **Appendix 5F: Approach to EMF and Heat as potential impacts.**	
		X	✓	X	Though the likelihood of direct impacts to these species is minimal, indirect effects through their prey is possible. This impact is scoped in and addressed in **Chapter 9: Benthic Ecology and Chapter 12: Fish Ecology.** Further information on EMF is detailed within **Appendix 5F: Approach to EMF and Heat as potential impacts.**	Source-pathway-receptor model

Activity and impact	Embedded mitigation	Outcome of scoping per phase			Justification	Overview of proposed approach
		C	O&M	D		
		X	✓	X	Though the likelihood of direct impacts to these species is minimal, indirect effects through their prey is possible. This impact is scoped in and addressed in **Chapter 9: Benthic Ecology and Chapter 12: Fish Ecology.**	Source-pathway-receptor model

10.9 Cumulative Effects

10.9.1.1 Cumulative effects on marine mammals resulting from the effects of the Project and other developments will be assessed in accordance with the guidance and methodologies set out in **Chapter 5: Approach to Scoping and EIA** and considering the other developments that have been screened in as part of the CEA screening exercise.

10.9.1.2 The following impacts from the Project have the potential to act cumulatively with impacts from other developments to contribute to cumulative effects:

10.9.1.3 Overlap of underwater noise fields causing injury or behavioural change to marine mammals, or separate nose fields acting on the same population of mammals.

10.9.1.4 Increased risk of mammal interactions associated with increased vessel traffic from multiple projects.

10.9.1.5 For cumulative noise impacts to arise, significant noise generating activities will be required to occur simultaneously or in close succession and situated such that noise propagation fields overlap directly, occur simultaneously within the home range of a population of marine mammals, or act on the same population at different times of year.

10.9.1.6 In the former case, this may increase sound levels over an acceptable threshold, and in the latter case this may result in disturbance or displacement from an unacceptably large area.

10.9.1.7 The CEA will screen permitted and potential developments within 500 km of the Project as a basis for this assessment. Projects with temporal and spatial overlap will be identified, and impacts assessed as quantitatively as possible, acknowledging that the level of data likely to be available may require qualitative assessment.

10.9.1.8 A similar approach will be applied to the cumulative assessment of increased marine traffic.

10.10 Potential Transboundary Effects

10.10.1.1 The potential effects from construction, O&M, and decommissioning on marine mammal receptors are considered in **Appendix 5D: Transboundary Screening Matrix**.

10.10.1.2 Transboundary impacts may arise if long range acoustic effects on marine mammals are identified, or if more localised effects are identified for wide ranging populations. Use of accepted MMMUs for the North Sea[308] as the basis for the assessment means that populations that straddle or cross international boundaries are accounted for.

10.11 Proposed Approach to the Environmental Impact Assessment

10.11.1.1 The Project-wide approach to the assessment methodology is set out in **Chapter 5: Approach to Scoping and EIA**. This will be implemented to assess the potential significant effects to marine mammals from the construction, O&M, and decommissioning of the Project.

10.11.1.2 This section outlines the proposed EIA approach for marine mammals. This includes proposed assessment methodology, relevant embedded mitigation measures, as well as those measures scoped into and out of the assessment.

10.11.2 Proposed Assessment Methodology

10.11.2.1 The approach to EIA will follow the general approach outlined in **Chapter 5: Approach to Scoping and EIA** of this Scoping Report. In addition to the general approach and guidance outlined in **Chapter 5: Approach to Scoping and EIA**, the assessment of marine mammals will also comply with the following guidance documents where they are specific to this topic:

- Chartered Institute of Ecology and Environmental Management (CIEEM) Guidelines for Ecological Impact Assessment in Britain and Ireland – Terrestrial, Freshwater, Coastal and marine[240].
- JNCC Statutory nature conservation agency protocol for minimising the risk of injury to marine mammals from piling noise[241].
- JNCC guidelines for minimising the risk of injury to marine mammals from geophysical surveys[242].
- JNCC guidelines for minimising the risk of injury to marine mammals using explosives[245].

10.11.2.2 With respect to the assessment of underwater noise effects, the following methodology is proposed:

- Population density of key species in the project area will be derived from survey data and published sources (for example Small Cetaceans in European Atlantic Waters and the North Sea (SCANS-IV) etc.).
- PTS and TTS ranges will be calculated using a dual metric approach, including SELcum (cumulative sound exposure level) and SPLpeak (peak sound pressure level), and noise contours of the behavioural disturbance will be generated.
- Potential numbers impacted by noise will be assessed and if above the generally accepted 1 % threshold (based on the most recent population estimates for the relevant management unit), iPCoD modelling will be carried out[309] [310] [311]. At this stage it is considered it might be needed for harbour porpoise, but unlikely for other species.

10.11.3 Proposed Underwater Noise Modelling Methodology

10.11.3.1 The underwater noise assessment will form a technical appendix to the EIAR, which will be used to inform the impact assessment for the Marine Mammals and Fish Ecology Chapters of the EIA.

10.11.3.2 The impact criteria will be based on the most recent and up-to-date scientific research and guidance, such as that published by Southall *et al.*[312] and National Marine Fisheries Service (NMFS)[313], while utilising a precautionary approach. Potential impacts arising from subsea noise on marine mammals will be assessed with respect to the potential for injury and behavioural disturbance. Piling source sound levels will be based on a combination of theoretical and empirical predictions, and detailed

source level modelling where appropriate. The associated source levels of other types of subsea noise associated with the Project, such as vessels, will be based on published data and established prediction methodologies.

10.11.3.3 Underwater noise modelling is planned to assess the potential impact of noise using a robust model. Underwater noise sources assessed will include impact piling, UXO clearance, geophysical and geotechnical surveys and vessel movements, and are detailed further in **Table 10-8**. In accordance with National Physical Laboratory (NPL) guidance[314], the choice of model will depend upon many factors which will be determined during the post-scoping consultation and will depend on site-specific circumstances (such as bathymetry). Following the recent release of Marine Directorate's review of the use of energy conversion factors in sound propagation modelling[250], it was highlighted that the sound field from impact piling features a Mach cone wavefront for which the propagation from a line source, which can lead to different rates of energy loss if a point source model is used.

10.11.3.4 Underwater acoustic propagation modelling for piling for this project will be undertaken using a combined distributed line-source array normal mode or parabolic equation model for low frequencies (<1 kHz) complimented by a line-source energy flux model for high frequencies (>1 kHz).

10.11.3.5 Currently, there is a lack of robust operational data available to be able to carry out any operational noise modelling of floating wind turbines. Thus, it is proposed that operational noise (including mooring noise, for example cable "snap") will be assessed qualitatively, including a review of all available literature.

10.11.3.6 The assessment will consider the bathymetry and other characteristics of the area, including the geo-acoustic properties of the seabed, as well as other factors such as the sound source characteristics and frequency range of interest. It is anticipated that the subsea noise assessment will include:

- A review of the publicly available literature and studies on the impact of impulsive subsea noise on marine mammal and fish species, including an assessment of the sensitivity of fish and marine mammals to subsea noise, and derivation of criteria for estimating the impact, to be agreed with the Statutory Nature Conservation Bodies (SNCB).
- Estimation of the MDS for source level noise for impact piling operations for the Development.
- Noise propagation modelling to estimate potential impact ranges for injury and behaviour to marine mammals and fish as a result of impact piling, UXO clearance, geophysical and geotechnical surveys and vessel movements as part of the Development.
- Noise propagation modelling to estimate potential impact ranges for injury and behaviour to marine mammals and fish as a result of any concurrent piling operations within the Development.

10.11.3.7 The model will be used to estimate the unweighted and hearing group weighted Sound Exposure Level (SEL), Root Mean Square (rms) (T90) sound pressure level and peak pressure level parameters, as recommended by Southall *et al*.[312], NMFS[313]

and other guidance[3]. The model will also incorporate swim speeds of marine mammals and fish to calculate SEL_{cum}, which will be agreed with stakeholders during consultation.

10.11.3.8 The combined effect of multiple events/operations will also be assessed/modelled and will consider the likely exposure times of species. Modelling scenarios will be undertaken for concurrent piling scenarios including maximum piling parameters within the PDE. Further, modelling will be undertaken with the consideration of mitigation, for example Acoustic Deterrent Device (ADDs), comparing otherwise identical scenarios with and without ADDs.

10.11.3.9 The results of the noise modelling will be presented in an Underwater Noise Technical Report, to be appended to the EIAR.

10.11.4 Protected Areas

10.11.4.1 The Project intersects with the Southern Trench NCMPA that is designated, in part, for its population of minke whales. The EIA will consider impacts to protected sites and an MPA assessment that includes all relevant protected areas (including East of Gannet and Montrose Fields NCMPA, Southern Trench NCMPA and Turbot Bank NCMPA) will be conducted and appended to the EIAR.

10.11.5 Assumptions and Limitations

10.11.5.1 The assessment is based on a combination of published data, two years of aerial survey and incidental observations collected during the benthic survey programme. It is assumed that these data are sufficient for the purposes of establishing a baseline for the EIA and no additional survey work is required.

10.12 Summary

10.12.1.1 A variety of cetacean and seal species occur within the Proposed Project Area and are considered potential receptors for environmental impacts related to the Project. The six key marine mammal receptor species which will be carried forward for detailed assessment in the EIAR are:

- Harbour porpoise;
- White beaked dolphin;
- Bottlenose dolphin;
- Northern minke whale;
- Harbour seal; and
- Grey seal.

[3] The Underwater Noise Technical Report is also used as an input to other marine ecology chapters within the EIA. In the case of fish ecology, receptors are assessed against the guidance contained within the Acoustical Society of America (ASA) Sound Exposure Guidelines for Fishes and Sea Turtles (Popper *et al.*, 2014).

10.12.1.2 Potential impacts have been identified during the different phases of the project, which will be assessed in the EIA. Impacts scoped out of the assessment are as follows:

- Direct impacts of water quality changes are scoped out because impacts from seabed disturbance on the water column will be localised in nature, of small areal extent and short duration. Impacts form accidental events will be exceptionally infrequent and amenable to mitigation through standard good management practices.
- Entanglement with mooring structures is scoped out. To date, there have been no documented instances of this occurring in the offshore renewables or hydrocarbons industries, including the Kincardine floating windfarm that has had floating structures in place since 2018. The nature of the mooring lines in terms of tension, rigidity and cable diameter preclude the possibility of forming any entangling loops, thus there is negligible potential for primary entanglement with subsea mooring systems. The type of fishing activity in the surrounding ICES rectangles means that there is unlikely to be a significant amount of problematic ALDFG that could be snagged on the WTG moorings, therefore the Project is unlikely to substantially increase the risk of secondary entanglement. Further information on entanglement is detailed within **Appendix 5G: Approach to secondary entanglement as a potential impact**.
- Impacts of EMF and direct impacts of heat have been scoped out as it is considered unlikely that perceptible physiological or behavioural changes to marine mammals will occur. Further information on EMF is detailed within **Appendix 5F: Approach to EMF and Heat as potential impacts.**
- Interactions with vessels during operation are scoped out at this stage. Such events will be very infrequent, and impacts will be minimised through the adoption of standard best practice.

10.12.1.3 The most wide-ranging potential impacts to marine mammals relate to underwater noise from piling during the construction phase. The EIA will address these through modelling of a realistic worst-case construction programme to determine the maximum extent of disturbance. The number of marine mammals affected within this area will be estimated and if the appropriate thresholds are reached, population consequence modelling will be undertaken.

10.13 Further Consideration for Consultees

10.13.1.1 Please find below specific scoping questions relevant to the topic of marine mammals:

- Do you agree that the data sources identified are sufficient to inform the marine mammal baseline for the EIAR?
- Do you agree that all the marine mammal protected areas within the study area have been identified?
- Have all potential impacts resulting from the Project been identified for marine mammal receptors?
- Do you agree that the impacts described in Section 10.8 can be scoped out?

- For those impacts scoped in (**Table 10-8**), do you agree that the methods described are sufficient to inform a robust impact assessment?
- Do you agree that the embedded mitigation measures described provide a suitable means for managing and mitigating the potential effects of the Project on marine mammal receptors?
- Do you have any additional specific requirements for the underwater noise modelling and assessment methodology?

11. ORNITHOLOGY

11.1 Introduction

11.1.1.1 This chapter of the Scoping Report considers the potential significant effects on offshore ornithology receptors of the Project. The chapter provides an overview of the baseline conditions relevant to the Project Area (as defined in **Chapter 1: Introduction**), the datasets to be used to inform the EIA, sources, pathways, and receptors of the potential significant effects to be considered, and how these effects will be assessed for the purpose of the EIA.

11.1.1.2 This chapter should be read alongside the following chapters and documents:

- **Chapter 9: Benthic Ecology** in terms of relevant habitat and key prey resources available to birds.
- **Chapter 12: Fish Ecology** in terms of key prey resources available to birds.
- **Appendix 5E: Marine Protected Area (MPA) Screening Report.**
- **Habitats Regulation Appraisal (HRA) Screening Report.**

11.2 Legislation, Policy, and Guidance

11.2.1 Legislation and Policy

11.2.1.1 Legislation and policy that has been used to inform the scope of the Ornithology chapter is set out in **Table 11-1**. Further information on policies relevant to the EIA are set out in **Chapter 2: Legislative and Policy Context.**

Table 11-1: Legislation and policy context

Legislation/Policy	Relevance to the assessment
Legislation	
EU Habitats Directive (Directive 92/43/EEC) on the Conservation of Natural Habitats and of Wild Fauna and Flora[315]	Maintenance and restoration of natural habitats and wild fauna within Europe.
EU Birds Directive (Council Directive 2009/147/EC) on the Conservation of Wild Birds[316]	Protection for naturally occurring wild bird species and their habitats in Europe.
Conservation of European Wildlife and Natural Habitats Convention ("The Bern Convention")[317]	International treaty for the protection of European wild plants and animals.
The Marine Environment (EU Exit) (Scotland) (Amendment) Regulations 2019[318]	Minor and technical amendments to EIA legislation in Scotland.
The Conservation (Natural Habitats &c.) Regulations 1994 (as amended)[319], The Conservation of Habitats and Species Regulations 2017[320] and The Conservation	Transpose the requirements of Directive 92/43/EEC (the Habitats Directive) for developments in Scottish Waters. The Habitat Regulations require that where a plan or project that is not directly connected with, or necessary to

Legislation/Policy	Relevance to the assessment
of Offshore Marine Habitats and Species Regulations 2017[321]	the management of a 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
The Conservation (Natural Habitats, etc.) (EU Exit) (Scotland) (Amendment) Regulations 2019[322]	Requirement for major building or development projects to be assessed in regard to potential environmental impact.
Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 [323]	Protection of habitats and European Protected Species (EPS) (as transposed into UK law, post-Brexit).
Wildlife and Countryside Act 1981 (as amended)[324]	Implementation of the Birds Directive and Bern Convention in Great Britain.
Wildlife and Natural Environment (Scotland) Act 2011[325]	Effective land and environment management, amended from the Wildlife and Countryside Act 1981
Marine (Scotland) Act 2010[326]	Allows Scottish marine planning and licensing while providing protection and enhancement of the marine environment; applies to Scottish territorial waters between 0 – 12 NM *("...the area of seabed from the baseline (broadly the mean low water springs) out to the 12 nautical mile limit managed by Crown Estate Scotland*").
Marine and Coastal Access Act 2009[327]	Applies to Scotland territorial waters between 12 – 200 NM.
National Policy	
Scottish Biodiversity Strategy to 2045[328]	Priority of work needed to meet Scottish biodiversity targets.
UK Post-2010 Biodiversity Framework[329]	UK strategy to achieve biodiversity targets licencing
Marine Policy	
Scotland National Marine Plan[330]	Compliance with legal requirements for protected areas and species in inshore and offshore environments (Policy Gen 9).

11.2.2 Technical Guidance

11.2.2.1 Technical guidance that has been used to define the ornithological assessment is set out in **Table 11-2**.

Table 11-2: Relevant technical guidance

Guidance reference	Relevance to the assessment
Guidelines for Ecological Impact Assessment in the UK and Ireland[331]	Overarching guidance for UK Environmental Impact Assessment.
Advice on marine renewables development Marine Ornithology Guidance Notes 1 to 11[332]	Guidance for ornithological modelling parameters and approach.
Seasonal Definitions for Birds in the Scottish Marine Environment[333]	Presentation of seasons to be used in assessment.
Environmental Impact Assessment Handbook: Guidance for competent authorities, consultees and others involved in the Environmental Impact Assessment process in Scotland[334]	Overarching guidance for Scottish Environmental Impact Assessment.
Joint Statutory Nature Conservation Bodies (SNCB) Interim Displacement Advice Note[335]	Species-specific displacement and mortality rates to be used in assessment of distributional responses (displacement and barrier effects).
Advice note from the joint Statutory Nature Conservation Bodies (SNCB) on avoidance rates to use in collision risk modelling[336]	Species-specific collision avoidance rates to be used in assessment of collision risk.

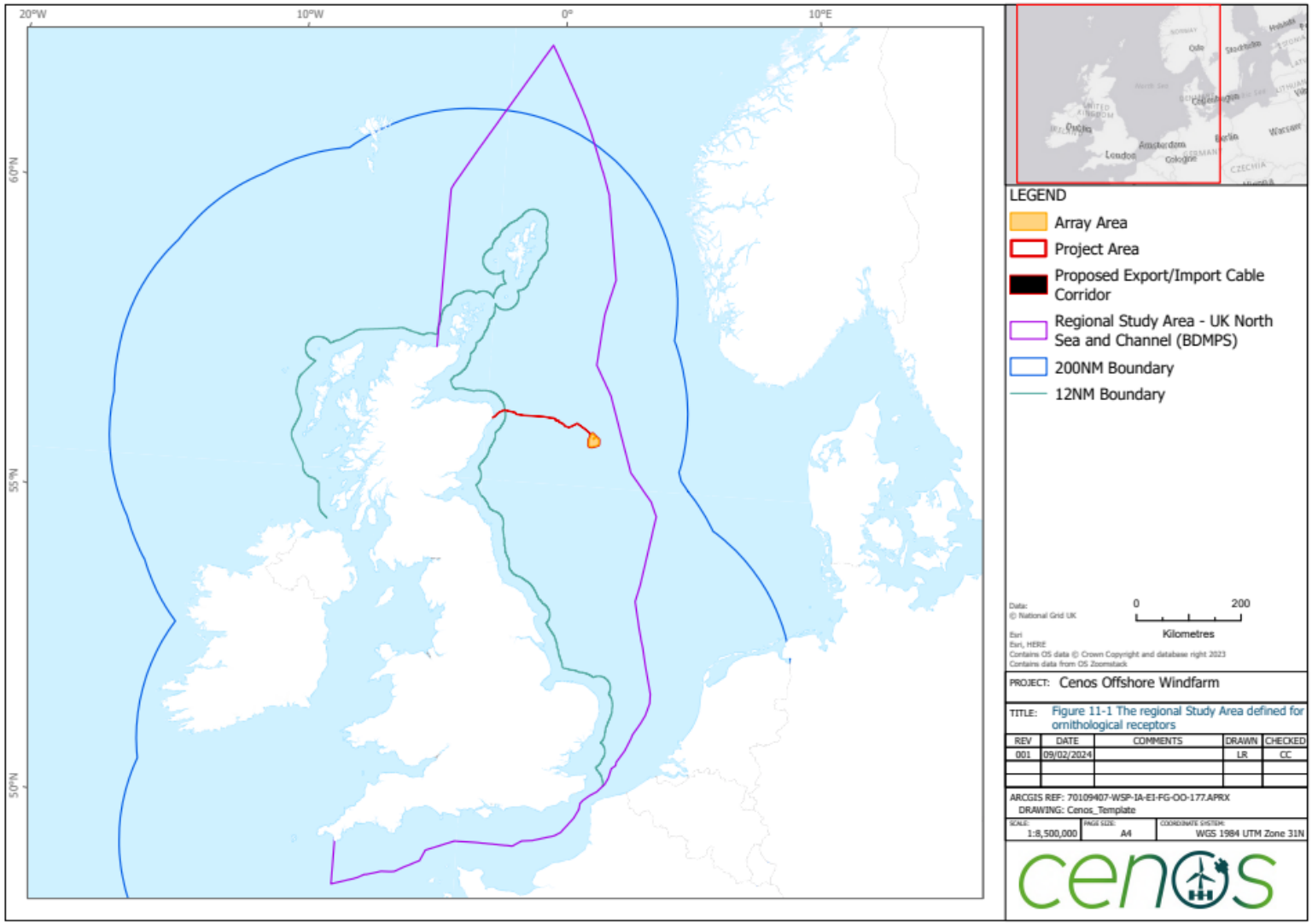
11.3 Study Area

11.3.1.1 A Regional Study Area was derived for ornithological receptors, which will be species-specific and derived from breeding season foraging ranges from Woodward *et al*.[337] and non-breeding season Biologically Defined Minimum Population Scales (BDMPS) regions as defined in Furness[338]. For the site-specific Digital Aerial Surveys (DAS) used to characterise the baseline environment, surveys were conducted over the INTOG lease area plus a 4 km buffer. This is the minimum buffer recommended in NatureScot guidance[339] (**Figure 11-1**). Consistent with the 2023 Scoping Report, this area will be referred to as 'the Survey Area'. In summary, there will be two areas of interest for ornithological receptors:

11.3.1.2 Regional Study Area: a large area of interest defined by species-specific foraging ranges; and

11.3.1.3 The Survey Area: the area covered by site-specific DAS, across the INTOG lease area.

Figure 11-1: The regional Study Area defined for ornithological receptors



11.4 Consultation

11.4.1.1 Consultation is a key part of the consent application process. This assessment has been and will be informed by engagement and discussion with various stakeholders including MD-LOT, NatureScot, JNCC and the RSPB Scotland.

11.4.1.2 A summary of the key issues raised during consultation to date, specific to ornithology, is outlined in **Table 11-3**, together with how these issues will be considered in the production of the EIAR.

Table 11-3: Summary of consultation relating to ornithology

Date and stakeholder	Consultation and key comments	How this is accounted for
MD-LOT, 2023 Scoping Opinion, June 2023[340]	The Scottish Ministers direct the Developer to the guidance notes recently published by NatureScot on its website to assist Developers in assessing the impacts of offshore development. The ornithology guidance notes should be utilised to their full potential in the preparation of the EIAR. The Developer should also consider the representation provided by RSPB.	NatureScot ornithology guidance notes will be used throughout ornithology assessment. RSPB representation will be considered.
MD-LOT, 2023 Scoping Opinion, June 2023[340]	The Scottish Ministers are unable to provide further, detailed advice for this receptor due to the lack of detail provided in the Scoping Report.	Noted. Additional detail added throughout this Report, in all sections.
NatureScot and JNCC, 26 May 2023, included with the 2023 Scoping Opinion, June 2023	We have recently attended a workshop (23 May 2023) with the CENOS project which NatureScot, JNCC and MD LOT representatives attended. This was held at our request due to our concerns about the paucity of information within the Scoping Report on a number of issues, including, but not limited to: - Statements of intentions to scope out topics with little or no justification at this stage	Noted. Additional information added in all sections, including but not limited to: justifications to scoping in/out impacts and approach to impact assessment. All information regarding MPAs will be presented separately in the MPA Screening Report.

Date and stakeholder	Consultation and key comments	How this is accounted for
	- No provision of impact assessment methods or techniques - Lack of detail on the project, particularly the likely infrastructure requirements within the ncMPA.	
NatureScot and JNCC (26 May 2023, included with the 2023 Scoping Opinion, June 2023	We provided advice on those aspects which we felt were lacking in an email to the developer and copied to MD LOT dated 4th May 2023. The workshop did not provide sufficient clarity around those points. We also suggested at the workshop, it would be in the interests of all parties for this project to re-scope and to provide the information we had suggested would be helpful. It is unclear if the developer will do so.	Noted. Project has been re-scoped and Scoping Workshop based on this information that has informed this report has been held. Addressed through this Report.
NatureScot and JNCC (26 May 2023, included with the 2023 Scoping Opinion, June 2023	At this point we are unable to provide detailed project specific scoping advice to inform a scoping opinion as there remains too much uncertainty on assessment methods to be used and the project envelope itself. To provide advice we would need to spend considerable time and effort and we are not prepared to do so based on the Scoping Report received. If the developer is not minded to re-scope, we are unwilling to provide detailed pre application advice, as we consider the scoping process to be the most appropriate opportunity to provide our advice. We also note that with CENOS not likely to re-scope and therefore our unwillingness to prioritise pre-application dialogue, this puts	Noted. Detailed information on assessment methodology and project envelope included in this Report. This Scoping Report should be acknowledged as a re-scoping of the Cenos Project.

Date and stakeholder	Consultation and key comments	How this is accounted for
	at risk the quality of an application, which we believe is a risk that the developer should be aware of.	
RSPB Scotland, 2023 Scoping Opinion.	RSPB Scotland encourage the adoption of a precautionary approach to the identification of relevant protected sites for seabirds with clear methodology on the exclusion of sites and species. We generally agree with the collection and analysis methods advised by NatureScot, with some exceptions as set out below. We recommend use of the guidance notes available on their website to inform assessment. If an Applicant chooses to undertake supplementary modelling using alternative parameters to that recommended, we suggest this is clearly labelled.	Methodology for the identification and exclusion of protected sites will follow NatureScot guidance.
RSPB Scotland, 2023 Scoping Opinion.	The RSPB has outstanding issues with the manner in which the bio-seasons definitions from Furness (2015) have been defined for gannet and kittiwake. This is because by using the "migration-free" seasonal definition as opposed to full breeding season the early and later months of the season are effectively excluded. For example, the kittiwake breeding season is defined as May to July, when evidence from colony monitoring shows that birds are present from April at least to August. In the latter part of the season all birds will have fledged but individual birds will still be present with both young and	Noted. Seasonal definitions will follow NatureScot[333].

Date and stakeholder	Consultation and key comments	How this is accounted for
	adult birds coming back to the cliff. These are still SPA birds, and those most likely to be affected by impacts from the development.	
RSPB Scotland, 2023 Scoping Opinion.	We welcome using foraging ranges as published in Woodward *et al*. (2019) to derive connectivity with SPA colonies. We also recommend that site specific data are examined and where the maximum foraging range from the colony exceeds the generic value, that the site-specific value is used. The exceptions to this are for common guillemot and razorbill. Tracking on Fair Isle showed foraging for both common guillemot and razorbill distances are greater than those of all other colonies. This may relate to poor prey availability during the study. However, trends for seabirds in the Northern Isles indicate this may be becoming a more frequent occurrence. For all designated sites south of the Pentland Firth (i.e. excluding the Northern Isles), we advise use of mean max (MM) plus one standard deviation (SD) discounting Fair Isle values. For clarity, North Caithness Cliffs SPA is considered to lie south of the Pentland Firth.	NatureScot guidance will be followed and Woodward *et al*[337] foraging ranges will be used to derive connectivity with SPA colonies. Where maximum foraging range from colony exceeds generic value (for gannet at St Kilda, Grassholm and Forth Islands), site-specific values will be used. For guillemot (*Uria aalge*) and razorbill (*Alca torda*) linked to sites in the Northern Isles, mean-max foraging range plus one standard deviation including Northern Isles data will be used. For sites south of the Pentland Firth for guillemot and razorbill, mean-max foraging range plus one standard deviation excluding Northern Isles data will be used.
RSPB Scotland, 2023 Scoping Opinion.	Whilst the RSPB agree with the majority of the NatureScot advised Avoidance Rates including the use of a 98.9% avoidance rate for non-breeding gannets, in our opinion, a 98% avoidance rate is more appropriate for	NatureScot guidance and recommended avoidance, displacement and mortality rates will be used. The matrix method will be used to assess distributional responses, and outputs for all advised displacement rates will be presented in a Technical Appendix.

Date and stakeholder	Consultation and key comments	How this is accounted for
	breeding gannets. This is because the figures used for the calculation of avoidance rates advocated by the SNCB are largely derived from the non-breeding season for gannet. During the breeding season, gannets are constrained to act as central placed foragers meaning they return to the colony after feeding in order to maintain territories, incubate eggs and provide for chicks. Once chicks have fledged adult gannets remain at sea and no longer visit the colony. Differences in behaviour between the breeding and non-breeding season are likely to result in changes in avoidance behaviour. This seasonally defined change in reactive behaviour will also be reflected in the distributional changes occurring due to the presence of turbines. As such, alongside the 70% displacement rate recommended by NatureScot for the assessment of gannet, we recommend the presentation of 60% displacement rate during the breeding season.	
RSPB Scotland, 2023 Scoping Opinion.	An EIAR must include a description of the likely significant effects of the development on the environment. RSPB are frequently presented with a matrix approach to significance which combines the value of a receptor with the magnitude of impacts. This formulaic approach is one way to present significance, but the	Noted. A matrix approach will be presented, as is the industry standard, to allow easy interpretation of possible impacts with similar offshore windfarm projects with submitted applications. However, discussion around the significance of effects, uncertainty present in impact assessment and associated limitations will also be discussed. Assessment of potential significant effects, in particular to SPA colonies, will be considered within the HRA process.

Date and stakeholder	Consultation and key comments	How this is accounted for
	categorisation is not biologically meaningful and may not be the best way to assesses the significance of impacts. Furthermore, the uncertainty in the score, as described by Wade *et al*[341]. (2016) is typically not incorporated into this approach. This should be case, and we would recommend doing so following the principal that the greater the uncertainty the greater the need for precaution (Searle *et al*., 2023[342]).	
RSPB Scotland, 16 June 2023, included with the 2023 Scoping Opinion, June 2023	RSPB Scotland disagree with the magnitude of impact being assessed in terms of predicted increases to baseline mortality. As above, small increases in mortality can have large impacts. It is more meaningful to view impacts across the lifeline of the development in comparison to population size in the absence of the development and consider long-term viability of colonies and time for recovery.	Noted. Population Viability Analysis (PVA) will be used to determine impacts to seabird populations over the lifetime of the Project, over a period of at least 25 and 50 years (and intended lease period if different). Changes to estimated overall population size against baseline conditions will be determined in addition to other metrics which have been deemed useful to assess population trends (counterfactual (ratio) of final population size (CPS) and counterfactual (ratio) of population growth-rate (CPC).
Scoping Workshop, 29 February 2024	Methodology and key assumptions for assessment were presented, in line with the detail presented in this scoping chapter, to NatureScot and MD-LOT. The presentation included information on the baseline data collected, and the approach to the consideration of Avian Influenza. It was clearly stated that the assessment would follow the NatureScot suite of guidance documents.	The comments provided within the Scoping Workshop from NatureScot, where confirmation was obtained, have been addressed within this 2024 ScopingScoping Report. The technical guidance that has been used to define the ornithological assessment is set out in **Table 11-2**. **Appendix 5G: Approach to secondary entanglement as a potential impact** sets out the Applicant's approach and justification to entanglement.

Date and stakeholder	Consultation and key comments	How this is accounted for
	NatureScot requested an updated on the survey strategy and the planned ornithological survey works. Confirmation obtained from NatureScot during workshop, that: • there are no further guidance/policy documents to be aware of; • there is no updated guidance currently available; • the study regions as defined were appropriate; • direct disturbance should also be included for the operational phase; • the proposed approach to cumulative effects, transboundary and interrelated effects were agreed; and • mCRM tool not yet available. Confirmation of the following was not available during the workshop: • until DAS report reviewed, the species scoped into assessment cannot be agreed; • acceptability of the proposed approach to derive guillemot non-breeding seasonal regional populations; • Approach to fulmar colonies to be included for the breeding season regional population for Collision Risk Modelling (CRM);	**Appendix 5A Survey Strategy** sets out the survey's undertaken to date by the Applicant, including the DAS. Direct disturbance during O&M from vessel movements will be included in the assessment (see **Table 11-8**). Collision risk to migratory species will be assessed qualitatively.

Date and stakeholder	Consultation and key comments	How this is accounted for
	• Approach to non-breeding season apportioning for guillemot	

11.5 Baseline Conditions

11.5.1 Data Information Sources

11.5.1.1 As per the 2023 Scoping Report, baseline data collected during DAS will be used in conjunction with published guidance, research, and other relevant data. The additional data sources are presented in **Table 11-4**. Any relevant new guidance or information which becomes available during the EIA process will also be included, if timely to the EIAR submission deadline.

Table 11-4: Key data sources for ornithological assessment

Source	Date	Summary	Coverage of Study Area
Site-specific DAS of the Project	2023	Site-specific DAS (10 % coverage of survey area) for ornithological receptors, April 2021 to March 2023	Array Area and buffer (partial Regional Study Area coverage)
Wintering and breeding bird surveys for NorthConnect interconnector[343]	2018	Monthly seabird counts along coast / cliffs, February 2016 to January 2017	Partial Regional Study Area coverage
Green Volt Offshore Windfarm site-specific aerial surveys[344]	2023	Site-specific DAS for ornithological receptors, May 2020 to April 2022	Partial Regional Study Area coverage
JNCC Online SPA standard data forms for Natura2000 sites	Various	Species-specific data for UK protected sites (SPAs)	Partial Regional Study Area coverage
Seabird Monitoring Programme colony counts	Various	Species-specific colony counts for UK colonies. Including data from periodic seabird census surveys (e.g. Seabird 2000 (1998 – 2002) Seabirds Count (2015 – 2022))	Partial Regional Study Area coverage
Digital aerial seabird and cetacean surveys	2021	Distribution data for seabirds and cetaceans from eight digital aerial surveys between February 2020 and	Partial Regional Study Area coverage

Source	Date	Summary	Coverage of Study Area
off the east coast of Scotland[345]		January 2021, in the western North Sea (east of Scotland)	
The identification of possible marine SPAs for seabirds in the UK: The application of Stage 1.1. – 1.4 of the SPA selection guidelines[346]	2012	Identification and classification of suitable marine habitat for conservation of Annex I species	Full Regional Study Area coverage
Non-breeding season populations of seabirds in UK waters: Population sizes for Biological Defined Minimum Population Scales (BDMPS)[338]	2015	Seabird population and demographic rate data	Full Regional Study Area coverage
Breeding density, fine-scale tracking and large-scale modelling reveal the regional distribution of four seabird species[347]	2017	At-sea distribution of seabird species from UK and Irish colonies	Full Regional Study Area coverage
Desk-based revision of seabird foraging ranges used for HRA screening[337]	2019	Species-specific breeding season foraging range data	Full Regional Study Area coverage
Distribution maps of cetacean and seabird populations in the North-East Atlantic[348]	2020	Distribution of seabirds and cetaceans on the northeast Atlantic between 1980 and 2018	Full Regional Study Area coverage
Interspecific variation in non-breeding aggregation: a multi-colony tracking study of two sympatric seabirds[349]	2022	Non-breeding distribution and population aggregation seabirds from UK colonies	Full Regional Study Area coverage

Source	Date	Summary	Coverage of Study Area
Auk tagging project: final report, January 2023[350]	2023	Non-breeding distribution and population aggregation seabirds from UK colonies. Links to data presented in Buckingham *et al.* (2022)	Full Regional Study Area coverage
Scaling possible adverse effects of marine windfarms on seabirds: developing and applying a vulnerability index[351]	2004	Development of Windfarm Sensitivity Index for seabirds in the Germany Exclusive Economic Zone (EEZ)	N/A
Assessing vulnerability of marine bird populations to offshore windfarms[352]	2013	Vulnerability of seabirds to offshore windfarms	N/A
Incorporating data uncertainty when estimating potential vulnerability of Scottish seabirds to marine renewable energy developments[341]	2016	Uncertainty in assessment of vulnerability of seabirds to offshore renewable energy developments	N/A
Mapping seabird sensitivity to offshore windfarms[353]	2017	Sensitivity of seabirds to offshore windfarms in English territorial waters	Mapping seabird sensitivity to offshore windfarms (Bradbury *et al.,* 2017).
Identifying important at-sea areas for seabirds using species distribution models and hotspot mapping[354]	2020	Hotspot mapping using Species Distribution Models (SDMs) for four seabird species	Full Regional Study Area coverage
Population consequences of displacement from proposed offshore wind energy developments for seabirds breeding at Scottish SPAs[355]	2014	Development of model to estimate effect of displacement due to offshore windfarms on seabirds	N/A

Source	Date	Summary	Coverage of Study Area
Finding out the fate of displaced birds[356]	2018	Explanation of SeabORD to assess displacement of seabirds by offshore windfarms	N/A
Using a Collision Risk Model to Assess Bird Collision Risks for Offshore Windfarms[357]	2012	Development of model to assess collision risk of seabirds with offshore windfarms	N/A
The Avoidance Rates of Collision Between Birds and Offshore Turbines[358]	2014	Assessment of avoidance rates to use in CRM of seabirds with offshore windfarms	N/A
Modelling flight heights of marine birds to more accurately assess collision risk with offshore wind turbines[359]	2014	Development of generic flight height data to be used in CRM	N/A
Seabirds and offshore windfarms in European waters: Avoidance and attraction [360]	2016	Assessment of avoidance rates of seabirds with offshore windfarms	N/A
Bird Collision Avoidance: Empirical evidence and impact assessments[361]	2018	Assessment of avoidance rates to use in CRM of seabirds with offshore windfarms	N/A
ORJIP Bird Collision and Avoidance Study[362]	2018	Assessment of avoidance rates to use in CRM of seabirds with offshore windfarms	N/A
Consideration of avoidance behaviour of northern gannet (*Morus bassanus*) in collision risk modelling for offshore windfarm impact assessments[363]	2023	Assessment of avoidance rates to use in CRM of seabirds with offshore windfarms	N/A

Source	Date	Summary	Coverage of Study Area
A population viability analysis modelling tool for seabird species[364]	2019	Explanation around how to use the tool which is required for population viability analysis	N/A

11.5.2 Proposed Assessment Methodology

11.5.2.1 The approach to EIA will follow the general approach outlined in **Chapter 5: Approach to Scoping and EIA** of this Scoping Report. In addition to the general approach and guidance outlined in **Chapter 5: Approach to Scoping and EIA**, the assessment of ornithological receptors will also comply with the following guidance documents where they are specific to this topic (see **Table 11-2**).

11.5.2.2 Seasonal use of the site by ornithological receptors will be determined through baseline characterisation, informed by the two-year programme of monthly site-specific DAS (more information in Section 11.5 Baseline Conditions) and other data sets as described in Section 11.5.1 Data Information Sources. Information on abundance, distribution, behaviour, sex, and age (where possible) will also be provided. These data will be used to calculate species-specific density and abundance estimates (with associated uncertainty) for the Project.

11.5.2.3 The impact assessment will adhere to industry standards[331] [365] and will closely follow the guidance provided from NatureScot on ornithological impact assessment[332]. Ornithological receptors taken through to impact assessment will be determined by site-specific occurrence and derived seasonal populations, conservation status and known sensitivity to offshore windfarms (e.g. Wade *et al*[341]). Species identified as key ornithological receptors to the Project will be subject to quantitative impact assessment.

11.5.2.4 In line with NatureScot guidance, generic flight height data from Johnston *et al*[359]. will be used during assessment of collision risk. The full proposed methodology for baseline characterisation, distributional responses, CRM and Population Viability Analysis (PVA) is presented below and will be subject to consultation with key stakeholders.

11.5.2.5 The quantitative methods which will be used are briefly outlined below, with more detail on the approach to assessment provided in the following sections.

- Assessment of distributional responses will be conducted using the Matrix approach[335] and SeabORD[356], where appropriate;
- Collision risk will be assessed using the stochastic CRM (sCRM) and deterministic Band framework using Caneco[366]. Option 2 of the model will be used with generic flight height data[359];
- PVA will be conducted, where necessary, using the Natural England (NE) PVA tool[364]. Current guidance requires PVA where adult annual survival rate at breeding SPA colonies exceeds 0.02 percentage points. The EIA will assess in

terms of regional populations and requirement for PVA will be discussed and agreed during the consultation process; and

- Apportioning of estimated impacts on seabirds to SPA populations during the breeding season and non-breeding season will be undertaken following NatureScot guidance[332]. More detail will be provided during the HRA screening process.

11.5.3 Existing Baseline

11.5.3.1 This section describes the present conditions which constitute the existing baseline environment for ornithology receptors within the regional Study Area.

Site-Specific Digital Aerial Surveys

11.5.3.2 As per the 2023 Scoping Report, site-specific DAS data are the primary data source to be used in impact assessment. To provide baseline data for the offshore ornithology assessment, a programme of monthly DAS across the INTOG lease area plus a 4 km buffer (the Survey Area) began in April 2021 and were completed in March 2023. Ornithological surveys were performed using a digital video survey method which follows the relevant industry standard methods.

11.5.3.3 A two-year DAS programme was completed between April 2021 – March 2023, capturing two complete breeding seasons and two non-breeding periods. Raw species counts are summarised in **Table 11-5** and are presented for the Survey Area, Array Area, and Array Area plus 2 km buffer.

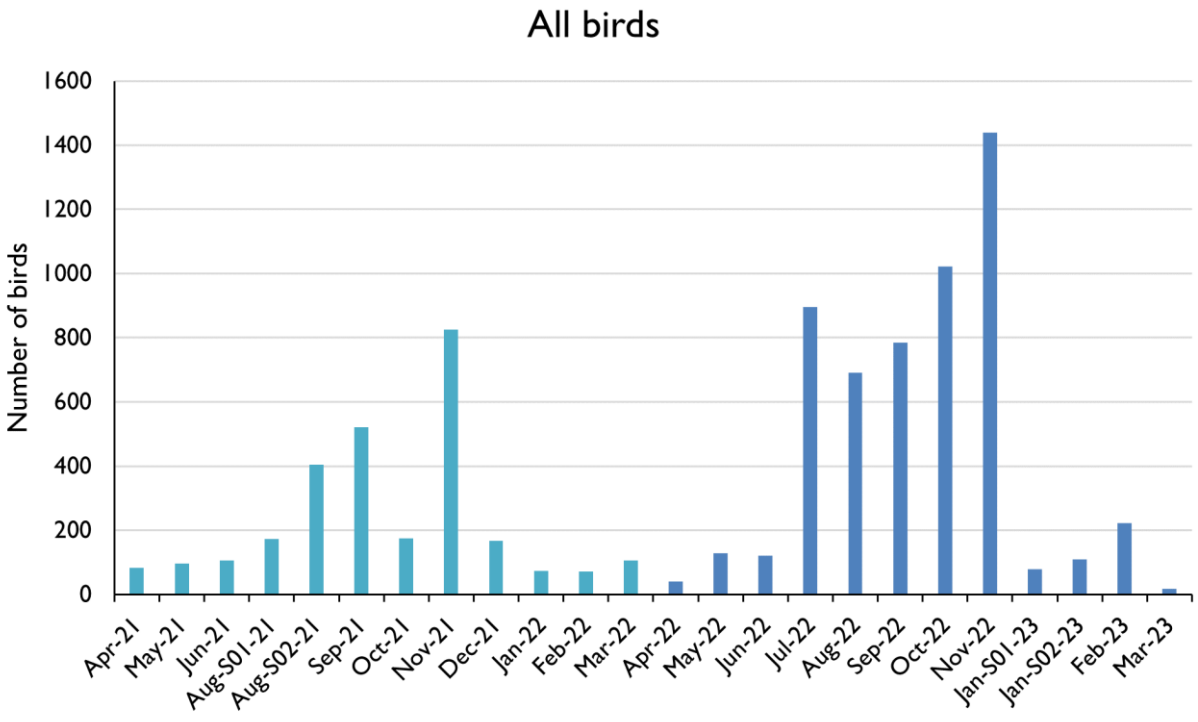
Table 11-5: Total observations from site-specific Digital Aerial Surveys (DAS) between April 2021 - March 2023 for the Survey Area, Array Area, and Array Area plus 2 km buffer (identified to species level)

Species	Survey Area	Array Area	Array Area + 2 km buffer
Guillemot	6557	2584	3945
Fulmar *(Fulmarus glacialis)*	1140	407	650
Gannet *(Morus bassanus)*	269	134	179
Kittiwake *(Rissa tridactyla)*	169	58	85
Puffin *(Fratercula arctica)*	86	34	48
Great black-backed gull	58	28	33
Razorbill	19	12	14
Herring gull *(Larus argentatus)*	15	5	10
Arctic tern *(Sterna paradisaea)*	13	5	13
Knot *(Calidris canutus)*	8	8	8
Common scoter *(Melanitta nigra)*	4	0	0

Species	Survey Area	Array Area	Array Area + 2 km buffer
Common gull	3	0	1
Great skua	2	1	1
Arctic skua	2	2	2
Little auk	1	1	1
Little gull	1	0	1
Total	**8347**	**3279**	**4991**

11.5.3.4 Between April 2021 and March 2023, 16 species were recorded within the Survey Area, equating to 8,344 observations to species level. A further 201 birds were recorded to species group level. **Plate 11-1** presents the total number of raw observations per survey month, with the most records observed in November 2022. As per the 2023 Scoping Report, guillemot was the most commonly observed species, followed by fulmar. Gannet and kittiwake were also relatively abundant. DAS indicated that most of the observed seabird species occur in the area during the non-breeding season, with the exception of kittiwake and puffin.

Plate 11-1: Raw observations of birds to species level from site-specific Digital Aerial Surveys (DAS) (light blue indicates Year 1 (April 2021 – March 2022), dark blue indicates Year 2 (April 2022 – March 2023)



11.5.3.5 The species recorded in site-specific DAS of the Project are broadly similar to those recorded during site-specific DAS of Green Volt Offshore Windfarm, the closest proposed offshore windfarm with a submitted application. During Green Volt Offshore Windfarm site-specific surveys 23,378 seabirds of 21 species were recorded between May 2020 and April 2021. Guillemot, fulmar, kittiwake, and gannet were the most abundant, the same as for the Project[344].

11.5.3.6 The ECC has not undergone site-specific DAS for baseline characterisation since any significant impacts to ornithology receptors are expected to be temporary and localised. Part of the ECC has already undergone impact assessment as detailed in the NorthConnect Interconnector EIAR[343]. No additional baseline data are proposed to be collected. However, since the ECC will make landfall within the Buchan Ness to Collieston Coast SPA, additional data sources outlining baseline conditions, and site-specific seabird surveys for the NorthConnect Interconnector landfall will be considered.

11.5.3.7 Seabird cliff surveys for the NorthConnect Interconnector identified areas of very low seabird density during the breeding season. Vantage point surveys performed from the coast to 2 km to sea recorded thirteen species, peaking in June 2016. The most abundant species were fulmar, kittiwake, guillemot, razorbill, herring gull, and shag (*Gulosus aristotelis*). Of the birds recorded during the breeding season, the majority were guillemot. Fulmar and herring gull were recorded within 100 m of where the HDD emergence point is proposed to be situated[343].

Designated sites

11.5.3.8 There are several statutorily designated sites in proximity to the cable landfall area and/or within foraging range of species recorded during site-specific DAS of the Project. Based on submitted applications for nearby offshore windfarms (e.g. Green Volt Offshore Windfarm, Berwick Bank Windfarm), SPAs which are thought to be included in assessment of the Project are presented in **Table 11-6**. Note that no screening or connectivity analysis has been performed. This list is purely indicative, not exhaustive and is subject to change. More information will become available through the EIA and HRA processes.

11.5.3.9 Within the EIA, impacts associated with the Array Area will be put into the context of regional populations, which are built from species-specific foraging ranges during the breeding season[337] and BDMPS regions in the non-breeding season[338]. Assessment of impacts of the ECC will be covered within the EIA, however this will be done qualitatively. Quantitative assessment of ornithological features at protected sites (SPAs) potentially affected by the Array Area and ECC, and any Likely Significant Effects (LSE), will be covered within the RIAA.

11.5.3.10 Breeding season foraging ranges presented in Woodward et al[337]. indicate that for some of the most abundant species recorded in DAS (e.g. guillemot), the Array Area will be outwith foraging range during the breeding season. Considering this and the raw observations from site-specific DAS, it is unlikely that quantitative assessment of all qualifying features of the SPAs listed in **Table 11-6** will need to be undertaken for EIA of the Array Area.

11.5.3.11 The species/SPA combinations for which impact assessment is likely to be required within the HRA are marked with an asterisk (subject to change through HRA Screening).

Table 11-6: SPAs likely to have connectivity with the Project and designated qualifying features. Asterisk denotes the species/SPA combinations for which connectivity is likely, which will be confirmed through HRA Screening

Site	Qualifying features
Buchan Ness to Collieston Coast SPA	Fulmar*, guillemot, herring gull, kittiwake*, shag
Troup, Pennan and Lion's Heads SPA	Fulmar*, guillemot, herring gull, kittiwake*, razorbill
Fowlsheugh SPA	Fulmar*, guillemot, herring gull, kittiwake*, razorbill
Forth Islands SPA	Kittiwake, Arctic tern, common tern (*Sterna hirundo*), cormorant (*Phalacrocorax carbo*), gannet*, guillemot, herring gull, lesser black-backed gull (*Larus fuscus*), puffin, razorbill, [Redacted] sandwich tern (*Thalasseus sandvicensis*), shag
East Caithness Cliffs SPA	Fulmar*, cormorant, great black-backed gull (*Larus marinus*), guillemot, herring gull, kittiwake, razorbill, [Redacted] , shag
North Caithness Cliffs SPA	Fulmar*, guillemot, kittiwake, [Redacted] puffin, razorbill

11.5.4 Future baseline

11.5.4.1 The description of current baseline reflects the Project's understanding of the current status of ornithology receptors in the area. The Project, as part of the INTOG leasing round, is in the vicinity of the Central North Sea Electrification (CNSE) Project, together with other areas proposed for floating offshore wind development. The distant location of the Project from coastal seabird breeding colonies means impacts are likely to be relatively low.

11.5.4.2 Baseline conditions are likely to change throughout lifetime of the Project (e.g. during the O&M phase) primarily due to ongoing climate change impacts, which have knock-on effects on the baseline environment. Such effects will be realised in the longer-term and it is not expected that the baseline described here will have changed significantly over the pre-construction or construction phases. Natural variability driven by environmental and behavioural factors is ever-present, as is the threat of natural phenomena, such as Highly Pathogenic Avian Influenza (HPAI), which will result in changes to populations, with or without the Project.

11.6 Basis of Assessment

11.6.1.1 The ornithology scoping assessment is based on the following key assumptions, which are also set out in **Chapter 3: Project Description**:

- The array will consist of up to 95 WTGs;

- There will be up to two offshore substations;
- Maintenance activities will be undertaken for both preventive and corrective maintenance requirements;
- ECC as per **Chapter 3: Project Description** and in particular the HDD works and cable pull will be timed as per the NorthConnect proposals laid out in their EIAR.
- The operational lifetime of the project is assumed to be a minimum of 30 years; and
- The decommissioning of the windfarm is anticipated to involve as close to full removal of offshore infrastructure as possible at the time of decommissioning (where safe/practicable to do so). The decommissioning works are likely to be undertaken in reverse to the sequence of construction works and involve similar levels of equipment and impact.

11.7 Relevant Embedded Mitigation Measures

11.7.1.1 Embedded mitigation measures have been identified and are proposed to be adopted as part of the Project design (primary mitigation); or implemented in accordance with industry standard practice that would occur with or without the input from the environmental assessment feeding into the process (tertiary mitigation). There is a commitment by the Applicant to implement these embedded mitigation measures and they have been considered within the 2024 EIA Scoping Report.

11.7.1.2 The requirement for additional mitigation measures (secondary mitigation) will be dependent on the significance of effects on ornithology receptors and will be consulted upon with consultees throughout the EIA process. Any additional mitigation measures will be presented within the EIAR.

11.7.1.3 Those measures that are relevant to ornithology are listed in **Table 11-7**. General mitigation measures, which would apply to all parts of the Project, are set out first. Thereafter mitigation measures that would apply specifically to ornithology issues associated with the Project are described separately.

Table 11-7: Embedded mitigation relating to ornithology

ID	Embedded mitigation measure
General	
ORN-001	A Project Environmental Monitoring Programme (PEMP) will be developed and adhered to for the Project. It will detail commitments to environmental monitoring.
ORN-002	A Vessel Management Plan (VMP) will be developed and adhered to for the Project. The VMP will detail types and numbers of vessels to be utilised by the Project.
ORN-003	In line with MAPROL convention requirements an MPCP will be developed for the Project and will detail the procedures to be actioned in the event of a pollution event.
Construction	
ORN-004	A Construction Method Statement (CMS) will be developed and adhered to for the Project. Including HDD works and cable pull timing as per the NorthConnect proposals laid out in their EIAR.
Operations and Maintenance	

ID	Embedded mitigation measure
ORN-005	A Lighting Marking Plan (LMP) will be developed and adhered to for the Project. The LMP confirms compliance with legal requirements regarding and lighting and marking in relation to shipping, navigation and lighting.
Decommissioning	
	Same as for construction

11.8 Scoping of Potential Significant Effects

11.8.1.1 In line with the EIA Regulations 2017, the EIA for the Project will only consider those impacts where there is risk of potential significant effects. The following section draws on NatureScot guidance and industry experience to identify those effect-receptor pathways that may potentially lead to a significant impact. Where experience and available evidence indicates an effect-receptor pathway will not lead to a potential significant effect with regards to the EIA Regulations 2017 the pathway is scoped out from assessment.

11.8.1.2 The potential significant effects on ornithological receptors are summarised in **Table 11-8**. The scoping assessment is based on a combination of the project design at the time of writing, embedded mitigation measures, understanding of the baseline environment, the evidence base for potential ornithology effects, and professional judgement. The approach to this assessment is set out in **Chapter 5: Approach to Scoping and EIA.**

11.8.1.3 The early identification of potential significant effects is used here as a tool aimed at delivering a proportionate approach to the EIA. In doing so, it sets out a high-level assessment of all potential effects, significant or not. The basis for scoping out certain effects, and therefore no longer considered is presented after the table, supported by evidence base.

Table 11-8: Summary of potential significant effects for ornithological scoped in (✓) or scoped out (x) of the EIAR during construction (C), O&M and decommissioning (D)"

Activity and impact	Embedded mitigation	Outcome of scoping per phase			Justification	Overview of proposed assessment
		C	O&M	D		
Disturbance and / or displacement of ornithology receptors	ORN-001, ORN-002, ORN-004	✓	✓	✓	There may be temporary disturbance and displacement effects to ornithological receptors during the construction of the Project due to the presence of vessels. However, these are expected to be localised and temporary in nature.	Qualitative assessment within EIAR.
	ORN-002	X	✓	X	There is potential for the presence WTGs to lead to distributional responses through displacement and barrier effects, effectively reducing the potential for ornithological receptors to be present within the Array Area and increasing the potential for longer flight paths and higher energy expenditure.	Quantitative assessment using Matrix Approach[335] and SeabORD.
	ORN-004	X	N/A	N/A	There may be temporary disturbance and displacement effects to ornithological receptors during the construction of the HDD. However, these are expected to be localised and temporary in nature and fully mitigated. This impact is therefore scoped out of the EIA.	No assessment.
Collision risk with turbines for ornithology receptors	ORN-005	X	✓	X	There is potential for the presence of WTGs to lead to direct mortality of ornithological receptors while in flight through collision with turbine blades.	Quantitative assessment using deterministic and stochastic model frameworks[366].
Changes to prey resources	ORN-001, ORN-003	✓	✓	✓	The presence of the Project has the potential to influence prey availability and therefore decrease foraging efficiency of ornithological receptors.	Qualitative assessment within EIAR.

Activity and impact	Embedded mitigation	Outcome of scoping per phase			Justification	Overview of proposed assessment
		C	O&M	D		
Underwater noise and vibration	ORN-002	✓	N/A	N/A	There is potential for diving birds (e.g. guillemot and gannet) to be present in the vicinity of the Project when noisy activities are occurring during construction (e.g. pile driving). It is likely birds will be aware of construction activities when they are not diving and may have been temporarily displaced. Although some species (e.g. cormorant) may be better adapted to hear underwater than other species[367], it is assumed that most diving birds do not have the same capacity to hear underwater as aquatic animals, as they are primarily adapted for aerial environments. It should also be noted that any piling activities will be short in duration. Therefore, underwater noise during construction is scoped out of impact assessment.	No assessment.
	ORN-004	X	N/A	N/A	UXO clearance may also affect diving birds such as guillemot and gannet. However, embedded mitigation, including Marine Mammal Observers (MMOs) will be deployed during UXO clearance to facilitate shutdown/cessation of such activities in the presence of marine mammals. MMOs will be aware of rafting birds if they are present so existing mitigation could be applied here (i.e. UXO clearance will be halted). Diving birds also do not have the same capacity to hear underwater as aquatic animals, as they are primarily adapted for aerial environments. Therefore, UXO clearance during pre-construction is scoped out of impact assessment.	No assessment.
Subsea mooring systems may cause entanglement resulting	ORN-001	X	X	X	Primary entanglement (direct entanglement with mooring lines or cables etc.) is scoped out as the nature of the mooring lines in terms of tension, rigidity	No assessment.

Activity and impact	Embedded mitigation	Outcome of scoping per phase			Justification	Overview of proposed assessment
		C	O&M	D		
in injury and/or mortality					and cable diameter preclude the possibility of forming any entangling loops. Secondary entanglement is defined as the entanglement of marine life in marine debris, such as derelict fishing gear caught on floating offshore wind mooring systems and cables. This potential significant effect is scoped out due to the following: 1. To date, there have been no recorded instances of secondary entanglement in mooring systems of renewable devices[368] or for anchored FPSO used in the oil and gas industry[369] which have similar or more complex mooring systems compared to those proposed by Cenos. 2. Fishing activity (demersal trawling and seine netting, and pelagic trawling) within the ICES rectangle in which the Array Area sits (43F1) occurs at low levels. There is no reported gill or trammel netting adjacent to the Array Area. 3. Early consultation and research conducted by the Natural Resources Defence Council (NRDC) indicate that marine debris is more likely to entangle at depths between 0-5 m below the sea surface[370]. In the semi-submersible design, the keel of the floating substructure will be submerged to approximately 10 – 20 m depth before a chain will connect the floating foundation substructure to catenary mooring lines. This largely removes the potential for diving seabirds to become ensnared in derelict fishing gear. Buoyant fishing gear is unlikely to become ensnared on the keel	

Activity and impact	Embedded mitigation	Outcome of scoping per phase			Justification	Overview of proposed assessment
		C	O&M	D		
					of the floating substructure reducing the potential for secondary entanglement from this type of fishing gear. For the TLP design, the angle and material of the mooring lines suggests it is likely that ALDFG will slide down the lines rather than hang in the water column. A build-up of marine debris at the bottom of the mooring lines is only likely for heavy fishing gear, such as demersal trawling nets, which would be too heavy to remain suspended in the water column, even when snagged on a mooring line. Secondary entanglement is therefore scoped out with respect to diving birds, based on the likely fishing gear types around the Array Area, and the lack of evidence of secondary entanglement from similar industries. Further information see **Appendix 5G: Approach to secondary entanglement as a potential impact.**	
Accidental spills to the marine environment	ORN-003	X	X	X	Accidental release of pollutants may impact ornithological receptors through accidental spills from vessels or other equipment. Spills are likely to be small scale and will be dispersed quickly, leading to limited interaction with ornithological receptors. The risk and impact of any pollutant release will be monitored and reduced through the MPCP (ORN-003), so that any accidental release is strictly controlled, and procedures implemented to minimise potential for impact. Therefore, accidental release of pollutants is scoped out of impact assessment. The potential for accidental spills from Project vessels will be managed and minimised through the preparation and adherence to an EMP which will	No assessment.

Activity and impact	Embedded mitigation	Outcome of scoping per phase			Justification	Overview of proposed assessment
		C	O&M	D		
					include measures compliant with MARPOL convention, as well as best practice for works in the marine environment (including individual vessel SOPEP). The magnitude of any accidental spill will be limited by the small chemical or fuel inventory on vessels. Any spill would be subject to a high level of dispersal and therefore any potential interaction with marine receptors will be minimised. This impact is therefore scoped out of the EIA.	

11.9 Cumulative Effects

11.9.1.1 Cumulative effects on ornithological receptors resulting from activities at the Project and other developments will be assessed in accordance with the guidance and methodologies set out in **Chapter 5: Approach to Scoping and EIA** and considering the other developments that have been screened in as part of the CEA screening exercise.

11.9.1.2 The following impacts from the Project have the potential to act cumulatively with impacts from other developments to contribute to cumulative effects and are proposed to be assessed quantitatively:

- Distributional responses during operation; and
- Collision risk during operation.

11.9.1.3 It is possible that the CEF tool, developed for Marine Directorate[371] may be available to quantitatively assess the cumulative effect of the Project and other offshore wind projects within species-specific foraging ranges (breeding season[337]) and BDMPS regions (non-breeding season[338]). However, this will need to be available within a reasonable timescale for inclusion. If available, then the CEF will preferentially be used during assessment. If the CEF is not available in a reasonable timescale, the process will be carried out manually as has been done for other Scottish projects (manual collation of mortality estimates and data analysis using NE PVA tool[364]).

11.9.1.4 Each project or plan screened in for quantitative cumulative assessment with potential to contribute to the above impacts will be assessed using the same methodology as is applied to EIA project alone impacts. To screen in projects to assess cumulative impacts for the EIA, species-specific foraging ranges will be used for the breeding and non-breeding seasons using Woodward *et al*[337]. and Furness[338], measured from the Project. For HRA purposes, foraging ranges, will be measured from SPA colonies to determine project inclusion.

11.9.1.5 As has been advised for other Scottish projects, two cumulative scenarios will be run per species and season: one including Berwick Bank estimated mortalities and one without.

11.10 Potential Transboundary Effects

11.10.1.1 Due to the proximity of the Project to the eastern boundary of the UK EEZ, and therefore seabird colonies in the eastern North Sea, and the wide-ranging distribution of seabirds, there is potential for transboundary effects to occur to ornithological receptors. The area of search for Transboundary Effects is the North Sea, with potential connectivity between the Project and seabird colonies at designated sites outwith Scotland.

11.10.1.2 During the breeding season, Woodward *et al*[337] foraging ranges will be used to determine transboundary connectivity. The potential effects from construction, O&M, and decommissioning on ornithology receptors are considered in **Appendix 5D: Transboundary Screening Matrix.**

11.11 Proposed Approach to the Environmental Impact Assessment

11.11.1.1 The Project-wide approach to the assessment methodology is set out in **Chapter 5: Approach to Scoping and EIA**. This will be implemented to assess the potential significant effects to ornithological receptors from the construction, O&M and decommissioning of the Project.

11.11.1.2 The specific legislation and guidance outlined in **Table 11-1** will also be considered in relation to the assessment, in addition to consultation with the stakeholders outlined above. This section outlines the proposed EIA approach for ornithology, including the proposed assessment methodology.

11.11.2 Approach to Assessment

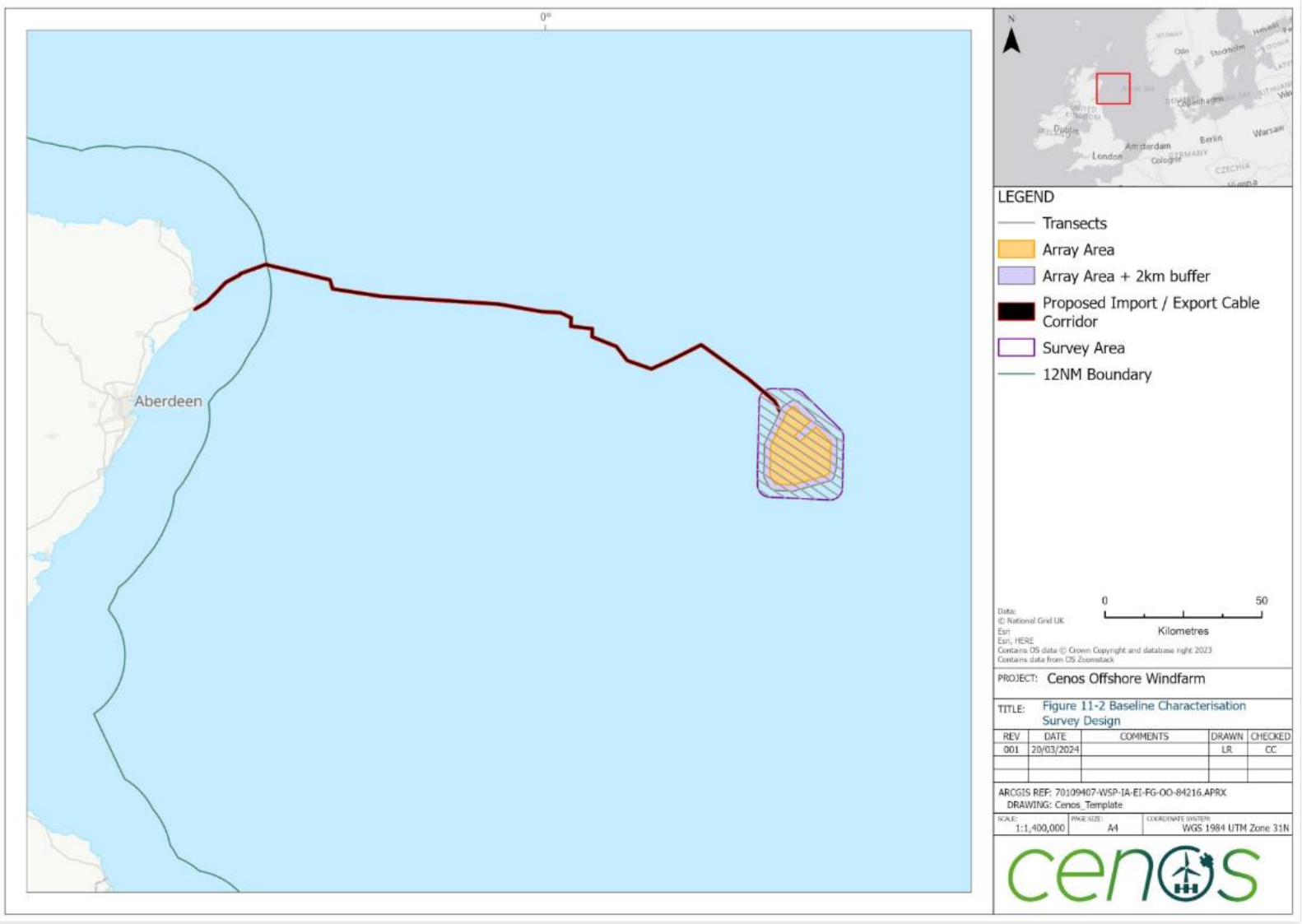
Baseline Characterisation

11.11.2.1 Baseline characterisation will be based on site-specific DAS and be further informed by additional data sources covering the wider region and landfall (Section 11.5). Consultation with MD-LOT, NatureScot and JNCC will occur throughout preparation of the EIA and will closely follow NatureScot ornithology guidance to ensure assessment will be as effective as possible. Baseline characterisation will allow conditions prior to the presence of the Project to be determined, against which potential significant effects to ornithological receptors can be estimated.

11.11.2.2 The DAS design consisted of 14 strip transects spaced 2.5 km apart across the Survey Area with an overall area of 835.97 km^2. Transects extended approximately north-west to south-east. Surveys were undertaken using an aircraft equipped with four HiDef Gen II cameras with sensors set to a resolution of 2 cm Ground Sample Distance (GSD). Each camera sampled a strip of 125 m width, separated from the next camera by ~25 m, thus providing a combined sampled width of 500 m within a 575 m overall strip. Two of the four cameras were analysed, achieving a minimum 10 percent target site coverage of the survey area in each flight.

11.11.2.3 The remaining footage is available for analysis at a later stage if required. Position data for the aircraft were captured from a Garmin Global Positioning System (GPS) Map 296 receiver with differential GPS enabled to give 1 m accuracy at one second intervals. Since DAS were conducted, the Array Area has been refined, to give an updated total area of 332.71 km^2; raw observations are presented in this 2024 Scoping Report for the Survey Area (INTOG lease area plus 4 km buffer), the Array Area and the Array Area plus 2 km buffer (**Figure 11-2**).

Figure 11-2: Baseline Characterisation Survey Design



11.11.2.4 Observations from site-specific DAS will be used to calculate density and abundance estimates for all species (where possible). Apportioning of 'unidentified' birds to species level will be performed to calculate density and population estimates where the number of unidentified birds in each species group will be assigned to species based on their respective abundance ratios. For example, if identified guillemot and razorbill occurred in a 4:1 ratio, then 80 percent of unidentified birds considered to be possibly either of those species would be assigned to guillemot and 20 percent assigned to razorbill.

11.11.2.5 For some diving species, e.g. guillemot, an availability bias correction will be applied to account for animals which were diving at the time of the survey and were therefore not present for detection. The full method and correction factors used to derive absolute estimates of density and abundance will be presented.

11.11.2.6 Where possible, following NatureScot guidance, the Marine Renewables Strategic Environmental Assessment tool (MRSea)[372] will be used to derive density and abundance estimates. To allow use of all available data, models will be run for the Survey Area and data will be selected for the areas of interest for impact assessment (the Array Area and Array Area plus 2 km buffer). MRSea can give rise to more robust estimates of density and abundance, with reduced uncertainty compared to design-based estimation.

11.11.2.7 Design-based estimates will also be calculated and may be used in replacement for MRSea estimates where there are very small samples (typically less than 10 observations per month) of species in surveys where MRSea may fail to generate an estimate of density and abundance.

11.11.2.8 Dead birds were recorded between April and August 2022. These will be removed from the DAS dataset prior to analysis and a summary will be provided; it is assumed that the majority of these deaths can be linked to the HPAI H5N1 outbreak. The approach for addressing HPAI in impact assessment needs to be discussed and agreed with MD-LOT and NatureScot. The current proposal for how this will be addressed within either the Baseline Technical Appendix or EIAR Chapter is as follows:

- Species affected and number of dead birds recorded during DAS;
- Removal of dead birds from calculation of density and abundance estimates;
- Explanation of current understanding of HPAI outbreak in relation to timing of survey programme;
- Presentation of changes to population counts during impacted years at relevant seabird colonies (if available through the Seabird Monitoring Programme); and
- Acknowledgment of how resurgence of HPAI may impact population trajectories and how this may affect future impact assessment.

Regional Populations to Assign Impact

11.11.2.9 For the assessment of distributional responses and collision, NatureScot (2020) guidance will be used to define seasonal periods (breeding and non-breeding season). Within assessment all impacts will be considered in the context of regional populations. Within the breeding season these are derived from species-specific

foraging ranges[337] while in the non-breeding season species-specific BDMPS regions presented in Furness[338] will be used.

11.11.2.10 For guillemot, NatureScot guidance states that in the non-breeding season the breeding season foraging range will be used to define the non-breeding season regional population as this species has not been shown to disperse far offshore during the non-breeding season but to stay relatively close to breeding colonies[349]. However, the Project is outside the mean-max foraging range + 1 Standard Deviation (SD) from all guillemot colonies. Two options are proposed to derive the non-breeding season regional population for guillemot:

- Option 1: Build a new 'regional population' from the colonies which are likely to contribute most to the observed guillemot densities recorded at the Project. Buckingham *et al*[349]. show that during the non-breeding season, 50 percent kernel density contours from multiple colonies overlap. At the very least, the colonies included in Buckingham *et al*[349] will be used to create the non-breeding season regional population. If more colonies are to be included this will be discussed and agreed during the consultation process.
- Option 2: The BDMPS regional population from Furness[338] will be used.

11.11.2.11 The option to be used will be discussed and agreed with MD-LOT and NatureScot during the consultation process. Monthly raw guillemot observations from DAS are presented in **Table 11-9** for context, to facilitate discussion around deriving the guillemot non-breeding season regional population.

Table 11-9: Raw Digital Aerial Survey observations for guillemot in Year 1 (March 2021 – February 2022) and Year 2 (March 2022 to February 2023) of survey. Note the guillemot breeding season is between April and mid-August and non-breeding season between mid-August and March (NatureScot, 2020)

Month	Year 1	Year 2	Total
March	9	3	12
April	15	13	28
May	25	47	72
June	40	185	225
July	137	309	446
August	224	262	486
September	29	342	371
October	279	518	797
November	43	25	68
December	8	5	13
January	7	8	15
February	46	5	51
Total	**862**	**1722**	**2584**

11.11.2.12 Breeding season foraging range for fulmar (*Fulmarus glacialis*) encompasses all UK and Irish colonies (mean-max + 1SD 1,200 km[337]). However, it is unlikely that birds further afield, particularly on the west coast of the UK and those in Ireland will have connectivity with the Project. As such, it is proposed that the regional population is composed of birds only on the northern and eastern coasts of

Scotland, including Orkney and Shetland. The list of proposed colonies to be included in the breeding season regional population is presented in **Table 11-10**.

Table 11-10: Colonies proposed to be included in fulmar breeding season regional population

Colony	
Buchan Ness to Collieston Coast SPA	Fowlsheugh SPA
Calf of Eday SPA	Hermaness, Saxa Vord and Valla Field SPA
Copinsay SPA	Hoy SPA
East Caithness Cliffs SPA	North Caithness Cliffs SPA
Fair Isle SPA	Noss SPA
Farne Islands SPA	Rousay SPA
Fetlar SPA	Sumburgh Head SPA
Flamborough and Filey Coast	Troup, Pennan and Lion's Head SPA
Foula SPA	West Westray SPA
Forth Islands SPA	

Distributional Responses

11.11.2.13 The proposed parameters to be used in assessment of distributional responses are presented in **Table 11-11**. The ornithological receptors which will be assessed for this potential significant effect will be:

- Kittiwake (Rissa tridactyla);
- Guillemot; and
- Gannet (Morus bassanus).

11.11.2.14 Following NatureScot guidance, the Matrix Approach[335] will be used for all species and seasons. SeabORD will be used where applicable (see below) to provide additional, contextual information.

11.11.2.15 For the Matrix Approach, impacts will be assessed and presented for the Project and 2 km buffer. All analysis will be run using Mean Seasonal Peak (MSP) population estimates.

Table 11-11: Displacement and mortality rates to be used in assessment of distributional responses

Species	Displacement rate	Mortality rate (breeding season)	Mortality rate (non-breeding season
Kittiwake	30 %	1 % and 3 %	1 % and 3 %
Guillemot	60 %	Not assessed	1 % and 3 %
Gannet	70 %	1 % and 3 %	1 % and 3 %

11.11.2.16 SeabORD can only be used for the breeding season (specifically the chick-rearing period) and is currently only able to be run for kittiwake, guillemot, razorbill and puffin; for the Project SeabORD will be run for kittiwake only, since guillemot are outside of Woodward *et al*[337]. Foraging range during the breeding season. SeabORD assesses distributional responses using specific SPA colony data. The

SPA colonies likely to be included in assessment (subject to change following connectivity and apportioning analysis) are:

- Buchan Ness to Collieston Coast SPA;
- Troup, Pennan and Lion's Heads SPA;
- Fowlsheugh SPA; and
- Forth Islands SPA.

11.11.2.17 SeabORD will be run for the project alone and cumulative scenarios. In cumulative scenarios other nearby offshore windfarms are included; these will be confirmed during impact assessment but those likely to be included are listed below:

- Green Volt Offshore Windfarm;
- Aberdeen Bay Windfarm (EOWDC);
- Hywind Scotland Pilot Park and
- Kincardine Offshore Windfarm.

Collision Risk

11.11.2.18 The proposed parameters to be used in assessment of collision risk are presented below. The ornithological receptors which will be assessed for this potential significant effect will be:

- Kittiwake;
- Gannet; and
- Fulmar.

11.11.2.19 Two approaches will be used to assess collision risk: Deterministic Band (Band, 2012) and sCRM[366]. Both will be run within the Caneco[366] Shiny app. Option 2 will be used for both approaches (Basic, using generic flight height data from Johnston *et al*[359]). Mortality estimates for the worst-case and most-likely scenario will be derived and presented per species, month, season (breeding/non-breeding) and annually. For both deterministic and stochastic approaches, 1000 samples from a distribution of mean monthly densities (from bootstrap samples) of flying birds within the Array Area will be used.

11.11.2.20 Default seabird biological parameters within the Caneco[366] Shiny app will be used (**Table 11-12**); these generally follow those presented in Horswill and Robinson[373].

Table 11-12: Seabird parameters to be used in CRM. Standard deviation of body length and wingspan presented within parentheses

Species	Body length (m)	Wingspan (m)	Flight speed (m/s^{-1})	Nocturnal activity (%)	Flight type
Kittiwake	0.39 (0.005)	1.08 (0.0625)	13.1	25.0	Flapping
Fulmar	0.45 (0.025)	1.07 (0.025)	13.0	80.0	Flapping
Gannet	0.935 (0.0325)	1.73 (0.0375)	14.9	8.0	Gliding

11.11.2.21 Two types of avoidance rate will be used: SNCB[336] and Ozsanlav-Harris *et al*[374] within both model approaches (**Table 11-13, Table 11-14**). Following NatureScot guidance, only mortality estimates using SNCB avoidance rates will be taken through to later stages of assessment. The avoidance rate for kittiwake is not specified within Ozsanlav-Harris *et al*[374] so the 'all gulls' rate will be used.

Table 11-13: Stochastic Collision Risk Modelling (sCRM) avoidance rates and associated standard deviation

Species	Avoidance rate (SNCB, 2014)	Avoidance rate[374]
Kittiwake	0.989 (+/- 0.002)	0.993 (+/- 0.0003)
Fulmar	0.990 (+/- 0.001)	0.991 (+/- 0.0002)
Gannet	0.989 (+/- 0.002)	0.993 (+/- 0.0003)

Table 11-14: Deterministic Collision Risk Modelling (Band, 2012) avoidance rates and associated +/- 2 standard deviations

Species	Avoidance rate (SNCB, 2014)	Avoidance rate[374]
Kittiwake	0.989 (+/- 0.002)	0.992
Fulmar	0.990 (+/- 0.002)	0.990
Gannet	0.989 (+/- 0.002)	0.992

11.11.2.22 The migratory CRM (mCRM) Shiny app is not yet available therefore there will be no quantitative assessment of migratory species. Qualitative assessment of migratory birds will be covered within the EIAR, if required. Raw observations of ornithological receptors in DAS show migratory species (warders and waterfowl) in low abundance (eight observations of knot in Survey Area; four observations of common scoter in Survey Area.

Population Modelling

11.11.2.23 To determine potential significant effects on populations due to the presence of the Project, PVA may be required. This will largely be determined by whether predicted windfarm impacts increase baseline mortality rates by at least 0.02 percentage points at affected colonies. Note this advice is most applicable to SPA-specific PVA models which are required for HRA. For EIA, where impacts are assessed against regional populations this threshold may not be reached, but expert judgement may deem it necessary to run regional PVA models.

11.11.2.24 PVAs will be conducted using the NE PVA tool[364], with counterfactuals of final population size (CPS) and ratio population growth rate (CPC) used as the key metrics[375]. Species-specific reference populations will be derived from the most recent counts available from the Seabird Monitoring Programme. PVAs will be run for project alone and cumulative scenarios. Model duration will be as follows:

- Baseline model: 50 years; and
- Impact model: 25 years and 50 years (plus intended lease period if different).

11.11.3 Assumptions and Limitations

11.11.3.1 There are likely to be various assumptions and limitations associated with the approach to assessment, especially when considering the highly variable nature of the marine environment and the highly mobile nature of ornithological receptors. The occurrence of the ornithological receptors considered varies widely over multiple temporal and spatial scales, and it should be noted that DAS provide only a snapshot of the conditions which are present at the Array Area. This, and other associated limitations and assumptions will be discussed in more detail as the assessment advances and presented within the EIAR Ornithology chapter.

11.12 Summary

11.12.1.1 This 2024 Scoping Report provides additional information on the potential significant effects of the Project on ornithological receptors and builds on the 2023 Scoping Report. Current available data relating to the Project and the wider region which may be used to determine potential significant effects are outlined, as well as detail on which potential significant effects will be considered within EIA and relevant embedded mitigation. The approach to EIA and proposed assessment methodology are presented.

11.13 Further Consideration for Consultees

11.13.1.1 The following questions are posed to consultees to refine ornithological impact assessment:

- Do you agree with the Study Areas defined for offshore ornithology?
- Do you agree with the species which have been scoped into assessment?
- Are there any new legislation/policy documents that the Project should be aware of?

- Is there any new guidance that the Project should be aware of? Is there any emerging guidance, which is relevant to ornithology?
- Is there updated guidance on how to address avian flu in assessment?
- Do you agree that the following impact pathways should be scoped in for assessment for ornithology receptors within the offshore EIAR: direct disturbance and displacement during construction and decommissioning; distributional responses during the operational phase; collision risk during the operational phase; changes to prey resources (all life-cycle phases)?
- Do you agree that the above impact pathways are scoped out for assessment for ornithology receptors?
- Should collision mortalities using avoidance rates from SNCB[336] or Ozsanlav-Harris *et al*[374] be taken through to later stages of assessment?
- Should collision mortalities using avoidance rates from SNCB[336] or Ozsanlav-Harris *et al*.[374] be taken through to later stages of assessment?
- What Option do you propose the Project takes, to derive guillemot non-breeding season regional populations?
- For Option 1 to derive guillemot non-breeding season regional populations, should additional colonies be added to those already listed in Buckingham *et al*[349].?
- Are you content for impacts to be considered in the context of guillemot non-breeding season regional populations for populations derived through both Option 1 and Option 2, for distributional responses and CRM?
- Would you prefer guillemot non-breeding season regional populations derived through Option 1 or Option 2 be used within PVAs?
- Do you agree with the list of colonies to be included in the breeding season regional population for fulmar?
- What is your preferred approach for non-breeding season apportioning? Should we use colony counts from the BDMPS[338] or are there more up to date data we should be using?
- Do you agree with the approach and assessment methodology proposed for project alone assessment?
- Do you agree with the potential significant effects which have been scoped into assessment?
- Do you agree with the approach for cumulative effects, in particular, how projects will be screened in for quantitative assessment of collision risk and distributional responses?
- Do you agree with the proposed approach for transboundary and inter-related effects? Or is there guidance / preferred approach that can be employed?
- Do you agree with the proposed approach, or is there guidance on a different preferred approach that can be employed?

- With the information presented in the questions above for ornithology, do you wish to raise any additional matters on the overview of the ornithology assessment presented?

12. FISH ECOLOGY

12.1 Introduction

12.1.1.1 This chapter of the Scoping Report considers the potential significant effects on fish ecology of the Project.

12.1.1.2 The chapter provides an overview of the baseline conditions relevant to the Project Area (as defined in **Chapter 1: Introduction**), the datasets to be used to inform the EIA, sources, pathways and receptors of the potential significant effects to be considered, and how these potential significant effects will be assessed for the purpose of the EIA.

12.1.1.3 This chapter includes demersal (epi-benthic and benthic), pelagic, elasmobranchs (sharks, skates, and rays) and diadromous (migratory) fish species. Given this assessment considers potential significant effects of the Project seaward of the MHWS, only the marine phase of diadromous fish are addressed within this chapter. Commercial aspects of fisheries are included in **Chapter 13: Commercial Fisheries** and shellfish are addressed in **Chapter 9: Benthic Ecology**.

12.1.1.4 Fish ecology interfaces with other aspects of the Project. As such, this chapter of the Scoping Report should be read alongside the following chapters:

- **Chapter 7: Marine and Coastal Processes**: Changes to marine geology, oceanography and physical processes have the potential to directly or indirectly impact fish features due to the reliance on physical processes during certain stages of their lifecycle.
- **Chapter 8: Marine Water and Sediment Quality**: Changes in marine water and sediment quality have the potential to result in adverse effects on fish fauna through toxicity and other mechanisms.
- **Chapter 9: Benthic Ecology**: Changes to the benthic environment has the potential to impact fish receptors that rely on benthic species as prey items or utilise benthic habitats.
- **Chapter 10: Marine Mammals**: Marine mammals considered within the EIA will include some species that rely on fish species as part of their diet and therefore impacts to fish could potentially indirectly impact marine mammals.
- **Chapter 11: Ornithology**: Fish form a part of the diet of several seabirds. A potential change in fish abundance or distribution may result in adverse effects on seabirds that are sensitive to changes to prey resource.
- **Chapter 13: Commercial Fisheries:** The commercial fisheries chapter includes commercially important species and fisheries data and there is an overlap between these sections. Information and data from this assessment will be used to inform the fish ecology assessment as commercial fisheries has the potential to directly and indirectly impact fish ecology.
- **Appendix 5E: Marine Protected Area Screening Assessment**: The MPA Screening Assessment, which accompanies this application, assesses the potential significant effects the protected features or processes on which the

conservation of any protected features of the screened in MPAs depend upon. Whilst this assessment does not form part of the EIA, the Fish Ecology chapter informs the MPA screening assessment, and reciprocally, the MPA screening assessment will identify if the Project is likely to hinder the achievement of the conservation objectives of the MPAs.

12.2 Legislation, Policy and Guidance

12.2.1 Legislation and Policy

12.2.1.1 Legislation and policy that has been used to inform the scope of the Fish Ecology chapter is set out in **Table 12-1**. Further information on policies relevant to the EIA are set out in **Chapter 2: Legislative and Policy Context.**

Table 12-1: Legislation and policy context

Legislation/policy	Relevance to the assessment
International: EC Directive (92/43/EEC) on the Conservation of Natural Habitats and of Wild Fauna and Flora[376] National: The Conservation (Natural Habitats, &c) Regulations 1994[377] National: The Conservation of Offshore Marine Habitats and Species Regulations 2017[378]	Sets out the conservation objectives for listed Annex II species, e.g. Atlantic salmon and sea lamprey, as animal species of community interest whose conservation requires the designation of special areas of conservation (SAC). Several SACs are designated for the conservation of Atlantic salmon on the North-east coast of Scotland.
Salmon and Freshwater Fisheries (Consolidation) (Scotland) Act 2003[379] (as amended)	Salmon and sea trout are protected under this Act in terms of protection to spawning gravel areas and eggs, potentially impacted from the cable route.
Nature Conservation (Scotland) Act 2004[380]	Section 1 places a statutory duty on all public bodies in Scotland to further the conservation of biodiversity. To help public bodies apply their biodiversity duties under this Act, the Scottish Minister has created a SBL, which includes fish species that are of principal importance for biodiversity conservation in Scotland. The Act also affords protection to Basking Sharks (*Cetorhinus maximus*), making it illegal to intentionally kill, injure or harass basking sharks.
Scottish Wild Salmon Strategy[381]	Published in January 2022, the Scottish Wild Salmon Strategy outlines the objectives, actions to improve the conditions of Scotland's rivers and better manage salmon stocks.
Eel Management plans for the United Kingdom – Scotland River Basin District[382]	Published in March 2010, the Scotland River Basin District Eel management plan outlines management targets, and actions to improve European eel stocks to a safe biological limit as required under the European Commission (EC) Eel Recovery Plan (Council Regulations No 1100/2007).

12.2.2 Technical Guidance

12.2.2.1 Technical guidance that has been used to define and inform this Scoping chapter and the proposed assessment is set out in **Table 12-2**.

Table 12-2: Relevant technical guidance

Guidance reference	Relevance to the assessment
Identification of Priority Marine Features[383;384] and Scottish Natural Heritage (SNH) Priority Marine Features Guidance[385]	The PMF report describes the process used to identify a list of priority marine habitats and species of conservation importance. The PMF guidance sets out a checklist to identify: the PMFs which may be impacted; how the PMF may be impacted; the magnitude of change and the significance. This guidance will be incorporated into the fish ecology EIA.
Marine Scotland, Consenting and Licensing Guidance: For Offshore Wind, Wave and Tidal Energy Applications[386]	Marine Scotland's (now Marine Directorate) consenting and licencing manual provides guidance on applying for consents and marine licences for offshore renewables. Guidance states an EIA must take account of the Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR) List of Threatened and/or declining species and habitat. Protected habitats, species and sites will be considered within the fish ecology EIA, taking the guidance on effects and their assessment into account.
Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine[387]	Guidance to promote good practice in Ecological Impact Assessment (EcIA) to assess the potential effects of the Project on ecological features for consideration in the EIA methodology will be used for the fish ecology assessment.
NatureScot advice on marine non-native species[388]	Provides guidance on identification on non-native species; and preventing introduction, including Marine Biosecurity Planning guidance. This guidance will be incorporated into the fish ecology assessment and embedded mitigation in relation to the potential spread of Invasive and Non-Native Species (INNS).
Guidelines for data acquisition to support marine environmental assessments of offshore renewable energy projects[389]	Guidance in the design, review and implementation of environmental data collection and analytical activities associated with all stages of offshore renewable energy developments.
Guidance note for Environmental Impact Assessment in respect of FEPA and CPA requirements[390]	Provides scientific guidance in gathering, interpreting and presentation data in EIA specific to the offshore windfarm industry. Guidance provides advice on the receptors to be included in assessment, and important aspects of fish habitats and biology to be addressed. Guidance will be considered during the fish ecology assessment.
Designing and applying a method to assess the sensitivities of highly mobile marine species to anthropogenic pressures[391]	Guidance on methodology to assess the sensitivities of highly mobile marine species to anthropogenic pressures. Including advice on the possible effects of activities (or operations) on protected habitats and species.

Guidance reference	Relevance to the assessment
OSPAR (Oslo and Paris Commission) Guidance on Environmental Considerations for Offshore Wind Farm Development[392]	Guidance to assist developers in identifying and considering any potential issues associated with determining the environmental effects of offshore windfarm developments for consideration in the fish ecology scoping assessment and EIA.

12.3 Study Area

12.3.1.1 The Study Area for the fish ecology assessment is defined as the Project Area together with the area that may experience impacts known as the ZoI. The ZoI has been defined considering the extent of tidal excursions. Close to shore the tidal ellipse is narrow, extending approximately 15 km on a north-south axis. The ellipse reduces in length with distance offshore and close to the eastern end of the ECC it is approximately 5 km long on a N by NE to S by SW axis, and up to 1 km wide (refer **Chapter 8: Marine Water and Sediment Quality**).

12.3.1.2 Considering the mobile nature of fish species, a precautionary approach has been adopted, with the fish Study Area extended to include a 15 km radius around both the Array Area and the ECC, as shown in **Figure 12-1**.

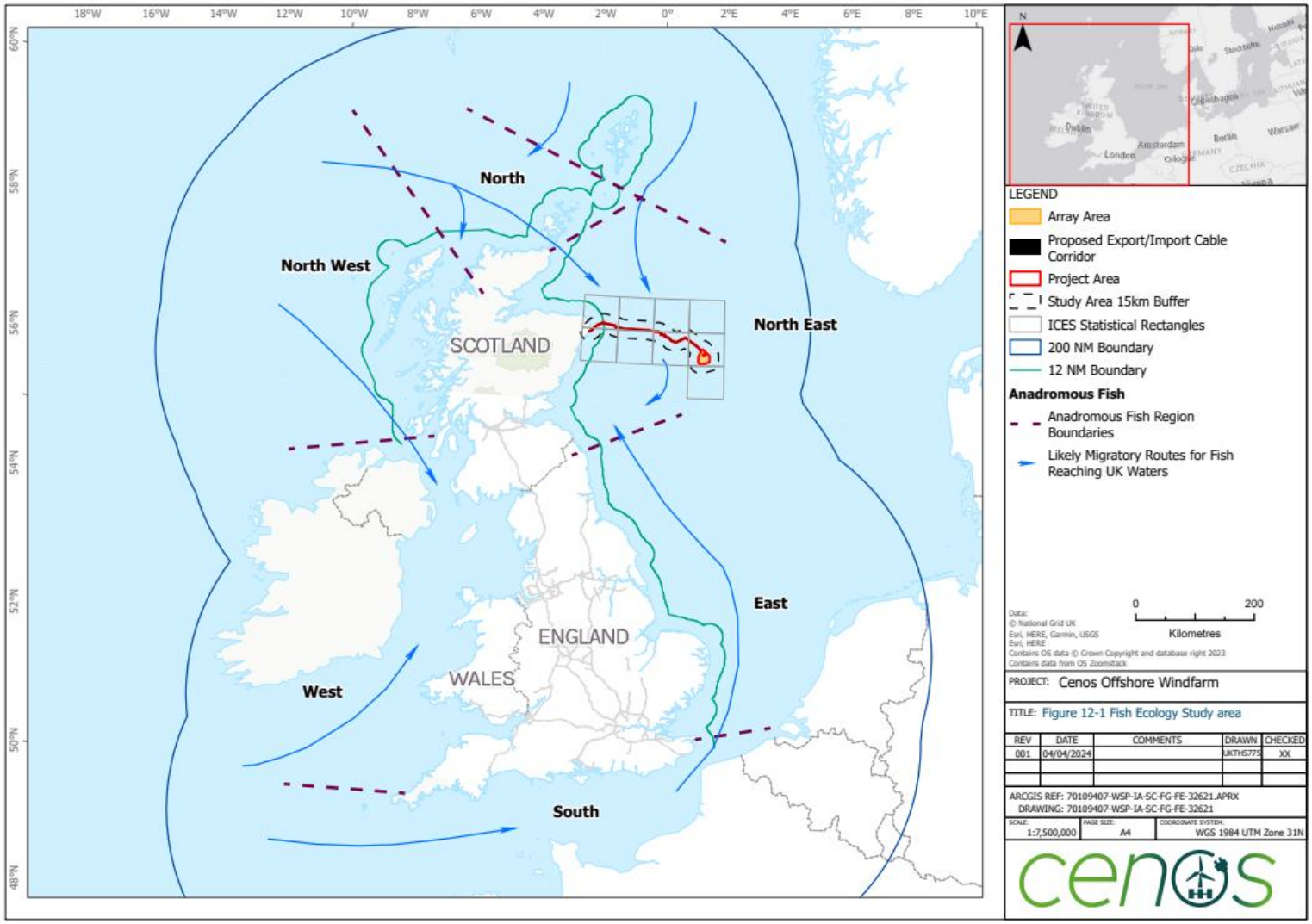
12.3.1.3 A wider regional context has been considered for diadromous fish species. Given the extensive open ocean and near shore migrations undertaken by these species[393] there is the potential for activities associated with the Project to cause potential significant effects at substantial distance from natal waters. On this basis, for these species all waters located within the north-east anadromous fish region boundary have been included within the Study Area, as shown in **Figure 12-1**.

12.3.1.4 Fisheries data collected by the International Council for Exploration of the Seas (ICES) is recorded and collated according to ICES statistical rectangles (ICES rectangles). Data from the ICES has been used to collate marine fish data for this assessment. ICES rectangles relevant to this assessment have been defined as those that intersect the Study Area, and include ICES 44E8, 44E9, 44F0, 44F1, 43E8, 43E9, 43F0, 43F1 and 42F1 (refer to **Figure 12-1**).

12.3.1.5 The ECC will be assessed from the Array Area to MHWS. The section of the ECC from MHWS to 12 NM is the same as the NorthConnect Cable Corridor. The Applicant is coordinating with NorthConnect Limited. NorthConnect Interconnector and the Project will only require one set of infrastructure, within the overlapping marine licence Project Area from 12 NM to MHWS.

12.3.1.6 The section of the ECC from MHWS to 12 NM has previously been assessed within the EIAR submitted for NorthConnect Limited (application reference number 06771 & 06870) and judged acceptable through the consenting of NorthConnect. The previous EIA work for NorthConnect will be considered in assessing the ECC from MHWS to 12 NM, updated by any other readily available information and surveys undertaken. See Section 12.5 for further details of the baseline conditions. Further details are in **Chapter 5: Approach to Scoping and EIA.**

Figure 12-1: Fish Ecology Study Area



12.4 Consultation

12.4.1.1 Consultation is a key part of the application process. This assessment has been and will be informed by engagement and discussion with various stakeholders such as NatureScot, MD-LOT and the District Salmon Fishery Boards.

12.4.1.2 A summary of the key issues raised during consultation to date, specific to fish ecology, is outlined in **Table 12-3,** together with how these issues will be considered in the production of the EIAR.

Table 12-3: Summary of consultation relating to fish ecology

Date and stakeholder	Consultation and key comments	How this is accounted for
MD-LOT, 2023 Scoping Opinion, June 2023	'*The Scottish Ministers advise the impact of EMF and heat are scoped in to the EIAR for the operational phase'*.	The Project agrees that Electromagnetic Field (EMF) and thermal loading during the operational phase of the Project from the export/import cables are taken forward for further consideration in the EIA for key receptors. Further information on EMF and heat is detailed within **Appendix 5F: Approach to EMF and Heat as potential impacts.**
MD-LOT, 2023 Scoping Opinion, June 2023	'*The Scottish Ministers advise that the Developer should consider the representation from the DSFB'*.	The Project agrees that District Salmon Fishery Boards (DSFBs) will be consulted further during this process with specific regard to diadromous fish species.
NatureScot, 2023 Scoping Opinion, June 2023	'*As well as considering commercial fish species, consideration will also be required of Priority Marine Features – fish species'*.	Species of principal importance for biodiversity conservation in Scotland, *PMFs – fish species,* will be taken forward for further consideration in the EIA.
NatureScot, 2023 Scoping Opinion, June 2023	'*We would also advise consideration of the following impact pathways - colonisation of structures and secondary entanglement'*.	The Project agrees that changes to composition, aggregation and abundance of fish stocks as a result of the introduction of infrastructure is taken forward for further consideration in the EIA. The potential for fish to be impacted by secondary entanglement is considered low. This is based on the fishing gear type used within the Array Area, historic evidence and the risk-based adaptive management approach which will be applied to the Project. The risk of

Date and stakeholder	Consultation and key comments	How this is accounted for
		secondary entanglement for fish fauna is therefore considered low and has been scoped out from further assessment. Further discussion of secondary entanglement is provided in **Table 12-11**. Further information on entanglement is detailed within **Appendix 5G: Approach to secondary entanglement as a potential impact**.
NatureScot, 2023 Scoping Opinion, June 2023	'*Diadromous fish species should be considered as part of the EIA and not as part of the HRA'*.	Diadromous fish will be taken forward for further consideration in the EIA. It has also been decided to include diadromous fish within the HRA for completeness.
Dee District Salmon Fishery Board, April 2023, included with the 2023 Scoping Opinion, June 2023	Sea trout, lamprey species and eels are considered species of principal importance for biodiversity conservation in Scotland and should be fully assessed.	Diadromous fish, including sea trout, lamprey species and eels will be taken forward for further consideration in the EIA.
Dee District Salmon Fishery Board, April 2023, included with the 2023 Scoping Opinion, June 2023	'*A key pressure identified in the Wild Salmon Strategy is marine development, with marine renewables highlighted as having the potential to impact salmon through noise, water quality and effects on electromagnetic fields (EMFs) used by salmon for migration these potential impacts should be fully assessed*.	Potential impact of waterborne noise, water quality and EMF on migratory salmonids will be taken forward for further consideration in the EIA. Further information on EMF is detailed within **Appendix 5F: Approach to EMF and Heat as potential impacts.**
Dee District Salmon Fishery Board, April 2023, included with the 2023 Scoping Opinion, June 2023	'*We do not agree that migrating diadromous fish should be scoped out of the assessment at this stage, on the basis that there is not enough evidence to suggest that there will not be an impact from the development'*.	Diadromous fish will be taken forward for further consideration in the EIA.
Dee District Salmon Fishery Board, April 2023, included with the 2023 Scoping Opinion, June 2023	'*No reference to the ScotMER Diadromous Fish Specialist Receptor Group. We would therefore suggest that further consultation takes place with*	The Project will continue to liaise with key stakeholders to ensure the assessment of any potential impact upon fish ecology is in line with best practice and evidence based.

Date and stakeholder	Consultation and key comments	How this is accounted for
	Marine Scotland Science and Fisheries Management Scotland with reference to broadening our understanding of any potential impact upon diadromous fish resulting of this proposed development'.	
Dee District Salmon Fishery Board, April 2023, included with the 2023 Scoping Opinion, June 2023	'*SFF would expect the project to scope in the latest science on EMF and Heat, Thrumming and Noise'*.	Waterborne noise, EMF and heat will be taken forward for further consideration in the EIA for key receptors and will be assessed in line with best practice and in accordance with the latest science. Further information on EMF and heat is detailed within **Appendix 5F: Approach to EMF and Heat as potential impacts.**
Scoping Workshop, 29 February 2024	The Applicant provided details on the proposed approach for fish ecology assessment for the EIA. NatureScot confirmed that static and fleeing fish as well as eggs and larvae for all different species will be considered in the scope of the assessment. It was also advised to scope in basking sharks at this stage of the assessment. It was agreed to scope in at this stage EMF and collision. It was agreed to scope out entanglement.	The comments provided within the Scoping Workshops from NatureScot have been considered and are addressed in this 2024 Scoping Report. The approach will be taken forward to the EIA (see Section 12.11). **Table 12-11** provides justification for the effects scoped in and scoped out. Further information on EMF and heat is detailed within **Appendix 5F: Approach to EMF and Heat as potential impacts.** Further information on entanglement is detailed within **Appendix 5G: Approach to secondary entanglement as a potential impact**.

12.5 Baseline Conditions

12.5.1 Data Information Sources

12.5.1.1 The baseline presented in this scoping report has been compiled from a variety of sources, including Scottish Sea Fisheries landing data (between 2017 - 2022) and historical information on the East of Gannet and Montrose Fields NCMPA.

12.5.1.2 Additional publicly available data will be reviewed to further inform the baseline condition of the fish community for environmental assessment. A list of the main data sources to be used is provided in **Table 12-4.**

Table 12-4: Key sources of fish fauna data

Source	Date	Summary	Coverage of Study Area
Ocean Biodiversity Information System[394]	2024	A global open-access data and information system that provides observation data for marine species, including fish.	Partial coverage of the Study Area.
ICES Database of Trawl Surveys (DATRAS)[395].	2017-2021	Fish trawl surveys and catch data by ICES rectangles.	Full coverage of the Study Area.
ICES Eggs and Larvae database[396]	Various	Fish egg and larvae data collected by ichthyoplankton surveys by ICES rectangles.	Full coverage of the Study Area.
Scottish Sea Fisheries Statistics[397]	2018-2022	Scottish sea fisheries statistics, including fishing effort and landing data by ICES rectangles.	Full coverage of the Study Area.
SAC and MPA designation documents and Natura 2000 standard data forms by JNCC[398]	Various	Information on designated sites, the qualifying features of these sites and species-specific conservation advice.	Designated site-specific data.
North Sea fish data held by Marine Information Network (MarLIN)[399]	2020	North Sea fish data.	Partial coverage of the Study Area.
North Sea fish fauna data by National Biodiversity Network (NBN) Gateway[400]	2024	Observational records of terrestrial and aquatic species.	Partial coverage of the Study Area.
UK OESEA A1a.4 Fish and Shellfish[401]	2022	Distribution and ecology of fish and commercially important shellfish in UK waters.	Partial overage of the Study Area.
Priority Marine Habitats by NatureScot and JNCC[402]	2020	Priority marine habitats information from NatureScot and JNCC.	Partial coverage of the Study Area.
Fisheries sensitivity maps in British waters[403], Spawning and nursery grounds of selected fish species in UK waters[404] and Fisheries Sensitivity Maps[405]	1998 2012 2010	Distribution of potential nursery and spawning grounds for several key fish species in UK waters.	Full coverage of the Study Area.
Healthy and Biologically Diverse datasets[406]	Various	Fisheries data and distribution maps of key fish species, including Scotland's demersal fish community, and common sharks and rays.	Full coverage of the Study Area.
Lesser sandeel habitat[407]	2021	Predictive habitat mapping and abundance of buried sandeels in the	Full coverage of the Study Area.

Source	Date	Summary	Coverage of Study Area
		northern parts of the North Sea and the northern areas of the Celtic seas.	
OSPAR list of threatened and declining fish species[408]	2024	List of threatened and declining fish species identified in need of protection.	Full coverage of the Study Area.

12.5.2 Existing Baseline

Overview

12.5.2.1 The Study Area is situated within the Central North Sea. The main EUNIS habitat types across the Study Area are deep circalittoral sand, deep circalittoral coarse sediment and deep circalittoral mud[409]. This level of habitat variety is likely to support a range of fish species out of more than 330 species known to inhabit the shelf seas of the UK Continental Shelf[401]. For the assessment, fish have been categorised into the following ecological groups:

- Pelagic fish species;
- Demersal fish species;
- Elasmobranchs species; and
- Diadromous fish species.

12.5.2.2 Priority marine species and protected species, where identified have been addressed in their respective ecological group as defined above.

Pelagic Fish Species

12.5.2.3 Pelagic species are found predominantly in the mid- and upper water layers of the water column, with their movement, distribution, and spawning are heavily influenced by hydrographic factors such as ocean currents. They are typically total, broadcast spawners with eggs released within a single spawning event and fertilised within the water column, and dispersed by ocean currents, although certain species such as Atlantic herring (*Clupea harengus*) are reliant on specific habitats for egg laying[410]. These species are therefore particularly susceptible to anthropogenic activities affecting the seabed.

12.5.2.4 Pelagic species are extremely mobile when tracking food availability and can make extensive seasonal migrations, resulting in a highly variable distribution through time. To account for this, the likely presence of pelagic species has been determined using landing returns between 2018 - 2022 as well as broad scale overviews of nursery and spawning grounds.

12.5.2.5 Some species of ecological or commercial importance that are likely to occur within the area include (**Table 12-5**):

- Atlantic herring;
- Atlantic mackerel; *Scomber scombrus;*

- Blue whiting *Micromesistius poutassou*;
- European sprat; *Sprattus sprattus* and
- Horse mackerel *Trachurus trachurus*.

Pelagic fish spawning and nursery grounds

12.5.2.6 Atlantic herring and European sprat have both spawning and nursery grounds within the Study Area, with additional nursery grounds identified for Atlantic mackerel and blue whiting (**Figure 12-2**). Horse mackerel do not appear to have discrete nursery grounds, but juveniles do occur throughout the area.

Atlantic herring

12.5.2.7 Herring are a widespread and abundant pelagic species with commercial and ecological importance, with the eggs and larvae constituting an important food source for predators[411]. Eggs are demersal and deposited on discrete spawning beds, preferring coarse sands or gravels[412], such as those found within the Study Area, although they are also known to spawn on man-made structures. Herring stocks are grouped by spawning times, with the northeastern Scottish sub population (the 'Buchan population') spawning between September and October[413].

European sprat

12.5.2.8 The European sprat is small bodied pelagic fish with high ecological importance, forming the main food source for an abundance of predatory species including fish, seabirds, and marine mammals[414]. The species is widely dispersed and highly mobile, with sprat found throughout the North Sea managed as a single stock[415]. The eggs are pelagic with spawning occurring between May and August[416].

Figure 12-2: Spawning and Nursery Areas: Herring, European Sprat, Atlantic Mackerel and Blue Whiting

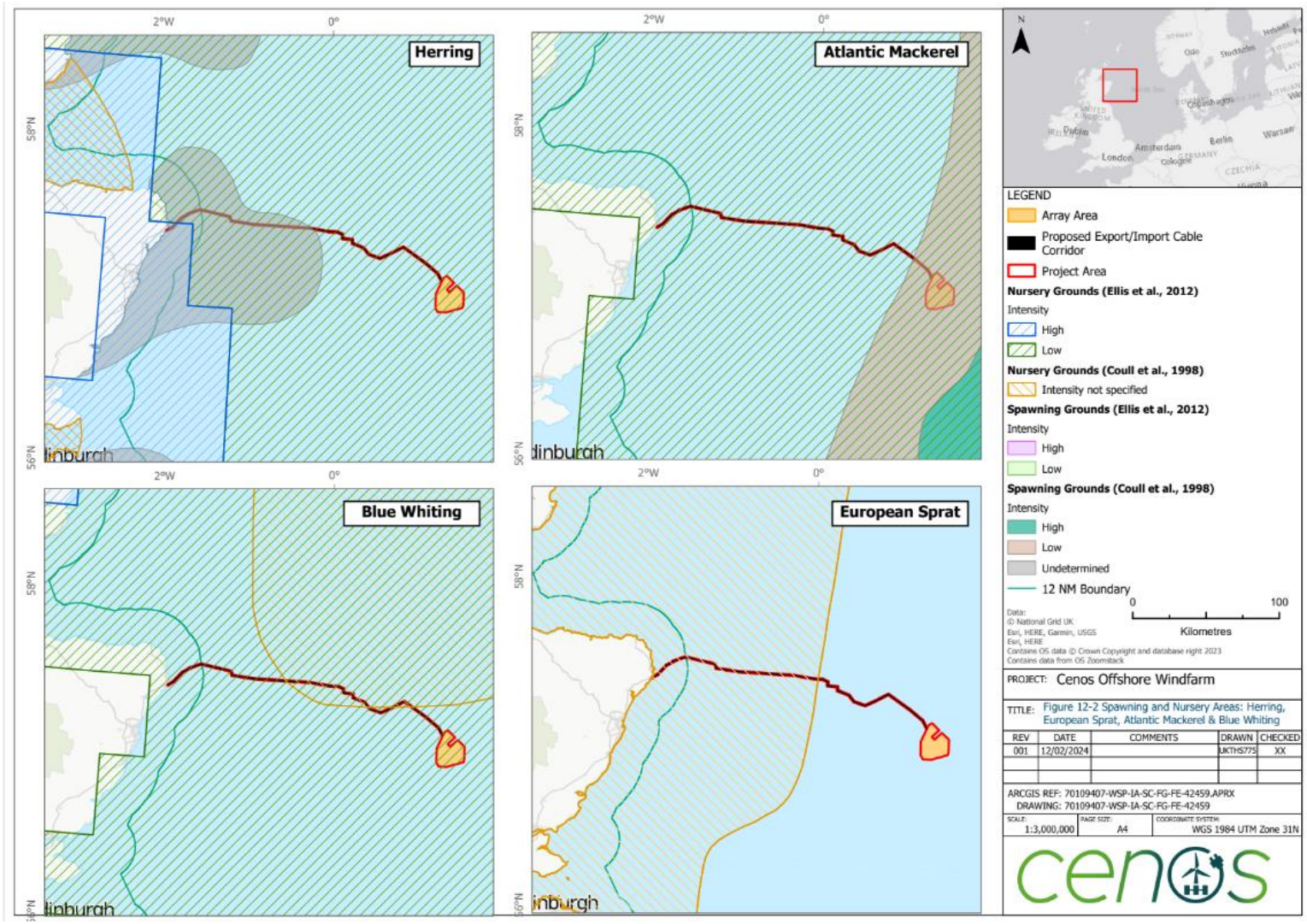


Table 12-5: Protection status of pelagic fish relevant to the Project[404, 408, 409]

Species	Overlap with Study Area		NERC S41 species	IUCN red List	Scottish PMF	SBL	OSPAR
	Spawning	Nursery					
Atlantic herring	Y*	Y	Y	Least concern	Y	N	N
Atlantic mackerel	Y	Y	Y	N	Y	N	N
Blue whiting	N	Y	Y	N	N	N	N
European sprat	Y	Y	N	N	N	N	N
Horse mackerel	N	Juveniles occur	Y	N	Y	N	N
*An important spawning ground for Atlantic mackerel has also been identified in proximity to the Array Area by the Norwegian Environment Agency[417]							

Demersal Fish Species

12.5.2.9 Demersal species live on or near the seabed and, and whilst the egg and larval stages are often subject to passive dispersal (advection), distribution of juvenile and adult life stages are principally determined by hydrography and sediment type (abiotic factors), although biotic factors such as competition and predator-prey interactions may also influence abundance and distribution. This group includes several important commercial species such as Atlantic cod (*Gadus morhua*), haddock (*Melanogrammus aeglefinus*), lemon sole (*Microstomus kitt)* and plaice (*Pleuronectes platessa*). Epibenthic species include important keystone species such as sandeel (*Ammodytes spp*.).

12.5.2.10 Due to their high mobility and migration patterns, the distribution of demersal fish can be extremely variable. To account for this, the likely occurrence of these species has been determined using landing returns as well as broad scale overviews of nursery and spawning grounds. Some species of ecological or commercial importance that are likely to occur within the area include (**Table 12-6**):

- Anglerfish (a.k.a. common monkfish) (*Lophius piscatorius*);
- Atlantic cod;
- Atlantic halibut (*Hippoglossus hippoglossus*);
- Dab (*Limanda limanda*);
- Haddock;
- Tusk (a.k.a. cusk) (*Brosme brosme*);
- European hake (*Merluccius merluccius*);
- Lemon sole;
- Lesser sandeel (*Ammodytes marinus*);
- Ling (*Molva molva*);
- Megrim (*Lepidorhombus whiffagonis*);
- Norway pout (*Trisopterus desmarkii*);
- Plaice;
- Saithe (*Pollachius virens*);
- Turbot (*Psetta maxima*);
- Whiting (*Merlangius merlangus*); and
- Witch (*Glyptocephalus cynoglossus*).

Demersal Fish Spawning and Nursery Grounds

12.5.2.11 High intensity spawning grounds for sandeel and Norway pout and low intensity spawning grounds for cod, whiting, lemon sole and plaice occur within the Study Area. Similarly, high intensity nursing grounds for whiting and low intensity nursing grounds for haddock, saithe, lemon sole, sandeel, cod, hake, anglerfish, and Norway

pout also occur within the Study Area. Nursery and spawning grounds for sandeel, Norway pout and whiting are shown on **Figure 12-3**.

Sandeel

12.5.2.12 Five species of sandeel are found within Scottish waters, with the lesser sandeel confirmed in the area via ICES landing returns. *A. marinus* is of high ecological importance as a food source for a wide variety of predators, particularly seabirds[418]. While industrial fishing of sandeel in the English North Sea and all Scottish waters has recently been banned (with a full ban on non-UK vessels coming into force April 2024), the species remains a highly commercially important species in Europe. Sandeel eggs are demersal and deposited on sandy substrate[419] such as that found within the Study Area. The larvae are pelagic and so nursery grounds often overlap spawning grounds. Adult sandeel remain dormant in the sediment throughout autumn/winter, briefly emerging to spawn around January[420]. Because of this behaviour and habitat preference they are particularly vulnerable to habitat loss and disturbance.

12.5.2.13 The Study Area intersects the Turbot Bank NCMPA. Turbot Bank NCMPA is designated for the protection of sandeels, with the site encompassing an area of sandy sediment associated with high abundances of the species. Turbot Bank has the potential to act as a source of young sandeels for maintaining and restocking surrounding areas[421].

Norway pout

12.5.2.14 Norway pout is a commercially important fish species in the North Sea for some EU nations in support of fishmeal and fish oil industries[422]. Norway pout is also an ecologically important fish species in the North Sea, constituting the main diet of other commercially important species such as saithe, whiting and cod[423]. Norway pout spawn along the eastern Scottish coast and between the Shetland and Norwegian coats between January and March with eggs subsequently dispersed by ocean currents[424]. The species is not generally considered to have discrete nursery grounds although juveniles have been recorded in the Study Area.

Figure 12-3: Spawning and Nursery Areas: Sandeel, Norway Pout and Whiting

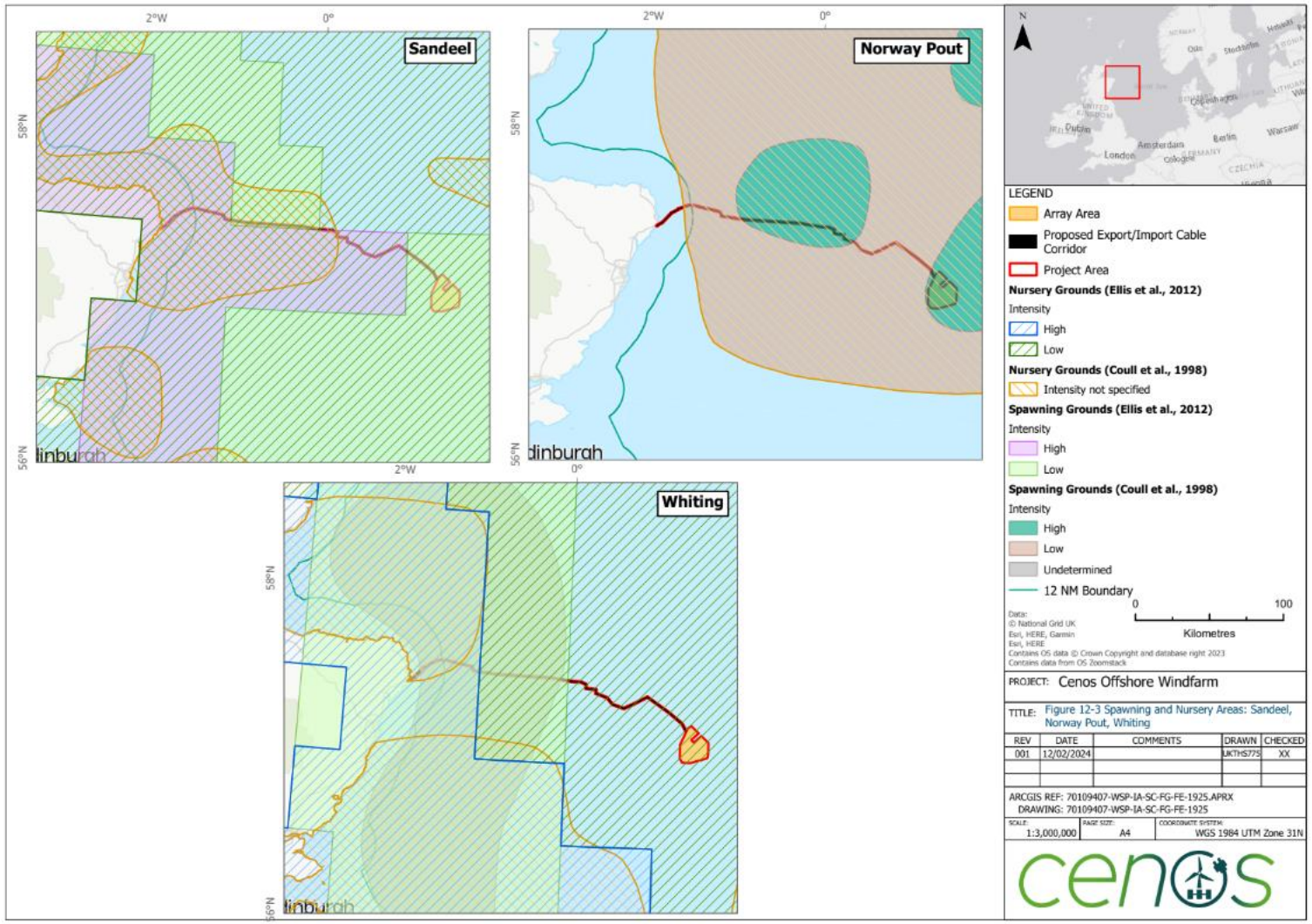


Table 12-6: Protection status of demersal fish relevant to the Project [404, 408, 409]

Species	Overlap with Study Area		NERC S41 species	IUCN red List	Scottish PMF	SBL	OSPAR
	Spawning	Nursery					
Anglerfish	N	Y	Y	N	N	Y	N
Atlantic cod	Y	Y	Y	Vulnerable	Y	Y	Y
Atlantic halibut	N	N	Y	Endangered	Y	N	N
Dab	TBC	TBC	N	N	N	N	N
Haddock	N	Y	N	Vulnerable	N	N	N
European hake	N	Y	Y	N	N	Y	N
Lemon sole	Y	Y	N	N	N	N	N
Lesser sandeel	Y	Y	Y	N	Y	Y	N
Ling	TBC	TBC	Y	N	Y	Y	N
Megrim	TBC	TBC	N	N	N	N	N
Norway pout	Y	Y	N	N	Y	Y	N
Plaice	Y	N	Y	N	N	Y	N
Saithe	N	Y	N	N	Y	N	N
Turbot	TBC	TBC	N	N	N	N	N

Species	Overlap with Study Area		NERC S41 species	IUCN red List	Scottish PMF	SBL	OSPAR
	Spawning	Nursery					
Whiting	Y	Y	Y	N	Y	Y	
Witch	TBC	TBC	N	N	N	N	N

Elasmobranchs

12.5.2.15 The elasmobranchs consist of sharks, skates, and rays, all three of which generally feature low reproductivity, low fecundity and late maturity when compared to other marine fish. Many species are protected due to their declining numbers, sensitivity to disturbance and slow rate of recovery from population loss[425]. Mobility varies between species, with some undergoing extensive migration[426] and others remaining more localised[427]. Spawning behaviour is similarly diverse with egg laying (oviparous) and live birth (viviparous) strategies found within the group.

12.5.2.16 Some elasmobranch species likely to be present in the Study Area include (**Table 12-7**):

- Angel shark *Squatina squatina*;
- Basking shark;
- Cuckoo ray *Leucoraja naevus*;
- Flapper skate *Dipturus intermedius*;
- Blue skate *Dipturus flossada*;
- Gulper shark *Centrophorus granulosus*;
- Kitefin shark *Dalatias lich;*
- Leafscale gulper shark *Centrophorus squamosus*;
- Lesser spotted dogfish *Scyliorhinus canicula*;
- Nursehound *Scyliorhinus stellaris*;
- Porbeagle shark *Lamna nasus*;
- Portuguese dogfish *Centroscymnus coelolepis*;
- Sandy ray *Leucoraja circularis*;
- Spotted ray *Raja montagui*;
- Spurdog *Squalus acanthias*;
- Thornback ray *Raja clavata*; and
- Tope shark *Galeorhinus galeus***.**

Elasmobranch spawning and nursery grounds

12.5.2.17 Low intensity nursing grounds for spurdog, tope shark and spotted ray occur within the Study Area (**Figure 12-4**). Spurdog and tope shark are viviparous species and so ecologically important habitats include sites where gravid females and juveniles are found. There is insufficient data to delineate the spawning grounds of spotted ray, but these areas are likely to broadly coincide with nursery grounds[30]. As nursery grounds are identified based on the presence of juveniles, the Study Area is potentially an ecologically important area for all three species.

Figure 12-4: Spawning and Nursery Areas: Spurdog, Tope Shark and Spotted Ray

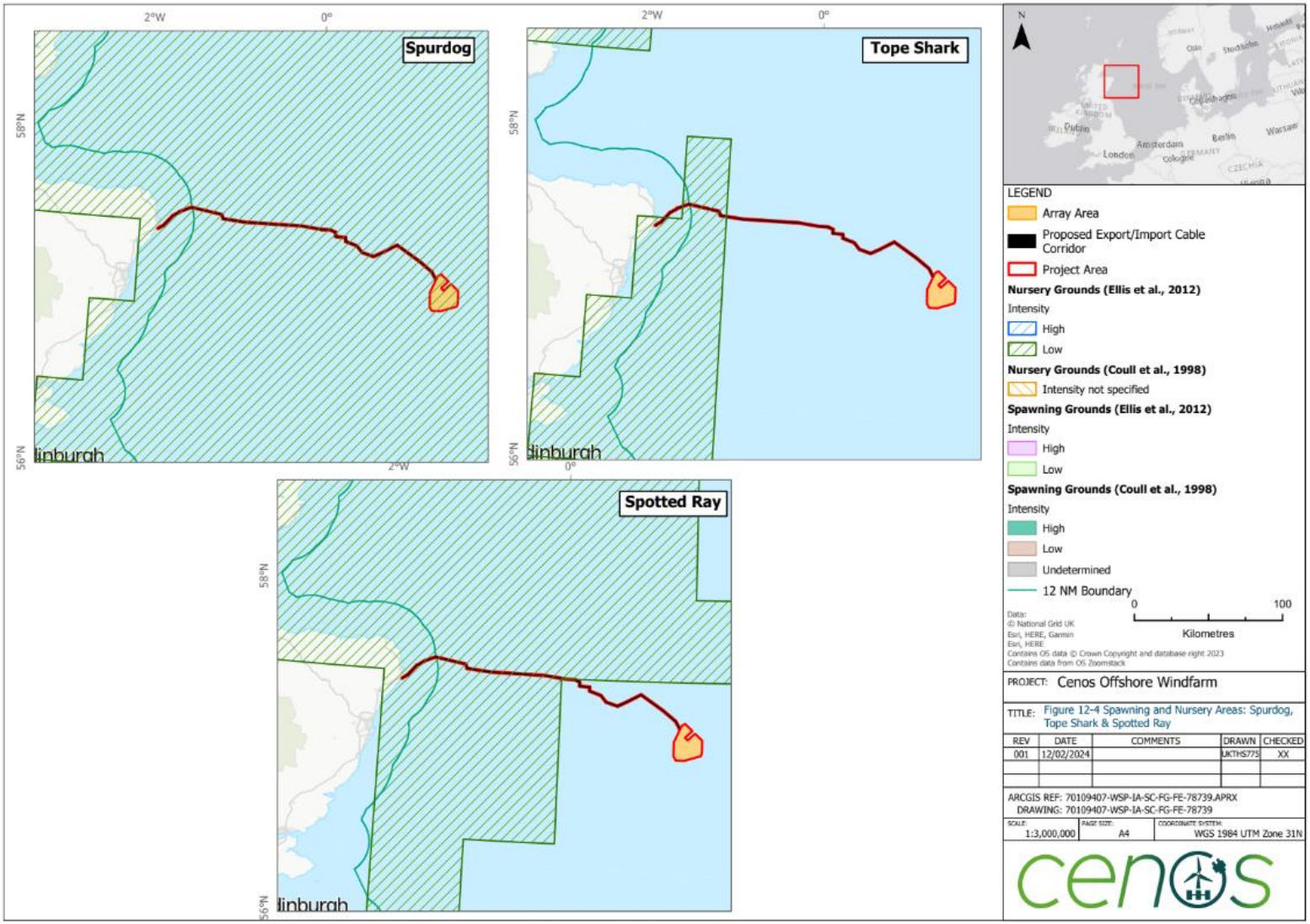


Table 12-7: Protection status of elasmobranch fish relevant to the Project [404, 408, 409]

Species	Overlap with Study Area		NERC S41 species	IUCN red List	Scottish PMF	SBL	OSPAR	WCA 1981	Berne Convention	Convention on migratory species
	Spawning	Nursery								
Angel shark	N/A	N/A	Y	Critically endangered	N	N	Y		N	N
Basking Shark	N/A	N/A	Y	Vulnerable	Y	Y	Y		Y	Y
Blue shark	N/A	N/A	Y	Near threatened	N	N	N		N	N
Cuckoo ray	N	N		Least Concern	N	N	N	N	N	N
Flapper skate	TBC	TBC	N	Critically Endangered	Y	Y	Y	TBC	TBC	TBC
Blue Skate	TBC	TBC	N	Critically Endangered	Y	Y	Y	TBC	TBC	TBC
Gulper shark	N/A	N/A	Y	Endangered	N	N	Y		N	N
Kitefin shark	N/A	N/A	Y	Vulnerable	N	N	N		N	N
Leafscale gulper shark	N/A	N/A	Y	Endangered	Y	N	Y		N	N
Lesser spotted dogfish	N	N	N	Least concern	N	N	N	N	N	N
Nursehound	N	N	N	Vulnerable	N	N	N	N	N	N
Porbeagle shark	N/A	N/A	Y	Endangered	Y	N	Y	N	N	Y
Portuguese dogfish	N/A	N/A	Y	Near threatened	Y	N	Y	N	N	N

Species	Overlap with Study Area		NERC S41 species	IUCN red List	Scottish PMF	SBL	OSPAR	WCA 1981	Berne Convention	Convention on migratory species
	Spawning	Nursery								
Sandy Ray	N/A	N/A	Y	Endangered	Y	N	N	N	N	N
Spotted ray	Unknown	Y	N	Least Concern	N	N	Y	TBC	TBC	N
Spurdog	n/a	Y	Y	Vulnerable	Y	N	Y	TBC	TBC	N
Thornback ray	N	N	N	Near threatened	N	Y	Y	TBC	TBC	N
Tope shark	n/a	Y	Y	Critically endangered	N	N	N	TBC	TBC	Y

Basking sharks

12.5.2.18 Basking sharks are the second largest cartilaginous fish in the world. They are on the OSPAR list of Threatened and Declining species and classed as globally Endangered by the International Union for the Conservation of Nature (IUCN). They are provided full legal protection Scotland.

12.5.2.19 They are present in UK coastal waters primarily in the summer months (June - August) and have been found to move to offshore shelf waters in winter months. Their distribution is linked to oceanographic features such as thermal fronts and productive chlorophyll patches which aggregate their plankton prey (zooplankton being their dominant prey item)[428]. Statistical modelling of basking sharks in Scottish territorial waters has increased understanding of their seasonal migrations and improved our understanding of areas of importance for the species[429]. Surface sightings are typically reported where sea surface temperatures range between 15 and 17.5 ^{o}C[430].

12.5.2.20 Few historical surface sightings of basking sharks have been recorded in the North Sea east of Scotland[431] and no basking sharks were identified during aerial surveys undertaken for the development area and wider survey area between 2022-2024. Notwithstanding these findings, the area has been identified as a region with potentially suitable habitat[429].

Migratory Fish

12.5.2.21 Migratory (diadromous) fish are fish that spend part of their life history in both freshwater and sea water, migrating between the two. Some species are anadromous, which means they spend the majority of their adult lives at sea returning to freshwater to reproduce. Lamprey species, Atlantic salmon (*Salmo salar)* and sea trout (*Salmo trutta*) are anadromous. European eels (*Anguilla anguilla*) which spawn at sea before their larvae predominantly migrate to freshwater are catadromous fish.

12.5.2.22 Given the extensive open ocean and near shore migrations undertaken by diadromous fish[393] there is the potential for the following migratory species to be present within the Study Area (**Table 12-8**):

- Atlantic salmon;
- Sea trout;
- European eel; and
- Sea lamprey *(Petromyzon marinus).*

Table 12-8: Protection status of diadromous fish relevant to the Project [404, 408, 409, 403]

Species	NERC S41 species	IUCN Red List	Scottish PMF	SBL	OSPAR	The Wildlife & Countryside Act 1981	Bern Convention	Convention on migratory species
Atlantic salmon	Y	Endangered	Y	Y	Y	Y (freshwater only)	N	N
Sea trout	Y	Least concern	Y	Y	N	N	N	N
European eel	Y	Critically endangered	Y	Y	Y	N	N	Y
Sea lamprey	Y	Least concern	Y	N	N	N	N	N

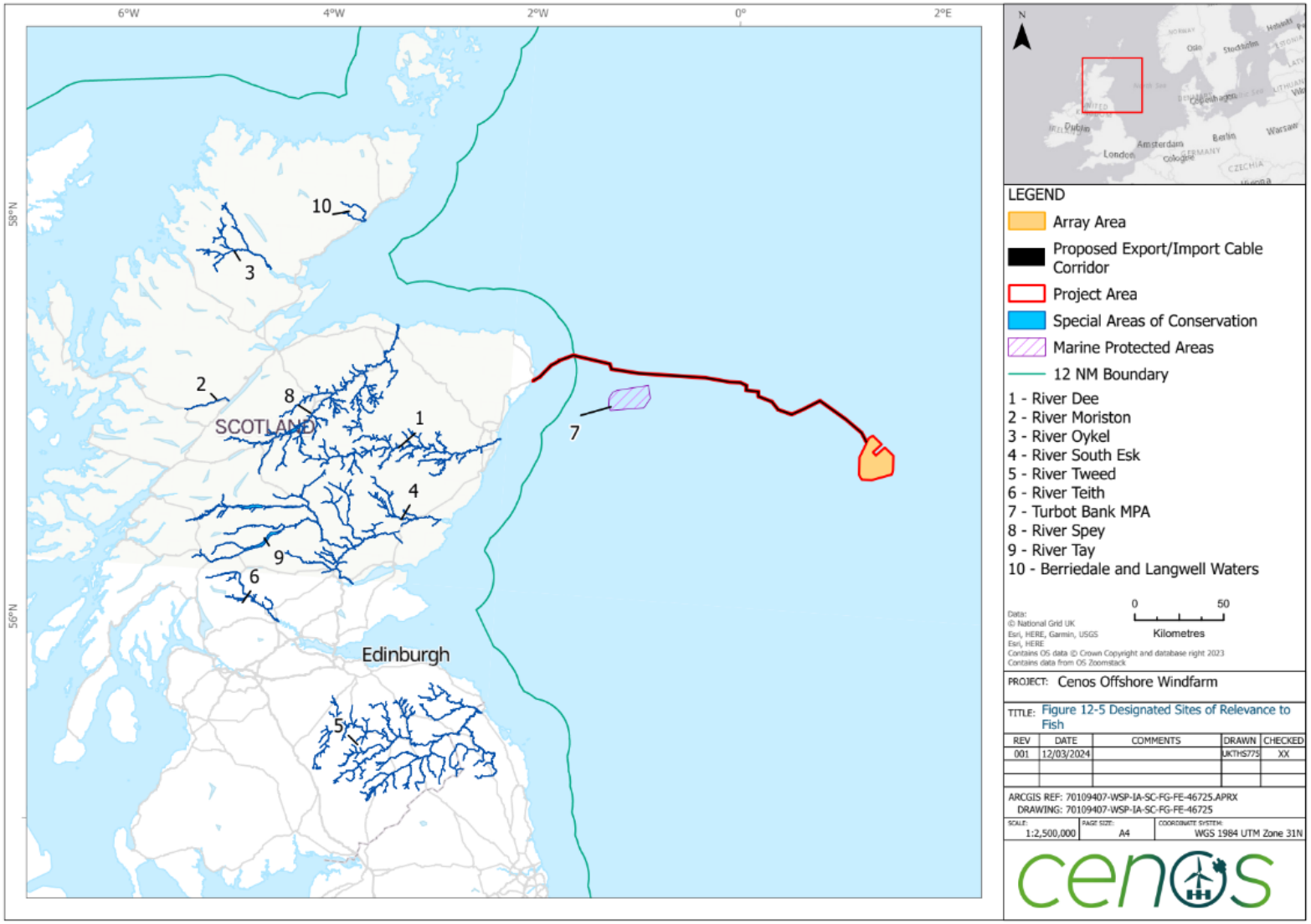
Diadromous Fish

12.5.2.23 A review of conservation designations in the diadromous fish Study Area has been undertaken to identify sites with fish as qualifying features. Sites which are designated for diadromous fish are listed in **Table 12-9** and presented in **Figure 12-5**.

Table 12-9: Conservation designations with relevance to fish ecology

Designated site	Relevant qualifying feature highlighted through site selection	By sea range from	
		Array boundary (km)	ECC (MHWS-seawards) (km)
River Dee SAC	Atlantic salmon	203	43
River Spey SAC	Atlantic salmon; sea lamprey	277	101
River South Esk SAC	Atlantic salmon	238	115
River Tay SAC	Atlantic salmon; river lamprey; sea lamprey; brook lamprey	302	180
Berriedale and Langwell Waters SAC	Atlantic salmon	311	134
River Oykel SAC	Atlantic salmon (not primary reason for site selection)	358	179
River Moriston SAC	Atlantic salmon (not primary reason for site selection)	396	220
River Tweed SAC	Atlantic salmon; river lamprey; sea lamprey; brook lamprey;	253	193
River Teith SAC	Sea lamprey; brook lamprey; river lamprey; Atlantic salmon (not primary reason for site selection)	364	261

Figure 12-5: Designated Sites of Relevance to Fish



12.5.3 Future Baseline

12.5.3.1 In the absence of the Project, the future fish ecology and environment in the Study Area is likely to experience changes associated with natural variation, climate change and non-climatic changes. Studies in the North Sea have demonstrated that long-term change in the fish community is likely to result from a combination of climatic (e.g. rising sea temperatures[432]) and non-climatic factors (e.g. changes in fishing patterns[433]).

12.5.3.2 Response of the fish community to changes in the climate and/or non-climatic factors will be dependent on individual species characteristics, including physiology (e.g., thermal preference), ecology, biogeography, and susceptibility to human impact (e.g., fishery target, bycatch)[68]. Using ocean temperature projections, Cote et al.[434] illustrated a poleward shift of suitable spawning areas for Atlantic cod under forecasted emission scenarios. For sandeel, increasing ocean temperatures was corelated with earlier emergence from winter dormancy[435]. Even where direct effects do not occur, climate change may affect prey resources, which in turn may drive changes in fish distribution. Such changes are inherently unpredictable or unquantifiable. Further, given the long-term nature of such processes, such changes are not likely to be significant between now and the commencement of the Project. Therefore, an assessment based on the current baseline would be adequately representative of conditions at the start of construction activities. Baseline verification may be required prior to decommissioning if any substantially intrusive methods prove necessary.

12.6 Basis of Assessment

12.6.1.1 The fish ecology scoping assessment is based on the following key assumptions, which are also set out in **Chapter 3: Project Description**:

- The array will consist of up to 95 WTGs;
- There will be up to two offshore substations;
- Scour protection may be required around the base of some or all foundations and cable protection may be required along cable routes;
- Inter-array and export / import cables will be buried, where possible;
- Maintenance activities will be undertaken for both preventive and corrective maintenance requirements;
- The operational lifetime of the project is assumed to be a minimum of 30 years; and
- The decommissioning of the Project is anticipated to involve the removal of all offshore infrastructure. The decommissioning works are likely to be undertaken in reverse to the sequence of construction works and involve similar levels of equipment and impact.

12.7 Relevant Embedded Mitigation Measures

12.7.1.1 Embedded mitigation measures have been identified and are proposed to be adopted as part of the Project design (primary mitigation); or implemented in accordance with industry standard practice that would occur with or without the input from the environmental assessment feeding into the process (tertiary mitigation). There is a commitment by the Applicant to implement these embedded mitigation measures and they have been considered within the 2024 EIA Scoping Report.

12.7.1.2 The requirement for additional mitigation measures (secondary mitigation) will be dependent on the significance of effects on fish ecology receptors and will be consulted upon with consultees throughout the EIA process. Any additional mitigation measures will be presented within the EIAR.

12.7.1.3 Those measures that are relevant to fish ecology are listed in **Table 12-10**. General mitigation measures, which would apply to all parts of the Project, are set out first. Thereafter mitigation measures that would apply specifically to fish ecology during the various project phases are described separately.

Table 12-10: Embedded mitigation relating to fish ecology

ID	Embedded mitigation measures
Construction	
FIS-001	A Piling Strategy will be developed and adhered to for the Project. It will detail noise mitigation measures to be implemented during piling activities (soft start and ramp up methods)
FIS-002	The ECC will be installed at the landfall using trenchless construction - HDD.
FIS-003	Cables will be buried as standard. Where adequate burial depth cannot be achieved, external cable protection methods will be utilised. This will be minimised as far as practicable. Cable burial will be informed by a CBRA and will be implemented utilising a CaP.
FIS-004	To minimise the introduction of invasive non-native species, all vessels used during installation, operation and decommissioning will follow the International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWM) which entered into force in 2017
FIS-005	An INNS Management Plan will be developed and adhered to for the Project. It will set out methods for minimising the potential for the introduction of INNS. The plan will include, but may not be limited to, measures to facilitate vessel compliance with the IMO ballast water management guidelines (International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004) and adherence to the IMO guidelines for the control and management of ships' biofouling to minimise the transfer of invasive aquatic species (Biofouling Guidelines).
Decommissioning	

ID	Embedded mitigation measures
FIS-006	A Decommissioning Programme will be developed for the Project in line with industry good practice, guidance and legislation.

12.7.1.4 Any secondary mitigation may be identified as the environmental assessment progresses and will be reported as required in the EIAR.

12.8 Scoping of Potential Significant Effects

12.8.1.1 In line with the EIA Regulations 2017, the EIA for the Project will only consider those impacts where there is a risk of a potential significant effects. The following section draws on industry experience to identify those effect-receptor pathways that may potentially lead to a significant impact. Where experience and available evidence indicates an effect-receptor pathway will not lead to a significant effect with regards to the EIA Regulations 2017 the pathway is scoped out from assessment.

12.8.1.2 The potential significant effects on fish ecology are summarised in **Table 12-11**. The scoping assessment is based on consideration of:

- The project design at the time of writing (including embedded mitigation measures);
- Available baseline information at the time of writing;
- The existing evidence base for effects on fish ecology;
- Feedback from consultees; and
- Professional judgement.

12.8.1.3 The early identification of potential significant effects is used here as a tool aimed at delivering a proportionate approach to the EIA. In doing so, it sets out a high-level assessment of all potential effects, significant or not.

Table 12-11: Summary of potential significant effects for fish ecology scoped in (✓) or scoped out (x) of the EIAR during construction (C), O&M and decommissioning (D)

Activity and impact	Embedded mitigation	Outcome of scoping per phase			Receptor	Justification	Overview of proposed assessment approach
		C	O&M	D			
Long term impacts to the seabed and sensitive fish habitats (e.g. spawning and/or nursey habitats)	FIS-006	✓	✓	✓	Pelagic; demersal; elasmobranchs; and migratory fish.	Placement of, for example, anchors, rock armouring or concrete mattresses will result in the long-term loss of seabed habitat or cause a change from one habitat type to another. This has the potential to result in direct impacts, such as the permanent loss of suitable spawning and nursery grounds, and indirect effects, such as permanent changes in prey resources. Potential impacts during the decommissioning and maintenance phase are considered similar, although potentially less than those outlined for the Construction phase.	Source-pathway receptor model.
Temporary impacts to the seabed and sensitive fish habitats (e.g. spawning and/or nursey habitats)	FIS-006	✓	✓	✓	Pelagic; demersal; elasmobranchs; and migratory fish.	Construction activities may cause temporary habitat loss and disturbance during seabed preparation and the installation of Project infrastructure (e.g., anchor systems, cables and jackets and any scour or cable protection). This may result in direct effects, such as temporary change in the availability	Source-pathway receptor model.

Activity and impact	Embedded mitigation	Outcome of scoping per phase			Receptor	Justification	Overview of proposed assessment approach
		C	O&M	D			
						of suitable spawning and nursery grounds, and indirect effects, such as a temporary change in prey resources. Potential impacts during the decommissioning and maintenance phase are considered similar, although potentially less than those outlined for the Construction phase.	
Potential changes to suspended sediment concentrations	FIS-002 FIS-006	✓	✓	✓	Pelagic; demersal; elasmobranchs; and migratory fish.	Construction activities may cause disturbance of sediments and contaminants which has the potential to temporarily increase suspended sediments into the water column. This may cause direct effects to fish, such as impacts to feeding and respiration mechanisms and/or indirect effects, such as impacts to food resources. Maintenance and decommissioning activities may also result in the disturbance of sediments and contaminants, increasing suspended sediment loads, although the magnitude is likely to be less than during construction activities.	Source-pathway receptor model.

Activity and impact	Embedded mitigation	Outcome of scoping per phase			Receptor	Justification	Overview of proposed assessment approach
		C	O&M	D			
	FIS-006	✓	✓	✓	Pelagic; elasmobranchs demersal;	Resettlement of suspended material disturbed during seabed preparation, cable laying, and installation, removal or maintenance of anchor systems, cables and jacks has the potential to lead to the smothering of less mobile life phases (e.g., eggs or larvae). As spawning habitat has been identified for demersal-spawning pelagic species (e.g., Atlantic herring), demersal fish and elasmobranch species within the Study Area, potential effects from smothering cannot be ruled out and will be assessed further in the EIA for these fish receptors. Migratory fish are highly mobile species and are unlikely to be directly impacted by smothering effects. Considering the importance of fish larvae as a food source for some migratory species[436] there is some potential for indirect effects through changes in prey resources. It is considered, however that the spatial extent of any potential reduction in prey availability will be minimal, temporary, and intermittent. Therefore, potential effects from	Source-pathway receptor model.

Activity and impact	Embedded mitigation	Outcome of scoping per phase			Receptor	Justification	Overview of proposed assessment approach
		C	O&M	D			
						smothering on migratory fish is considered low and has been scoped out from further assessment.	
Underwater noise and vibration	FIS-001	✓	✓	✓	Pelagic; demersal; elasmobranchs; and migratory fish.	Construction activities, such as the clearance of UXO's and piling for the substation foundations may cause temporary increases in waterborne noise and vibration. Maintenance and decommissioning activities may also temporarily increase underwater noise and vibration, although the magnitude is likely to be substantially less than during construction activities. Increased noise and vibration during construction, maintenance, and decommissioning activities may result in injury, and/or behavioural changes (e.g., due to auditory masking) to all fish receptors. 'Thrumming' and 'snap' noises may also be produced during the operational period of the project from tidal and wave action operating on the mooring lines of the floating structures. Acoustic propagation from these noise sources of floating offshore windfarms, and the resulting	Underwater noise modelling and source-pathway receptor model.

Activity and impact	Embedded mitigation	Outcome of scoping per phase			Receptor	Justification	Overview of proposed assessment approach
		C	O&M	D			
						impact on fish is currently unknown[437]. Further examination of the acoustic propagation of these sources of noise will be undertaken during the EIA to appropriately quantify potential operational noise impacts to fish. As such, impacts of operational noise on fish cannot be scoped-out at this stage.	
Accidental spills to the marine environment	N/A	X	X	X	Pelagic; demersal; elasmobranchs; and migratory fish.	Pollution from accidental events has the potential to impact on fish species both directly and indirectly (via prey species availability or contamination). However, no significant pollution scenarios are expected as appropriate vessel management will be in place and standard construction measures will be adhered (e.g. MARPOL guidelines). The potential for accidental spills from Project vessels will be managed and minimised through the preparation and adherence to an EMP which will include measures compliant with the MARPOL convention, as well as best practice for works in the marine environment (including individual vessel SOPEP).	N/A

Activity and impact	Embedded mitigation	Outcome of scoping per phase			Receptor	Justification	Overview of proposed assessment approach
		C	O&M	D			
						The magnitude of any accidental spill will be limited by the small chemical or fuel inventory on vessels. Any spill would be subject to a high level of dispersal and therefore any potential interaction with marine receptors will be minimised. As such, both direct and indirect impacts associated with accidental pollution events has been scoped-out from further assessment for all fish receptors.	
Potential effects from EMF and heat generated by cables	FIS-003	X	✓	X	Demersal; elasmobranchs; and migratory fish	Subsea cables emit localised electromagnetic fields (EMF). EMFs may interfere with navigation, feeding and predator or conspecific detection and/or may provoke an attraction, avoidance, stress, or alarm behaviour response in electro- or magneto-sensitive fish species (or their prey species). Elasmobranchs are generally considered to be the most electro sensitive species group as they possess a highly sensitive electrosensory system (ampullae of Lorenzini), and attraction and avoidance behaviours have been	Source-pathway receptor based on the sensitivity thresholds of key species against the EMF produced by the proposed subsea cables.

Activity and impact	Embedded mitigation	Outcome of scoping per phase			Receptor	Justification	Overview of proposed assessment approach
		C	O&M	D			
						observed in some elasmobranchs to the electric fields produced by buried subsea cables[438]. As such, potential significant effects from EMF on elasmobranchs cannot be scoped-out and will be considered further within the EIA. Low-level magnetic fields may also induce behavioural change in other marine fish species that have advanced electro-sensory systems. As demersal fish species spend prolonged periods of time on, or near the seabed there is potential for prolonged exposure to EMF. Rather as pelagic species spend most of the time in the mid- and upper water layers it is considered unlikely these species will be frequently exposed to localised EMF generated from the subsea cables. As such, the potential effects of EMF on demersal species will be assessed further in the EIA, whilst it is proposed to scope-out potential effects of EMF on pelagic species. Some migratory fish are also known to utilise the earth's magnetic field to aid navigation in open ocean, and	

Activity and impact	Embedded mitigation	Outcome of scoping per phase			Receptor	Justification	Overview of proposed assessment approach
		C	O&M	D			
						current research suggests there is potential for interference of anthropogenic EMF on migrating species whereby migration or movement routes take them over or near cables[439]. As such, impacts of EMF on migratory species cannot be scoped-out at this stage and will be considered further within the EIA. For further information see **Appendix 5F: Approach to EMF and Heat as potential impacts.**	
	FIS-003	X	✓	X	Pelagic; demersal; elasmobranchs	Subsea cables produce heat caused by energy loss. It is possible, that some fish species (e.g., demersal fish) may experience some negative effects, such as avoidance behaviour in response to heat emitted by the subsea cables. However, the interactions between fish and areas of elevated temperature are likely to be very limited due to the restricted area of effect (within a couple of metres[440]) and mobile nature of these receptors. It is possible, however that more sensitive, and less mobile life-phases, such as eggs or larvae	Source-pathway receptor model.

Activity and impact	Embedded mitigation	Outcome of scoping per phase			Receptor	Justification	Overview of proposed assessment approach
		C	O&M	D			
						deposited on the seabed may experience negative effects, including a potential reduction in larvae viability. As spawning habitat has been identified for demersal-spawning pelagic species (e.g., Atlantic herring), demersal fish and elasmobranch species within the ECC, effects from heat cannot be scoped-out at this stage for these fish receptors. Migratory fish do not spawn within the ECC. As such, there is no credible pathway for heat effects on any of the more sensitive, or less mobile life-phases (e.g., eggs or larvae) of migratory species. Considering the importance of fish larvae as a food source for some migratory species[436] there is some potential for indirect effects through changes in prey resources. It is considered, however that the spatial extent of any potential reduction in prey availability will be minimal when considering the mobile nature of these species and the availability of foraging grounds in adjacent areas. As such, the risk of disturbance to, or displacement of	

Activity and impact	Embedded mitigation	Outcome of scoping per phase			Receptor	Justification	Overview of proposed assessment approach
		C	O&M	D			
						migratory fish because of heat effects from subsea cables is considered low and has been scoped out from further assessment. For further information see **Appendix 5F: Approach to EMF and Heat as potential impacts.**	
Operational windfarm may act as a fish aggregation device (FAD)	N/A	X	✓	✓	Pelagic; demersal; elasmobranchs; and migratory fish.	Offshore windfarm floating infrastructure may act as fish aggregating devices (FAD's), increasing habitat complexity and positively influencing biodiversity by providing refugia and nursery grounds. Smaller species and juveniles may use FADs strictly for predator avoidance, while predatory species may be drawn to feed on aggregating prey items. Changing spatial distribution of prey may therefore influence the distribution of higher trophic predators such as piscivorous fish and sharks which may change interactions between prey species and predatory species. Removal of the offshore windfarm floating infrastructure during decommissioning may reverse the effects identified above (e.g., removal	Source-pathway receptor model.

Activity and impact	Embedded mitigation	Outcome of scoping per phase			Receptor	Justification	Overview of proposed assessment approach
		C	O&M	D			
						of FADs). Thus, if the structures are found to act as FADs and alter predator-prey interactions during operation, it is possible that the subsequent removal during decommissioning may have a similar effect. As such, the potential for floating infrastructure installed as part of the Project to act as FADs will be assessed further in the EIA. If a change in stock distribution and/or predator/prey interaction is identified through this assessment, potential effects from the subsequent removal during the decommissioning phase will also be assessed within the EIA.	
Subsea mooring systems may cause entanglement resulting in injury and/or mortality	N/A	X	X	X	Pelagic; demersal; elasmobranchs; and migratory fish.	To date, there have been no recorded instances of fish entanglement from mooring systems of renewable devices, or for anchored FPSO vessels in the oil and gas industry[441] which have similar or more complex mooring systems compared to those proposed for the Project's floating turbine structures. Given the number, size and physical characteristics of mooring lines	N/A

Activity and impact	Embedded mitigation	Outcome of scoping per phase			Receptor	Justification	Overview of proposed assessment approach
		C	O&M	D			
						associated with offshore wind turbines it is considered highly unlikely that any fish species with potential to occur in the Study Area would be of greater enough size to become directly entangled in the mooring lines or associated structures.	
	N/A	X	X	X	Pelagic; demersal; elasmobranchs; and migratory fish.	Derelict or ghost nets are a recognised global issue and widely known to contribute to ALDFG. This equipment drifts through the sea until it disintegrates or sinks to the seabed, often continuing to trap fish and other marine animals. It is possible that lost or abandoned fishing gear may get caught in the mooring lines of the floating wind turbines, posing a risk of secondary entanglement to some fish species. Risk of secondary entanglement to fish is dependent on both the type of fishing gear that is lost, and the specific characterises of the fish species of concern (e.g., vertical distribution within the water column, body size and feeding ecology[441]). Fishing activity, within the ICES rectangle in which the Array Area sits	N/A

Activity and impact	Embedded mitigation	Outcome of scoping per phase			Receptor	Justification	Overview of proposed assessment approach
		C	O&M	D			
						(43F1), occurs at low levels and is dominated by demersal trawling for Nephrops. Low levels of demersal seine netting and pelagic trawling also take place. Weighted nets, such as demersal trawls and demersal seine nets are likely to quickly sink to the seabed in the location they are lost[442]. As such, the risk of these types of fishing gear becoming fouled within the Array Area is low. Pelagic trawl nets are unweighted, but the scale and material used in these nets renders them heavy nevertheless. As such, should they be lost by a fishing vessel it is not anticipated that they would remain within the water column for an extended period, and would rather quickly sink to the seabed, effectively reducing the risk of fouling on mooring structures. In the rare scenario that these forms of fishing gear did happen to become entangled on mooring lines, the angle and material of these structures suggests that fishing gear will slide down the lines, and onto the seabed rather than remain in the water column. Marine debris accumulating	

Activity and impact	Embedded mitigation	Outcome of scoping per phase			Receptor	Justification	Overview of proposed assessment approach
		C	O&M	D			
						at the seabed are less likely to ensnare pelagic species, basking sharks and diadromous species as they are not expected spend a large amount of time near the seabed in proximity to the Array Area. Demersal species have the greatest potential to be impacted by these types of fishing gear as they spend a larger quantity of time near the seabed. It is acknowledged that it is not yet known if marine debris that become entangled on mooring systems would increase the risk of entanglement for fish compared to the baseline of ghost fishing. It is possible that buoyant types of lost fishing gear may be transported into the Array Area by ocean currents or wind at substantial distances from where they were lost. Given that diadromous fish are thought to migrate within surface waters, and basking sharks are known to feed in surface waters buoyant types of fishing gear may pose a greater threat of secondary entanglement to these species. It is, however considered unlikely that buoyant	

Activity and impact	Embedded mitigation	Outcome of scoping per phase			Receptor	Justification	Overview of proposed assessment approach
		C	O&M	D			
						fishing gear would become entangled in mooring lines in consideration of the design of the floating structures. The keel of the floating structures is submerged to a depth of approximately 10-20 m, with mooring lines subsequently attached to the submerged keel and fixed to anchors located on the seabed. This design means that mooring lines are absent from the first 10 m of the water column. Given buoyant fishing gear is likely to remain in surface waters it is therefore considered unlikely that these forms of fishing gear would become ensnared on the mooring lines. Regardless of the low risk identified for secondary entanglement, a Fisheries Liaison Officer (FLO) will be initially employed by the Project. This will allow engagement with fishermen to record lost/snagged gear in relation to the Project. Safety and exclusion zones around the Array Area will also limit the potential for fishing gear interactions with the project's submerged infrastructure.	

Activity and impact	Embedded mitigation	Outcome of scoping per phase			Receptor	Justification	Overview of proposed assessment approach
		C	O&M	D			
						Based on the fishing gear type used within the Array Area, historic evidence and the risk-based adaptive management approach which will be applied to the Project the risk of secondary entanglement to all fish is considered low, and has been scoped-out from further assessment. For further information see **Appendix 5G: Approach to secondary entanglement as a potential impact.**	

12.9 Cumulative Effects

12.9.1.1 Cumulative effects on fish ecology resulting from the effects of the Project and other developments will be assessed in accordance with the guidance and methodologies set out in **Chapter 5: Approach to Scoping and EIA** and considering the other developments that have been screened in as part of the CEA screening exercise.

12.9.1.2 The following impacts from the Project have the potential to act cumulatively with impacts from other developments to contribute to cumulative effects:

- Overlap of underwater noise fields causing injury or behavioural change to fish fauna.

12.9.1.3 For cumulative noise impacts to arise, it is required that significant noise generating activities occur simultaneously, and these are situated where noise fields may overlap directly, or simultaneously overlap on the home range of the same population of fish. In the former case, this may increase sound levels over an acceptable threshold, and in the latter case this may result in disturbance or displacement from an unacceptably large area.

12.9.1.4 Noise propagation modelling will be used to determine an appropriate ZoI associated with piling and UXO clearance. The noise contours associated with these impacts will be used to screen for potential cumulative effects. The CEA will screen permitted and potential developments within these identified noise contours as a basis for this assessment. Projects with temporal and spatial overlap will be identified, and impacts assessed as quantitatively as possible, acknowledging that the level of data likely to be available may require qualitative assessment.

12.10 Potential Transboundary Effects

12.10.1.1 The potential effects from construction, O&M, and decommissioning on fish fauna receptors are considered in **Appendix 5D: Transboundary Screening Matrix.**

12.10.1.2 Important Atlantic mackerel and sandeel spawning grounds are found east of the Array Area in Norwegian waters.Transboundary impacts may arise if long range acoustic effects on fish are identified during the spawning period. Mackerel spawn typical between May and June and sandeel between January and February.

12.10.1.3 Noise propagation modelling to be undertaken during the EIA will be used to assess potential transboundary effects on adjacent spawning grounds for Atlantic mackerel and sandeel. The extent, magnitude, probability, duration, frequency, and reversibility of any identified impacts to these species will be considered further in the EIA. Results of noise modelling and/or the implementation of mitigation strategies may demonstrate that there are no relevant impact pathways for significant effects on the relevant aspects of the environment in EEA states.

12.10.1.4 No further transboundary effects were identified during the screening exercise undertaken in **Appendix 5D: Transboundary Screening Matrix.**

12.11 Proposed Approach to the Environmental Impact Assessment

12.11.1.1 The Project -wide approach to the assessment methodology is set out in **Chapter 5: Approach to Scoping and EIA**. This approach along with other guidance referenced in will be implemented to assess the potential significant effects on fish receptors from the construction, O&M, and decommissioning of the Project.

12.11.1.2 The potential impacts of the Project will be assessed based on the existing fish community (the baseline) with a particular focus on any areas or features of conservation interest. This includes features that are protected, are the basis for a designation or are fundamentally ecologically linked to another feature of conservation interest. This assessment will be conducted with reference to *Guidelines for Ecological Impact Assessment in the UK and Ireland – Terrestrial, Freshwater, Coastal and Marine.* Potential direct and indirect impacts as a result of the various phases of the Project will then be assessed based on the sensitivity of the receptor and the magnitude of impact (i.e. the degree of change caused by the Project) using the matrix approach as illustrated in **Chapter 5: Approach to Scoping and EIA**.

12.11.1.3 The Scottish Government's FeAST and the MarLIN[443] MarESA will be used to assist in determining the sensitivity of fish ecological receptors for the assessment. It is important to note that throughout the development of the Project, design, environmental constraints, and sensitivities have been considered and the design parameters have been developed to reduce impacts on the environment. Additional measures will also be proposed to mitigate the wider impacts from the Project, as relevant. If it is found that the Project may have a direct impact on sites that are designated for conservation at the national or international site network level, then the requisite information will be provided alongside the EIAR to assist the competent authority to carry out the relevant assessment.

12.11.1.4 Cumulative effects will be assessed by taking into consideration any other relevant developments, proposed or existing, that are in the vicinity of the project, and which have the potential to affect the same features (see Section 12.9).

12.11.2 Assumptions and Limitations

12.11.2.1 The assessment will be based on existing data sets and literature with relevant coverage to the Project Area. Where available the assessment will also be informed by incidental observations and habitat data drawn from site specific surveys such as, aerial surveys (large, surface orientated ichthyofauna such as basking sharks, sharks, ocean sunfish and large fish shoals) and targeted benthic surveys (including drop-down video surveys and sediment mapping) which may provide further records of substrate orientated and minor species. It is considered that this data is sufficient for the purposes of establishing a baseline for the EIA and no additional survey work is required.

12.11.2.2 The variety of publicly available and industry specific data sources will be reviewed to inform the environmental assessment. A list of some data sources to be used in the final assessment is provided in **Table 12-2.**

12.11.2.3 It is recognised that a desk-based review of fisheries landings data, reported by Marine Directorate at an International Council for the Exploration of the Sea (ICES) rectangle level will likely be skewed towards species with a commercial interest.

12.11.2.4 The desktop study for the cable corridor between the MHWS and 12 NM from shore will be based on the NorthConnect EIAR[444], the historical information from the designations crossed by this section of the cable corridor as well as other publicly available data. The mitigation measures for the cable corridor between the MHWS and 12 NM from shore will be largely the same as those previously proposed (and accepted) for the NorthConnect cable, given that the locations coincide and the broad characteristics of the fish communities between MHWS and 12 NM are as previously described. It is acknowledged that small scale variations may have occurred in the intervening period since NorthConnect's assessment, and these minor changes may require management through micro siting the cable route. The requirement for micro siting will be determined by pre-construction surveys and reported prior to construction commencing.

12.11.2.5 It is considered that this assessment is based on the most up-to-date information on fish fauna within the Study Area and reflects conditions recorded at the time of the project-specific surveys, as well as consideration of existing knowledge on the potential trends in the baseline in the future. As such, it is considered to provide a suitable basis for the EIA.

12.12 Summary

12.12.1.1 A variety of fish species occur within the Project Area and are considered potential receptors of environmental impact. The key fish fauna include:

- Demersal fish (including epi-benthic and benthic species);
- Pelagic fish;
- Elasmobranchs; and
- Diadromous species.

12.12.1.2 Potential impacts have been identified during the different phases of the project, which will be assessed in the EIA. Impacts scoped out of the assessment are as follows:

- Direct impacts resulting from accidental release of pollutants are scoped out because impacts form accidental events will be exceptionally infrequent and amenable to mitigation through standard good management practices.
- Primary and secondary entanglement have been scoped out as there is no design-based pathway to introduce primary entanglement risk. Moreover, derelict fishing gear forms part of the existing baseline environment in terms of marine debris. The project's design precludes any increase in unintended catches, injury or mortality to marine species associated with 'ghost fishing' due to derelict fishing gear becoming fouled on Cenos infrastructure. This is due in part to the depths of the lines and cables which will be in the water (all emanating from the hull of the foundations at 15 m depths or greater), which are well below the primary region of risk associated with 'ghost fishing' (i.e. the upper 5 m surface waters[445]), thereby removing any derelict gears from the zone of greatest impact. Moreover, fouled gears would enjoy a decrease in surface area once wrapped around any mooring lines or cables, thereby reducing their catch potential. Fishing gear is designed to maximise catches by providing for the greatest potential surface area

for nets, using weights and buoys to maintain spread within the water column. Fouled (wrapped) gears would have reduced capacity for spread potential against free-floating derelict gears. Finally, the types of fishing which are active in the waters surrounding the array target demersal species using weighted gears which would sink. Losses of gears due to snagging or otherwise are not considered to potentiate a secondary entanglement pathway (via fouling of the Array Area's infrastructure) as there is very limited scope for these heavy gears to travel into the Array Area and re-enter the water column. This is corroborated by the fact that, to date, there have been no reported instances of secondary entanglement due to fouled fishing gears on any of the cables and mooring systems on the surrounding floating oil and gas assets (e.g. the nearby Anasuria FPSO, which has been in operation since 1996, etc.). Further information on entanglement is detailed within **Appendix 5G: Approach to secondary entanglement as a potential impact**.

12.13 Further Consideration for Consultees

12.13.1.1 Please find below specific scoping questions relevant to the topic of fish ecology:

- Do you agree with the Study Area defined for the fish ecology assessment?
- Do you agree that the data sources identified are sufficient to inform the fish ecology baseline for the EIAR? Are there any new or emerging data sources or guidance documents that should be considered?
- Have all receptors and impacts potentially resulting from the Project been identified?
- Do you agree that the impacts described in **Table 12-11** can be scoped out?
- For those impacts scoped in **Table 12-11** do you agree that the methods described are sufficient to inform a robust impact assessment?
- Do you agree that the embedded mitigation measures described provide a suitable means for managing and mitigating the potential effects of the Project on fish receptors?
- Do you agree with the approach for the CEA and for transboundary effects?

13. COMMERCIAL FISHERIES

13.1 Introduction

13.1.1.1 This chapter of the Scoping Report considers the potential significant effects on commercial fisheries of the Project. The chapter provides an overview of the baseline conditions relevant to the Project Area (as defined in **Chapter 1: Introduction**), the datasets to be used to inform the EIA, sources, pathways and receptors of the potential significant effects to be considered, and how these potential significant effects will be assessed for the purpose of the EIA.

13.1.1.2 This chapter should be read alongside the following chapters and documents:

- **Chapter 9: Benthic Ecology;** includes commercially important shellfish species and information on seabed habitats. Information and data from the Benthic Ecology chapter will be used to inform the commercial fisheries assessment, as impacts on the ecology of shellfish species could result on impacts on the commercial fisheries that target them.
- **Chapter 12: Fish Ecology** includes commercially important species and fisheries data. Information and data from the Commercial Fisheries chapter will be used to inform the fish ecology assessment, as commercial fisheries have the potential to directly and indirectly impact fish ecology.
- **Chapter 14: Shipping and Navigation** potential shipping and navigation impacts may cause interference or risk to commercial fishing vessels transiting and actively fishing. Therefore, the shipping and navigation assessment will inform the commercial fisheries assessment.
- **Chapter 19: Socio-economics** potential effects on the fishing sector and fishing communities will impact the socio-economics assessment. Therefore, the commercial fisheries assessment will inform the socio-economic assessment.

13.2 Legislation, Policy and Guidance

13.2.1 Legislation and Policy

13.2.1.1 Legislation and policy that has been used to inform the scope of the Commercial Fisheries chapter is set out in **Table 13-1.** Further information on policies relevant to the EIA are set out in **Chapter 2: Legislative and Policy Context**.

Table 13-1: Legislation and policy context

Legislation/policy	Relevance to the assessment
Marine Policy	
National Marine Plan (NMP)[446] FISHERIES 1	This policy advises that marine planners and decisions makers should aim to ensure that: • Existing fishing opportunities and activities are safeguarded wherever possible.

Legislation/policy	Relevance to the assessment
	• An ecosystem-based approach to the management of fishing which ensures sustainable and resilient fish stocks and avoids damage to fragile habitats. • Protection for vulnerable stocks (in particular for juvenile and spawning stocks through continuation of sea area closures where appropriate). • Improved protection of the seabed and historical and archaeological remains requiring protection through effective identification of high-risk areas and management measures to mitigate the impacts of fishing, where appropriate. • That other sectors take into account the need to protect fish stocks and sustain healthy fisheries for both economic and conservation reasons. • Delivery of Scotland's international commitments in fisheries, including the ban on discards. Mechanisms for managing conflicts between fishermen and/or between the fishing sector and other users of the marine environment.
NMP[446] FISHERIES 2	This policy advises on factors that should be taken into account when deciding on uses of the marine environment and the potential impact on fishing.
NMP[446] FISHERIES 3	This policy advises that where existing fishing opportunities or activity cannot be safeguarded, a Fisheries Management and Mitigation Strategy should be prepared by the proposer of development or use, involving full engagement with local fishing interests (and other interests as appropriate) in the development of the Strategy.
NMP[446] CABLES 2	This policy advises on the methods and factors that should be considered with regards to new cables in order to minimise impacts on the environment, seabed and other users.
NMP[446] Section 6. Sea Fisheries, Interactions with Other Users, (paragraphs 6.22 to 6.26)	Advises on the interactions between the fishing industry and other interests which should be borne in mind in any proposed marine development and factored into marine planning processes.
NMP[446] Section 11. Offshore Wind and Marine Renewable Energy, Interactions with Other Users (paragraphs 11.26 to 11.29)	Advises on how to minimise the physical competition for space, navigational restrictions and the impact of physical structures in the sea arising from the presence of marine renewable energy development.
NMP[446] Section 14. Submarine Cables, Interactions with Other Users (paragraphs 14.9 to 14.11)	Advises on methods to minimise the risk of adverse interactions between seabed cables and fishing activity.

13.2.2 Technical Guidance

13.2.2.1 Technical guidance that has been used to define the assessment is set out in **Table 13-2**.

Table 13-2: Relevant technical guidance

Guidance reference	Relevance to the assessment
Good Practice Guidance for assessing fisheries displacement by other licensed marine activities[447]	Provides concise guidance to help clarify the assessment process with regard to fisheries displacement for stakeholders, regulators and developers.
Guidance on preparing a Fisheries Management and Mitigation Strategy (FMMS) DRAFT.[448]	Provides guidance to offshore renewable energy developers on how to prepare a FMMS.
Best Practice Guidance for Offshore Renewables Developments[449]	Provides guidance on promoting co-existence between the fishing and offshore renewables sectors, as well as appropriate mitigation.
Best Practice Guidance for Offshore Renewables Developments: Recommendations for Fisheries Disruption Settlements and Community Funds[450]	Provides guidance on promoting co-existence between the fishing and offshore renewables sectors, as well as appropriate mitigation.
Cumulative impact assessment guidelines, guiding principles for cumulative impacts assessments in offshore wind farms[451]	Provides guidance and practical solutions with regard to cumulative impact assessments.
Best practice guidance for fishing industry financial and economic impact assessments[452]	Provides guidance to policy-makers and the industry on assessing the impacts on commercial fisheries as a result of areas closed or restricted to fishing.
Guidelines for data acquisition to support marine environmental assessments of offshore renewable energy projects. Contract report: ME5403, May 2012[453]	Guidelines to assist developers, environmental consultants, regulators, decision-makers and consultees in the design, review and implementation of environmental data collection and analytical activities associated with all stages of offshore renewable energy developments.
Options and opportunities for marine fisheries mitigation associated with wind farms. Final report for Collaborative Offshore Wind Research into the Environment contract FISHMITIG09.[454]	Provides guidance on options and opportunities for marine fisheries mitigation associated with windfarms.
Fishing and Submarine Cables: Working Together.[455]	Booklet intended to help fishermen avoid catching submarine cables and to provide information about what to do if fishing gear is snagged in a cable area.

13.3 Study Area

13.3.1.1 Fisheries data are recorded and collated by ICES statistical rectangles. The commercial fisheries study area has therefore been defined with reference to the ICES rectangles within which the Project is located. These are as follows (see **Figure 13-1)**:

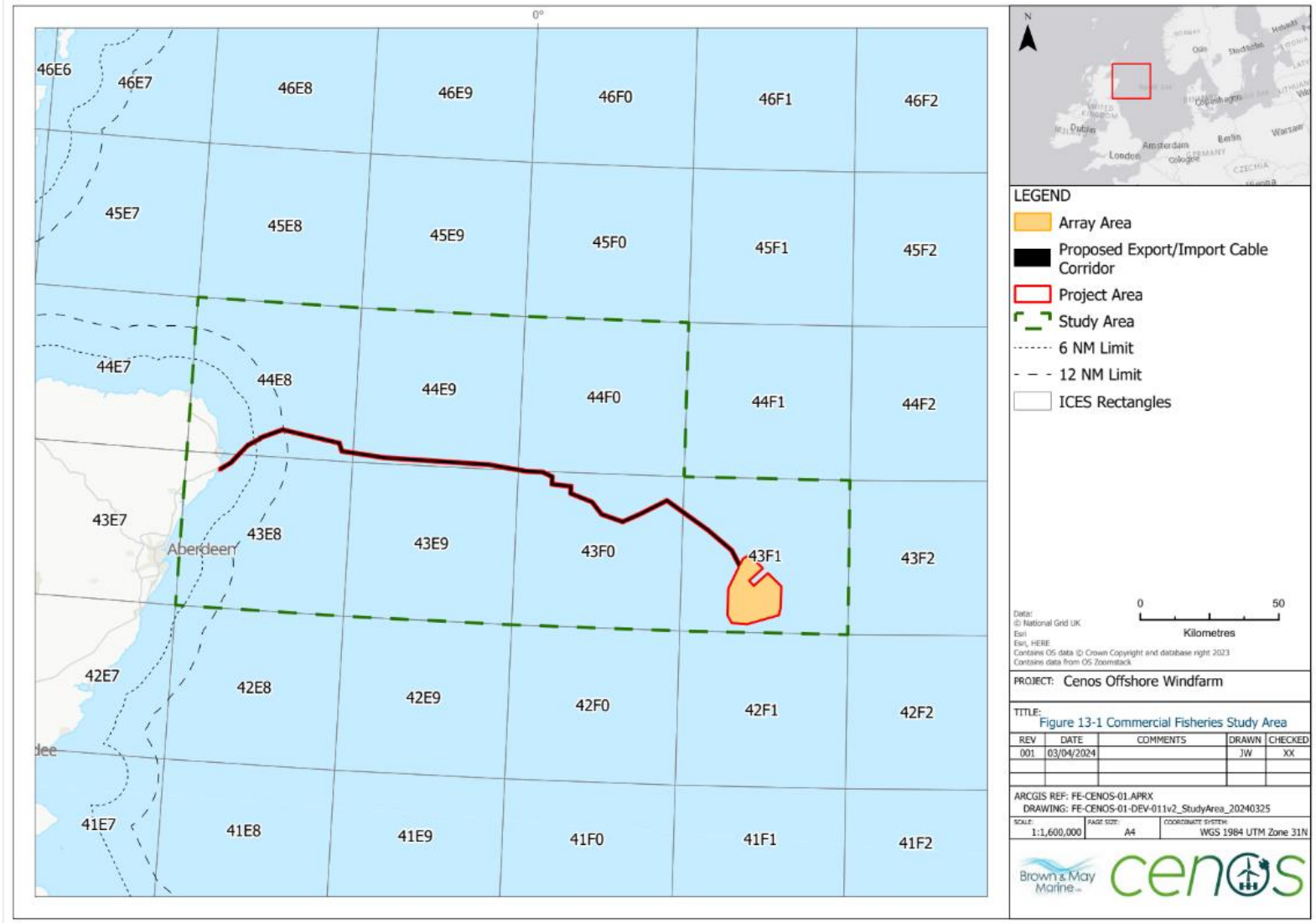
- ICES rectangle 43F1, in which the Array Area and a small section of the offshore part of the ECC are located;
- ICES rectangles 43F0, 44F0, 43E9 and 44E9, where the majority of the offshore section of the ECC is located; and
- ICES rectangles 44E8 and 43E8, where the inshore section of the ECC is located.

13.3.1.2 Whilst the study area described above will help identify key fisheries of relevance to the area of the Project, where relevant, data and information may be analysed and presented for wider areas to provide context and describe the wider extent of activity of the fisheries included in the assessment.

13.3.1.3 The ECC will be assessed from the Array Area to MHWS. The section of the ECC from MHWS to 12 NM is the same as the NorthConnect Cable Corridor. The Applicant is coordinating with NorthConnect Limited. NorthConnect Interconnector and the Project will only require one set of infrastructure, within the overlapping marine licence Project Area from 12 NM to MHWS.

The section of the ECC from MHWS to 12 NM has previously been assessed within the EIAR submitted for NorthConnect Limited (application reference number 06771 & 06870) and judged acceptable through the consenting of NorthConnect. The previous EIA work for NorthConnect will be considered in assessing the ECC from MHWS to 12 NM, updated by any other readily available information and surveys undertaken. See Section 13.5 for further details of the baseline conditions. Further details are in **Chapter 5: Approach to Scoping and EIA.**

Figure 13-1: Commercial Fisheries Study Area



13.4 Consultation

13.4.1.1 Consultation is a key part of the application process. This assessment has been and will be informed by engagement and discussion with relevant fisheries stakeholders as appropriate. To date, consultation has been undertaken with Marine Scotland Science (MSS) (the scientific division of the Marine Directorate), the SFF and the SWFPA.

13.4.1.2 A summary of the key issues raised during consultation to date, specific to commercial fisheries, is outlined in **Table 13-3** below, together with how these issues will be considered in the production of the EIAR.

Table 13-3: Summary of consultation relating to commercial fisheries

Date and stakeholder	Consultation and key comments	How this is accounted for
MSS (the scientific division of the Marine Directorate), 2023 Scoping Opinion, June 2023	MSS welcome engagement with the Scottish Fishermen's Federation (SFF) to support the EIA process however MSS recommend also engaging with other fisheries associations such as the Scottish White Fish Producers Association (SWFPA) and the Regional Inshore Fisheries Groups (RIFGs) to ensure wide engagement with fisheries stakeholders.	A project Fisheries Liaison Officer (FLO) has been appointed for the Project to facilitate on-going engagement with the fishing industry. An initial meeting was held with SFF and SWFPA providing a project overview and answering specific questions from the scoping feedback. In addition, the Applicant has also employed a Stakeholder Engagement Lead who oversees a communication plan which will manage future engagement activities. Engagement with fisheries stakeholders is on-going and will continue post-consent.
MSS(the scientific division of the Marine Directorate), 2023 Scoping Opinion, June 2023	MSS advise that the commercial fisheries assessment for the EIA would benefit from the addition of Automatic Identification System (AIS) data and MMO/Marine Scotland surveillance sightings data. These would help to further improve the baseline fisheries data for the study area. MSS advise that important fishing areas should be mapped and considered along with other technical and environmental constraints within the cable corridor routing considerations (Section 2.5.7 [of 2023 Scoping Report]).	Up-to-date, publicly available data from Marine Scotland and the MMO will be used to inform the commercial fisheries assessment as appropriate, including surveillance sightings, amongst other datasets (see **Table 13-4**). In addition, AIS data for fishing vessels collated as part of the Shipping and Navigation assessment, will be referred to as appropriate in the Commercial Fisheries chapter. Similarly, information provided by fishermen during consultation on the distribution of fishing activity and key grounds will also be accounted for in the Commercial Fisheries chapter.

Date and stakeholder	Consultation and key comments	How this is accounted for
MSS(the scientific division of the Marine Directorate), 2023 Scoping Opinion, June 2023	MSS are content with the proposed potential impacts considered for each stage of the project development in relation to commercial fisheries. However, MSS advise that potential impacts to commercial fish stocks are also assessed.	Potential impacts on fish and shellfish species, including those of commercial importance will be addressed in detail in in **Chapter 9: Benthic Ecology** and **Chapter 12: Fish Ecology**, Chapter of the EIAR. The Commercial Fisheries chapter will cross reference the findings of **Chapter 9: Benthic Ecology and Chapter 12: Fish Ecology** as appropriate and assess the potential for the identified impacts on commercial species to result in impacts on the fisheries that target them.
MSS(the scientific division of the Marine Directorate), 2023 Scoping Opinion, June 2023	MSS note that the developer has proposed that the EIA only focuses on the effects associated with increased vessel traffic and does not include the effects associated with reduced access, exclusion and displacement since effects are not expected to be significant for the project. MSS disagree with this proposal at this stage of the process as despite low levels of commercial fishing activity in the project area, the area of reduced access or exclusion for the project has yet to be determined based on floating turbine type, radius of the mooring lines and turbine spacing. Associated with reduced access, exclusion and displacement are included in the EIA for both the project area and cable corridor	Impacts relating to exclusion and displacement from established fishing grounds have been scoped into the assessment (**Table 13-6**).
MSS(the scientific division of the Marine Directorate), 2023 Scoping Opinion, June 2023	MSS note that the developer states that any rock will be laid in a profile suitable for over trawling, specifically to reduce the likelihood of gear snagging. MSS advise that the developer provides clarification on how they will ensure their rock berms are over trawlable without a post-laid cable over-trawl survey.	Post-installations surveys will be undertaken to confirm cable burial status and to identify potential changes to seabed conditions. The findings can then be shared with the fishing industry via the FLO and other channels, where appropriate. Consideration may be given to over-trawl trials where key trawling fishing areas are identified taking account of activity levels and the importance of specific areas to the fishing industry.

Date and stakeholder	Consultation and key comments	How this is accounted for
		Further details on post-installation surveys and the potential need for over-trawl surveys will be included in the Project's Fisheries Management and Mitigation Strategy (FMMS) (captured within the as a condition of the marine licence).
SFF 2023 Scoping Opinion, June 2023	The SFF is very concerned that this development is in such a rush to build and power that the Rochdale Envelope approach is going to be stretched to the limit. Turbines are not defined, mooring systems are not defined, cabling is not defined, customers are not defined, with this lack of clarity a terrestrial planning authority would be hard pushed to accept such an application. This rush is highlighted in the expectation that all the required scoping, EIA and Licence application are filed by end of 2023, expecting consent in 2024 to qualify for CFD in 2025, followed by incremental powering up to allow for income at the earliest stage possible.	The Project is undertaking detailed design optioneering and further design decisions will be presented, alongside consideration of alternatives, within the EIAR. Whilst there is uncertainty at present on final design, the assessments presented are carried out assuming a realistic worst-case scenario.
SFF 2023 Scoping Opinion, June 2023	The preconstruction surveys and preparation and stakeholder consultation are still to be developed, which makes production of a full and proper EIA and Licence Application before the end of 2023 even more unlikely. There may be a drive to cut the consenting time, but cutting corners is not the way to do it, the fastest the process should be is the speed which gives the proper outputs at completion.	This feedback has been noted. The Applicant has recently appointed a stakeholder engagement lead who will provide greater clarity on these matters. Furthermore, consultation with the fishing industry through the FLO has been ongoing and will continue post-application.
SFF 2023 Scoping Opinion, June 2023	Whilst the SFF cannot deny the ICES square is maybe not as productive as its	Impacts relating to exclusion and displacement from established fishing

Date and stakeholder	Consultation and key comments	How this is accounted for
	neighbours, that does not mean that the assessment of productivity of the fleet should not be properly considered, and thence the displacement which may occur. Displacement remains an option that must be scoped in.	grounds have been scoped into the assessment (**Table 13-6).**
SFF 2023 Scoping Opinion, June 2023	It is clear that throughout the staged construction and maintenance operations there will often be moorings, cables etc waiting for hook up, and it is not good enough for the developer to claim that there is too much uncertainty surrounding this and cables routes in order to avoid assessing the impacts. There must exist enough knowledge within the renewables industry to scope these in with more confidence than that. Furthermore there must be scoped in the impact of leaving these infrastructure elements buoyed in the sea, and any need for Guard Vessels should be assessed.	The Project will undertake the EIA using the design envelope approach based on the realistic worst-case scenario associated with each parameter and receptor. This helps to ensure that the EIA process has considered the maximum effects the Project, whilst also allowing for further optimisation and refinement at the time of construction and flexibility in key commercial project decisions, noting that this may be several years after the application is made. In addition, as outlined in **Table 13-5** consideration will be given to the use of guard vessels at appropriate times.
SFF 2023 Scoping Opinion, June 2023	The request talks about many of the ongoing discussions surrounding the growth of renewables, but consultations and draft plans are not relevant until finalised. The SFF would expect the Licence application to show how the developer has considered the Fishing Policies from the Scottish National Marine Plan. The SFF would expect the project to scope in the latest science on EMF and Heat, Thrumming and Noise, rather than claiming on P74 that the effects are not evidenced so scoped out. The onus is on the developer to	The EIA will be undertaken within the context of the current marine planning policy framework that is relevant to the project location, including relevant policies within the NMP. The approach to the assessment of potential impacts on fish and shellfish species, including those of commercial importance, is detailed in **Chapter 9: Benthic Ecology** and **Chapter 12: Fish Ecology**. Further information on EMF and heat is detailed within **Appendix 5F: Approach to EMF and Heat as potential impacts.**

Date and stakeholder	Consultation and key comments	How this is accounted for
	provide evidence to back up these claims.	
SFF 2023 Scoping Opinion, June 2023	Touching on decommissioning, the description given is not suitable, therefore the SFF would expect to see a much improved proposition, including the need for any cutting to be below seabed 3 level. The SFF would expect to see decommissioned cable scoped in to determine whether it is safe to leave it behind, which could end up with patchwork pieces of cable all over the North Sea.	Consideration will be given in the Commercial Fisheries chapter to potential impacts associated with construction, O&M as well as the decommissioning phase. A Decommissioning Plan will be prepared prior to decommissioning setting out how decommissioning will be undertaken based on legislation, policy and technology available at that time. This will include consideration of decommissioned cables and other infrastructure.
MD-LOT, 2023 Scoping Opinion, June 2023	The Scottish Ministers draw the Developers attention to the MD-SEDD advice in relation to data sources to inform the baseline assessment and advise that this is fully considered and addressed by the Developer in the EIAR.	The MD-SEDD advice on commercial fisheries assessment will be considered and addressed within the EIAR (**Table 13-4**).
MD-LOT, 2023 Scoping Opinion, June 2023	The Scottish Ministers broadly agree with the impacts proposed to be scoped into the EIAR in Section 13 of the Scoping Report. However, advise that potential impacts to fish stocks are also scoped in. Additionally, the Scottish Ministers do not agree that the effects associated with reduced access, exclusion and displacement can be scoped out at this stage due to lack of refinement of the design envelope and advise that these potential impacts must be scoped into the EIAR for both the windfarm area and export cable routes and refer the Developer to MD-SEDD advice and the representation from SFF in this regard.	The approach to the assessment of potential impacts on fish and shellfish species, including those of commercial importance is presented in **Chapter 12: Fish Ecology** and **Chapter 9: Benthic Ecology.** Impacts relating to exclusion and displacement from established fishing grounds have been scoped into the assessment (**Table 13-6**).

Date and stakeholder	Consultation and key comments	How this is accounted for
MD-LOT, 2023 Scoping Opinion, June 2023	In Section 13.3.2 of the Scoping Report, the Developer states that rock protection will be laid on areas of cable where burial depth cannot be achieved. In line with the MD-SEDD advice, the Scottish Ministers advise that the EIAR clarify how the rock berms will be over trawlable in the absence of post-laid cable overtrawl survey. The Scottish Ministers advise more detailed information in relation to decommissioning is required, in particular in relation to the potential safety hazard disused infrastructure left in the marine environment poses to commercial fishing in line with the SFF representation.	Post-installations surveys will be undertaken to confirm cable burial status and to identify potential changes to seabed conditions. The findings can then be shared with the fishing industry via the FLO and other channels, where appropriate. Consideration may be given to over-trawl trials where key trawling fishing areas are identified taking account of activity levels and the importance of specific areas to the fishing industry. Further details on post-installation surveys and the potential need for over-trawl surveys will be included in the Project's FMMS. Consideration will be given in the Commercial Fisheries chapter to potential impacts associated with construction, O&M, as well as the decommissioning phase. A Decommissioning Plan will be prepared prior to decommissioning setting out how decommissioning will be undertaken based on legislation, policy and technology available at that time. This will include consideration of decommissioned cables and other infrastructure.
MD-LOT, 2023 Scoping Opinion, June 2023	The Scottish Ministers note that the Developer has proposed to engage with the fishing community and have enlisted a Fishing Liaison Officer to this effect. In addition to the SFF, this should also include the SWFPA and the Regional Inshore Fisheries Groups, this is in line with MD-SEDD advice.	An initial meeting has been held with SFF and SWFPA providing a project overview and answering specific questions from the scoping feedback. Consultation with the fishing industry via the appointed FLO is on-going and will continue post-consent. In addition, the Applicant has also now employed a Stakeholder Engagement Lead who will look to provide a communication plan which will consider future engagement activities.
MD-LOT, 2023 Scoping Opinion, June 2023	Section 2.7.1.1 of the Scoping Report states that mooring lines may be installed and buoyed off temporarily until the WTGs can be installed. The Scottish Ministers refer the Developer to the SFF representation and advise that the need for guard vessels should be considered in this regard.	This feedback has been noted and any deposit or infrastructure that causes or is likely to cause obstruction or danger to navigation will be marked and notified according to MCA and NLB requirements and advice. In addition, as outlined in **Table 13-5** consideration will be given to the use of guard vessels at appropriate times.

Date and stakeholder	Consultation and key comments	How this is accounted for
Scoping Workshop, 29 February 2024	The Applicant provided details on the proposed approach for commercial fisheries assessment for the EIA. Marine Scotland Analytical Unit advised including a question concerning socio-economic impacts to fisheries in consultation questionnaires.	The comments provided within the Scoping Workshop from Marine Scotland Analytical Unit have been considered and are addressed in this 2024 Scoping Report. The Applicant will obtain socio-economic data through direct consultation with the fishing industry, this consultation will include questions relevant to the socio-economic assessment. Further detail on the scope of the socio-economic assessment are detailed in **Chapter 19: Socio-Economics**. The approach will be taken forward to the EIA.

13.5 Baseline Conditions

13.5.1 Data Information Sources

13.5.1.1 The key sources of data and information that will be used to inform the commercial fisheries baseline are outlined in **Table 13-4**. This will be complemented with information collected through consultation with the fishing industry as well as relevant information on fishing activity collected as part of **Chapter 14: Shipping and Navigation**, which will help further characterise the baseline.

Table 13-4: Key sources of data

Source	Date	Summary	Coverage of study area
UK Landings Data by ICES Rectangle (Marine Management Organisation (MMO) / Marine Scotland)[456]	2018 to 2022 (2013 to 2022 for scallop dredging to take account of the cyclical nature of the fishery)	Landings statistics data for UK-registered vessels including landing year; landing month; vessel length category; ICES rectangle; vessel/gear type; species; live weight (tonnes) and live weight (value (£)).	Covers the entire study area
UK Fisheries Surveillance Sightings (MMO / Marine Scotland)[456]	2012 to 2021	Surveillance sightings of vessels by gear type (all nationalities) recorded in UK waters by surveillance patrols.	Covers the entire study area.
Fishing Activity for UK Vessels 15m and over Data layers (MMO)[456]	2016 to 2020	Satellite tracking data (Vessel Monitoring System (VMS) pings recorded in 0.05° by 0.05° grids from UK	Covers the entire study area.

Source	Date	Summary	Coverage of study area
		vessels in UK and European waters. VMS data is combined with log book data with values assigned to each cell in the grid in terms of effort and value (£).	
Fishing Activity for UK Vessels 12m and under Data layers (Marine Scotland)[457]. Available from NMPi.	2017 to 2021	Data of the position of each fishing day indicating where the majority of the catch was taken, as declared by under 12 m vessels, along with the associated catch weight and values. Data is aggregated into c-squares of 0.05 x 0.05 decimal degrees and grouped into fishing sector (pots and traps, bottom trawls, dredges, rod and lines and other)	Covers the entire study area
ScotMap (Marine Scotland) Available from NMPi.	2007 to 2011	Marine Directorate (previously Marine Scotland) project which provides spatial information on the fishing activity of Scottish-registered commercial fishing vessels under 15 m in overall length. The data was collected during face-to-face interviews with individual vessel owners and operators and relates to fishing activity for the period 2007 to 2011. The data is aggregated and analysed to provide information on the monetary value, relative importance (relative value) and the usage (number of fishing vessels and crew) of seas around Scotland.	Covers the entire study area

Source	Date	Summary	Coverage of study area
Data for OSPAR request on the production of spatial data layers of fishing intensity pressure (ICES)[458]. Available from NMPi.	2010 to 2020	VMS and logbook data combined collected by ICES and presented as average fishing intensity (hours) for Dredges, Nephrops and crustaceans with bottom trawls and bottom trawls. All nationalities combined.	Covers the entire study area
Creel Fishing Effort Study[459]. Available from NMPi.		Effort analysis based on 130 vessels using creels to target crab and lobster surveyed on the east coast of Scotland between June to September 2016.	Covers the inshore area.

13.5.2 Existing Baseline

13.5.2.1 This section describes the present conditions which constitute the existing baseline environment for commercial fisheries within the study area.

13.5.2.2 The commercial fisheries study area supports a range of commercial fishing activities. Analysis of data of UK landings values (**Figure 13-2** and **Figure 13-3**) indicates that overall, the main fishing method across the study area is demersal trawling for *Nephrops (Nephrops norvegicus)* and fish. However, the level of activity, main methods, and target species vary depending on the section of the study area under consideration:

- In ICES rectangle 43F1, where the Array Area and a small part of the offshore section of the ECC are located, fishing activity occurs at low levels compared to other sections of the commercial fisheries study area and is predominantly focused on demersal trawling for *Nephrops* and fish species such as haddock (*Melanogrammus aeglefinus*). This rectangle also supports low levels of activity by demersal seines and pelagic trawlers.
- In ICES rectangles 43F0, 44F0, 43E9 and 44E9, where the majority of the ECC is located, demersal trawling for *Nephrops* and fish together with pelagic trawling for herring represent the main fishing activities. These rectangles also record landings from demersal seines, although at very low levels. Landings values in these rectangles, particularly in 44E9 and 44E0, are considerably higher than in the rectangle where the Array Area is located (43F1), with annual average values over £4.5 m. It should be noted that landings of the pelagic fishery for herring concentrate for the most part in rectangle 43E9 and that activity is not expected in significant levels in the immediate area of the ECC. Well established herring fishing grounds are located within this rectangle primarily in areas south of the ECC.

- In rectangles 44E8 and 43E8, where the inshore section of the ECC is located, activity is by vessels operating static gear such as pots (generally referred to as creels in Scotland) targeting edible crab (*Cancer pagurus*) and lobster (*Homarus gammarus*) as well as dredgers targeting king scallop (*Pecten maximus*). These rectangles, particularly 44E8, also record landings by demersal trawlers targeting *Nephrops* and fish species.
- The analysis of surveillance sightings by country presented in **Figure 13-4** suggests that fishing activity in the area of the Array Area and ECC is predominantly undertaken by UK registered vessels. As shown in **Figure 13-4**, non-UK vessels are recorded within the study area in some levels in ICES rectangle 43E9. These are predominantly Dutch and Danish vessels focused on pelagic trawling for herring, As previously noted for UK vessels, and as illustrated by the distribution of surveillance sightings within rectangle 43E9, activity by non-UK vessels engaged in the herring fishery is not expected in significant levels in the immediate area of the ECC. Well established herring fishing grounds are located within this rectangle primarily in areas south of the ECC.

Figure 13-2: UK Landings by Method – Value (£) (Average 2018-2022)

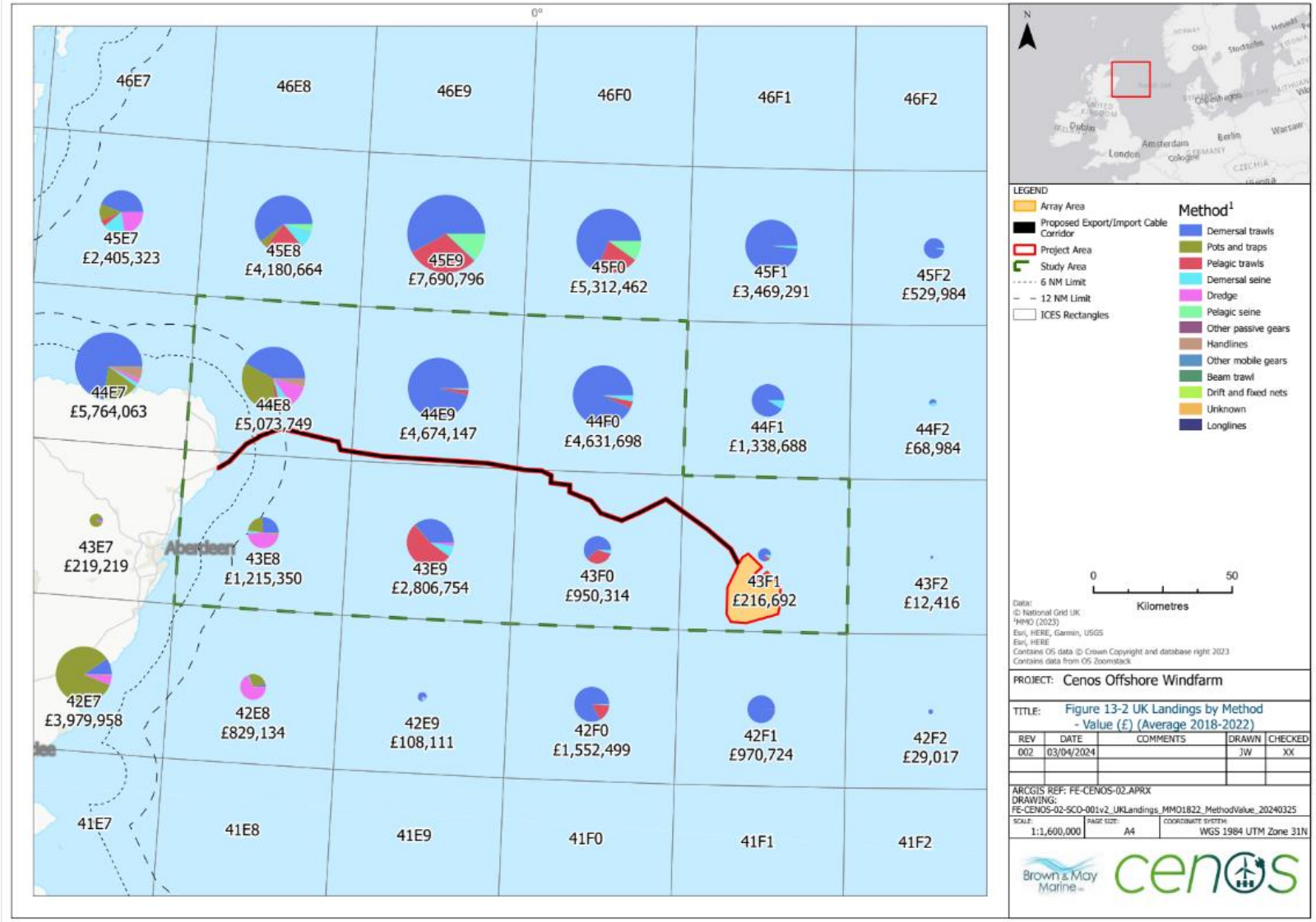


Figure 13-3: UK Landings by Species – Value (£) (Average 2018-2022)

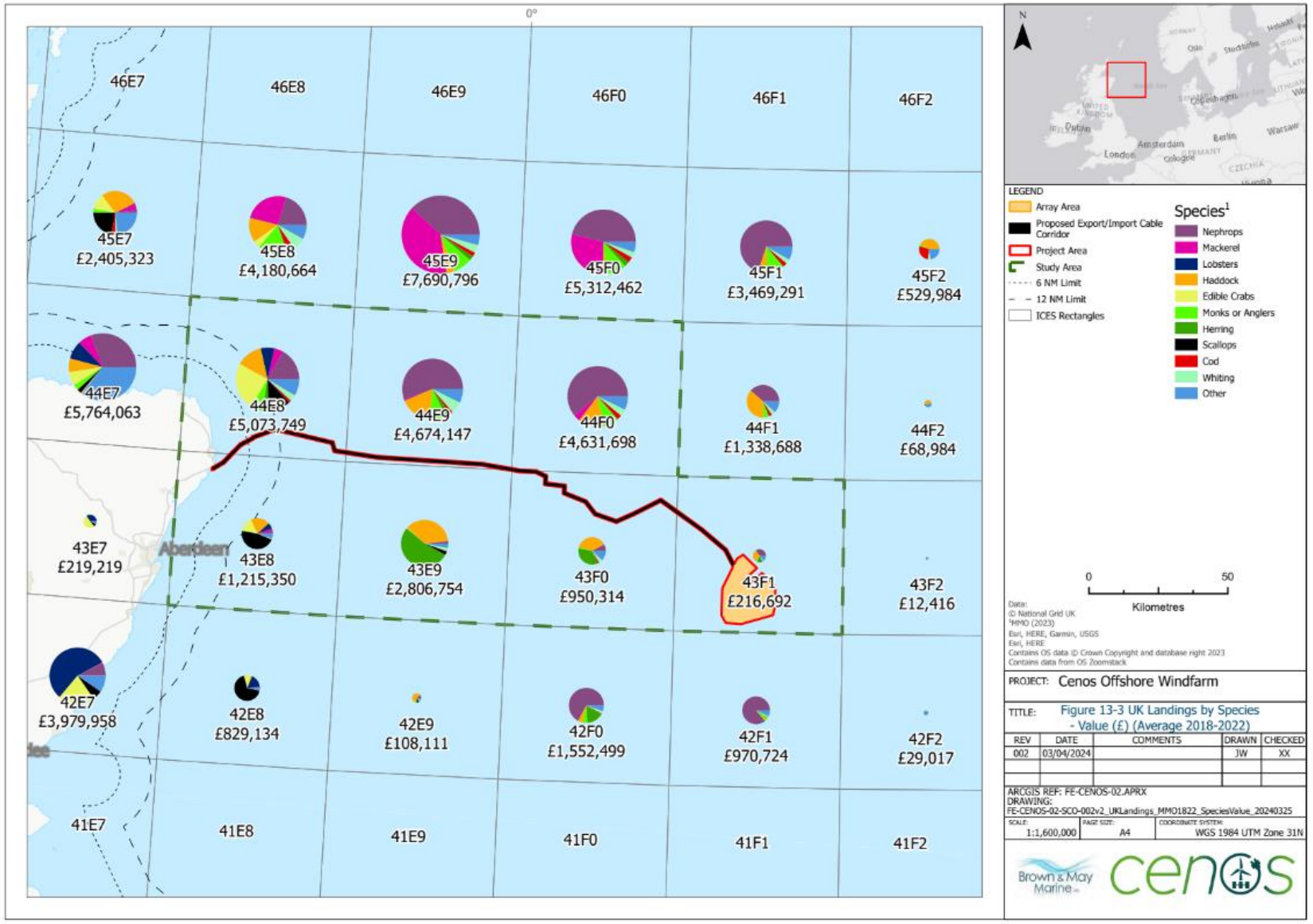
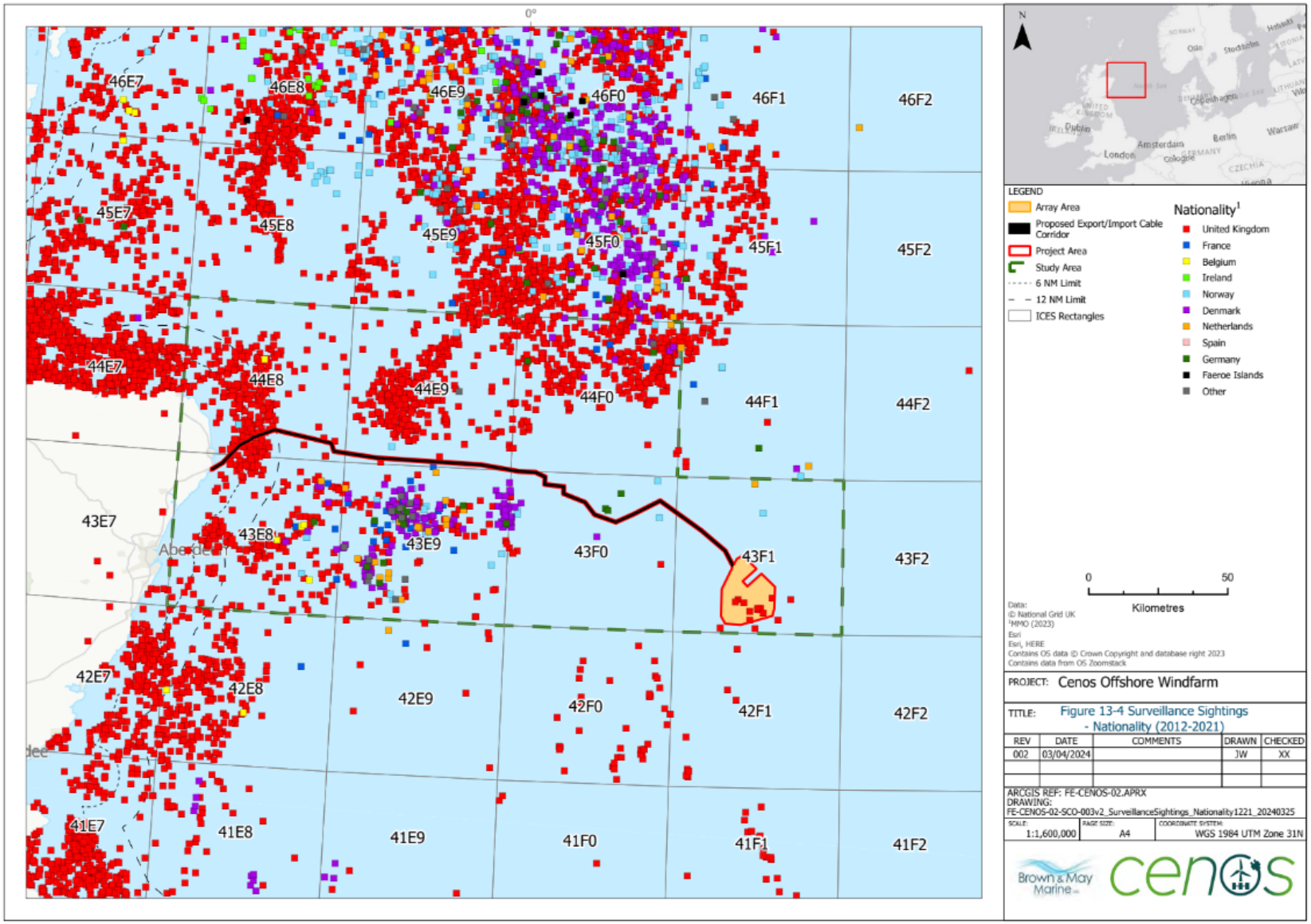


Figure 13-4: Surveillance Sightings - Nationality (2012-2021)



13.5.3 Future Baseline

13.5.3.1 This section provides an outline of the factors that may influence the future baseline regarding commercial fishing. A qualitative description of the evolution of the baseline environment, on the assumption that the Project is not constructed, will be presented in the Commercial Fisheries EIAR Chapter, using available information and scientific knowledge of this topic.

13.5.3.2 The levels, values and types of commercial fishing occurring within regional, national, and international sea areas are subject to a wide range of factors. These include variations in the conditions of the stocks of target species, changes in the quotas of pressure stock species, closures/restrictions to fishing as part of the implementation of management measures within designated MCZs, spatial restrictions, local byelaws, effort limits and vessel and gear regulations. Economic effects as well as national and international politics also have significant potential to determine the future of commercial fishing. Similarly, advances in the design of fishing vessels, and their gears and electronics may result in significant changes in the structure of fishing fleets, including those of relevance to the study area.

13.6 Basis of Assessment

13.6.1.1 The commercial fisheries scoping assessment is based on the following key assumptions, which are also set out in **Chapter 3: Project Description**:

- The array will consist of up to 95 WTGs;
- There will be up to two offshore substations;
- Scour protection may be required around the base of some or all foundations and cable protection may be required along cable routes;
- Inter-array and import / export cables will be buried, where possible;
- Maintenance activities will be undertaken for both preventive and corrective maintenance requirements;
- The operational lifetime of the project is assumed to be a minimum of 30 years; and
- The decommissioning of the windfarm is anticipated to involve as close to full removal of offshore infrastructure as possible at the time of decommissioning (where safe/practicable to do so). The decommissioning works are likely to be undertaken in reverse to the sequence of construction works and involve similar levels of equipment and impact.

13.7 Relevant Embedded Mitigation Measures

13.7.1.1 Embedded mitigation measures have been identified and are proposed to be adopted as part of the Project design (primary mitigation); or implemented in accordance with industry standard practice that would occur with or without the input from the environmental assessment feeding into the process (tertiary mitigation). There is a commitment by the Applicant to implement these embedded mitigation measures and they have been considered within this Scoping Report.

13.7.1.2 The requirement for additional mitigation measures (secondary mitigation) will be dependent on the significance of effects on commercial fisheries receptors and will be consulted upon with consultees throughout the EIA process. Any additional mitigation measures will be presented within the EIAR.

13.7.1.3 Measures that are relevant to commercial fisheries are listed in **Table 13-5**. General mitigation measures applying to all parts of the Project are set out first. Thereafter, mitigation measures that would apply specifically to commercial fisheries issues associated with the construction, O&M phase are described separately.

Table 13-5: Embedded mitigation relating to commercial fisheries

ID	Embedded mitigation measures
General	
COM-001	A Fisheries Liaison Officer (FLO) has been appointed by the Project and the role will be maintained to provide a Project-specific point of contact to liaise and engage with the fishing industry.
COM-002	A Fisheries Management and Mitigation Strategy (FMMS) will be produced in consultation with the fishing industry, detailing the Applicant's approach to liaison and co-existence and including proposed mitigation measures for relevant fisheries as appropriate.
COM-003	Timely and efficient distribution of Notice(s) to Mariners' (NtM), Kingfisher notifications and other navigational warnings of the position and nature of works associated with the Project. Notifications to FishSafe providing location of windfarm infrastructure.
COM-004	Adherence to relevant good practice guidance (i.e. FLOWW[449, 450]).
COM-005	A Construction CEMP will be developed and adhered to for the Project. The CEMP will detail how environmental commitments will be attained during the construction phase of the Project.
COM-006	A Vessel Management Plan (VMP) will be developed and adhered to for the Project. The VMP will detail types and numbers of vessels to be utilised by the Project.
COM-007	Any objects dropped on the seabed during works associated with the Project will be reported and objects will be recovered where they pose a hazard to other marine users and where recovery is possible.
COM-008	Use of guard vessels and Offshore Fisheries Liaison Officers (OFLOs) where appropriate.
Construction	
COM-009	Cables will be buried as standard. Where adequate burial depth cannot be achieved, external cable protection methods will be utilised. This will be minimised as far as practicable. Cable burial will be informed by a CBRA and will be implemented utilising a CaP.
COM-010	A CBRA will be undertaken to confirm the extent to which cable burial can be achieved for the Project. The CBRA will identify areas where adequate burial depth cannot be achieved and therefore require external protection.
COM-011	Information on the areas where infrastructure is installed will be distributed to relevant representative organisations and stakeholders in appropriate formats for inclusion in charts and information bulletins.
COM-012	Undertaking of post-lay and burial inspection surveys and, where appropriate and practicable, undertaking of rectification works.

ID	Embedded mitigation measures
COM-013	A CaP will be developed and adhered to for the Project. The plan will include details of proposed installation methods and techniques based on the Project Design. It will also set out the requirement for any post-installation monitoring.

13.7.1.4 Any secondary mitigation identified as the environmental assessment progresses would be reported in the EIAR. Secondary mitigation of relevance to commercial fishing will also be included within the FMMS produced for the Project.

13.8 Scoping of Potential Significant Effects

13.8.1.1 In line with the EIA Regulations 2017, the EIA for the Project will only consider those impacts where there is a risk of a potential significant effects. The following section draws on industry experience to identify effect-receptor pathways that may lead to a significant impact. Where experience and available evidence indicates an effect-receptor pathway will not lead to a significant effect with regards to the EIA Regulations 2017, the pathway is scoped out from assessment.

13.8.1.2 The potential significant effects on commercial fisheries are summarised in **Table 13-6.** The scoping assessment is based on a combination of the project design at the time of writing, embedded mitigation measures, understanding of the baseline environment at the time of writing, the evidence base for commercial fisheries effects, further consultation with consultees, and professional judgement. The approach to this assessment is set out in **Chapter 5: Approach to Scoping and EIA**.

13.8.1.3 The early identification of potential significant effects is used here as a tool aimed at delivering a proportionate approach to the EIA. In doing so, it sets out a high-level assessment of all potential effects, significant or not. The basis for scoping out certain effects, and therefore no longer considered, is presented after the table supported by an evidence base.

Table 13-6: Summary of potential significant effects for commercial fisheries scoped in (✓) or scoped out (x) of the EIAR during construction (C), O&M and decommissioning (D)

Activity and Impact	Embedded Mitigation	Outcome of Scoping per Phase			Justification	Overview of Proposed Assessment Approach
		C	O&M	D		
Loss of or restricted access to fishing grounds	COM-001, COM-002, COM-003, COM-004, COM-005, COM-006, COM-007, COM-008, COM-009, COM-010, COM-011, COM-012, COM-013.	✓	X	✓	The implementation of safety zones around construction and decommissioning works may result in temporary loss/restricted access to fishing grounds	Qualitative assessment based on standard impact assessment matrix.
		X	✓	X	The presence of Project infrastructure may result in loss or restricted access to fishing grounds during the O&M phase. The implementation of safety zones around major maintenance activities may also result in temporary localised loss or restricted access to grounds.	Qualitative assessment based on standard impact assessment matrix.
Displacement of fishing effort to other areas		✓	✓	✓	Displacement of fishing effort associated with loss of access to fishing grounds during construction, O&M and decommissioning, leading to potential increased competition for fisheries resources and conflict between fisheries.	Qualitative assessment based on standard impact assessment matrix.
Interference with fishing activity		✓	✓	✓	Interference with fishing activities and with static fishing gear due to increased vessel transits associated with construction/ decommissioning and O&M activities.	Qualitative assessment based on standard impact assessment matrix.
Increased steaming distances and times		✓	✓	✓	Fishing vessels required to take alternative routes to navigate to and/from fishing grounds due to the presence of safety zones and/or infrastructure during construction, O&M and decommissioning.	Qualitative assessment based on standard impact assessment matrix.
Increased risk of loss or damage to		✓	✓	✓	The presence of Project infrastructure (e.g. anchoring systems, dynamic cables, cable	Qualitative assessment based on standard

Activity and Impact	Embedded Mitigation	Outcome of Scoping per Phase			Justification	Overview of Proposed Assessment Approach
		C	O&M	D		
fishing gear (snagging risk)					protection) as well as other seabed obstacles (accidentally dropped objects, etc) may pose a snagging risk to fishing vessels and have potential to result in loss or damage to fishing gear. Aspects related to safety risks for fishing vessels associated with potential gear snagging, are assessed together with navigational risks under **Chapter 14: Shipping and Navigation.**	impact assessment matrix.
Changes to exploited fish and shellfish resources	See **Chapter 12: Fish Ecology** and **Chapter 9: Benthic Ecology** for details on proposed embedded mitigation in relation to fish and shellfish species	✓	✓	✓	Impacts on the ecology of fish and shellfish species of commercial importance leading to impacts on the commercial fisheries that exploit them.	Qualitative assessment based on findings of **Chapter 9: Benthic Ecology** and **Chapter 12: Fish Ecology**

13.8.2 Impacts Scoped out of Assessment

13.8.2.1 All potential impacts to commercial fishing have been scoped in for assessment.

13.9 Cumulative Effects

13.9.1.1 Cumulative effects on commercial fisheries resulting from the effects of the Project and other developments will be assessed in accordance with the guidance and methodologies set out in **Chapter 5: Approach to Scoping and EIA** and considering the other developments that have been screened in as part of the CEA screening exercise.

13.9.1.2 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).

13.9.1.3 All impacts scoped into the impact assessment for the Project (see **Table 13-6**) will be assessed in the CEA.

13.10 Potential Transboundary Effects

13.10.1.1 As described in Section 13.5 and illustrated in **Figure 13-4**, non-UK fishing vessels may target fishing grounds within the commercial fisheries study area at times. Activity by these vessels is expected to concentrate in areas south of the ECC rather than where the ECC is located. As such, although very limited, there may be potential for transboundary effects to occur on non-UK fisheries, and these are scoped in for further assessment. Further information is provided in **Appendix 5D: Transboundary Screening Matrix.**

13.10.1.2 Information on the approach to transboundary impacts on fish and shellfish species, including those of commercial importance, is provided in **Chapter 12: Fish Ecology** and **Chapter 9: Benthic Ecology**, respectively.

13.11 Proposed Approach to the Environmental Impact Assessment

13.11.1.1 The Project-wide approach to the assessment methodology is set out in **Chapter 5: Approach to Scoping and EIA.** This will be implemented to assess the potential significant effects to commercial fisheries receptors from the construction, O&M, and decommissioning of the Project.

13.11.1.2 The specific guidance outlined in **Table 13-2** will also be considered in relation to the assessment, in addition to consultation with the stakeholders outlined above.

13.11.1.3 This section outlines the proposed EIA approach for commercial fisheries. This includes proposed assessment methodology, relevant embedded mitigation measures, as well as those effects scoped into and out of the assessment.

13.11.2 Proposed Assessment Methodology

13.11.2.1 The EIA will follow the approach outlined in **Chapter 5: Approach to Scoping and EIA** of this 2024 Scoping Report. In addition to the general approach and guidance

outlined in **Chapter 5: Approach to Scoping and EIA**, the assessment of commercial fisheries receptors will also comply with the guidance documents detailed in **Table 13-2**.

13.11.3 Assumptions and Limitations

13.11.3.1 The limitations of the sources of data and information used to inform the fisheries assessment will be clearly set out in the Commercial Fisheries chapter of the EIAR. Whilst data and information limitations apply to both inshore and offshore fishing activities, they tend to be more pronounced for inshore fisheries as these often involve vessels in the smaller length categories (i.e. under 12 m). These vessels are currently not satellite tracked (i.e. not included in the VMS dataset) nor required to have AIS transmitters. As a result, publicly available information on the spatial distribution of inshore fishing activities tends to be more limited than for offshore areas.

13.11.3.2 To ensure that the characterisation of the baseline is as robust as possible, in addition to the analysis of publicly available fisheries data, information will be collected via direct consultation with the fishing industry.

13.12 Summary

13.12.1.1 The commercial fisheries study area supports a range of commercial fishing activities. Overall, demersal trawling for *Nephrops* and fish represents the main activity in the ICES rectangles where the Array Area and the majority of the ECC are located. In addition, there is a pelagic fishery for herring in areas south of the ECC within rectangle 43E9. In comparison to the other ICES rectangles within the study area, the rectangle where the Array Area is located sustains low landings values.

13.12.1.2 In areas closer to shore, potting for edible crab and lobster and scallop dredging, represent the main fishing activities.

13.12.1.3 All potential significant effects on commercial fisheries have been scoped in for assessment in the EIAR, and embedded measures proposed to minimise potential impacts on fisheries receptors have been identified. Consultation with fisheries stakeholders is on-going and will continue throughout the application phase, as well as post-application.

13.13 Further Consideration for Consultees

13.13.1.1 Please find below specific scoping questions relevant to the topic of commercial fisheries:

- Do you agree with the key commercial fisheries receptors identified as requiring assessment (lobster and crab fishery, scallop dredging, demersal trawling for *Nephrops* and fish and the pelagic fishery for herring)?
- Do you agree with the listed data sources in **Table 13-4** and are there any additional datasets that you feel should be reviewed to characterise the commercial fisheries baseline?
- Do you agree with the potential impacts that have been identified for assessment on commercial fisheries receptors?

- Are there any additional guidance documents that should be considered?
- Are there any additional fisheries organisations that should be consulted?
- How do MD-LOT and its advisors anticipate the management of compensation, mitigation, alternative investment etc?

14. SHIPPING AND NAVIGATION

14.1 Introduction

14.1.1.1 This chapter of the Scoping Report considers the potential significant effects on shipping and navigation of the Project. The chapter provides an overview of the baseline conditions relevant to the Project Area (as defined in **Chapter 1: Introduction**), the datasets to be used to inform the EIA, sources, pathways and receptors of the potential significant effects to be considered, and how these potential significant effects will be assessed for the purpose of the EIA.

14.1.1.2 As described further in Section 14.11, the shipping and navigation risk assessment will follow the relevant MCA guidance, primarily Marine Guidance Note (MGN) 654[460] which requires the undertaking of a Navigational Risk Assessment (NRA). This chapter of the Scoping Report therefore sets out additional data, consultation and assessment requirements that will form part of the overarching NRA process.

14.1.1.3 This chapter should be read alongside the following chapters and documents:

- **Chapter 13: Commercial Fisheries** given the overlap in commercial fishing activity and vessel (navigation) safety.
- **Chapter 17: Marine Infrastructure and Other Users** given the overlap in vessel access to other offshore infrastructure including helicopter access.

14.1.1.4 It is noted that the shipping and navigation assessment will assess effects relating to navigational safety only. Effects relating to fishing gear will be assessed in **Chapter 13: Commercial Fisheries**.

14.2 Legislation, Policy and Guidance

14.2.1 Legislation and Policy

14.2.1.1 Legislation and policy that has been used to inform the scope of the Shipping and Navigation chapter is set out in **Table 14-1**. Further information on policies relevant to the EIA and their status is set out in **Chapter 2: Legislative and Policy Context.**

Table 14-1: Legislation and policy context

Legislation/policy	Relevance to the assessment
Legislation	
United Nations Convention on the Law of the Sea (UNCLOS) (United Nations (UN), 1982)	Lays down a comprehensive regime of law and order in the world's oceans and seas establishing rules governing all uses of the oceans and their resources.
Convention on the International Regulations for Preventing Collisions at Sea (COLREGs) (International Maritime Organization (IMO), 1972/77)	Establishes the navigation rules which must be followed by vessels at sea to prevent a collision incident.

Legislation/policy	Relevance to the assessment
International Convention for the Safety of Life at Sea (SOLAS) (IMO, 1974)	Specifies the minimum standards for the construction, equipment and operation of vessels, compatible with their safety.
National Policy	
United Kingdom Marine Policy Statement (His Majesty's Government), 2011)	Provides a framework for preparing Marine Plans and taking decisions affecting the marine environment.
Scotland's National Marine Plan[461]	Provides a framework for all marine activity in Scottish territorial and offshore waters.

14.2.2 Technical Guidance

14.2.2.1 Technical guidance that has been used to define the assessment is set out in **Table 14-2**.

Table 14-2: Relevant technical guidance

Guidance reference	Relevance to the assessment
Marine Guidance Note (MGN) 654 OREI: Guidance on UK Navigational Practice, Safety and Emergency Response (Maritime and Coastguard Agency)	Highlights issues that shall be considered when assessing the effect on navigational safety from offshore renewable energy developments, proposed in UK internal waters, UK territorial sea, or the UK Exclusive Economic Zone (EEZ).
Revised Guidelines for Formal Safety Assessment (FSA) (International Maritime Organization)[462]	A structured and systematic methodology based upon risk analysis and Cost Benefit Analysis (CBA) (if applicable) to reduce effects to As Low as Reasonably Practicable (ALARP).
International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) Guidance G1162 on the Marking of Man-Made Offshore Structures[463] and IALA Recommendation O-139 on the Marking of Man-Made Offshore Structures[464]	Describes lighting and marking requirements for offshore installations to increase safety for passing vessels.
The Royal Yachting Association's (RYA) Position on Offshore Renewable Energy Developments: Paper 1 (of 4) – Wind Energy[465]	Sets out the RYA position in relation to the development of offshore renewable wind energy.
MCA and HSE Regulatory Expectations on Moorings for Floating Wind and Marine Devices[466]	Provide essential considerations for the mooring systems and how they should be considered in proportion to the potential risks to develop a safe and sustainable development.

14.3 Study Area

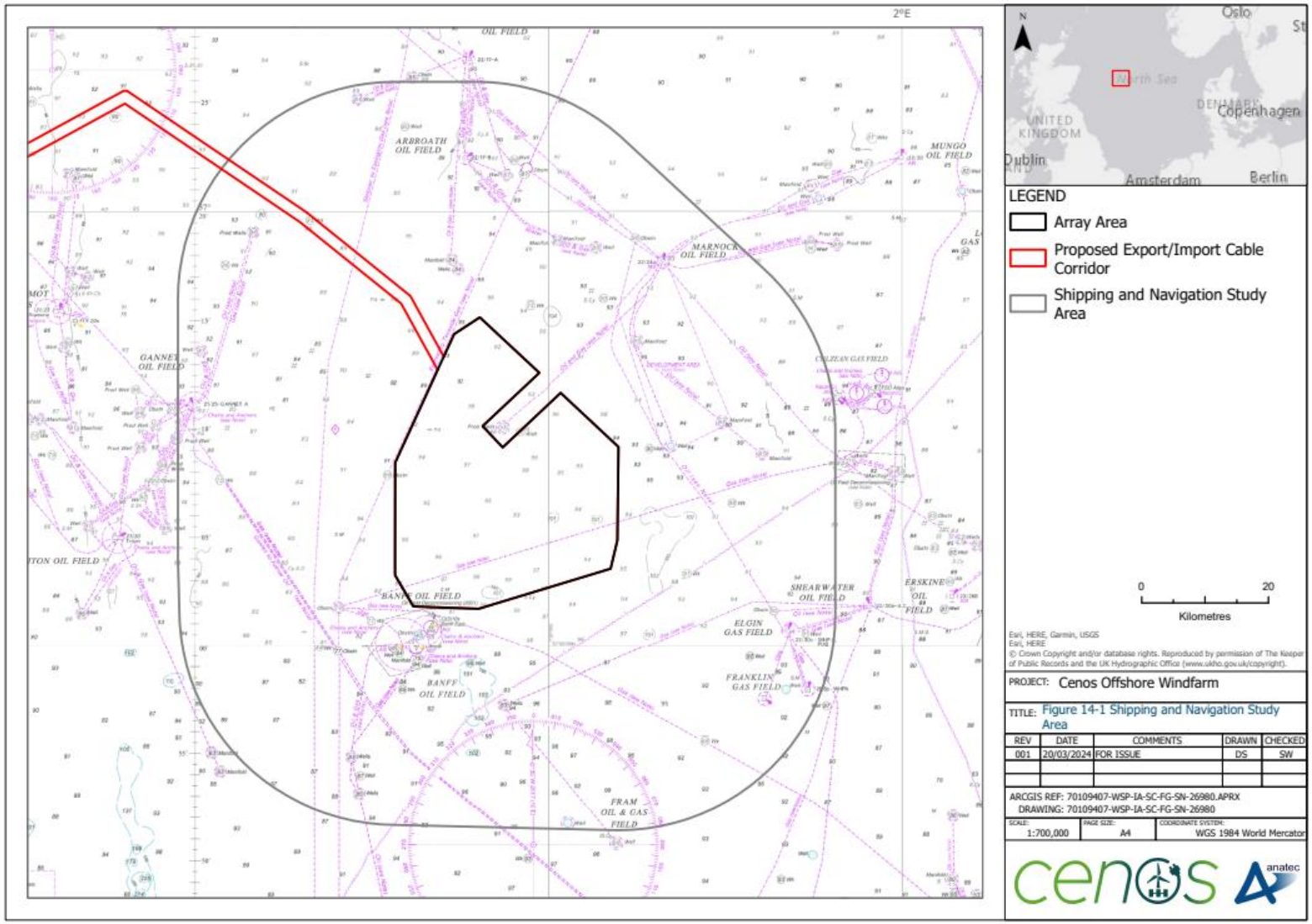
14.3.1.1 Data collection and analysis has primarily been undertaken within a minimum 10 NM buffer (the 'Study Area') of the Array Area. This study area has been retained from

data assessment undertaken in Section 12 of the 2023 Scoping Report as it encompasses an area in excess of 10 NM of the Array Area, which is typical for a shipping and navigation study area, as presented in **Figure 14-1**. A 10 NM buffer is large enough to capture the most relevant navigational features and passing marine traffic whilst remaining specific to the project being studied. For the NRA, a 10 NM buffer around the Array Area will be used.

14.3.1.2 The ECC will be assessed from the Array Area to MHWS. The section of the ECC from MHWS to 12 NM is the same as the NorthConnect Cable Corridor. The Applicant is coordinating with NorthConnect Limited. NorthConnect Interconnector and the Project will only require one set of infrastructure, within the overlapping marine licence Project Area from 12 NM to MHWS.

14.3.1.3 The section of the ECC from MHWS to 12 NM has previously been assessed within the EIAR submitted for NorthConnect Limited and judged acceptable through the consenting of NorthConnect. The previous EIA work for NorthConnect will be considered in assessing the ECC from MHWS to 12 NM, updated by any other readily available information and surveys undertaken. See Section 14.5 for further details of the baseline conditions. Further details are in **Chapter 5: Approach to Scoping and EIA**.

Figure 14-1: Shipping and Navigation Study Area



14.4 Consultation

14.4.1.1 Consultation is a key part of the assessment process. This assessment has been and will be informed by engagement and discussion with various stakeholders such as:

- MCA;
- NLB;
- UK Chamber of Shipping (UKCOS);
- RYA Scotland;
- Cruising Association (CA);
- SFF; and
- Regular commercial operators, including those operating oil and gas support services.

14.4.1.2 A summary of the key issues raised during consultation is outlined in **Table 14-3**, together with how these issues will be considered in the production of the EIAR.

14.4.1.3 A Hazard Workshop will be held with these organisations invited to discuss the potential hazards relating to shipping and navigation due to the presence of the project, with the findings used to inform a hazard log which will be used as input to the risk assessment. Relevant fishing industry representatives will also be invited to attend the Hazard Workshop.

Table 14-3: Summary of consultation relating to shipping and navigation

Date and stakeholder	Consultation and key comments	How this is accounted for
MCA (Virtual Meeting), 19 July 2023	Due to the distance offshore, the Applicant requested an exemption from a winter survey and to instead supplement the summer survey data with 12 months of Automatic Identification System (AIS) data. MCA agreed with this approach as long as the summer survey was extended to three weeks instead of two, and proposed that the CA along with RYA Scotland be consulted.	A three-week summer survey was undertaken between 22 August 2023 and 12 September 2023. The CA and RYA Scotland have been added as key stakeholders.
UKCOS, 13 April 2023, included with the 2023	UKCOS recommends additional AIS data for 2022 is procured to accurately assess seasonal variation.	A 12-month analysis will be carried out as part of the NRA process and submitted in accordance with MGN 654.

Date and stakeholder	Consultation and key comments	How this is accounted for
Scoping Opinion, June 2023	UKCOS advises that Marine Accident Investigation Branch (MAIB) data is increased from 10 years to 20 years to fully assess trends and historic incidents.	MAIB data will be extended to include 20 years of data within the NRA which will be assessed in a qualitative manner. Modelling will only consider 10 years of data given the advancements in regulation and vessel technology they have changed the safety standards and operational capabilities of vessels.
	UKCOS requests that vessel displacement should be included as potential impacts during all phases of the Project. Additionally, collision risk should be broken down into risk between third party vessels as well as risk between third party vessels and project vessels. UKCOS also asserts that allision risk should be included as an impact within construction and decommissioning phases.	Vessel displacement, collision risk between third party vessels, and collision risk between third party vessels and project vessels will be considered as potential impacts, and allision risk during construction and decommissioning phases will be scoped in.
	UKCOS recommended a wider routeing study area of 50 NM.	The cumulative study area will consider projects within 50 NM, including any routeing impacts.
MCA, 05 April 2023, included with the 2023 Scoping Opinion, June 2023	The MCA requires that the EIAR consider collision risk, navigational safety, emergency response etc., as per the requirements of MGN 654.	The NRA will be compliant with MGN 654 and will consider all vessel types and identified hazards.
	The MCA highlights that Burial Protection Index study and anchor penetration study should be completed if necessary. The MCA also note they would allow a water depth reduction of 5% referenced to Chart Datum.	The NRA will be compliant with MGN 654 where under keel clearance will be assessed.
	The MCA encourages a cumulative assessment within shipping and navigation risk regarding overall reduction in navigable sea room.	Cumulative effects regarding shipping and navigation will be assessed within the NRA.
	The MCA confirms that guidance on regulatory mooring expectations should be followed and that a Third-Party Verification of the mooring arrangements will be required.	The Project will follow all guidance listed in **Table 14-2**, and compliance with regulatory expectations will be an embedded mitigation.

Date and stakeholder	Consultation and key comments	How this is accounted for
RYA, 27 March 2023, included with the 2023 Scoping Opinion, June 2023	The RYA request to contribute to the NRA via the Hazard Workshop	The RYA will be included in the NRA Hazard Workshop.
NLB, 22 March 2023 included with the 2023 Scoping Opinion, June 2023	The NLB will work with the Applicant to develop the Lighting and Marking Plan (LMP) and Navigational Safety Plan (NSP).	The LMP and NSP will be considered as embedded mitigation measures within the NRA.
	The NLB request the inclusion of the cumulative effects with regards to shipping and navigation within the EIAR.	Cumulative effects regarding shipping and navigation will be assessed within the NRA.
Scoping Workshop, 29 February 2024	The Applicant provided a high level summary during the Scoping Workshop. At the time of writing, no further consultee responses have been received.	Waiting for Scoping Opinion.

14.5 Baseline Conditions

14.5.1 Data Information Sources

14.5.1.1 An initial desk-based review of data sources to support this scoping report has been identified in the 2023 Scoping Report, as presented in **Table 14-4**.

Table 14-4: Key sources of data

Source	Date	Summary	Coverage of study area
14 Days AIS	Between 9 and 22 June 2021	Characterising vessel traffic movements in the study area	Full coverage
14 Days AIS	Between 3 and 16 December 2021		
RNLI Incident Data	2008 - 2022	Review of maritime incidents in the study area	
MAIB Incident Data	2010 - 2019		
NP54 Admiralty Sailing Directions North Sea (West) Pilot (United Kingdom Hydrographic Office[467]	2021	Characterising other navigational features in the study area	
UKHO Admiralty Charts 272-0, 273-0, 274-0 and 278-0	2023		

Source	Date	Summary	Coverage of study area
RYA Coastal Atlas[468]	2019	Characterising recreational vessel movements in the study area	

14.5.2 Existing Baseline

Navigational Features

14.5.2.1 This section describes the present conditions which constitute the existing baseline environment for shipping and navigation within the study area.

14.5.2.2 This section provides preliminary assessment of key navigational features located within and in proximity to the Array Area. An overview of the identified features is presented in **Figure 14-2**.

14.5.2.3 There are seven oil and gas fields located within the study area, with various offshore infrastructure located at each, as detailed in **Table 14-5**. Chains and anchors can be seen at a number of these nearby oil and gas installations.

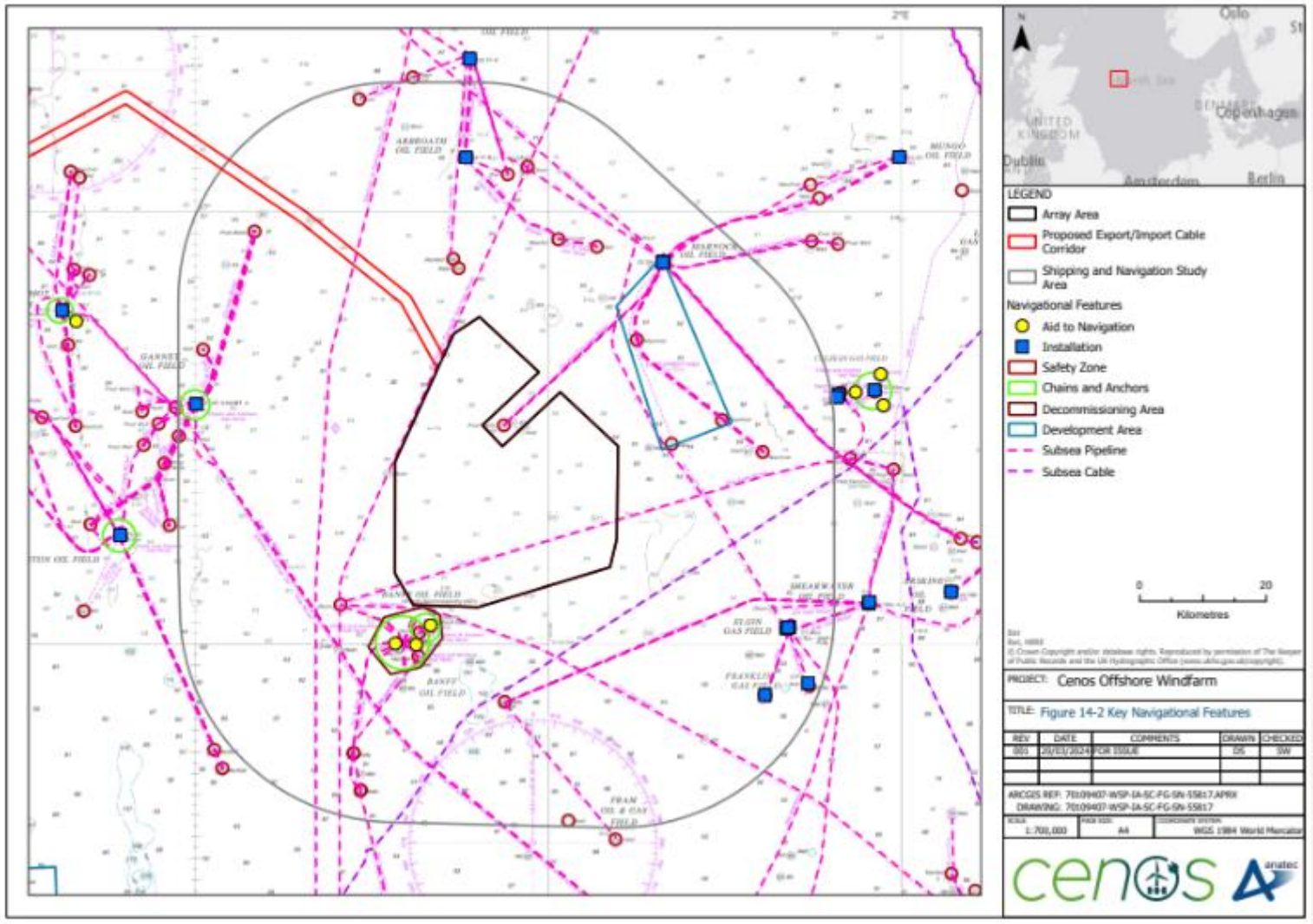
14.5.2.4 A total of 142 pipelines run through the study area with a number of these running parallel to one another. Five of the pipelines are at the pre-commissioning stage, four are not in use and one is proposed but is charted and therefore considered relevant to the baseline.

14.5.2.5 It is noted that planned developments are not considered baseline but will be considered on a cumulative basis within the NRA.

Table 14-5: Offshore infrastructure within the study area

Name	Distance from the Array Area (NM)	Manned status	Field type	Phase
Arbroath Platform	6.5	Manned	Oil	Operational
Marnock Complex, for instance, Eastern Trough Area Project (ETAP)	7.0	Manned	Oil & Gas	Operational
Franklin West Platform	7.8	Normally Unmanned Installation (NUI)	Gas	Operational
Elgin Complex	7.9	Manned	Gas	Operational
Gannet Alpha Platform	9.2	Manned	Oil	Operational
Franklin Platform	9.4	NUI	Gas	Operational

Figure 14-2: Key Navigational Features



Marine Traffic

14.5.2.6 This section provides preliminary assessment of the available marine traffic data.

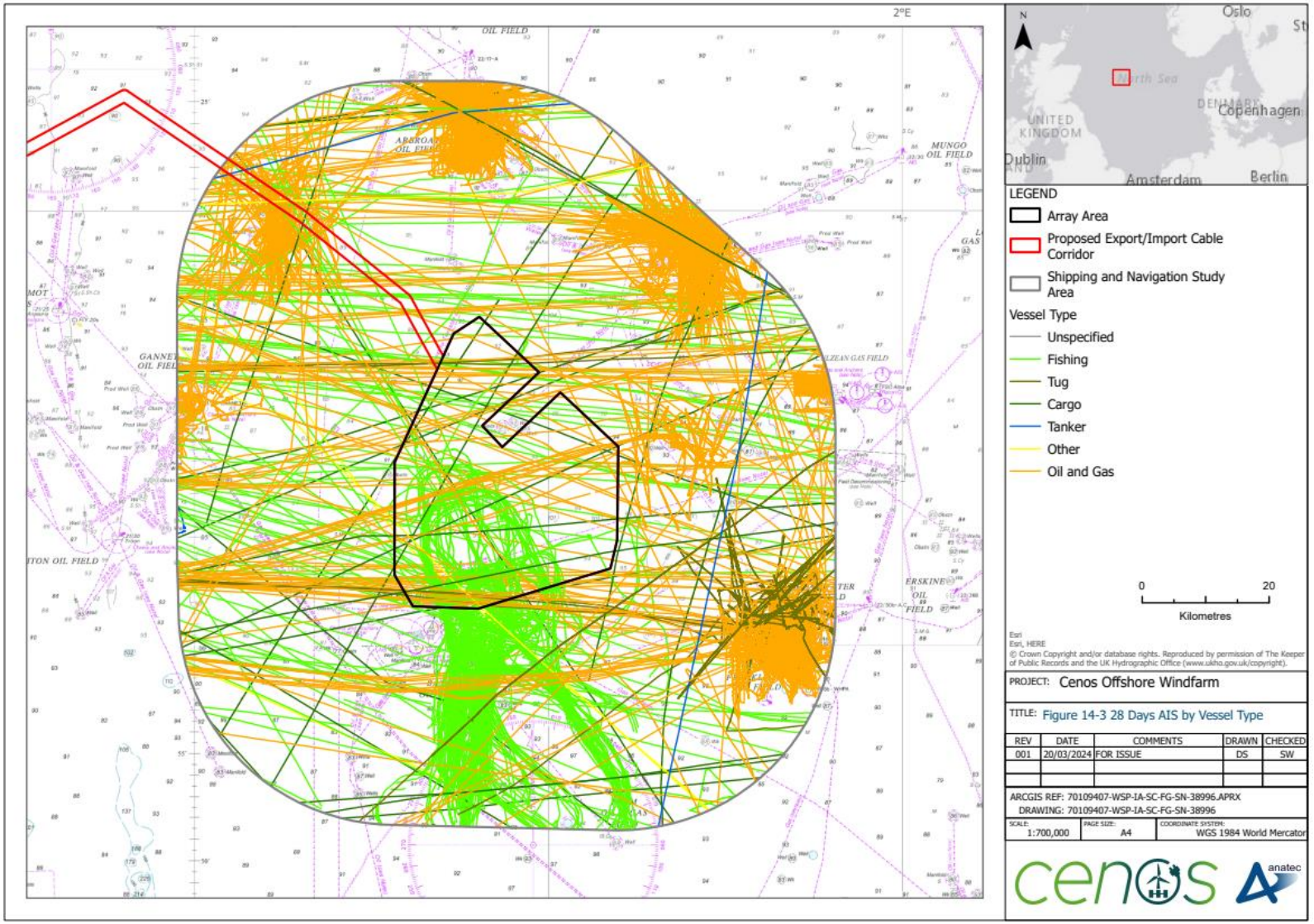
14.5.2.7 The vessels recorded within the study area during the summer and winter 2021 periods are presented in **Figure 14-3**, colour-coded by vessel type. Vessels involved in temporary drilling operations were excluded from analysis; this also includes fixed installations including drilling rigs which broadcast on AIS.

14.5.2.8 An average of 20 vessels per day were recorded within the study area, and approximately six per day intersecting the Array Area. The most common vessel types were oil and gas vessels (approximately 13 per day) and fishing vessels (approximately five per day).

14.5.2.9 Active fishing was observed within the southern portion of the Array Area, with the majority of array area intersections being from demersal trawlers (approximately 86 percent). Fishing activity was typically recorded during the summer months (96 percent). No recreational activity was noted within the study area during the 28-day period.

14.5.2.10 Anchoring activity may be identified via an interrogation of navigational status broadcast on AIS, a speed analysis of vessels and a check of vessel track behaviour. Based on these processes, no anchoring activity was recorded within the study area, which may be expected given the distance offshore and charted water depths within the study area (minimum 80 m below Chart Datum (CD)).

Figure 14-3: 28 days AIS by Vessel Type



Maritime Incidents

14.5.2.11 This section reviews maritime incidents that have occurred in the vicinity of the Array Area based on recent RNLI data and MAIB data. The analysis is intended to provide a general indication as to whether the area of the Project is currently a low or high-risk area in terms of maritime incidents.

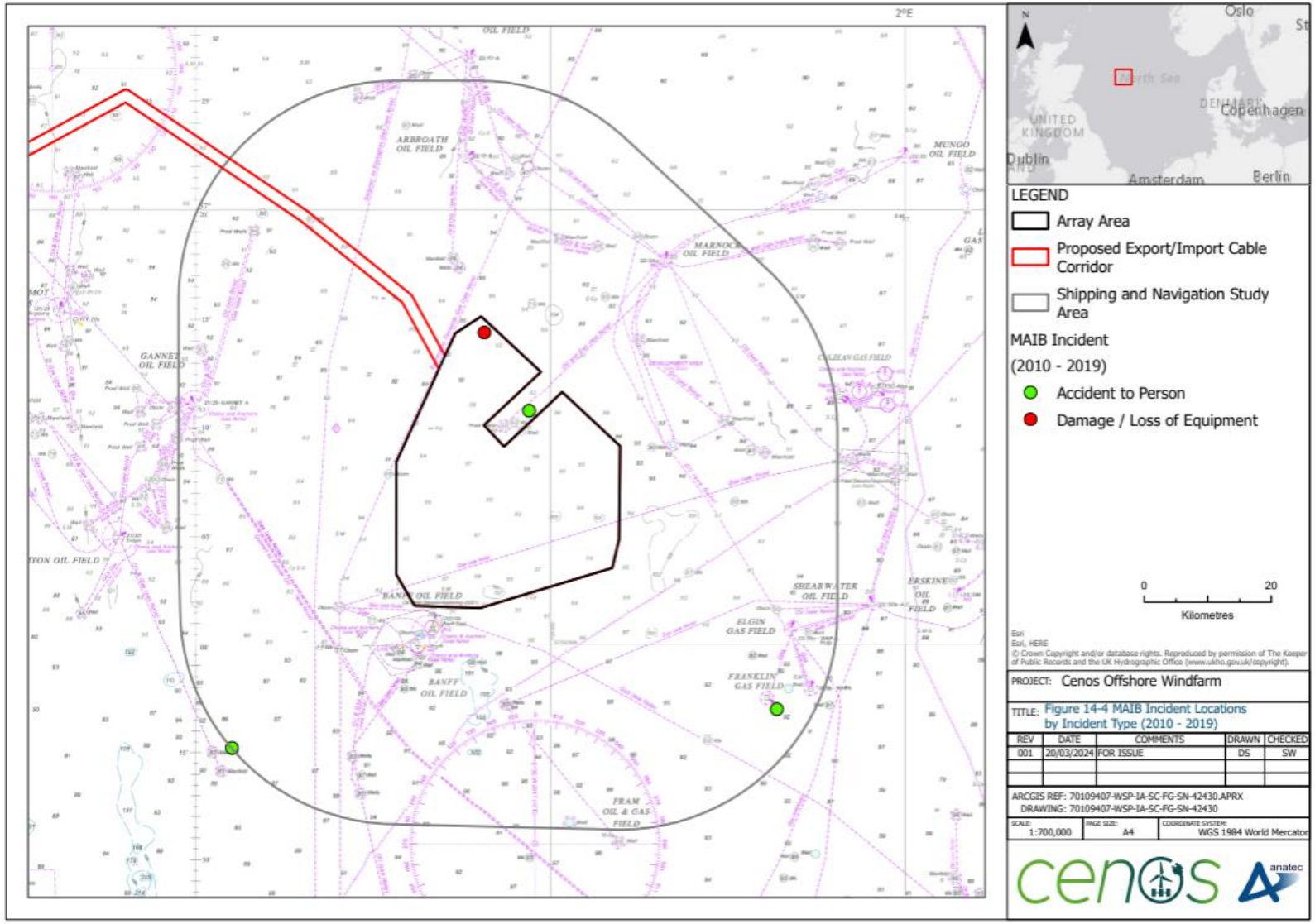
14.5.2.12 The MAIB incident locations (excluding false alarms and hoaxes) recorded within the study area during the ten-year period between 2010 and 2019 are presented in **Figure 14-4,** colour coded by incident type.

14.5.2.13 Over the ten-year period, four incidents were recorded within the study area based on MAIB data, all of which involved offshore industry vessels. One incident occurred within the Array Area itself, this was a damage/loss of equipment incident, with the other incidents being accident to person.

14.5.2.14 No incidents were recorded by the RNLI within the study area. The nearest incident was a person in danger, roughly 18 NM northeast of the Array Area. This may be expected given the distance offshore and the RNLI's operational limit of 100 NM.

14.5.2.15 Overall, based on the reported incidents and considering the number of vessels recorded within the study area during the survey periods, the total number of reported incidents is relatively low

Figure 14-4: MAIB Incident Locations by Incident Type (2010 – 2019)



14.5.3 Future Baseline

14.5.3.1 Future changes in shipping depend on a variety of complex factors such as trading patterns and vessel design and as such are difficult to predict. The NRA will therefore consider a conservative increase which will be discussed with relevant stakeholders. It should be considered that levels of oil and gas activity are likely to change, noting the ongoing decommissioning of various North Sea fields.

14.6 Basis for Assessment

14.6.1.1 The shipping and navigation scoping assessment is based on the following key assumptions, which are also set out in **Chapter 3: Project Description**:

- The array will consist of up to 95 WTGs;
- There will be up to two offshore substations;
- Maintenance activities will be undertaken for both preventive and corrective maintenance requirements;
- The operational lifetime of the project is assumed to be a minimum of 30 years; and
- The decommissioning of the windfarm is anticipated to involve as close to full removal of offshore infrastructure as possible at the time of decommissioning (where safe/practicable to do so). The decommissioning works are likely to be undertaken in reverse to the sequence of construction works and involve similar levels of equipment and impact.

14.7 Relevant Embedded Mitigation Measures

14.7.1.1 Embedded mitigation measures have been identified and are proposed to be adopted as part of the Project design (primary mitigation); or implemented in accordance with industry standard practice that would occur with or without the input from the environmental assessment feeding into the process (tertiary mitigation). There is a commitment by the Applicant to implement these embedded mitigation measures and they have been considered within the 2024 EIA Scoping Report.

14.7.1.2 The requirement for additional mitigation measures (secondary mitigation) will be dependent on the significance of effects on shipping and navigation receptors and will be consulted upon with consultees throughout the EIA process. Any additional mitigation measures will be presented within the EIAR.

14.7.1.3 Measures that are relevant to shipping and navigation are listed in **Table 14-6**. Further mitigation measures may be identified during the NRA process and if so, will be incorporated into the assessment of the residual significance of risk and consulted upon with relevant consultees.

Table 14-6: Embedded mitigation relating to shipping and navigation

ID	Embedded mitigation measures
SHI - 001	The Applicant will ensure compliance with MGN 654 and its annexes, where applicable, including SAR Checklist in consultation with the MCA.
SHI - 002	All offshore infrastructure associated with the Project will be appropriately marked on the UKHO Admiralty charts.
SHI - 003	Promulgation of information for vessel routes, timings and locations, safety zones and advisory passing distances as required (for example NtM, Kingfisher Bulletin)
SHI - 004	Application for safety zones of up to 500 m during construction and periods of major maintenance, and either statutory or advisory safety zones during operation (to be agreed during further consultation).
SHI - 005	Marine coordination and communication to manage project vessel movements
SHI - 006	Marking and lighting of the Array Area in agreement with NLB and in line with IALA Recommendation O-139 and G1162. A Lighting Marking Plan (LMP) will be developed and adhered to for the Project. The LMP confirms compliance with legal requirements regarding and lighting and marking in relation to shipping, navigation and lighting.
SHI - 007	In line with MAPROL convention requirements an MPCP will be developed for the Project and will detail the procedures to be actioned in the event of a pollution event.
SHI - 008	Compliance with MCA and HSEs published regulatory expectations on mooring devices for floating wind and marine devices (2017)
SHI - 009	Cables will be buried as standard. Where adequate burial depth cannot be achieved, external cable protection methods will be utilised. This will be minimised as far as practicable. Cable burial will be informed by a CBRA and will be implemented utilising a CaP. Any damage, destruction or decay of cables notified to MCA, NLB, Kingfisher, and UKHO no later than 24 hours after discovered.
SHI - 010	Minimum blade clearance of 22 m in operational conditions above the water line with allowance for degrees of motion which may mean clearance is less than 22m in certain conditions i.e. adverse weather/swell.
SHI - 011	Guard vessel(s) as required by risk assessment

14.7.1.4 Any secondary mitigation will be identified as the environmental assessment progresses and reported in the EIAR.

14.8 Scoping of Potential Significant Effects

14.8.1.1 In line with the EIA Regulations 2017, the EIA for the Project will only consider those impacts where there is a risk of a potential significant effects. The significance of effects will be determined as an output of the formal safety assessment detailed in Section 14.11.

14.8.1.2 The potential significant effects on shipping and navigation are summarised in **Table 14-7**. The scoping assessment is based on a combination of the project design at the time of writing, embedded mitigation measures, understanding of the baseline environment at the time of writing, the evidence base for shipping and navigation effects, further consultation with consultees, professional judgement, and the

requirements of MGN 654. Impacts identified will also be considered for potential cumulative effects in the NRA.

14.8.1.3 The early identification of potential significant effects is used here as a tool aimed at delivering a proportionate approach to the EIA. In doing so, it sets out a high-level assessment of all potential effects, significant or not. The basis for scoping out certain effects, and therefore no longer considered is presented after the table, supported by evidence base.

Table 14-7: Summary of potential significant effects for shipping and navigation scoped in (✓) or scoped out (x) of the EIAR during construction (C), O&M and decommissioning (D)"

Activity and impact	Embedded mitigation	Outcome of scoping per phase			Justification	Overview of proposed assessment approach
		C	O&M	D		
Displacement of vessels.	SHI-001, SHI-002, SHI-003, SHI-004, SHI-005, SHI-006, SHI-007, SHI-008, SHI-009, SHI-010, SHI-011	✓	✓	✓	Construction and decommissioning activities and the presence of the Array Area during operation may displace existing routes and activity resulting in an increase in the likelihood of vessel to vessel encounters between third-party vessels with a subsequent increase in vessel-to-vessel collision risk.	As per the requirements of MGN 654.
Collision risk	SHI-001, SHI-002, SHI-003, SHI-004, SHI-005, SHI-006, SHI-007, SHI-008, SHI-009, SHI-010, SHI-011	✓	✓	✓	The presence of vessels associated with construction, O&M and decommissioning activities may result in an increase in the likelihood of vessel to vessel encounters between third-party vessels and project vessels with a subsequent increase in vessel-to-vessel collision risk.	As per the requirements of MGN 654.
Allision risk	SHI-001, SHI-002, SHI-003, SHI-004, SHI-005, SHI-006, SHI-007, SHI-008, SHI-009, SHI-010, SHI-011	✓	✓	✓	The presence of array infrastructure may introduce a vessel to structure allision risk, including for vessels under power, adrift and navigating internally within the array.	As per the requirements of MGN 654.
Anchor snagging risk	SHI-001, SHI-002, SHI-003, SHI-004, SHI-009	X	✓	X	The presence of offshore cables and mooring lines associated with floating WTGs may increase the likelihood of a third-party vessel's anchor interacting with a cable including a snagging risk.	As per the requirements of MGN 654.
Loss of station for a floating structure.	SHI-001, SHI-002, SHI-003, SHI-004, SHI-005, SHI-006, SHI-008,	X	✓	X	A failure of the mooring or anchoring system may lead to the detachment (complete or partial) of a floating structure resulting in the structure losing	As per the requirements of MGN 654.

Activity and impact	Embedded mitigation	Outcome of scoping per phase			Justification	Overview of proposed assessment approach
		C	O&M	D		
					station and creating a hazard to third-party vessels.	
Potential impacts to aids to navigation.	SHI-001, SHI-006, SHI-011	✓	✓	✓	The presence of surface infrastructure may reduce the effectiveness or prevent use of existing aids to navigation located in proximity to the Array Area.	As per the requirements of MGN 654.
Under keel clearance interaction	SHI-001, SHI-003, SHI-006, SHI-008, SHI-009	X	✓	X	The presence of cable protection and mooring or anchoring systems may reduce charted water depths resulting in an increase in under keel interaction risk for passing vessels.	As per the requirements of MGN 654.
Potential impacts to Emergency response capability.	SHI-001	X	✓	X	The presence of the Array Area and O&M activities may increase the number of emergency incidents resulting in a reduction in emergency response capability and/or reduced access for emergency responders including Search and Rescue (SAR) assets.	As per the requirements of MGN 654.
Potential impacts to vessels navigation, communication, and position fixing equipment.	SHI-001	X	✓	X	The presence of infrastructure may affect a vessel's use of its navigation, communication, and position fixing equipment.	As per the requirements of MGN 654.

14.8.2 Impacts Scoped Out of Assessment

14.8.2.1 Given that MGN 654 notes impacts which must be considered within the NRA, no impacts will be scoped out of the NRA process, although based upon the findings of the NRA some impacts may be scoped out of the risk assessment (including within the EIAR) as detailed further in Section 14.11.

14.9 Cumulative Effects

14.9.1.1 Cumulative effects on shipping and navigation resulting from the effects of the Project and other developments will be assessed in accordance with the guidance and methodologies set out in **Chapter 5: Approach to Scoping and EIA** and MGN 654. The assessment will consider other developments that have been screened in as part of the CEA screening exercise within a 50 NM study area.

14.9.1.2 There is potential for cumulative effects to occur on shipping and navigation users due to other potential projects or activities. All impacts outlined for the risk assessment of the project in isolation will be considered for inclusion in the cumulative risk assessment.

14.9.1.3 A screening exercise will be undertaken in the NRA to determine which other projects or activities should be included in the cumulative risk assessment. Criteria which will be considered as part of this screening exercise includes status, proximity to the Array Area, the level to which they are anticipated to cumulative impact relevant users, and data confidence.

14.10 Potential Transboundary Effects

14.10.1.1 A screening of transboundary impacts will be undertaken. The screening exercise will identify if there is the potential for transboundary impacts upon shipping and navigation due to the Project. Specifically, vessels transiting to/from other countries may be exposed to a transboundary impact.

14.10.1.2 The potential effects from construction, O&M, and decommissioning on shipping and navigation receptors are considered in **Appendix 5D: Transboundary Screening Matrix.**

14.11 Proposed approach to the Environmental Impact Assessment

14.11.1.1 The Project-wide approach to the assessment methodology is set out in **Chapter 5: Approach to Scoping and EIA**. However, whilst this has informed the general approach that has been used, the primary guidance on assessment of shipping and navigation risk is provided by the MCA.

14.11.1.2 The specific legislation and guidance outlined in **Table 14-2** will be considered in relation to the assessment, in addition to consultation with the stakeholders outlined above.

14.11.2 Proposed Assessment Methodology

14.11.2.1 The assessment of shipping and navigation receptors will comply with the following guidance documents where they are specific to this topic:

- MGN 654 OREIs – Guidance on UK Navigation Practice, Safety and Emergency Responses and its Annexes[460].
- Revised Guidelines for Formal Safety Assessment (FSA) for Use in the Rule-Making Process[462].
- International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) Recommendation O-139 The Marking of Offshore Man-Made Structures[464].
- IALA Guideline G1162 The Marking of Offshore Man-Made Structures[463].
- MGN 372 Amendment 1 OREIs – Guidance to Mariners Operating in the Vicinity of UK OREIs[469].
- The RYA' Position of Offshore Energy Developments: Paper 1 – Wind Energy[465].
- MCA and Health & Safety Executive (HSE) Regulatory Expectations on Moorings for Floating Wind and Marine Devices[466].

14.11.2.2 As per the methodology provided in the MCA methodology (Annex 1 to MGN 654), the NRA should assess impacts on a preliminary basis to identify which should be included within the EIA. Given that the NRA includes a set of criteria under MGN 654 which must be considered, no impact will be scoped out at this scoping stage, and all impacts will be considered within the NRA process.

14.11.2.3 The IMO FSA Methodology is the internationally recognised approach for assessing impacts to shipping and navigation users, and is the approach required under MGN 654. This methodology differs to that presented in **Chapter 5: Approach to Scoping and EIA** and to that used in other chapters, however it is the methodology required for the shipping and navigation assessment by the relevant regulatory bodies. This methodology is centred on risk control and assesses each impact in terms of its frequency and consequence in order that its significance can be determined as "broadly acceptable", "tolerable", or "unacceptable". Any impact assessed as "unacceptable" will require additional mitigation measures implemented beyond those considered embedded to reduce the impact to within "tolerable" or "broadly acceptable" parameters.

14.11.2.4 The frequency and consequence of each impact will be assessed, with significance then determined via a risk matrix approach (**Table 14-8**). This process will consider a number of inputs, including:

- Quantitative modelling (Anatec's CollRisk software);
- Output of the baseline assessment including vessel traffic surveys;
- Consideration of embedded mitigation measures;
- Lessons learnt from other offshore developments;
- Level of stakeholder concern;

- Outputs of consultation.
- Expert opinion.

Table 14-8: Risk matrix

Frequency of occurrence	**Frequent**	Tolerable	Tolerable	Unacceptable	Unacceptable	Unacceptable
	Reasonably Probable	Broadly Acceptable	Tolerable	Tolerable	Unacceptable	Unacceptable
	Remote	Broadly Acceptable	Broadly Acceptable	Tolerable	Tolerable	Unacceptable
	Extremely Unlikely	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable	Tolerable	Tolerable
	Negligible	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable	Tolerable
		Negligible	**Minor**	**Moderate**	**Serious**	**Major**
		Severity of consequence				

14.11.3 Assumptions and Limitations

14.11.3.1 The primary data sources considered within this 2024 Scoping Report are two 14-day AIS datasets which have been used to characterise the marine traffic baseline. There are limitations associated with AIS assessment, data may underrepresent levels of fishing vessels below 15 metres (m) and recreational vessels, as these vessels are not required to broadcast via AIS. Therefore, in line with MGN 654, data collection for the NRA has included radar data to ensure all vessels are captured. Admiralty publications including nautical charts have been used to establish the navigational features baseline, and maritime incident data provided by the MAIB and Royal National Lifeboat Institution (RNLI) has been used to establish baseline incident rates.

14.12 Summary

14.12.1.1 Consultation will be held with relevant statutory and non-statutory organisations as necessary and as part of the pre-application process. For shipping and navigation, the NRA process will be informed via consultation with key relevant stakeholders. This is expected to include:

- Dedicated key stakeholder meetings (for example, MCA, NLB, RYA Scotland and the UKCOS);
- Regular operator outreach (for instance, consultation with regular users of the area);

- A hazard workshop with local stakeholders;
- Liaison via Fishing Liaison Officer where appropriate; and
- Other consultation as directed by the NRA process.

14.12.1.2 In addition to the data sources listed in Section 14.5, the following additional datasets have been collected to inform the NRA. These have been agreed during consultation with the MCA.

- Twenty-one days of AIS, Radio Detection and Ranging (RADAR), and visual observations within the study area in compliance with MGN 654, between the 22 August 2023 and the 12 September 2023; and
- 12 Months AIS data covering the study area to assess seasonal activity during 2023 in accordance with MGN 654.

14.12.1.3 Potential significant effects will be described, and the assessment will include consideration of potential significant cumulative and transboundary effects as appropriate. It is noted that as per the assessment methodology section above, the NRA will apply the FSA as required under MGN 654.

14.13 Further Consideration for Consultees

14.13.1.1 Please find below specific scoping questions relevant to the topic of shipping and navigation:

- Do you agree that the data sources identified are sufficient to inform the shipping and navigation baseline for the Project NRA?
- Have all potential impacts resulting from the Project been identified for shipping and navigation users?
- Do you have any concerns in relation to the location or nature of the Project and cumulative routeing within the North Sea?
- Do you agree that the embedded mitigation measures described provide a suitable means for managing and mitigating the potential effects of the Project on shipping and navigation users?

15. MARINE CULTURAL HERITAGE AND ARCHAEOLOGY

15.1 Introduction

15.1.1.1 This chapter of the Scoping Report considers the potential significant effects on marine cultural heritage and archaeology of the Project. The chapter provides an overview of the baseline conditions relevant to the Project Area (as defined in **Chapter 1: Introduction**), the datasets to be used to inform the EIA, sources, pathways and receptors of the potential significant effects to be considered, and how these potential significant effects will be assessed for the purpose of the EIA.

15.1.1.2 Marine cultural heritage and archaeology interfaces with other aspects and as such, should be considered alongside these; namely:

- **Chapter 7: Marine and Coastal Processes:** Due to the potential for altered marine processes to affect marine archaeological remains, the marine geology, oceanography and physical processes section will be used to inform the marine cultural heritage and archaeology assessment.
- **Chapter 16: Seascape, Landscape and Visual Impact Assessment**: This chapter has informed the marine cultural heritage and archaeology section regarding visual effects on marine heritage features.

15.1.1.3 The interlinkages between these topics and marine cultural heritage and archaeology are considered within the respective topic sections.

15.2 Legislative, Policy and Guidance

15.2.1 Legislation and Policy

15.2.1.1 Legislation and policy that has been used to inform the scope of the Marine Cultural Heritage and Archaeology chapter is set out in **Table 15-1**. Further information on policies relevant to the EIA are set out in **Chapter 2: Legislative and Policy Context**.

Table 15-1: Legislation and policy context

Legislation/Policy	Relevance to the assessment
Conventions	
The United Nations Convention on the Law of the Sea[470] (UNCLOS)	The convention established rules governing the use of the oceans and outlined both the traditional legal framework and introduced new additions. Provisions on the marine historic environment state how the remains should be treated and that ownership of remains lay with the state of origin.
The European Convention on the Protection of the Archaeological Heritage (revised[471]), known as the Valletta Convention	The convention sets out conservation and enhancement of the archaeological heritage, both terrestrial and marine, as a goal of planning policy and sets guidelines for the funding of physical investigation and research, publication of research findings, public access and awareness, and constitutes an institutional framework for pan-European co-operation on the archaeological heritage.

Legislation/Policy	Relevance to the assessment
Annex to the United Nations Educational, Scientific, and Cultural Organisation (UNESCO) Convention on the Protection of the Underwater Cultural Heritage 2001[472]	The convention provides a framework on how to better identify, research and protect underwater heritage while ensuring its preservation and sustainability.
Legislation	
Protection of Wrecks Act 1973[473]	Provides protection for designated shipwreck sites within UK waters. Access and operations within the boundaries of the protected area may be permitted under licence from the Secretary of State but any unlicenced operations that may disturb the site are illegal.
Ancient Monuments and Archaeological Areas Act 1979[474]	Provides provision for the protection and preservation of remains with high archaeological or historical interest. Operations or activities with the potential to disturb or damage the remains within the boundaries of the protected area may be permitted following the granting of Scheduled Monument Consent from the Secretary of State but any unlicenced operations that may disturb the site are illegal.
The Protection of Military Remains Act 1986[475]	Provides protection for the wreckage of military aircraft and certain military wrecks. Designations can be either as a Controlled Site or Protected Place where access may be permitted but any operations that may disturb the site are illegal unless licenced by the Ministry of Defence. All military aircraft are automatically protected under this legislation; however, vessels must be designated individually.
Merchant Shipping Act 1995[476]	The Receiver of Wreck administers is responsible for processing incoming reports of wreck and cargo. The Project has the potential to impact items associated with wrecks, which fall within the definition of 'wreck'.
Marine and Coastal Access Act 2009[477]	The Act provides a framework to help balance competing demands on UK's seas. It establishes the MMO and introduces a duty to protect and enhance the marine environment.
Marine (Scotland) Act 2010[478]	Provides the designated of Historic Marine Protected Areas (HMPA) in respect of historically significant areas within the marine zone, including wrecks formerly protected under the Protection of Wrecks Act[473].
Marine (Scotland) Act Factsheet[479]	The Marine (Scotland) Act 2010[478] provides a framework to help balance competing demands on Scotland's seas. It introduces a duty to protect and enhance the marine environment and includes measures to help boost economic investment and growth in areas such as marine renewables.
Policy	
UK Marine Policy Statement[480] (update 2020)	Sets out high-level objectives for the marine space, including achieving a sustainable marine economy and identifies a wide range of relevant marine uses. Requires use of the marine environment and its resources to maximise sustainable activity, prosperity and opportunities for all.

Legislation/Policy	Relevance to the assessment
	Requires use of marine environment recognises the protection and management needs of marine cultural heritage according to its significance.
Scotland's National Marine Plan[481]	GEN 6 Historic environment states the development and use of the marine environment should protect and, where appropriate, enhance heritage assets in a manner proportionate to their significance.
Historic Environment Policy for Scotland[482] (HEPS)	The document is designed to support and enable good decision-making about changes to the historic environment. HEPS sets out a series of principles and policies for the recognition, care and sustainable management of the historic environment which have informed development of the proposed scope and methodology of the assessment.
Scottish Planning Policy[483]	Discusses how proposals for energy infrastructure development should take account of spatial frameworks for wind farms and heat maps where relevant. Considerations will vary relative to the scale but are likely to include: • Net economic impacts; • Scale of contribution to renewable energy generation; • Effect on greenhouse gas emissions; and • Impacts on historic environment.
NPF4 [484]	Revised draft policies of relevance to this area of technical assessment include: • Policy 1: Tackling the Climate and Nature Crisis; and • Policy 7: Historic Assets and Places.

15.2.2 Technical Guidance

15.2.2.1 Technical guidance that has been used to define the assessment and will be used to inform the EIA assessment is set out in **Table 15-2**.

Table 15-2 Relevant technical guidance

Guidance reference	Relevance to the assessment
Historic Environment Guidance for the Offshore Renewable Energy Sector[485]	A generic guidance note on the survey, appraisal and monitoring of the historic environment during the development of offshore renewable energy projects in the UK. The guidance is applicable to the marine environment and the coastal environment adjacent to any development, encompassing the inter-tidal area, coastal margin and those areas further inland likely to be affected by offshore renewable energy developments.
Guidance for Assessment of Cumulative Impacts on the Historic Environment from Offshore Renewable Energy[486]	A guidance note on the assessment the cumulative effects on the historic environment during the development of offshore renewable energy projects in the UK. The guidance is

Guidance reference	Relevance to the assessment
	applicable to the marine environment and the coastal environment adjacent to any development, encompassing the inter-tidal area, coastal margin and those areas further inland likely to be affected by offshore renewable energy developments.
Code of Practice for Seabed Development[487]	The code provides guidance to developers on risk management and legislative implications of developing within the marine environment in the UK. It also outlines the responsibility of developers in protecting the UK's marine heritage.
Guidance for Offshore Geotechnical Investigations and Historic Environment Analysis: guidance for the renewable energy sector[488]	A guidance note on the aims of offshore geotechnical investigations and the resulting analysis undertaken during the development of offshore renewable energy projects in the UK. The guidance is applicable to the marine environment and the coastal environment adjacent to any development, encompassing the inter-tidal area, coastal margin and those areas further inland likely to be affected by offshore renewable energy developments.
Assessing Boats and Ships 1860-1913, 1914-1938 and 1939-1950. Archaeological Desk-Based Assessments in 3 volumes[489]	Guidance to assess the significance of shipwrecks from the 19th and 20th centuries.
Chartered Institute for Archaeologists' Standard and Guidance for Historic Environment Desk-Based Assessments[490], consultancy advice [490] and Code of Conduct[491]	A generic guidance note on the assessment of the historic environment during the development projects in the UK. The Code of Conduct guides the practices and standards for archaeological assessment both onshore and offshore.
Archaeological Written Schemes of Investigation for Offshore Wind Farm Projects Offshore Renewables Projects[492]	Guidance on the range of archaeological methodologies that may be required as part of the initial investigation stages or the mitigation phase of offshore projects.
Historic Environment Scotland (HES) Scotland's Historic Marine Protected Areas[493]	Explains what HMPA are and HES' role in advising the Scottish Government in designating these areas.
Scottish Archaeological Research Framework – Marine and Maritime[494]	An overview of the research questions that inform archaeological investigation within Scottish territorial waters.
Managing Changing in the Historic Environment: Setting[495]	Guidance notes regarding the understanding and assessment of impacts to the setting of designated and undesignated heritage sites.
Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017[496]	Regulations applying to EIA projects within territorial waters to 12 NM.
Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2007[497]	Regulations applying to EIA projects offshore from 12 NM to 200 NM.

Guidance reference	Relevance to the assessment
Our Place in Time: Historic Environment Strategy for Scotland[498]	The strategy sets out how the historic environment can be understood, valued, cared for and enjoyed. It sets out the goals and general strategies to be employed to manage the historic environment sensitively.
Management Guidelines for military aviation sites[499]	Guidance regarding the management and understanding of sites that include military aviation remains.

15.3 Study Area

15.3.1.1 Initial data gathering to support the development of the 2024 Scoping Report has been undertaken utilising a 5 km study area buffered from the Array Area and ECC, the landfall location, and covers all receptors seawards of MHWS to the Array Area (**Figure 15-1**, **Figure 15-2**, **Figure 15-3** and **Figure 15-4**).

15.3.1.2 The ECC will be assessed from the Array Area to MHWS. The section of the ECC from MHWS to 12 NM is the same as the NorthConnect Cable Corridor. The Applicant is coordinating with NorthConnect Limited. NorthConnect Interconnector and the Project will only require one set of infrastructure, within the overlapping marine licence Project Area from 12 NM to MHWS.

15.3.1.3 The section of the ECC from MHWS to 12 NM has previously been assessed within the EIAR submitted for NorthConnect Limited (application reference number 06771 & 06870) and judged acceptable through the consenting of NorthConnect. The previous EIA work for NorthConnect will be considered in assessing the ECC from MHWS to 12 NM, updated by any other readily available information and surveys undertaken. See Section 15.5 for further details of the baseline conditions.

15.3.1.4 All receptors between MHWS and 12 NM have been assessed as part of the separate already consented NorthConnect project and have been scoped out. Assessment of the impacts to the setting of onshore designated assets has been scoped out as any potential impacts from the construction of the ECC on setting would be negligible and there would be no intervisibility between the assets and the Array Area.

15.3.1.5 Data gathered as part of the NorthConnect project will be utilised to inform the assessment, in addition to data collected as part of the Project.

15.3.1.6 Data would be gathered to characterise the nature of onshore heritage assets to identify whether there is relevant contextual data that could inform the marine cultural heritage and archaeology assessment.

Figure 15-1: Marine Cultural Heritage and Archaeology Study Area: Part 1

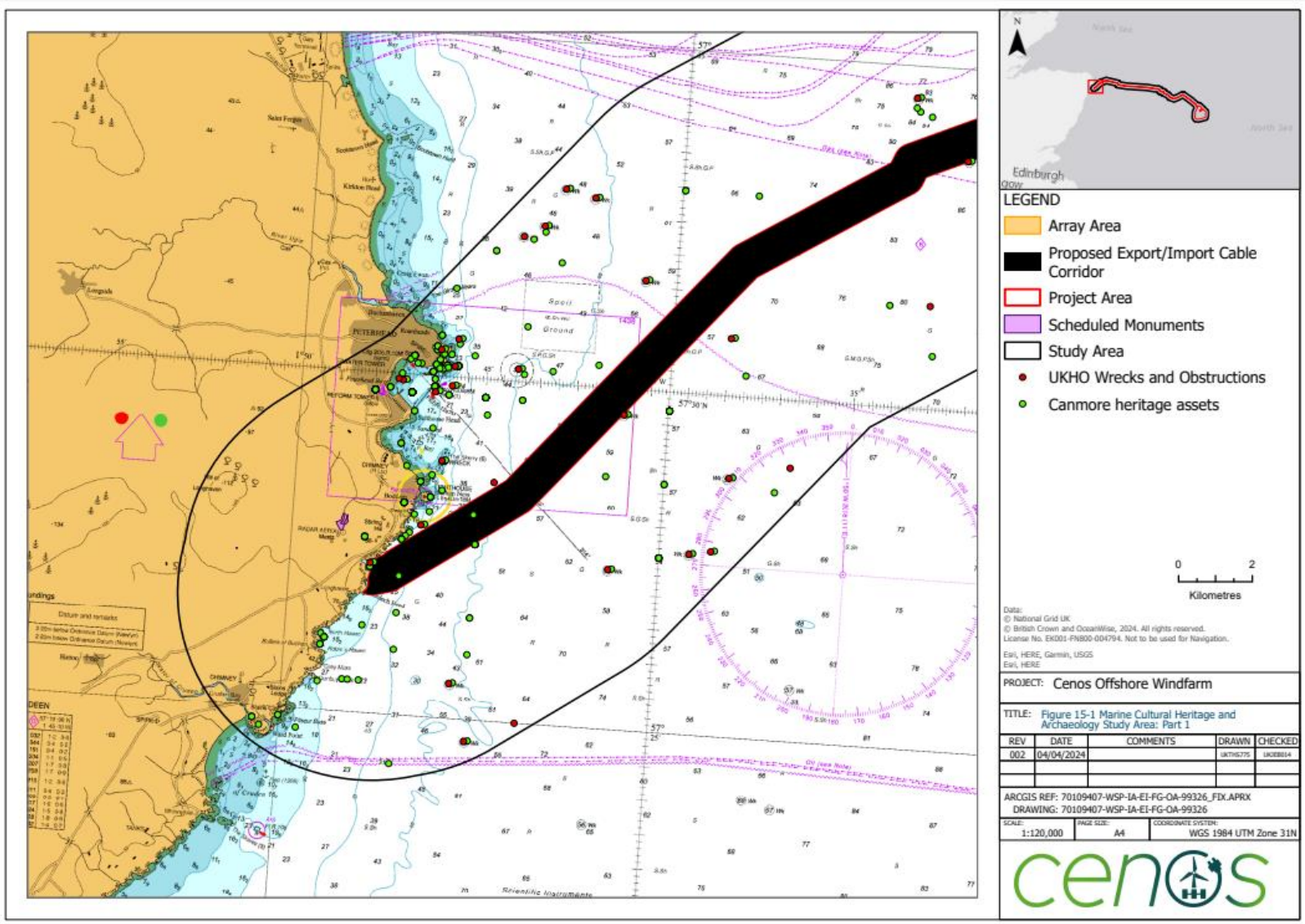


Figure 15-2: Marine Cultural Heritage and Archaeology Study Area: Part 2

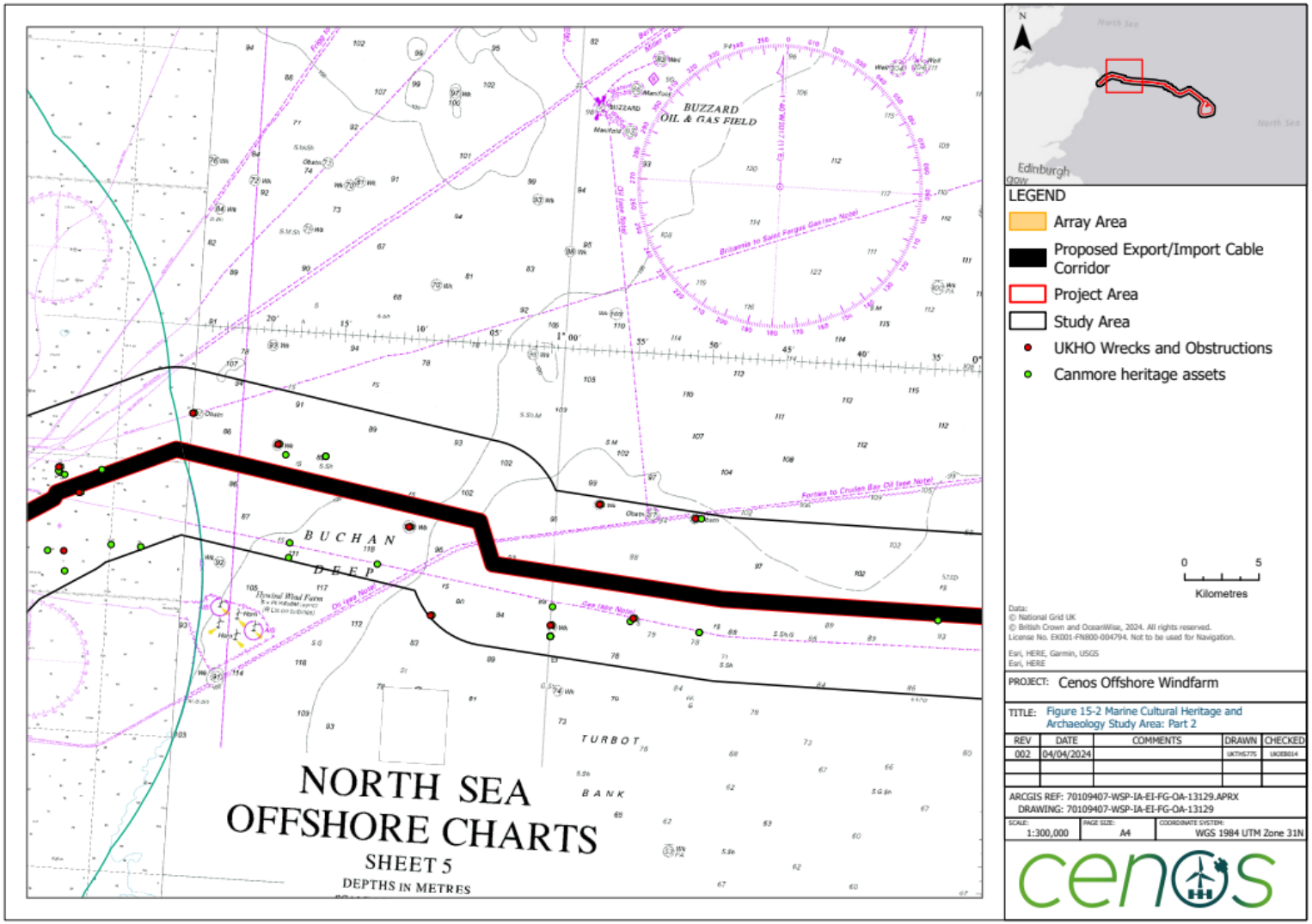


Figure 15-3: Marine Cultural Heritage and Archaeology Study Area: Part 3

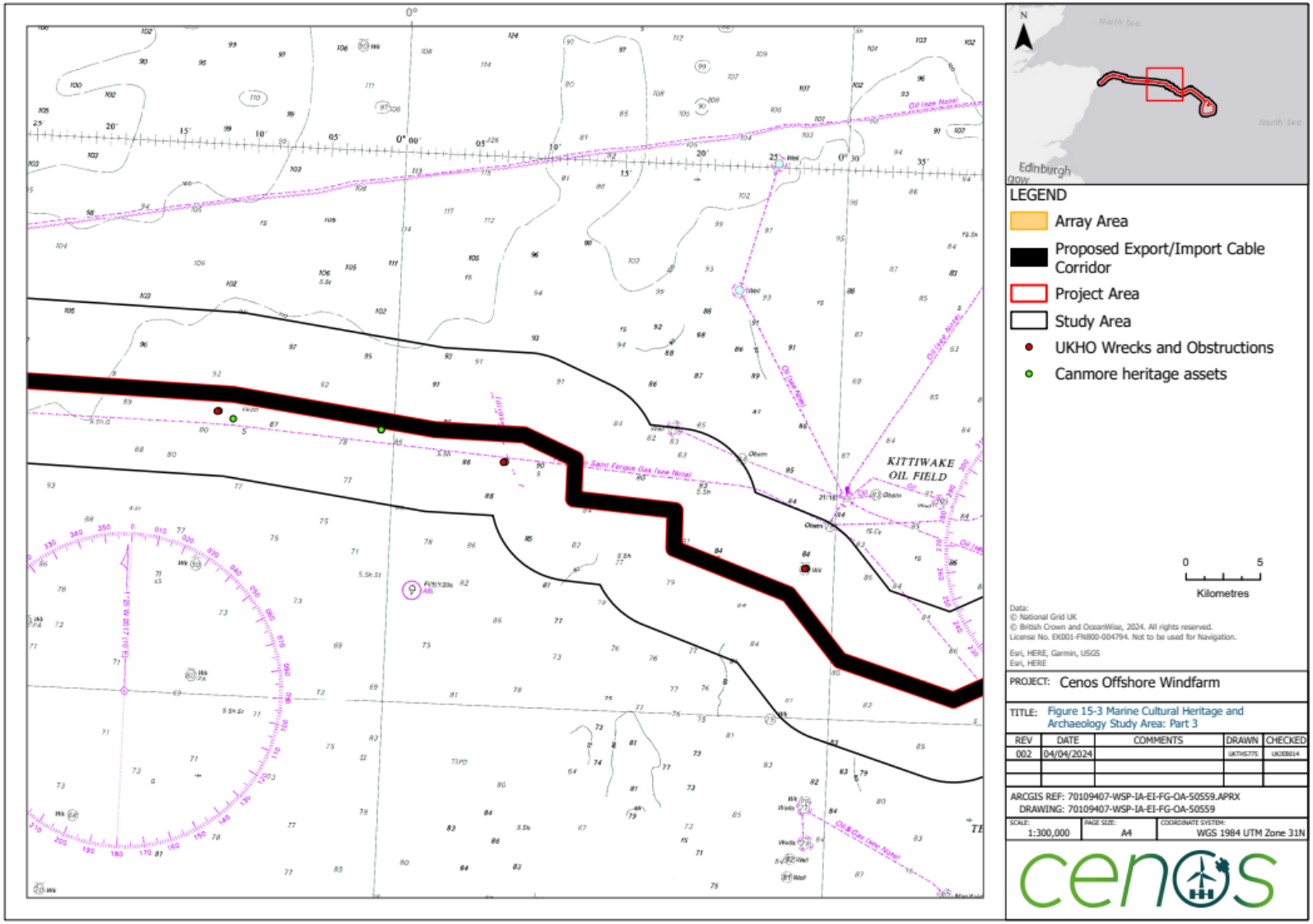
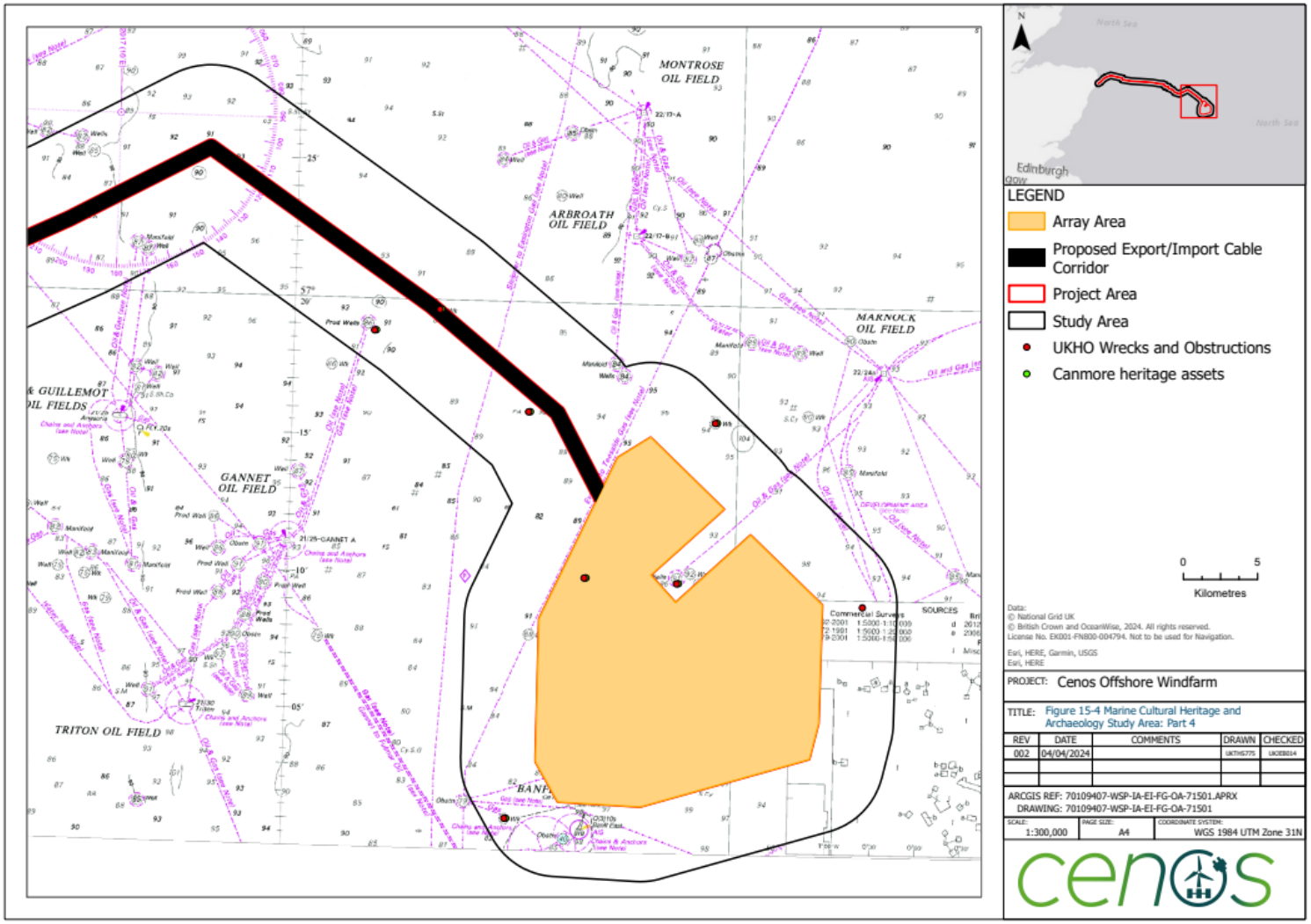


Figure 15-4: Marine Cultural Heritage and Archaeology Study Area: Part 4



15.4 Consultation

15.4.1.1 Consultation is a key part of the application process. This assessment has been and will be informed by engagement and discussion with various stakeholders. For the preparation of the EIAR, marine cultural heritage and archaeology would require consultation with HES, the advisor to MD-LOT. The archaeological advisor to Aberdeenshire Council will be consulted. Discussions would focus on study areas, methodology, key constraints, and any other information which may not be available through the Historic Environment Record (HER).

15.4.1.2 A summary of the key issues raised during consultation to date, specific to Marine Archaeology, is outlined in **Table 15-3** below, together with how these issues will be considered in the production of the EIAR.

Table 15-3: Summary of consultation relating to marine cultural heritage and archaeology

Date and stakeholder	Consultation and key comments	How this is accounted for
MD-LOT, 2023 Scoping Opinion, June 2023	The Scottish Ministers highlight the representation from Aberdeenshire Council in relation to the limitations of Canmore and advise that, in addition to the data sources listed in Table A-7 of Appendix A of the Scoping Report, the local authority Historic Environment Record should also be reviewed for undesignated assets.	Aberdeenshire Historic Environment Record data will be acquired and used to inform the baseline desk-based assessment for EIA (noted in **Table 15-4**).
	In relation to the study area, for the avoidance of doubt, the Scottish Ministers advise that this must include the cable routes as well as the windfarm area.	The proposed study area will be buffered from the Array Area and cable route as described in Section 15.3.
	The Scottish Ministers advise that the baseline data presented is insufficient and as such impacts to marine archaeology, cultural heritage and geomorphology cannot be scoped out. The Scottish Ministers therefore advise that direct and indirect impacts must be scoped into the EIAR for further assessment, this is in line with the representations made by HES and Aberdeenshire Council. The assessment must include the cable routes and consideration of indirect impacts on known remains in the vicinity of the Project.	Following review of the baseline data, direct and indirect impacts to marine archaeology, cultural heritage and geomorphology within the vicinity of the Project have been scoped in to the EIA assessment.
	The Scottish Ministers also advise that cumulative impacts are scoped into the EIAR for further assessment and direct the Developer to the HES representation in this regard.	Cumulative impacts have been scoped in to the assessment (see Section 15.9).
	The Scottish Ministers advise that the HES advice in relation to the Written Scheme of	HES will be consulted regarding the mitigation strategy and their

Date and stakeholder	Consultation and key comments	How this is accounted for
	Investigation (WSI) is implemented in full by the Developer.	advice will be implemented as part of any WSI for mitigation works.
Scoping Workshop, 29 February 2024	The Applicant provided a high level summary during the Scoping Workshop. At the time of writing, no further consultee responses have been received.	The Applicant has contacted HES on 08 March 2024 for further consultation. The Applicant is waiting for a Scoping Opinion for further consideration to inform the approach to assessment for EIA.

15.5 Baseline Conditions

15.5.1 Data Information Sources

15.5.1.1 Key sources of marine cultural heritage and archaeology data are shown in **Table 15-4**.

Table 15-4: Key sources of marine cultural heritage and archaeology data

Source	Date	Summary
HES designated data	Dec 2023	Data sets identifying designated assets within Scotland (World Heritage Sites, HMPAs, Scheduled Monuments, Listed Buildings, Battlefields, Gardens and Designed Landscapes, Conservation Areas)
Protected Wrecks (Historic England)	Dec 2023	Record of each Protected Wreck within UK territorial waters.
United Kingdom Hydrographic Office (UKHO) Wrecks and Obstructions data[500]	Dec 2023	An extensive data set containing over 94,000 charted, uncharted, live and dead wrecks and obstructions from around the world.
Canmore/Canmore Maritime (HES)	Dec 2023	Identifies recorded wrecks and losses in Scottish waters from a number of sources.
Geophysical Survey	Jul 2023 - Sep 2023	Results of geophysical survey of the Array Area using MBES, magnetometry, SSS and SBP. For description of the surveys see **Table 5A-2 of Appendix 5A**.

15.5.2 Existing Baseline

15.5.2.1 This section describes the present conditions which constitute the existing baseline environment for marine cultural heritage and archaeology within the offshore study area.

15.5.2.2 A high-level appraisal of historic assets has been undertaken to inform the scoping assessment using publicly available information. This is intended to provide an initial

indication of the potential issues that will be considered in the EIA. Designated and non-designated historic assets within the Array Area, ECC and the 5 km study area have been identified through information collated from Canmore, HES, and the UKHO. The identified assets provide an overview of the quantity and character of built and buried heritage within the Array Area and ECC **Figure 15-1, Figure 15-2, Figure 15-3** and **Figure 15-4)**.

15.5.2.3 Marine cultural heritage and archaeology receptors can be attributed to four main categories of sites or features:

- Submerged prehistoric landscapes resulting from changes to sea-level and eventual stabilisation of sea-level at or near present levels. Such landscapes may contain highly significant evidence of prehistoric human occupation and/or environmental change.
- Archaeological remains of watercraft deposited when such vessels sank while at sea or became abandoned in an intertidal context which subsequently became inundated.
- Remains of aircraft crash sites, either coherent assemblages or scattered material usually the result of Second World War (WWII) military conflict, but also numerous passenger casualties, particularly during the peak of seaplane activity during the interwar period. Also includes aircraft, airships and other dirigibles dating to the First World War (WWI) though these rarely survive in the archaeological record.
- Structural remains other than watercraft, including such elements as fish traps, abandoned quays, hards, defensive structures or sites lost to coastal erosion may be found within the intertidal zone (between MHWS and MLWS) and marine zone. Marine cultural heritage and archaeology receptors located seaward of MHWS to 12 NM will only be assessed to determine the extent of potential impact outside of the consented NorthConnect cable corridor. Intertidal heritage assets located up to MHWS have been reviewed for this 2024 Scoping Report.

15.5.2.4 There are no Protected Wrecks or HMPAs within the study area. There is one scheduled monument extending into the intertidal area within the study area comprised of Boddam Castle (SM3252).

15.5.2.5 There is one UKHO and Canmore recorded wreck within the Array Area noted as the U-74. As previously noted in the 2023 Scoping Report, the U-74 was erroneously reported to have been sunk off the coast of Peterhead and a wreck in Dunbar Harbour was identified as the U-74 in 2008. It is noted on the UKHO wreck record that the wreck was noted as dead meaning that it could not be relocated. It is currently unclear if this point indicates the location of an unknown wreck or if it should be removed. There are 11 UKHO and Canmore data points directly located on the line of the ECC to the MHWS. Ten of the Canmore data points are for 19th or 20th century wrecks, one is recorded as an obstruction.

15.5.2.6 There are an additional 47 UKHO wrecks and obstructions within the study area, nine of which are noted as foul ground, five as undefined, and 35 as wrecks. There are an additional 458 assets recorded by Canmore within the Study Area, 426 of which are located between MHWS and 12 NM. 336 of the Canmore assets are recorded losses of late post-medieval or modern vessels but have not been confirmed in the

location noted. Of the remaining 122 assets, 93 assets are records of shipwrecks of unknown date or prior to the 18th century, three assets are noted as aircraft wrecks, one as a natural feature (boulder), one as a buoy, and 15 as general obstructions.

15.5.2.7 The potential for the presence of archaeological and palaeoenvironmental remains will be considered within a marine cultural heritage and archaeology desk-based assessment and through the archaeological analysis of marine geophysical survey data and geotechnical survey data for the ECC and the Array Area (surveys undertaken in 2023).

15.5.3 Future Baseline

15.5.3.1 The existing environment for marine archaeology and cultural heritage as set out above has been shaped by a combination of factors, with the most prevalent being changes in global sea levels and associated climatic and environmental conditions. These conditions have and will continue to affect the burial and preservation of remains.

15.5.3.2 Marine physical processes, including the cycle of burial and exposure due to storm events, have an ongoing effect on the preservation of archaeological material. Sediment cover provides protection from physical marine processes, reducing the risk of erosion and degradation. It is not possible to assess the effect of this impact upon individual heritage assets as this will depend on the nature of the exposed heritage asset and site-specific conditions. The potential increase and violence of storm activity as a result of climate instability may exacerbate the effects of the burial and exposure cycle on affected assets.

15.5.3.3 Underwater cultural heritage is also under threat from warming waters caused by climate change. As the sea levels rise, the impact of the tidal activity on heritage assets within and adjacent to the intertidal will increase. In addition, warming waters result in the northward migration of invasive species, may include the blacktip shipworm (*Lyrodus pedicellatus*) and great shipworm (*Teredo navalis*), which are considered to be a major threat to wooden wrecks and other wooden structures within the marine environment.

15.5.3.4 Further marine infrastructure projects within the region will all have the potential to cause adverse direct impacts on heritage assets or contribute to beneficial impacts. This includes large-scale enhanced understanding of the archaeological resource through large area geophysical/geotechnical survey data released to the public domain or the enhanced knowledge of key characteristics, features or elements derived from site-specific survey and investigations. There is the potential for loss or disturbance of possible historic wreck sites arising from discovery and other marine infrastructure projects.

15.6 Basis of Assessment

15.6.1.1 The marine cultural heritage and archaeology scoping assessment is based on the following key assumptions, which are also set out in **Chapter 3: Project Description**:

- The array will consist of up to 95 WTGs;
- There will be up to two offshore substations;

- Scour protection may be required around the base of some or all foundations and cable protection may be required along cable routes;
- Inter-array and export / import cables will be buried, where possible;
- Maintenance activities will be undertaken for both preventive and corrective maintenance requirements;
- The operational lifetime of the project is assumed to be a minimum of 30 years; and
- The decommissioning of the windfarm is anticipated to involve as close to full removal of offshore infrastructure as possible at the time of decommissioning (where safe/practicable to do so). The decommissioning works are likely to be undertaken in reverse to the sequence of construction works and involve similar levels of equipment and impact.

15.7 Relevant Embedded Mitigation Measures

15.7.1.1 Embedded mitigation measures have been identified and are proposed to be adopted as part of the Project design (primary mitigation); or implemented in accordance with industry standard practice that would occur with or without the input from the environmental assessment feeding into the process (tertiary mitigation). There is a commitment by the Applicant to implement these embedded mitigation measures and they have been considered within the 2024 EIA Scoping Report (see **Table 15-5**).

15.7.1.2 The requirement for additional mitigation measures (secondary mitigation) will be dependent on the significance of effects on marine cultural heritage and archaeology receptors and will be consulted upon with consultees throughout the EIA process. Any additional mitigation measures will be presented within the EIAR.

15.7.1.3 As there is a commitment to implementing these environmental measures, and also to various standard sectoral practices and procedures, they are considered inherently part of the design of the Project and have, therefore, been considered in the 2024 Scoping Report.

Table 15-5: Embedded mitigation relating to marine cultural heritage and archaeology

ID	Embedded mitigation measures
MCHA - 1	Where practical, sensitive sites will be avoided by the temporary and permanent offshore footprint.
MCHA - 2	Loss or disturbance of possible submerged historic landscape elements arising from altered seabed conditions (for example scour) will be mitigated, as far as possible, through sensitive design.
MCHA - 3	Loss or disturbance of possible submerged historic landscape elements arising from works will be mitigated, as far as possible, through selection of appropriate working methods. The working methods would include but would not be limited to avoidance of identified marine heritage assets and anthropogenic geophysical anomalies by a minimum of 30 m during seabed preparation, device location, cable routing and installation activities.
MCHA - 4	A Decommissioning Programme will be developed for the Project in line with industry good practice, guidance and legislation.

15.7.1.4 Secondary mitigation may be identified as the environmental assessment progresses and would be reported as required in the EIAR.

15.8 Scoping of Potential Significant Effects

15.8.1.1 In line with the EIA Regulations 2017, the EIA for the Project will only consider those impacts where there is a risk of a potential significant effect. The following section draws on industry experience and expertise to identify those effect-receptor pathways that may potentially lead to a significant impact. Where experience and available evidence indicates an effect-receptor pathway will not lead to a significant impact with regards to the EIA Regulations 2017, the pathway is scoped out from assessment.

15.8.1.2 The potential significant effects on the marine historic environment are summarised in **Table 15-6.** The scoping assessment is based on a combination of the Project design at the time of writing, embedded mitigation, understanding of the baseline conditions at the time of writing, the evidence base for marine cultural heritage and archaeology, and professional judgement. The approach to this assessment is set out in **Chapter 5: Approach to Scoping and EIA**.

15.8.1.3 The early identification of potential significant effects is used here as a tool aimed at delivering a proportionate approach to the EIA. In doing so, it sets out a high-level assessment of all potential effects, significant or not. The basis for scoping out certain effects, and therefore no longer considered, is presented within **Table 15-6**.

Table 15-6: Summary of potential significant effects for marine cultural heritage and archaeology scoped in (✓) or scoped out (x) of the EIAR during construction (C), O&M and decommissioning (D)

Activity and Impact	Embedded Mitigation	Outcome of Scoping per Phase			Justification	Overview of Proposed Assessment Approach
		C	O&M	D		
Indirect impact of the Project	N/A	ü	ü	ü	Potential disturbance of wrecks through the recovery of cultural material as a result of discovery.	Geophysical survey results would be used to identify potential wreck remains. The wrecks would be described and characterised through archival research. The limits of the wrecks will be determined and recorded.
	MCHA - 2	✓	✓	✓	Removal, truncation, or disturbance of marine archaeology and cultural heritage assets and deposits as a result of scour.	Geophysical survey results would be used to identify potential marine archaeological remains and characterise the limits of the remains. Geotechnical borehole remains would be used to characterise the potential for palaeoenvironmental remains and palaeolandscape features. The desk-based assessment would be used to identify and characterise the known marine archaeological and cultural heritage remains to determine the potential for further marine archaeological remains and deposits. The results of physical processes assessments would be used to inform the assessment.
Direct impact of the project	MCHA - 1 MCHA - 3	✓	✓	X	Removal, truncation, or disturbance of marine archaeology and cultural heritage assets and deposits during intrusive operations on the seabed. Direct impact by penetration, compression and disturbance during construction and maintenance activities.	Geophysical survey results would be used to identify potential marine archaeological remains and characterise the limits of the remains. Geotechnical borehole remains would be used to characterise the potential for palaeoenvironmental remains and palaeolandscape features. The desk-based assessment would be used to identify and characterise the known marine archaeological and cultural heritage remains to determine the

Activity and Impact	Embedded Mitigation	Outcome of Scoping per Phase C	O&M	D	Justification	Overview of Proposed Assessment Approach
						potential for further marine archaeological remains and deposits.
	MCHA – 4	N/A	N/A	X	Effects during decommissioning have been scoped out based on the knowledge of the baseline environment, the nature of planned works and professional judgement on the potential for impact from projects more widely. The conclusions follow (in a site-based context) existing best practice. The scoped out effect is considered below. Potential effects arising from the decommissioning of the Project have been scoped out from further assessment. In effect, any disturbance arising during this phase of the Project will present only minor effects on archaeological remains and/or geoarchaeological deposits that have previously been disturbed and mitigated during the construction or operational phases. It is possible that	

Activity and Impact	Embedded Mitigation	Outcome of Scoping per Phase			Justification	Overview of Proposed Assessment Approach
		C	O&M	D		
					best practice mitigation measures, such as a Protocol of Archaeological Discovery (PAD) or WSI, will be required to ensure that very minor additional disturbance can be more fully mitigated.	
Direct impact to onshore cultural heritage assets as a result of changes within their setting.	N/A	X	X	X	No significant effects are anticipated as the ECC excavation and the laying of cables would be temporary and limited visually. Additionally, there would be no intervisibility between Array Area and onshore cultural heritage assets as a result of the considerable distance of the Array Area from shore.	

15.9 Cumulative Effects

15.9.1.1 There is potential for cumulative effects on the cultural heritage assets to occur when the Project is considered together with other developments. The potential cumulative effects between the offshore elements of the Project and other developments with respect to marine cultural heritage and archaeology will be considered within the EIAR.

15.9.1.2 The CEA would be undertaken in accordance with the methodology set out in **Chapter 5: Approach to Scoping and EIA** of this 2024 Scoping Report and Historic Environment Policy for Scotland (HES, 2019).

15.10 Potential Transboundary Effects

15.10.1.1 No effects on marine cultural heritage and archaeology receptors are likely to be transboundary. This is detailed further in **Appendix 5D**.

15.11 Proposed Approach to the Environmental Impact Assessment

15.11.1.1 The EIAR will set out the planning framework in respect of buried historic assets (archaeological remains), built historic assets and historic landscapes within the marine environment and the interface between the terrestrial and marine environments. It will include the methodology for assessing the environmental effects predicted during the construction, operation and decommissioning phases. It will provide a summary overview of the baseline conditions. The guidance used during the preparation of the Chapter is outlined in **Table 15-2**.

15.11.1.2 The Historic Environment Policy for Scotland[501] defines the significance of historic assets by the following values: aesthetic, historic, scientific, and social value for past, present or future generations. The determination of the significance is based on statutory designation, professional judgement and through consultation with statutory consultees.

15.11.2 Determining Receptor Sensitivity and Value

15.11.2.1 Each historic asset is evaluated against the range of criteria listed above on a case-by-case basis, in accordance with the criteria listed in **Table 15-7**. This also considers regional variations and individual qualities, where applicable.

15.11.2.2 Unless the nature and exact extent of marine archaeological remains within any given area has been determined through prior investigation, their significance can be uncertain, and a judgement will be made on the basis of existing knowledge.

15.11.2.3 In relation to designated historic assets, the assessment considers the contribution that historic character and setting make to the overall significance of the asset.

Table 15-7: Definition of sensitivity levels for marine cultural heritage and archaeology

Value or sensitivity	Guidelines
Very High	This category contains heritage assets that will be considered to be of international importance either for historic associations or their informative potential. This category includes World Heritage Sites (including nominated sites) and assets of acknowledged international importance.
High	This category contains heritage assets that will be considered to be of national importance either for historic associations or their informative potential. This category includes heritage assets designated as scheduled monuments, protected military remains, listed buildings (Category A and B), or HMPAs and those heritage assets of scheduled quality and importance. Also includes palaeoenvironment remains that are either very well-preserved or particularly important for understanding specific periods.
Medium	Heritage assets of regional importance for historic associations or their informative potential. This category includes Listed Buildings (Category C), well-preserved live wrecks that are not suitable for designation, or palaeoenvironmental remains that are typical of a region.
Low	Non-designated heritage assets of local importance for historic associations or their informative potential may include marine debris or less well-preserved marine material, or generally representative archaeological material or feature types.
Negligible	These include those features that are recorded but no longer extant, which are suggestive of further activity but not of intrinsic value (for example, records of losses without identified wreck sites, some ‘dead’ wrecks, isolated finds of debris).

15.11.3 Determining Magnitude of Change

15.11.3.1 Determination of magnitude of change upon the significance of known or potential historic assets is based on the severity of likely impact (for example, physical effects on built historic assets or the permanent presence of new structures etc. that result in changes to the contribution of setting to the heritage significance of a built historic asset). **Table 15-8** describes the criteria used in this assessment to determine the magnitude of change.

Table 15-8: Definition of magnitude of change levels for marine cultural heritage and archaeology

Magnitude of Change	Criteria (adverse)	Criteria (beneficial)
Major	Total or substantial change to an asset. Loss or disturbance of defining features of the asset. Comprehensive changes to setting such as extreme visual effects, gross change of noise or change to sound quality, or fundamental changes to use or access.	Preservation of a heritage asset in situ where it would otherwise be completely or almost lost. Changes that appreciably enhance the cultural significance of a heritage asset and how it is understood, appreciated, and experienced.
Moderate	Changes to many key archaeological materials or elements, such that the	Changes to important elements of a heritage asset's fabric or setting,

Magnitude of Change	Criteria (adverse)	Criteria (beneficial)
	significance of the heritage asset is clearly modified. Considerable changes to setting that affect the character of the heritage asset such as visual change to many key aspects or views, noticeable differences in noise or sound quality, or considerable changes to use or access.	resulting in its cultural significance being preserved (where this would otherwise be lost) or restored. Changes that improve the way in which the heritage asset is understood, appreciated, and experienced.
Minor	Changes to key archaeological materials or key historic building elements, such that the significance of the heritage asset is slightly altered. Slight changes to setting such as slight visual changes to few key aspects or views, limited changes to noise levels or sound quality, or slight changes to use or access.	Changes that result in elements of a heritage asset's fabric or setting detracting from its cultural significance being removed. Changes that result in a slight improvement in the way a heritage asset is understood, appreciated, and experienced.
Negligible	Changes to archaeological materials or historic buildings elements such that alterations to the significance of the heritage asset are very minor. Very minor changes to setting such as virtually unchanged visual effects, very slight changes in noise levels or sound quality, or very slight changes to use or access.	Very minor changes that result in elements of a heritage asset's fabric or setting detracting from its cultural significance being removed. Very minor changes that result in a slight improvement in the way a heritage asset is understood, appreciated, and experienced.
No change	Changes to fabric or setting that leave significance unchanged.	

15.11.4 Evaluation of Significance of Effects

15.11.4.1 The assessment of potential significant effects considers all stages of the Project. The significance level attributed to each effect will be assessed based on the heritage significance of the affected historic asset and the magnitude of change (impact) to the heritage significance of the asset.

15.11.4.2 Effects may be either negative (adverse) or positive (beneficial) and are defined initially without mitigation. Where the resulting effect comprises two separate levels (for instance, ‘moderate or minor’ or ‘minor or negligible’), professional judgement will be applied to select the most appropriate significance of effect. Where information is insufficient to be able to quantify either the asset significance or magnitude of change with any degree of certainty, the effect is given as 'uncertain'. This might be the case for possible buried historic assets, the presence, nature, date, extent, and significance of which is uncertain due to the absence of any site-based investigation.

15.11.4.3 Residual effects that are classified as moderate or above are considered ‘significant’ in EIA terms; however, professional judgement is applied for moderate effects. Residual effects classified as slight or below are considered ‘not significant’.

15.12 Summary

15.12.1.1 The Array Area and the ECC contain no known designated assets. The Array Area contains the known site of one wreck on the UKHO Wrecks and Obstructions data. The ECC contains 11 UKHO and Canmore data points. The Array Area and the ECC lie within an area of likely potential for, palaeoenvironmental deposits, palaeo-geomorphological features and remains of wrecks dated from the medieval through the modern period.

15.12.1.2 A study area of 5 km around the Array Area and the ECC is proposed. The following impacts to marine archaeology, cultural heritage and geomorphology are scoped into the assessment for consideration:

- Indirect impact from disturbance of wrecks through the recovery of cultural material as a result of discovery;
- Direct impact of sediment removal containing undisturbed archaeological contexts during seabed preparation ahead of construction activities;
- Direct impact by penetration, compression and disturbance during seabed preparation, construction of turbine foundations, and laying of cables;
- Indirect impact of altered sea-bed conditions, for example scour or differential deposition of sediments; and
- Direct impact by penetration, compression and disturbance effects during repair and maintenance activities.

15.12.1.3 Direct impact by penetration, compression and disturbance effects of jack-up barges and anchoring of maintenance vessels during the operational phase. An assessment of cumulative effects on the marine archaeology, cultural heritage and geomorphology receptors is scoped in to the EIAR.

15.12.1.4 Mitigation measures will be proposed to address any adverse effects. Opportunities for enhancing the significance of any heritage assets will be identified.

15.13 Further Consideration for Consultees

15.13.1.1 Please find below specific scoping questions relevant to the topic of marine cultural heritage and archaeology:

- Do you agree with the approach to characterising impacts to marine archaeological discoveries?
- Do you agree that direct impacts to onshore cultural heritage as a result of changes to their setting and impacts arising from decommissioning should be scoped out?
- Do you agree that transboundary effects for marine archaeology, cultural heritage and geomorphology should be scoped out?
- Do you agree that the geophysical surveys listed in **Table 15-4** and detailed in Table 5A-2 of **Appendix 5A** is sufficient to inform the baseline?

- Do you agree that the potential impacts and receptors resulting from the Project have been identified for marine archaeology, cultural heritage and geomorphology?
- Do you think any additional data sources or guidance need to be considered?
- Do you have any additional specific requirements for the assessment methodology?

16. SEASCAPE, LANDSCAPE AND VISUAL IMPACT ASSESSMENT

16.1 Introduction

16.1.1.1 This chapter of the Scoping Report considers the potential significant effects on the seascape / landscape resource and visual amenity that may arise from the construction, O&M, and decommissioning of the Project. The chapter provides an overview of the baseline conditions relevant to the Project Area (as defined in **Chapter 1: Introduction**), the datasets to be used to inform the EIA, sources, pathways and receptors of the potential significant effects to be considered, and how these potential significant effects will be assessed for the purpose of the EIA.

16.1.1.2 The seascape, landscape and visual impact assessment (SLVIA) interfaces with many other aspects and as such, should be considered alongside these; namely:

- **Chapter 15: Marine Cultural Heritage and Archaeology:** This section informs the marine archaeology section regarding visual effects on marine heritage features.
- **Chapter 19: Socio-economics, including Health:** This section informs the socio-economic section regarding visual effects on marine related visual receptors, such as viewpoints relevant to recreation and the visitor economy.
- **Chapter 22: Climate Change Resilience:** The interference with climate resilience with SLVIA is captured in the In-Combination Climate Impacts (ICCI) assessment.

16.2 Legislation, Policy and Guidance

16.2.1 Legislation and Policy

16.2.1.1 Legislation and policy that has been used to inform the scope of the SLVIA chapter is set out in **Table 16-1**. Further information on policies relevant to the EIA are set out in **Chapter 2: Legislative and Policy Context**.

Table 16-1: Legislation and policy context

Legislation/Policy	Relevance to the assessment
Legislation	
The Electricity Act (1989)[502]	• Sets out the preservation natural beauty and providing reasonable mitigation. • It is considered that natural beauty should be given a broad scope and would include seascape and coastal landscape in accordance with the European Landscape Convention (ELC).
The European Landscape Convention (ELC) (2000)[503]	• The ELC covers land and water (inland and seas). • The ELC sets out commitments to recognize landscapes in law, to establish policies aimed at landscape planning,

Legislation/Policy	Relevance to the assessment
	alongside the protection, management, and the integration of landscape into other policy areas.
National Policy	
NPF4[504]	A full review of the relevance of the Approved NPF4 2023 for this EIA is provided in **Chapter 2: Legislative and Policy Context**. Policies of relevance to this area of technical assessment are: • Policy 1: Tackling the Climate and Nature Crisis • Spatial Planning Priorities: North – Productive Places • Policy 10: Coastal Development • Policy 11: Energy
Marine Policy	
Scottish National Marine Plan[505] - GEN 1 – General Planning Principle - GEN 4 – Co-existence - GEN 7 Landscape / Seascape - REC & TOURISM 5	• GEN 1 supports sustainable developments which provide economic benefit to Scottish communities and social benefits. • GEN 4 emphasises the need for co-existence between development sectors and activities and requires cumulative impacts to be addressed. • GEN 7 emphasises Development should take account of seascape, landscape and visual impacts. • REC & TOURISM 5 sets out requirement to support enhancements to the aesthetic qualities, coastal character and wildlife experience.
Local Planning Policy	
Aberdeenshire Local Development Plan (LDP) 2023[506]	Policies of relevance to this area of technical assessment are: • E2 Landscape • PR1 Protecting Important Resources • PR2 Preserving and Protecting Important Development Sites • C2 Renewable Energy These focus on the importance of renewable energy deployment and safeguarding sites for specific use.
Aberdeenshire Council Natural Heritage Strategy (2019-2022)[507] • Aim 1: Protection of Natural Heritage • Aim 2: Enhancement of Nature Heritage • Aim 3: Promotion of Natural Heritage	• Objective 1.6 – Protect locally significant sites for nature conservation.

16.2.2 Technical Guidance

16.2.2.1 Technical guidance that has been used to define the assessment is set out in **Table 16-2.**

Table 16-2: Relevant technical guidance

Guidance reference	Relevance to the assessment
Guidelines for Landscape and Visual Impact Assessment, 3rd Edition (GLVIA3)[508]	This is the main technical guidance on LVIA including seascape assessment.
Visual Representation of Development Proposals, Technical Guidance Note 06/19[509]	Technical guidance governing the visual representation of development proposals – how visualisations (photography, wirelines and photomontages) should be presented.
An Approach to Seascape Sensitivity Assessment[510]	Provides advice and guidance on seascape sensitivity assessment, at a more detailed level than GLVIA.
NatureScot Landscape Sensitivity Assessment Guidance[511]	Provides advice and guidance on seascape and landscape sensitivity assessment, at a more detailed level than GLVIA and is specific to Scotland.
Assessing the cumulative landscape and visual impact of onshore wind energy developments[512]	Provides advice and guidance on the cumulative assessment of onshore windfarms, although the methodology and principles may also be applied to offshore windfarm development.
NatureScot Guidance note: Coastal Character Assessment[513]	Provides advice and guidance on coastal character assessment, at a more detailed level than GLVIA and is specific to Scotland.
NatureScot Landscape Character Assessment Guidance[514]	Provides advice and guidance on landscape character assessment, at a more detailed level than GLVIA and is specific to Scotland.
Offshore Renewables – Guidance on Assessing the Impact on Coastal Landscape and Seascape[515]	Provides advice and guidance on scoping and assessment of offshore renewables development.
Visual Representation of Wind Farms, Version 2.2[516]	Technical guidance governing the Study Area for assessment and visual representation of windfarm development proposals – how visualisations (photography, wirelines and photomontages) should be presented.

16.3 Study Area

16.3.1.1 Institute of Environmental Management and Assessment (IEMA) Guidance[517] recommends a proportionate EIAR focused on the potential significant effects of a development, and a proportionate EIAR aspect chapter. The SLVIA Study Area must therefore be large enough to capture all potential significant effects. However, an overly large SLVIA Study Area may be considered disproportionate if it makes understanding the key impacts of the Project more difficult by including extraneous baseline information, and hence receptors that are unlikely to be significantly affected by the Project.

16.3.1.2 This is supported by the Landscape Institute (GLVIA3)[508] (paragraph 3.16), which recommends that "*The level of detail provided should be that which is reasonably required to assess the likely significant effects".* Paragraph 5.2 also states that *"The Study Area should include the site itself and the full extent of the wider landscape around it which the Project may influence in a significant manner"*.

16.3.1.3 The ECC will be assessed from the Array Area to MHWS. The section of the ECC from MHWS to 12 NM is the same as the NorthConnect Cable Corridor. The Applicant is coordinating with NorthConnect Limited. NorthConnect Interconnector and the Project will only require one set of infrastructure, within the overlapping marine licence Project Area from 12 NM to MHWS.

16.3.1.4 The section of the ECC from MHWS to 12 NM has previously been assessed within the EIAR submitted for NorthConnect Limited (application reference number 06771 & 06870) and judged acceptable through the consenting of NorthConnect. The previous EIA for NorthConnect will be considered in assessing the ECC from MHWS to 12 NM and updated by any other readily available information and surveys undertaken. See Section 16.5 for further details of the baseline conditions. Further details are in **Chapter 5: Approach to Scoping and EIA**.

16.3.1.5 The Study Area is based on professional judgement and aims to include those areas that are potentially and likely to be significantly affected by the Project. This judgement is based on the Project's early understanding of the local landscape character and the scale of the construction and development proposed within the Scoping Boundary as well as a review of Study Areas used for similar projects.

16.3.1.6 The Scottish Natural Heritage (SNH) Visual Representation of Wind Farms, Version 2.2[516] advises that the Study Area or zone of theoretical visibility (ZTV) for WTGs exceeding 150 m to blade tip height, is 45 km from the outer-most WTG positions. The document advises on page 12 that "*greater distances may need to be considered for the larger turbines used offshore.*" It may also be noted that the SLVIA Study Areas for the Moray West and Moray East offshore windfarms were 50 km from the outer-most WTG positions and 40 km in respect of the Beatrice offshore windfarm.

16.3.1.7 A 50 km Study Area will not include any landscape or visual receptors, and any receptors beyond this distance will have almost negligible to no visibility of the Project due to the curvature of the Earth. Given the Array Area is located approximately 185 km at its closest point from the coast / Scottish Mainland, there is no appropriate or proportionate Study Area for the SLVIA.

16.4 Consultation

16.4.1.1 This assessment has been informed by engagement and discussion with various stakeholders including MD-LOT, NatureScot, and Aberdeenshire Council via the 2023 Scoping Report submission. SLVIA was also discussed during the Scoping Workshop held 29 February 2024. **Table 16-3** summaries consultation to date and how this is accounted for in the report.

Table 16-3: Summary of consultation relating to SLVIA

Date and stakeholder	Consultation and key comments	How this is accounted for
MD-LOT, 2023 Scoping Opinion, June 2023[518]	*The Scottish Ministers are unable to provide further, detailed advice due to the lack of information provided in the Scoping Report.*	Addressed via submission of this chapter of this 2024 Scoping Report which supersedes the 2023 Scoping Report.
Aberdeenshire Council, included with the 2023 Scoping Opinion, June 2023	*Chapter 11 of the Scoping Report notes the distance between the development area and mainland Scotland as being approximately 85km. It is also noted that existing oil and gas platforms are located a similar distance away, and few of these are visible from the Scottish mainland. This will be due to the intervening distance and also the curvature of the earth.* *The Council accepts the suggestion at paragraph 11.4 that an assessment of the impacts of the proposed windfarm on seascape, landscape and visual resources is scoped out of an EIA on the basis of the intervening distance from land and low sensitivity of seascape receptors.*	Noted that Aberdeenshire Council accepts that an assessment of the impacts of the Project on SLVIA is scoped out of the EIA.
Scoping Workshop, 29 February 2024	NatureScot requested wet storage was to be considered as part of the SLVIA assessment.	The wet storage of turbines outside of the Array Area in close proximity to a port is linked to a decision on construction and marshalling port(s) and as such potential impacts associated with wet storage are proposed to be scoped out of this assessment.

16.5 Baseline Conditions

16.5.1 Data Information Sources

16.5.1.1 Key sources of SLVIA data are shown in **Table 16-4**.

Table 16-4: Key sources of SLVIA data

Source	Date	Summary	Coverage of Study Area
NatureScot (formerly SNH)	2005	An assessment of the sensitivity and capacity of the Scottish seascape in relation to windfarms[519]	Full coverage of the area within the Scoping Boundary and provisional SLVIA Study Area.
NatureScot (formerly SNH)	2018	Map and guidance on Coastal Character Assessment (CCA)[520]	Full coverage of the area within the Scoping Boundary and provisional SLVIA Study Area.
NorthLink Ferries	Accessed 2023	Ferry routes[521] .	Full coverage of the area within the Scoping Boundary and provisional SLVIA Study Area.

16.5.2 Existing Baseline

16.5.2.1 No areas of land or coastline are located within 50 km of the Array Area. As stated above, the coast is 185 km from the Array Area. The Aberdeen to Lerwick ferry route is also located over 150 km from the Array Area.

16.5.2.2 There are therefore considered to be no relevant seascape, landscape or visual receptors that will be impacted by the Project.

16.5.2.3 The Central North Sea is home to oil and gas platforms which have some intervisibility with each other however, due to the long intervening distance from the coast, very few of these existing installations are actually visible from the Scottish mainland.

16.6 Basis of Assessment

16.6.1.1 The SLVIA scoping assessment is based on the following key assumptions, which are also set out in **Chapter 3: Project Description**.

- The array will consist of up to 95 WTGs;
- There will be up to two offshore substations;
- Maintenance activities will be undertaken for both preventive and corrective maintenance requirements;
- The operational lifetime of the project is assumed to be a minimum of 30 years; and
- The decommissioning of the windfarm is anticipated to involve as close to full removal of offshore infrastructure as possible at the time of decommissioning (where safe/practicable to do so). The decommissioning works are likely to be

undertaken in reverse to the sequence of construction works and involve similar levels of equipment and impact.

16.7 Relevant Embedded Mitigation Measures

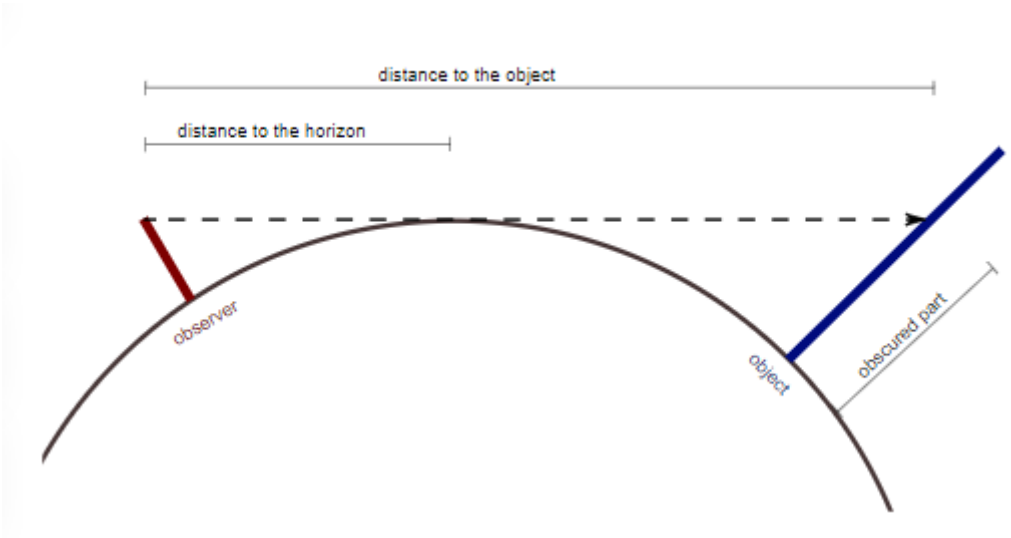
16.7.1.1 No SLVIA related embedded measures are proposed to reduce the potential for impacts on seascape / landscape and visual receptors in relation to the Project.

16.8 Scoping of Potential Significant Effects

16.8.1.1 The visibility and visual impacts of a windfarm are affected by distance and other aspects such as siting and weather conditions[516]. A review undertaken as part of the OESEA programme found that for offshore WTGs with a height of 250 – 300 m (to blade tip) a visual effect may occur at distances of up to 47.6 km[522]. The WTGs used for the Project may be up to 320 m to the maximum blade tip height and hence in theory could be seen at even greater distances. Hence, project specific consideration is required as suggested by the relevant guidance[516].

16.8.1.2 The curvature of the earth affects the visibility of an object, particularly when there are no other visual obstructions between the viewpoint and the object, as is the case in marine situations. **Plate 16-1** demonstrates the effect of the curvature of the Earth on the visibility of objects at distance, the horizon may obscure all or part of the object, depending on the height of the observer and the distance from the object.

Plate 16-1: The effect of curvature of the earth on visibility of objects at distance[523]



The visibility of an object can be calculated using two equations:

1. The distance between the observer and the horizon given by the equation:

$$a = \sqrt{(r+h)^2 - r^2}$$

2. The height in metres that is obstructed by the curvature of the Earth, given by the equation:

$$x = \sqrt{a^2 - 2ad + d^2 + r^2} - r$$

Where a = distance to the horizon, h = eyesight level above mean sea level, r = Earth's radius (6371 km), x = the height of the obstructed part and d = the distance between the observer and lowest point of the object.

16.8.1.3 To understand the potential visibility of from a receptor's viewpoints, a number of scenarios have been assumed and the aforementioned calculations performed (see **Table 16-5**). Receptors that have been considered include land-based receptors, vessels operating in and around the area and existing oil and gas installations in the vicinity of the Project.

Table 16-5: Example scenarios demonstrating visibility of the Project

Scenario	d - Distance to the Array Area (km)	h - Eyesight level (m)	a - Distance to Horizon (km)	x - Obscured object part (m)
On-land (low-lying coastal area)	185	5	8	2,459
On-land (mountain peak)	185	1000	113	408
Oil Rig/ Large Cruise Vessel	10	25	18	0
Oil Rig/ Large Cruise Vessel	50	25	18	81
Oil Rig/ Large Cruise Vessel	75	25	18	256
Oil Rig/ Large Cruise Vessel	100	25	18	530
Small vessel	10	5	8	0
Small vessel	50	5	8	139
Small vessel	75	5	8	352

16.8.1.4 The Project could utilise WTGs with blade tip height of up to 320 m and the Project area is 185 km from the Scottish coast. Due to the very long distance from the shore and the curvature of the Earth the Project will not be visible to land-based receptors be they at sea level or on top of a Munro (see **Table 16-5**). As **Table 16-5** shows that the upper parts of WTGs will be visible to small vessels over 50 km, away, and larger vessels may have intervisibility of the upper parts at over 75 km away. Receptors on vessels passing closer to the windfarm will see more of the windfarm and are likely to have a view for a longer period of time. However, the effect will still be short lived as they transit past, and as such is not deemed significant. It is acknowledged that oil and gas platforms within 85 km of the Project will have intervisibility with at least parts of WTGs. The closest platforms will be able to see full WTGs. However, workers on the assets are not classed as sensitive visual receptors.

16.8.1.5 Given the distance from land and low sensitivity of seascape receptors, it is proposed that the SLVIA is scoped-out for any further assessment in the EIA.

16.9 Cumulative Effects

16.9.1.1 Cumulative seascape, landscape and visual effects arise from the presence of multiple developments, usually other developments, affecting the same receptors. The low sensitivity of the offshore seascape and offshore visual receptors means that any cumulative effects are unlikely to be judged significant. Cumulative landscape and visual effects resulting from the Project in addition to and in combination with other similar developments are proposed to be scoped out due to their long distance offshore and lack of visibility from the coastline.

16.10 Potential Transboundary Effects

16.10.1.1 Transboundary impacts relating to SLVIA are considered unlikely to occur given the proximity of the Array Area to other European Economic Area (EEA) States, with the closest coastline being 286 km in Norway. Therefore, it is proposed that SLVIA is considered scoped out from further consideration within the EIA with regard to transboundary effects. This is detailed further in **Appendix 5D: Transboundary Screening Matrix.**

16.11 Proposed Approach to the Environmental Impact Assessment

16.11.1.1 As discussed in Sections 16.8, 16.9 and 16.10, the effects of the Project on SLVIA receptors are proposed to be scoped out and therefore no approach to the EIA methodology is presented.

16.12 Summary

16.12.1.1 No areas of land or coastline are located within 50 km of the Array Area with the coast being 185 km from the Array Area. The Aberdeen to Lerwick ferry route is also located over 150 km from the Array Area.

16.12.1.2 There are therefore considered to be no relevant seascape, landscape or visual receptors that will be impacted by the Project.

16.13 Further Consideration for Consultees

16.13.1.1 Please find below specific scoping questions relevant to the topic of seascape, landscape visual impact assessment:

- As discussed at the Scoping Workshop on 29 February 2024 and supported by the 2023 Scoping Opinion, the Applicant proposes that SLVIA should be scoped out of the EIA. Do you agree that the SLVIA remains scoped out of the EIAR?

17. MARINE INFRASTRUCTURE AND OTHER USERS

17.1 Introduction

17.1.1.1 This chapter of the Scoping Report considers the potential significant effects on marine infrastructure and other users (MI&OU) from the Project. The chapter provides an overview of the baseline conditions relevant to the Project Area (as defined in **Chapter 1: Introduction**), the datasets to be used to inform the EIA, sources, pathways, and receptors of the potential significant effects to be considered, and how these potential significant effects will be assessed for the purpose of the EIA.

17.1.1.2 This chapter interfaces with other chapters of the Project covering specialist areas which would otherwise fall within the scope of marine infrastructure and/or other users. These chapters cover the impacts of the Project on:

- **Chapter 13: Commercial Fisheries** including productive use of sea areas and potential economic values.
- **Chapter 14: Shipping and Navigation** including issues related to the safe use of vessels, the avoidance of fixed and temporary infrastructure and the need to alert mariners to Project works.
- **Chapter 18: Military and Civil Aviation** including impacts on infrastructure and uses in the airspace above the surface.
- **Chapter 19: Socio-economics** including where impacts from other energy projects and marine-based recreational activities are assessed.
- **Chapter 20: Materials and Waste** including use and disposal of materials of various types in connection with Project development and related activities.

17.1.1.3 The MI&OU assessment will consider marine infrastructure and potentially affected users that have not been covered in these other technical topics, including subsea cables and utilities, dredging and offshore disposal sites, other marine energy projects and oil and gas infrastructure. The MI&OU assessment will consider the potential significant effects on receptors which may arise from the construction, O&M and decommissioning of the Project elements that are seaward of MHWS.

17.1.1.4 The main receptor groups considered within the scope of MI&OU have been established with reference to the sectors identified within Scotland's NMP[524] together with consideration of dredge spoil. The list detailed in **Table 17-1** provides a cross reference to the receptor groups and the corresponding figures used in this chapter to illustrate the baseline.

Table 17-1: Identification of MI&OU sub-topic names with reference to sectors in Scotland's NMP[524]

Sectors as identified within Scotland's NMP[524]	Approach within this MI&OU chapter	MI&OU receptor group and baseline figure (where applicable)
Sea Fisheries	Not included (see **Chapter 13: Commercial Fisheries**)	*Not applicable*
Aquaculture	Included for seaweed. Not included for fish (see **Chapter 12: Fish Ecology)** and shellfish (see **Chapter 9: Benthic Ecology**)	Aquaculture
Wild Salmon and Diadromous Fish	Not included (see **Chapter 12: Fish Ecology; Chapter 13: Commercial Fisheries;** and **Chapter 19: Socio-economics**)	*Not applicable*
Oil and Gas	Included	Surface infrastructure (excluding renewable energy) (**Figure 17-6**); Pipelines, power and telecommunications cables (**Figure 17-5**)
Carbon Capture and Storage (CCS)	Included	CCS (**Figure 17-9**)
Offshore Wind and Marine Renewable Energy	Included	Renewable energy (**Figure 17-7**)
Recreation and Tourism	Not included (see **Chapter 19: Socio-economics**)	*Not applicable*
Shipping	Not included (see **Chapter 14: Shipping & Navigation**)	*Not applicable*
Submarine Cables	Included	Pipelines, power and telecommunications cables (**Figure 17-5**)
Defence	Included	Defence (**Figure 17-8**)
Aggregates	Included	Marine aggregates (**Figure 17-2)**
Dredge spoil	Included	Dredge spoil (**Figure 17-3**)

17.2 Legislation, Policy, and Guidance

17.2.1 Legislation and Policy

17.2.1.1 Legislation and policy that has been used to inform the scope of the MI&OU chapter is set out in **Table 17-2.** Further information on policies relevant to the EIA are set out in **Chapter 2: Legislative and Policy Context**.

Table 17-2: Legislation and policy context

Legislation/Policy	Relevance to the assessment
NPF4[525]	Revised policies of relevance to this area of technical assessment are: • Policy 1: Tackling the climate and nature crises. • National Spatial Strategy: northeast • National Developments: 3. Strategic Renewable Electricity Generation and Transmission Infrastructure
Scottish Planning Policy[526] (2014) Paragraph 169	Discusses how proposals for energy infrastructure development should take account of spatial frameworks for windfarms and heat maps where relevant. Consideration will vary relative to the scale but are likely to include: • Net economic impacts; • Scale of contribution to renewable energy generation; • Effect on greenhouse gas emissions; • Cumulative impacts; • Impacts on communities and individual dwellings; • Landscape and visual; • Natural heritage; • Carbon rich soils impacts; • Impacts on historic environment; • Impacts on road traffic; and • Effects on hydrology.
Scotland's National Marine Plan[524] • GEN 1 – General Planning Principle • GEN 4 – Co-existence	• GEN 1 supports sustainable developments which provide economic benefit to Scottish communities and social benefits. • GEN 4 emphasises the need for co-existence between development sectors and activities and requires cumulative impacts to be addressed.
Aberdeenshire Local Development Plan (LDP) 2023[527]	Modified proposed policies of relevance to this area of technical assessment are: • C2 – Renewable Energy. • PR2 – Preserving and Protecting Important Development Sites. These focus on the importance of renewable energy deployment and safeguarding sites for specific uses.

17.2.2 Technical Guidance

17.2.2.1 No technical guidance has been identified that is not already covered in other chapters with an interface to this MI&OU chapter. This will be informed by consultee liaison and engagement and updated for the EIAR where relevant.

17.3 Study Area

17.3.1.1 The Study Area for the MI&OU scoping assessment is defined as (i) the area within which the offshore infrastructure will be installed and operated (i.e. the Array Area and ECC) which may directly interact with third party Infrastructure and Other Marine

Users; together with (ii) the Central North Sea area as the widest perspective of the Study Area.

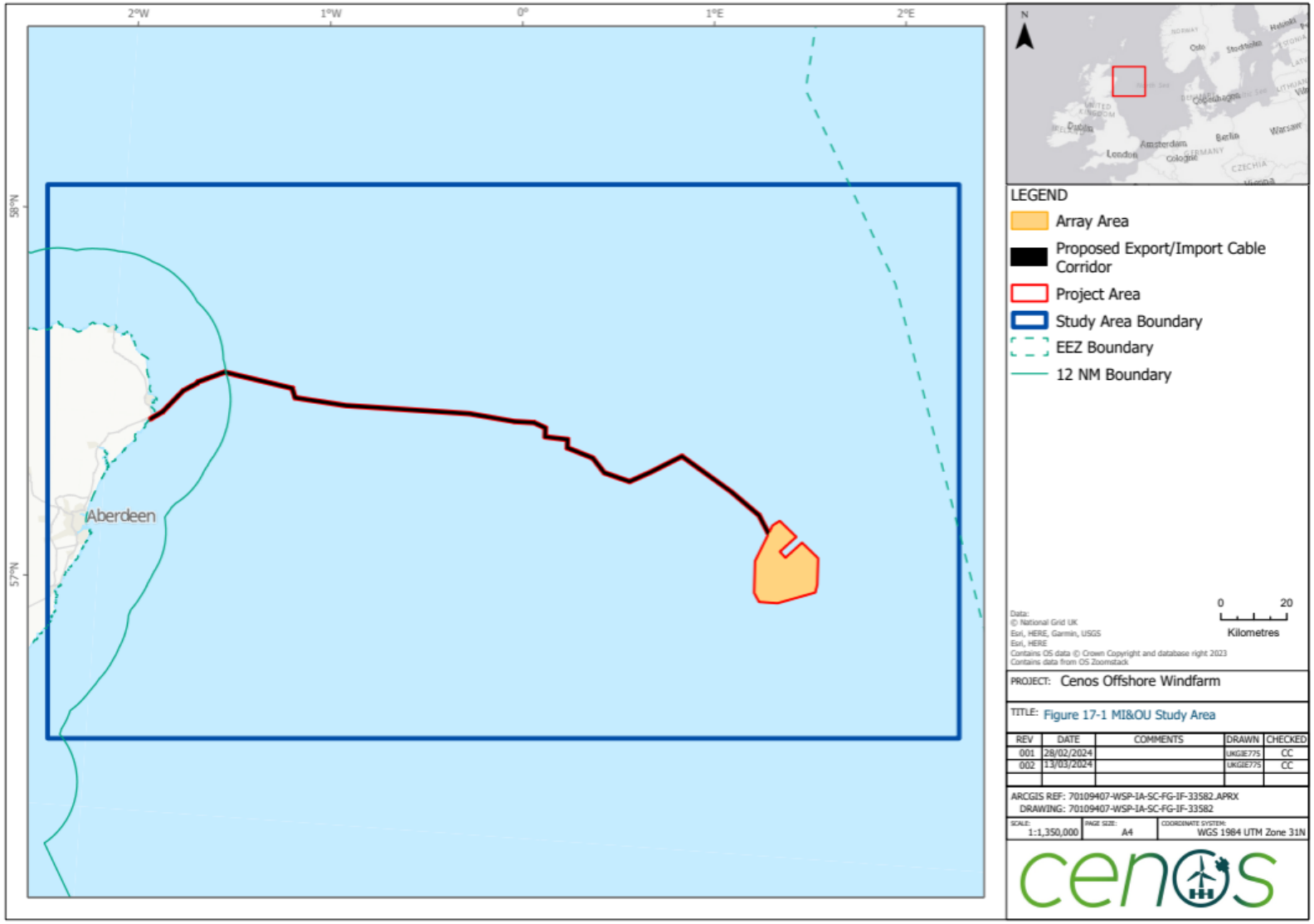
17.3.1.2 The Study Area, which includes significant infrastructure with multiple owners and operators, is illustrated in **Figure 17-1.** Potential significant effects from physical disruption to existing infrastructure are more likely near the Project Area.

17.3.1.3 The ECC will be assessed from the Array Area to MHWS. The section of the ECC from MHWS to 12 NM is the same as the NorthConnect Cable Corridor. The Applicant is coordinating with NorthConnect Limited. NorthConnect Interconnector and the Project will only require one set of infrastructure, within the overlapping marine licence Project Area from 12 NM to MHWS.

17.3.1.4 The section of the ECC from MHWS to 12 NM has previously been assessed within the EIAR submitted for NorthConnect Limited and judged acceptable through the consenting of NorthConnect. The previous EIA work for NorthConnect will be considered in assessing the ECC from MHWS to 12 NM, updated by any other readily available information and surveys undertaken. See Section 17.5 for further details of the baseline conditions. Further details are in **Chapter 5: Approach to Scoping and EIA.**

17.3.1.5 Any transboundary impacts which would extend further than the Study Area are addressed separately (see Section 17.10).

Figure 17-1: MI&OU Study Area



17.4 Consultation

17.4.1.1 Consultation is a key part of the application process. This assessment will be informed by engagement and discussion with various stakeholders. These include owners and operators of existing assets and representatives of institutions with responsibilities or concerns related to future uses.

17.4.1.2 A summary of the key issues raised during consultation to date, specific to MI&OU, is outlined in **Table 17-3** below, together with how these issues will be considered in the production of the EIAR.

Table 17-3: Summary of consultation relating to MI&OU

Date and stakeholder	Consultation and key comments	How this is accounted for
Scoping Workshop, 29 February 2024	The Applicant provided a high level summary during the Scoping Workshop. At the time of writing, no further consultee responses have been received.	Waiting for Scoping Opinion.

17.5 Baseline conditions

17.5.1 Data Information Sources

17.5.1.1 An initial desk-based review was undertaken using the NMPi online system[534]. **Table 17-4** details data sources utilised to inform this chapter.

Table 17-4: Key Sources of MI&OU Data

Source	Date	Summary	Coverage of study area
EMODNet[528]	Accessed February 2024	• Cables and Pipelines	Full Coverage
NSTA	Accessed February 2024	• Cables and Pipelines	Full Coverage
TeleGeography	Accessed February 2024	• Telecommunication Cables	Full Coverage
NSTA	Accessed February 2024	• Oil and Gas Platforms	Full Coverage
NMPi	Accessed February 2024	• Digitised Aggregate Resources Data	Full Coverage
EMODNet[528]	Accessed February 2024	• Explosives disposal Sites	Full Coverage
CES	Accessed February 2024	• Carbon Capture & Storage	Full Coverage
NMPi	Accessed February 2024	• Digitised Military Estates	Full Coverage

Source	Date	Summary	Coverage of study area
NMPi	Accessed February 2024	• Digitised Military Danger/Exercise Areas	Full Coverage
CES	Accessed February 2024	• Windfarms	Full Coverage
NMPi	Accessed February 2024	• Sectoral Marine Plans	Full Coverage
EMODNet[528]	Accessed February 2024	• Active O&G Licences	Full Coverage
NSTA	Accessed February 2024	• O&G Wells	Full Coverage
EMODNet[528]	Accessed February 2024	• Dredge Spoil Deposit Sites	Full Coverage

17.5.2 Existing Baseline

17.5.2.1 The desk-based review has identified the following infrastructure and other marine users (not already identified in commercial fisheries, shipping and navigation and socio-economics):

- Productive resources of aggregates;
- Dredged spoil sites;
- Oil and gas infrastructure and operations;
- Subsea networks, including cables and pipelines;
- Renewable energy;
- Defence facilities and exercise and danger areas; adn
- Carbon Capture and Storage (CCS); and
- Historic munitions disposal sites.

Productive Resources of Aggregates

17.5.2.2 The Marine Directorate identifies marine aggregates in the following way: *"Marine aggregate extraction removes sand and gravel from the seabed for use as construction aggregate (in concrete), land reclamation (as fill) or beach replenishment*". Scotland has considerable marine aggregate resources, but terrestrial deposits have traditionally been preferred.

17.5.2.3 The Project will overlap with an area identified as evaporite resource as identified by the Crown Estate[529]and detailed on NMPi[534]. These areas of evaporite resource have not been used for the purposes of extraction and as such represent areas where data supports the presence of a particular mineral resource. Evaporite resources are geologically associated with petrochemicals, and potentially occur extensively in parts of the North Sea.

17.5.2.4 An area identified as construction aggregate resource (sand) is not located within the study area but at a distance of approximately 40 km from the ECC (**Figure 17-2**).

17.5.2.5 The ECC overlaps with an area identified as fill aggregate as shown in **Figure 17-2**.

17.5.2.6 No coal or metallic mineral resources are identified in the Study Area.

17.5.2.7 There are no licences for marine aggregate extraction identified within the Study Area or within the wider east Scotland region[530].

Dredge Spoil Sites

17.5.2.8 According to the Scottish Government[531], dredging is required to maintain the water depth required keep ports operating. Dredging is therefore considered important in maintaining access to Peterhead Harbour.

17.5.2.9 There are two open disposal sites (North Buchan Ness and Peterhead disposal sites) and four closed disposal sites (middle Buchan Ness, middle Buchan Ness B, south Buchan Ness, and south Buchan Ness B) near the ECC (see **Figure 17-3**). The two open sites have been used for the deposition of dredged harbour material from Peterhead and / or Boddam Harbour.

17.5.2.10 No sites overlap with the Project Area.

17.5.2.11 The effect of the Project on shipping and navigation, including vessel activity in relation to dredge spoil disposal activities is covered is **Chapter 14: Shipping and Navigation**.

Oil and Gas Infrastructure and Operations

17.5.2.12 Within the northeast region of Scotland, there is a well-established oil and gas industry and the Project overlaps with existing licence blocks. The Array Area avoids all major hydrocarbon infrastructure apart from one active gas pipeline.

17.5.2.13 Within the Study Area there are multiple oil and gas wells, predominantly decommissioned but some are active or suspended. This is shown in **Figure 17-4**.

17.5.2.14 There are also multiple pipelines associated with oil and gas operations which are located within the Study Area (**Figure 17-4**).

17.5.2.15 The Project Area is 3.8 km from the nearest surface infrastructure, which is an oil and gas platform. Within 30 km there are an additional 19 platforms (including three FPSOs).

17.5.2.16 The effect of the Project on access to and services used by these platforms regarding shipping and navigation is covered in **Chapter 14: Shipping and Navigation**.

17.5.2.17 The effects of the increased surface infrastructure of the Project on overall levels of safety including nearby platforms is covered in **Chapter 21: Major Accidents and Disasters**.

Subsea Networks, Including Cables and Pipelines

17.5.2.18 As shown in **Figure 17-5** and **Table 17-6** there are many pipelines, subsea cables (power and telecommunication), and other subsea infrastructure in the Study Area.

17.5.2.19 The ECC will cross several pipelines and cables, subject to survey verification. This includes gas pipelines, oil pipelines and inactive pipelines:

- 20” Gas Fulmar A to St Fergus;
- Forties C to Cruden Bay;
- Durward Manifold to 1 Wellheads Oil Line;
- Langeled Pipeline;
- Cats Pipeline; and
- Culzean 22 inch Gas Export Flowline.

17.5.2.20 The ECC also crosses one power cable and will possibly cross a further power cable which will connect to the Salamander Wind Farm, depending on the Salamander Wind Farm’s construction programme and final routing design.

Renewable Energy

17.5.2.21 Renewable energy (tidal, wave and wind) including both operational and lease areas are shown on **Figure 17-7**.

17.5.2.22 There are no operational or lease areas tidal or wave sites within the Study Area.

17.5.2.23 A number of offshore wind lease agreement areas and wind developments are found in the survey area (see **Table 17-5**). The closest operational offshore windfarm to the Project is the Hywind Offshore Windfarm, located approximately 165 km from the Array Area. There is one offshore wind project currently under construction within the Study Area (Seagreen Phase 1), approximately 180 km from the Array Area.

Table 17-5: Offshore windfarm in the MI&OU Study Area

Offshore windfarm	Operator	Status
Marram	ScottishPower Renewables (UK) Limited, Shell Wind Energy Ltd	Concept/early planning
Green Volt	Flotation Energy	Consent application submitted
Aspen	Cerulean Winds	Concept/early planning
Unnamed	Harbour Energy	Cancelled
Beech North; Beech South	Cerulean Winds	Concept/early planning
Salamander	Simply Blue Group, Subsea 7, Ørsted (UK) Limited	Concept/early planning
HyWind Scotland	Equinor ASA (previously Statoil ASA), Masdar	Operational
BT Alternative Energy Investments	BP PLC	Concept/early planning
Muir Mhòr (previously Mara Mhor) Offshore Wind Farm	Fred. Olsen Renewables Ltd, Vattenfall AB	Concept/early planning
CampionWind	Shell Wind Energy Ltd, ScottishPower Renewables (UK) Limited	Concept/early planning
Cedar	Cerulean Winds	Concept/early planning

Offshore windfarm	Operator	Status
Bellrock	Renantis (formerly Falck Renewables),BlueFloat Management, S.L.U	Concept/early planning
Ossian Offshroe Wind Farm	SSE PLC, Marubeni Corporation, Copenhagen Infrastructure Partners	Concept/early planning
Morven	BP PLC, EnBW Energie Baden-Württemberg AG	Concept/early planning
Seagreen Phase 1	SSE Renewables, Total Energies, PTT Exploration, Production Public Company Limited	Under construction
Bowdun Offshore Wind Farm	D.E.M.E. Concessions NV, Qair Marine, Aspiravi Holding NV	Concept/early planning
Kincardine	Grupo COBRA	Operational
Aberdeen Offshore Wind Farm	Vattenfall Wind Power Ltd	Operational
Seagreeen 1A Offshore Wind Farm	SSE Renewables, Total Energies, PTT Exploration, Production Public Company Limited	Consented
Inch Cape Offshore Wind Farm	Red Rock Power Limited, ESB	Pre-construction
Culzean Floating Wind Pilot Project	TotalEnergies E&P UK	Concept/early planning

17.5.2.24

17.5.2.25 During the EIA, the Applicant will seek to consult with those offshore windfarm operators where the potential for an interaction between the Project infrastructure (Array Area and ECC) and the existing or proposed projects exist.

Defence Facilities and Exercise and Danger Areas

17.5.2.26 Defence facilities and exercise and danger areas (known as PEXA) are shown in **Figure 17-8**. The nearest exercise area is approximately 40 km north and slightly west from Peterhead and nearest danger area is approximately 30 km south along the coast to Aberdeen.

17.5.2.27 The effects of the Project on military aviation are covered in the military and civil aviation assessment in **Chapter 18: Military and Civil Aviation**. No further assessment is undertaken in this MI&OU chapter of any other aspects of defence related to use of airspace, including radar and telecommunications.

Historic Munitions Disposal Sites

17.5.2.28 The nearest historic munitions area to the Project is approximately 40 km south of Peterhead. The potential remains for UXO to exist within the Project area and elsewhere (**Figure 17-10**).

Figure 17-2: Marine areas in the Central North Sea with productive resources of aggregates

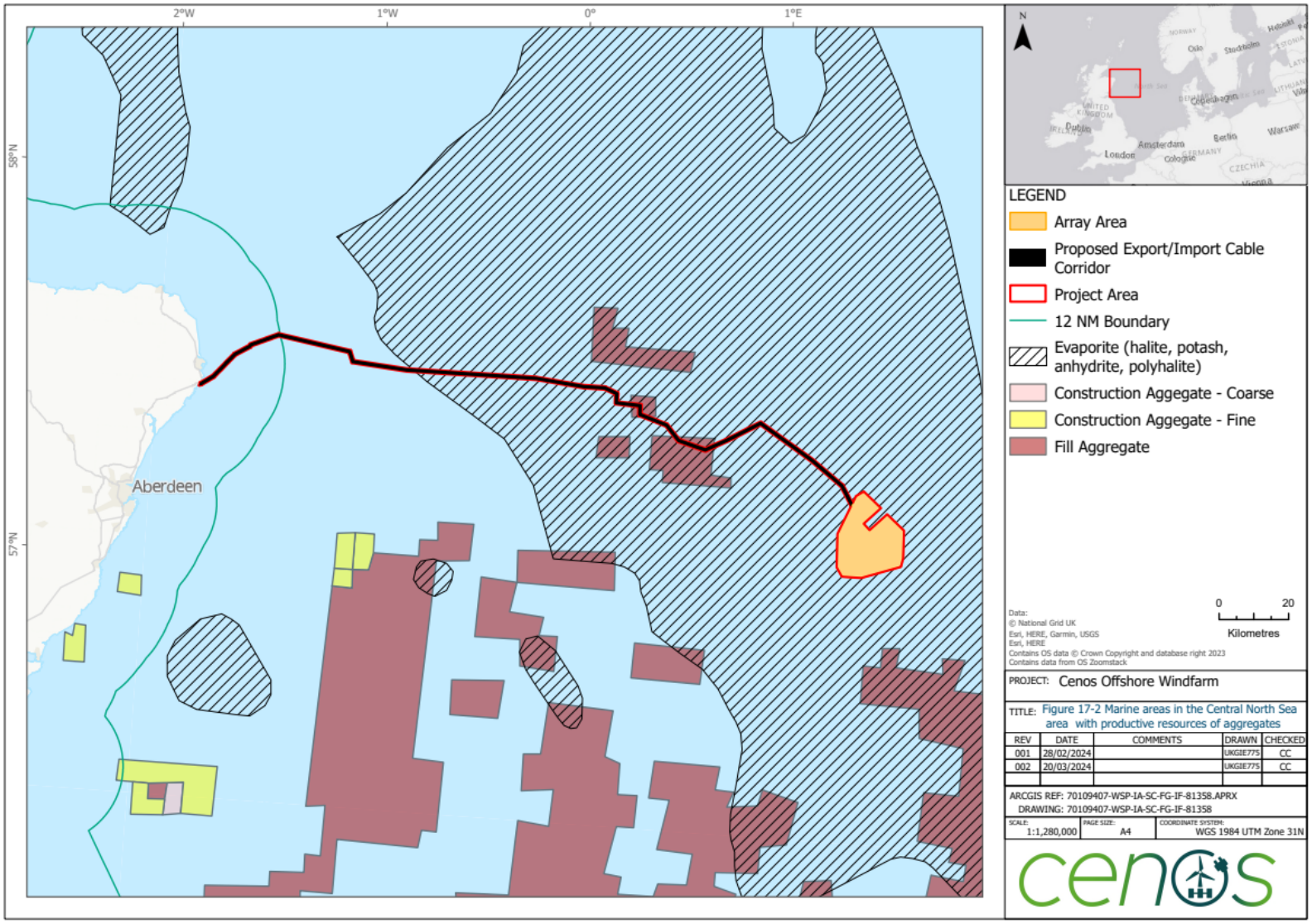


Figure 17-3: Dredge spoil sites in the Central North Sea

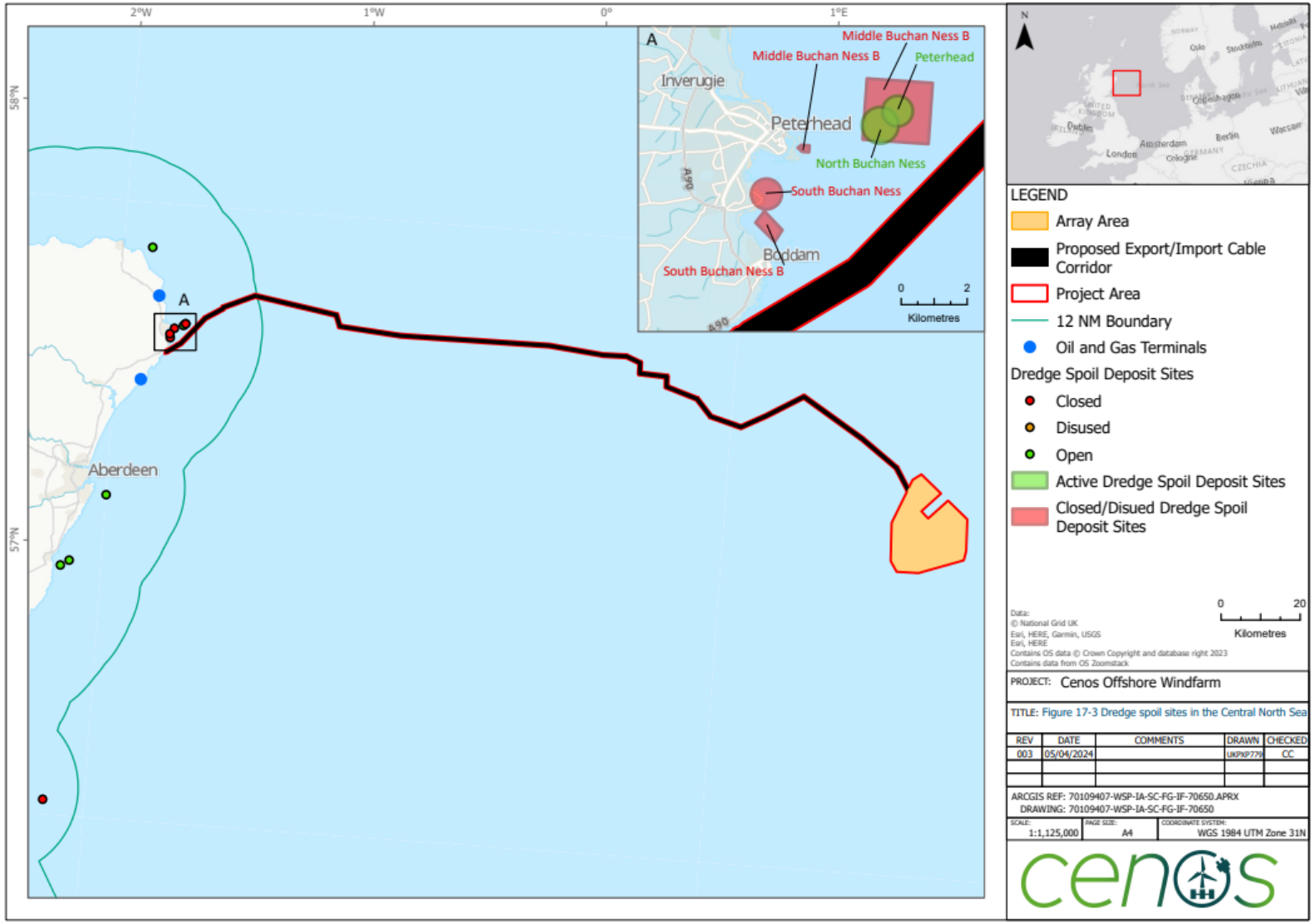


Figure 17-4: Oil and gas infrastructure and operations in the Central North Sea

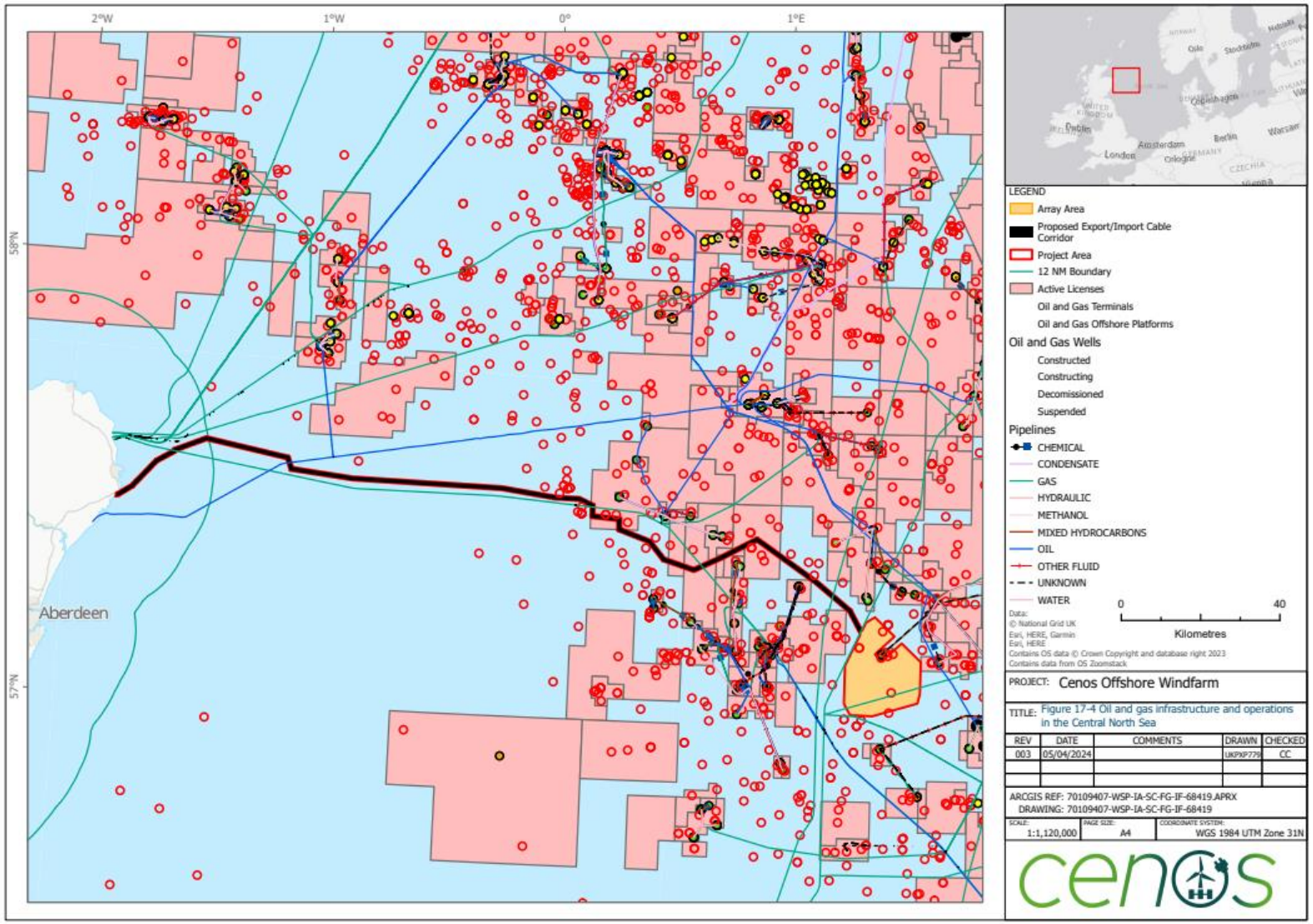


Figure 17-5: Subsea networks in the Central North Sea

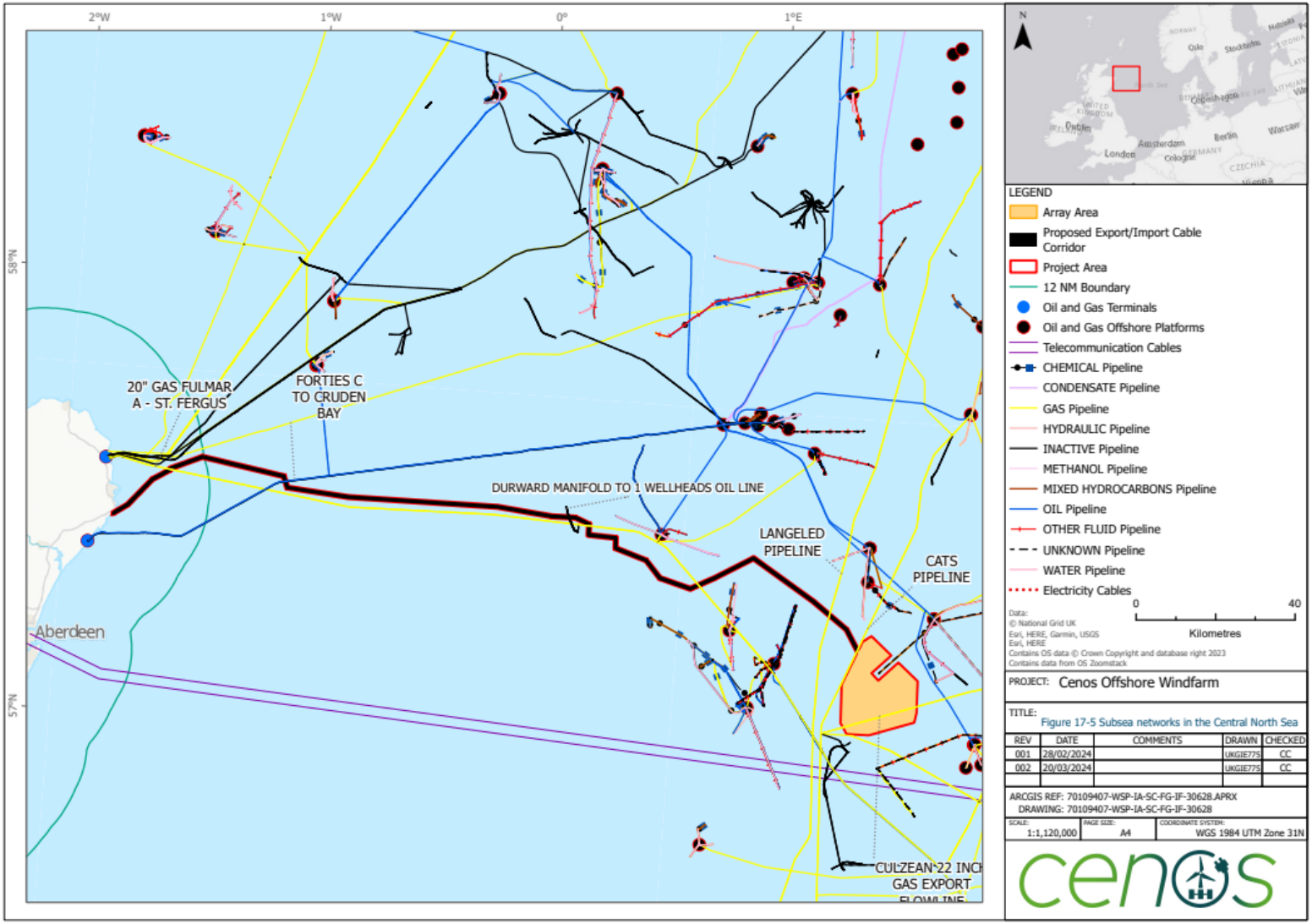


Figure 17-6 Surface infrastructure (excluding renewable energy) in Central North Sea

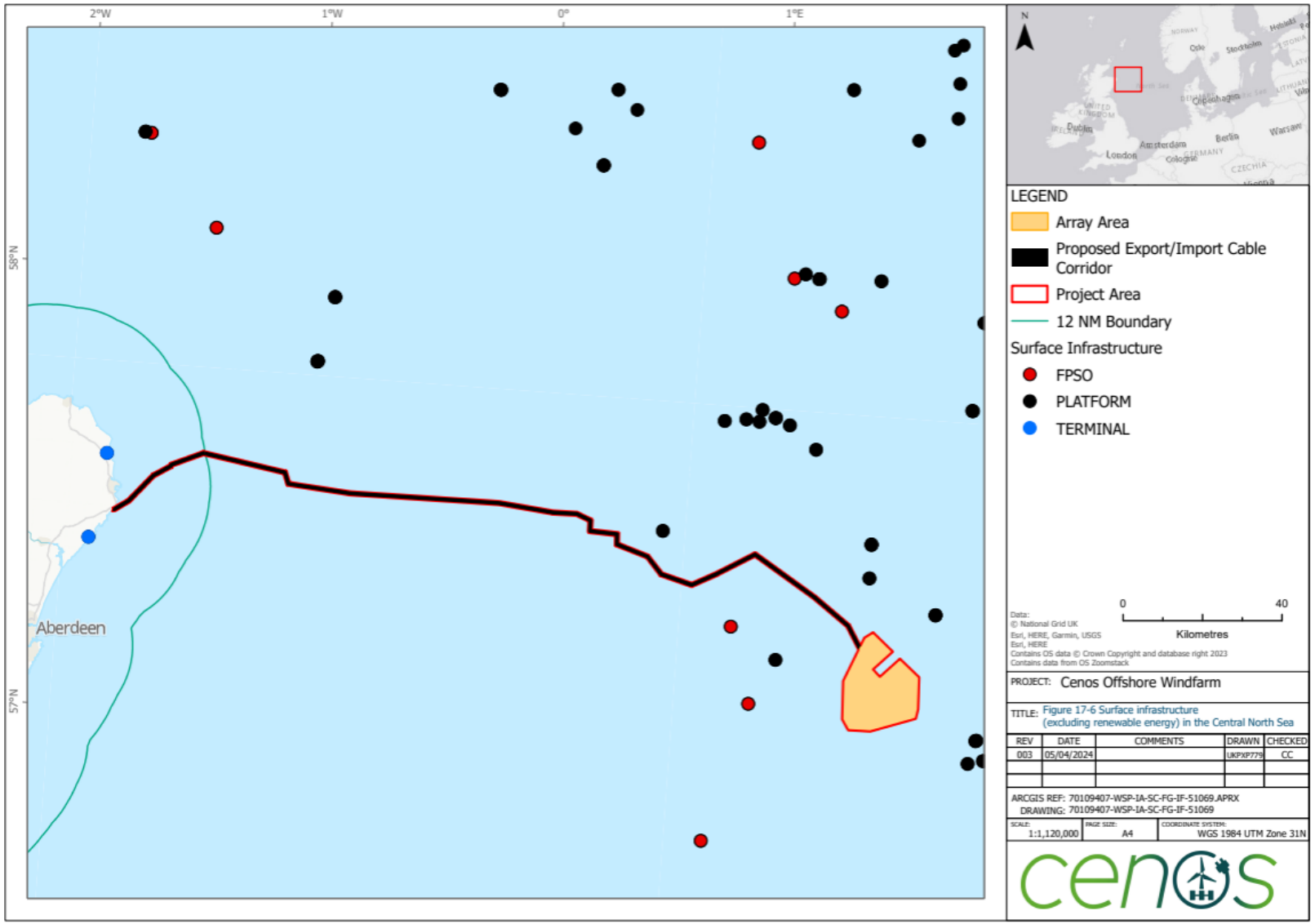


Figure 17-7: Renewable energy in Central North Sea

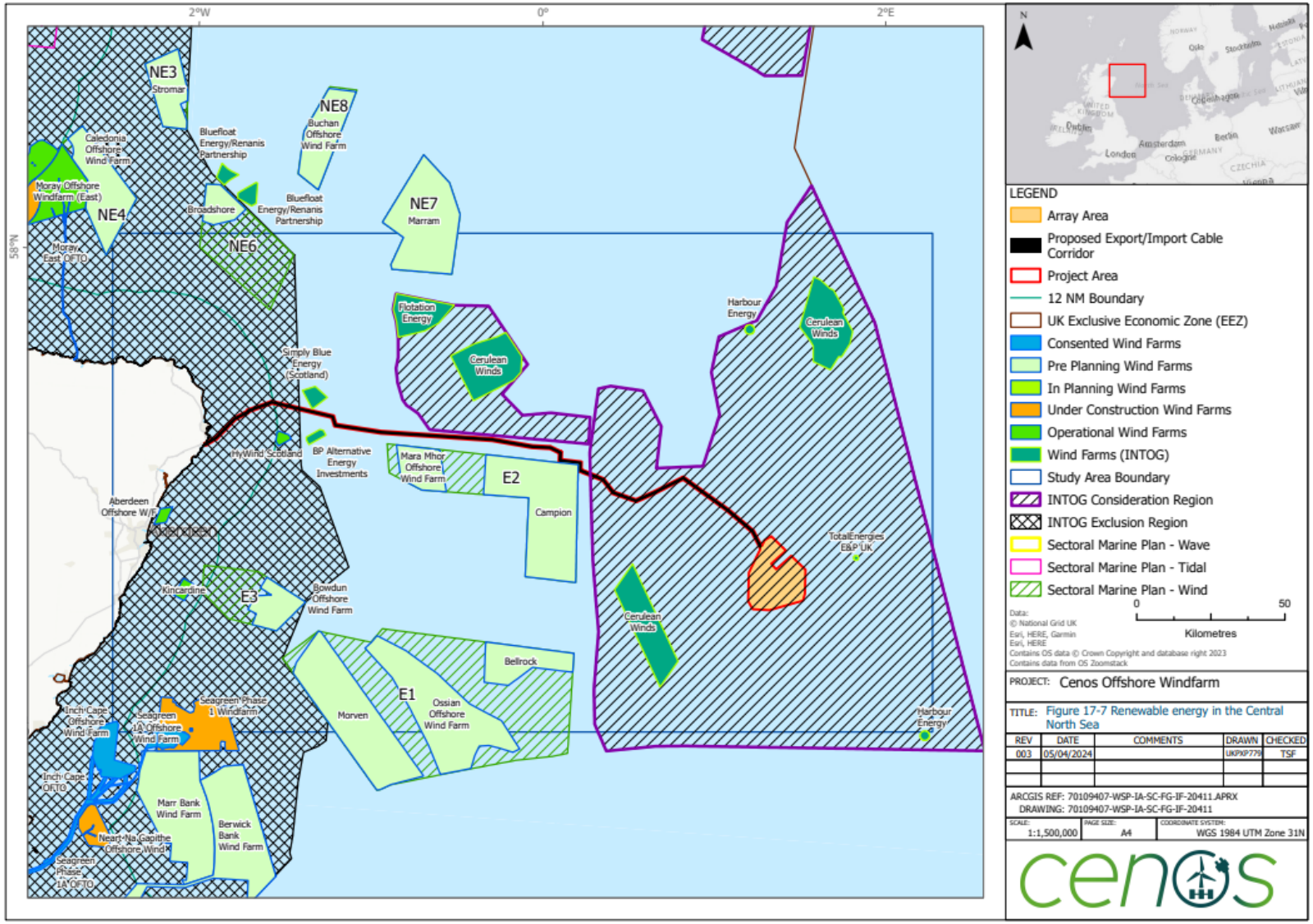


Figure 17-8: Defence facilities and exercise and danger areas in the Central North Sea

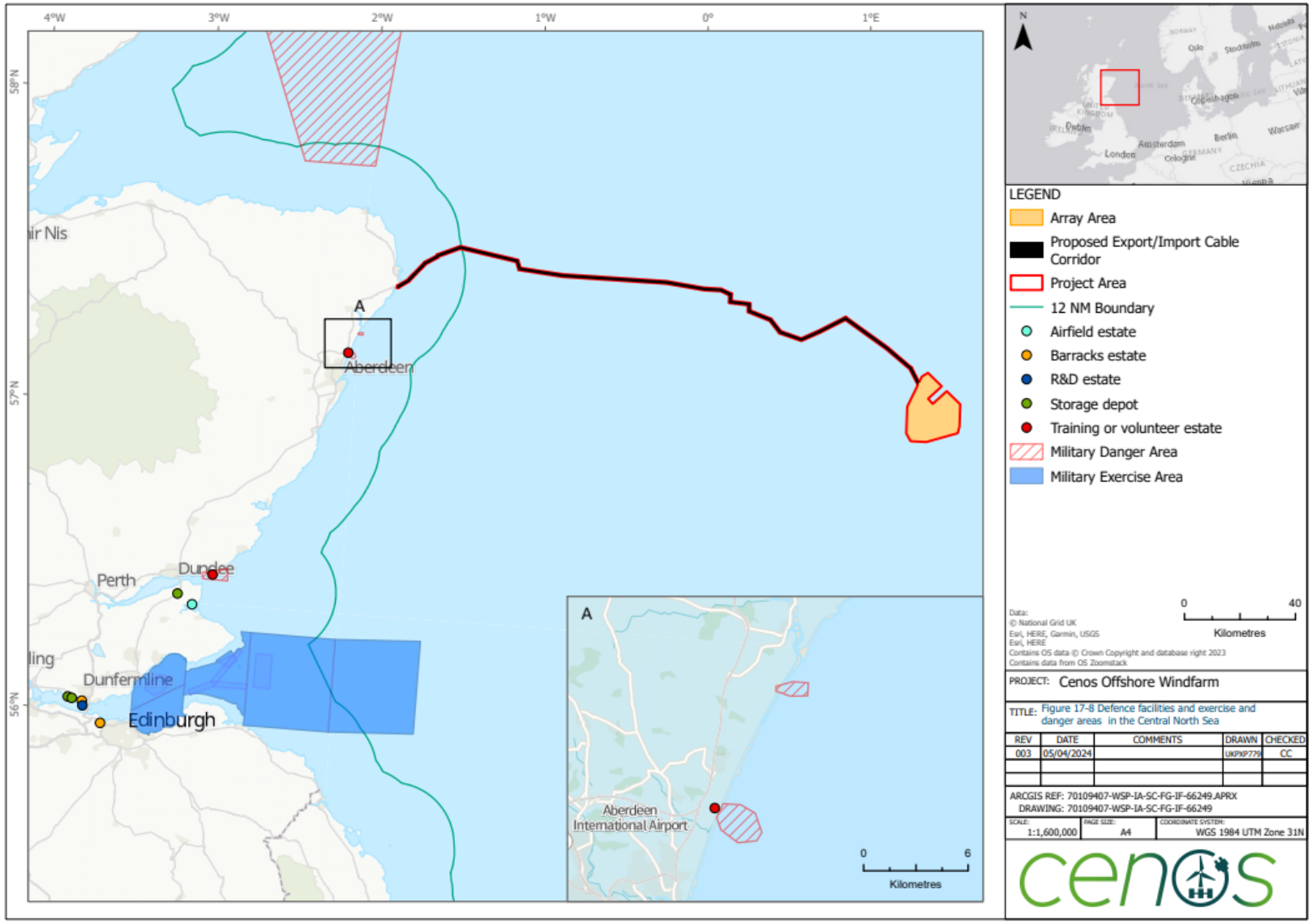


Figure 17-9: Indicative map of CCS Lease sites from Crown Estate Scotland and NSTA Licences

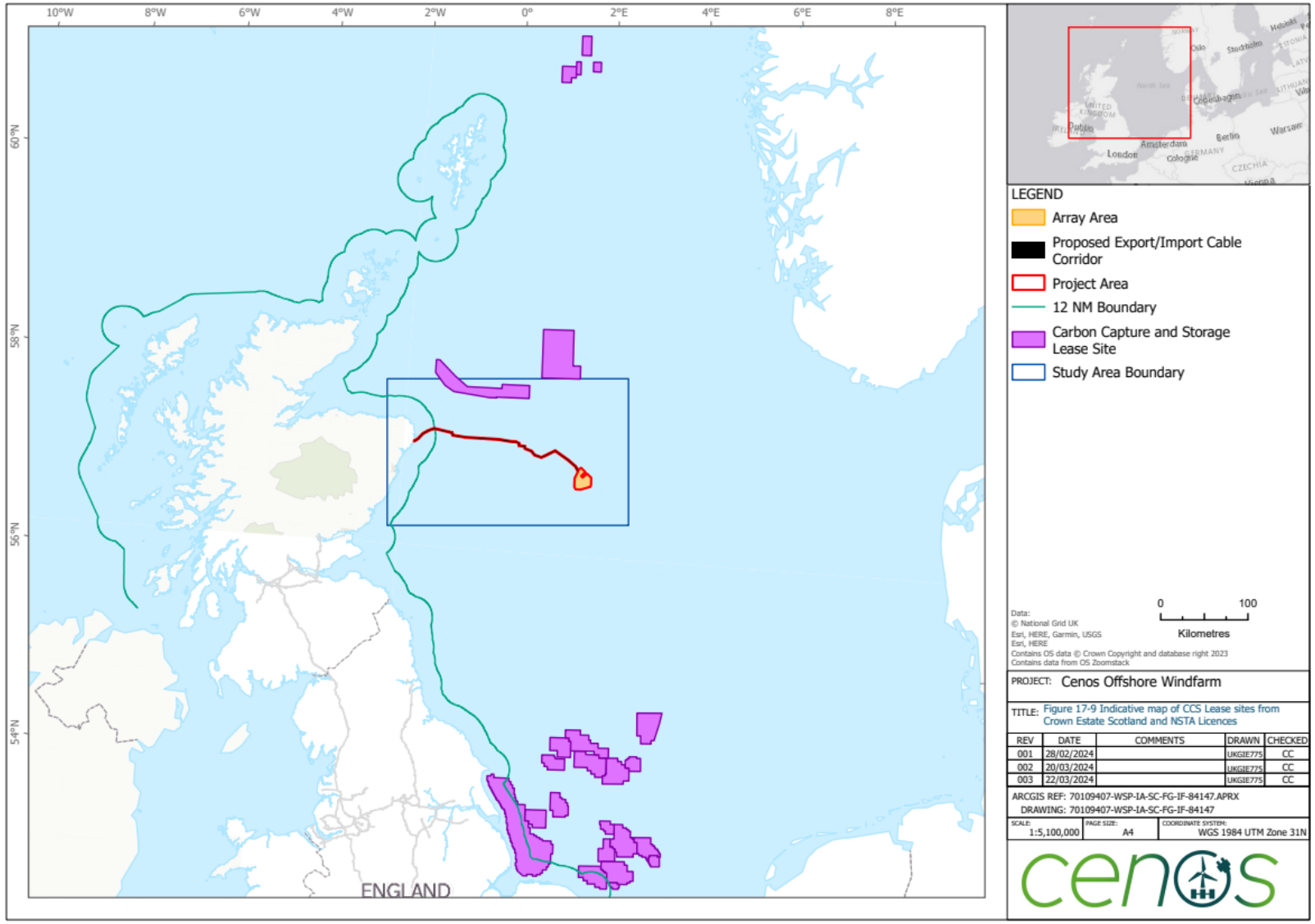
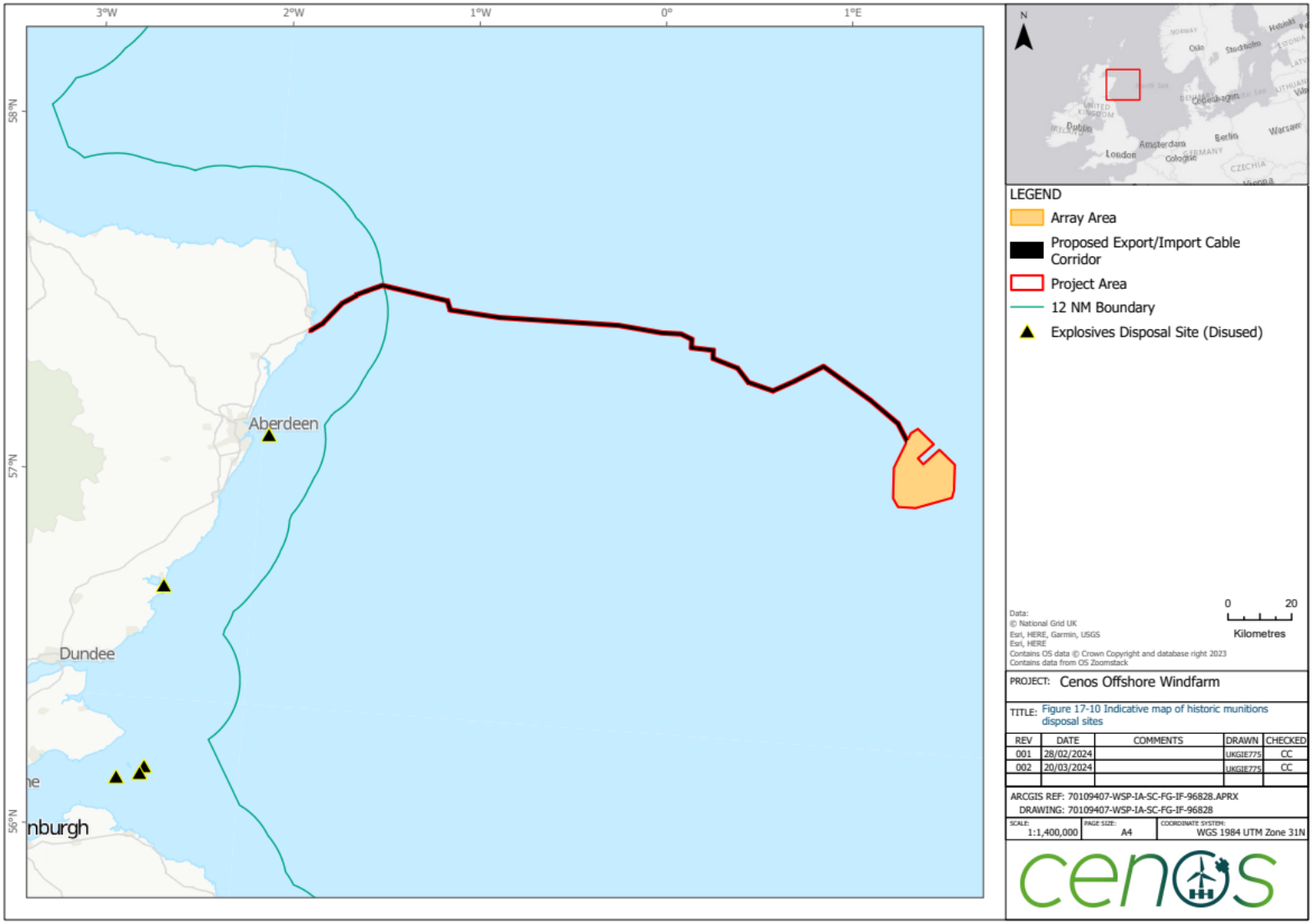


Figure 17-10: Indicative map of historic munitions disposal sites



Carbon Capture and Storage (CCS)

17.5.2.29 As part of the UK's Storage Appraisal Project (UKSAP)[532], a strategic study of the potential for UK carbon dioxide (CO2) storage provided the top 20 sites from a potential 579 sites) greater than 50Mt capacity, that fit a certain set of criteria suitable to CCS focused on geology, engineering, contaminant, and cost. The sites are predominantly located in the North Sea.

17.5.2.30 Two CCS licenced areas (CS012 and CS011) are located within the study area, approximately 50 km of the Project (**Figure 17-9**). No other licence areas exist within the study area however a carbon capture lease area (Acorn) occurs adjacent to licence area CS011.

17.5.2.31 No infrastructure for capture or use of carbon uses currently exists within the Central North Sea area.

17.5.3 Future Baseline

17.5.3.1 On the basis of available evidence, in the absence of the Project, any future baseline for MI&OU over the lifetime of the Project is unlikely to be markedly different from the current baseline.

17.6 Basis of Assessment

17.6.1.1 The MI&OU scoping assessment is based on the following key assumptions, which are also set out in **Chapter 3: Project Description**:

- Inter-array and export / import cables will be buried, where possible;
- Maintenance activities will be undertaken for both preventive and corrective maintenance requirements;
- The operational lifetime of the project is assumed to be a minimum of 30 years; and
- The decommissioning of the windfarm is anticipated to involve as close to full removal of offshore infrastructure as possible at the time of decommissioning (where safe/practicable to do so). The decommissioning works are likely to be undertaken in reverse to the sequence of construction works and involve similar levels of impacts.

17.7 Relevant Embedded Mitigation Measures

17.7.1.1 Embedded mitigation measures have been identified and are proposed to be adopted as part of the Project design (primary mitigation) or implemented in accordance with industry standard practice that would occur with or without the input arising from environmental assessment (tertiary mitigation). There is a commitment by the Applicant to implement these embedded mitigation measures and they have been considered within the 2024 EIA Scoping Report.

17.7.1.2 The requirement for additional mitigation measures (secondary mitigation) will be dependent on the significance of effects on MI&OU receptors and will be consulted

on with consultees throughout the EIA process. Any additional mitigation measures may be identified as the environmental assessment progresses and will be presented within the EIAR. Measures which are relevant to MI&OU are listed in **Table 17-6.**

Table 17-6: Relevant MI&OU Embedded Mitigation

ID	Embedded mitigation measure
MI&OU-001	Application for safety zones of up to 500 m during construction and periods of major maintenance, and either statutory or advisory safety zones during operation (to be agreed during further consultation).
MI&OU-002	Timely and efficient distribution of NtM, Kingfisher notifications and other navigational warnings of the position and nature of works associated with the Project.
MI&OU-003	An Emergency Response and Cooperation Plan (ERCOP) to be developed in line with MCA Guidance and confirms the measures, the Project has in place to support any emergency response.
MI&OU-004	Any objects dropped on the seabed during works associated with the Project will be reported and objects will be recovered where they pose a hazard to other marine users and where recovery is possible.
MI&OU-005	The Applicant will develop and adhere to an EMP. An OEMP will be submitted as part of the consent application documents. A Construction Environmental Management Plan (CEMP) will be developed and adhered to for the Project. The CEMP will detail how environmental commitments will be attained during the construction phase of the Project.
MI&OU-006	A Decommissioning Programme will be developed for the Project in line with industry good practice, guidance and legislation.
MI&OU-007	A UXO hierarchy will be applied for UXO clearance techniques with the following order of preference: 1. Avoid 2. Relocation 3. Remove. 4. Low order deflagaration. 5. High order deflagaration.

17.8 Scoping of Potential Significant Effects

17.8.1.1 In line with the EIA Regulations 2017, the EIA for the Project will only consider those impacts where there is a potential for significant effects. The following section draws on industry experience to identify pathways between impacts and receptors that may potentially lead to significant effects. Where experience and available evidence indicates potential significant effects will not occur with regard to the EIA Regulations 2017 the pathway is scoped out from assessment.

17.8.1.2 The potential significant effects for MI&OU are summarised in **Table 17-7**. This scoping assessment is based on a combination of the Project design at the time of writing, embedded mitigation measures, the evidence base and understanding of the baseline environment at the time of writing, and professional judgement.

17.8.1.3 The identification of potential significant effects is used here in order to deliver a proportionate approach to the EIA. In doing so, it sets out a high-level assessment of

all potential significant effects with the basis for scoping out certain impacts presented according to the evidence base for each sub-topic.

Table 17-7: Summary of potential significant effects for MI&OU scoped in (✓) or scoped out (x) of the EIAR during construction (C), O&M and decommissioning (D)"

Activity and impact	Embedded mitigation	Scoped in or scoped out per phase			Justification	Overview of proposed approach
		C	O&M	D		
Potential effects on other renewable energy developments	MI&OU-001, MI&OU-002, MI&OU-003, MI&OU-004, MI&OU-005	X	X	X	There are no areas identified for tidal or wave resources within the Central North Sea area. Therefore, there will be no potential for an impact, and these are scoped out. A number of offshore wind lease agreement areas and developments have been identified in the Survey Area, with the closest operational windfarm being HyWind, 165 km from the Array Area. These effects are therefore proposed to be scoped out.	N/A.
Potential effects on existing oil and gas operations	MI&OU-001, MI&OU-002, MI&OU-003, MI&OU-004, MI&OU-005	✓	✓	✓	The Project is located in an area with significant oil and gas infrastructure, with the closest platform located 3.8 km from the Project Area. These effects will be considered for further assessment during the EIA.	Assessment of design. Engagement with oil and gas owners / operators.
	MI&OU-001, MI&OU-002, MI&OU-003, MI&OU-004, MI&OU-005	✓	✓	✓	The ECC will cross a maximum of 10 pipelines including gas, oil and inactive pipelines. Potential impacts as a result of these crossings will be assessed during the EIA.	Engagement with oil and gas owners / operators.
Potential effects on military and defence activities	MI&OU-001, MI&OU-002, MI&OU-003, MI&OU-004, MI&OU-005	X	X	X	The nearest exercise area is approximately 40 km north and slightly west from Peterhead and nearest danger area is approximately 30 km south along the coast to Aberdeen. These are considered sufficiently distant to	N/A

Activity and impact	Embedded mitigation	Scoped in or scoped out per phase			Justification	Overview of proposed approach
		C	O&M	D		
					lead to no potential significant effects. The effects of the Project on defence as a result of effects on ports are scoped-out. The effects of the Project on defence are not expected to be significant based on the locations of current facilities as well as exercise and danger areas and are therefore proposed to be scoped out.	
Potential effects on subsea telecommunications and power infrastructure.	MI&OU-001, MI&OU-002, MI&OU-003, MI&OU-004, MI&OU-005	✓	X	X	The Project will cross one power cable and possibly a second power cable from the Salamander Wind Farm (depending on the Salamander Wind Farm's construction programme and final routing design). Therefore, these effects will be considered during the EIA.	Engagement with telecomms operators.
Potential effects on licensed dredge spoil disposal sites.	MI&OU-001, MI&OU-002, MI&OU-003, MI&OU-004, MI&OU-005	✓	X	X	There is a cluster of two active and four closed dredge disposal sites within the study area. Due to the proximity to the ECC, this effect will be considered for further assessment during the EIA.	Design, implementation and schedule for ECC. Engagement with disposal owners or operators.
Disturbance or discovery of UXO within the Project Area.	MI&OU-004, MI&OU-006	✓	X	✓	The nearest historic munitions area to the Project is approximately 40 km offshore south of Peterhead. While the historic munitions disposal sites are not within the Project Area there is the potential for discovery of unidentified UXO during pre-construction surveys or construction. Therefore, these effects will be considered for further assessment during the EIA.	Design, implementation and schedule for ECC. Engagement with owners / operators.

Activity and impact	Embedded mitigation	Scoped in or scoped out per phase			Justification	Overview of proposed approach
		C	O&M	D		
Potential sterilisation of areas for marine aggregates.	N/A	✓	X	X	The Marine Directorate[3] states that there are no licensed areas for extracting marine aggregates in the Study Area. Additionally, no coal and metallic minerals are identified in the Study Area. Thus, these will not be considered further. However, the ECC overlaps with an area identified as full aggregate. Therefore, this effect will be considered for further assessment during the EIA.	Engagement with MD-LOT regarding approach to significance of sterilisation in the Project area.
Potential effects on aquaculture receptors.	N/A	X	X	X	No active aquaculture sites have been identified in the Study Area. The closest site is located approximately 40 km from the Project Area. Therefore, this effect will be scoped out.	N/A
Potential effects on planned areas for CSS.	N/A	X	X	X	No infrastructure for capture or use of carbon currently exists within the Central North Sea area. Two CSS license areas exist within the Study Area, approximately 50 km from the Project Area. Based on the distance to the Project Area, the effects of the Project on CCS development are not expected to be significant and are therefore scoped out.	N/A
Potential effects on ferry routes.	MI&OU-002	X	X	X	There are no known ferry routes which pass through, or close to, the Array Area. The ECC will cross over one known ferry route (Aberdeen to Orkney and Shetland),	N/A

Activity and impact	Embedded mitigation	Scoped in or scoped out per phase			Justification	Overview of proposed approach
		C	O&M	D		
					however the construction impacts will be temporary. The Project will ensure timely and efficient distribution of NtM of the position and nature of works associated with the Project. Therefore, this effect is scoped out.	

17.9 Cumulative Effects

17.9.1.1 Cumulative effects on MI&OU resulting from the effects of the Project and other developments will be assessed in accordance with the guidance and methodologies set out in **Chapter 5: Approach to Scoping and EIA** and through consideration of the other developments identified in the CEA screening exercise.

17.9.1.2 The following impacts from the Project have the potential to act cumulatively with impacts from other developments to contribute to cumulative effects on marine infrastructure and users because of:

- Potential uses of marine resources; and
- Increased obstruction and / or disruption to infrastructure and other marine users such as pipelines and cables.

17.9.1.3 Cumulative effects related to use of airspace are covered in the **Chapter 18: Military and Civil Aviation.**

17.10 Potential Transboundary Effects

17.10.1.1 The potential significant effects from construction, O&M, and decommissioning on MI&OU receptors are considered in **Appendix 5D: Transboundary Screening Matrix**.

17.10.1.2 Transboundary effects include activities which may disrupt assets which provide products and services consumed or delivered outside the UK national borders, such as the use of cables and pipelines. Engagement with stakeholders operating or owning assets will be undertaken to confirm the extent of potential transboundary effects.

17.10.1.3 Therefore, it is proposed that transboundary impacts upon MI&OU are assessed further within the EIA and are not scoped out at this time.

17.11 Proposed Approach to the Environmental Impact Assessment

17.11.1.1 The Project-wide approach to the assessment methodology is set out in **Chapter 5: Approach to Scoping and EIA** and will be adopted for assessing the potential significant effects on MI&OU receptors during construction, O&M, and decommissioning phases. The proposed assessment methodology covers the impacts scoped into the assessment and the relevant mitigation measures.

17.11.1.2 The emerging INTOG SMP is focused on the assistance the oil and gas sector can provide in meeting the commitments of the North Sea Transition Deal and contributing to a Just Transition[533] (see **Chapter 2: Legislative and Policy Context**). The Initial Plan Framework (IPF) outlines the planning framework and the spatial footprint of the seabed areas relevant to the INTOG CES leasing process and the associated planning stages in INTOG delivery.

Receptors

17.11.1.3 Specific receptor groups are identified early in this chapter (see Section 17.1). The receptors scoped in according to the scoping considerations in **Table 17-7** are those that will be assessed within the EIAR. The key receptors are the operators and owners of marine infrastructure, although indirect impacts may potentially affect the services they provide and users of those services. The potential for indirect impacts will be confirmed through engagement with the operators and owners and reported in the EIAR.

Construction, Operation and Decommissioning Phases

17.11.1.4 Potential significant effects affecting MI&OU receptors are more likely during periods with a greater level of Project activities (construction and decommissioning), however effects may also occur in during operation through activities such as cable maintenance and repair. For these reasons, the majority of effects are considered to be temporary.

17.11.1.5 Resources such as seabed aggregates which become inaccessible ('sterilised') due to new Project infrastructure are likely to remain inaccessible throughout the lifetime of the Project.

17.11.2 Assumptions and Limitations

17.11.2.1 The following assumptions and limitations have been identified:

- The MS Maps NMPi online mapping system[534] is assumed to correctly identify and present any underlying data sources for which primary data is not available; and
- Further engagement with asset owners/operators nearby is noted as necessary to confirm details of interactions between the Project and infrastructure.

17.12 Summary

17.12.1.1 The Project Area is located in a part of the Central North Sea area which has experienced significant development and there is the potential for interaction with multiple types of infrastructure and owners/operators. Therefore, the MI&OU scoping assessment has identified a limited number of types of potentially significant effects (see **Table 17-7**).

17.13 Further Consideration for Consultees

17.13.1.1 Please find below specific scoping questions relevant to the topic of MI&OU:

- Do you agree that the data sources identified are sufficient to inform the MI&OU baseline for the EIAR?
- Do you agree that all planned and proposed infrastructure in the current Study Area has been identified?
- Have all potential significant effects resulting from the Project been identified for MI&OU receptors?

- Do you have recommended distances or buffers for those impacts scoped in within **Table 17-7**?
- Do you agree with the scoped in aspects of MI&OU in **Table 17-7**?
- Do you agree with the scoped out aspects of MI&OU in **Table 17-7**?
- Do you agree that the embedded mitigation measures described in **Table 17-6** provide a suitable means for managing and mitigating the potential significant effects of the Project on MI&OU receptors?

18. MILITARY AND CIVIL AVIATION

18.1 Introduction

18.1.1.1 This chapter of the Scoping Report considers the potential significant effects on military and civil aviation of the Project. The chapter provides an overview of the baseline conditions relevant to the Project Area (as defined in **Chapter 1: Introduction**), the datasets to be used to inform the EIA, sources, pathways, and receptors of the potential significant effects to be considered, and how these potential significant effects will be assessed for the purpose of the EIA.

18.1.1.2 This chapter should be read alongside the following chapters:

- **Chapter 14: Shipping and Navigation** pertains to WTG lighting and the evolution of the flashing lights on WTGs to avoid confusion to mariners from aviation lighting.
- **Chapter 17: Marine Infrastructure and Other Users** which considers military and defence activities.

18.2 Legislation, Policy and Guidance

18.2.1 Legislation and Policy

18.2.1.1 Legislation and policy that has been used to inform the scope of the Military and Civil Aviation chapter is set out in **Table 18-1**. Further information on policies relevant to the EIA are set out in **Chapter 2: Legislative and Policy Context.**

Table 18-1: Legislation and policy context

Legislation/Policy	Relevance to the assessment
Civil Aviation Act 1982[535], the Rules of the Air Regulations 2015[536] and the Air Navigation Order 2016[537]	The Civil Aviation Act 1982 governs air flight in the UK and defines the powers of the UK Civil Aviation Authority The Air Navigation Order 2016 forms the legal foundation for almost all areas of civil aviation that are still regulated at national level. The Rules of the Air Regulations 2015 are the provision of the code of regulations governing matters of air traffic such as requirements for collision avoidance and requirements relating to visual flight and instrument flight rules

18.2.2 Technical Guidance

18.2.2.1 Technical guidance that has been used to define the assessment is set out in **Table 18-2**.

Table 18-2: Relevant technical guidance

Guidance reference	Relevance to the assessment
CAP 393 Air Navigation: The Order and the Regulations[538]	States the Rules of the Air regarding civil aviation in the UK[539] and includes for completeness terms of Air Navigation Order 2016[540] and the Rules of the Air Regulations 2015[541].
CAP 493 Standards for Offshore Helicopter Landing Areas[542]	Outlines the regulatory framework and requirements for offshore helicopter landing areas located in the UK Continental Shelf and for UK registered helicopters worldwide.
CAP 670 – Air Traffic Services Safety Requirements[543]	Outlines the regulatory framework and requirements for safety.
CAP 764 CAA Policy and Guidance on Wind Turbines[544]	Outlines Civil Aviation Authority (CAA[545]) policy and guidance with respect to wind turbines and impacts on aviation receptors, and how these should be considered by stakeholders, developers and competent authorities when assessing projects.
CAP 774 UK Flight Information Services[546]	UK Flight Information Services are a suite of air traffic services that are provided in class G airspace within the UK Flight Information Region. When notified, elements of these services can also be provided in other airspace classifications. The document is applicable to both civil and military pilots and providers of air traffic services in Class G airspace.
MAA: MAA Regulatory Publication 3000 Series: Air Traffic Management Regulations[547]	Regulatory framework for military personnel and military air traffic control.
MAA: Manual of Military Air Traffic Management[548]	Outlines the regulations for military air traffic control and emergency procedures for military designated airspace.
UK Aeronautical Information Publication (AIP)[549]	Provides information on civilian aerodromes and aviation procedures within UK airspace.
Norwegian AIP[550]	Provides information on civilian aerodromes and aviation procedures within Norwegian airspace.
UK MiL AIP[551]	Provides information on military aerodromes in the UK and guidance to military aircrew on in-flight navigation procedures.
Marine Guidance Note (MGN) 654: Safety of Navigation: OREIs - Guidance on UK Navigational Practice, Safety and Emergency Response[552]	Provides guidance on assessing impacts on navigational safety and emergency response from offshore windfarms (and other technologies) in the UK (in addition to the Territorial Sea and EEZ).

18.3 Study Area

18.3.1.1 The Study Area for the military and civil aviation assessment has been defined in relation to the maximum operating ranges of any applicable radar systems relevant to military and civil air traffic services and air defence, together with the offshore helideck platforms located with 9 NM of the Array Area. The ECC will not have an

impact on aviation considerations and has not been considered further. The Study Area is set out in **Figure 18-1** to **Figure 18-3**.

Figure 18-1: Civil aviation considerations

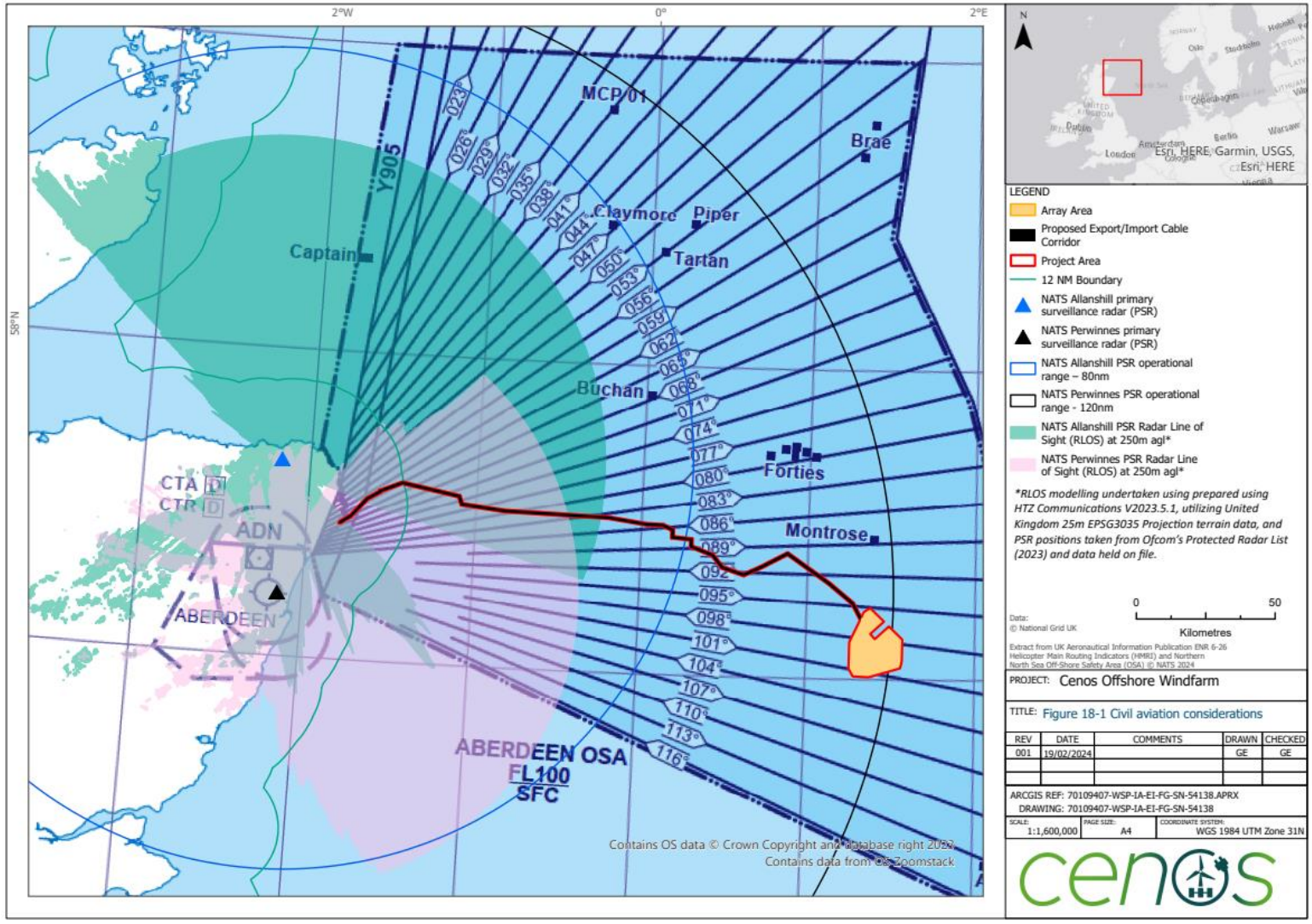


Figure 18-2: Helicopter Platforms

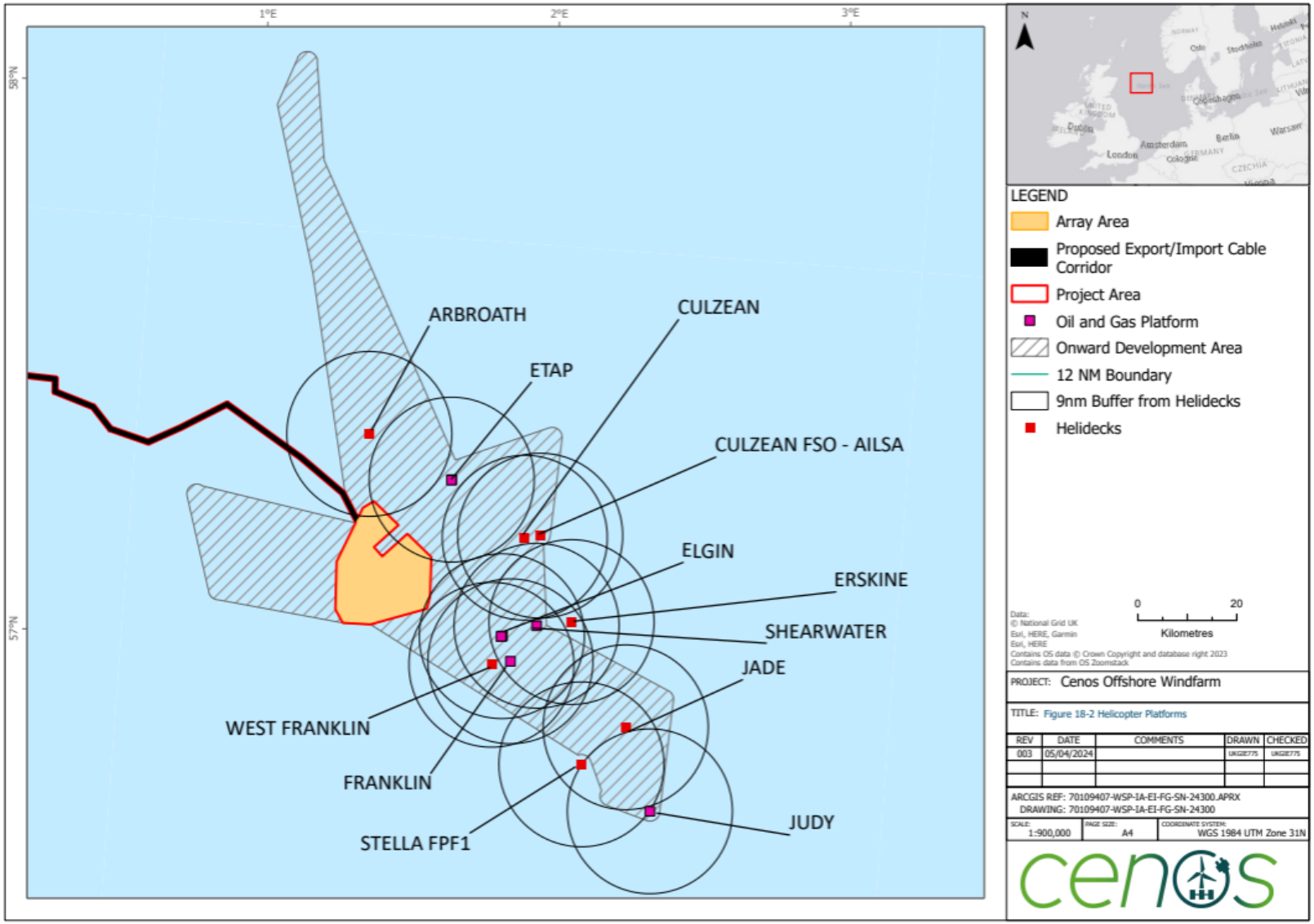
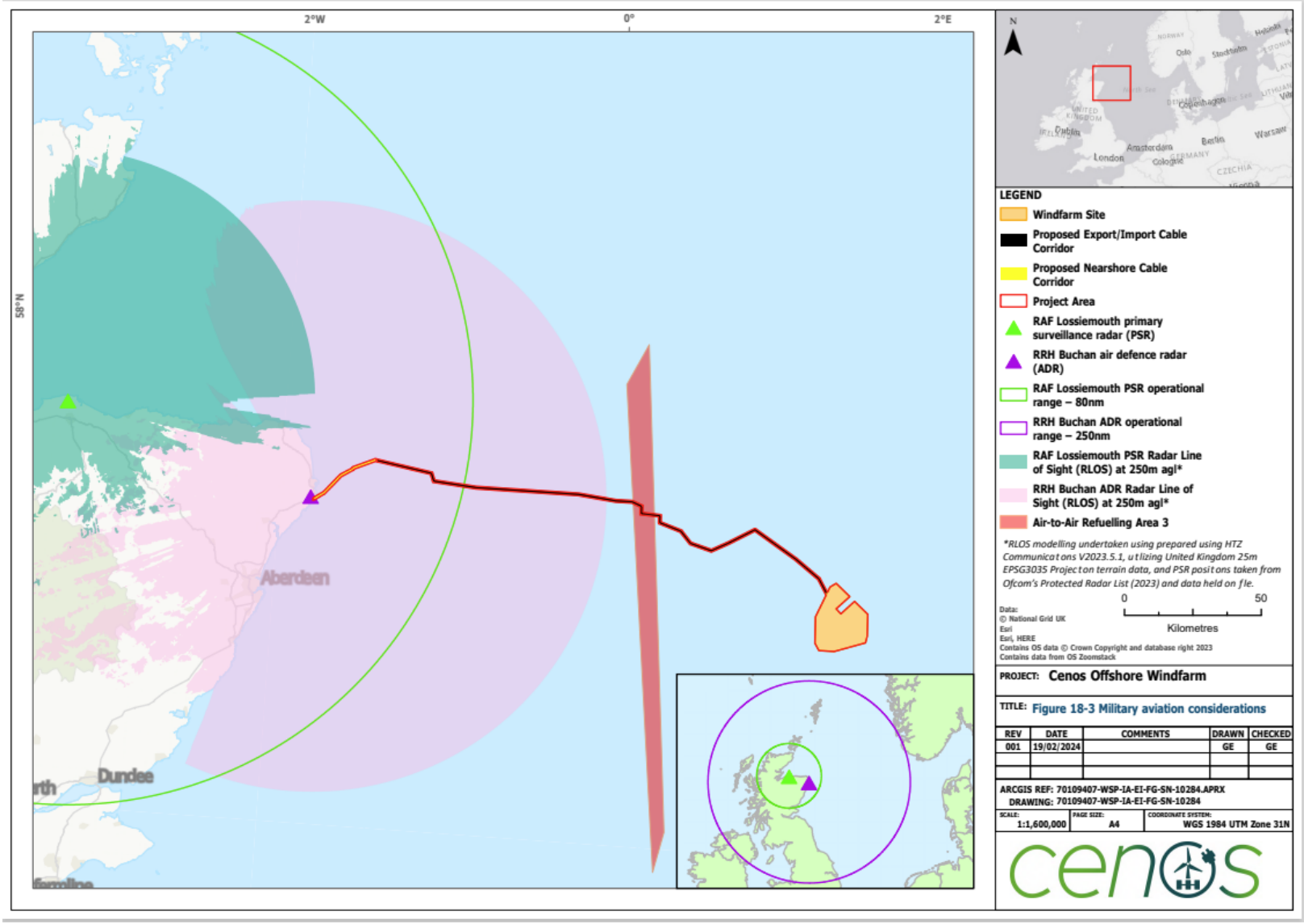


Figure 18-3: Military aviation considerations



18.4 Consultation

18.4.1.1 Consultation is a key part of the application process. This assessment has been and will continue to be informed by engagement and discussion with various stakeholders, such as offshore helicopter operators to helidecks within 9 NM of the Array Area.

18.4.1.2 A summary of the key issues raised during consultation to date, specific to military and civil aviation, is outlined in **Table 18-3** below, together with how these issues will be considered in the EIAR.

Table 18-3: Summary of consultation relating to military and civil aviation

Date and Stakeholder	Consultation and key comments	How this is accounted for
Aberdeen International Airport, 17 April 2023, included with the 2023 Scoping Opinion, June 2023	Aberdeen International Airport response to 2023 Scoping Report: outwith airport consultation zone, no further need for consultation.	No further action required. Scoped out.
Edinburgh Airport, 24 March 2023, included with the 2023 Scoping Opinion, June 2023	Edinburgh Airport response to 2023 Scoping Report: outwith airport safeguarding zone, no comment, no objection.	No further action required. Scoped out.
MCA, 5 April 2023, included with the 2023 Scoping Opinion, June 2023	MCA response to 2023 Scoping report: Applicant's attention drawn to MGN654, noting relevantly to aviation issue of lighting and marking of Windfarm Site and compliance with Search and Rescue (SAR) requirements set out in MGN654 Annex 5.	Embedded mitigation of lighting and marking of Array Area and compliance with SAR requirements to be addressed in the EIAR.
Defence Infrastructure Organisation (DIO) for the Ministry of Defence (MOD), included with the 2023 Scoping Opinion, June 2023	Defence Infrastructure Organisation (DIO) for the Ministry of Defence (MOD) response to 2023 Scoping Report: MOD is content that Section 20 (Aviation Consideration) of the 2023 Scoping Report identified relevant MOD aviation and radar receptors. MOD added that: The potential for the development to be detectable to, and potentially affect, the operation of radar systems has been assessed. No MOD radars are identified within the submitted Scoping Report as being affected by the proposed wind farm, an initial assessment indicates no reason for the MOD to dispute this position.	Intention to scope out military radar and Air-to-Air Refuelling Area (AARA) – further evidence set out below. Embedded mitigation of lighting and marking to address military lighting request as component of overall lighting and marking of Array Area in the EIAR.

Date and Stakeholder	Consultation and key comments	How this is accounted for
	MOD noted need for WTGs to be fitted with MOD accredited aviation safety lighting (25cd visible or infra-red) in addition to civil lighting and charting requirements.	
NATS Safeguarding (24 March 2023, included with the 2023 Scoping Opinion, June 2023	NATS Safeguarding response to 2023 Scoping Report: NATS anticipates no impact from the proposal and makes no comments on Scoping Opinion.	Intention to scope out civil radar and air traffic service provision – further evidence set out below.
MD-LOT, 2023 Scoping Opinion, June 2023	2023 Scoping Opinion: Scottish Ministers content that aviation can be scoped out of the EIAR for all phases of the Project but note the need to address the impact O&G on low flying aircraft, particularly military aircraft, in the EIAR.	Impact on low flying aircraft to be addressed by embedded mitigation of lighting and marking to be outlined in the EIAR.
Scoping Workshop, 29 February 2024	The Applicant provided a high level summary during the Scoping Workshop. At the time of writing, no further consultee responses have been received.	Waiting for Scoping Opinion.

18.5 Baseline Conditions

18.5.1 Data Information Sources

18.5.1.1 An initial desk-based review has been undertaken of publicly available data sources outlined in **Table 18-4**.

Table 18-4: Key Sources of military and civil aviation data

Source	Date	Summary	Coverage of Study Area
UK AIP[549]	Accessed 2024	Location of civil aerodromes, airspace classifications and helicopter main route indicators (HMRI)	N/A
UK Mil AIP[551]	Accessed 2024	Location of military aerodromes	N/A
Norwegian AIP[550]	Accessed 2024	Classification of neighbouring Norwegian airspace and helicopter operations	N/A
Online GIS sources	Accessed 2023	Locations for NATS (En-Route) and military radars	N/A

18.5.2 Existing Baseline

18.5.2.1 This section describes the present conditions which constitute the existing baseline environment for military and civil aviation within the offshore Study Area.

Civil Aviation

18.5.2.2 The Project is within the Scottish Flight Information (FIR) Region for air traffic control (ATC), the air space regulated by the UK CAA. The airspace above the Project is uncontrolled Class G airspace. Above Flight Level (FL) 195, approximately 19,500 ft above mean sea level (amsl), there is controlled airspace.

18.5.2.3 NATS[553] provides en-route ATC services within the Scottish FIR. There are two NATS primary surveillance radars (PSR) in north-eastern Scotland, Perwinnes near Aberdeen Airport and Allanshill on the north coast. These are shown on **Figure 18-1**, as well as the operational range for each (up to 80 NM for Allanshill and up to 120 NM for Perwinnes), together with an indicative radar line of site (RLOS) from each at 250 m amsl. This RLOS has been prepared using HTZ Communications V2023.5.1 to undertake the assessment, utilizing UK 25 m EPSG3035 Projection terrain data, and PSR positions taken from both Ofcom's Protected Radar List (2023) as well as data held on file.

18.5.2.4 As established by consultation response of NATS in the 2023 Scoping Opinion, the Project is not within RLOS of either of Perwinnes or Allanshill PSR.

18.5.2.5 The Project is currently outside any safeguarding areas for civil airports and aerodromes as detailed in CAP764. A construction and marshalling and operations and maintenance port(s) has not yet been identified for the Project and may not be known prior to finalisation of the EIAR. The Applicant committed to the development of Scotland and as such it is proposed to assume that both the construction and marshalling and O&M ports are located on the East Coast of Scotland. Once a port(s) has been identified for the Project, should any aerodrome be identified nearby to the Project, they will need to be considered and safeguarded pre-construction.

18.5.2.6 The closest HM Coastguard Search and Rescue (SAR) helicopter bases to the Array Area are Inverness (approx. 180 NM) and Sumburgh (approx. 185 NM). The Array Area is within the operating range of the SAR helicopters based at these bases.

Helicopter Operations

18.5.2.7 A number of helicopter main routing indicators (HMRI) occur over the Array Area as illustrated in **Figure 18-1** which shows an extract from the AIP (ENR5-26 showing HMRI and the northern North Sea offshore safety area).

18.5.2.8 The AIP[549] in ENR1.6 states:

> *"4.5.2.3.1 Helicopter Main Routing Indicators are indicators of routes typically and routinely flown by helicopters operating to and from off-shore destinations and are promulgated for the purpose of signposting concentrations of helicopter traffic to other airspace users. HMRI promulgation does not predicate the flow of helicopter traffic. Whilst HMRIs have no airspace status and assume the background airspace classification within which they lie (in the case of the Northern North Sea, Class G), they are used by the air navigation service*

provider (NATS Ltd/ Aberdeen) and helicopter operators for flight planning and management purposes."

"4.5.2.3.2 HMRIs have no lateral dimensions. Vertically the HMRIs over the Northern North Sea (55°N to 62°N) extend from 1500 FT AMSL to FL 85 (inclusive) …"

"4.5.2.3.3 Compliance with the HMRI structure is not compulsory."

18.5.2.9 Although these routes are not compulsory and are in uncontrolled airspace, consideration will be given to any impact on helicopter operators.

18.5.2.10 NATS in its consultation response in the 2023 Scoping Opinion anticipated "no impacts from the proposal".

18.5.2.11 CAP764 sets out a consultation zone of 9 NM around offshore helicopter destinations (platforms with helidecks). CAP764 makes it clear that *"this consultation zone is not a prohibition on development within 9 NM of offshore operations but a trigger for consultation with helicopter operators, the operators of existing installation and exploration and development locations to determine a solution that maintains safe offshore helicopter operations alongside the proposed development."*

18.5.2.12 Helicopter destinations within 9 NM of the Array Area are shown on **Figure 18-2.** Consultation will be undertaken helicopter operators and platform operators within 9 NM of the Array Area as part of the EIAR.

Military Aviation - Radar

18.5.2.13 The nearest military air defence radar is located at Buchan. It has an operational range of up to 250 NM.

18.5.2.14 The nearest military aerodrome is RAF Lossiemouth on the Moray coast. RAF Lossiemouth has a PSR with an operational range of up to 80 NM and provides a military ATC service.

18.5.2.15 Both the Buchan and RAF Lossiemouth PSR, their operational ranges and an indicative RLOS for each at 250 m amsl is shown on **Figure 18-3.** This RLOS has been prepared using HTZ Communications V2023.5.1 to undertake the assessment, utilizing UK 25 m EPSG3035 Projection terrain data, and PSR positions taken from both Ofcom's Protected Radar List (2023) as well as data held on file.

18.5.2.16 As established by a consultation response from the MOD in the 2023 Scoping Opinion, the Project is not within RLOS of either of Buchan air defence radar or the RAF Lossiemouth PSR.

Military Aviation - Operations

18.5.2.17 The Project lies in proximity to MOD Air-to Air Refuelling Area 3 (AARA 3), which extends from 10,000 ft – 29,000 ft amsl (FL100 to FL290) as shown on **Figure 18-3.**

18.5.2.18 Based on the maximum height parameters of the WTGs and offshore platforms, it is unlikely that the Project will have any impact on MOD low flying activities.

18.5.3 Future Baseline

18.5.3.1 Determining the future baseline draws upon information about the likely future use and management of the Project site in the absence of development and any other projects (consented or proposed) that may act cumulatively with the Project to affect military or civil aviation.

18.5.3.2 On the basis of available evidence, in the absence of the Project, any future baseline for military or civil aviation over the lifetime of the Project is unlikely to be markedly different from the current baseline.

18.6 Basis of Assessment

18.6.1.1 The military and civil aviation scoping assessment is based on the following key assumptions, which are also set out in **Chapter 3: Project Description:**

- Minimum of 68 WTGs and maximum number of 95 WTGS;
- Minimum blade tip height of 255 m and maximum blade tip height of 320 m;
- Minimum rotor diameter of 236 m and maximum rotor diameter of 280 m;
- Minimum WTG spacing of 1000 m and maximum WTG spacing of 1848 m;
- One platform per WTG with a maximum height of the platform (including draft and freeboard) of 45 m;
- There will be up to two offshore substations;
- The operational lifetime of the project is assumed to be a minimum of 30 years; and
- The decommissioning of the windfarm is anticipated to involve as close to full removal of offshore infrastructure as possible at the time of decommissioning (where safe/practicable to do so). The decommissioning works are likely to be undertaken in reverse to the sequence of construction works and involve similar levels of equipment and impact.

18.6.1.2 Once a port(s) has been identified for the Project, should any aerodrome be identified nearby to the Project, they will need to be considered and safeguarded pre-construction.

18.6.1.3 The ECC will not have an impact on aviation considerations and has not been considered further.

18.7 Relevant Embedded Mitigation Measures

18.7.1.1 Embedded mitigation measures have been identified and are proposed to be adopted as part of the Project design (primary mitigation); or implemented in accordance with industry standard practice that would occur with or without the input from the environmental assessment feeding into the process (tertiary mitigation). There is a commitment by the Applicant to implement these embedded mitigation measures and they have been considered within the 2024 EIA Scoping Report.

18.7.1.2 The requirement for additional mitigation measures (secondary mitigation) will be dependent on the significance of effects on military and civil aviation receptors and will be consulted upon with consultees throughout the EIA process. Any additional mitigation measures will be presented within the EIAR.

18.7.1.3 In addition to the specific embedded mitigation measures relevant to military and civil aviation listed in **Table 18-5**, consultation will be undertaken with helicopter operators and platform operators within 9 NM of the Array Area to identify any potential impacts on the maintenance of safe helicopter operations to these platforms.

Table 18-5: Embedded mitigation relating to military and civil aviation

ID	Embedded mitigation measures
MIL-001	Development of Emergency Response and Cooperation Plan (ERCOP).
MIL-002	Appropriate marking of the Project on Admiralty and aeronautical charts. All permanent infrastructure structures (WTGs, sub-stations and other structures) of more than 100 m in height will be charted on aeronautical charts, with details (including positions and heights of structures) being submitted to the CAA at least eight weeks prior to construction in accordance with Article 225A of the Air Navigation Order 2016. The CAA will share the information with Defence Geographic Centre (DGC) for inclusion in MOD databases.
MIL-003	The Applicant will develop and adhere to an EMP. An OEMP will be submitted as part of the consent application documents.
MIL-004	An aeronautical lighting plan will be agreed and implemented in consultation with the CAA, MCA and MOD. This will contain specific requirements in terms of military and civil aviation lighting to be installed on WTGs incorporating the requirements of CAP 393 and other relevant legislation and guidance (e.g. CAP 437).
MIL-005	Any temporary obstacles associated with infrastructure (such as WTGs and platforms) which are of more than 100m in height (e.g. construction infrastructure such as cranes and/or meteorological masts) are to be notified to the CAA in accordance with Article 225A of the Air Navigation Order 2016 and where required identified to military and civil aviation aircrews by notifying the Notice to Airmen (NOTAM) system.
MIL-006	A Decommissioning Programme will be developed for the Project in line with industry good practice, guidance and legislation.

18.8 Scoping of Potential Significant Effects

18.8.1.1 In line with the EIA Regulations 2017, the EIA for the Project will only consider those impacts where there is a risk of a potential significant effect. The following section draws on industry experience to identify those effect-receptor pathways that may potentially lead to a significant impact. Where experience and available evidence indicates an effect-receptor pathway will not lead to a significant effect with regards to the EIA Regulations 2017 the pathway is scoped out from assessment.

18.8.1.2 The potential significant effects on military and civil aviation are summarised in **Table 18-6.** The scoping assessment is based on a combination of the Project design at the time of writing, embedded mitigation measures, understanding of the baseline environment at the time of writing, the evidence base for military and civil aviation

effects, further consultation with consultees, and professional judgement. The approach to this assessment is set out in **Chapter 5: Approach to Scoping and EIA**.

18.8.1.3 The early identification of potential significant effects is used here as a tool aimed at delivering a proportionate approach to the EIA. In doing so, it sets out a high-level assessment of all potential effects, significant or not. The basis for scoping out certain effects is presented after the table, supported by evidence base.

Table 18-6: Summary of potential significant effects for military and civil aviation scoped in (✓) or scoped out (x) of the EIAR during construction (C), O&M and decommissioning (D)

Activity and impact	Embedded measures	Outcome of scoping per phase			Justification	Overview of proposed approach
		C	O&M	D		
Impacts on civil or military aviation by creation of an aviation obstacle.	MIL-001, MIL-002, MIL-003, MIL- 004, MIL-005, MIL-006	✓	✓	✓	Embedded measures address impacts on civil aviation by creation of an obstacle environment and to this extent, this impact can be scoped out. Potential impacts on operations to offshore platform helidecks within 9 NM of the Array Area are scoped in, pending further consultation with helicopter and platform operators.	Consultation with helicopter and platform operators in proximity to the Array Area.
	MIL-002, MIL-002, MIL-003, MIL- 004, MIL-005, MIL-006	X	X	X	Embedded measures address impact on military aviation by creating of an obstacle environment, hence this impact is scoped out. Potential effects on MOD operations/air to air refuelling areas are scoped out due to the distance (both vertical upwards and horizontally) between the maximum height parameters of the WTGs and platforms and the base of AARA3 (FL100/10,000ft amsl).	N/A
Impacts on civil or military aviation radar.	None required.	N/A	X	N/A	Potential effects on civil ATC radar and air traffic services provided using civil ATC radar have been scoped out due to the absence of any RLOS from any civil radar facilities within the study area, as acknowledged by NATS in its scoping response of 24 March 2023 and supported by the RLOS modelling shown in **Figure 18-1**.	N/A
	None required.	N/A	X	N/A	Potential effects on MOD ATC radar and air defence radar are scoped out due to the absence of any RLOS from any military radar facilities within the study area, as acknowledged by the MOD in its scoping response of 21 June 2023 and supported by the RLOS modelling shown in **Figure 18-3**.	N/A

18.9 Cumulative Effects

18.9.1.1 Cumulative effects on military and civil aviation resulting from the effects of the Project and other developments will be assessed in accordance with the guidance and methodologies set out in **Chapter 5: Approach to Scoping and EIA** and considering the other developments that have been screened in as part of the CEA screening exercise.

18.9.1.2 The Project has the potential to act cumulatively with impacts from other developments creating an increase in an aviation obstacle environment.

18.10 Potential Transboundary Effects

18.10.1.1 Due to the localised nature of potential impacts, transboundary impacts are considered unlikely to occur and therefore it is proposed that military and civil aviation is considered scoped out from further consideration within the EIA. This is detailed further in **Appendix 5D: Transboundary Screening Matrix**.

18.11 Proposed Approach to the Environmental Impact Assessment

18.11.1.1 The Project-wide approach to the assessment methodology is set out in **Chapter 5: Approach to Scoping and EIA**. This will be implemented to assess the potential significant effects on to military and civil aviation receptors from the Project.

18.12 Summary

18.12.1.1 Further desk-based studies and analysis will be undertaken to identify and assess civil aviation receptors, notably helicopter operators to proximate offshore platforms. This study will be supplemented with consultation with the relevant statutory and non-statutory organisations as necessary.

18.13 Further Consideration for Consultees

18.13.1.1 Please find below specific scoping questions relevant to the topic of military and civil aviation:

- Do you agree that the data sources identified are sufficient to inform the military and civil aviation baseline for the EIAR?
- Do you agree that all the military and civil aviation receptors within the defined Study Area have been identified?
- Have all potential impacts resulting from the Project been identified for military and civil aviation receptors?
- Do you agree with the scoped out impacts presented in **Table 18-6**?
- For those impacts Scoped in **Table 18-6,** do you agree that the methods described are sufficient to inform a robust impact assessment?

19. SOCIO-ECONOMICS

19.1 Introduction

19.1.1.1 This chapter of the Scoping Report considers the potential significant effects on socio-economics, including knock-on effects on human health, of the Project. The chapter provides an overview of the baseline conditions relevant to the Project Area (as defined in **Chapter 1: Introduction**), the datasets to be used to inform the EIA, sources, pathways and receptors of the potential significant effects to be considered, and how these potential significant effects will be assessed for the purpose of the EIA.

19.1.1.2 The socio-economic assessment will only consider the offshore elements of the Project. Therefore, the socio-economic assessment considers impacts on offshore receptors as well as impacts on onshore receptors which would be affected by offshore elements of the Project. For example, an onshore recreation receptor could have reduced amenity as a result of offshore construction works.,

19.1.1.3 The onshore elements of the socio-economic assessment during construction, O&M as well as decommissioning are economy and employment; influx of workers; as well as recreation and tourism.

19.1.1.4 The offshore elements of the socio-economic assessment during construction, O&M as well as decommissioning are recreation and tourism as well as marine commercial activities and businesses.

19.1.1.5 The knock-on effects of socio-economics on human health also consider onshore and offshore elements of the Project as described above.

19.1.1.6 **Chapter 5: Approach to Scoping and EIA** sets out the approach taken to ports and other onshore elements of the Project.

19.1.1.7 This chapter should be read alongside the following chapters and documents:

- **Chapter 7: Marine and Coastal Processes** for possible effects on marine and coastal recreation and tourism activities, the marine geology, oceanography and coastal processes assessment has been considered for the scoping exercise.
- **Chapter 8: Marine Water and Sediment Quality** for possible effects on marine and coastal recreation and tourism activities, the marine water and sediment quality assessment has been considered for the scoping exercise.
- **Chapter 11: Ornithology** for possible effects on marine and coastal recreation and tourism activities, the ornithology assessment has been considered for the scoping exercise.
- **Chapter 12: Fish Ecology** for possible effects on marine and coastal recreation and tourism activities, the fish ecology assessment has been considered for the scoping exercise.
- **Chapter 13: Commercial Fisheries** for possible effects on commercial fishing activities could have an impact on socio-economics. Therefore, the commercial fisheries assessment has been considered for the scoping exercise.

- **Chapter 14: Shipping and Navigation** for possible effects on the shipping and recreational boats, the shipping and navigation has been considered for the scoping exercise.
- **Chapter 15: Marine Cultural Heritage and Archaeology** for possible effects on marine and coastal recreation and tourism activities, the marine archaeology assessment has been considered for the scoping exercise.
- **Chapter 16: Seascape, Landscape and Visual Impact Assessment**: has been considered for the scoping exercise in relation to visual effects on marine and terrestrial related visual receptors.
- **Chapter 17: Marine Infrastructure and Other Users** for possible effects on marine infrastructure and other users which could have an impact on socio-economic receptors. Therefore, the infrastructure and other users assessment has been considered for the scoping exercise.

19.1.1.8 It is worth noting, at the time of writing, a construction and marshalling and Operations and Maintenance port(s) has not yet been identified for the Project and may not be known prior to finalisation of the EIAR and is subject to commercial agreement. The Applicant is however committed to the development of Scotland and as such, for the purpose of the EIA, it is proposed to assume that both the construction and marshalling and O&M ports are located on the East Coast of Scotland. Following an agreement with statutory consultees, the socio-economics assessment will undertake a proportionate assessment of the short-listed port locations likely to be used for the construction, operation, and maintenance of the Project.

19.2 Legislation, Policy, and Guidance

19.2.1 Legislation and Policy

19.2.1.1 Legislation and policy that has been used to inform the scope of the socio-economics chapter is set out in **Table 19-1**. Further information on policies relevant to the EIA and their status is set out in **Chapter 2: Legislative and Policy Context**.

Table 19-1: Legislation and policy context

Legislation/Policy	Relevance to the assessment
Legislation	
Equality Act 2010 [554]	The Act legally protects people from discrimination in the workplace and in wider society. It aims to protect the following characteristics from discrimination: • Age; • Disability; • Gender reassignment; • Marriage and civil partnership; • Pregnancy and maternity; • Race; • Religion or belief; • Sex; and

Legislation/Policy	Relevance to the assessment
	• Sexual orientation.
National Policy	
Overarching National Policy Statement (NPS) for Energy EN-1[555]	Paragraph 5.13.2 states that "*Where the project is likely to have socio-economic impacts at local or regional levels, the applicant should undertake and include in their application an assessment of these impacts as part of the ES*." Paragraph 5.13.4 sets out that assessments should consider all relevant socio-economic impacts, including job creation and training, provision of additional local services, indirect beneficial impacts, effects on tourism, effects of the influx of construction workers and cumulative effects. It also sets out the need for development of low-carbon industries at the local and regional level as well as nationally. Paragraph 5.13.6 states that "*Socio-economic impacts may be linked to other impacts, for example visual impacts considered in Section 5.10 [of the NPS] but may also have an impact on tourism and local businesses*." Paragraph 4.3.4 states "*As described in the relevant sections of this NPS [National Policy Statement] and in the technology specific NPSs, where the proposed project has an effect on humans, the ES [Environmental Statement] should assess these effects for each element of the project, identifying any potential adverse health impacts, and identifying measures to avoid, reduce or compensate for these impacts as appropriate*."
NPF4 [556]	The revised draft NPF4 and associated regulations were formally adopted by the Scottish Government in February 2023. The revised draft policies of relevance to the socio-economics assessment are: ▪ Policy 21: Play, Recreation and Sport; ▪ Policy 23: Health and Safety; ▪ Policy 25: Community Wealth Building; ▪ Policy 26: Business and Industry; and ▪ Policy 30: Tourism.
NPF3[557]	The NPF3 identifies Peterhead as a focus for important projects for carbon capture storage, North Sea interconnectors and offshore renewable energy development. The NPF3 also notes the need for major infrastructure investment to unlock the growth of Scotland's marine renewable energy sector.
Scottish Planning Policy (SPP)[558]	The SPP sets out how proposals for energy infrastructure development should take account of spatial frameworks for wind farms and heat maps where relevant. Paragraph 169 sets out that considerations of an energy infrastructure development, with the relevant considerations to the socio-economics assessment being:

Legislation/Policy	Relevance to the assessment
	• net economic impacts; • scale of contribution to renewable energy generation; • cumulative impacts; • impacts on communities and individual dwellings; • public access; • impacts on tourism and recreation; and • decommissioning.
A Fairer, Greener Scotland[559]	The Programme sets out aims for all parts of communities to share in the benefits of green developments. Priority 3 sets out for a net zero nation, ending Scotland's contribution to climate change in a fair way.
The Environment Strategy for Scotland[560]	The Strategy sets out a 2045 vision which recognises the relationship between environment, society and economy with outcomes that are relevant to the Proposed Development including: • Healthy environment supports a fairer, healthier, more inclusive society; and • Sustainable economy conserves and grows our natural assets.
The Scottish Energy Strategy[561]	The Strategy identifies the energy sector as the cornerstone of Scotland's modern, industrialised economy. The energy sector delivered reliable and secure energy to homes and businesses, supported tens of thousands of jobs and generated £45.7 billion in turnover for Scotland in 2015. The Strategy also emphasises the reputation for innovation in Scotland and sets out the economic opportunities for the Scottish supply chain, manufacturers and consumers of energy. The Strategy recognises the transition to a low carbon economy over the coming decades and the need for this to happen in a way that tackles inequality and poverty and promotes a fair and inclusive jobs market.
Offshore Wind Policy Statement[562]	The Statement sets out the overarching economic context arising from the major expansion foreseen for offshore wind in Scotland together with the considerations related to supply chains, skills and export potential.
Marine Policy	
Scotland's National Marine Plan[563]	GEN 1 General Planning Principle supports sustainable developments which provide economic benefit to Scottish communities and social benefits. GEN 2 Economic Benefits encourages sustainable development and use which provides economic benefit to Scottish communities. GEN 3 Social Benefit encourages sustainable development and use which provides social benefits.

Legislation/Policy	Relevance to the assessment
	GEN 4 Co-existence emphasises the need for co-existence between development sectors and activities, and requires cumulative impacts to be addressed.
Offshore Wind Policy Statement[562]	The Statement sets out ambitions for the future of offshore wind in Scotland and provides the context for the Sectoral Marine Plan (as below). The Statements sets out the scale of economic opportunity that has been identified along with the associated requirements for the supply chain and provision of skills. Specific reference is made to the large potential export market for floating wind technology.
Local Planning Policy	
Aberdeen City and Shire Strategic Development Plan[564]	The Plan provides a framework for development relevant to Aberdeen City and Shire. It identifies four geographic Strategic Growth Areas and an ambition to be a world-leading offshore technology base. The Plan also identifies planned increase in harbour capacity through the development of Aberdeen South Harbour and the need for upgrades to energy networks in the Strategic Growth Areas.
Aberdeenshire Local Development Plan [565]	Proposed policies of relevance to the socio-economics assessment are: • Policy C2: Renewable Energy; • Policy PR1: Protecting Important Resources; and • Policy RD1: Providing Suitable Services.

19.2.2 Technical Guidance

19.2.2.1 Technical guidance that has been used to define the assessment is set out in **Table 19-1**. **Chapter 2: Legislative and Policy Context** sets out the legislation and policy that is of relevance to socio-economics.

Table 19-2: Relevant Technical Guidance

Guidance reference	Relevance to the assessment
The Green Book (and supplementary guidance)[566].	The advice in The Green Book provides a broad framework for how policies, programmes and projects in the UK should be appraised and evaluated to inform decision making. Published by UK Government's HM Treasury, it covers assessment guidelines for economic and social effects. It contains and references further supplementary guidance on specific socio-economic effects, such as health and crime.
The Additionality Guide[567].	Provides more specific guidance on how to assess impact of a policy intervention (or a private sector investment) on the local, regional and national economy. Additionality is the "*extent to which something happens as a result of an intervention that would have not occurred in the absence of intervention*."

Guidance reference	Relevance to the assessment
Draft Advice on Net Economic Benefit and Planning[568].	This summarises economic methodologies relevant to the application of planning legislation and policy in Scotland. The topics covered include study area and the specification of impacts as well as the need for a proportionate approach to the level of evidence.
Defining 'Local Area' for assessing impact of offshore renewables and other marine developments[569].	This provides a structured approach to identifying impacts and their relevant spatial areas. It sets out six principles that can be used for identifying local areas in relation to offshore wind developments.
Guidance on assessing the socioeconomic impacts of offshore wind farms[570].	This provides guidance on identifying, predicting and assessing potential economic and social impacts associated with offshore windfarms.
General Advice for Socio-Economic Impact Assessment[571].	This provides guidance on identifying and assessing potential economic and social impacts associated with offshore windfarms. The advice note also provides guidance on gathering baseline information.
Effective Scoping of Human Health in Environmental Impact Assessment[572].	This guidance covers the consideration of health as a topic in EIA. It presents a framework that supports a proportionate approach to scoping that can apply to all scales of EIA.
Determining Significance for Human Health in Environmental Impact Assessment[573]	This guidance provides an industry agreed approach to determining sensitivity of human health receptors, and for determining the magnitude of human health effects. It also sets out how to provide an evidence-based narrative to explain why the change is or is not significant for public health.
Health and Environmental Impact Assessment: A Briefing for Public Health Teams in England[574].	This briefing note aims to raise awareness amongst Directors of Public Health and their public health teams about EIA. It identifies when and how public health teams can contribute to the EIA process. This note is part of UK Health Security Agency's (formally Public Health England) work to describe and demonstrate effective, practical local action on a range of wider determinants of health.

19.3 Study Area

19.3.1.1 The study area for the socio-economic assessment has been identified with reference to guidance from MD-LOT (formerly Marine Scotland) on definition of the 'Local Area'[569]. This guidance provides a more detailed and specific approach to defining the study area where previous practice has been ad-hoc. It identifies six main principles:

- Principle 1 (Dual Geographies) - the local area for the supply chain and investment impacts should be separate from the local area(s) for wider socioeconomic impacts.
- Principle 2 (Appropriate Impacts) - the appropriate impacts to be considered for assessments should be identified prior to defining the local areas.

- Principle 3 (Epicentres) - the local areas should include all the epicentres of the appropriate impacts.
- Principle 4 (Accountability) - the local areas used in the assessment should comprise of pre-existing economic or political geographies (community councils, local authorities, development agencies) to enhance accountability.
- Principle 5 (Understandable) - the local areas should be defined in such a way that they are understandable to the communities they describe.
- Principle 6 (Connected Geography) - the local area for the supply chain and investment impacts should consist of connected (including coastal) pre-existing economic or political geographies.

19.3.1.2 Based on the MD-LOT guidance, the local economy and employment study area used as the basis for scoping is the Aberdeenshire Council area and Aberdeen City area as it includes the population that is likely to experience many of the economy and employment effects. As outlined in Section 19.1, an assessment of the short-listed ports will be undertaken. The local study area will be reviewed and developed based on design evolution; taking into consideration the location of ports that are short-listed for the EIA. A larger national study area of Scotland has also been applied to capture the wider economy and employment effects of the Project. These study areas have also been applied for the knock-on socio-economic effects on human health. **Figure 19-1** shows the local and national study areas.

19.3.1.3 A separate study area has been used to identify potential recreation receptors, tourism receptors and commercial actives and businesses. The recreation, tourism and commercial study area is 5 km from the Project Area. This study area will be extended if it is anticipated that the Project could affect socio-economic receptors beyond 5 km of the Project Area, in particular taking into consideration impacts from other topics such as **Chapter 17: Marine Infrastructure and Other Users**. For example, if the Project were to effect coastal processes that would disturb or limit coastal recreation activities.

19.3.1.4 **Figure** 19-2 shows the recreation, tourism and commercial study area.

19.3.1.5 The ECC will be assessed from the Array Area to MHWS. The section of the ECC from MHWS to 12 NM is the same as the NorthConnect Cable Corridor. The Applicant is coordinating with NorthConnect Limited. NorthConnect Interconnector and the Project will only require one set of infrastructure, within the overlapping marine licence Project Area from 12 NM to MHWS.

19.3.1.6 The section of the ECC from MHWS to 12 NM has previously been assessed within the EIAR submitted for NorthConnect Limited (application reference number 06771 & 06870) and judged acceptable through the consenting of NorthConnect. The previous EIA work for NorthConnect will be considered in assessing the ECC from MHWS to 12 NM, updated by any other readily available information and surveys undertaken. See Section 19.5 for further details of the baseline conditions. Further details are in **Chapter 5: Approach to Scoping and EIA**

Figure 19-1: Local and Regional Study Areas

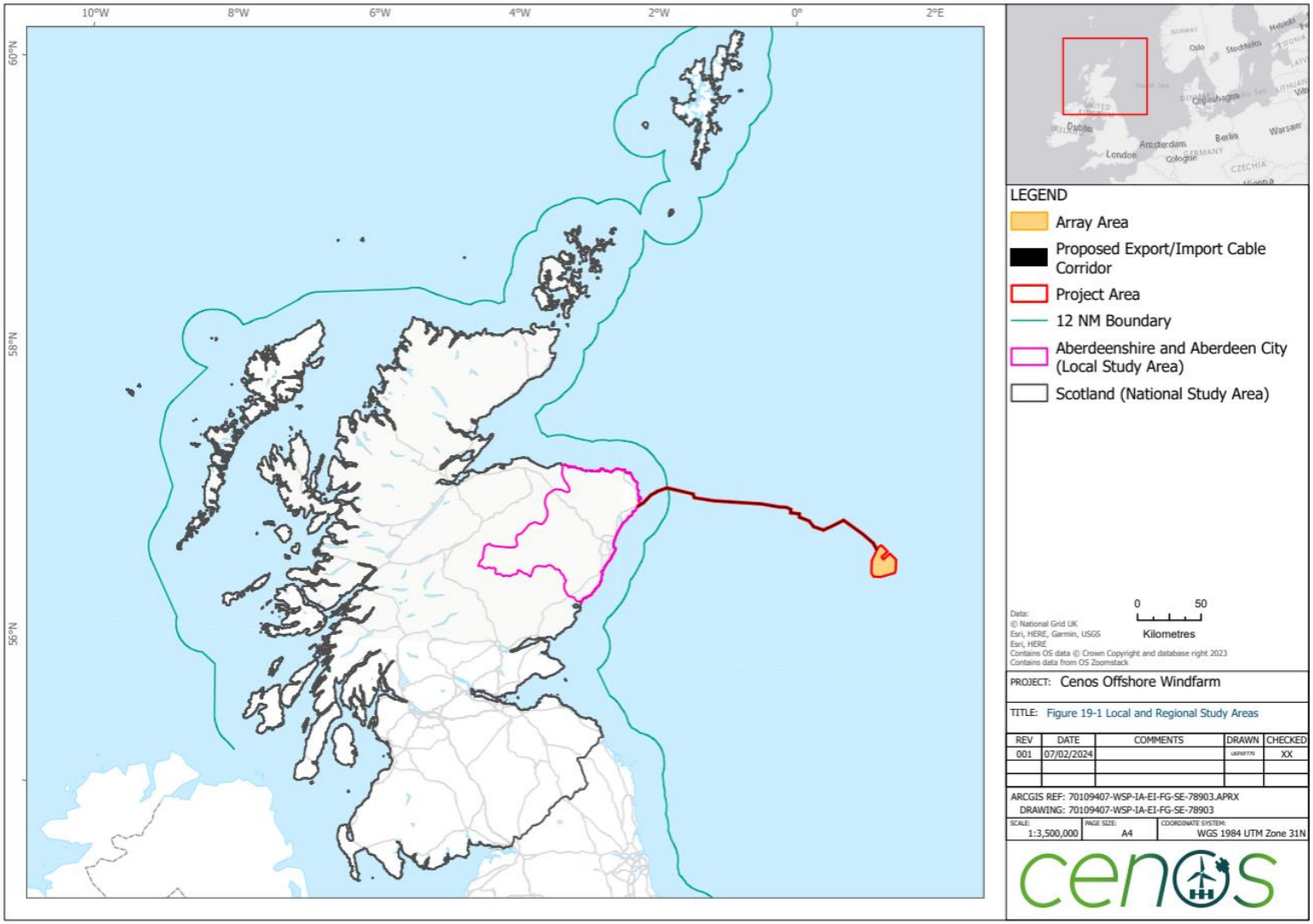
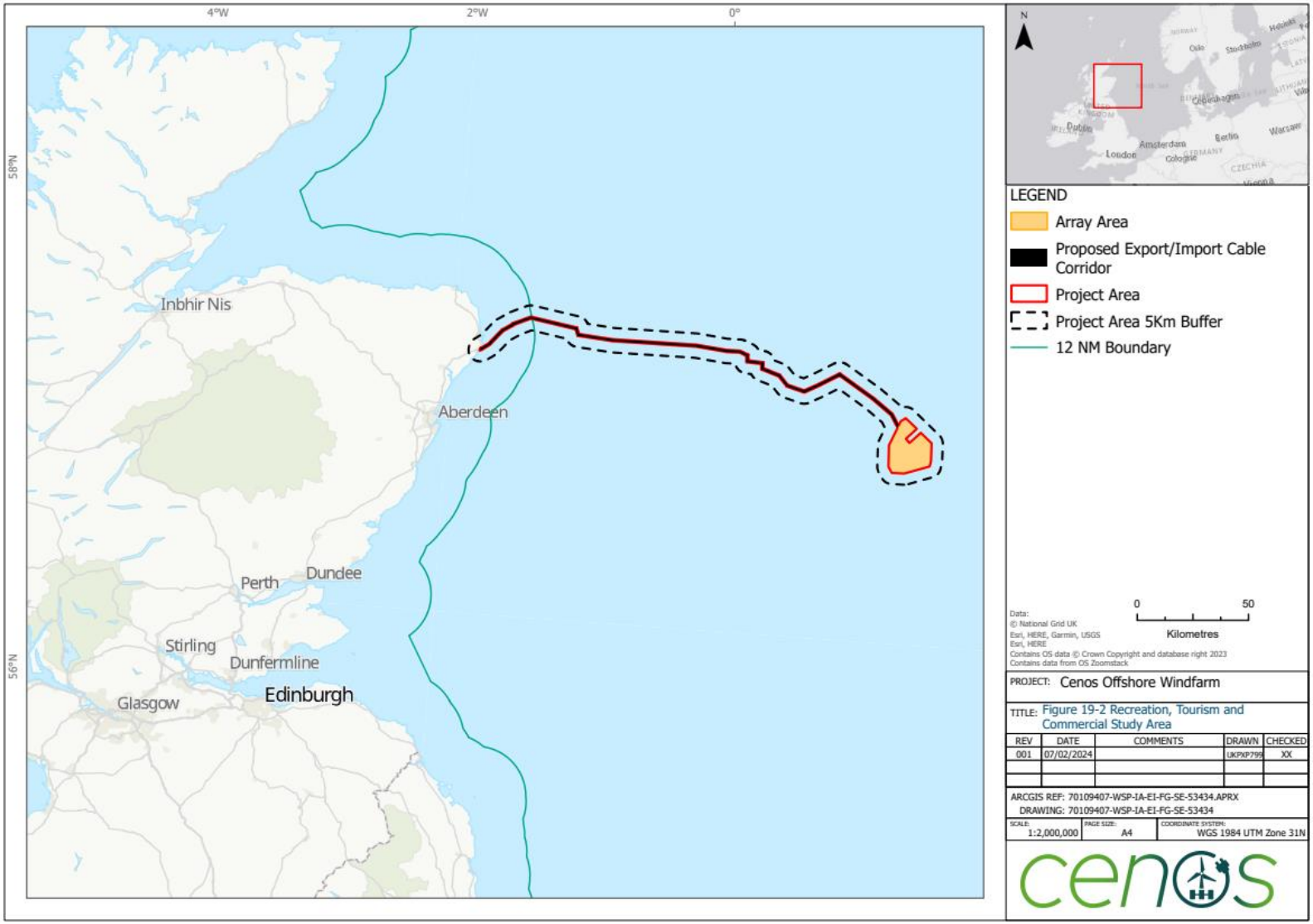


Figure 19-2: Recreation, Tourism and Commercial Study Area



19.4 Consultation

19.4.1.1 Consultation is a key part of the application process. This assessment has been and will be informed by engagement and discussion with various stakeholders such as MD-LOT as well as key recreation groups, Aberdeenshire Council and Aberdeen City Council in order to verify and enhance the recreation and tourism baseline. Additionally, as set out in **Chapter 13: Commercial Fisheries** data will be obtained through direct consultation with the fishing industry; this consultation will include questions relevant to the socio-economic assessment.

19.4.1.2 A summary of the key issues raised during consultation to date, specific to socio-economics, is outlined in **Table 19-3** below, together with how these issues will be considered in the production of the EIAR.

Table 19-3: Summary of consultation relating to socio-economics

Date and stakeholder	Consultation and key comments	How this is accounted for
MD-LOT, 2023 Scoping Opinion, June 2023	"*The Scottish Ministers advise that the Developer must undertake a full Socio-Economic Impact Assessment ("SEIA") and in completing this, advise the Developer to fully consider the guidance and principles detailed in Annex 1 of the MAU [Marine Analytical Unit] advice*."	A full SEIA has been considered, with the scope of the socio-economics assessment set out in Section 19.8 of this chapter. The advice provided by MAU will be considered as part of the assessment (see **Table 19-2**).
	"*The Scottish Ministers note that the study area is yet to be defined and will be dependent on the location of ports, construction yards, operation centres and other onshore epicentres. It is unclear if this will be known at the time of application. The Scottish Ministers expect primary data to be collected in the relevant areas and advise that the Developer fully address MAU advice in this regard*."	The study areas for the socio-economics assessment are set out in Section 19.3 of this chapter. As set out in paragraph 19.3.1.2, the local study area will be reviewed and developed based on design evolution; taking into consideration the location of ports that are short-listed for the EIA. Primary data will be obtained through consultation with relevant recreation groups, Aberdeenshire Council and Aberdeen City Council in order to verify and enhance the recreation and tourism baseline.

Date and stakeholder	Consultation and key comments	How this is accounted for
		Additionally, as set out in **Chapter 13: Commercial Fisheries** data will be obtained through direct consultation with the fishing industry; this consultation will include questions relevant to the socio-economic assessment. To supplement the primary data collection, consultation undertaken for the NorthConnect scheme will also be used to inform the socio-economic assessment where applicable.
	"*With regards to the baseline characterisation, the Scottish Ministers advise that it is not appropriate to assume that host communities have the characteristics of Scotland as a whole. It is recommended that the SEIA includes detailed descriptions of the baseline and assumptions and includes details of primary data to fully assess the potential impact of the project at all phases of the Project. This is in line with MAU advice.*"	The baseline information for the socio-economics assessment is set out in Section 19.5 of this chapter and includes baseline data at the local and national level. Details of the primary data to be collected and existing primary data that will be used to inform the assessment are detailed in the row above.
	"*The Scottish Ministers broadly agree with the impacts to be scoped into the EIAR as identified in Chapter 15 of the [2023] Scoping Report for the construction, operation and decommissioning phases of the Project. In addition, the Scottish Ministers advise that tourism and recreation, socio-cultural impacts and distributional impacts are also scoped into the EIAR and direct the Developer to the MAU advice in this regard.*"	Potential tourism and recreation, socio-cultural impacts and distributional impacts have been considered for the Project. The scope of the socio-economic assessment is set out in Section 19.8 of this chapter.
	"*The Scottish Ministers note that the [2023] Scoping Report is lacking in detail as to the specific methodology that will be used to assess the economic impacts and advise that the EIAR include a detailed description of the methodological approach*	The assessment methodology that will be used for the socio-economics assessment is set out in Section 19.11 of this chapter. Further details of the

Date and stakeholder	Consultation and key comments	How this is accounted for
	taken also including key assumptions that underpin any estimates. This is in line with MAU advice."	assessment approach will be provided in the EIAR. The advice provided by MAU will be considered as part of the assessment (see **Table 19-2**).
	"*Finally, in section 3.5.2 of the [2023] Scoping Report the Developer commits to developing a Project Communications Plan, the Scottish Ministers advise that a detailed engagement plan is included in the EIAR and direct the Developer to MAU advice in this regard*."	A Project Communications Plan will be submitted alongside the EIAR.
	"*Section 16.3 of the [2023] Scoping Report considers the potential impacts of the Project on human health during all phases of the Proposed Development. In table 16-1 of the [2023] Scoping Report the Developer provides a description of each effect considered and its justification for scoping it out of the EIAR*."	**Appendix 19A: Human Health Effects** of this report provides a table detailing the consideration of potential human health effects. This table draws on the table from the 2023 Scoping Report (Table 16-1) with amendments to scope in relevant determinants of health related to socio-economics.
	"*The Scottish Ministers are content for human health to be scoped out of the EIAR as a standalone chapter on the basis that the knock-on social impact to human health is fully considered in the SEIA and direct the Developer to MAU advice to this regard*."	The knock-on social impacts to human health have been considered within this chapter. The scope of the socio-economic assessment is set out in Section 19.8 of this chapter. **Appendix 19A: Human Health Effects** draws on the table from the 2023 Scoping Opinion detailing the potential human health effects. This table has been modified to scope in relevant determinants of health related to socio-economics.
Marine Scotland Analytical Unit, 2023 Scoping	Marine Scotland Analytical Unit recommended that a full Socio-Economic Impact Assessment should be scoped into the EIA. They have provided general advice	Potential tourism and recreation, socio-cultural Impacts, distributional impacts and knock-on socio-

Date and stakeholder	Consultation and key comments	How this is accounted for
Opinion, June 2023	on how to deliver this within their scoping response.	economic impacts have been considered for the Project. The scope of the socio-economic assessment is set out in Section 19.8 of this chapter. The assessment methodology that will be used for the socio-economics assessment is set out in Section 19.11 of this chapter. Further detail of the assessment approach will be provided in the EIAR.
	Marine Scotland Analytical Unit noted that the socio-economic section of the 2023 Scoping Report was quite high level and there was not very much information about the approach to the assessment or the approach to the decisions made.	
	Marine Scotland Analytical Unit noted that the range of impacts scoped into the socio-economics assessment was narrow. They noted that impacts on tourism and recreation had not been considered, neither have socio-cultural impacts or distributional impacts. Marine Scotland Analytical Unit indicated that these impacts should be scoped into the socio-economics assessment.	
	Marine Scotland Analytical Unit also noted that knock on socio-economic impacts had not been considered. These include: commercial fisheries, cultural heritage and human health. If these impacts are scoped into the EIAR, then potential knock on social impacts to be included in the socio-economics assessment. It was also noted that the Information and rationale given for excluding these impacts was not very robust.	
	In addition, it was not clear who was being consulted to comment on the Socio-economic chapter, as a list of consultees has not been provided.	Relevant sector bodies will be asked to comment on the EIA Scoping Report as part of the EIA scoping process, in accordance with the EIA Regulations. It is anticipated that the list of consultees will include, for example, Aberdeenshire Council, Fisheries Management Scotland, Department for Business, Energy and Industrial Strategy as well as Sport Scotland.
	Marine Scotland Analytical Unit noted that a lot of the data presented in the baseline section is at Scotland or UK level, and so is	The baseline information for the socio-economics assessment is set out in

Date and stakeholder	Consultation and key comments	How this is accounted for
	not especially useful for understanding potential impacts of the project. The developers also state that, in the absence of local data, they will assume that host communities have the characteristics of Scotland as a whole. This does not seem to be a valid assumption.	Section 19.5 of this chapter and includes baseline data at the local and national level.
	Marine Scotland Analytical Unit broadly agreed with the proposals in the 2023 Scoping Report to assess the economic impact in terms of GVA and employment. It was noted that the assessment should include direct, indirect and induced impacts and take account of deadweight, leakage, displacement and substitution. Sensitivity analysis to account for risk, uncertainty and optimism bias should also be considered. Marine Scotland Analytical Unit provided an annex (Annex 1) with further advice. Marine Scotland Analytical Unit expect to see a detailed description of the methodology used to assess economic impacts in the EIA, including specific details about the methodological approach taken and any key assumptions that underpin any estimates.	The assessment methodology that will be used for the socio-economics assessment is set out in Section 19.11 of this chapter. Further detail of the assessment approach will be provided in the EIAR. The advice provided by MAU will be considered as part of the assessment (see **Table 19-2**).
	Marine Scotland Analytical Unit noted that it was not clear whether the onshore and offshore impacts of the scheme would be considered together. If they were, Marine Scotland Analytical Unit would like the potential social impacts associated with traffic, noise, air pollution, cultural heritage, landscape and visual amenity and land use to be included in the Socio-economic chapter of the EIA.	As detailed in paragraph 19.1.1.2, the socio-economics assessment only considers the offshore elements of the Project. The socio-economic assessment considers impacts on offshore receptors as well as impacts on onshore receptors which would be affected by the Project. The scope of the socio-economic assessment is set out in Section 19.8 of this chapter.
	Marine Scotland Analytical Unit noted that it was not clear whether the location of epicentres would be known when the EIA is carried out. If this is the case, they would	As detailed in paragraph 19.11.2.11, the socio-economics assessment will consider a short-list of port

Date and stakeholder	Consultation and key comments	How this is accounted for
	expect primary data to be collected in relevant areas, in order to gather local information about potential impacts. Marine Scotland Analytical Unit also noted that at the point of applying for a license the developers may not know which ports or landfall locations they will use, nor where they will source their workforce from. Without this information it is difficult to plan primary research and provide a detailed assessment of social impacts. Nevertheless, Marine Scotland Analytical Unit expect transparency on what has the potential to significantly impact but which cannot be assessed fully due to a lack of sufficient detail.	locations. The port that will be used for the construction as well as O&M of the Project will be identified post consent. Details of the primary data to be collected and existing primary data that will be used to inform the assessment are detailed above.
	Marine Scotland Analytical Unit noted that there is little information about the engagement that has taken place to date, or the engagement that is planned in the future. The report mentions that there will be a Project Communications Plan, but there is no detail about what would include. Marine Scotland Analytical Unit recommended including a detailed plan of the future engagement activities, including who will be engaged with, in what way and on what topics, socio-economic impacts should be the focus of some of this engagement. They also recommended that a Community Liaison Officer is appointed to ensure effective communication and engagement with relevant stakeholders and communities in the future.	A Project Communications Plan will be submitted alongside the EIAR. Details regarding the consultation that will be undertaken to inform the socio-economics assessment are detailed above.
	Marine Scotland Analytical Unit provided a conclusion of their responses, where they: • Recommend that a full socio-economic impact assessment is scoped in, and that this should include tourism and recreation, socio-cultural effects, distributional impacts, and the knock on social impacts of impacts to other receptors such as commercial fisheries, cultural heritage and human health.	Potential tourism and recreation, socio-cultural Impacts, distributional impacts and knock-on socio-economic impacts have been considered for the Project. The scope of the socio-economic assessment is set out in Section 19.8 of this chapter.

Date and stakeholder	Consultation and key comments	How this is accounted for
	• Suggest more clarity on whether the offshore and onshore components are being considered together, and if they are, we suggest the knock on social impacts of impacts to the human environment such as traffic, noise, landscape and visual amenities to be included in the socio-economic impacts assessment. • Recommend a more detailed engagement plan, including who will be engaged with, on what topics, and in what way. They expect the outcome of these engagement activities to be included in future assessments.	As detailed in paragraph 19.1.1.2, the socio-economics assessment only considers the offshore elements of the Project. A Project Communications Plan will be submitted alongside the EIAR.
	Marine Scotland Analytical Unit also noted that at the point of applying for a license the developers may not know which ports or landfall locations they will use, nor where they will source their workforce from. Without this information it is difficult to plan primary research and provide a detailed assessment of social impacts. Nevertheless, we expect transparency on what has the potential to significantly impact but which cannot be assessed fully due to a lack of sufficient detail.	As detailed in paragraph 19.11.2.11, the socio-economics assessment will consider a short-list of port locations. The port that will be used for the construction as well as O&M of the Project will be identified post consent. Details regarding the consultation that will be undertaken to inform the socio-economics assessment are detailed above.
Scoping Workshop, 29 February 2024	The Applicant provided details on the proposed **scope of** the socio-economics assessment for the EIA. Marine Scotland Analytical Unit noted that onshore elements should be considered in the scope of assessment.	The comments provided within the Scoping Workshop from MAU have been considered and addressed in in this 2024 Scoping Report. Paragraph 19.1.1.2 outlines that only offshore elements of the Project are considered relevant for the socio-economics assessment.

19.5 Baseline Conditions

19.5.1 Data Information Sources

19.5.1.1 **Table 19-4** sets out the data sources that were used to inform the baseline conditions.

Table 19-4: Key sources of data

Source	Date	Summary	Coverage of study area
Office for National Statistics	Ongoing	This is the national statistical institute of the UK and publishes a range of socio-economic statistics on an ongoing basis.	Full coverage of the study area.
National Records of Scotland	Ongoing	This non-ministerial department of the Scottish Government publishes a range of socio-economic statistics on an ongoing basis.	Full coverage of the study area.
Public Health Scotland	Ongoing	This is Scotland's national public health body and issues a range of publications including research, guidance and statistics on human health.	Full coverage of the study area.
Visit Scotland	Ongoing	This provides a summary of tourism statistics and information.	Full coverage of the study area.
Recreational and tourist organisations	Ongoing	These provides details of recreational and tourism activities and facilities within the vicinity of the Project.	Partial coverage of the study area.

19.5.2 Existing Baseline

19.5.2.1 This section describes the present conditions which constitute the existing baseline environment for socio-economics, including human health, within the study areas.

Demography/Population

19.5.2.2 The 2021 population estimates for Aberdeenshire and Aberdeen City were 262,700 and 227,400 respectively (the most recently available data at the time of writing)[575]. In Scotland there was a total of 5,479,900 residents.

19.5.2.3 The estimated working age population (aged 16-64) as a percentage of the total resident population in Aberdeenshire, Aberdeen City, Scotland and Great Britain is shown in **Table 19-5** below. In 2021, a lower percentage of the Aberdeenshire population were of working age when compared to Aberdeen City, Scotland and Great Britain as a whole. In contrast, a higher percentage of the Aberdeen City population were of working age when compared to Aberdeenshire, Scotland and Great Britain.

Table 19-5: Population aged 16-64 (% of the resident population) 2021

Aberdeenshire	Aberdeen City	Scotland	Great Britain
61.1 %	67.8 %	63.8 %	62.9 %

Economy and Employment

19.5.2.4 In 2022, there were 99,000 employee jobs in Aberdeenshire; of which 67.7 percent were full-time and 32.3 percent were part-time. In Aberdeen City, there were 158,000 employee jobs; of which 70.3 percent were full-time and 29.7 percent were part-time.

19.5.2.5 The NOMIS Job Densities Report[575] is available on a Local Authority-wide and sub-regional level and indicates the availability of employment and labour demand. As of 2022 (the most recently available data at the time of writing), the job density levels (i.e. the ratio of total jobs to the population aged 16-64) in Aberdeenshire was 0.74 and in Aberdeen City was 1.11. This shows a lower rate of employment opportunities in Aberdeenshire and a higher rate of employment opportunities in Aberdeen City when compared to Scotland (0.81) and Great Britain (0.87).

19.5.2.6 **Table 19-6** shows the proportion of total employees working in each industry sector in 2022 in Aberdeenshire, Aberdeen City, Scotland and Great Britain as a whole. Sector G, Sector C and Sector M had the highest proportion of employees in Aberdeenshire. The greatest percentage of employees in Aberdeenshire was in Sector G: Wholesale and Retail trade and Repair of Vehicles (14.1 percent), which is a higher percentage than Aberdeen City (9.5 percent) and Scotland (12.9 percent) and a similar percentage to Great Britain (14.0 percent). The second largest sector in Aberdeenshire was Sector C: Manufacturing (13.1 percent), which was significantly higher than the percentage for Aberdeen City (5.1 percent), Scotland (6.9 percent) and Great Britain as a whole (7.6 percent).

19.5.2.7 Other sectors with noticeably higher employment in Aberdeenshire when compared to Scotland and Great Britain were: Sector B: Mining and Quarrying; Sector M: Professional, Scientific and Technical Activities; and Sector F: Construction. In contrast, sectors which were less well represented in Aberdeenshire were: Sector Q: Human Health and Social Work Activities; Sector J: Information And Communication; Sector K: Financial and Insurance Activities; and Administrative sectors (N and O).

19.5.2.8 The industry sectors that had the highest proportion of employees in Aberdeen City in 2022 were Sector Q, Sector M and Sector B. The greatest percentage of employees in Aberdeen City was in Sector Q: Human Health and Social Work Activities (17.1 percent), which was higher than Aberdeenshire (9.1 percent), Scotland (15.7 percent) and Great Britain as a whole (13.5 percent). The percentage of employees working in Sector B: Mining and Quarrying (12.7 percent) was significantly higher than Aberdeenshire (3 percent), Scotland (1 percent) and Great Britain (0.2 percent). The percentage of employees working in Sector M: Professional, Scientific and Technical Activities in Aberdeen City (12.7 percent) was similar to Aberdeenshire (12.1 percent) but higher than Scotland (7.4 percent) and Great Britain (9.1 percent).

19.5.2.9 There were no other sectors that have a noticeably higher percentage of employees in Aberdeen City when compared to Scotland and Great Britain. Sectors that were less well represented in Aberdeen City when compared to Scotland and Great Britain

were: Sector C: Manufacturing; Sector F: Construction; Sector G: Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles; Sector J: Information and Communication; Sector K: Financial and Insurance Activities; and Sector P: Education.

Table 19-6: Overview of employee jobs by industry sector in 2022

Industry Sector	Aberdeenshire	Aberdeen City	Scotland	Great Britain
B: Mining and quarrying	3.0	12.7	1.0	0.2
C: Manufacturing	13.1	5.1	6.9	7.6
D: Electricity, gas, steam and air conditioning supply	0.6	0.3	0.8	0.4
E: Water supply; sewerage, waste management and remediation activities	0.7	0.3	0.7	0.7
F: Construction	8.1	3.8	5.7	4.9
G: Wholesale and retail trade; repair of motor vehicles and motorcycles	14.1	9.5	12.9	14.0
H: Transportation and storage	3.5	4.4	4.1	5.0
I: Accommodation and food service activities	7.1	8.2	8.4	8.0
J: Information and communication	1.8	1.9	3.2	4.6
K: Financial and insurance activities	0.7	0.6	3.3	3.3
L: Real estate activities	0.9	0.9	1.3	1.9
M: Professional, scientific and technical activities	12.1	12.7	7.4	9.1
N: Administrative and support service activities	6.1	8.2	8.1	9.0
O: Public administration and defence; compulsory social security	3.5	4.4	6.5	4.7
P: Education	9.1	6.3	8.8	8.6
Q: Human health and social work activities	9.1	17.1	15.7	13.5
R: Arts, Entertainment and Recreation	3.0	1.9	3.0	2.4
S: Other service activities	1.5	1.3	1.6	2.0

19.5.2.10 Gross Value Added (GVA) is a key indicator used to measure economic performance. Total GVA estimates for all industries in 2021[576] were:

- £149 billion in Scotland; and
- £6.5 billion in Aberdeenshire.

19.5.2.11 As set out in Section 15.2 of the 2023 Scoping Report, the UK and Scottish economies have benefited from oil and gas income since the 1970s, and the industry continues to play a key role in terms of economic and energy security, while Scotland has experienced a rapid expansion of wind power.

19.5.2.12 The Fraser of Allander Institute report[577] has been updated since the 2023 Scoping Report and it estimated that there were approximately 27,150 full-time employees in the Scottish renewable energy sector which includes direct, indirect and induced jobs in 2020. The report further estimated there were approximately 6,735 jobs in offshore wind specifically, which shows a higher number of employees in offshore wind and the renewable energy sector overall than in 2019 (4,700).

19.5.2.13 Details regarding the supply chain will be presented as part of the EIAR.

Education

19.5.2.14 **Table 19-7** details the qualifications of the resident population aged 16-64 in Aberdeenshire and Aberdeen City in comparison to Scotland and Great Britain in 2022 (the most up to date data at the time of writing). Rates of attainment in Aberdeenshire were generally in line or higher than Scotland and Great Britain; however, rates of attainment in Aberdeenshire for RQF3 and RQF4 and above qualifications were lower than Scotland. Rates of attainment were mostly higher in Aberdeen City when compared to Scotland and Great Britain. The rate of people in Aberdeenshire with other qualifications was lower than Scotland and Great Britain and significantly higher in Aberdeen City. The proportion of people aged between 16-64 with no qualifications in Aberdeenshire was lower than Scotland and higher than Great Britain. The proportion of people with no qualifications in Aberdeen City was significantly lower than Scotland and Great Britain.

Table 19-7: Qualifications January – December 2022 of the population aged 16-64

Qualification	Aberdeenshire	Aberdeen City	Scotland	Great Britain
RQF4 and above	46.5	53.8	54.2	45.7
RQF3 and above	70.3	73.6	72.8	66.9
RQF2 and above	87.6	87.3	86.0	85.8
RQF1 and above	89.6	88.5	87.5	88.5
Other qualifications	2.8	6.9	4.5	4.7
No qualifications	7.5	4.6	8.0	6.8

Recreation

19.5.2.15 As outlined in the NorthConnect EIAR[578], Aberdeen Divers is a small collective of recreational cold-water divers, based on the northeast coast that use Boddam harbour as a base for diving in this area. However, they do not tend to venture as far south as the Long Haven Bay area and usually concentrate dives around the Buchan Ness lighthouse at Boddam, although a small number dive on a wreck to the north of Long Haven Bay directly from boats.

19.5.2.16 As set out in the NorthConnect EIAR[578], recreational marine vessels mostly use the coastal waters off Peterhead. Peterhead harbour hosts a sailing club (Peterhead Sailing Club), a Sea Cadet Unit and three Royal Yachting Association training centres. As sailing clubs are present in Peterhead, it is anticipated that the cruising routes and, potentially, places of refuge for yachts are located within the recreation study area.

19.5.2.17 The Bullers of Buchan is listed as a sea kayaking location on the Scottish Sea Kayaking website[579] with a trip distance of 10 km. The type of activity is described as "coastal paddling" with users remaining near to the coast.

19.5.2.18 As set out in **Chapter 14: Shipping and Navigation**, no recreational fishing activities were recorded as part of the marine traffic survey. However, there are sea angling trips offered by Misty Angling Trips that sail from Buchaness throughout the summer which may utilise the area within the recreation study area[580].

19.5.2.19 Green Howe Marine Services primarily deliver service and provisions for boats anchored out in Aberdeen Bay and the North Sea Harbour Port of Aberdeen and local North East of Scotland coastal port areas[581]. However, the company also offer recreational tours within Aberdeen Bay including Aberdeen Harbour Tours, dolphin tours and a cruise to Aberdeen Windfarm once a month. However, based on the information available and location of the recreation study area, it is not anticipated that the wildlife boat tour would utilise the area within the recreation study area.

19.5.2.20 There are also a number of onshore recreation receptors within the study area, including:

- Longhaven Cliffs Nature Reserve located adjacent to the landfall to the west;
- Slains Castle approximately 3.4 km south west of the landfall;
- Cruden Bay golf club approximately 4.6 km south west of the landfall;
- Cruden Bay beach approximately 4 km south west of the landfall;
- Port Erroll Harbour approximately 4.1 km south west of the landfall;
- Bullers of Buchan hiking area approximately south west 1.2 km of the landfall;
- Buchan Ness lighthouse approximately 3.6 km north of the landfall;
- Boddam castle approximately 3 km north of the landfall; and
- Boddam recreation park approximately 3.3 km north of the landfall.

19.5.2.21 Sandford Bay, located just north of Boddam, is listed as a surfing location on the Nomad Surfers website[582].

19.5.2.22 As set out in NorthConnect EIAR[578], a coastal path is located along the cliffs, within the recreation study area, and is part of the network of Core Paths in Aberdeenshire and links Whinnyfold just south of Cruden Bay with Boddam, Peterhead and further north to Rattray Head. The terrain is rough coast path, muddy in places with unprotected cliff edges. The section at Long Haven Bay runs through the Long Haven Scottish Wildlife Trust reserve. The Trust provides parking for a small number of cars at Longhaven on the A90, which gives easy access to the coastal path.

19.5.2.23 The Angling Trust is a member-based organisation consisting of anglers across the UK. According to the map on the Angling Trust website, there are no facilities associated with recreational fishing within the study area[583]. However, it is anticipated that anglers may informally use the area within the study area for angling.

19.5.2.24 There are also a number of climbing crags along this section of the North East coast. The records accessible from www.ukclimbing.com do not show any recent logged ascents at this site since it was last updated in November 2023[584].

19.5.2.25 Consultation will be undertaken with relevant recreation groups, Aberdeenshire Council and Aberdeen City Council in order to verify and enhance the recreation and tourism baseline.

Tourism

19.5.2.26 North Link Ferries run services from Aberdeen to Lerwick in Shetland and Kirkwall in Orkney[585]. Ferries travelling from Aberdeen to Kirkwall travel three times a week (two in winter) and from Kirkwall to Aberdeen four times a week (three in winter). Each night there is one ferry service running each way between Aberdeen and Lerwick. These routes are located within the recreation study.

19.5.2.27 There is also tourist accommodation within the tourism study area:

- Four tourist accommodations in Cruden Bay including self-catering accommodation, a bed and breakfast and two 3-star hotels; and
- Five tourist accommodations in Boddam including self-catered accommodation, and three-star and four-star hotels.

19.5.2.28 Tourism is a key sector in Scotland's economy. In 2019, the Grampian region, which includes Aberdeenshire saw 230,000 overnight visits by international visitors and 1,093,000 visits from domestic (GB) visitors, associated with spending of £114m, and £203m respectively. Compared to 2018, international visits were down by 25 percent and domestic visits down by 4 percent. Total day tourism in 2019 was 14,603,000 visits, down by 5 percent compared to 2018 levels. The region has seen significant change recently with demand from domestic (Scottish) visitors replacing both international visitors and visitors from England and Wales. This is reflected as a shift to day tourism and fewer overnight visits with a fall in overall expenditure at the sector level[586].

Marine Commercial Activities and Businesses

19.5.2.29 The baseline for commercial fisheries is captured in **Chapter 13: Commercial Fisheries**. The commercial fisheries study area (defined within **Chapter 13: Commercial Fisheries**) supports a range of commercial fishing activities. The main fishing method across the commercial fisheries study area is demersal trawling, predominantly for *Nephrops*. As set out in **Chapter 13: Commercial Fisheries,** data will be obtained through direct consultation with the fishing industry; this consultation will include questions relevant to the socio-economic assessment.

19.5.2.30 As set out in **Chapter 14: Shipping and Navigation**, the most common vessel types that were identified as part of the marine traffic survey were oil and gas vessels (approximately 13 per day) and fishing vessels (approximately five per day). The

vessels recorded within the marine traffic survey study area during the summer and winter 2021 periods are presented in **Figure 14-3** of **Chapter 14: Shipping and Navigation,** colour-coded by vessel type.

19.5.2.31 There are no onshore businesses that rely on amenity for business operations within the study area, other than recreational and tourism businesses identified above.

Human Health

19.5.2.32 In Aberdeenshire, life expectancy in 2019-21 for males was 78.8 years compared to 82.0 years for females, which is higher than the Aberdeen City average of 76.9 for males and 81.0 for females and the Scotland average of 76.5 years for males and 80.08 for females[587].

19.5.2.33 The Public Health Scotland local area profile for Aberdeenshire between the years of 2019 to 2022[588] shows that the health and wellbeing in Aberdeenshire is generally better than the Aberdeen City and Scotland averages. Rates of Alcohol-related hospital admissions are significantly lower in Aberdeenshire than in Aberdeen City and Scotland. However, the percentage of those that use active travel to get to work is statistically significantly worse than both the Aberdeen City and Scotland averages. **Table 19-8** shows some of the determinants of health from the health and wellbeing profile for Aberdeenshire and Aberdeen City.

Table 19-8: Health and wellbeing profile for Aberdeenshire and Aberdeen City

	Aberdeenshire	Aberdeen City	Scotland
Smoking Prevalence aged 16-34 years (%)	22.9	17.3	18.6
Smoking attributable deaths (age-sex standardised rate per 100,000 people)	220.87	269.55	270.02
Alcohol-related hospital admissions (age-sex standardised rate per 100,000 people)	265.83	567.94	611.05
Active travel to work (%)	9.52	19.84	16.93
Chronic obstructive pulmonary disease (COPD) patient hospitalisations ((age-sex standardised rate per 100,000 people)	117.04	185.58	207.45
Coronary heart disease patient hospitalisations ((age-sex standardised rate per 100,000 people)	294.13	350.55	341.63

	Aberdeenshire	Aberdeen City	Scotland
Child healthy weight in primary 1 (%)	77.36	69.94	76.58
Adults overweight (including obesity) (%)*	69	59	65
Adults claiming incapacity benefit/severe disability allowance (%)	3.24	4.38	6.07

*Taken from Scottish Health Survey (2016 – 2019)[589]

19.5.2.34 The Scottish Index of Multiple Deprivation[590] is a standard tool for identifying areas with relatively high levels of deprivation across Scotland. Scotland is split into 6,976 small areas, of roughly equal population sizes, called “data zones”. These domains are combined into one index, ranking each data zone in Scotland from 1, being most deprived, to 6,976, being least deprived.

19.5.2.35 Aberdeenshire has no data zones within the 5 percent most deprived areas in Scotland, which shows a lower level of deprivation compared to Aberdeen City, where one data zone is within the 5 percent most deprived areas (Woodside). The lowest ranking data zone in Aberdeenshire is located in Fraserburgh (Fraserburgh Harbour and Broadsea) which is within the 10 percent most deprived areas in Scotland. In Aberdeenshire, 29 percent of the data zones fall into the 20 percent least deprived areas in Scotland, these are also located in Fraserburgh and Peterhead. Aberdeenshire’s highest ranking data zone can be found in Stonehaven.

19.5.3 Future Baseline

19.5.3.1 National Records of Scotland publishes population projections for each local authority and health board area every two years. Release dates for updated projections outputs are currently under review, therefore, the most recently available set is from the year 2018 to the year 2043[591]. Aberdeenshire’s population is projected to increase by an estimated 267,795 people in the 25-year projection period, a 2.4 percent change from 2018 levels (261,470 people). The relatively low levels of change in population size over the past six years, together with corresponding low levels of growth forecast for the period to 2028, indicate stability in the underlying socio-economic circumstances.

19.5.3.2 There is anticipated to be significant growth in the offshore wind sector. Further information from the government will be used in production of the EIAR if it becomes available.

19.6 Basis of Assessment

19.6.1.1 The socio-economics scoping assessment is based on the following key assumptions, which are also set out in **Chapter 3: Project Description**:

- The array will consist of between 68 and 95 WTGs;
- There will be up to two offshore substations;

- The likely maximum duration of the construction phase of the Project is up to three years;
- A construction and marshalling and Operations and Maintenance port(s) has not yet been identified for the Project and may not be known prior to finalisation of EIAR and is subject to commercial agreement;
- The short-listed ports that are likely to be used for the Project will be assessed at the EIA stage. The final port(s) will be identified post-consent.
- Maintenance activities will be undertaken for both preventive and corrective maintenance requirements;
- The operational lifetime of the project is assumed to be a minimum of 30 years; and
- The decommissioning of the windfarm is anticipated to involve as close to full removal of offshore infrastructure as possible at the time of decommissioning (where safe/practicable to do so). The decommissioning works are likely to be undertaken in reverse to the sequence of construction works and involve similar levels of equipment and impact.

19.7 Relevant Embedded Mitigation Measures

19.7.1.1 Embedded mitigation measures have been identified and are proposed to be adopted as part of the Project design (primary mitigation); or implemented in accordance with industry standard practice that would occur with or without the input from the environmental assessment feeding into the process (tertiary mitigation). There is a commitment by the Applicant to implement these embedded mitigation measures and they have been considered within the 2024 EIA Scoping Report.

19.7.1.2 The requirement for additional mitigation measures (secondary mitigation) will be dependent on the significance of effects on socio-economics receptors and will be consulted upon with consultees throughout the EIA process. Any additional (secondary) mitigation measures will be presented within the EIAR..

19.7.1.3 Those measures that are relevant to socio-economics are listed in **Table 19-9**.

Table 19-9: Embedded mitigation relating to socio-economics

ID	Embedded mitigation measures
SOC-001	A Skills and Employment Plan will be prepared prior to the Project commencing operation.
SOC-002	A Supply Chain Strategy will be prepared prior to the Project commencing operation.
SOC-003	An OEMP will be submitted as part of the Application. The OEMP will be developed into an Environment Management Plan (EMP) by the contractor. The contractor will ensure that the relevant environmental measures within the EMP and health and safety procedures are implemented. The EMP will identify the project management structure roles and responsibilities with regard to managing and reporting on the environmental impact of the Project. The OEMP will be the securing mechanism for many measures.

19.7.1.4 Opportunities that could enhance the positive impacts of the Project will be considered as the Project develops. Potential opportunities that could be considered include:

- The use of locally manufactured content where possible;
- The use of local contractors during construction for onshore infrastructure and potential offshore construction work where possible;
- The potential for cross-training across different offshore sectors, such as oil and gas to help support the transition of skilled works into the offshore renewable industry;
- Employment and training possibilities for local people on the O&M of a windfarm where feasible; and
- Supporting the community through sponsorship of local groups and teams.

19.8 Scoping of Potential Significant Effects

19.8.1.1 In line with the EIA Regulations 2017[592], the EIA for the Project will only consider those impacts where there is a risk of a potential significant effect. The following section draws on industry experience to identify those effect-receptor pathways that may potentially lead to a significant impact. Where experience and available evidence indicates an effect-receptor pathway will not lead to a significant effect with regards to the EIA Regulations 2017[592] the pathway is scoped out from assessment.

19.8.1.2 The potential significant effects on socio-economics, including human health, are summarised in **Table 19-10**. The scoping assessment is based on a combination of the project design at the time of writing, embedded mitigation measures, understanding of the baseline environment at the time of writing, the evidence base for socio-economics effects and professional judgement. The approach to this assessment is set out in **Chapter 5: Approach to Scoping and EIA**. The socio-economics scoping assessment for the Project draws on the Local Community and Economy assessment for the NorthConnect, as set out in the NorthConnect EIAR[578].

19.8.1.3 The early identification of potential significant effects is used here as a tool aimed at delivering a proportionate approach to the EIA. In doing so, it sets out a high-level assessment of all potential effects, significant or not. The basis for scoping out certain effects, and therefore no longer considered is presented after the table, supported by evidence base.

Table 19-10: Summary of potential significant effects for socio-economics scoped in (✓) or scoped out (x) of the EIAR during construction (C), O&M and decommissioning (D)

Activity and Impact		Embedded Measures	Outcome of Scoping per Phase			Justification	Overview of Proposed Approach Assessment
			C	O&M	D		
Economy and employment	Project demand for labour	SOC-001	✓	✓	✓	N/A	Desk based study utilising online data sources and consultation information where relevant
	Supply of labour to meet project demand	SOC-001	✓	✓	✓	N/A	
	Project demand for products and services	SOC-002	✓	✓	✓	N/A	
	Supply of products and services	SOC-002	✓	✓	✓	N/A	
	Project expenditure increasing economic activity (GVA) within the local and wider economies	N/A	✓	✓	✓	N/A	
Influx of workers	Increase in demand on local services due to an influx of workers	N/A	✓	✓	✓	N/A	Desk based study utilising online data sources
	Socio-cultural and distributional effects	N/A	✓	✓	✓	N/A	
Recreation and tourism	Impacts to recreational and tourism receptors	SOC-003	✓	✓	✓	N/A	Desk based study utilising online data sources and consultation information where available.

Activity and Impact		Embedded Measures	Outcome of Scoping per Phase			Justification	Overview of Proposed Approach Assessment
			C	O&M	D		
							The assessment will draw on other assessments undertaken for the Project including, for example, **Chapter 15: Marine Cultural Heritage and Archaeology, Chapter 16: Seascape, Landscape and Visual Impact Assessment, Chapter 14: Shipping and Navigation** and **Chapter 12: Fish Ecology**.
Marine commercial activities and businesses	Disruption to marine commercial activities	N/A	✓	✓	✓	N/A	Desk based study utilising online data sources and consultation information where available. The assessment will draw on **Chapter 13: Commercial Fisheries, Chapter 14: Shipping and Navigation** and **Chapter 17: Marine Infrastructure and Other Users.**
Human health		SOC-001, SOC-002 and SOC-003	✓	✓	✓	**Appendix 19A: Human Health Effects** of this report provides a table detailing the consideration of potential human health effects. This table draws on the table from the 2023 Scoping Report (Table 16-1) with amendments to scope in	Desk based study utilising online data sources. The assessment will draw on the outcomes of the socio-economics assessment.

Activity and Impact	Embedded Measures	Outcome of Scoping per Phase			Justification	Overview of Proposed Approach Assessment
		C	O&M	D		
					these determinants of health related to socio-economics	
	N/A	X	X	X	**Appendix 19A: Human Health Effects** of this report provides a justification to scope out these determinants of health related to socio-economics.	N/A

19.8.2 Impacts Scoped Out of Assessment

19.8.2.1 A number of potential effects have been scoped out from further assessment of the knock-on human health assessment, resulting from a conclusion of no potential significant effects. These conclusions have been made based on the knowledge of the baseline environment, the nature of planned work and the professional judgement on the potential for impact from such projects more widely. The conclusions follow (in a site-based context) existing best practice. **Appendix 19A: Human Health Effects** of this report provides a justification to scope out relevant determinants of health related to socio-economics.

19.8.2.2 All potential significant effects identified will be considered at further stages of the assessment as more detail regarding the design becomes available and greater levels of baseline data are collected and analysed.

19.9 Cumulative Effects

19.9.1.1 Cumulative effects on socio-economics resulting from the effects of the Project and other developments will be assessed in accordance with the guidance and methodologies set out in **Chapter 5: Approach to Scoping and EIA** and considering the other developments that have been screened in as part of the CEA screening exercise.

19.9.1.2 The impacts from the Project which have the potential to act cumulatively with impacts from other developments include the majority of those identified in **Table 19-10** depending on implementation plans and will be considered in the EIAR using the latest information available at the time.

19.10 Potential Transboundary Effects

19.10.1.1 No effects on socio-economic receptors are likely to be transboundary. This is detailed further in **Appendix 5D: Transboundary Screening Matrix**. An extended supply chain for labour, services, equipment or materials may lead to transboundary socio-economic impacts outside the UK. However, the level of purchases arising from the Project is considered relatively small compared to the size of the well-developed international markets in which they take place and the assessment of effects is proposed to be scoped out.

19.11 Proposed Approach to the Environmental Impact Assessment

19.11.1.1 The Project-wide approach to the assessment methodology is set out in **Chapter 5: Approach to Scoping and EIA**. This will be implemented to assess the potential significant effects on socio-economics receptors, including knock-on human health effects, from the construction, O&M, and decommissioning of the Project.

19.11.1.2 As detailed in paragraph 19.1.1.2, the socio-economics assessment only considers the potential impacts of the offshore elements of the Project. The socio-economic assessment for the Project draws on the Local Community and Economy chapter for the NorthConnect EIAR where relevant[578].

19.11.1.3 The specific guidance outlined in **Table 19-2** will also be considered in relation to the assessment, in addition to consultation with the stakeholders outlined in paragraph 19.4.1.1.

19.11.1.4 This section outlines the proposed EIA approach for the socio-economics assessment, including potential knock-on human health effects. This includes the proposed assessment methodology, relevant embedded mitigation measures, as well as those measures scoped into and out of the assessment.

19.11.2 Proposed Assessment Methodology

19.11.2.1 There are no specific guidelines or requirements for socio-economic assessments set out in any statutory guidance regarding the preparation of an EIA. However, the assessment of socio-economics receptors will draw on the guidance documents detailed in **Table 19-2**. Socio-economic assessments have an established practice of including a description of the socio-economic consequences of the effects on the environment as experienced by people and communities locally and, where appropriate, more widely. The method adopted is therefore one of determining the existing and future circumstances for these communities (the baseline) followed by the assessment of relevant topics and effects on individual receptors. The approach uses desk-based analysis and professional judgment/opinion as well as relevant government advice and other guidance.

19.11.2.2 Human health is influenced by a range of indirect and direct factors; some controllable such as lifestyle, and some uncontrollable such as genetics. In determining physical, mental and social wellbeing, factors known as “determinants of health” are considered which reflect the range of influences, from society and the environment, on an individual. The human health assessment is in accordance with the IEMA guidance on Effective Scoping of Human Health in Environmental Impact Assessment[572] and Determining Significance for Human Health in Environmental Impact Assessment[573].

Identification of Effects

19.11.2.3 The simplest specification of the topics covered by socio-economics are those affecting 'people', commonly supplemented by more specific characterisations of groups or organisations they belong to, such as 'workforce'. In assessment, individuals and groups are termed receptors.

19.11.2.4 The identification of possible socio-economic effects on these receptors follows the principles underpinning EIA, including the principle of scoping. The impacts resulting from the activities related to the Project are identified and described according to knowledge of how activities related to it will occur. Such knowledge is continuously evolving as the design and understanding of the Project advances. Socio-economic effects may also arise from specific changes to the environment and be assessed using evidence provided in support of assessment of other EIA topics.

19.11.2.5 In addition, specific activities of the Project could change a determinant of health and potentially result in health outcomes (an effect). This is identified as a ‘Health Pathway’. Impacts from the Project that result in a change to determinants of health, have the potential to cause beneficial or adverse effects on health, either directly or indirectly. **Appendix 19A: Human Health Effects** of this report provides a table

detailing the consideration of potential human health effects. This table draws on the table from the 2023 Scoping Report (Table 16-1) with amendments to scope the education and training as well as employment and income determinants of health into the socio-economic assessment.

19.11.2.6 The potential significant socio-economic and human health effects are presented in **Table 19-10** and comprise those that are currently understood to require assessment. The list is based on information currently available regarding the Project, review of previous impact assessments for similar developments and consideration of the range of potential socio-economic and human health impacts that may occur.

Assessment Methodology

19.11.2.7 The assessment methodology for each of the elements proposed to be scoped in, as set out in **Table 19-10,** has been outlined below.

Economy and Employment

19.11.2.8 Employment generation from the construction, O&M and decommissioning of the Project will be considered as part of the assessment. The assessment will also consider the labour demand generated by the Project alongside the existing supply of labour in the national employment market. The Applicant will estimate the number of Full Time Equivalent jobs that would be generated during the construction, O&M and decommissioning of the Project. The estimate will be based on the Applicant's experience and knowledge of the sector and Project; with the estimate being custom to the design and requirements of the Project.

19.11.2.9 The demand for products and services (i.e. the supply chain) as well as the supply of these products and services will be considered as part of the assessment. The assessment will be informed by the material requirements of the Project.

19.11.2.10 Economic activity and investment will be increased by project expenditure, leading to increases in Gross Value Added. Gross Value Added will be considered as part of the assessment and will be calculated based on the Project information.

Influx of Workers

19.11.2.11 The assessment will consider the impacts of workers residing at the port locations that will be short-listed for the EIA. Workers residing at the port locations could increase demand on local services including, for example, tourist accommodation. The assessment will also consider the socio-cultural and distributional effects associated with an influx of workers to the port locations. The assessment will consider the number of workers that are likely to reside within the port area and the workers that are likely to reside in offshore accommodation vessels.

Recreation and Tourism

19.11.2.12 The assessment will consider the potential impacts of the Project on recreational and tourism receptors due to a loss of amenity and loss of availability. The assessment will also consider knock-on impacts from other environmental topics on receptors with socio-economic importance. This will include changes to natural and marine

archaeology assets which could impact on the perceived quality and availability of recreation and tourism resources. For example, the Project could impact on a shipwreck site which could be a recreational and tourism resource for scuba divers.

19.11.2.13 As part of the assessment, consultation will be undertaken with relevant recreation groups, Aberdeenshire Council and Aberdeen City Council in order to verify and enhance the recreation and tourism baseline.

19.11.2.14 The assessment will draw on other assessments undertaken for the Project including, for example, **Chapter 15: Marine Cultural Heritage and Archaeology, Chapter 16: Seascape, Landscape and Visual Impact Assessment, Chapter 14: Shipping and Navigation** and **Chapter 12: Fish Ecology**.

Marine Commercial Activities and Businesses

19.11.2.15 As part of the assessment, commercial activities and businesses that operate within the study area will be identified. As set out in paragraph 19.3.1.3, the 5km study area will be extended if it is anticipated that the Project could affect socio-economic receptors beyond 5 km of the Project Area. The assessment will consider how the Project would impact on business operations during the construction, O&M as well as decommissioning of the Project.

19.11.2.16 As set out in **Chapter 13: Commercial Fisheries,** data will be obtained through direct consultation with the fishing industry; this consultation will include questions relevant to the socio-economic assessment.

19.11.2.17 The assessment will draw on the outcomes of **Chapter 13: Commercial Fisheries**, **Chapter 14: Shipping and Navigation** and **Chapter 17: Marine Infrastructure and Other Users**.

Human Health

19.11.2.18 The human health assessment will consider the knock-on health impacts of the socio-economic assessment. The health determinants which have the potential to be affected by the Project include: housing / accommodation; open space, leisure and play; community identity, culture, resilience and influence; education and training; and employment and income.

Assessment of Significance

19.11.2.19 The assessment of the significance of the socio-economic and human health effects is the primary concern and main output of the assessment. Significance is assessed including embedded mitigation measures. Where the potential for a significant effect remains, additional measures can be considered to avoid, enhance, reduce or compensate for this effect. The assessment will report on the anticipated socio-economic and human health effects of the Project following the implementation of all mitigation to determine the residual effects.

19.11.2.20 Criteria for significance will be developed alongside the estimates of effects to meet the requirements for assessment of the specific types of effects according to the characteristics of receptors, as well as meeting good practice for criteria (such as being easy-to-use). Outcomes for assessments of significance will use the categories

of ‘Major’, ‘Moderate’, ‘Minor’ or ‘Negligible’. Effects can be either beneficial or adverse.

19.11.2.21 The significance of socio-economic and human health effects will be assessed through the evaluation of the combination of the magnitude of effects and sensitivity of receptors using the matrix defined in the generic project-wide approach. Assessment of significance for human health is informed by the IEMA 2022 guidance[573] (outlined in Section 19.2.1 of this chapter).

Receptor Sensitivity

19.11.2.22 The sensitivity of a receptor is a summary term that describes the ability of the receptor to withstand or absorb change within the period of time the impact is expected to occur and without a fundamental change to its character or attributes. Sensitivity to socio-economic and human health effects has no single interpretation and can be seen as capturing the concept of a value that is potentially threatened or enhanced. A range with four levels of sensitivity (high, medium, low and very low) is used to describe receptors.

19.11.2.23 Sensitivity of socio-economic and human health receptors may depend on their current and future characteristics as well as the nature of the impact, reflecting aspects such as:

- Previous experience of socio-economic change;
- Vulnerability from pre-existing social circumstances or health condition;
- Cultural values, including public interest, perceptions towards a risk or potential change, and acceptability;
- Environmental vulnerability of habitats important to the socio-economic and health context (such as open space and public parks); and
- The ability of a receptor to respond to change.

Magnitude of Change

19.11.2.24 The magnitude of change is a summary term used to describe the features of an effect which can be represented as varying over a range. Straightforward socio-economic and human health effects may be represented with quantitative indicators, such as employment relative to a national average, but other effects may need a semi-quantitative or qualitative approach to account for variation. A range with four levels to represent the magnitudes of effects (high, medium, low and negligible) is used and covers features such as:

- A more general concept of scale or extent (for example, number of groups and/or people, businesses affected; spatial area affected);
- The duration and frequency of effects and whether they are permanent or time-limited (short, medium, long);
- The direction of change and its reversibility; and
- The probability of occurrence.

Determination of Significance

19.11.2.25 The evaluation of significance for both socio-economics and human heath will be based on a set of customised criteria which:

- Can be consistently and rationally applied and documented;
- Reflect procedure and guidance; and
- Reflect precedent experience.

19.11.2.26 Quantitative thresholds for criteria related to specific effects are referenced if relevant and available, supplemented by professional judgement that aims to reflect whether impacts threaten or enhance socio-economic and human health conditions. In this context the criteria identified in guidance will be used in considering the magnitude of effects, sensitivity of receptors and significance, particularly at individual locations.

19.11.2.27 The assessment of significance is based on a combination of the receptor sensitivity and the magnitude of change and the final summary of significance is to be presented in a table showing each effect and identifying whether it is beneficial or adverse together with the accompanying rationale. The matrix for evaluating significance of effect is presented in **Table 5-3** in **Chapter 5: Approach to Scoping and EIA**.

19.12 Summary

19.12.1.1 The socio-economics aspect of the EIAR, including human health, will reflect the detailed description of the Project and follow the best practice approach referred to above. It will draw on the latest datasets that are available and be conducted at an appropriate geographic scale.

19.12.1.2 Consultation will be held with relevant organisations. This will include, for example, consultation with relevant socio-economic, tourism and recreation stakeholders, relevant sector bodies (including MD-LOT Analytical Unit), key recreational and interest groups and local communities as part of the Pre-application Consultation process, which is set out in **Chapter 5: Approach to Scoping and EIA**. In addition, consultation will be undertaken with relevant recreation groups, Aberdeenshire Council and Aberdeen City Council in order to verify and enhance the recreation and tourism baseline. Additionally, as set out in **Chapter 13: Commercial Fisheries** data will be obtained through direct consultation with the fishing industry; this consultation will include questions relevant to the socio-economic assessment.

19.12.1.3 Potential significant effects will be described and the assessment will include consideration of potential significant cumulative effects, as appropriate.

19.13 Further Consideration for Consultees

19.13.1.1 Please find below specific scoping questions relevant to the topic of socio-economics:

- Do you agree that the data sources identified are sufficient to inform the socio-economics baseline for the EIAR?
- Can you confirm whether there are any other impact-pathways that should be considered?

- Have all potential impacts resulting from the Project been identified for socio-economic receptors?
- Do you agree that the impacts described in Section 19.8 can be scoped out?
- For those impacts scoped in (**Table 19-10**), do you agree that the methods described are sufficient to inform a robust impact assessment?
- Do you agree that the embedded mitigation measures described provide a suitable means for managing and mitigating the potential effects of the Project on socio-economic receptors?

20. MATERIALS AND WASTE

20.1 Introduction

20.1.1.1 This chapter of the Scoping Report considers the potential significant effects on materials and waste of the Project. The Project comprises the Array Area and ECC (from MHWS to the Array Area).

20.1.1.2 The chapter provides an overview of the baseline conditions relevant to the Project Area (as defined in **Chapter 1: Introduction**), the datasets to be used to inform the EIA, sources, pathways and receptors of the potential significant effects to be considered, and how these potential significant effects will be assessed for the purpose of the EIA.

20.1.1.3 This chapter should be read alongside the following chapters and documents:

- **Chapter 3: Project Description** which details the Project parameters;
- **Chapter 17: Marine Infrastructure and Other Users** which considers, the impacts of potential sterilisation of marine aggregates; and
- **Chapter 23**: **Carbon and Greenhouse Gases** which considers the embodied carbon associated with the material resources.

20.2 Legislation, Policy and Guidance

20.2.1 Legislation and Policy

20.2.1.1 Legislation and policy that has been used to inform the scope of the Materials and Waste chapter is set out in **Table 20-1.** Further information on policies relevant to the EIA are set out in **Chapter 2: Legislative and Policy Context.**

Table 20-1: Legislation and policy

Legislation/Policy	Relevance to the assessment
Legislation	
The Revised EU Waste Framework Directive 2008/98/EC[593]	Whilst it is acknowledged that following the UK's departure from the EU, compliance with EU directives is no longer necessary, the Directives provide useful legislative context, and a summary has been included. The Directive provides a comprehensive foundation for the management of waste across the European Union and provides a common definition of waste. A definition of waste is provided in the predecessor to this Directive (European Directive 2006/12/EC) which defines waste as: "*any substance or object that the holder discards, or intends or is required to discard*." The Applicant and contractors involved in waste generation must be aware of the definition of waste and relevant waste legislation.

Legislation/Policy	Relevance to the assessment
Council Directive 1999/31/EC of 26 April 1999 on the Landfill of Waste[594] 'The Landfill Directive'	The Landfill Directive aims to protect both human health and the environment. In particular, it provides measures, procedures and guidance to reduce as much as possible negative impact from landfill. In particular to surface water, groundwater, soil, air; on the global environment including greenhouse effect; and risks to human health. The Directive introduces rigorous operational and technical requirements. Whilst the UK's departure from the EU is acknowledged, the Directive provides context and they primary legislation form which Scottish and UK Regulations transpose. The Applicant and contractors involved in waste generation must minimise waste disposal to landfill, and ensure waste generated is correctly disposed of.
Circular Economy (Scotland) Bill[595]	The Bill will implement new legislation to tackle waste and increase reuse and recycling rates. Ministers will have powers to set statutory and local targets for delivery of a circular economy to measure progress in reducing waste and the nation's carbon footprint. The Applicant and contractors involved in waste generation must apply circular economy principals to minimise waste disposal to landfill and increase reuse and recycling rates.
The Environmental Protection (Duty of Care) (Scotland) Regulations 2014[596]	The legislation sets out the requirements for documenting waste movements through the completion of waste transfer notes. The Applicant and contractors involved in waste generation must ensure waste movements are appropriately documented.
The Waste (Scotland) Regulations 2012[597]	The legislation implements a number of actions in the Scottish Government's Zero Waste Plan. Under these amendments, holders of waste, including waste producers, have a duty to take reasonable steps to increase the quantity and quality of recyclable materials through segregation of waste and promoting high quality recycling. The Applicant and contractors involved in waste generation must ensure waste is appropriately managed and disposed of.
Waste Management Licensing (Scotland) Regulations 2011 (as Amended)[598]	These Regulations consolidated the waste management licensing and exemption system. Regulation 30 and Schedule 5 requires waste brokers and dealers to be registered. The regulations also determine waste management activities that are or are not exempt from taking place under a waste management licence. The Applicant and contractors involved in waste generation must ensure waste is appropriately managed and disposed of.

Legislation/Policy	Relevance to the assessment
The Special Waste Regulations 1996 (As Amended)[599]	The regulations provide a definition of 'special waste' in Scotland to cover all hazardous waste. The regulations set out the requirements for moving hazardous waste through the completion of consignment notes. Special wastes must be disposed of or treated by specifically licensed facilities and covered by separate consignment notes. Mixing of special wastes is strictly prohibited. The Applicant and contractors involved in hazardous (special) waste generation must ensure hazardous waste is appropriately managed and disposed of.
The Environmental Protection Act 1990[600]	The Act defines, within England, Wales and Scotland, the fundamental structure and authority for waste management and control of emissions into the environment. The Act outlines the requirement of the manager of a development to ensure that any excess materials or waste as a result of construction activities are recovered or disposed of without any subsequent adverse effects upon the surrounding environment. The Applicant and contractors involved in waste generation must ensure waste is appropriately managed and disposed of.
National Policy	
National Policy Statement (NPS) for Renewable Energy Infrastructure (EN-3)[601]	The Policy came into force on 17 January 2024 and identifies the requirement, where requested by the Secretary of State) to submit a decommissioning programme to *"demonstrate a commitment to ensure any long-term environmental impacts re removed following decommissioning"* (paragraph 2.8.79). The statement reiterates a similar requirement made in the previous iteration of EN-3 (National Policy Statement for Renewable Energy Infrastructure (EN-3))[602] (paragraph 2.6.54). The Applicant may be required to prepare a decommissioning plan.
Overarching NPS for Energy (EN-1) 2023[603]	The NPS for Energy sets out national policy for energy infrastructure. In Section 5.15 of the policy (Resource and Waste Management), Government expectations on hazardous and non-hazardous waste are outlined, which are intended to protect human health and the environment by producing less waste and by using it as a resource wherever possible. Applicants should also ensure that through construction best practices, material is reused or recycled on site where possible, or sourced from recycled or reused sources, and low carbon materials, sustainable sources and local suppliers are used. The Applicant and contractors involved in waste generation must ensure waste is appropriately managed and disposed of.

Legislation/Policy	Relevance to the assessment
NPF4[604]	The Policy's Zero Waste principle is to *"encourage, promote and facilitate development that is consistent with the waste hierarchy".* This will be achieved through the reduction and reuse of construction materials and deliver of zero waste infrastructure. The Applicant and contractors involved in waste generation must make efforts to increase resource efficiency and manage waste generation and disposal.
Scotland's Zero Waste Plan[605]	The plan sets out the strategic direction for waste policy for Scotland. The plan aims to *"achieve a zero waste Scotland"* where resource efficiency is maximised to *"minimising Scotland's demand on primary resources, and maximising the reuse, recycling and recovery of resources instead of treating them as waste."* The Applicant and contractors involved in material resource consumption and waste generation must make efforts to increase resource efficiency and manage waste generation and disposal.
Scotland's National Marine Policy[606]	The policy sets the objective for the marine aggregates industry and therefore is not directly relevant to the Project. However the National Marine Policy does identify areas of aggregate reserves. The Applicant and contractors involved in the construction of the Project will need to consider the potential sterilisation marine aggregate resources, and take appropriate measure, in agreement with the statutory bodies, to minimise the impact.

20.2.2 Technical Guidance

20.2.2.1 Technical guidance that has been used to define the assessment is set out in **Table 20-2**.

Table 20-2: Relevant technical guidance

Guidance reference	Relevance to the assessment
Institute of Environmental Management and Assessment Guide to Materials and Waste in Environmental Impact Assessment ('IEMA Guide').[607]	The Guidance has been used to assess the potential impacts and effects from the Project, using the process and significance criteria it sets out.

20.3 Study Area

20.3.1.1 The spatial scope and Study Areas of the materials and waste assessment is defined in the IEMA Guide as:

- The Project Area - the extent of works within the Site Boundary.

- The Expansive Study Area extends to the availability of construction materials and the capacity of waste management facilities within the UK and, where data is available, the onshore regions closest to the Project. In this case, the regions of northeast Scotland have been included, comprising of, Aberdeen City, Aberdeenshire, Angus, Dundee City, Perth and Kinross and Stirling.

20.3.1.2 The ECC will be assessed from the Array Area to MHWS. The section of the ECC from MHWS to 12 NM is the same as the NorthConnect Cable Corridor. The Applicant is coordinating with NorthConnect Limited. NorthConnect Interconnector and the Project will only require one set of infrastructure, within the overlapping marine licence Project Area from 12 NM to MHWS.

20.3.1.3 The section of the ECC from MHWS to 12 NM has previously been assessed within the EIAR submitted for NorthConnect Limited (application reference number 06771 & 06870) and judged acceptable through the consenting of NorthConnect. The previous EIA work for NorthConnect will be considered in assessing the ECC from MHWS to 12 NM, updated by any other readily available information and surveys undertaken. See Section 20.5 for further details of the baseline conditions. Further details are in **Chapter 5: Approach to Scoping and EIA**.

20.4 Consultation

20.4.1.1 A summary of the key issues raised during consultation to date, specific to materials and waste, is outlined in **Table 20-3**, together with how these issues will be considered in the production of the EIAR.

Table 20-3: Summary of consultation relating to materials and waste

Date and Stakeholder	Consultation and key comments	How this is accounted for
MD-LOT, 2023 Scoping Opinion, June 2023 [608]	The Scottish Minsters noted that they were content with the data sources and baseline information provided and agreed that the assessment of materials and waste is scoped into the EIA for the construction, operation and decommissioning phases.	As justified within this 2024 Scoping Chapter for materials and waste (Section 20.8), it is considered that there will be no significant effects during the construction phase, on the basis that measures for sustainable resource management, waste avoidance and diversion from landfill will be applied. During operation of the Project material resource consumption and waste generation and disposal will be negligible, required only for maintenance and repair activities during this time. The Applicant will ensure that legal requirements to apply the waste hierarchy and therefore minimising waste generation are applied. A Decommissioning Plan will be developed at the end of life of the Project (post consent). This plan will assess methods to ensure sustainable disposal of the Project infrastructure in line with

Date and Stakeholder	Consultation and key comments	How this is accounted for
		available waste management technology and in accordance with legislation and policy in place at the time of decommissioning.
Scoping Workshop, 29 February 2024	The Applicant provided a high level summary during the Scoping Workshop. At the time of writing, no further consultee responses have been received.	Waiting for Scoping Opinion.

20.5 Baseline Conditions

20.5.1 Data Information Sources

20.5.1.1 The data sources used to inform this materials and waste baseline are summarised in **Table 20-4**. This data is periodically updated, and the most recent version of the data available at the time of writing this Scoping chapter have been used. The data sources will be reviewed and updated as necessary for the EIAR.

Table 20-4: Key sources of data

Source	Date	Summary	Coverage of Study Area
British Geological Survey *'The Mineral Resources of Scottish Waters and the Central North Sea'*[609]	Accessed January 2024	Provides data on the offshore mineral reserves.	Data provided for Scottish waters.
SEPA *'Waste from all sources – Summary data 2021'*[610]	Accessed January 2024	Provides data on recovery rates to inform the baseline	Data provided for Scotland.
SEPA *'Scottish Waste Sites and Capacity Tool'*.[611]	Accessed January 2024	Provides remaining landfill capacity data to inform the baseline	Covers the expansive Study Area (northeast Scotland comprising; Aberdeenshire, Aberdeen City, Angus, Dundee City, Perth and Kinross and Stirling)

20.5.2 Existing Baseline

20.5.2.1 This section describes the present conditions which constitute the existing baseline environment for materials and waste within the Project Area.

Materials

Material Resources Currently Required

20.5.2.2 The current land use for the Project Area comprises the North Sea and sea floor. Consequently, no material resources are consumed in the current baseline scenario.

Material Resource Availability

20.5.2.3 The development of offshore windfarms requires predominantly pre-fabricated components, constructed outside of the Project Area, with the manufactures forming the supply chain to the Applicant. Manufacturers of offshore windfarm components are inherently aware of the demand for offshore wind, with the Global Wind Energy Council indicating that over 380 GW of new offshore wind capacity will be added over the next decade (2023-2032)[612].

20.5.2.4 The components for the Project shall be developed through recourse to international supply chains for equipment and components. The project shall endeavour to maximise UK supply of components and assembly of those components where practicable to do so. Decisions have not been made on suppliers for equipment and components, but the Applicant is considering large well established international suppliers who are able to supply large volumes of the necessary components.

20.5.2.5 The components required to develop the project are composed of readily available international commodities such as steel and copper. There will be no significant depletion of any UK raw material resources from construction of the Project. In relation to the manufacturer's delivery of the commodities and pre-fabricated component parts, the manufacturers will be subject to country specific controls to operate. A review of a selection of offshore wind turbine manufactures[613,614,615] demonstrates a strong commitment to sustainable resourcing, lifecycle assessments and circular economy principles. Given this, assessment of material resources required for the Project will not be taken further.

Mineral Safeguarding Areas

20.5.2.6 The NMPi[616] indicates that the ECC will pass over and adjacent to aggregate reserves (sand and gravel) which are located approximately 130 km offshore to the east of Peterhead.[616] The reserves are however below other oil and gas infrastructure, and lie within the INTOG leasing area. The impacts of potential sterilisation of marine aggregates will be further assessed in **Chapter 17: Marine Infrastructure and Other Users**.

Waste

Waste Currently Generated

20.5.2.7 The current land use for the Project Area (the North Sea and sea floor) does not generate any waste.

Waste Recovery Infrastructure Availability

20.5.2.8 Permitted operational waste recovery and management sites in 2022 in the northeast of Scotland region are presented in **Table 20-5**. The total annual capacity for the operational sites is also presented for context.[617]

Table 20-5: Permitted operational waste recovery and management sites in north-east Scotland, 2022

Local Authority	Waste recovery facility type(s)	Total number of operational sites	Annual capacity (tonnes)
Aberdeen City	Metal recycler, other treatment	19	941,295
Aberdeenshire	Metal recycler, other treatment	30	981,393
Angus	Metal recycler, other treatment	10	145,797
Dundee City	Metal recycler, other treatment	22	233,396
Perth and Kinross	Metal recycler, other treatment	12	362,498
Stirling	Metal recycler, other treatment	7	130,446
Total northeast Scotland		113	2,794,825

20.5.2.9 SEPA data[618] shows that within Scotland, the recycling rate for construction and demolition waste (excluding recycled hazardous waste and soil and stone) was 89.4 percent in 2021. Between 2011 and 2018, the recycling rate has been between 81.7 percent to 99.7 percent, above the target of 70 percent by 2020. Data for 2019 and 2020 are unavailable.

20.5.2.10 Given the availability of regional waste management infrastructure, and a recovery rate of over 80 percent of construction waste within Scotland, there is strong potential for waste generated by the Project to be diverted from landfill.

Remaining Landfill Capacity

20.5.2.11 At the end of 2022, the landfill sites within northeast Scotland were recorded as having nine million tonnes of remaining capacity for inert and non-hazardous waste, as presented in **Table 20-6**.

Table 20-6: Remaining landfill capacity in north-east Scotland, 2022

Local Authority	Landfill site type	Remaining capacity 2022 (tonnes)
Aberdeen City	None	0
Aberdeenshire	Inert	773,680
	Non-hazardous	5,086,376
Angus	Inert	3,200,758
Dundee City	None	0
Perth and Kinross	None	0

Local Authority	Landfill site type	Remaining capacity 2022 (tonnes)
Stirling	None	0
Total northeast Scotland	Inert	3,974,438
	Non-hazardous	5,086,376
	All	9,060,814

20.5.2.12 No hazardous waste landfill capacity remains within the northeast Scotland local authority areas. However, at the end of 2022, Scotland's remaining hazardous waste landfill capacity comprised 17,225 tonnes.

20.5.2.13 Simple statistical forecasting (using the Microsoft Excel forecasting function) has been used to demonstrate (in **Plate 20-1** and **Plate 20-2**), long term void capacity for inert, non-hazardous and hazardous waste. In accordance with the IEMA guide, the remaining landfill capacity for hazardous waste is considered at a national level, whereas inert and non-hazardous capacity is considered at a regional level. The dotted line represents a smoothed trend line.

20.5.2.14 The forecasting is taken to the year of planned construction completion of the Project (currently anticipated in 2031) in the absence of future landfill provision. Forecasting beyond the construction period is considered too inaccurate to provide a robust assessment given the uncertainty in future waste management techniques and landfill provision.

Plate 20-1: Remaining inert and non-hazardous landfill capacity in north-east Scotland

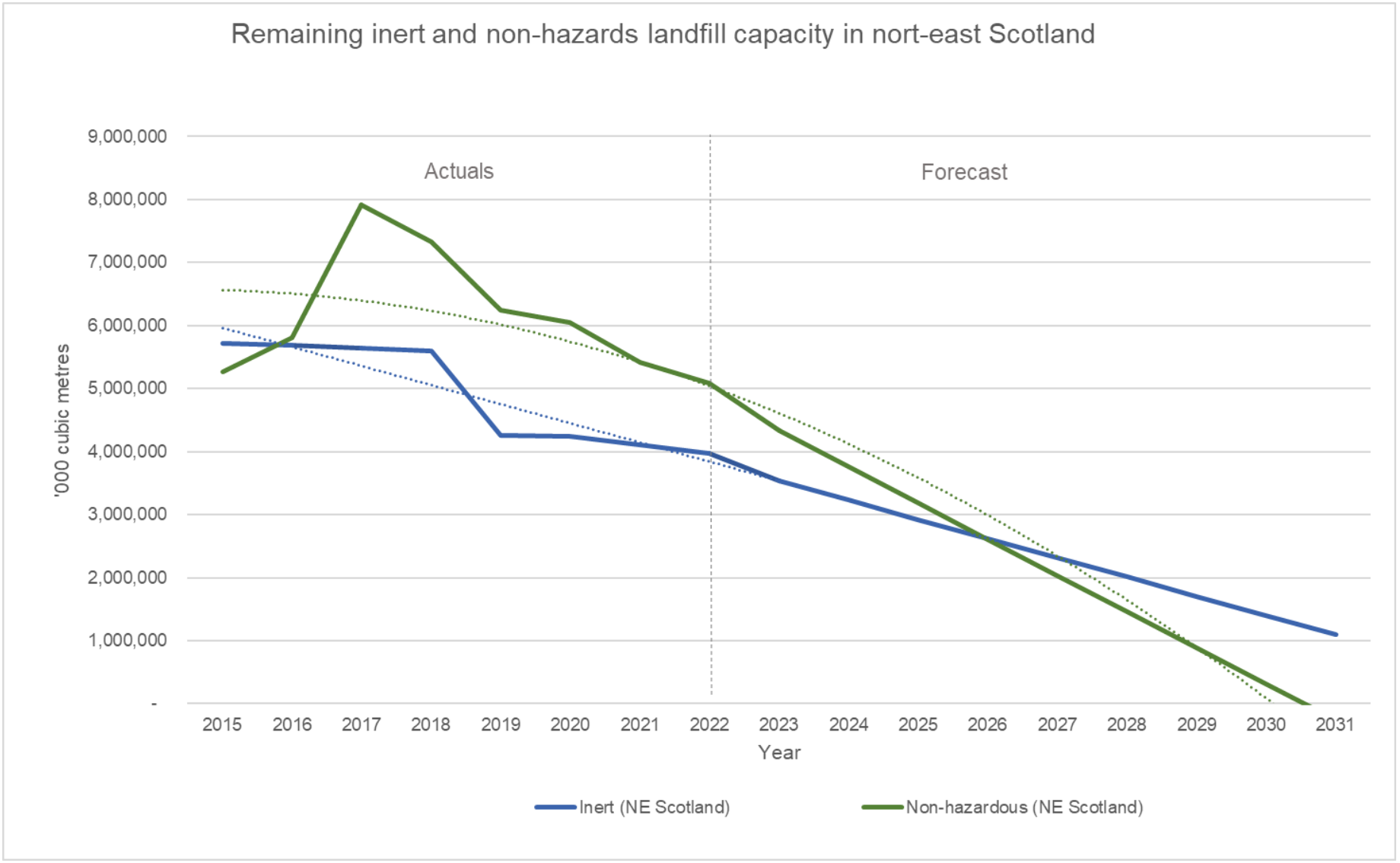
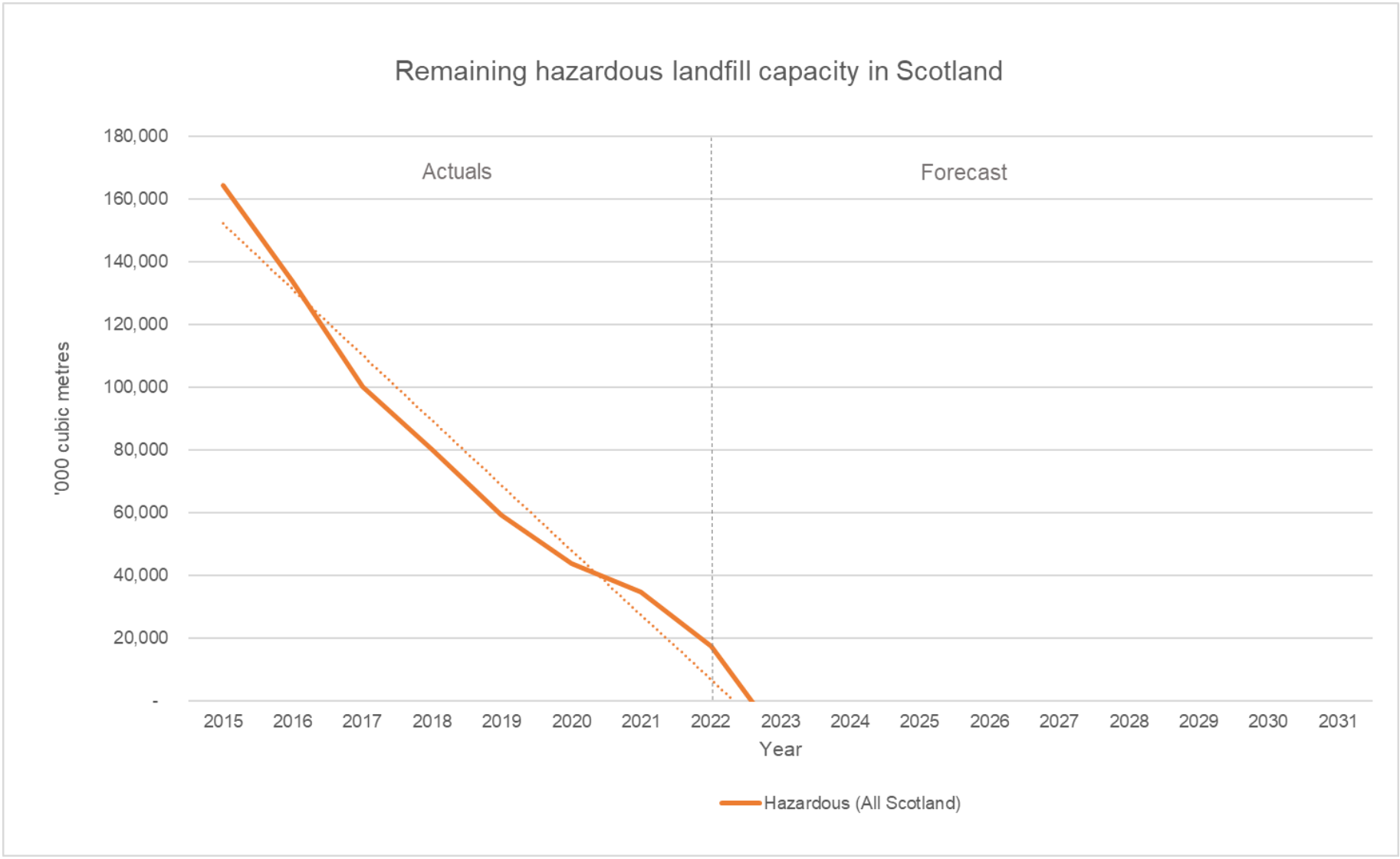


Plate 20-2: Remaining hazardous landfill capacity in Scotland



20.5.2.15 Baseline data indicates that in the absence of future provision, inert, non-hazardous and hazardous landfill capacity will become an increasingly sensitive receptor. The forecast data indicates that between 2022 and 2031, inert landfill capacity is expected to reduce by as much as 72 percent and non-hazardous capacity will elapse in 2030. Hazardous landfill capacity is anticipated to elapse in 2023, in the absence of future provision. The forecasting calculations are made using actual remaining capacity data from 2015 to 2022 and forecast forward (using the Microsoft Excel forecasting function). It is recognised that the forecast data is as estimation of future capacity and may not accurately reflect future remaining landfill capacity. In line with the Waste Hierarchy and best practice, waste disposal to landfill should be a last resort, with developers seeking to avoid waste generation, re-use and recycle waste prior to considering disposal to landfill. In the event of hazards waste landfill capacity elapsing in Scotland, hazardous waste capacity in England will be available for use by the Project if required. It should be noted that hazardous waste generated by the Project is expected to be negligible.

20.5.3 Future Baseline

20.5.3.1 In the future baseline (in the absence of the Project), the consumption of materials resources and waste generation to landfill is anticipated to remain minimal.

20.6 Basis of Assessment

20.6.1.1 The materials and waste scoping assessment is based on the following key assumptions, which are also set out in **Chapter 3: Project Description**.

- Maintenance activities will be undertaken for both preventive and corrective maintenance requirements;
- The operational lifetime of the project is assumed to be a minimum of 30 years; and
- The decommissioning of the windfarm is anticipated to involve as close to full removal of offshore infrastructure as possible at the time of decommissioning (where safe/practicable to do so). The decommissioning works are likely to be undertaken in reverse to the sequence of construction works and involve similar levels of equipment and impact.

20.7 Relevant Embedded Mitigation Measures

20.7.1.1 Embedded mitigation measures have been identified and are proposed to be adopted as part of the Project design (primary mitigation); or implemented in accordance with industry standard practice that would occur with or without the input from the environmental assessment feeding into the process (tertiary mitigation). There is a commitment by the Applicant to implement these embedded mitigation measures and they have been considered within the 2024 EIA Scoping Report.

20.7.1.2 The requirement for additional mitigation measures (secondary mitigation) will be dependent on the significance of effects on materials and waste receptors and will be consulted upon with consultees throughout the EIA process. Any additional mitigation measures will be presented within the EIAR.

20.7.1.3 Those measures that are relevant to materials and waste are listed in **Table 20-7**. General mitigation measures, which would apply to all parts of the Project, are set out first. Thereafter mitigation measures that would apply specifically to Material and Waste issues associated with the Project are described separately.

Table 20-7: Embedded mitigation relating to materials and waste

ID	Embedded mitigation measure
Construction	
MAT-001	A CEMP will be developed and adhered to for the Project. The CEMP will detail how environmental commitments will be attained during the construction phase of the Project. The CEMP will make reference to current guidance and standards applicable to construction phase, such as NatureScot Guidance – Good practice during Windfarm Construction, which makes reference to Circular Economy principles, minimising excavations and subsequent management of resources. The CEMP will make reference to the avoidance of waste and applying the highest tiers of the Waste Hierarchy.
O&M	
MAT-002	The components for the Project shall be developed through recourse to international supply chains for equipment and components. There will be no significant depletion of any UK raw material resources during O&M of the Project. Components specified for the Project will be fit for purpose, minimising replacement requirements. Furthermore, condition monitoring and risk based inspection will be undertaken during operation to monitor and manage efficient performance. The Applicant will implement a policy of repair over replacement to extend the life of assets. During operation, the Project will align with the guidance produced in the Offshore Wind Environmental Improvement Package Measure, and / or any subsequent guidance or standard which is published.
Decommissioning	
MAT-003	The design specification of assets will be considered to ensure sustainable end of life disposal options are available. It is currently anticipated that moorings will be disconnected and recycled. Where practicable it is anticipated that the steel infrastructure will be dismantled and recycled. The nacelle components will be separated and diverted to appropriate streams for recycling. The turbine blades are expected to be of a composite material, significant progress has been made towards recyclable composites and the Project shall endeavour to maximise recycling of the blades. A Comprehensive Decommissioning Plan will be developed towards the end of life of the Project. This plan will assess methods to ensure sustainable disposal of the Project infrastructure in line with available waste management technology and in accordance with legislation and policy in place at the time of decommissioning. It is anticipated that certain elements (buried cables, buried piles) will remain partially in-situ, these will be cut below the mudline and any exposed portion suitably buried. At decommissioning, the Project will align with the guidance produced in the Offshore Wind Environmental Improvement Package Measure, and / or any subsequent guidance or standard which is published.

20.8 Scoping of Potential Significant Effects

20.8.1.1 In line with the EIA Regulations, the EIA for the Project will only consider those impacts where there is the potential of significant effects. The following section draws on industry experience to identify those effect-receptor pathways that may potentially lead to a significant effect. Where experience and available evidence indicates an effect-receptor pathway is unlikely to lead to a significant effect with regards to the EIA Regulations 2017 the pathway is scoped out from assessment.

20.8.1.2 The potential significant effects on materials and waste are summarised in **Table 20-8.** The scoping assessment is based on a combination of the Project design at the time of writing, embedded mitigation measures, understanding of the baseline environment at the time of writing, the evidence base for Material and Waste effects, and professional judgement. The approach to this assessment is set out in **Chapter 5: Approach to Scoping and EIA**.

20.8.1.3 The early identification of potential significant effects is used here as a tool aimed at delivering a proportionate approach to the EIA. In doing so, it sets out a high-level assessment of all potential effects, significant or not. The basis for scoping out certain effects, and therefore no longer considered, is presented after the table, supported by suitable justification.

Table 20-8: Summary of Potential Significant Effects for materials and waste

Activity and Impact	Embedded Measures	Outcome of Scoping per Phase			Justification	Overview of Proposed Approach
		C	O&M	D		
Consumption of material resources and generation and disposal of waste during construction of the Project	MAT-001	X	N/A	N/A	The development of offshore windfarms requires predominantly pre-fabricated components, constructed outside of the Project Area, with the manufactures forming the supply chain to the Applicant. There will be no significant depletion of any UK raw material resources from construction of the Project. The Project is also located over an aggregate (sand and gravel) reserve, however this is sterilised by existing oil and gas infrastructure and is within the INTOG lease area. The construction of the Project may generate waste. However, given the largely pre-fabricated nature of windfarms and associated infrastructure, generation of waste is considered to be minimal. The CEMP will secure mitigation measures undertaken as part of the design and during construction to specify (where feasible) sustainable material resource consumption; measures to avoid waste generation and apply the highest levels of the Waste Hierarchy.	N/A
Consumption of material resources and generation and disposal of waste during O&M of the Project	MAT-002	N/A	X	N/A	The O&M of the Project will require replacement component parts, supplied by manufacturers. The generation and disposal of waste to landfill during the O&M phase is anticipated to be minimal, produced by routine maintenance and repair activities.	N/A

Activity and Impact	Embedded Measures	Outcome of Scoping per Phase			Justification	Overview of Proposed Approach
		C	O&M	D		
					Condition monitoring and risk based inspection to monitor and manage performance and a policy of repair of assets over replacement will ensure that that the quantity of waste generated will be minimal. Elements which require disposal from maintenance and repair activities are likely to contain recyclable elements, and there Will be diverted from landfill. Therefore, the impact on regional and national resources availability and landfill capacity will be negligible. During operation, the Project will align with the guidance produced in the Offshore Wind Environmental Improvement Package Measure, and / or any subsequent guidance or standard which is published.	
Consumption of material resources and generation and disposal of waste during decommissioning	MAT-003	N/A	N/A	X	During decommissioning, as no construction activities are required, the requirement for material resources will be negligible. At the end of life, the decommissioning of the Project will generate waste. A comprehensive Decommissioning Plan will be developed and will assess methods to ensure sustainable disposal of the Project infrastructure in line with available waste management technology and in accordance with legislation and policy in place at the time of decommissioning. WTGs currently have an 85 to 95 % recycling rate by mass, with the turbine blades being a more complex component to recycle due to its composite	N/A

Activity and Impact	Embedded Measures	Outcome of Scoping per Phase			Justification	Overview of Proposed Approach
		C	O&M	D		
					parts[619],[620]. However, developments within the sector are addressing the disposal of turbine blades and considering circular economy principles. As the Project is expected to be in operation for up to 30 years, it is expected that sustainable waste disposal practices will be available. At decommissioning, the Project will align with the guidance produced in the Offshore Wind Environmental Improvement Package Measure, and / or any subsequent guidance or standard which is published.	

20.9 Cumulative Effects

20.9.1.1 Due to the absence of potential significant effects for materials and waste, no cumulative effects are anticipated.

20.10 Potential Transboundary Effects

20.10.1.1 The components for the Project shall be developed through recourse to international supply chains for equipment and components. The manufacturers delivering the commodities and prefabricated component parts, will be subject to country specific controls to operate. A review of a selection of offshore wind turbine manufacturers[621,622,623] demonstrates a strong commitment to sustainable resourcing, lifecycle assessments and circular economy principles. The sector as a whole is a growth sector, and manufacturers will inherently be aware of the supply requirements necessary to deliver future developments. As such, it is considered that there will be no significant transboundary effects on materials and waste receptors. This is detailed further in **Appendix 5D: Transboundary Screening Matrix**.

20.11 Proposed Approach to the Environmental Impact Assessment

20.11.1.1 As discussed in Sections 20.8, 20.9 and 20.10 the effects of the Project on materials and waste receptors are proposed to be scoped out and therefore no approach to the EIA methodology is presented.

20.11.2 Assumptions and Limitations

20.11.2.1 To ensure transparency within all stages of the EIA process, the following limitations and assumptions have been identified:

- A lifecycle assessment (including embodied carbon and water) of materials has not been included, as the effort and resources required to complete such an exercise are deemed disproportionate to the benefit they would offer the assessment of significance of effects. Furthermore, many of the elements assessed within a lifecycle assessment are not directly relevant to the goals of this chapter. Embodied carbon (as part of a whole life carbon assessment) is assessed in **Chapter 23: Carbon and Greenhouse Gases**.
- The manufacturers providing the component parts for the Project will be large well established international suppliers who are able to supply large volumes of the necessary components and can demonstrate their commitment to sustainable practices.
- The assessment of impacts and effects on landfill void capacity will be dependent upon the validity of the collated information, regarding the waste generated and disposed of by the Project during ‘in scope’ phases of the development.
- The waste assessment baseline uses the most recent available data, which is up to and including 2022 (unless stated otherwise). The data, collated by the Scottish Environment Protection Agency (SEPA) includes licenced and permitted waste management sites and is based on information provided by the operators.

- Due to a cyber-attack on SEPA systems in 2020, there is limited site return data for quarters two, three and four of 2020. The data has been validated by SEPA, however it was not subject to all the initial quality assurance check typically carried out.

20.12 Summary

20.12.1.1 The components required to develop the project are composed of readily available international commodities such as steel and copper. There will be no significant depletion of any UK raw material resources from construction of the Project. In relation to the manufacturer's delivery of the commodities and pre-fabricated component parts, the manufacturers will be subject to country specific controls to operate and can demonstrate a strong commitment to sustainable resourcing, lifecycle assessments and circular economy principles. Given this, assessment of material resources required for the Project will not be taken further. During O&M, component parts will be supplied by manufacturers. Condition monitoring and risk-based inspection to monitor and manage performance of component parts and a policy of repair of assets over replacement conditioning monitoring and repair work will reduce the need for replacement parts. By the nature of decommissioning activities, material resources will not be required in quantities which result in potential significant effects. The Project will align with the guidance produced in the Offshore Wind Environmental Improvement Package Measure, and / or any subsequent guidance or standard which is published during operation and decommissioning. As such, the impacts of material resource consumption from the Project is not anticipated to result in adverse significant affects and has been scoped out of further assessment.

20.12.1.2 The potential impacts to marine aggregates are considered in **Chapter 17: Marine Infrastructure and Other Users**.

20.12.1.3 Baseline data to demonstrate the capacity of waste infrastructure to divert waste from landfill and demonstrate the anticipated reduction in landfill capacity has been described. A qualitative assessment of waste generation from the Project suggests that the pre-fabrication nature of the construction will minimise waste generation. Furthermore, any waste generated, disposal methods will follow the highest feasible tiers of the waste hierarchy. During O&M, waste will be generated during routine maintenance and repair, however the Applicant will seek to repair assets in preference to replacement, where feasible, thereby reducing waste disposal, as well as maximising recycling of removed assets and components. During decommissioning, it is anticipated that assets that are removed will be recycled. The Project will align with the guidance produced in the Offshore Wind Environmental Improvement Package Measure, and / or any subsequent guidance or standard which is published, A comprehensive Decommissioning Plan will be developed (post consent) to ensure sustainable disposal. As such the impacts of waste generation and disposal to landfill is not anticipated to result in adverse significant affects and has been scoped out of further assessment.

20.12.1.4 To conclude, it is proposed to scope out the assessment of materials and waste on the basis that embedded mitigation measures will result in no significant effects.

20.13 Further Consideration for Consultees

20.13.1.1 Please find below specific scoping questions relevant to the topic of materials and waste:

- Do you agree that the materials and waste assessment should be scoped out of the EIAR?

21. MAJOR ACCIDENTS AND DISASTERS

21.1 Introduction

21.1.1.1 This chapter of the Scoping Report considers the vulnerability of the of the Project to major accidents and/or disasters (MA&D), caused by natural hazards or manmade hazards (including operational failure), and any potential significant effects as well as impacts to receptors arising from MA&D affecting the Project. For the purpose of the EIA, the vulnerability of the Project to a MA&D event during decommissioning is anticipated to be no worse than that for the construction phase following the implementation of risk management plans for decommissioning. Construction and decommissioning are therefore considered together.

21.1.1.2 The chapter provides an overview of the baseline conditions relevant to the Project Area (as defined in **Chapter 1: Introduction**), the datasets to be used to inform the EIA, sources, pathways and receptors of the potential significant effects to be considered, and how these potential significant effects will be assessed for the purpose of the EIA.

21.1.1.3 Based on professional judgement, MA&D are events or situations that have the potential to affect the Project and to go on to cause immediate or delayed serious damage to one or more of the following: human health; welfare; cultural heritage; and the environment.

21.1.1.4 The list of MA&D categories and types to which the Project may be vulnerable during construction and operation phases are listed in **Table 21-1.**

Table 21-1: MA&D categories and types

Category	Type
Natural	Geophysical
	Hydrological
	Climatological and Meteorological
	Biological
Technological or Manmade Hazards	Societal
	Industrial and Urban Accidents
	Transport Accidents
	Pollution Accidents
	Utility Failures
	Malicious Attacks
	Engineering Accidents and Failures

21.1.1.5 This chapter should be read alongside the following chapters:

- **Chapter 7: Marine and Coastal Processes**: to provide a broader environmental context of the risks associated with these MA&D events/situations, to identify potential receptors and appropriate mitigation measures.
- **Chapter 8: Marine Water and Sediment Quality**: to provide a broader environmental context of the risks associated with these MA&D events/situations, to identify potential receptors and appropriate mitigation measures.
- **Chapter 9: Benthic Ecology**: to provide a broader environmental context of the risks associated with these MA&D events/situations, to identify potential receptors and appropriate mitigation measures.
- **Chapter 14: Shipping and Navigation**: to provide a broader environmental context of the risks associated with these MA&D events/situations, to identify potential receptors and appropriate mitigation measures.
- **Chapter 17: Marine Infrastructure and Other Users**: to provide a broader environmental context of the risks associated with these MA&D events/situations, to identify potential receptors and appropriate mitigation measures.
- **Chapter 18: Military and Civil Aviation**: to provide a broader environmental context of the risks associated with these MA&D events/situations, to identify potential receptors and appropriate mitigation measures.
- **Chapter 22: Climate Change Resilience**: to provide a broader environmental context of the risks associated with these MA&D events/situations, to identify potential receptors and appropriate mitigation measures.

21.1.1.6 These chapters also include examples of the measures that may be used to prevent or mitigate potential significant effects and details of the preparedness for, and proposed response to, emergencies. Measures will be identified further in the EIAR.

21.1.1.7 The definitions of key terms used in this chapter (see **Glossary**) have been developed by reference to the definitions used in EU and UK legislation and guidance relevant to MA&D as well as professional judgement in the context of the Project.

21.2 Legislation, Policy, and Guidance

21.2.1 Legislation and Policy

21.2.1.1 Legislation and policy that has been used to inform the scope of the MA&D chapter is set out in **Table 21-2.** Further information on policies relevant to the EIA are set out in **Chapter 2: Legislative and Policy Context**

Table 21-2: Policy, Legislation and Guidance Applicable to MA&D

Legislation	Description
The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017[624]	The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (the 'Electricity Works EIA Regulations 2017') cover the process of EIA in the context of electricity generation projects. They apply the amended EU Directive 2014/52/EU. Schedule 4 Paragraph 5(d) of the Electricity Works EIA Regulations 2017 requires: A description of the likely significant effects of the development on the environment resulting from the risks to human health, cultural heritage or the environment (for example due to accidents or disasters). Schedule 4, Paragraph 8 of the Electricity Works EIA Regulations 2017 requires: A description of the expected significant adverse effects of the Project on the environment deriving from the vulnerability of the Project to risks of MA&D that are relevant to the project concerned. If appropriate, a description of the measures envisaged to prevent or mitigate the significant adverse effects of major accidents and / or disasters on the environment and details of the preparedness for and proposed response to such emergencies.
The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017[625]	The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (the 'Marine Works EIA Regulations 2017') cover the process of EIA in the context of electricity generation projects. They apply the amended EU Directive 2014/52/EU. Schedule 4 Paragraph 5(d) of the Marine Works EIA Regulations 2017 requires: A description of the likely significant effects of the development on the environment resulting from the risks to human health, cultural heritage or the environment (for example due to accidents or disasters). Schedule 4, Paragraph 9 of the Marine Works EIA Regulations 2017 requires: A description of the expected significant adverse effects of the Project on the environment deriving from the vulnerability of the Project to risks of MA&D that are relevant to the project concerned. If appropriate, a description of the measures envisaged to prevent or mitigate the significant adverse effects of major accidents and / or disasters on the environment and details of the preparedness for and proposed response to such emergencies.

21.2.2 Technical Guidance

21.2.2.1 Technical guidance that has been used to define the assessment is set out in **Table 21-3**.

Table 21-3: Relevant technical guidance

Guidance Reference	Relevance to the assessment
Institute of Environmental Management and Assessment (IEMA): Major Accidents and Disasters in EIA: A Primer 2020[626]	The purpose of the primer is to increase awareness of the MA&D topic and its application within all stages of EIA. The primer outlines an assessment methodology based on known current practice within the UK and provides definitions of key terminology. The Primer is structured around a typical assessment approach and provides a proportionate method for considering major accidents and disasters through the stages of EIA.
'Green Leaves III' Guidelines for Environmental Risk Assessment and Management 2011[627]	Providing generic guidance for the assessment and management of environmental risks. A cyclical framework for risk management is presented that identifies four main components of risk assessment: • Formulating the problem; • Carrying out an assessment of the risk; • Identifying and appraising the management options available; and • Addressing the risk with a risk management strategy. A source-pathway-receptor model is suggested as a tool to assist in risk screening and an example is provided of applying the following filters to prioritise significant hazards for further investigation: • The plausibility of linkages between the source of a hazard and a receptor; • The relative potency of a hazard, availability of a pathway, or vulnerability of a receptor; • The likelihood of an event, based on historic occurrence or of changed circumstances; or • A view on the performance of current risk management measures that, if they were to fail, may increase the potential for future harm.
ISO 31000:2018 Risk Management –Guidelines 2018[628]	This guidance identifies a number of principles that need to be satisfied to make risk management effective. If the standards are adopted and applied the management of any risk should help minimise losses, improve resilience, improve controls and improve the identification of opportunities and threats. The ISO standard states that when defining risk criteria, the following factors should be considered: • The nature and types of causes and consequences that can occur and how they will be measured; • How likelihood will be defined; • The timeframe(s) of the likelihood or consequence(s); • How the level of risk is to be determined;

Guidance Reference	Relevance to the assessment
	• The views of stakeholders; • The level at which risk becomes acceptable or tolerable; and • Whether combinations of multiple risks should be considered and, if so how, and which combinations should be considered.
The G + Global Offshore Wind Health and Safety Organisation: Good Practice Guidelines Database[629]	G+ has published ten good practice guidance documents to date. The guidance is intended to be used by all to improve global health and safety standards within offshore windfarms.
International Maritime Organization (IMO) (2018): Revised Guidelines for Formal Safety Assessment (FSA) for use in the IMO Rule-Making Process[630]	The FSA is a structured and systematic methodology, aimed at enhancing maritime safety, including protection of life, health, the marine environment, and property. FSA can be used as a tool to help in the evaluation of new regulations for maritime safety and protection of the marine environment. The FSA approach to risk assessment is applicable to the Project and has been used alongside the other guidance listed above to develop the approach to the assessment of MA&D presented within this chapter.

21.3 Study Area

21.3.1.1 Based on professional judgement, the following factors, and associated distances from the Project, were adopted for setting the Study Area to capture internal and external influencing factors that may have high adverse consequences on the Project:

- Manmade features:
  - Airports and airfields within 13 km (the general safeguarding zone);
  - Control of Major Accident Hazard facilities within 5 km;
  - Nuclear installations within 3 km (distance to The Land Use Planning Outer Consultation Zone);
  - Oil and gas installations within 500 m; and
  - Subsea installations within 500 m.
- Natural features with the potential to create risks within:
  - 3 km (chiefly hydrological and geological, for example seismic activity); and
  - 1 km (chiefly hydrological and geological, for example unstable ground conditions).

21.4 Consultation

21.4.1.1 Consultation is a key part of the application process. Specific consultation has not been undertaken to inform this 2024 Scoping Report for MA&D.

21.4.1.2 A summary of the key issues raised during consultation to date, specific to MA&D, is outlined in **Table 21-4** below, together with how these issues will be considered in the production of the EIAR.

Table 21-4: Summary of consultation relating to MA&D

Date and stakeholder	Consultation and key comments	How this is accounted for
MD-LOT, 2023 Scoping Opinion, June 2023	*The Scottish Ministers do not consider that the Developer has provided sufficient information to justify scoping out the risk of major accidents and disasters. Consequently, it must be scoped in for further assessment in the EIAR in respect of the construction, operation and decommissioning phases of the Project.*	**Table 21-1** of this MA&D Scoping Chapter has considered the vulnerability of the Project to a variety of MA&D categories and types. Justification is provided for scoping in or out the different MA&D types in **Appendix 21.1**.
MD-LOT, 2023 Scoping Opinion, June 2023	*In doing so, the Developer should make use of appropriate guidance, including the IEMA 'Major Accidents and Disasters in EIA: A Primer', to better understand the likelihood of an occurrence and the Projects vulnerability to or ability to cause a potential accident or disaster.*	As outlined in Section 21.1 the approach to the assessment of MA&D is aligned with the IEMA Primer and also makes use of other relevant guidance.
MD-LOT, 2023 Scoping Opinion, June 2023	*The Scottish Ministers advise that existing sources of risk assessment or other relevant studies should be used to establish the baseline rather than collecting survey data and note the IEMA Primer provides further advice on this. This should include the review of the identified hazards from your baseline assessment, the level of risk attributed to the identified hazards and the relevant receptors to be considered.*	Section 21.1 of this MA&D Scoping Chapter sets out the approach to scoping and the use of existing risk assessments as appropriate. As outlined in Section 21.1 of this 2024 Scoping Report, the approach to the assessment of MA&D is aligned with the IEMA Primer.
MD-LOT, 2023 Scoping Opinion, June 2023	*The assessment must detail how significance has been defined and detail the inclusions and exclusions*	A definition of significance in the context of MA&D is provided in Section 21.8.3 below.

Date and stakeholder	Consultation and key comments	How this is accounted for
	within the assessment. Any mitigation measures that will be employed to prevent, reduce or control significant effects should be included in the EIAR.	Section 21.8.2 of this MA&D Scoping Chapter sets out the approach to scoping and identifies those receptors which have been excluded and the justification for this. Section 21.8 provides justification for scoping in or out the different MA&D types. Details of embedded mitigation measures are provided in Section 21.6 below. Where necessary, further mitigation measures will be presented in the EIAR.
MD-LOT, 2023 Scoping Opinion, June 2023	In Table 17-1 of the [2023] Scoping Report the Developer considers the WTGs be a potential risk to low flying aircraft however do not propose to consider this further in the EIAR. The Scottish Ministers advise that the potential impact of the Project on low flying aircraft must be considered in the EIAR and direct the Developer to the representation by Marine Directorate in this regard. The Scottish Ministers have provided comment within this receptor chapter to reflect the Scoping Report however the Developer may wish to address this within an aviation chapter of the EIAR.	In the MA&D Chapter of the 2024 Scoping Report, potential risks associated with aviation have been scoped in for further assessment in the EIAR.
Scoping Workshop, 29 February 2024	The Applicant confirmed there is no change to 2023 Scoping Report position under basis that relevant mitigations considered under other topics and therefore MA&D remains scoped out.	This chapter of the 2024 Scoping Report has used IEMA guidance and other relevant guidance to better understand the likelihood of occurrences and vulnerabilities of the Project. MA&D is scoped out of further assessment.

21.5 Baseline Conditions

21.5.1 Data Information Sources

21.5.1.1 The baseline conditions described for MA&D are derived from the desk study sources in **Table 22-5**.

Table 21-5: Key sources of data

Source	Date Accessed	Summary	Coverage of study area
National Risk Register 2023 Edition[631];	1 February 2024	This document is the unclassified version of the National Risk Register and it identifies the main types of civil emergencies that could affect the UK in the next five years.	Full coverage
North of Scotland Resilience Partnership Community Risk Register 2022[632];	1 February 2024	This document highlights risks that have the highest likelihood and potential to have significant impact, causing disruption to the North of Scotland region and its communities.	Full coverage
British Geological Survey (BGS) GeoIndex Onshore[633];	1 February 2024	Map based data set covering, for example, earthquake risk, geology, hazard maps and mining.	Full coverage
BGS GeoIndex Offshore[634];	1 February 2024	Map based data set covering marine geoscience data.	Full coverage
Tsunamis Hazard Map[635];	1 February 2024	Map based data set identifying tsunami hazard.	Full coverage
The International Disaster Database[636];	1 February 2024	A global database with information on over 26,000 mass disasters from 1900 to the present day.	Full coverage
Health and Safety Executive's (HSE) Planning Advice Web App[637];	1 February 2024	Map based visual indication of consultation zones associated with major accident hazard sites and/or pipelines.	Full coverage
HSE's Control of Major Accident Hazards (COMAH) 2015	1 February 2024	Database of major accident hazard sites.	Full coverage

Source	Date Accessed	Summary	Coverage of study area
Public Information Search[638];			
Ordnance Survey mapping;	1 February 2024	Mapping of the local area.	Full coverage
Google aerial and street view maps[639];	1 February 2024	Mapping of the local area.	Full coverage

21.5.2 Existing Baseline

21.5.2.1 This section describes the present conditions which constitute the existing baseline environment for MA&D within the offshore Study Area.

21.5.2.2 The baseline relevant to MA&D comprises:

- Features external to the Project that contribute a potential source of hazard to the Project;
- Sensitive environmental receptors at risk of potential significant effects; and
- Current (without the Project) MA&D risks for the existing locality.

21.5.3 Future Baseline

21.5.3.1 In the future baseline and in the absence of the Project, it is considered that the current environment within the Study Area would remain the same and as such there is no risk of a MA&D occurring. The other chapters of the 2024 Scoping Report, such as climate change, consider changes to the future baseline which, if there was a future development in this location, may increase the vulnerability to a MA&D.

21.6 Basis of Assessment

21.6.1.1 The MA&D scoping assessment is based on the following key assumptions, which are also set out in **Chapter 3: Project Description**:

- The array will consist of up to 95 WTGs;
- There will be up to two offshore substations;
- Maintenance activities will be undertaken for both preventive and corrective maintenance requirements;
- The operational lifetime of the project is assumed to be a minimum of 30 years; and
- The decommissioning of the windfarm is anticipated to involve as close to full removal of offshore infrastructure as possible at the time of decommissioning (where safe/practicable to do so). The decommissioning works are likely to be

undertaken in reverse to the sequence of construction works and involve similar levels of equipment and impact.

21.7 Relevant Embedded Mitigation Measures

21.7.1.1 Embedded mitigation measures have been identified and are proposed to be adopted as part of the Project design (primary mitigation); or implemented in accordance with industry standard practice that would occur with or without the input from the environmental assessment feeding into the process (tertiary mitigation). There is a commitment by the Applicant to implement these embedded mitigation measures and they have been considered within the 2024 EIA Scoping Report.

21.7.1.2 The requirement for additional mitigation measures (secondary mitigation) will be dependent on the significance of effects on MA&D receptors and will be consulted upon with consultees throughout the EIA process. Any additional mitigation measures will be presented within the EIAR.

21.7.1.3 Those measures that are relevant to MA&D are listed in **Table 21-6**.

Table 21-6: Embedded mitigation relating to MA&D

ID	Embedded mitigation measures
MA&D-001	Implementation of Environmental, Health & Safety Management systems
MA&D-002	Supplier management environmental, health and safety standards (for example, Construction Skills Certification Scheme)
MA&D-003	Risk management systems
MA&D-004	A CEMP will be developed and adhered to for the Project. The CEMP will detail how environmental commitments will be attained during the construction phase of the Project.

21.7.1.4 This assessment assumes that embedded mitigation measures identified in each of the technical topic chapters (**Chapter 7: Marine and Coastal Processes** to **Chapter 23: Carbon and Greenhouse Gases**) will be implemented for the Project, in order to assess the magnitude of impact.

21.7.1.5 Any secondary mitigation may be identified as the environmental assessment progresses and would be reported as required in the EIAR.

21.8 Description of Potential Vulnerability to Major Accident and Disaster Risks

21.8.1.1 There is no published guidance for the application of the legal requirements to the assessment of MA&D. However, selected relevant guidance for risk assessment methodologies is summarised in **Table 21-3**.

21.8.1.2 In addition to the information sources used to collate baseline information (detailed in Section 21.5), the following have been consulted to support the identification of potential MA&D:

- The Cabinet Office National Risk Register 2023 Edition. This document is the unclassified version of the National Risk Register, and it identifies the main types of civil emergencies that could affect the UK in the next five years. It is recognised, however, that this document does not provide an all-encompassing list of all potential accidents and disasters and its timescales are short term.
- North of Scotland Resilience Partnership Community Risk Register 2022. This document highlights risks that have the highest likelihood and potential to have significant impact, causing disruption to the North of Scotland region and its communities.
- The International Federation of Red Cross & Red Crescent Societies Early Warning, Early Action[640]. This guidance looks to other countries including those in warmer climates, thereby identifying risks that the UK may encounter in the future in light of climate change and global warming.
- The International Disaster Database contains data covering over 22,000 mass disasters in the world since 1900 to the present day and aims to *"rationalise decision making for disaster preparedness, as well as provide an objective base for vulnerability assessment and priority setting"*.

21.8.2 Scoping Process for Major Accidents and Disasters

Likelihood and Consequence Events

21.8.2.1 Low likelihood and low consequence events are scoped out as these are unlikely to result in significant adverse effects; because they do not fall into the definition of a MA&D (see **Table 21-1**).

21.8.2.2 High likelihood and low consequence events are also scoped out, as they will not lead to significant adverse effects.

21.8.2.3 High likelihood and high consequence events are also scoped out, as it is assumed that existing legislation and regulatory controls would not permit the Project to be progressed under these circumstances.

21.8.2.4 The remaining events, low likelihood, and high consequence events, are the subject of the MA&D assessment. Using professional judgement, the assessment identifies relevant events and determines whether a significant environmental effect is possible.

21.8.3 Significance of Effect Criteria

21.8.3.1 By definition, a major accident and/or disaster would have a major significant effect on the environment (including human health, welfare and/or the environment). Accordingly, any risks that could result in a MA&D event without suitable mitigation, management or regulatory controls in place will be assessed as significant in the context of EIA.

Occupational Health and Safety

21.8.3.2 In accordance with emerging EIA practice, occupational health and safety (H&S) is scoped out of this topic as it is covered by detailed H&S legislation: The Management

of Health and Safety at Work Regulations 1999[641], The Workplace (Health, Safety and Welfare) Regulations 1992[642] and The Electricity at Work Regulations[643].

21.9 Scoping of Potential Significant Effects

21.9.1.1 A long list of possible onshore and offshore MA&D groups, categories and types has been prepared in **Appendix 21.1: Major Accidents and Disasters Long List**. This list has been pre-screened to exclude those MA&D types which are not considered to be relevant to the Project due to its location in a developed country in an offshore environment.

21.9.1.2 The remaining MA&D groups, categories and types have been reviewed to rule out any potential MA&D that are considered highly unlikely to occur based on baseline information and information from the technical topics relevant to MA&D. A number of onshore MA&D types, which could potentially impact the offshore environment, have been considered as these may impact the construction phase of the Project.

21.9.1.3 A three-component process has been followed to identify whether the MA&D types require further detailed assessment in the EIAR. This process involves identifying whether there is a source, pathway, and receptor for each MA&D type. If either of these components is missing, then the MA&D type has been scoped out.

21.9.1.4 As detailed and justified within **Appendix 21.1: Major Accidents and Disasters Long List,** all the MA&D types have been scoped out of further assessment in the EIAR.

21.10 Cumulative Effects

21.10.1.1 The MA&D assessment has, by its very nature, implicitly considered interactions with external factors such as other existing projects which may impact on the Study Area. The assessment approach for MA&D, which considers the vulnerability of the Project to MA&D events, does not assess potential cumulative effects on sensitive receptors as a MA&D event, is a rare, isolated event, which does not have on-going impacts.

21.10.1.2 Cumulative effects associated with potential future developments in the vicinity of the Project, such as the Onward Development Area, have been considered. However, this cannot discount the fact that other potential MA&D risks may emerge once the projects within the Onward Development Area have been defined. These risks will be assessed as part of the application process for the required marine licence applications associated with these cables.

21.11 Potential Transboundary Effects

21.11.1.1 By definition, a MA&D event could result in a significant environmental effect and may result in transboundary effects. The EIAR will consider potential transboundary effects for those MA&D types which have been scoped in for further assessment.

21.11.1.2 The potential effects from construction, operation (including maintenance) and decommissioning on MA&D receptors are considered in **Appendix 5D: Transboundary Screening Matrix**.

21.12 Proposed Approach to the Environmental Impact Assessment

21.12.1.1 As discussed in Sections 21.8, 21.10 and 21.11, the effects of the Project on MA&D are proposed to be scoped out and therefore no approach to the EIA methodology is presented.

21.12.2 Assumptions and Limitations

21.12.2.1 To ensure transparency within the EIA process, the following limitations and assumptions have been identified:

- The assessment of MA&D will take into consideration the relevant embedded mitigation in the design and additional mitigation measures that are developed throughout the EIA process;
- The design of the Project will be subject to relevant Hazard Identification (HAZID) studies and actions identified will be integrated into the final design, to reduce risks to ALARP;
- The construction phase of the Project will be managed through the implementation of the construction phase plan required under the Construction, Design and Management (CDM) Regulations 2015;
- The Project is being designed and its implementation guided by other industry standards and codes, many of which are mandatory. These require infrastructure and systems to be designed so that risks to people and the environment are either eliminated or reduced to levels that are ALARP;
- Environmental effects associated with unplanned events that do not meet the definition of a MA&D (for example, minor leaks and spills that may be contained within the construction sites) are addressed in other topic chapters as appropriate and not in this chapter; and
- It is recognised that the management framework for the Project is not fully defined at this stage; however, a presumption of standard practice and regulatory compliance within the adopted management framework has been assumed and will be developed following the appointment of the principal contractor.

21.13 Summary

21.13.1.1 All of the MA&D types have been scoped out of further assessment in the EIAR justification for this has been provided in **Appendix 21.1**.

21.14 Further Consideration for Consultees

21.14.1.1 Please find below specific scoping questions relevant to the topic of MA&D:

- Do you agree that the impacts described in **Appendix 21A: Major Accidents and Disasters** can be scoped out?

22. CLIMATE CHANGE RESILIENCE

22.1 Introduction

22.1.1.1 This chapter of the Scoping Report considers the potential significant effects of climate change on the Project. The chapter provides an overview of the baseline conditions relevant to the Project Area (as defined in **Chapter 1: Introduction**), the datasets to be used to inform the EIA, sources, pathways and receptors of the potential significant effects to be considered, and how these potential significant effects will be assessed for the purpose of the EIA.

22.2 Legislation, Policy, and Guidance

22.2.1 Legislation and Policy

22.2.1.1 Legislation and policy that has been used to inform the scope of the Climate Change Resilience chapter is set out in **Table 22-1**. Further information on policies relevant to the EIA are set out in **Chapter 2: Legislative and Policy Context**.

Table 22-1: Legislation and policy context

Legislation/Policy	Relevance to the assessment
Legislation	
The Climate Change (Scotland) Act 2009[644] (and amendments)	Scotland has its own distinct climate change legislation, the Climate Change (Scotland) Act 2009, which was amended by the Climate Change (Emissions Reduction Targets) (Scotland) Act 2019[645]. Scotland has committed to achieving net zero by 2045, with a series of interim and annual targets that are more ambitious than the UK's targets. The Climate Change (Scotland) Act 2009 sets targets for reducing Scotland's impacts on climate change and the need to prepare for managing such impacts.
Policy	
Overarching National Policy Statement for Energy (EN-1) 2023[646]	The Government has published an update to the Overarching National Policy Statement for Energy. Section 4.10 highlights that applicants and the Secretary of State should take the impacts of climate change into account when developing and consenting to new energy infrastructure. Paragraph 4.10.1 states that: *"Whilst we must continue to accelerate efforts to end our contribution to climate change by reaching Net Zero greenhouse gas emissions, adaptation is also necessary to manage the impacts of current and future climate change. If new energy infrastructure is not sufficiently resilient against the possible impacts of climate change, it will not be able to satisfy the energy needs as outlined in Part 3 of this NPS."* Paragraph 4.10.2 states that: *"Climate change is already altering the UK's weather patterns and this will continue to accelerate depending on global carbon emissions. This means*

Legislation/Policy	Relevance to the assessment
	it is likely there will be more extreme weather events. As well as climatic and seasonal changes such as hotter, drier summers and warmer, wetter winters, there is also a likelihood of increased flooding, drought, heatwaves, and intense rainfall events, as well as rising sea levels, increased storms and coastal change. Adaptation is therefore necessary to deal with the potential impacts of these changes that are already happening." Paragraph 4.10.8 states that: *"New energy infrastructure will typically need to remain operational over many decades, in the face of a changing climate. Consequently, applicants must consider the direct (e.g. site flooding, limited water availability, storms, heatwave and wildfire threats to infrastructure and operations) and indirect (e.g. access roads or other critical dependencies impacted by flooding, storms, heatwaves or wildfires) impacts of climate change when planning the location, design, build, operation and, where appropriate, decommissioning of new energy infrastructure."* Paragraph 4.10.10 states that: *"Applicants should assess the impacts on and from their proposed energy project across a range of climate change scenarios, in line with appropriate expert advice and guidance available at the time."* Paragraph 4.10.11 states that: *"Applicants should demonstrate that proposals have a high level of climate resilience built-in from the outset and should also demonstrate how proposals can be adapted over their predicted lifetimes to remain resilient to a credible maximum climate change scenario. These results should be considered alongside relevant research which is based on the climate change projections."* Paragraph 4.10.13 states that: *"The Secretary of State should be satisfied that applicants for new energy infrastructure have taken into account the potential impacts of climate change using the latest UK Climate Projections151 and associated research and expert guidance (such as the EA's Climate Change Allowances for Flood Risk Assessments or the Welsh Government's Climate change allowances and flood consequence assessments) available at the time the ES was prepared to ensure they have identified appropriate mitigation or adaptation measures. This should cover the estimated lifetime of the new infrastructure, including any decommissioning period."*
National Policy Statement for Renewable Energy Infrastructure (EN-3) 2023 [647]	The Government has published an update to the National Policy Statement for Renewable Energy Infrastructure. Section 2.4 highlights that applicants and the Secretary of State should take the impacts of climate change into account when developing and consenting to new energy infrastructure, as per the Overarching National Policy Statement for Energy. Paragraph 2.4.8 states that: "*Whilst offshore wind farms will not be affected by flooding, applicants should demonstrate that any necessary land-side infrastructure (such as cabling and onshore substations) will be appropriately resilient to climate-change*

Legislation/Policy	Relevance to the assessment
	induced weather phenomena. Similarly, applicants should particularly set out how the proposal would be resilient to storms."
NPF4[648]	Scotland's NPF sets out a long-term spatial strategy with a comprehensive set of national planning policies to form part of the statutory development plan. Policy 2 addresses climate adaptation, stating that "*Development proposals will be sited and designed to adapt to current and future risks from climate change*." The intent of the policy is to "*encourage, promote and facilitate development that minimises emissions and adapts to the current and future impacts of climate change*."
Scotland's National Marine Plan[649]	Scotland's NMP[649] provides a comprehensive overarching framework for all marine activity in Scottish waters, to enable sustainable development and use of the marine area in a way which will protect and enhance the marine environment whilst promoting both existing and emerging industries. One of the five key objectives of the Framework is Climate Adaptation. Policy GEN5 states that: "*Marine planners and decision makers must act in the way best calculated to mitigate, and adapt to, climate change… Adaptation: Marine planners and decision makers should be satisfied that developers and users have sufficient regard to the impacts of a changing climate and, where appropriate, provide effective adaptation to its predicted effects. Offshore and coastal developments should be appropriately sited and designed, and use technologies and equipment appropriate for local conditions, now and in the future, giving particular consideration to vulnerability, scale and longevity of operation. The Scottish Climate Change Adaption Programme31 should be complied with. Where appropriate, marine planning authorities should be satisfied that adequate risk management and contingency plans are in place, particularly in relation to potential changes in sea temperatures, sea level rise, storminess and extreme water levels, using the best scientific evidence available at the time*."

22.2.2 Technical Guidance

22.2.2.1 Technical guidance that has been used to define the assessment is set out in **Table 22-2.**

Table 22-2: Relevant technical guidance

Guidance reference	Relevance to the assessment
Institute of Environmental Management and Assessment (IEMA) EIA Guide to: Climate Change Resilience and Adaptation 2020[650]	Hereafter referred to as 'the IEMA Guidance'. This guide provides a framework for the effective consideration of climate change resilience and adaptation in the EIA process. This guide has been used within the assessment approach. This includes the recommended approach of using a high emission

Guidance reference	Relevance to the assessment
	scenario of RCP8.5 at the 50th percentile for the 2080s providing a suitable conservative approach to the climate assessment; identifying climate change vulnerability and sensitivity of receptors at scoping stage; undertaking a significance assessment at EIAR stage; and developing additional adaptation/EIA mitigation measures in the EIAR.
ISO 14091:2021 Adaptation to climate change – Guidelines on vulnerability, impacts and risk assessment[651]	This international standard provides guidelines on approaches to assess climate change-related risks. It highlights the role of risk assessments in improving climate change adaptation planning and informing climate change adaptation activities from their implementation through to monitoring.

22.3 Study Area

22.3.1.1 The scope for the Climate Change Resilience (CCR) assessment relates to the impact of climate change on the Project (rather than the impact of the Project on climate change). As such, the study area for the Project is within the redline boundary of the Project area (see **Figure 1-1** of **Chapter 1: Introduction**). Temporally the study is bounded by the lifespan of the Project from construction through operations and maintenance to decommissioning. For full details see **Chapter 3: Project Description**.

22.3.1.2 In the context of a Climate Change Resilience Assessment (CCRA), all elements of the Project as part of this application are located within a relatively close proximity of each other. Therefore, the same baseline conditions and future baseline (projections) apply for all Project elements. The Project elements considered are located within the study area, however some of the baseline data is sourced from the nearest land area; the use of climate change data is further described in Section 22.5.

22.4 Consultation

22.4.1.1 Consultation is a key part of the application process. This assessment has been and will be informed by engagement and discussion with various internal and external stakeholders. A summary of the key issues raised during consultation to date, specific to CCR, is outlined in **Table 22-3** below.

22.4.1.2 On 29 February 2024, a Scoping Workshop was held with MD-LOT and its advisors. It was agreed at this workshop that no further consultation on CCR is required. Therefore, no specific consultation around CCR is anticipated with external stakeholders at this stage.

22.4.1.3 A workshop was undertaken with the Project design team to identify the embedded mitigation measures in the design with regards to CCR. No formal further consultation is planned.

Table 22-3: Summary of consultation relating to climate change resilience

Date and stakeholder	Consultation and key comments	How is this accounted for
MD-LOT, 2023 Scoping Opinion, June 2023	*The Scottish Ministers are broadly content with the elements proposed by the Developer to be scoped in for and out from further assessment in the EIAR, as detailed within Chapter 18 of the Scoping Report*[4].	Information presented in this chapter updates the information presented in Chapter 18 of the 2023 Scoping Report. All aspects of CCR remain scoped out.
Scoping Workshop, 29 February 2024	The Applicant confirmed that CCR will be scoped out. The Applicant has had a lot of early engagement with engineers and has embedded climate change resilience into the Project design. Therefore, there will not be significant effects on the Project from Climate Change.	All embedded mitigation measures will be outlined in this chapter of the 2024 Scoping Report.

22.5 Baseline Conditions

22.5.1 Data Information Sources

22.5.1.1 Information on climate change within the CCR Study Area was collected through a detailed desktop review of existing studies and datasets. These are summarised in **Table 22-4**.

Table 22-4: Key sources of data

Source	Date	Summary	Coverage of study area
Met Office	2020	Aberdeen Airport climate station historical data[652]	Approximately 40 km southwest of the ECC between MHWS and 12 NM.
Met Office	2022	State of the UK Climate Report summarising UK climate trends and data[653]	Applicable to the UK.
Met Office	2018	UKCP18 Marine Report[654].	Applicable to the UK.
Met Office	2018	UKCP18 Fact Sheet: Sea Level Rise and Storm Surges [655]	Applicable to the UK.

[4] As per Chapter 18 of the 2023 Scoping Report.

Source	Date	Summary	Coverage of study area
Met Office	2018	UKCP18 future climate projections data [656]	The Climate Risk Indicators were used to extract UKCP18 data for Aberdeen City Council, as the nearest data point to the Project.
UK Climate Risk Indicators	2021	Climate Risk Indicators future climate projections data[657]	
National Tidal and Sea Level Facility	2022	Sea level trends[658]	This data was used to infer the current baseline sea level data from Aberdeen, as the nearest data point to the Project.
HM Government	2017	Future of the Sea: Ocean Acidification[659]. Study presenting future projections in ocean acidification across the UK seas.	UK-wide with more detailed data for the North Sea.
Wind Energy Science	2022	Current and future wind energy resources in the North Sea – projections.[660]	North Sea
Journal of Marine Science and Engineering	2019	Wave Climate Change in the North Sea and the Baltic Sea: a study for regional wave climate projection under RCP8.5 Scenario[661]	North Sea

22.5.2 Existing Baseline

22.5.2.1 This section describes the present conditions which constitute the existing baseline environment for the climate within the offshore study area.

22.5.2.2 The current baseline describes the climate variables over the past three decades (1991 – 2020) for temperature, precipitation, wind, solar radiation, and marine characteristics such as acidification and wave heights. Sea level trend data for the nearest monitoring station (Aberdeen) is also provided.[658] This provides an understanding of how recent climate trends have impacted the study area. Where available, quantitative climate trend data is presented for both the UK context as well as the local climate, as represented by Aberdeen Airport climate station[652] (approximately 40 km southwest of the ECC, the nearest climate station to the Project, see **Figure 22-1**).

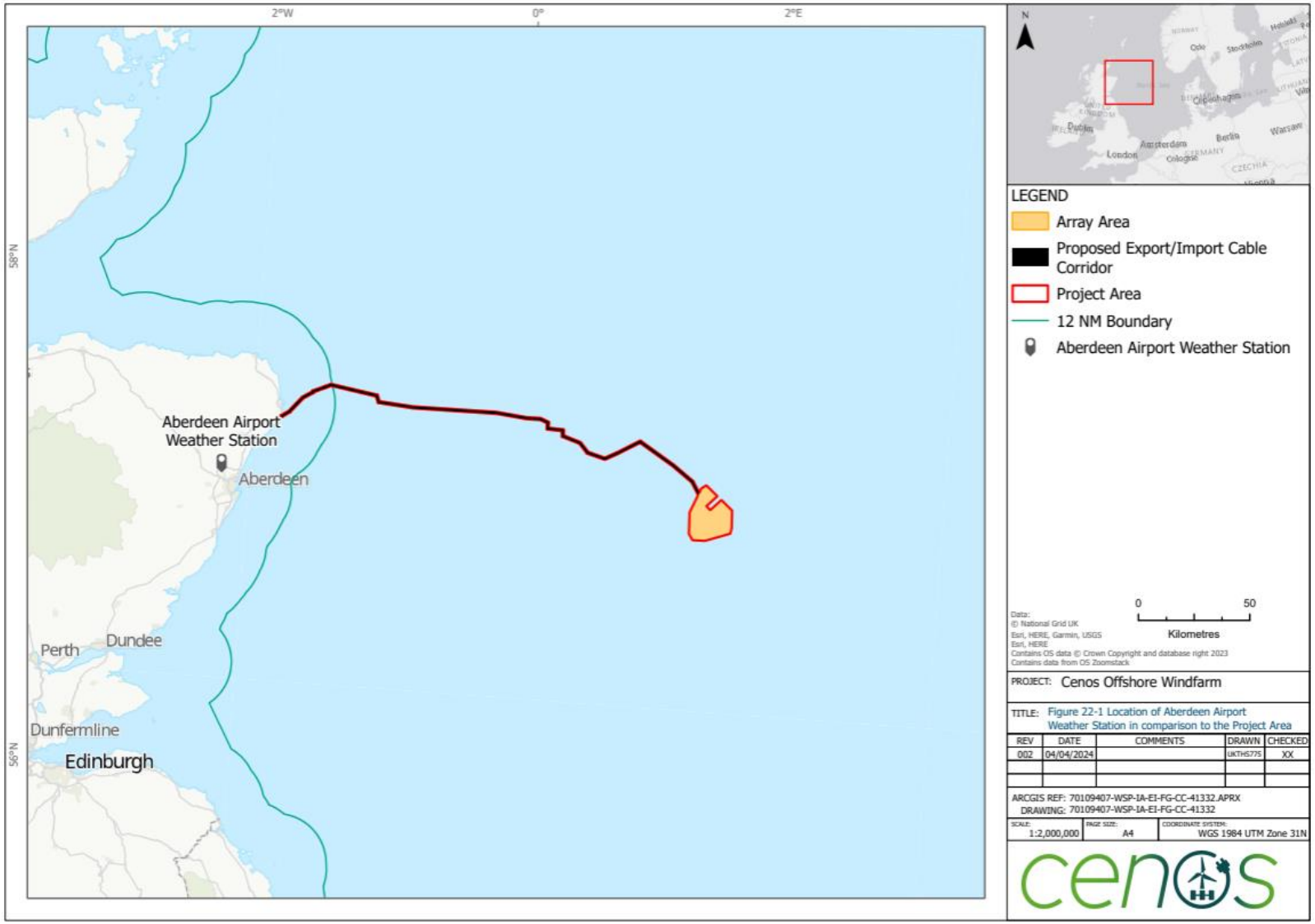
UK Context

22.5.2.3 According to the latest State of the UK Climate Report[653], the UK's climate is changing, with recent decades warmer, wetter and sunnier than the 20th century. The Report highlights that the UK has warmed at a broadly consistent (but slightly higher) rate than the observed change in global mean temperature. The key findings from the latest 2022 report are as follows.

- The observations show that in the UK extremes of temperature are changing much faster than the average temperature;

- 40 °C was recorded in the UK for the first time during a heatwave which exceeded previous records by a large margin. The UK's record warm year of 2022 and unprecedented July heatwave were both made more likely by climate change;
- 2022 was the warmest year in the UK series from 1884, 0.9 °C above the 1991 – 2020 average. It was the first year to record a UK annual mean temperature above 10 °C. All the top-10 warmest years for the UK in the series from 1884 have occurred in this century;
- For the most recent decade (2013 – 2022) UK winters have been 10 percent wetter than 1991 – 2020 and 25 percent wetter than 1961 – 1990;
- In recent years, widespread and substantial snow events have occurred in 2021, 2018, 2013, 2010 and 2009, but their number and severity have generally declined since the 1960s;
- The UK annual mean wind speed from 1969 to 2022 shows a downward trend, consistent with that observed globally;
- Over the past 30 years (1993 – 2022) the sea level has risen by 11.4 cm. The rate of sea-level rise is increasing; and
- The most widespread storm surges of 2022 came with storm Eunice on 18 February, with the northern Irish Sea witnessing over 1 m skew surges.

Figure 22-1: Location of Aberdeen Airport Weather Station in comparison to the Project Area



Local Climate

Precipitation – Rainfall

22.5.2.4 Average seasonal rainfall at Aberdeen Airport climate station, Scotland East, and the UK - for the period 1991 – 2020 - is presented in **Table 22-5**. It shows that the climate station is drier than both the region and the UK average across both seasons, significantly in winter.

Table 22-5: Long term average seasonal rainfall (mm) (1991–2020) for Aberdeen Airport climate station, Scotland East, and the rest of the UK

Season	Aberdeen Airport climate station	Scotland East	UK
Summer (June, July, August)	208 mm	269 mm	253.4 mm
Winter (December, January, February)	205 mm	343 mm	344.9 mm

Temperature

22.5.2.5 **Table 22-6** shows the long-term average seasonal mean temperature for Aberdeen Airport climate station, Scotland East, and the UK between 1991 – 2020. It shows that the climate station is significantly warmer than the region, but slightly cooler than the UK average.

Table 22-6: Long term average mean seasonal temperature (°C) (1991–2020) for Aberdeen Airport climate station, Scotland East, and the rest of the UK

Season	Aberdeen Airport climate station	Scotland East	UK
Summer (June, July, August)	14.0 °C	13.0 °C	14.6 °C
Winter (December, January, February)	4.0 °C	2.6 °C	4.1 °C

Air Frost

22.5.2.6 The climate station experienced 48.8 days of air frost annually, on average, which is significantly lower than the regional average of 81.9 days, but only slightly lower than the UK average of 53.4.

Wind

22.5.2.7 Eastern Scotland is one of the windier parts of the UK, being relatively close to the track of Atlantic depressions. In general, the strongest winds are associated with the passage of deep depressions across or close to the UK. The frequency and strength of these depressions is greatest in the winter half of the year, especially from December to February, and this is when mean speeds and gusts (short duration peak

values) are strongest. The average monthly mean wind speed in knots was 8.75, compared to the regional average of 10.3 knots and UK average of 9.3 knots.

Solar Radiation

22.5.2.8 Average seasonal sunshine hours at Aberdeen Airport climate station, Scotland East, and the UK for the period 1991 – 2020 is presented in **Table 22-7**. The table shows that the climate station receives greater sunshine than the region and the UK during both seasons.

Table 22-7: Long term average seasonal sunshine (hours) (1991–2020) for Aberdeen Airport climate station, Scotland East, and the rest of the UK

Season	Aberdeen Airport climate station	Scotland East	UK
Summer (June, July, August)	583 hours	446 hours	507 hours
Winter (December, January, February)	194 hours	151 hours	162 hours

Sea Level Rise

22.5.2.9 The Study Area is located in the North Sea. The National Tidal and Sea Level Facility at the nearest tide gauge station (located at Aberdeen, approximately 100 km west), has been recording sea level since 1931[658]. The data shows that from 1932 to 2022 sea level has risen by 147 mm from 6,996 mm to 7,143 mm.

22.5.3 Future Baseline

22.5.3.1 The UKCP18[656] probabilistic projections for RCP8.5[5,6] (high emission scenarios) have been used to infer future changes in a range of climate variables that may affect the vulnerability of the Project to climate change. The Climate Risk Indicators (CRI), developed as part of the UK Climate Change Resilience Programme has been used to infer this assessment[657]. The CRI utilises the UKCP18 projections and allows for a range of climate change related indicators (including but not limited to, Met Office heatwaves and heat stress). The CRI data for the local authority of Aberdeen City Council has been used to inform this assessment, as the nearest projections data point for the Project. This is due to the UKCP18 quantitative data based on land projections. The data sources listed in **Table 22-4** were used to demonstrate the future climate change baseline for the marine parameters.

22.5.3.2 The future climate has been presented for the 2030s (2020 – 2049), the 2050s (2040 – 2069) and 2080s (2070 – 2099) to identify the anticipated climate conditions. These projections are provided against the baseline period of 1981 – 2010 (based on model

[5] Representative Concentration Pathways (RCPs) specify concentrations of greenhouse gases that will result in total radiative forcing increasing by a target amount by 2100, relative to pre-industrial levels. Radiative forcing targets for 2100 have been set at 2.6, 4.5, 6.0 and 8.5 W m-2 named RCP2.6, RCP4.5, RCP6.0 and RCP8.5, respectively.

[6] RCP8.5 (high emission scenarios) is used to ensure a suitable conservative approach in line with IEMA guidance

data), and 1991 – 2020 (current climate) as an indication of change from the baseline period.

22.5.3.3 Climate change is projected to lead to warmer wetter winters and hotter drier summers, with an increase in the intensity and frequency of extreme events such as heatwaves, storms and wind events. The information presented below illustrates how the climate may evolve at the Array Area of the Project by the end of the century.

22.5.3.4 **Table 22-8** provides an overview of current and projected summer and winter temperature and rainfall for the local authority of Aberdeen City Council, the nearest land data.

Table 22-8: Temperature and rainfall data for the Model Reference (1981-2010), current (1991-2020) and future climate (2030s, 2050s and 2080s) for RCP8.5 (anomalies), the table shows the 50th percentile (10th percentile to 90th percentile) values

Climate variable	Model reference (1981 – 2010)	Current baseline (1991 – 2020)	RCP8.5		
			2030	2050	2080
Average summer temperature	13.8 ºC	14.0 °C	+1.1 ºC (0.4 ºC to 1.7 ºC)	+2.0 ºC (0.9 ºC to 3.1 ºC)	+3.9 ºC (2.0 ºC to 5.9 ºC)
Average winter temperature	3.7 ºC	4.0 °C	+0.9 ºC (0.1 ºC to 1.7 ºC)	+1.4 ºC (0.4 ºC to 2.5 ºC)	+2.5 ºC (0.8 ºC to 4.4 ºC)
Min winter temperature	0.7 ºC	1.0 ºC	+0.9 ºC (0.1 ºC to 1.8 ºC)	+1.4 ºC (0.3 ºC to 2.7 ºC)	+2.6 ºC (0.7 ºC to 4.7 ºC)
Max summer temperature	17.6 ºC	17.7 ºC	+1.1 ºC (0.3 ºC to 1.9 ºC)	+2.0 ºC (0.7ºC to 3.4 ºC)	+4.2 ºC (1.7 ºC to 6.7 ºC)
Average summer Rainfall	183 mm	208 mm	-1.8 % (- 14.4 % to +11.6 %)	-8.7 % (- 26.2 % to +9.5 %)	-21.7 % (- 44.7 % to +5.3 %)
Average winter rainfall	199 mm	205 mm	+15.3 % (+1.3 % to +31.1%)	+18.5 % (+0.2 % to +41.4 %)	+33.2 % (+2.8 % to +73.0 %)

Wind

22.5.3.5 UKCP18 depicts a wide spread of future changes in mean surface wind speed, however, there is large uncertainty in projected changes in circulation over the UK and natural climate variability contributes to much of this uncertainty. It is therefore difficult to represent regional extreme winds and gusts within regional climate models.

22.5.3.6 Hamann, Garcia-Santiago and Pena[660] results show that annual mean wind speed and wind resources in Northern Europe are not particularly affected by climate change in 2031 – 2050 relative to 1995 – 2014, according to a sub-set of 16 models in the CMIP6 collection. Most models agree on reductions in the future wind in summer in the North Sea. The energy production calculations show that summer

energy production in a planned large windfarm cluster in the North Sea could be reduced by a median of 6.9 percent during 2031 – 2050 when taking into account the windfarm wakes (that account by −0.7 percent) and the changes in air density (that account by −0.9 percent).

22.5.3.7 In terms of storms, the analysis presented here is a summary of expected changes in storm patterns under a changing climate. A storm is defined by the Met Office as a wind event measuring 10 or higher on the Beaufort scale (equivalent to a wind speed of 27 m/s or 60 mph)[662].

22.5.3.8 Studies[663] relating to future projections of storms suggest that climate driven storm changes are less distinct in the northern than southern hemisphere. However, such is the wide range of inter-model variation, robust projections of changes in storm track are not yet possible and there is low confidence in the direction of future changes in the frequency, duration or intensity of storms affecting the UK.

Sea Level Rise

22.5.3.9 The Study Area is located in the North Sea. Therefore, it is at risk of future sea level rise. Sea level projections at the closest marine projections data point[7], approximately 100 km west of the Project, just off the coast of Aberdeen, range from 0.11 m in the 2030s to 0.59 m in the 2080s. **Table 22-9** below depicts the projected sea level rise for the 2030s, 2050s and 2080s using UKCP18 marine projections data.

Table 22-9: Sea level rise projections (m) presented as 50th percentile (10th percentile to 90th percentile) for the Project

2030s	2050s	2080s
0.11 m (0.07 m to 0.14 m)	0.21 m (0.14 m to 0.29 m)	0.42 m (0.28 m to 0.59 m)

Waves

22.5.3.10 Sea level rise over the considered time periods of the Project is expected to affect tidal characteristics substantially, however there is no evidence for significant changes in future storm surges, although confidence in this trend is low. The marine projections also consider that there is no significant additional increase in the statistics of extreme water levels associated with atmospheric storminess only. The projections for the 21st century suggest a general reduction in wave heights and extreme waves in the order of 10 – 20 percent, however this is specific to the location and some coastal regions may remain dominated by local weather variability.

Ocean Acidification

22.5.3.11 UKCP18 does not provide information on changes to coastal water properties, such as sea surface temperature and acidification[654]. An HM Government report[659] states that "*Assuming atmospheric CO_2 increases to 500ppm by 2050 (the median Intergovernmental Panel on Climate Change (IPCC) scenario), a decrease of ~ 0.1 pH units over most of the North Sea area is projected; however, if atmospheric CO_2*

[7] Coastal Location (latitude(N), longitude(E)): 57.17, -1.92

rises to 1000ppm (worst-case IPCC scenario) over the next 50 years, a decrease of 0.5 pH units below pre-industrial levels is projected".

22.5.4 Receptors

Construction Phase

22.5.4.1 Sensitive receptors within the construction phase include:

- Human health such as construction workers; and
- Temporary infrastructure assets.

Operation Phase

22.5.4.2 Sensitive receptors within the operation phase include:

- Infrastructure assets: such as above sea level infrastructure (Turbines, Blades), below sea level infrastructure (WTG structures, Foundations, Cabling), and mechanical and electrical assets (offshore sub-stations); and
- Human health: such as operatives undertaking maintenance activities.

Decommissioning Phase

22.5.4.3 Sensitive receptors within the decommissioning phase include:

- Infrastructure assets: such as temporary infrastructure/facilities and equipment; and
- Human health: such as decommissioning workers.

22.6 Basis of Assessment

22.6.1.1 The climate change resilience scoping assessment is based on the following key assumptions, which are also set out in **Chapter 3: Project Description**.

- The array will consist of up to 95 WTGs;
- There will be up to two offshore substations;
- Maintenance activities will be undertaken for both preventive and corrective maintenance requirements;
- The operational lifetime of the project is assumed to be a minimum of 30 years;
- The decommissioning of the windfarm is anticipated to involve as close to full removal of offshore infrastructure as possible at the time of decommissioning (where safe/practicable to do so). The decommissioning works are likely to be undertaken in reverse to the sequence of construction works and involve similar levels of equipment and impact; and
- Embedded mitigation measures are implemented as detailed in the following paragraphs.

22.7 Relevant Embedded Mitigation Measures

22.7.1.1 Embedded mitigation measures have been identified and are proposed to be adopted as part of the Project design (primary mitigation); or implemented in accordance with industry standard practice that would occur with or without the input from the environmental assessment feeding into the process (tertiary mitigation). There is a commitment by the Applicant to implement these embedded mitigation measures and they have been considered within the 2024 EIA Scoping Report.

22.7.1.2 The requirement for additional mitigation measures (secondary mitigation) will be dependent on the significance of effects on climate change resilience receptors and will be consulted upon with consultees throughout the EIA process. Any additional mitigation measures will be presented within the EIAR.

22.7.1.3 The design of offshore infrastructure is highly regulated by international standards. IEC 61400, for instance, is an International Standard published by the International Electrotechnical Commission[664], which prescribes a set of design requirements to ensure the structural integrity of wind turbines. In particular, the standard is established to ensure that wind turbines are appropriately engineered to ensure their structural integrity against damage from all hazards, including climatic conditions, within the planned lifetime of the asset.

22.7.1.4 Those measures that are relevant to CCR are listed in **Table 22-10**. The embedded measures have been developed with the design team through workshops and engagement as part of this EIA process and are summarised below.

Table 22-10: Embedded mitigation relating to climate change resilience

ID	Embedded mitigation measures
Construction	
CEM-001	Construction sites will be prepared to cope with climate change variables such as heavy rainfall, for example through ensuring protection for construction personnel. The Design Basis will include seasonal site-specific rainfall information and extreme wind speeds for different return periods and temperatures will be assessed during the design.
CEM-002	Weather forecasting will be used as part of construction planning and work stopped / re-scheduled if risk / exposure level may be exceeded. Ahead of works, contractors will monitor weather patterns and health and safety protocols will be adhered to.
CEM-003	Proportionate control measures will be in place to account for working in adverse weather conditions.
CEM-004	Equipment, including cranes, will be operated in accordance with any restrictions noted in the equipment manual and or certification as well as any requirements stemming from adverse weather working policies, lift plans, or applicable method statements.
O&M	
OEM-001	The WTG and foundations substructures will be designed utilising site specific MetOcean data and in accordance with suitable design codes and standards in line with good industry practice. Sufficient safety factors shall be applied in the design to account for the anticipated design life. An assessment shall be made of potential effects from climactic change over the anticipated design life and appropriate factors shall be included in the design to account for this.

ID	Embedded mitigation measures
OEM-002	During detailed design, the integrated WTG/substructure response will be modelled to check that the WTG/floater design satisfies Original Equipment Manufacturer (OEM) WTG criteria.
OEM-003	Scheduled maintenance will take place following the maintenance requirements of the OEM, insurer's requirements and country specific regulations. Some components (such as blades and the transformer) will require detailed service and inspection at periodic intervals. Equipment installed in compliance with Health and Safety Protocols (for example, lifts and firefighting equipment) will be inspected in accordance with national regulations including but not limited to PUWER and LOLER. Continuous monitoring of components using Supervisory Control and Data Acquisition (SCADA) will monitor the condition of certain components. This system will alert the operator to situations where unplanned maintenance intervention or additional inspection may be necessary.
OEM-004	WTG OEMs have developed the blade design to withstand increased erosion, especially Leading Edge Erosion (LEE). During the detailed design, protection measures will be developed which can be included in the design or there is an ability to retrofit, improving the adaptive capacity of the asset. These protection measures could include thick composite layers or tape, or lightweight metal alloys may be applied to the edge at fabrication or retrofitted. Alternatively, avoidance measures may be taken, such as using the WTG controller to reduce the tip speed during high erosion causing events.
OEM-005	WTG OEM have developed the blade design to withstand increased turbulence. During the detailed design, a solution to reduce wear that is suited to the Array Area conditions will be developed, such as modifications that can be specified or retrofitted (for example, vortex generators, serrated trailing edges and winglets).
OEM-006	WTG are fitted with anemometers to monitor wind speeds to enable the WTGs to be shut down, or operate at reduced speeds, at higher wind speeds to prevent damage. During the detailed design, further solutions will be investigated to improve forecasting, such as forward-facing LiDAR at key points across the Array Area.
OEM-007	Cables will be buried as standard. Where adequate burial depth cannot be achieved, external cable protection methods will be utilised. This will be minimised as far as practicable. Cable burial will be informed by a CBRA and will be implemented utilising a CaP.
OEM-008	Suitable load and condition monitoring of mooring lines and inter-array cables shall be implemented to provide an additional source of information in determining a risk based inspection strategy and ensuring suitable inspection and maintenance intervals are planned.
OEM-009	As part of O&M procedures, inspections are typically undertaken by an unmanned aerial vehicle (UAV) / drone and will highlight where further detailed inspection is required by a technician. Ahead of a technician inspection, weather forecasting will be used to plan for and avoid maintenance during extreme weather events, such as storms and high temperature events. Maintenance activities will aim to be planned in less severe weather conditions, such as summer months, to avoid this impact.
OEM-010	WTG OEM blade design have been developed that perform well across a variety of conditions and efficiency will be prioritised. Adaptive capacity can be built into the Project where measures may be installed during the operation to allow the same or more energy

ID	Embedded mitigation measures
	to be extracted from the same or lower wind speeds. Further upgrades to the WTG controller may allow for performance improvements at lower windspeeds, or to utilise more effective wake steering, to reduce the impact of wakes on down-wind WTGs.
OEM-011	The WTGs, foundations and associated infrastructure are designed to withstand heat stress, typically by sensitive components housed with local climate control (for example, HVAC) to maintain temperatures and humidity within certain limits, in the event of increased temperatures or hot spells. Maintenance of the HVAC systems will be performed as part of the regular servicing and inspections. Fans and filters will be replaced periodically based on condition or age, which may become more frequent with increasing temperatures.
OEM-012	Corrosion protection or mitigation will be installed in accordance with suitable and well recognised international standards.
OEM-013	The design of the Project will take into account the risk of ice throw during operation and implement suitable control measures to protect personnel.
Decommissioning	
DEM-001	Weather forecasting will be used as part of decommissioning planning and work stopped / re-scheduled if risk / exposure level may be exceeded. Ahead of works, contractors will monitor weather patterns and health and safety protocols will be adhered to.
DEM-002	A Decommissioning Plan will be developed and approved prior to construction addressing the decommissioning measures for the Project. The Decommissioning Plan will be written in accordance with applicable guidance and will detail the management, environmental management and schedule for decommissioning activities. It is anticipated that decommissioning will be planned with the climate conditions at the time of decommissioning in mind and therefore, it is expected that the Project will be resilient to any changes in climate at the time of decommissioning.

22.8 Scoping of Potential Significant Effects

22.8.1.1 In line with the EIA Regulations 2017, the EIA for the Project will only consider those impacts where there is a risk of a potential significant effects. Where experience and available evidence indicates an effect-receptor pathway will not lead to a significant effect, with regards to the EIA Regulations 2017, the pathway is scoped out from assessment.

22.8.1.2 The potential significant effects of CCR on the Project are summarised in **Table 22-11**. The scoping assessment is based on a combination of the project design at the time of writing, embedded mitigation measures, understanding of the baseline environment at the time of writing, the evidence base for CCR effects, further consultation with consultees, and professional judgement. The detailed approach to this assessment is set out in Section 22.8. **Appendix 22A, Volume 2** contains the vulnerability assessment, which includes the scoring of exposure and sensitivity, as the basis to the scoping in **Table 22-11**.

22.8.1.3 The early identification of potential significant effects is used here as a tool aimed at delivering a proportionate approach to the EIA. In doing so, it sets out a high-level assessment of all potential effects, significant or not. The basis for scoping out certain effects, and therefore no longer considered is presented after **Table 22-11**, supported by evidence base.

Table 22-11: Summary of potential significant effects for CCR scoped in (✓) or scoped out (x) of the EIAR during construction (C), O&M and decommissioning (D)"

Activity and impact	Embedded measures	Outcome of Scoping per phase			Justification	Overview of proposed assessment approach
		C	O&M	D		
Extreme storminess and high waves leading to increased unsafe working environments and delays to construction programme.	CEM-001 CEM-002	X	X	X	Scoped out (please refer to Section 22.8.2 for rationale)	N/A
Increased heat stress or heat exhaustion experienced by the construction workforce.	CEM-002 CEM-003	X	X	X	Scoped out (please refer Ssection 22.8.2 for rationale)	N/A
Increased risk of disruption to construction work, such as cranes unable to operate in high winds, reduced accessibility, and an increased safety risk.	CEM-001 CEM-002 CEM-004	X	X	X	Scoped out (please refer to section 22.8.2 for rationale)	N/A
Destabilisation or degradation of WTG mechanical systems, facilities and structures due to increased frequency and intensity of storm events and wave heights.	OEM-001 OEM-002 OEM-003	X	X	X	Scoped out (please refer to Section 22.8.2 for rationale)	N/A
Increased turbulence can hinder turbine performance and power production and increases wear on the turbines due to increased frequency and intensity of	OEM-003 OEM-005	X	X	X	Scoped out (please refer to Section 22.8.2 for rationale)	N/A

Activity and impact	Embedded measures	Outcome of Scoping per phase			Justification	Overview of proposed assessment approach
		C	O&M	D		
storm events and wave heights.						
More energetic and/or more frequent thunderstorms/torrential rainstorms leading to a high level of water particles continuously striking the turbine blades increasing leading edge erosion. This is compounded in fog, mist, high humidity conditions.	OEM-003 OEM-004	X	X	X	Scoped out (please refer to Section 22.8.2 for rationale)	N/A
High wind speeds over operating limits can cause damage or failures.	OEM-003 OEM-006	X	X	X	Scoped out (please refer to Section 22.8.2 for rationale)	N/A
Loading and sediment transport across seabed leading to loss of integrity of foundations and cabling systems from scour and exposure due to increased frequency and intensity of storm events and wave heights.	OEM-003 OEM-007	X	X	X	Scoped out (please refer to Section 22.8.2 for rationale)	N/A
Change in wave loading may dramatically affect the overall fatigue life of electrical cable systems and mooring lines.	OEM-001 OEM-003 OEM-008	X	X	X	Scoped out (please refer to Section 22.8.2 for rationale)	N/A

Activity and impact	Embedded measures	Outcome of Scoping per phase			Justification	Overview of proposed assessment approach
		C	O&M	D		
Impeded access for maintenance and inspection leading to safety concerns for the operational and maintenance workforce due to increased frequency and intensity of storm events and wave heights.	OEM-003 OEM-009	X	X	X	Scoped out (please refer to Section 22.8.2 for rationale)	N/A
Decrease in wind speeds and wave height could result in a reduced power production and increased idle time	OEM-001 OEM-003 OEM-010	X	X	X	Scoped out (please refer to Section 22.8.2 for rationale)	N/A
Overheating of mechanical and electrical (M&E) assets such as offshore substations, leading to a decrease in asset performance and rating and/or requiring additional electricity demand for mechanical cooling units.	OEM-003 OEM-011	X	X	X	Scoped out (please refer to Section 22.8.2 for rationale)	N/A
Higher temperatures effect air density, reducing wind turbine power output	OEM-001 OEM-003 OEM-010	X	X	X	Scoped out (please refer to Section 22.8.2 for rationale)	N/A
Increased biofouling of mooring lines and substructures due to favourable environmental for	OEM-003	X	X	X	Scoped out (please refer to Section 22.8.2 for rationale)	N/A

Activity and impact	Embedded measures	Outcome of Scoping per phase			Justification	Overview of proposed assessment approach
		C	O&M	D		
microorganisms from high temperatures						
Increased heat stress or heat exhaustion experienced by the O&M workforce.	OEM-009	X	X	X	Scoped out (please refer to Section 22.8.2 for rationale)	N/A
Build up on the leading edge of the wind turbine blades and damage tower bottoms and cabling due to cold snaps.	OEM-003 OEM-013	X	X	X	Scoped out (please refer to Section 22.8.2 for rationale)	N/A
Increased corrosion of the structures due to increase sea surface temperatures and ocean acidification.	OEM-003 OEM-012	X	X	X	Scoped out (please refer to Section 22.8.2 for rationale)	N/A
Sea Level Rise (SLR) impacting upon mooring line or tether tension limits which may be exceeded due to the increase in elevation. The impact less noticeable for floating turbines.	OEM-001 OEM-003	X	X	X	Scoped out (please refer to Section 22.8.2 for rationale)	N/A
SLR may also affect the corrosion rate of offshore turbine foundations by exceeding the height of the corrosion-resistant section of the foundation.	OEM-001 OEM-003 OEM-012	X	X	X	Scoped out (please refer to Section 22.8.2 for rationale)	N/A

Activity and impact	Embedded measures	Outcome of Scoping per phase			Justification	Overview of proposed assessment approach
		C	O&M	D		
Increased heat stress or heat exhaustion experienced by the workforce associated with decommissioning.	DEM-001 DEM-002	X	X	X	Scoped out (please refer to Section 22.8.2 for rationale)	N/A
Extreme storminess and wave height leading to increased unsafe working environments and delays to decommissioning programme.	DEM-001 DEM-002	X	X	X	Scoped out (please refer to Section 22.8.2 for rationale)	N/A
There is an increased risk of disruption to decommissioning work, such as cranes unable to operate in high winds.	DEM-002	X	X	X	Scoped out (please refer to Section 22.8.2 for rationale)	N/A

22.8.2 Impacts Scoped Out of Assessment

22.8.2.1 Early engagement with the design team around embedding CCR in the design has enabled the development of embedded measures through the iterative design process. These embedded measures set out how the Project will reduce its vulnerability to climate change impacts, and therefore give rise to no potential significant effects. The embedded measures reduce vulnerability of the development by either reducing the exposure of the development to the climate variables, or decreasing the sensitivity of the receptor if the climate change impact were to occur. By doing this, climate change impacts associated with the construction, operation and decommissioning of the Project have been scoped out.

22.9 Cumulative Effects

22.9.1 In-Combination Climate Change Impacts (ICCI)

22.9.1.1 The receptors for the ICCI assessment are receptors within the surrounding environment that would be impacted by the Project, in combination with future climatic conditions.

22.9.1.2 An ICCI assessment is undertaken by assessing how identified receptors in the surrounding environment, such as marine ecosystems, are affected by future climate parameters. The climate parameters relevant to the Project are extreme weather events, temperature, and precipitation. Inclusion of an ICCI has been scoped in, but this will be addressed at EIAR stage and captured within the relevant chapters as part of the assessments for their environmental topics. The ICCI assessment will identify if any reported effects will be exacerbated or ameliorated by the effects of climate change and identify further mitigation where required. It will also assess whether the embedded measures will continue to be effective considering changes to climate.

22.10 Potential Transboundary Effects

No effects on climate change resilience receptors are likely to be transboundary. This is detailed further in **Appendix 5D: Transboundary Screening Matrix**.

22.11 Proposed Approach to the Environmental Impact Assessment

22.11.1.1 As discussed in Sections 22.8, 22.9 and 22.10, CCR has been scoped out of further assessment within the EIA and therefore no approach to the EIA methodology is presented.

22.12 Summary

22.12.1.1 The ICCI assessment has been scoped in for further assessment within the relevant topic chapters of the EIAR, which will be determined during this assessment process.

22.13 Further Consideration for Consultees

22.13.1.1 Please find below specific scoping questions relevant to the topic of climate change resilience:

- The Scoping Report assesses the vulnerability of the assets to climate change through a scoring of sensitivity and exposure. Through this assessment, impacts with low vulnerability can be scoped out of further assessment as they are unlikely to give rise to significant effects. Extensive engagement and workshops with the engineering design team has allowed for early identification of climate change impacts that could result in potential significant effects, and embedded measures have been developed to mitigate this and reduce the assets vulnerability. It is, therefore, proposed and justified through the vulnerability assessment that climate change impacts can be scoped out. The iterative design process will refine the details of climate change mitigation and design measures and will be captured within the Project Description and detailed design. Is this acceptable?
- Are there any centralised databases / mapping services that can be provided by MD-LOT to support the characterisation of climate change?
- The in-combination climate impacts are scoped in and will be assessed through the EIA topics. Is this acceptable?

23. CARBON AND GREENHOUSE GASES

23.1 Introduction

23.1.1.1 This chapter of the Scoping Report considers the potential significant effects associated with greenhouse gases (GHG) from the Project. This chapter outlines the methodology to be employed in the EIA.

23.1.1.2 This chapter provides an overview of the baseline conditions within the Project Area, as defined in **Chapter 1: Introduction**, the datasets to be used to inform the EIA, sources, pathways and receptors of the potential significant effects to be considered, and how these potential significant effects will be assessed for the purpose of the EIA.

23.1.1.3 The assessment of GHG emissions aims to scrutinise the Project's contribution to climate change, focusing on GHG emissions associated with construction, O&M and decommissioning phases. Within this section, the Scoping Report details the proposed methodology for the EIA, also outlines embedded mitigation measures, to effectively reduce the significant effects from the Project.

23.1.1.4 The EIA Regulations 2017[665] mandate the consideration of the Project's impact on climate, including the nature and magnitude of GHG emissions, and its vulnerability to climate change, referred to as climate change resilience (CCR). The scope of the CCR assessment is set out in **Chapter 22: Climate Change Resilience** of this Scoping Report.

23.1.1.5 The primary objective of the GHG assessment is to evaluate the impact of GHG emissions resulting from the construction, O&M, and decommissioning phases of the Project. These calculations will help to determine the Project's influence on achieving national, regional, and local targets for decarbonisation.

23.2 Legislation, Policy, and Guidance

23.2.1 Legislation and Policy

23.2.1.1 Legislation and policy that has been used to inform the scope of the Carbon and Greenhouse Gases chapter is set out in **Table 23-1.** Further information on policies relevant to the EIA are set out in **Chapter 2: Legislative and Policy Context**.

Table 23-1: Legislation and policy context

Legislation/policy	Relevance to the assessment
Legislation	
The United Nations Framework Convention on Climate Change (UNFCCC), 1992[666]	The UNFCC is an international treaty which established a global climate governance framework and solidified climate change as an agenda item for future agreements and policies. The UNFCCC facilitated intergovernmental climate change negotiations such as the Conference of the Parties (COP).
The Kyoto Protocol, 1987[667]	Following from the UNFCCC, the Kyoto Protocol committed industrialised countries to limit and reduce their GHG emissions

Legislation/policy	Relevance to the assessment
	in accordance with individual targets to reduce the rate and extent of global warming. Annex A of the Kyoto Protocol defined key GHGs as follows: • Carbon dioxide (CO2) • Methane (CH4) • Nitrous oxide (N2O) • Hydrofluorocarbons (HFC) • Perfluorocarbons (PFC) • Sulphur Hexafluoride (SF6) • Nitrogen Trifluoride (NF3).
The Climate Change Act 2008[668] and Climate Change (Scotland) Act 2009[669]	The Climate Change Act 2008 provides the legal basis for the UK's long-term response to tackling climate change. The Climate Change Act (2050 Target Amendment) Order 2019 revised the UK's target to net zero by 2050, with an interim target of 78 % emission reduction by 2035 compared to 1990 levels. The Act requires the UK Government to set legally binding carbon budgets to limit GHG emissions in a given time period. These budgets are set by the Climate Change Committee (CCC) in five year periods. Scotland has its own distinct climate change legislation, the Climate Change (Scotland) Act 2009, which was amended by the Climate Change (Emissions Reduction Targets) (Scotland) Act 2019. Scotland has committed to achieving net zero by 2045, with a series of interim and annual targets that are more ambitious than the UK's targets. Unlike the UK's five yearly carbon budgets, the Scottish Government sets targets on a yearly basis (Scottish Carbon Budget).
The Paris Agreement, 2015[670]	The Paris Agreement entered into force in 2016 and was ratified by the UK Government at COP22. It is a legally binding international treaty with an overarching goal of "*holding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels*". The Paris Agreement requires countries to submit national climate action plans known as Nationally Determined Contributions (NDC), with each successive NDC reflecting increasing decarbonisation ambitions.
Policy	
NPF4[671]	Scotland's fourth NPF (NPF4) sets out the national spatial strategy up to 2045, which guides infrastructure projects on principles and priorities. NPF4 supports developments that

Legislation/policy	Relevance to the assessment
	enable decarbonisation through the provision of renewable, low carbon and zero emission technologies (Policies 1 and 11). In addition, NPF4 requires developments to minimise their lifecycle GHG emissions as far as possible (Policy 2).
Scotland's Climate Change Plan[672]	The Scottish Government publishes Climate Change Plans to set out the pathway to achieving its GHG emission reduction targets per the Climate Change (Scotland) Act 2009[669]. The most recent version, the 2018 – 2032 Update, includes the Offshore Wind Policy Statement that supports the development of between eight to 11 GW of offshore wind capacity by 2030.
The Innovation and Targeted Oil and Gas (INTOG) Decarbonisation Sectoral Marine Plan[673]	The INTOG Decarbonisation Sectoral Marine Plan provides a strategic framework for offshore wind projects in sustainable locations to help deliver net zero commitments, with a focus on the delivery of smaller innovation projects (IN) and the provision of low-carbon electricity to the offshore oil and gas sector (TOG).
The UK Net Zero Strategy 2021[674] and British Energy Security Strategy, 2022[675]	The UK Net Zero Strategy and British Energy Security Strategy (BESS) apply to Scotland and provide a national commitment to the provision of low-carbon, secure and affordable energy sources, including an ambition to deliver up to 50 GW of offshore wind capacity by 2030.
Aberdeenshire Local Development Plan (LDP), 2023[676]	The Aberdeenshire LDP 2023 aims to help develop a strong and resilient economy whilst maintaining a high quality of life and environment with new sustainable development. Policy C2 'Renewable Energy' supports renewable energy and energy storage developments which are in appropriate sites and of the appropriate design.

23.2.2 Technical Guidance

23.2.2.1 Technical guidance that has been used to define the assessment is set out in **Table 23-2**.

Table 23-2: Relevant technical guidance

Guidance reference	Relevance to the assessment
Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance – 2nd Edition (IEMA, 2022)[677].	The Institute of Environmental Management and Assessment (IEMA) guidance is a key resource for assessing GHG emissions in an EIA context. The 2022 update builds on the 2017 version, emphasising early-stage mitigation and nuanced evaluation of emissions significance. It recognises the interconnected impact of GHG emissions on various environmental aspects and underscores the importance of considering a project's contribution to legally binding GHG reduction targets in the UK. The guidance advocates for optimising GHG performance and minimising emissions contributions

Guidance reference	Relevance to the assessment
	through early-stage influence on project location and design.
Publicly Available Standard (PAS) 2080:2023 – Carbon Management in Buildings and infrastructure[678]	PAS 2080:2023 is a standard that specifies the requirements for the management of whole-life carbon in buildings and infrastructure. It guides organizations in holistic carbon management, reducing costs, fostering industry leadership, and adapting to a low-carbon future. The assessment methodology considers this framework, specifically for evaluating distinct phases in the project lifecycle.
The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (GHG Protocol), World Resources Institute (WRI) and World Business Council for Sustainable Development. (2015)[679].	This resource establishes standards and guidance for creating a GHG emissions inventory. It encompasses the accounting and reporting of the six GHGs outlined in the Kyoto Protocol. In the assessment methodology, these six GHGs are collectively treated as carbon dioxide equivalent (CO_2e).
Royal Institution of Chartered Surveyors (RICS) Guidance Note Methodology to calculate embodied carbon 2nd edition (2023)[680]	This is a practical framework for quantity surveyors to calculate embodied carbon emissions associated with their projects. The guidance note provides a set of principles for measuring embodied carbon, helps select and specify materials that are efficient while ensuring they're safe and durable, and quantifies the benefits of low carbon design to the client and society. The Note will play a crucial role in the assessment methodology for determining embodied carbon.
Climate Change Committee (CCC) Sixth Carbon Budget Report Sector Summaries – Electricity Generation (2020)[681]	This document provides a summary of the content pertaining to the electricity generation sector in the Sixth Carbon Budget Advice from the CCC. The CCC's recommended carbon budget allocations for the electricity generation sector are as follows: • Fourth carbon budget (2023 to 2027): 1950 $MtCO_2e$; • Fifth carbon budget (2028 to 2032): 1725 $MtCO_2e$; and • Sixth carbon budget (2033 to 2037): 965 $MtCO_2e$ The assessment will place emissions in the context of these sectoral allocations.

23.3 Study Area

23.3.1.1 The study area for the GHG assessment encompasses the entire Project Area. The Project's geographical scope covers approximately 333 km^2 in the Array Area. The ECC connects the Array Area to MHWS. The section of the ECC from MHWS to 12 NM is the same as the NorthConnect Cable Corridor. The Applicant is coordinating with NorthConnect Limited. NorthConnect Interconnector and the Project will only require one set of infrastructure, within the overlapping marine licence Project Area from 12 NM to MHWS.

23.3.1.2 The section of the ECC from MHWS to 12 NM has previously been assessed within the EIAR submitted for NorthConnect Limited (application reference number 06771 & 06870) and judged acceptable through the consenting of NorthConnect. The previous EIA work for NorthConnect will be considered in assessing the ECC from MHWS to 12 NM, updated by any other readily available information and surveys undertaken. See Section 23.5 for further details of the baseline conditions.

23.3.1.3 The GHG assessment will consider emissions associated with construction, O&M, and decommissioning activities within this defined study area. Additionally, the study area extends to include a nautical radius of 12 NM (~22 km) around the project, considering the movement of vessels for daily operations and other maritime activities within its vicinity.

23.3.1.4 The study area is broken down into the following parts for determining the existing and future baseline scenarios of the Project.

- Array Area; and
- ECC.

23.3.1.5 The Project Area will be reviewed and adjusted based on improvements to the Project design, new impact pathways identified and feedback from consultations, as required.

23.4 Consultation

23.4.1.1 Consultation is a key part of the application process. This GHG assessment will be informed by engagement and discussion with various stakeholders such as the 2023 and 2024 Scoping Opinions by MD-LOT.

23.4.1.2 A summary of the key issues raised in the 2023 Scoping Opinion[682], specific to GHG assessment, is outlined in **Table 23-3**, together with how these issues will be considered in the production of the EIAR.

Table 23-3: Summary of consultation relating to GHG assessment.

Date and stakeholder	Consultation and key comments	How this is accounted for
MD-LOT, 2023 Scoping Opinion, June 2023	Scottish Ministers are content that the GHG Assessment included within the EIAR is to be based on a Life Cycle Assessment approach and notes that the IEMA GHG Guidance provides further insight on this matter.	Reference to the IEMA Technical Guidance has been followed through while deciding on the approach for estimating the GHG emissions.
MD-LOT, 2023 Scoping Opinion, June 2023	The assessment should consist of the pre-construction, construction, operation and decommissioning phases,	This has been included in the baseline section of this chapter.

Date and stakeholder	Consultation and key comments	How this is accounted for
	as well as benefits beyond the life cycle of the Project.	
Scoping Workshop, 29 February 2023	The Applicant provided a high level summary during the Scoping Workshop. At the time of writing, no further consultee responses have been received.	Waiting for Scoping Opinion.

23.5 Baseline Conditions

23.5.1 Data Information Sources

23.5.1.1 The assessment baseline for GHG emissions is established using the UK carbon budgets[683], along with sector allocations recommended by the CCC and Scotland's carbon emissions reduction targets[684]. This baseline relies solely on these sources, and no additional data is gathered to inform it. The details regarding data sources for the GHG assessment are provided in the assessment methodology.

23.5.1.2 As per IEMA guidance, the current baseline covers existing GHG emissions before the construction and operation of the assessed project, including emissions from existing projects and infrastructure slated for refurbishment, demolition, or replacement. Depending on the project nature, establishing a sectoral baseline may be necessary, considering baseline emissions from business-as-usual (BaU) power generation or other interconnected elements like the electricity grid.

23.5.1.3 The fourth carbon budget (2023 to 2027) of 1,950 $MtCO_2e$ and Scotland's 2022 annual target[685] of 34.2 $MtCO_2e$ are considered as information sources for the current baseline for the GHG emissions assessment. The 2022 CCC sector allocations for electricity generation are 48.5 $MtCO_2e$ under the UK carbon budget and 1.2 $MtCO_2e$ within Scotland's 2022 annual target.

23.5.1.4 In 2019, the UK Government published its Net Zero Strategy aiming to decarbonize the country's power system by 2035 and achieve a fully decarbonized system by 2050. The Offshore Wind Net Zero Investment Roadmap outlines plans for approximately 78 GW of offshore wind capacity in the UK, with a significant emphasis on both fixed-bottom (60 percent) and floating (40 percent) installations.

23.5.1.5 To ensure compliance with government targets, a significant reduction in GHG emissions in the future is necessary. The UK and Scottish Governments established a net zero target, requiring a 100 percent reduction in GHG emissions below 1990 levels by 2050. Policies addressing decarbonization targets have been implemented on national, regional, and local scales. The future baseline accounts for pertinent policies and spans several UK carbon budgets throughout the Project's lifetime, including the fifth carbon budget (2028 to 2032) of 1,725 $MtCO_2e$, and the sixth carbon budget (2033 to 2037) of 965 $MtCO_2e$.

23.5.2 Existing Baseline

23.5.2.1 The existing baseline assessment considers the emissions from the Project Site only. The existing baseline emissions at the Array Area are assumed to be nil, as the site is offshore with no development/activity at present. The change in GHG emissions associated with the Project will be evaluated against national, regional and local targets for decarbonisation (the future baseline).

23.5.3 Future Baseline

23.5.3.1 In terms of the future baseline, in the 'no development' scenario for the Project where it is not developed, the future baseline will be determined by the current GHG emissions from the Site. Since there is no physical development or activity at the Project Site in this specific scenario, GHG emissions from the Project Area before construction and operation are considered to be zero. This comprehensive evaluation ensures a thorough examination of potential emissions across different scenarios and energy sources.

23.6 Basis of Assessment

23.6.1.1 The carbon and GHG scoping assessment is based on the following key assumptions, which are also set out in **Chapter 3: Project Description**:

- The array will consist of up to 95 WTGs;
- There will be up to two offshore substations;
- Inter-array and export cables will be buried, where possible;
- Maintenance activities will be undertaken for both preventive and corrective maintenance requirements;
- The operational lifetime of the project is assumed to be a minimum of 30 years; and
- The decommissioning of the windfarm is anticipated to involve as close to full removal of offshore infrastructure as possible at the time of decommissioning (where safe/practicable to do so). The decommissioning works are likely to be undertaken in reverse to the sequence of construction works and involve similar levels of equipment and impact.

23.6.1.2 For the purpose of the assessment, calculations will be conducted assuming all electricity generated from the Project is exported to the grid.

23.6.1.3 It is anticipated that the Project will provide onward connection to oil and gas assets located in the waters to the north, west and southeast of the proposed Array Area within the Targeted Oil and Gas Onward Development Area.

23.6.1.4 The oil and gas platforms in the vicinity of the Project will be connected to the Project in future. However, such connections are not part of the Project and hence not therefore been assessed as part of the GHG assessment. These will be considered as part of the environmental assessments associated with the future Marine licence applications for these cables.

23.6.1.5 The CEA (Section 23.9) will consider the effects of the likely connections to the oil and gas platforms recognising that this is an INTOG project.

23.7 Relevant Embedded Mitigation Measures

23.7.1.1 During the design phase, which covers all stages of the project's life cycle, the PAS 2080:2023 Carbon Management in Infrastructure approach will be used to manage and optimise the carbon footprint. This ensures the most effective implementation of the standard, minimising carbon costs, and maximising benefits. Emissions will be categorised systematically with relevant mitigation measures throughout the project, from inception to decommissioning stages.

23.7.1.2 Embedded mitigation measures have been identified and are proposed to be adopted as part of the Project design (primary mitigation); or implemented in accordance with industry standard practice that would occur with or without the input from the environmental assessment feeding into the process (tertiary mitigation). There is a commitment by the Applicant to implement these embedded mitigation measures and they have been considered within the 2024 EIA Scoping Report.

23.7.1.3 The requirement for additional mitigation measures (secondary mitigation) will be dependent on the significance of effects on GHG receptors and will be consulted upon with consultees throughout the EIA process. Any additional mitigation measures will be presented within the EIAR.

23.7.1.4 **Table 23-4** outlines the embedded mitigation measures relevant to GHG assessment, encompassing general measures applicable across all aspects of the Project. Following these are specific mitigation measures tailored for GHG assessment issues related to the offshore activities of the floating windfarm.

Table 23-4: Embedded mitigation relating to GHG assessment

ID	Embedded mitigation measures
Construction	
GHG-001	The Applicant will develop and adhere to an EMP. An OEMP will be submitted as part of the consent application documents.
Operations and Maintenance	
GHG-005	GHG emissions reduction opportunities will be embedded throughout the project lifecycle. These opportunities will be determined at each phase of the project and include sustainable product selection and raw material use during the maintenance, repair and replacement periods.
GHG-006	Regularly monitor and optimise the movement of vessels involved in the daily operations of the windfarm and the surrounding oil rigs.
Decommissioning	
GHG-008	A Decommissioning Programme will be developed for the Project in line with industry good practice, guidance and legislation.

23.7.1.5 Any secondary mitigation required will be identified as the environmental assessment progresses and will be reported as required in the EIAR.

23.8 Scoping of Potential Significant Effects

23.8.1.1 The methodology outlined in this section, following the EIA Regulations 2017, focuses on likely significant impacts resulting from the Project. Drawing on industry experience, effect-receptor pathways[8] potentially leading to a significant impact are identified. If evidence suggests that an effect-receptor pathway will not lead to a significant effect according to the EIA Regulations 2017, it is scoped out from assessment.

23.8.1.2 The potential significant effects from GHG emissions on the atmosphere (receptor) are summarised in **Table 23-5,** considering the project design, embedded mitigation measures, baseline environment, evidence base, consultation with stakeholders, and professional judgment. The overall approach is detailed in **Chapter 5: Approach to Scoping and EIA**.

23.8.1.3 Early identification of potential significant effects serves as a tool for a proportionate EIA approach, offering a high-level assessment of potential effects. The decision to scope out certain effects is supported by evidence presented after the table.

23.8.1.4 Operational wind turbines generate electricity without directly using fossil fuels, but associated manufacturing, installation, O&M and decommissioning processes can contribute to GHG emissions. Key sources of GHG emissions in floating windfarm developments include materials for turbines, platforms, mooring, anchorage, steel, and glass fibre production, and fuel use during installation, O&M, and decommissioning.

23.8.1.5 Identified potential impacts on carbon and GHG throughout construction, O&M, and decommissioning phases are based on the current Project design, embedded mitigation measures, baseline understanding, available evidence, policy and guidance, and professional judgment. This aligns with PAS 2080, categorising emissions across lifecycle stages, ensuring comprehensive consideration of all emission sources throughout the project's lifecycle. **Table 23-5** represents the potential significant GHG impacts, following the lifecycle stages outlined in PAS 2080. The presentation aligns with the standard GHG considerations for the assessment.

[8] Effect-receptor pathways are potential pathways that could lead to a significant impact because of the Project.

Table 23-5: Summary of potential significant effects for GHG

Activity and impact	Embedded mitigation	Outcome of scoping per phase			Justification	Overview of proposed assessment approach
		C	O&M	D		
Effects during preconstruction	N/A	N/A	N/A	N/A	Pre-construction GHG emissions, originating from preliminary studies, strategy development, design, EIA, and cost planning, are expected to be negligible. Consequently, they have been deliberately excluded from the assessment. These pre-construction activities, predominantly office-based and surveys across the value chain, are unlikely to have a significant impact on emissions. Adhering to IEMA guidance for GHG assessments, activities that contribute less than 1 percent to the total emissions can be omitted if they do not substantially affect the assessment results.	N/A
Effects during construction	N/A	X	N/A	N/A	Product stage: raw material supply, transport, and manufacture	Details of materials used during the construction period including quantity and distances transported from the supplier to the project site.
	GHG - 001	X	N/A	N/A		Fuel consumption, hours of use of vessels during construction period, years of construction, no. of trips per day from port.
	GHG - 001	X	N/A	N/A		Further consultation with MD-LOT, the Applicant to develop the OEMP including these measures.
Effects during operation	– N/A	N/A	X	N/A		Daily activities at the windfarm, no. of vessel trips required, fuel

Activity and impact	Embedded mitigation	Outcome of scoping per phase			Justification	Overview of proposed assessment approach
		C	O&M	D		
						consumption, weekly and annual hours of use.
	GHG - 002	N/A	X	N/A		Lifetime of materials, lifetime of projects, no. of replacements required, frequency and materials which need to be replaced/repaired.
	N/A	N/A	X	N/A	Operational water use involves GHG emissions associated with the consumption of water required for the Project's operation. This activity is excluded from consideration because it is anticipated that the GHG emissions related to operational water use will be minimal and not likely to be significant. It is deemed irrelevant to the Project, and, as such, has been scoped out.	N/A
Effects during decommissioning	GHG - 004	N/A	N/A	X		Waste material quantity estimated at the end of project lifecycle, percentage of wate materials to be recycled or sent to the landfill.

23.9 Cumulative Effects

23.9.1.1 Cumulative effects on GHG resulting from the effects of the Project and other developments will be assessed in accordance with the guidance and methodologies set out in **Chapter 5: Approach to Scoping and EIA** and considering the other developments that have been screened in as part of the CEA screening exercise.

23.9.1.2 The impacts from the Project which have the potential to act cumulatively with impacts from other developments include the majority of those identified in **Table 23-5** depending on implementation plans and will be considered in the EIAR using the latest information available at the time.

23.9.1.3 As described above, based on the consents currently being sought all electricity generated from the Project will be exported to the grid. However, the Project is an INTOG project and future consents will be sought for electricity transmission via AC cables connecting the Project with surrounding oil and gas infrastructure. The CEA will therefore include consideration of the potential significant effects of these connections identifying the effects of decarbonising platforms that currently generate electricity using gas generators.

23.10 Potential Transboundary Effects

23.10.1.1 Potential transboundary impacts to GHG arising from the construction, O&M and decommissioning of the Project will be assessed in the future baseline against the UK and Scottish carbon budgets and net zero targets, which have been set under international commitments to the Paris Agreement[ix]. No effects on carbon and GHG receptors are likely to be transboundary. This is detailed further in **Appendix 5D: Transboundary Screening Matrix**.

23.11 Proposed Approach to the Environmental Impact Assessment

23.11.1.1 The Project-wide approach to the assessment methodology is set out in **Chapter 5: Approach to Scoping and EIA**. This will be implemented to assess the potential significant effects on GHG assessment receptors from the construction, O&M and decommissioning phases of the Project.

23.11.1.2 The specific guidance outlined in **Table 23-2** will also be considered in relation to the assessment, in addition to consultation with the stakeholders outlined above.

23.11.1.3 This section outlines the proposed EIA approach for GHG assessment. This includes the proposed assessment methodology, relevant embedded mitigation measures, as well as those effects scoped into and out of the assessment.

23.11.1.4 The assessment of GHG receptors will comply with all the associated legislation/policies, as well as the technical guidance documents identified in Section 23.2.

[ix] The Paris Agreement, adopted during the UN Climate Change Conference (COP21) in December 2015, is a legally binding international treaty. It aims to combat climate change by limiting global warming to well below 2°C and striving to keep it below 1.5°C.

23.11.2 Proposed Assessment Methodology

23.11.2.1 The GHG assessment methodology for the Project builds upon the foundational approach outlined in **Chapter 5: Approach to Scoping and EIA**. This elaboration specifically addresses how the methodology will be applied and tailored to meet the distinctive demands of the GHG assessment.

23.11.2.2 The overarching goal of the technical assessment is to both quantify and provide context for GHG emissions throughout the Project's lifecycle. This includes consideration of material use, transport, construction processes, O&M, decommissioning activities, and the consequential reduction in GHG emissions due to the Project's influence on fossil fuel-based energy generation.

23.11.2.3 The methodology outlined in this Scoping Report is based on guidance from IEMA's "Assessing Greenhouse Gas Emissions and Evaluating their Significance" [677]. For the GHG assessment required in an EIA, this involves identifying early mitigations, scoping to pinpoint GHG concerns and key sources, defining the assessment's scope and methodology, conducting the GHG emissions assessment with boundaries and methodology, evaluating the significance of emissions, and reporting on the findings.

23.11.2.4 The proposed assessment methodology follows the PAS 2080 guidance covering the 'before use,' 'use,' and 'end of life' stages of the infrastructure lifecycle to estimate the GHG emissions throughout the Project's lifecycle. This approach aligns seamlessly with the latest IEMA guidance, ensuring a comprehensive evaluation with a focus on a conservative emissions scenario.

23.11.2.5 The detailed methodology for each stage of the infrastructure lifecycle (as per PAS 2080) is as follows:

- A1-A3 – Product Stage: Employing RICS methodology and Inventory of Carbon and Energy (ICE) Database for embodied carbon calculations.
- A4 – Construction Transport: Employing Department for Environment Food and Rual Affairs (DEFRA) Emissions Factors Toolkit (EFT) and industry benchmarks for estimating GHG emissions during material and personnel transport during the construction period.
- A5 – Construction Process Stage: Calculating GHG emissions during installation works using available data or RICS' construction Key Performance Indicator (KPI).
- B2-B5 - Maintenance, Repair, Replacement, and Refurbishment: Estimating GHG emissions during the use stage, encompassing operation, maintenance, and replacement activities.
- C1-C4 – End of Life Stage: Anticipating GHG emissions during decommissioning based on assumptions derived from the reverse installation process.

23.11.2.6 GHG emissions associated with the various activities considered in the proposed scope of the Project will be calculated by multiplying the activity data with the associated GHG emission factor, as per the following equation.

GHG emissions = Emission factor X Activity Data,

where activity data represents ***quantitative information*** *about the specific* ***activity or process*** *that generates greenhouse gas emissions; includes details such as the* ***amount of fuel consumed****,* ***production output****, or* ***energy usage;***

GHG emission factor *represents the* ***quantity of a greenhouse gas (GHG)*** *emitted into the atmosphere due to a specific activity. It is typically expressed as the* ***mass of gas per unit of emissions-producing activity or material input.***

23.11.3 The GHG emission factors will be sourced from relevant databases including annual emission factors produced by BEIS, The Green Book issued by the UK Government[687], and the Inventory of Carbon and Energy (ICE – University of Bath).

23.11.3.1 The significance of a proposed project's impacts in an EIA Scoping report will be determined based on its whole life GHG emissions:

- **Major adverse:** The project's GHG impacts are unmitigated and do not significantly contribute to Scotland's emissions reduction goals.
- **Moderate adverse:** The project's GHG impacts are partially mitigated, and it only partially contributes to Scotland's emissions reduction goals.
- **Minor adverse:** The project's GHG impacts align fully with design requirements and standards, in line with Scotland's emissions reduction goals.
- **Negligible:** The project has minimal effects on emissions but exceeds Scotland's reduction goals, demonstrating exceptional performance.
- **Beneficial:** The project reduces GHG emissions below the baseline, making a significant positive impact on Scotland's reduction goals.

23.11.3.2 The assessment includes the critical metric of the carbon payback period, determining when emissions averted by the Project equal its overall lifecycle emissions. The annual energy generation during O&M stage will be estimated using Renewables UK's recommended high-level approach[686]. The grid carbon intensity will also consider the decarbonisation of the UK grid, in line with the carbon budget and Net Zero carbon emission target of the Scottish Government. The Department for Energy Security and Net Zero (DESNZ), (earlier known as the BEIS) anticipated load factors for offshore wind developments in the UK will be used, ensuring a realistic representation of electricity generation.

23.11.4 Assumptions and Limitations

23.11.4.1 In the Product Stage (A1 – A3 stages), embodied carbon will be calculated using the RICS methodology and the ICE Database for raw material supply and manufacture of project assets.

23.11.4.2 During Construction Transport (A4), the GHG emissions associated with the transport of materials, vessels, equipment, and workers will be estimated using DEFRA Emissions Factors Toolkit, industry benchmarks, and DfT data. The transport emissions will be calculated for the transport of materials from the supplier locations to the project site. Data regarding vessel fuel consumption for the construction phase will be requested from the client and the associated emission factors will be taken from The Green Book issued by the UK Government[687] and the Fourth Greenhouse Gas Study (2020) by the IMO[688].

23.11.4.3 During the Construction Process stage (A5), the GHG emissions related to installation works and offshore infrastructure will be calculated based on available information or industry benchmarks.

23.11.4.4 GHG emissions during the use stage will be estimated based on available data from the Applicant, including O&M activities, embodied carbon of raw materials, and offshore vessel movements.

23.11.4.5 Where specific data is unavailable, assumptions will be made to characterise GHG emissions, using proxy information and relevant case studies. All assumptions will be explicitly stated in the EIAR for transparency.

23.12 Summary

23.12.1.1 The methodology described in this section will quantify GHG emissions from the identified potentially significant sources, as outlined in **Table 23-5**. Activity data for the assessment will be sourced from the Project's design/engineering team and publicly available benchmarking sources. The scope and approach to assessment has been informed by the 2023 Scoping Opinion.

23.13 Further Consideration for Consultees

23.13.1.1 Please find below specific scoping questions relevant to the topic of carbon and GHG:

- Do you agree that the impacts described in Section 23.8 can be scoped out?
- Do you agree that the impacts described in Section 23.8 can be scoped in?
- For those impacts scoped in **Table 23-5**, do you agree that the methods described are sufficient to inform a robust impact assessment?
- Could MD-LOT provide feedback and agreement on the proposed approach to assessment, as outlined above?

24. SUMMARY AND NEXT STEPS

24.1 Introduction

24.1.1.1 The information included in this 2024 Scoping Report has been prepared to supersede the 2023 Scoping Report. The 2024 Scoping Report considers all feedback provided by the MD-LOT and other stakeholders in the 2023 Scoping Opinion. Further details on the purpose of this 2024 Scoping Report are provided in **Chapter 1: Introduction.** The Project will assist with the decarbonisation of the oil and gas industry through the electrification of offshore oil and gas installations, while also providing surplus power to the UK grid. Full details are provided in **Chapter 2: Legislative and Policy Context.**

24.1.1.2 The consent application covered by this 2024 Scoping Report, and the subsequent EIAR, is for the offshore activities associated with the Project. The existing data for NorthConnect's infrastructure consent will be utilised from MHWS to 12 NM. It is of note that Town and Country Planning permission is applicable for onshore development only, and therefore not applicable to this offshore 2024 Scoping Report.

24.1.1.3 The Project will have a generating capacity of up to 1,350 MW and the Array Area is located 185 km offshore northeast of Aberdeen (at the nearest point). Full project details are provided in **Chapter 3: Project Description.**

24.1.1.4 **Chapter 5: Approach to Scoping and EIA** describes the approach to Scoping, the principles of the EIA and the approach used to identify any potential significant effects of the Project on the physical, biological, and human environmental receptors during the construction, O&M, and decommissioning phases. **Chapter 5: Approach to Scoping and EIA** also presents the broad principles relating to the establishment of baseline conditions, embedded mitigation and the methodology for the assessment of effects that will be adopted for EIA, as well as an overview of the proposed methodologies for CEA and transboundary assessment. The main aspects of the offshore environment likely to be significantly affected by the construction, O&M and decommissioning of the Project have been identified. For each of the identified aspects, this 2024 Scoping Report has identified the extent of relevant environmental studies to be undertaken as part of the EIA.

24.1.1.5 The EIAR will outline the full EIA process and will be submitted alongside consent applications for:

- A s.36 consent under the Electricity Act 1989;
- A marine licence under the MCAA 2009 (Between 12 NM and 200 NM); and
- A marine licence under the Marine (Scotland) Act 2010 (Between 0 and 12 NM).

24.2 Scope of the Assessment

24.2.1.1 Potential significant effects of the Project have been identified according to each EIA aspect. For some of these, further data collection and an assessment will be required to determine the significance of the effects. These effects have been scoped in and an appropriate level of assessment proposed.

24.2.1.2 For other potential effects it is proposed that they be scoped out of the EIA (i.e. no further data collection or assessment is proposed). These conclusions have been made based on the knowledge of the baseline environment, the nature of the Project and the available evidence on the potential for impacts from such projects more widely. **Table 24-1** provides a summary confirmation of the aspects and effects that are proposed to be scoped in or out of the EIA.

Table 24-1: Summary of potential effects scoped in (✓) or scoped out (x) of the EIAR during construction (C), O&M and decommissioning (D)

Aspect	Activities and effects scoped in or scoped out	Outcome of scoping per phase		
		C	O&M	D
Chapter 7: Marine and Coastal Processes	Potential changes to suspended sediment concentrations.	✓	✓	✓
	Potential changes to coastal/seabed morphology.	✓	✓	✓
	Potential modifications to sediment transport pathways.	✓	✓	✓
	Potential seabed scouring.	✓	✓	✓
	Potential changes to wave and tidal regime.	X	X	X
	Modifications to stratification and frontal features.	X	✓	X
Chapter 8: Marine Water and Sediment Quality	Accidental spills to the marine environment.	X	X	X
	Potential changes to suspended sediment concentrations.	✓	✓	✓
	Mobilisation of sediment contaminants.	✓	✓	✓
	Loss of drilling muds and cuttings into the sea from the subtidal exit of HDD	✓	X	X
Chapter 9: Benthic Ecology	Temporary impacts to the seabed and benthic habitats.	✓	X	✓
	Long term impacts to the seabed and benthic habitats.	X	✓	X
	Potential changes to suspended sediment concentrations.	✓	X	✓
	Landfall works may disturb intertidal habitats and species	X	X	X
	Accidental spills to the marine environment.	X	X	X
	Introduction of hard substrate in a predominantly sedimentary environment.	X	✓	X
	Increased predation	X	✓	X
	Potential effects from EMF and heat generated by cables.	X	✓	X
	Removal of hard substrates during decommissioning resulting in loss of colonised surfaces	X	X	X
	Introduction of INNS.	✓	✓	✓
Chapter 10: Marine Mammals	Underwater noise and vibration	✓	✓	✓
	Offshore vessel interactions with marine mammals resulting in injury or mortality.	X	X	X
	Potential changes to suspended sediment concentrations.	X	X	X
	Subsea mooring systems may cause entanglement resulting in injury and /or mortality.	X	X	X
	Presence of offshore structures creating a physical barrier effect.	X	X	X
	Electromagnetic Fields (EMF) and heat from energised cables	X	X	X

Aspect	Activities and effects scoped in or scoped out	Outcome of scoping per phase		
		C	O&M	D
	Changes to prey resources.	X	✓	X
Chapter 11: Ornithology	Disturbance and/or displacement of ornithology receptors.	✓	✓	✓
	Collision risk with turbines for ornithology receptors .	X	✓	X
	Changes to prey resources.	✓	✓	✓
	Underwater noise and vibration	✓	N/A	N/A
	Subsea mooring systems may cause entanglement resulting in injury and/or mortality.	X	X	X
	Accidental spills to the marine environment.	X	X	X
Chapter 12: Fish Ecology	Long term impacts to the seabed and sensitive fish habitats (e.g. spawning and/or nursery grounds).	✓	✓	✓
	Temporary impacts to the seabed and sensitive fish habitats (e.g. spawning and/or nursery grounds).	✓	✓	✓
	Potential changes to suspended sediment concentrations.	✓	✓	✓
	Underwater noise and vibration	✓	✓	✓
	Accidental spills to the marine environment.	X	X	X
	Potential effects from EMF and heat generated by cables.	X	✓	X
	Operational windfarm may act as a fish aggregation device (FAD).	X	✓	✓
	Subsea mooring systems may cause entanglement resulting in injury and/or mortality.	X	X	X
Chapter 13: Commercial Fisheries	Loss of or restricted access to fishing grounds.	✓	X	✓
	Displacement of fishing effort to other areas.	✓	✓	✓
	Interference with fishing activity.	✓	✓	✓
	Increased steaming distances and times.	✓	✓	✓
	Increased risk of loss or damage to fishing gear (snagging risk).	✓	✓	✓
	Changes to exploited fish and shellfish resources.	✓	✓	✓
Chapter 14: Shipping and Navigation	Displacement of vessels	✓	✓	✓
	Collision risk	✓	✓	✓
	Allision risk	✓	✓	✓
	Anchor snagging risk	X	✓	X
	Loss of station for a floating structure.	X	✓	X

Aspect	Activities and effects scoped in or scoped out	Outcome of scoping per phase		
		C	O&M	D
	Potential impacts to aids to navigation.	✓	✓	✓
	Under keel clearance interaction	X	✓	X
	Potential impacts to Emergency response capability.	X	✓	X
	Potential impacts to vessels navigation, communication, and position fixing equipment.	X	✓	X
Chapter 15: Marine Cultural Heritage and Archaeology	Indirect impact of the project	✓	✓	✓
	Direct impact of the project	✓	✓	✓
	Direct impact to onshore cultural heritage assets from changes to their setting.	X	X	X
Chapter 16: Seascape, Landscape and Visual Impact Assessment	All effects have been scoped out.	X	X	X
Chapter 17: Marine Infrastructure and Other Users	Potential effects on other renewable energy developments	X	X	X
	Potential effects on existing oil and gas operations.	✓	✓	✓
	Potential effects on military and defence activities.	X	X	X
	Potential effects on subsea telecommunications and power infrastructure.	✓	X	X
	Potential effects on licensed dredge spoil disposal sites.	✓	X	X
	Disturbance or discovery of UXO within the Project Area.	✓	X	✓
	Potential sterilisation of areas for marine aggregates.	✓	X	X
	Potential effects on aquaculture receptors.	X	X	X
	Potential effects on planned areas for CSS.	X	X	X
	Potential effects on ferry routes.	X	X	X
Chapter 18: Military and Civil Aviation	Impacts on civil or military aviation by creation of an aviation obstacle.	✓	✓	✓
	Impacts on civil or military aviation radar.	N/A	X	N/A
Chapter 19: Socio-Economics	Project demand for labour	✓	✓	✓
	Supply of labour to meet project demand	✓	✓	✓
	Project demand for products and services	✓	✓	✓
	Supply of products and services	✓	✓	✓
	Project expenditure increasing economic activity (GVA) within local and wider economies	✓	✓	✓

Aspect	Activities and effects scoped in or scoped out	Outcome of scoping per phase		
		C	O&M	D
	Increase in demand on local services due to an influx of workers	✓	✓	✓
	Socio-cultural and distributional effects	✓	✓	✓
	Impacts to recreational and tourism receptors	✓	✓	✓
	Disruption to marine commercial activities	✓	✓	✓
	Potential effects on Human health	✓	✓	✓
Chapter 20: Materials and Waste	All effects have been scoped out.	X	X	X
Chapter 21: Major Accidents and Disasters	All effects have been scoped out.	X	X	X
Chapter 22: Climate Change Resilience	All effects have been scoped out.	X	X	X
Chapter 23: Carbon and Greenhouse Gases	Effects during preconstruction.	N/A	N/A	N/A
	Effects during construction.	X	N/A	N/A
	Effects during operation and maintenance.	N/A	X	N/A
	Effects during decommissioning	N/A	N/A	X

24.3 Cumulative Effects

24.3.1.1 A CEA will be undertaken as part of the EIA process and will be reported in the final EIAR.

24.3.1.2 The CEA long list has been provided as part of this 2024 Scoping Report (see **Appendix 5C**).

24.3.1.3 There is currently no specific Scottish overarching guidance on the methodological framework for assessing cumulative effects. Therefore, the methodology will follow current industry best practice and the approach will be informed by several guidance documents including: the Planning Inspectorate's Advice Note Seventeen, the RenewableUK and the Natural Environment Research Council (NERC) published guidelines on the undertaking of CEA and the Marine Directorate's guidance on offshore wind, wave and tidal energy applications, which provides guidance on the types of projects to include in a CEA .

24.4 Transboundary Impacts

24.4.1.1 As part of this 2024 Scoping Report, a transboundary impacts screening exercise has been completed. Transboundary impacts have been screened in where the Project has the potential to have potential significant effects on the environment in other EEA States. This is in relation to:

- Marine mammals;
- Ornithology;
- Fish ecology;
- Shipping and navigation;
- Infrastructure and other users; and
- Major accidents and disasters.

24.4.1.2 The Transboundary Screening Matrix has been provided as part of this 2024 Scoping Report (see **Appendix 5D**).

24.5 Consultation

24.5.1.1 In developing the EIA, the Applicant has and expects to continue to undertake detailed consultation. This will include engagement to both seek views on the Project and to continue to refine and develop the approach to the EIA, whilst taking full account of the views expressed in the 2023 Scoping Opinion and the expected 2024 Scoping Opinion.

24.5.1.2 On 29th February 2024, a Scoping Workshop was held with MD-LOT and its statutory advisors. The purpose of this workshop was to provide a Project update, as well as discussing the impacts to be scoped in and scoped out for the key technical topics. Feedback from the workshop has been incorporated into this 2024 Scoping Report under the relevant technical topics (see **Chapter 7** to **Chapter 23** inclusive).

24.6 Proposed Structure of the EIA

24.6.1.1 The structure of the EIAR will be designed to enable robust and consistent consideration of the likely significance of effects, including cumulative effects, that arise from the development of the Project.

24.6.1.2 The matters that the Applicant considers are suitable to be included in the EIAR as well as those matters that it is considered appropriate to scope out, are summarised within each of the technical chapters (see **Chapters 7** to **Chapter 23** inclusive). The technical chapters of the EIAR will be refined and informed by the Scoping Opinion and ongoing consultation throughout the pre-application process. Technical supporting information and drawings will be provided as appendices to the EIAR. A non-technical summary will also be provided to ensure that the EIAR is summarised in an accessible manner. The approach to the EIAR will be in accordance with good practice guidance provided by recognised bodies such as IEMA.

24.6.1.3 The assessment of each technical topic will address the following (adapted as necessary to meet the specific technical and assessment characteristics of each topic):

- Legislative and policy context: A summary of the relevant legislation and policy that have been taken into account in assessing each individual topic;
- Consultation: A summary of the consultation responses received to date from statutory consultees and outcomes of the Scoping process;
- Baseline conditions: Detail confirming the spatial extent of the study area, description of the methodology of baseline data gathering, including baseline data sources and site specific surveys, as well as describing the existing and likely evolving future environment;
- Basis for the assessment: Key parameters for each technical topic assessment and definition of the MDS;
- Embedded mitigation: Detail on any mitigation measures that have been identified and adopted as part of the evolution of the Project design (i.e. embedded into the Project design) of relevance to the topic;
- Methodology: Topic specific detail on the approach to the impact assessment;
- Environmental assessment of those effects scoped into the EIA: An assessment of the significance of any identified effects and the magnitude of the potential effects that may arise during the construction, O&M and decommissioning phases of the development. This section will take account of any embedded mitigation and identify any further relevant mitigation measures required to avoid, reduce and if possible, remedy any adverse effects and will present an assessment of the confidence of any assessments of effect;
- Cumulative effects: An assessment of any cumulative effects arising from interaction with other projects, plans or activities where these effects have not been scoped out for further consideration;
- Transboundary effects: An assessment of any effects from the Project on the environment of other EEA where these effects have not been scoped out for further consideration;

- Further Monitoring: Identification of any further monitoring required and, where relevant, included as conditions within the marine licence(s) and/or s.36; and
- Residual effects: Summary of residual effects (taking into account embedded and further mitigation, where relevant);

24.7 Next Steps

24.7.1.1 Consultees responding to the request for views on the scope of the EIA in response to this 2024 Scoping Report are encouraged to respond in as much detail as possible and specifically to address the specific questions set out at the end of each chapter of the 2024 Scoping Report. This will be helpful to the Applicant in understanding the response, in determining the acceptability of the proposed scope of the EIA and the approach to be adopted in undertaking the remaining EIA process, and to focus further discussions during the ongoing consultation planned post scoping and throughout the pre-application phase.

24.7.1.2 Following the statutory consultation, the Applicant expects to refine the Project and develop the final EIAR, before making an application to MD-LOT by the end of 2024.

25. REFERENCES

Introduction References

[1] Flotation Energy. (2023). *Scoping Report*. Available at: https://marine.gov.scot/sites/default/files/flo-cen-rep-0010_cenos_scoping_report_document_-_redacted.pdf (Accessed: February 2024).

[2] Marine Directorate. (2023). *Scoping Opinion*. Available at: https://marine.gov.scot/sites/default/files/cenos_offshore_windfarm_-_flotation_energy_ltd_-_eia_scoping_opinion.pdf (Accessed: June 2023).

[3] Department for Energy Security and Net Zero. (2021). *North Sea Transition Deal.* [online] Available at: https://www.gov.uk/government/publications/north-sea-transition-deal (Accessed: February 2024).

[4] *The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017*. Available at: https://www.legislation.gov.uk/ssi/2017/101/contents/made (Accessed: February 2024).

[5] *The Environmental Impact Assessment (Miscellaneous Amendments) (Scotland) Regulations 2017*. Available at: https://www.legislation.gov.uk/ssi/2017/168/contents/made (Accessed: February 2024).

[6] *The Marine Works (Environmental Impact Assessment) Regulations 2007*. Available at: https://www.legislation.gov.uk/uksi/2007/1518/contents (Accessed: February 2024).

[7] *Electricity Act 1989*. Available at: https://www.legislation.gov.uk/ukpga/1989/29/contents (Accessed: February 2024).

[8] *Marine and Coastal Act 2009*. Available at: https://assets.publishing.service.gov.uk/media/5a7ffa2c40f0b62305b886e0/pb13855-marine-coastal-access.pdf (Accessed: June 2023).

[9] *Marine (Scotland) Act 2010. (asp. 5)*. Available at: https://www.legislation.gov.uk/asp/2010/5/contents (Accessed: June 2023).

Legislative And Policy Context References

[10] United Nations (1997). *Kyoto Protocol to the United Nations Framework Convention on Climate Change*. Available at: https://unfccc.int/documents/2409 (Accessed: February 2024).

[11] *Climate Change Act 2008*. Available at: https://www.legislation.gov.uk/ukpga/2008/27/contents (Accessed: February 2024).

[12] *Climate Change Act 2008 (2050 Target Amendment) Order 2019*. Available at: https://www.legislation.gov.uk/ukdsi/2019/9780111187654 (Accessed: February 2024).

[13] *Climate Change (Scotland) Act 2009*. Available at: https://www.legislation.gov.uk/asp/2009/12/contents (Accessed: February 2024).

[14] *Climate Change (Emissions Reduction Targets) (Scotland) Act 2019*. Available at: https://www.legislation.gov.uk/asp/2019/15/enacted (Accessed: February 2024).

[15] Scottish Government (2923). *Draft Energy Strategy and Just Transition Plan*. Available at: https://www.gov.scot/publications/draft-energy-strategy-transition-plan/ (Accessed: February 2024).

[16] United Nations (1992). *United Nations Framework Convention on Climate Change*. Available at: https://unfccc.int/resource/docs/convkp/conveng.pdf (Accessed: February 2024).

[17] United Nations. (2015). *Paris Agreement*. Available at: https://unfccc.int/sites/default/files/english_paris_agreement.pdf (Accessed: February 2024).

[18] Scottish Government (2020) *Securing a green recovery on a path to net zero: climate change plan 2018–2032 – update*. Available at: https://www.gov.scot/publications/securing-green-recovery-path-net-zero-update-climate-change-plan-20182032/pages/0/ (Accessed: February 2024).

[19] United Nations. (2021). *Glasgow Climate Pact*. Available at: https://unfccc.int/sites/default/files/resource/cma3_auv_2_cover%2520decision.pdf (Accessed: February 2024).

[20] *EU (Withdrawal) Act 2018*. Available at: https://www.legislation.gov.uk/ukpga/2018/16/contents/enacted (Accessed: February 2024).

[21] European Commission. (2001). *Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources*. Available at: https://eur-lex.europa.eu/eli/dir/2018/2001/oj (Accessed: February 2024).

[22] European Commission. (2023). *Directive (EU) 2023/2413 of the European Parliament and of the Council of 18 October 2023 amending Directive (EU) 2018/2001, Regulation (EU) 2018/1999 and Directive 98/70/EC as regards the promotion of energy from renewable sources, and repealing Council Directive (EU) 2015/652*. Available at: https://eur-lex.europa.eu/eli/dir/2023/2413/oj (Accessed: February 2024).

[23] *Environment Act 2021*. Available at: https://www.legislation.gov.uk/ukpga/2021/30/contents/enacted (Accessed: February 2024).

[24] Scottish Government (2017). *The future of energy in Scotland: Scottish energy strategy*. Available at: https://www.gov.scot/publications/scottish-energy-strategy-future-energy-scotland-9781788515276/ (Accessed: February 2024).

[25] Scottish Government (2023) *National Planning Framework 4 (NPF4).* Available at: https://www.gov.scot/publications/national-planning-framework-4/ (Accessed: 07 February 2024).

[26] Department for Business & Trade; Department for Business, Energy & Industrial Strategy and Department for Energy Security & Net Zero (2020). *Offshore Wind Sector Deal*. Available at: https://www.gov.uk/government/publications/offshore-wind-sector-deal/offshore-wind-sector-deal (Accessed: February 2024).

[27] Department for Energy Security and Net Zero and Department for Business, Energy & Industrial Strategy (2020). *Energy White Paper: Powering our Net Zero Future*. Available at:

https://www.gov.uk/government/publications/energy-white-paper-powering-our-net-zero-future (Accessed: February 2024).

[28] Climate Change Committee (2020). *Sixth Carbon Budget*. Available at: https://www.theccc.org.uk/publication/sixth-carbon-budget/ (Accessed: February 2024).

[29] HM Government (2022) *British Energy Security Strategy*. Available at: https://www.gov.uk/government/publications/british-energy-security-strategy (Accessed: January 2024)

[30] *Electricity Act 1989. (c. 29).* Available at: https://www.legislation.gov.uk/ukpga/1989/29/contents (Accessed: June 2023).

[31] *Marine and Coastal Act 2009*. Available at: https://assets.publishing.service.gov.uk/media/5a7ffa2c40f0b62305b886e0/pb13855-marine-coastal-access.pdf (Accessed: June 2023).

[32] *Marine (Scotland) Act 2010. (asp. 5)*. Available at: https://www.legislation.gov.uk/asp/2010/5/contents (Accessed: June 2023).

[33] *The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017. (SI 2017 101)*. Available at: https://www.legislation.gov.uk/ssi/2017/101/contents/made (Accessed: June 2023).

[34] *The Environmental Impact Assessment (Miscellaneous Amendments) (Scotland) Regulations 2017*. Available at: https://www.legislation.gov.uk/ssi/2017/168/contents/made (Accessed: February 2024).

[35] *The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017*. Available at: https://www.legislation.gov.uk/ssi/2017/115/contents (Accessed: February 2024)

[36] *The Marine Works (Environmental Impact Assessment) Regulations 2007. (SI 2017 1518)*. Available at: https://www.legislation.gov.uk/uksi/2007/1518/data.xht?view=snippet&wrap=true (Accessed: June 2023).

[37] European Commission (1992). *Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora*. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:31992L0043 (Accessed: February 2024).

[38] European Commission (2009) *Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds (Codified version).* Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32009L0147 (Accessed: February 2024).

[39] *The Conservation (Natural Habitats, &c.) Regulations 1994. (SI 1994 2716)*. Available at: https://www.legislation.gov.uk/uksi/1994/2716/made/data.pdf (Accessed: June 2023).

[40] *The Conservation of Offshore Marine Habitats and Species Regulations 2017. (SI 2017 1013)*. Available at: https://www.legislation.gov.uk/uksi/2017/1013/made/data.pdf (Accessed: June 2023).

[41] *The Conservation of Habitats and Species Regulations 2017*. Available at: https://www.legislation.gov.uk/uksi/2017/1012/contents/made (Accessed: February 2024).

[42] *Wildlife and Countryside Act 1981*. Available at: https://www.legislation.gov.uk/ukpga/1981/69 (Accessed: February 2024).

[43] European Commission (2000). *Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy.* Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32000L0060 (Accessed: February 2024).

[44] *Water Environment and Water Services (Scotland) Act 2003. (asp. 3)* Available at: https://www.legislation.gov.uk/asp/2003/3/contents (Accessed: June 2023).

[45] *The Water Environment (Controlled Activities) (Scotland) Regulations 2011*. *(SI 2011 209).* Available at: https://www.legislation.gov.uk/ssi/2011/209/contents/made (Accessed: June 2023).

[46] The European Commission, (2008). *Directive 2008/56/EC of the European Parliament and the Council establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive).* Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32008L0056&from=EN (Accessed: June 2023).

[47] *The Marine Strategy Regulations 2010. (SI 2010 1627).* Available at: https://www.legislation.gov.uk/uksi/2010/1627/made/data.pdf (Accessed: June 2023).

[48] *The Marine Environment (Amendment) (EU Exit) Regulations 2018. (SI 2018 1399).* Available at: https://www.legislation.gov.uk/uksi/2018/1399/contents/made (Accessed: June 2023).

[49] *Energy Act 2004. (c. 20).* Available at: https://www.legislation.gov.uk/ukpga/2004/20/contents (Accessed: June 2023).

[50] Scottish Government, (2022). *Guidance for Applicants on Using the Design Envelope for Applications under Section 36 of the Electricity Act 1989*. Available at: https://www.gov.scot/publications/guidance-applicants-using-design-envelope-applications-under-section-36-electricity-act-1989/documents/ (Accessed: June 2023).

[51] Department for Business, Energy & Industrial Strategy (BEIS), (2019). *Decommissioning of Offshore Renewable Energy Installations Under the Energy Act 2004. Guidance notes for industry.* Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/916912/decommisioning-offshore-renewable-energy-installations-energy-act-2004-guidance-industry__1_.pdf (Accessed: June 2023).

[52] Scottish Government, (2022). *Decommissioning of Offshore Renewable Energy Installations in Scottish waters or in the Scottish part of the Renewable Energy Zone under The Energy Act 2004: Guidance notes for industry (in Scotland)*. Available at: https://www.gov.scot/publications/offshore-renewable-energy-decommissioning-guidance-scottish-waters/documents/ (Accessed: June 2023).

[53] *The Offshore Marine Conservation (Natural Habitats, &c.) Regulations 2007. (SI 2007 1842).* Available at: https://www.legislation.gov.uk/uksi/2007/1842/made/data.pdf (Accessed: June 2023).

[54] *Wildlife and Natural Environment (Scotland) Act 2011. (asp. 6).* Available at: https://www.legislation.gov.uk/asp/2011/6/contents/enacted (Accessed: June 2023).

Project Description References

[55] Scottish Government, (2022). *Electricity Act 1989-section 36 applications: guidance for applicants on using the design envelope approach*. Available at: https://www.gov.scot/publications/guidance-applicants-using-design-envelope-applications-under-section-36-electricity-act-1989/ (Accessed: February 2024).

[56] Maritime and Coastguard Agency (2024). *Offshore Renewable Energy Installations: Requirements, guidance and operational considerations for SAR and Emergency Response (MGN 654 Annex 5).* Available at: https://assets.publishing.service.gov.uk/media/65a695fc640602000d3cb75d/OREI_SAR_Requirements_v4_.pdf (Accessed: February 2024)

[57] MCA (2021). '*MGN 654 (Merchant and Fishing) Offshore Renewable Energy Installations (OREI) – Guidance on UK Navigational Practice, Safety and Emergency Response'*. Southampton: MCA.

[58] NorthConnect (2018). *NorthConnect HVDC Cable Infrastructure EIAR: Volume 1*. Available at: NorthConnect HVDC Cable - Environmental Impact Assessment Report - Volume 2 | Marine Scotland Information (Accessed: January 2024)

[59] NorthConnect (2018). HVDC Cable Infrastructure – UK Construction Method Statement. Available at: HVDC Cable Infrastructure Construction Method Statement (northconnect.no) (Accessed: March 2024).

[60] *Energy Act, 2004 (as amended).* Available at: https://www.legislation.gov.uk/ukpga/2004/20/contents (Accessed: February 2024)

[61] Scottish Government, (2022). *Offshore renewable energy: decommissioning guidance for Scottish waters.* Available at: https://www.gov.scot/publications/offshore-renewable-energy-decommissioning-guidance-scottish-waters/pages/1/ (Accessed: February 2024)

[62] *Waste (Scotland) Regulations. 2012*. Available at: https://www.legislation.gov.uk/sdsi/2012/9780111016657/contents (Accessed: February 2024).

Site Selection And Consideration Of Alternatives References

[63] *Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017*. Available at: https://www.legislation.gov.uk/ssi/2017/101/contents/made (Accessed: March 2024).

[64] *The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017*. Available at: https://www.legislation.gov.uk/ssi/2017/115/contents/made (Accessed: March 2024).

[65] EMODnet. (2021). *EUSeaMap 2021 Marine Strategy Framework Directive Broad-Scale Benthic Habitat Types.* Available at:

https://gis.ices.dk/geonetwork/srv/eng/catalog.search#/metadata/10d3d35c-8f8e-40ff-898f-32e0b037356c (Accessed: March 2024).

[66] Marine Scotland (2021). *Sectoral Marine Plan for Offshore Wind for Innovation and Targeted Oil and Gas Decarbonisation (INTOG). Planning Specification and Context Report*. Available at: https://marine.gov.scot/sites/default/files/sectoral_marine_plan_for_offshore_wind_for_intog_-_project_spec-context_report_-_confidential_-_23_august_2021_1.pdf (Accessed: March 2024).

[67] *Scottish Government (2022). Sectoral marine plan - offshore wind for innovation and targeted oil and gas decarbonisation: initial plan framework*. Available at: https://www.gov.scot/publications/initial-plan-framework-sectoral-marine-plan-offshore-wind-innovation-targeted-oil-gas-decarbonisation-intog/documents/ (Accessed: March 2024).

[68] RSPB (2016). *The RSPB's 2050 Energy Vision*. Available at: https://www.iema.net/download-document/37295 (Accessed: March 2024).

Approach to Scoping and EIA References

[69] Flotation Energy (2023). *Scoping Report*. Available at: https://marine.gov.scot/sites/default/files/flo-cen-rep-0010_cenos_scoping_report_document_-_redacted.pdf (Accessed: January 2024).

[70] Marine Directorate (2023). *Scoping Opinion*. Available at: https://marine.gov.scot/sites/default/files/cenos_offshore_windfarm_-_flotation_energy_ltd_-_eia_scoping_opinion.pdf (Accessed: June 2023).

[71] *The Electricity Works (Environmental Impact Assessment) (Scotland) regulations 2017. (SI 2017 101)*. Available at: https://www.legislation.gov.uk/ssi/2017/101/contents/made (Accessed: January 2024).

[72] *The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017. (SI 2017 115).* Available at: https://www.legislation.gov.uk/ssi/2017/115/contents/made (Accessed: January 2024).

[73] *The Marine Works (Environmental Impact Assessment) Regulations 2007.* Available at: *https://www.legislation.gov.uk/uksi/2007/1518/contents/made* (Accessed: 25 January 2024).

[74] *The Environmental Impact Assessment (Miscellaneous Amendments) (Scotland) Regulations 2017*. Available at: https://www.legislation.gov.uk/ssi/2017/168/contents/made (Accessed: January 2024).

[75] *The Conservation (natural habitats, &c.) regulations 1994. (SI 1994 2716*). Available at: https://www.legislation.gov.uk/uksi/1994/2716/made/data.pdf (Accessed: January 2024).

[76] *The Conservation of Habitats and Species Regulations 2017* (SI 2017 1012). Available at: https://www.legislation.gov.uk/uksi/2017/1012/note/made (Accessed: 09 February 2024)

[77] *The Conservation of Offshore Marine Habitats and Species Regulations 2017 (SI 2017 1013).* Available at: https://www.legislation.gov.uk/uksi/2017/1013/made/data.pdf (Accessed: January 2024)

[78] Chartered Institute of Ecology and Environmental management (CIEEM), (2018) *Guidelines for Ecological Impact Assessment (EcIA) in the UK and Ireland – Terrestrial, Freshwater, Coastal and Marine*. Available at: https://cieem.net/wp-content/uploads/2018/08/ECIA-Guidelines-2018-Terrestrial-Freshwater-Coastal-and-Marine-V1.1Update.pdf (Accessed: February 2024)

[79] Centre for Environmental, Fisheries and Aquaculture Science (CEFAS) (2012) *Guidelines for data acquisition to support marine environmental assessments of offshore renewable energy projects*. CEFAS; London.

[80] Institute of Environmental Management and Assessment (IEMA), (2017*). Delivering Proportionate EIA: A Collaborative Strategy for Enhancing UK Environment Impact Assessment Practice*. Available at: https://www.iema.net/resources/reading-room/2017/07/18/delivering-proportionate-eia (Accessed: January 2024).

[81] Scottish Government (2023) *National Planning Framework 4 (NPF4).* Available at: https://www.gov.scot/publications/national-planning-framework-4/ (Accessed: February 2024).

[82] The Planning Inspectorate (2019). *Advice Note Seventeen: Cumulative effects assessment relevant to nationally significant infrastructure projects*. Available at: https://infrastructure.planninginspectorate.gov.uk/legislation-and-advice/advice-notes/advice-note-17/ (Accessed: January 2024).

[83] Maclean, I.M.D, Wright, L.J., Showler, D.A and Rehfisch, M.M. (2009) *A Review of Assessment Methodologies for Offshore Windfarms*. British Trust for Ornithology Report Commissioned by Cowrie Ltd.

[84] RenewableUK (2013). *Cumulative Impact Assessment Guidelines – Guiding Principles for Cumulative Impact Assessment in Offshore Wind Farms*. Available at: https://tethys.pnnl.gov/sites/default/files/publications/Cumulative-Impact-Assessment-Guidelines.pdf (Accessed: January 2024).

[85] Institute of Environmental Management and Assessment (2015). *Shaping Quality Development*. Available at: https://www.iaia.org/pdf/wab/IEMA%20Guidance%20Documents%20EIA%20Guide%20to%20Shaping%20Quality%20Development%20V6.pdf (Accessed: January 2024).

[86] Institute of Environmental Management and Assessment (IEMA), (2017*). Delivering Proportionate EIA: A Collaborative Strategy for Enhancing UK Environment Impact Assessment Practice*. Available at: https://www.iema.net/resources/reading-room/2017/07/18/delivering-proportionate-eia (Accessed: January 2024).

[87] Scottish Natural Heritage and Historic Environment Scotland (2018) *A Handbook on Environmental Impact Assessment. Guidance for competent authorities, consultation bodies, and others involved in the Environmental Impact Assessment process in Scotland*. Available at https://www.nature.scot/sites/default/files/2018-05/Publication%202018%20-%20Environmental%20Impact%20Assessment%20Handbook%20V5.pdf (Accessed: February 2024)

[88] Marine Scotland (2022). *Electricity Act 1989 - section 36 applications: guidance for applicants on using the design envelope*. Available at:

https://www.gov.scot/publications/guidance-applicants-using-design-envelope-applications-under-section-36-electricity-act-1989/documents/ (Accessed: January 2024).

[89] Scottish Government (2013). *Planning Advice Note 1/2013: Environment Impact Assessment*. Available at: https://www.gov.scot/publications/planning-advice-note-1-2013-environmental-impact-assessment/ (Accessed: January 2024).

[90] Scottish Government (2017). *Planning Circular 1/2017: Environmental Impact Assessment Regulations*. Available at: https://www.gov.scot/publications/planning-circular-1-2017-environmental-impact-assessment-regulations-2017/pages/3/ (Accessed: January 2024)

[91] Centre for environment, Fisheries and Aquaculture Science (CEFAS) (2004) *Offshore Windfarms : Guidance Note for Environmental Impact Assessment in respect of FEPA and CPA Requirements* Available at: https://www.cefas.co.uk/publications/files/windfarm-guidance.pdf (Accessed: March 2024).

[92] Scottish Government (2022) *Decommissioning of Offshore Renewable Energy Installations in Scottish waters or in the Scottish part of the Renewable Energy Zone under The Energy Act 2004*. Available at: https://www.gov.scot/publications/offshore-renewable-energy-decommissioning-guidance-scottish-waters/documents/ (Accessed: 13 March 2024).

[93] Marine Scotland (2018). *Marine Scotland Consenting and Licensing Guidance For Offshore Wind, Wave and Tidal Energy Applications*. Available at: https://www.gov.scot/publications/marine-scotland-consenting-licensing-manual-offshore-wind-wave-tidal-energy-applications/ (Accessed: January 2024).

[94] *The Electricity Act 1989*. Available at: https://www.legislation.gov.uk/ukpga/1989/29/contents (Accessed: January 2024).

[95] Department for Energy Security and Net Zero (2023*). National Policy Statement for Renewable Energy Infrastructure (EN-3). November 2023*. Available at: National Policy Statement for renewable energy infrastructure (EN-3) (publishing.service.gov.uk) (Accessed: 25 January 2024).

[96] Planning Inspectorate (2018). *Advice Note Nine: Rochdale Envelope (Version 3)*. Available at: https://infrastructure.planninginspectorate.gov.uk/legislation-and-advice/advice-notes/advice-note-nine-rochdale-envelope/ (Accessed: 25 January 2024).

[97] NorthConnect (2018). *NorthConnect HVDC Cable Infrastructure EIAR: Volume 1*. Available at: https://marine.gov.scot/data/northconnect-hvdc-cable-environmental-impact-assessment-report-volume-1 (Accessed: 25 January 2024).

[98] NorthConnect (2018). *NorthConnect HVDC Cable Infrastructure EIAR: Volume 2*. Available at: NorthConnect HVDC Cable - Environmental Impact Assessment Report - Volume 2 | Marine Scotland Information (Accessed: 20 March 2024).

[99] *Marine and Coastal Access Act 2009*. Available at: https://www.legislation.gov.uk/ukpga/2009/23/contents (Accessed: 25 January 2024).

[100] *Marine (Scotland) Act 2010*. Available at: https://www.legislation.gov.uk/asp/2010/5/contents (Accessed: 25 January 2024).

[101] *Town and Country Planning (Scotland) Act 1997*. Available at: https://www.legislation.gov.uk/ukpga/1997/8/contents (Accessed: January 2024).

[102] European Commission (1992). *Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora*. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A01992L0043-20130701 (Accessed: 25 January 2024).

[103] Scottish Government (2018). *Offshore Wind, Wave and Tidal Energy Applications: Consenting and Licensing and Manual*. Available at: https://www.gov.scot/publications/marine-scotland-consenting-licensing-manual-offshore-wind-wave-tidal-energy-applications/pages/2/ (Accessed: 25 January 2024).

[104] UK Centre for Ecology and Hydrology, (2022). *Cumulative effects Framework for key ecological receptors: project overview*. Available at: https://www.ceh.ac.uk/our-science/projects/cumulative-effects-framework-key-ecological-receptors (Accessed 25 January 2024).

[105] Woodward, I., Thaxter, C.B., Owen, E., Cook, A.S.C.P. (2019). *Desk-based revision of seabird foraging ranges used for HRA screening*. BTO Research Report 724

Consultation Process References

[106] Marine Directorate (2023). *Scoping Opinion.* Available at: https://marine.gov.scot/sites/default/files/cenos_offshore_windfarm_-_flotation_energy_ltd_-_eia_scoping_opinion.pdf (Accessed: June 2023).

[107] Flotation Energy (2023). *Scoping Report.* Available at: https://marine.gov.scot/sites/default/files/flo-cen-rep-0010_cenos_scoping_report_document_-_redacted.pdf (Accessed: March 2024).

[108] Department of Energy and Climate Change, (2011). *National Policy Statement for Renewable Energy Infrastructure (EN-3)*. July 2011. London: The Stationery Office.

[109] *Electricity Act 1989*. (c.29). Available at: https://www.legislation.gov.uk/ukpga/1989/29/contents (Accessed: June 2023).

[110] *Marine (Scotland) Act 2010*. Available at: https://www.legislation.gov.uk/asp/2010/5/contents (Accessed: March 2024).

[111] Marine and Coastal Access Act 2009. (c. 23). Available at: https://www.legislation.gov.uk/ukpga/2009/23/contents (Accessed: June 2023).

Marine and Coastal Processes References

[112] *The Conservation (natural habitats, &c.) regulations 1994. (SI 1994 2716).* Available at: https://www.legislation.gov.uk/uksi/1994/2716/made/data.pdf (Accessed: 25 January 2024).

[113] Scottish Government (2014). *National Planning Framework 3*. Available at: https://www.gov.scot/publications/national-planning-framework-3/documents/ (Accessed: March 2024).

[114] Scottish Government (2015). *Scotland's National Marine Plan*. Available at: https://www.gov.scot/publications/scotlands-national-marine-plan/documents/ (Accessed: March 2024).

[115] UK Government (2011) *UK Marine Policy Statement*. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69322/pb3654-marine-policy-statement-110316.pdf (Accessed 6 February 2024).

[116] Aberdeenshire Council (2023). *Aberdeenshire Local Development Plan 2023*. Available at: https://aberdeenshire.gov.uk/planning/plans-and-policies/ldp-2023/ (Accessed: March 2024).

[117] Cefas (2012). *Guidelines for Data Acquisition to Support Marine Environmental Assessments of Offshore Renewable Energy Projects*. Available at: https://www.marineenergywales.co.uk/wp-content/uploads/2018/05/ORLEG.pdf (Accessed: February 2024).

[118] Lambkin, DO; Harris, JM; Cooper WS & Coates, T (2009). *Coastal Process Modelling for Offshore Wind farm Environmental Impact Assessment: Best Practice Guide*. Available at: https://www.researchgate.net/publication/228784265_Coastal_Process_Modelling_for_Offshore_Wind_Farm_Environmental_Impact_Assessment_Best_Practice_Guide (Accessed: February 2024).

[119] Copper, W; Saulter, A & Hodgetts, P (2008). *Guidelines for the use of metocean data through the life cycle of a marine renewable energy development (C666)*. London: CIRIA.

[120] CEFAS (2004). *Offshore Windfarms: Guidance note for Environmental Impact Assessment in Respect of FEPA and CPA requirements*. Available at: https://www.cefas.co.uk/publications/files/windfarm-guidance.pdf (Accessed: February 2024).

[121] Brooks, A; Whitehead, P & Lambkin, D (2018). *Guidance on Best Practice for Marine and Coastal Physical Processes Baseline Survey and Monitoring Requirements to Inform EIA of Major Development Projects Report No 243.* Available at: https://repository.oceanbestpractices.org/handle/11329/2223 (Accessed: February 2024).

[122] Natural Resources Wales. (2020). GN041. *Marine Physical Processes Guidance to inform Environmental Impact Assessment (EIA).* Available at: https://cdn.cyfoethnaturiol.cymru/media/692263/marine-physical-processes-guidance-to-inform-environmental-impact-assessment-eia.pdf (Accessed: February 2024).

[123] ABPmer (2008). *Atlas of UK Marine Renewable Energy Resources*. Available at: http://www.renewables-atlas.info/ (Accessed: 10 February 2024).

[124] UK Hydrographic Office (2023). *Admiralty Charts. 213 Scotland – East Coast: Fraserburgh to Newburgh (tidal diamonds B, C, D).* Taunton: UKHO.

[125] UK Hydrographic Office (2023). Admiralty Charts. 278 North Sea Offshore Charts: Sheet 5 (tidal diamonds B, D, E, F). Taunton: UKHO.

[126] MD-LOT (Marine Directorate - Licensing Operations Team, formerly Marine Scotland – Licensing Operations Team) (2023) *Scoping Opinion adopted by the Scottish Ministers under: The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 and The Marine Works (Environmental Impact Assessment) Regulations 2007. Cenos Offshore Windfarm.* Edinburgh; Scottish Government.

[127] MMT. (2018). *Benthic Survey Report: NorthConnect - UK Nearshore, North Sea, and Norwegian Ford Survey In (Vol. Rev A).* Reading: MMT.

[128] PhysE. (2023). *CENOS Wind Farm Metocean Criteria. C918 - R 1027-23 (1D).* Newport: PhysE

[129] British Oceanographic Data Centre (2023). *Marine data sharing and preservation, managed by the National Oceanography Centre*. Available at: https://www.bodc.ac.uk/ (Accessed: February 2024).

[130] Health & Safety Executive (2001). *Environmental considerations*. Available at: https://webarchive.nationalarchives.gov.uk/ukgwa/20230103120103/https://www.hse.gov.uk/research/otopdf/2001/oto01010.pdf (Accessed: February 2024).

[131] Health & Safety Executive (2005). *Wave mapping in UK waters*. Available at: https://www.hse.gov.uk/Research/rrpdf/rr392.pdf (Accessed: February 2024).

[132] ABPmer (2018). *Seastates data explorer*. Available at: https://www.seastates.net/explore-data/ (Accessed: February 2024).

[133] Cefas (2024). *Wavenet*. Available at: https://wavenet.cefas.co.uk/map (Accessed: February 2024).

[134] National Oceanography Centre (2024). *National Tidal and Sea Level Facilities*. Available at: https://ntslf.org/ (Accessed: February 2024).

[135] British Geological Survey (2024). *Geoindex offshore*. Available at: https://mapapps2.bgs.ac.uk/geoindex_offshore/home.html (Accessed: February 2024).

[136] European Commission (2024). *EMODnet Map Viewer*. Available at: https://emodnet.ec.europa.eu/geoviewer/ (Accessed: February 2024).

[137] International Hydrographic Organization & UNESCO (2024). *General Bathymetric Chart of the Oceans*. Available at: https://download.gebco.net/ (Accessed: February 2024).

[138] Scottish Government (2022). *Marine Scotland information*. Available at: https://marine.gov.scot/ (Accessed: February 2024).

[139] Cefas (2024). *Monthly average non-algal Suspended Particulate Matter concentrations on the UK shelf waters*. Available at: https://data.cefas.co.uk/view/18133 (Accessed: February 2024).

[140] British Geological Society (2024) *SEA: data portal*. Available at: https://webapps.bgs.ac.uk/data/sea/app/search (Accessed: February 2024).

[141] UK Hydrographic Office (2014). *The UKHO Archive*. Available at: https://www.gov.uk/guidance/the-ukho-archive (Accessed: February 2024).

[142] Scottish Government (2019). *Scottish Coast Observatory Data*. Available at: https://marine.gov.scot/data/scottish-coastal-observatory-data (Accessed: February 2024).

[143] Dynamic Coast (2024). *Homepage*. Available at: https://www.dynamiccoast.com/ (Accessed: February 2024).

[144] Scottish Government (2024). *Scottish Remote Sensing Portal*. Available at: https://remotesensingdata.gov.scot/ (Accessed: February 2024).

[145] ICES (2000). *Ocean Climatology of the North-West European Shelf*. Available at: https://www.ices.dk/data/dataset-collections/Pages/Ocean-Climatology.aspx (Accessed: February 2024).

[146] Met Office (2018). *UK Climate Projections*. Available at: https://www.metoffice.gov.uk/research/approach/collaboration/ukcp/index (Accessed: February 2024).

[147] Cathie Associates (2018) *NorthConnect Cable Burial Risk Assessment*. Cathie Associates: Newcastle-Upon-Tyne

[148] Marine Scotland. (2016). *Large-scale features of functional significance*. https://marine.gov.scot/information/large-scale-features-functional-significance (Accessed: 10 February 2024)

[149] Rovco Ltd. (2023). *Offshore Wind Farm Geophysical Results Report. UK Sector, North Sea. 23014-EN-SU-RP-003 Rev B*. Bristol: Rovco.

[150] MMT. (2018). *Geophysical, Benthic and Geotechnical Route Survey: Final Survey Report, Ref: 102273-NOC-MMT-SUR-REP-SURVEYRE*. Reading: MMT.

[151] Rovco Ltd, 2023. Geophysical Results Report, CENOS OWF Geoenvironmental Survey. 23014-EN-SU-RP-003. B1

[152] Holmes R, Bulat J, Henni P, Holt J, James C, Kenyon N, Leslie A, Long D, Musson R, Pearson S, Stewart *H* (2004). *DTI Strategic Environmental Assessment Area 5 (SEA5): Seabed and superficial geology and processes*. Available at: https://assets.publishing.service.gov.uk/media/5a7a3e88e5274a34770e5481/SEA5_TR_Geology_BGS.pdf (Accessed: February 2024).

[153] European Commission. (2023). *European Marine Observation and Data Network (EMODnet)*. Available at: https://emodnet.ec.europa.eu/en/geology (Accessed: 10 February 2024.

[154] Gafeira, J., Green, S., Morando, A., Cooper, R., Long, D., and Gatliff, R., (2010). *Distribution of rock/hard substrate in UK offshore waters and England territorial waters - MB0103*. Available at: https://www.researchgate.net/publication/283637148_Distribution_of_rockhard_substrate_in_UK_offshore_waters_and_England_territorial_waters_-_MB0103 (Accessed: February 2024).

[155] Marine Scotland. (2020). *Suspended particulate inorganic matter (turbidity).* Available at: https://marine.gov.scot/sma/assessment/suspended-particulate-inorganic-matter-turbidity (Accessed: 10 February 2024)

[156] Silva, T. (2016). *Monthly average non-algal Suspended Particulate Matter concentrations. Cefas, UK. V1*. Available at: https://doi.org/10.14466/CefasDataHub.31 (Accessed: February 2024).

[157] Silva, T. (2016). *Monthly average non-algal Suspended Particulate Matter concentrations. Cefas, UK. V1*. Available at: https://www.cefas.co.uk/data-and-publications/dois/monthly-average-non-algal-supended-particulate-matter-concentrations/ (Accessed: March 2024).

[158] Utne-Paln, AC (2002). *Visual feeding of fish in a turbid environment: Physical and behavioural aspects*. Marine and Freshwater Behaviour and Physiology, Vol 35, Issue 1-2.

[159] Carpenter JR, Merckelbach L, Callies U, Clark S, Gaslikova L, Baschek B (2016*) Potential Impacts of Offshore Wind Farms on North Sea Stratification*. PLoS ONE 11(8): e0160830. doi:10.1371/journal.pone.0160830

[160] Schultze, L. K. P., Merckelbach, L. M., Horstmann, J., Raasch, S., & Carpenter, J. R. (2020). *Increased mixing and turbulence in the wake of offshore wind farm foundations*. Journal of Geophysical Research: Oceans, 125, e2019JC015858. Available at: https://agupubs.onlinelibrary.wiley.com/doi/10.1029/2019JC015858 (Accessed: March 2024).

[161] Miller, LP; Matassa, CM & Trussell, GT (2014). *Climate change enhances the negative effects of predation risk on an intermediate consumer*. Global Change Biology, Vol 20 Issue 12, p 3824-3844.

Miller, P.I., Xu, W., Lonsdale, P. (2014). *Seasonal shelf-sea front mapping using satellite ocean colour to support development of the Scottish MPA network*. Scottish Natural Heritage Commissioned Report No. 538.

[162] Miller, P.I., Xu, W., Lonsdale, P. (2014). *Seasonal shelf-sea front mapping using satellite ocean colour to support development of the Scottish MPA network*. Scottish Natural Heritage Commissioned Report No. 538.

[163] Shennan, I. (1989). *Holocene crustal movements and sea-level changes in Britain*. Journal of Quaternary Science, Vol. 4, 77–89.

[164] Palmer, M.D., Harris, G.R. AND Gregory, J.M., (2018). *Extending CMIP5 projections of global mean temperature change and sea level rise due to thermal Exploring future extreme water levels around the UK 39 expansion using a physically-based emulator*. Environmental Research Letters, 13 (8), 084003.

[165] Environment Agency (2016). *Flood risk assessments: climate change allowances*. Available at: https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances (Accessed: February 2024).

Marine Water and Sediment Quality References

[166] OSPAR (1992) *The Convention for the Protection of the Marine Environment of the North East Atlantic*. Available at: https://www.ospar.org/site/assets/files/1290/ospar_convention.pdf (Accessed: March 2024).

[167] European Commission (2000) *EC Directive (2000/60/EC) establishing a framework for Community action in the field of water policy* (the Water Framework Directive – WFD), as amended by *Directive 2008/105/EC on environmental quality standards in the field of water policy, amending and subsequently repealing Council Directives 82/176/EEC, 83/513/EEC, 84/156/EEC, 84/491/EEC, 86/280/EEC and amending Directive 2000/60/EC* (the EQS Directive) and *Directive 2013/39/EU amending Directives 2000/60/EC and 2008/105/EC* (the EQS amendment Directive). Transposed in Scotland through the *Water Environment and Water Services (Scotland) Act 2003*

(asp. 3) (as amended), available at: https://www.legislation.gov.uk/asp/2003/3/contents and *The Environment (EU Exit) (Scotland) (Amendment etc.) Regulations 2019* (SSI 2019:0026), available at: https://www.legislation.gov.uk/ssi/2019/26/contents (both accessed 6 February 2024).

[168] European Commission (2008). *Directive 2008/105/EC of the European Parliament and of the Council of 16 December 2008 on environmental quality standards in the field of water policy, amending and subsequently repealing Council Directives 82/176/EEC, 83/513/EEC, 84/156/EEC, 84/491/EEC, 86/280/EEC and amending Directive 2000/60/EC of the European Parliament and of the Council*. Available at: https://eur-lex.europa.eu/eli/dir/2008/105/oj (Accessed: March 2024).

[169] European Commission (2013). *Directive 2013/39/EU of the European Parliament and of the Council of 12 August 2013 amending Directives 2000/60/EC and 2008/105/EC as regards priority substances in the field of water policy Text with EEA relevance*. Available at: https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=celex%3A32013L0039 (Accessed: March 2024).

[170] Scottish Government (2014). *The Scotland River Basin District (Standards) Directions 2014*. Available at: https://www.gov.scot/publications/scotland-river-basin-district-standards-directions-2014/ (Accessed: March 2024).

[171] Scottish Government (2014). *The Scotland River Basin District (Status) Directions 2014.* Available at: https://www.gov.scot/publications/scotland-river-basin-district-status-directions-2014/ (Accessed: March 2024).

[172] *Water Environment and Water Services (Scotland) Act 2003. (asp. 3)* Available at: https://www.legislation.gov.uk/asp/2003/3/contents (Accessed: March 2024).

[173] The Environment (EU Exit) (Scotland) (Amendment etc.) Regulations 2019. Available at: https://www.legislation.gov.uk/ssi/2019/26/contents (Accessed: 6 February 2024).

[174] European Commission (2006) *EC Directive (2006/7/EC) concerning the management of bathing water quality and repealing Directive 76/160/EEC (the Bathing Water Directive)*. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32006L0007 (Accessed: 6 February 2024).

[175] *The Bathing waters (Scotland) Regulations 2008* (SSI 2008:0170). Available at: https://www.legislation.gov.uk/ssi/2008/170/contents (Accessed 6 February 2024).

[176] European Commission (2008) *EC Directive (2008/56/EC) establishing a framework for Community action in the field of marine environmental policy* (the Marine Strategy Framework Directive - MSFD). Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32008L0056&from=EN (Accessed: 6 February 2024).

[177] *The Marine Strategy Regulations 2010. (SI 2010 1627).* Available at: https://www.legislation.gov.uk/uksi/2010/1627/made/data.pdf (Accessed: March 2024).

[178] *The Marine Environment (Amendment) (EU Exit) Regulations 2018. (SI 2018 1399).* Available at: https://www.legislation.gov.uk/uksi/2018/1399/contents/made (Accessed: March 2024).

[179] SEPA (2021) *The River Basin Management Plan for Scotland 2021-2027.* Available at: https://www.sepa.org.uk/media/594088/211222-final-rbmp3-scotland.pdf (Accessed: March 2024).

[180] UK Government (2011) *UK Marine Policy Statement*. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69322/pb3654-marine-policy-statement-110316.pdf (Accessed 6 February 2024).

[181] Scottish Government (2015). *Scotland's National Marine Plan: A single Framework for Managing Our Seas*. Available at: https://www.gov.scot/binaries/content/documents/govscot/publications/strategy-plan/2015/03/scotlands-national-marine-plan/documents/00475466-pdf/00475466-pdf/govscot%3Adocument/00475466.pdf (Accessed 6 February 2024).

[182] RenewableUK (2013) *RenewableUK and NERC Cumulative Impact Assessment Guidelines – Guiding Principles for Cumulative Impact Assessment in Offshore Wind Farms*. Available at: https://tethys.pnnl.gov/publications/cumulative-impacts-assessment-guidelines-guiding-principles-cumulative-impacts (Accessed: 6 February 2024).

[183] Judd (2012) *Guidelines for data acquisition to support marine environmental assessments of offshore renewable energy projects*. Cefas contract report: ME5403 – Module 15. 99pp. Available at: https://tethys.pnnl.gov/sites/default/files/publications/CEFAS_2012_Eenvironmental_Assessment_Guidance.pdf (Accessed: 6 February 2024).

[184] Environment Agency (2023). *Clearing the Waters for All*. *Environment Agency guidance on Water Framework Directive assessment for activities in transitional and coastal waters*. Available at: https://www.gov.uk/guidance/water-framework-directive-assessment-estuarine-and-coastal-waters (Accessed: March 2024).

[185] Canadian Council for Ministers of the Environment (2002) *Canadian Sediment Quality Guidelines for the Protection of Aquatic Life* comprising: Introduction – updated 2001; Protocol - 1995; Summary Tables - updated 2002. Toronto: CCME.

[186] UK Admiralty (1977) *Chart 213 Scotland – East Coast: Fraserburgh to Newburgh* (tidal diamonds B, C, D).

[187] UK Admiralty (2017) *Chart 278 North Sea Offshore Charts: Sheet 5* (tidal diamonds B, D, E, F)

[188] MD-LOT (Marine Directorate - Licensing Operations Team, formerly Marine Scotland – Licensing Operations Team) (2023) *Scoping Opinion adopted by the Scottish Ministers under: The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 and The Marine Works (Environmental Impact Assessment) Regulations 2007. Cenos Offshore Windfarm.* Edinburgh; Scottish Government.

[189] Scottish Government (2011). *Scotland's Marine Atlas: Information for the National Marine Plan*. Available at: https://www.gov.scot/publications/scotlands-marine-atlas-information-national-marine-plan/ (Accessed: 6 February 2024).

[190] Marine Scotland (2024) *National Marine Plan interactive (NMPi).* Available at: https://marinescotland.atkinsgeospatial.com/nmpi/ (Accessed: 6 February 2024).

[191] SEPA (2024) *Bathing waters data*. Available at: https://www2.sepa.org.uk/bathingwaters/ (Accessed: 6 February 2024).

[192] SEPA (2024) *WFD datasheets*. Available at: https://www2.sepa.org.uk/WaterBodyDataSheets/ (Accessed: 6 February 2024).

[193] SEPA (2024) *Water Classification Hub*. Available at: https://www.sepa.org.uk/data-visualisation/water-classification-hub/ (Accessed: 6 February 2024).

[194] Cefas (2016). *Suspended Sediment Climatologies around the UK. Report for the UK Department for Business, Energy & Industrial Strategy offshore energy Strategic Environmental Assessment programme prepared by Centre for Environment, Fisheries and Aquaculture Science*. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/584621/CEFAS_2016_Suspended_Sediment_Climatologies_around_the_UK.pdf (Accessed: 6 February 2024).

[195] NorthConnect (2018). NorthConnect HVDC Cable Infrastructure EIAR. Available at: NorthConnect English - NorthConnect English (Accessed: 25 January 2024)

[196] Hywind (2015) *Hywind Scotland Pilot Park Environmental Statement*. Available at: https://cdn.sanity.io/files/h61q9gi9/global/621c1e2b5c660fddc74a85142e99ac3f29ab0eb2.pdf?hywind-scotland-environmental-statement-april-2015-equinor.pdf (Accessed: 6 February 2024).

[197] GreenVolt (2021) *Green Volt Offshore Windfarm – Offshore Environmental Impact Assessment: Offshore Scoping Report*. Available at: https://marine.gov.scot/sites/default/files/scoping_report_green_volt_offshore_wind_farm.pdf (Accessed: 6 February 2024)

[198] IMO (1973). *The International Convention for the Prevention of Pollution from Ships, 1973 (MARPOL) (as modified by the Protocol of 1978 or "MARPOL 73/78").*

[199] IMO (2001) *The International Convention on the Control of Harmful Anti-Fouling Systems on Ships 2001*.

[200] *The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017* (SSI 2017:0115) (as amended). Available at: https://www.legislation.gov.uk/ssi/2017/115/contents (Accessed: 6 February 2024).

[201] *The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017* (SSI 2017:0101) (as amended). Available at: https://www.legislation.gov.uk/ssi/2017/101/contents (Accessed: 6 February 2024).

Benthic Ecology References

[202] Judd,A. (2012) *Guidelines for data acquisition to support marine environmental assessments of offshore renewable energy projects*. Cefas contract report: ME5403 – Module 15. Available at: https://tethys.pnnl.gov/sites/default/files/publications/CEFAS_2012_Eenvironmental_Assessment_Guidance.pdf (Accessed 14 January 2024)

[203] OSPAR (2008) *OSPAR Guidance on Environmental Considerations for Offshore Wind Farm Development (Reference number: 2008-3)*. Available at: https://www.ospar.org/work-areas/eiha/offshore-renewables (Accessed 14 February 2024)

[204] CIEEM (2018) *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine version 1.2*. Chartered Institute of Ecology and Environmental Management, Winchester.

[205] Gubbay (2007). *Defining and managing Sabellaria spinulosa reefs: Report of an inter-agency workshop 1-2 May, 2007*. Available at: https://data.jncc.gov.uk/data/ecdbc5ba-e200-47e3-b7c6-adf464287712/JNCC-Report-405-FINAL-WEB.pdf (Accessed: 30 January 2024).

[206] Irving, R. (2009). *The identification of the main characteristics of stony reef habitats under the Habitats Directive. Summary report of an inter-agency workshop 26-27 March 2008. JNCC Report No. 432*. JNCC; Peterborough.

[207] Golding. N., Albrecht. J., McBreen. F. (2020). *Refining criteria for defining areas with a 'low resemblance' to Annex I stony reef; Workshop Report*. *JNCC Report No. 656*, JNCC, Peterborough, ISSN 0963-8091.

[208] MMO (2014). *Marine Licensing: sediment analysis and sample plans (Updated 2023)* Available at: https://www.gov.uk/guidance/marine-licensing-sediment-analysis-and-sample-plans - ##Suitability%20of%20material (Accessed 14 February 2024)

[209] Canadian Council of Ministers of the Environment (2001). *Canadian Environmental Quality Guidelines – Sediment.* Available at: https://ccme.ca/en/resources/sediment (Accessed: 09 February 2024).

[210] MD-LOT (Marine Directorate - Licensing Operations Team, formerly Marine Scotland – Licensing Operations Team) (2023) *Scoping Opinion adopted by the Scottish Ministers under: The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 and The Marine Works (Environmental Impact Assessment) Regulations 2007. Cenos Offshore Windfarm.* Edinburgh; Scottish Government.

[211] Flotation Energy (2023) *Cenos offshore Windfarm Scoping Report. Version 1 February 2023*. *FLO-CEN-REP-0010*. Flotation Energy; Edinburgh.

[212] Rovco (2023a). *Habitat Assessment Report OWF & ECC. Cenos OWF Array and Export Cable Corridor Geophysical Survey*. Rovco; Bristol.

[213] Rovco (2023b). *Environmental Survey Baseline Report. Cenos OWF Array and Export Cable Corridor Geophysical Survey*. Rovco; Bristol.

[214] OSPAR. (2023). *The 2023 Quality Status Report for the Northeast Atlantic. OSPAR Commission, London*. Available at: https://oap.ospar.org/en/ospar-assessments/quality-status-reports/qsr-2023/ (Accessed: 20 December 2023).

[215] Defra (2023). *Magic maps.* Available at: https://magic.defra.gov.uk/magicmap.aspx (Accessed: March 2024).

[216] Department for Business, Energy & Industrial Strategy (2022). *UK Offshore Energy Strategic Environmental Assessment 4 (OESEA4)*. Available at: https://www.gov.uk/government/consultations/uk-offshore-energy-strategic-environmental-assessment-4-oesea4 (Accessed: March 2024).

[217] McCabe, C., McBreen, F. & O'Connor, J. (2020). *East of Gannet and Montrose Fields MPA Monitoring Report 2015 (version 2)*. JNCC-MSS Partnership Report No. 1. JNCC, Peterborough, ISSN 2634-2081.

[218] European Commission (2024). *EMODnet Map Viewer*. Available at: https://emodnet.ec.europa.eu/geoviewer/ (Accessed: February 2024).

[219] NatureScot (2020). *Possible Nature Conservation MPA advice documents – Southern Trench*. Available at: https://www.nature.scot/doc/possible-nature-conservation-mpa-advice-documents-southern-trench (Accessed: March 2024).

[220] NorthConnect (2018). *NorthConnect HVDC Cable Infrastructure EIAR: Volume 1*. Available at: https://marine.gov.scot/data/northconnect-hvdc-cable-environmental-impact-assessment-report-volume-1 (Accessed: 25 January 2024).

[221] JNCC (2012). *CEND19x12: Cruise report for Braemar Pockmarks cSAC, Scanner Pockmark cSAC and Turbot Bank NCMPA proposal*. Available at: https://hub.jncc.gov.uk/assets/14030bfa-8bda-4a20-8dd5-4f93385d6c22 (Accessed: March 2024).

[222] European Commission (2012). *Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora*. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A01992L0043-20130701 (Accessed: 09 February 2024).

[223] Henry, L & Roberts, J (2014). *Applying the OSPAR habitat definition of deep-sea sponge aggregations to verify suspected records of the habitat in UK waters*. Available at: https://data.jncc.gov.uk/data/788783fe-0c27-4faf-9fc3-6b1b1ad3bf78/JNCC-Report-508-FINAL-WEB.pdf (Accessed: 09 February 2024).

[224] Marine Scotland (2024). *Maps NMPI*. Available at: https://marinescotland.atkinsgeospatial.com/nmpi// (Accessed: February 2024).

[225] Global Maritime (2023). Cenos Offshore Wind Farm: Nearshore Survey Review. Global Maritime; London

[226] Kröncke I. (1995). *Long-term changes in North Sea benthos*. Senckenberg Marit, 26, 73-80.

[227] Moore, P.J. and Smale, D.A. (2020) *Impacts of climate change on shallow and shelf subtidal habitats relevant to the coastal and marine environment around the UK*. MCCIP Science Review 2020, 272–292.

[228] Weinert, M et al (2021). *Climate change effects on marine protected areas: Projected decline of benthic species in the North Sea.* Available at: https://www.sciencedirect.com/science/article/pii/S0141113620309971 (Accessed: 09 February 2024).

[229] Reid, P. C., and Valdés, L. (2011). *ICES status report on climate change in the North Atlantic*. ICES Cooperative Research Report No. 310. 262 pp.

[230] Marine Scotland (2016) *FEAST.* Available at: https://marine.gov.scot/data-source-types/feast -:~:text=FEAST%20is%20a%20Feature%20Activity,marine%20environment%20may%20be%20required. (Accessed 14 January 2024)

[231] Tyler-Walters, H., Tillin, H.M., d'Avack, E.A.S., Perry, F., Stamp, T., (2023). *Marine Evidence based Sensitivity Assessment (MarESA) – Guidance Manual. Marine Life Information Network (MarLIN).* Marine Biological Association of the UK, Plymouth, pp. 170. Available from https://www.marlin.ac.uk/publications (Accessed: 30 January 2024).

[232] MMO (2013). *Marine conservation zones and marine licensing*. Available at: https://assets.publishing.service.gov.uk/media/5a7f98a0ed915d74e622b6cb/Marine_conservation_zones_and_marine_licensing.pdf (Accessed: 30 January 2024).

Marine Mammals References

[233] OSPAR (1992) *The Convention for the Protection of the Marine Environment of the North East Atlantic*. Available at: https://www.ospar.org/site/assets/files/1290/ospar_convention.pdf (Accessed: March 2024).

[234] *The Conservation (natural habitats, &c.) regulations 1994. (SI 1994 2716*). Available at: https://www.legislation.gov.uk/uksi/1994/2716/made/data.pdf (Accessed: 25 January 2024).

[235] *Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019*. Available at: https://www.legislation.gov.uk/uksi/2019/579/contents/made (Accessed: March 2024).

[236] *Marine (Scotland) Act 2010*. Available at: https://www.legislation.gov.uk/asp/2010/5/contents (Accessed: March 2024).

[237] *Nature Conservation (Scotland) Act 2004*. Available at: https://www.legislation.gov.uk/asp/2004/6 (Accessed: March 2024).

[238] *Protection of Seals (Designation of Haul-out Sites) (Scotland) Order 2014*. Available at: https://www.legislation.gov.uk/ssi/2014/185/pdfs/ssipn_20140185_en.pdf (Accessed: March 2024).

[239] *The Conservation of Offshore Marine Habitats and Species Regulations 2017*. Available at: https://www.legislation.gov.uk/uksi/2017/1013 (Accessed: March 2024).

[240] Chartered Institute of Ecology and Environmental Management. (2022). *Guidelines for Ecological Impact Assessment in the UK and Ireland. Terrestrial, Freshwater, Coastal and Marine.* Available at: https://cieem.net/wp-content/uploads/2018/08/ECIA-Guidelines-2018-Terrestrial-Freshwater-Coastal-and-Marine-V1.2-April-22-Compressed.pdf (Accessed: February 2024).

[241] JNCC. (2010). *Statutory nature conservation agency protocol for minimising the risk of injury to marine mammals from piling noise*. Available at https://data.jncc.gov.uk/data/31662b6a-19ed-4918-9fab-8fbcff752046/JNCC-CNCB-Piling-protocol-August2010-Web.pdf (Accessed: 18 January 2024).

[242] JNCC. (2017). *JNCC guidelines for minimising the risk of injury to marine mammals from geophysical surveys.* Available at https://data.jncc.gov.uk/data/e2a46de5-43d4-43f0-b296-c62134397ce4/jncc-guidelines-seismicsurvey-aug2017-web.pdf (Accessed: 12 March 2024).

[243] JNCC. (2010). *JNCC guidelines for minimising the risk of injury to marine mammals from using explosives*. Available at https://data.jncc.gov.uk/data/24cc180d-4030-49dd-8977-a04ebe0d7aca/JNCC-Guidelines-Explosives-Guidelines-201008-Web.pdf (Accessed: 12 March 2024).

[244] National Marine Fisheries Service. (2016). *Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing: Underwater Acoustic Thresholds for Onset of Permanent and Temporary Threshold Shifts.* Available at:

https://www.sprep.org/attachments/VirLib/Global/technical-guidance-assessing-effects-anthropogenic-sound-marine-mammal-hearing-noaa.pdf (Accessed: February 2024).

[245] JNCC. (2010). *The Protection of Marine European Protected Species from Injury and Disturbance*. Guidance for the marine area in England and Wales and the UK offshore marine area. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/850708/Draft_Guidance_on_the_Protection_of_Marine_European_Protected_Species_from_Injurt_and_Disturbance.pdf (Accessed: March 2024).

[246] Marine Scotland. (2020). *The Protection of Marine European Protected Species from Injury and Disturbance.* Guidance for Scottish Inshore Waters. Available at: https://www.gov.scot/binaries/content/documents/govscot/publications/advice-and-guidance/2020/07/marine-european-protected-species-protection-from-injury-and-disturbance/documents/marine-european-protected-species-guidance-july-2020/marine-european-protected-species-guidance-july-2020/govscot%3Adocument/EPS%2Bguidance%2BJuly%2B2020.pdf (Accessed: March 2024).

[247] Marine Scotland. (2014). *'Guidance on the Offence of Harassment at Seal Haul-out Sites'.* Available at: https://www.gov.scot/policies/marine-environment/seal-haul-out-sites/ (Accessed: February 2024).

[248] Department for Business, Energy & Industrial Strategy *et al* (2022). *Policy paper: Marine environment: unexploded ordnance clearance joint interim position statement*. Available at: https://www.gov.uk/government/publications/marine-environment-unexploded-ordnance-clearance-joint-interim-position-statement/marine-environment-unexploded-ordnance-clearance-joint-interim-position-statement (Accessed: February 2024).

[249] ORJIP. (2023). *Reducing uncertainty in underwater noise assessment for offshore winf (ReCon).* Available at: https://www.carbontrust.com/our-work-and-impact/guides-reports-and-tools/reducing-uncertainty-in-underwater-noise-assessments-for-offshore-wind-recon (Accessed: February 2024).

[250] Wood, M.A., M.A. Ainslie, and R.D.J. Burns. (2023). *Energy Conversion Factors in Underwater Radiated Sound from Marine Piling: Review of the method and recommendations*. *Document 03008, Version 1.2*. Available at: https://www.gov.scot/binaries/content/documents/govscot/publications/research-and-analysis/2023/10/energy-conversion-factors-underwater-radiated-sound-marine-piling-review-method-recommendations-2/documents/energy-conversion-factors-underwater-radiated-sound-marine-piling-review-method-recommendations/energy-conversion-factors-underwater-radiated-sound-marine-piling-review-method-recommendations/govscot%3Adocument/energy-conversion-factors-underwater-radiated-sound-marine-piling-review-method-recommendations.pdf (Accessed: February 2024).

[251] MD-LOT. (2021). *UK dolphin and porpoise conservation strategy: high level strategy.* Available at: UK dolphin and porpoise conservation strategy: high level strategy - gov.scot (www.gov.scot) (Accessed: March 2024).

[252] Flotation Energy. (2023) *Cenos offshore Windfarm Scoping Report. Version 1 February 2023*. FLO-CEN-REP-0010.

[253] Flotation Energy. (2023) *Cenos offshore Windfarm Scoping Report. Version 1 February 2023*. FLO-CEN-REP-0010.

[254] MD-LOT (Marine Directorate - Licensing Operations Team, formerly Marine Scotland – Licensing Operations Team) (2023) *Scoping Opinion adopted by the Scottish Ministers under: The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 and The Marine Works (Environmental Impact Assessment) Regulations 2007. Cenos Offshore Windfarm.* Edinburgh; Scottish Government.

[255] Department for Business, Energy & Industrial Strategy (2022). *UK Offshore Energy Strategic Environmental Assessment Future Leasing/Licensing for Offshore Renewable Energy, Offshore Oil & Gas and Gas Storage and Associated Infrastructure OESEA4 Environmental Report*. Available at: https://assets.publishing.service.gov.uk/media/623356e4e90e0709e1e4530d/OESEA4_Environmental_Report.pdf (Accessed: February 2024).

[256] OSPAR. (2023). *The 2023 Quality Status Report for the Northeast Atlantic. OSPAR Commission, London*. Available at: https://oap.ospar.org/en/ospar-assessments/quality-status-reports/qsr-2023/ (Accessed: 20 December 2023).

[257] Gilles, A, Authier, M, Ramirez-Martinez, NC, Araújo, H, Blanchard, A, Carlström, J, Eira, C, Dorémus, G, FernándezMaldonado, C, Geelhoed, SCV, Kyhn, L, Laran, S, Nachtsheim, D, Panigada, S, Pigeault, R, Sequeira, M, Sveegaard, S, Taylor, NL, Owen, K, Saavedra, C, Vázquez-Bonales, JA, Unger, B, Hammond, PS (2023). *Estimates of cetacean abundance in European Atlantic waters in summer 2022 from the SCANS-IV aerial and shipboard surveys. Final report published 29 September 2023*. Available at: https://www.tiho-hannover.de/itaw/scans-iv-survey (Accessed: March 2024).

[258] Hammond, P.S., Lacey, C., Gilles, A., Viquerat, S., Börjesson, P., Herr, H., Macleod, K., Ridoux, V., Santos, M.B., Scheidat, M., Teilmann, J., Vingada, J. and Øien, N. (2021). *Estimates of cetacean abundance in European Atlantic waters in summer 2016 from the SCANS-III aerial and shipboard surveys. SCANS-III project report 1, 39 pp*. Available at: https://scans3.wp.st-andrews.ac.uk/files/2021/06/SCANS-III_design-based_estimates_final_report_revised_June_2021.pdf (Accessed: 16 January 2024)

[259] Lacey, C., Gilles, A., Borjesson, P., Herr, H., Macleod, K., Ridoux, V., Santos, M.B., Scheidat, M., Teilmann, J., Sveegaard, S., Vingada, J., Viquerat, S., Oien, N. and Hammond. P.S. (2022). *Modelled density surfaces of cetaceans in European Atlantic waters in summer 2016 from the SCANS-III aerial and shipboard surveys.* SCANS-III project report 2, 31pp + Appendices.

[260] Hague, E., Sinclair, R. and Sparling, C. (2020). *Regional baselines for marine mammal knowledge across the North Sea and Atlantic areas of Scottish waters* (*Report No. Scottish Marine and Freshwater Science Vol 11 No 12). Report by Marine Scotland Science*. Available at: https://data.marine.gov.scot/dataset/regional-baselines-marine-mammal-knowledge-across-north-sea-and-atlantic-areas-scottish (Accessed: January 2024).

[261] Waggitt, J.J., Evans, P.G.H., Andrade, J., Banks, A., Boisseau, O., Bolton, M., Bradbury, G., Brereton, T., Camphuysen, C., Durinck, J., Felce, T., Fijn, C., Garcia-Baron, I., Garthe, S., Geelhoed, S., Gilles, A., Goodall, M., Haelters, H., Hamilton, S., Hartney-Mills, L., Hodgins, N., James, K., Jessopp, M., Kavanagh, A., Leopold, M., Lohrengel, K., Louzao, M., Markones, N., Martinez-Cedeira, J., O Cadhla, O., Perry, S., Pierce, G., Ridoux, V., Robinson, K., Santos, M., Saavedra, C., Skov, H., Stienen, E., Sveegaard., S., Thompson,

P., Vanermen, N., Wall, D., Webb, A., Wilson, J., Wanless, S. and Geert Hiddink, H. (2020). *Distribution maps of cetacean and seabird populations in the North-East Atlantic*. J Appl Ecol; 57: 253–269. Available at: https://besjournals.onlinelibrary.wiley.com/doi/10.1111/1365-2664.13525 (Accesses: February 2024).

[262] IAMMWG. (2022). *Updated abundance estimates for cetacean Management Units in UK waters (Revised 2022)*. Available at: https://data.jncc.gov.uk/data/3a401204-aa46-43c8-85b8-5ae42cdd7ff3/jncc-report-680-revised-202203.pdf (Accessed: February 2024).

[263] SCOS (Special Committee on Seals). (2022). *Scientific Advice on Matters Related to the Management of Seal Populations: 2022*. (online) Available at: http://www.smru.st-andrews.ac.uk/files/2023/09/SCOS-2022.pdf (Accessed: 30 January 2024)

[264] Carter, M.I.D., Boehme,L ., Cronin, M.A., Duck, C.D., Grecian, W.J., Hastie, G.D., Jessopp, M., Matthiopoulos, J., McConnell, B.J., Miller, D.L., Morris, C.D., Moss. S.E.W., Thompson, D., Thompson, P.M. and Russell, D.J.F. (2022). *Sympatric seals, satellite tracking and protected areas: Habitat-based distribution estimates for conservation and management. Front. Mar. Sci. 9*. Available at: https://aura.abdn.ac.uk/bitstream/handle/2164/18725/Carter_etal_FMS_Sympatric_Seals_Satellite_VoR.pdf?sequence=1 (Accessed: February 2024).

[265] Arso Civil, M., Quick, N., Mews, S., Hague, E., Cheney, B.J., Thompson, P.M. & Hammond, P.S. (2021). *Improving understanding of bottlenose dolphin movements along the east coast of Scotland.* Final report. Report number SMRUC-VAT-2020-10 provided to European Offshore Wind Deployment Centre (EOWDC), March 2021 (unpublished).

[266] Russell, D. J. F. and McConnell, B. J. (2014). *Seal at-sea distribution, movements and behaviour*. Department of Energy and Climate Change.

[267] Brookes, K. (2017). *The East Coast Marine Mammal Acoustic Study data.* Available at: https://data.marine.gov.scot/dataset/east-coast-marine-mammal-acoustic-study (Accessed 14 Match 2024).

[268] BEIS. (2022*). Offshore Energy Strategic Environmental Assessment 4 (OESEA4) Appendix 1a.8 Marine Mammals*. Available at: https://assets.publishing.service.gov.uk/media/62333df3e90e0709dedf1a25/Appendix_1a_8_-_Marine_mammals.pdf (Accessed: 20 December 2023)

[269] BEIS. (2022). *Offshore Energy Strategic Environmental Assessment 4 (OESEA4) Appendix 1a.6 Marine Reptiles*. Available at: https://assets.publishing.service.gov.uk/media/623357f28fa8f504a6d54c7a/Appendix_1a_6_-_Marine_reptiles.pdf (Accessed: 16 January 2023)

[270] HiDef. (2023). *Digital video aerial surveys of seabirds and marine mammals at Central North Sea: 2-Year Report April 2021 to March 2023*. Issue v.1 HP00144-702-01-01

[271] Rovco. (2023). *Benthic Marine Mammal Observation and Passive Acoustic Monitoring Report: Cenos OWF Array and Export Cable Corridor Geophysical Survey. Rev. 01, December 2023*. FLO-CEN-REP-0035

[272] Dolman, S.J., Champion, A., Clark, J., Eisfeld-Pierantonio, S., Green, M., Gregerson, S., Hodgins,N., Ritter, F., Tetley, M. and Hoyt, E. (2013). *Making space for porpoises, dolphins*

and whales in UKseas: Harbour Porpoise Special Areas of Conservation as part of a coherent network of marine protected areas for cetaceans. A WDC Report. Available from: https://www.researchgate.net/publication/314455815_Making_space_for_porpoises_dolphins_and_whales_in_UK_seas_Harbour_Porpoise_Special_Areas_of_Conservation_as_part_of_a_coherent_network_of_marine_protected_areas_for_cetaceans#fullTextFileContent (Accessed: March 2024).

[273] Sonntag, R.P., Benke, H., Hiby, A.R., Lick, R. and Adelung, D. (1999). *Identification of the first harbour porpoise (Phocoena Phocoena) calving ground in the North Sea*, Journal of Sea Research, Volume 41, Issue 3. ISSN 1385-1101.

[274] HiDef. (2023). *Digital video aerial surveys of seabirds and marine mammals at Central North Sea: 2-Year Report April 2021 to March 2023*. Issue v.1 HP00144-702-01-01

[275] Reid, J.B., Evans, P.G.H. and Northridge, S.P. (2003). *Atlas of Cetacean distribution in north-west European waters,* JNCC, Peterborough, ISBN 1 86107 550 2.

[276] Jansen, O., Leopold, M., Meesters, E. and Smeenk, C. (2010). *Are white-beaked dolphins Lagenorhynchus albirostris food specialists? Their diet in the southern North Sea*. Journal of the Marine Biological Association of the United Kingdom;90(8):1501-1508, doi:10.1017/S0025315410001190

[277] Evans, P.G.H., Baines, M.E. and Coppock, J. (2011). *Abundance and behaviour of cetaceans and basking sharks in the Pentland Firth and Orkney Waters*. Report by Hebog Environmental Ltd & Sea Watch Foundation. Scottish Natural Heritage Commissioned Report No.419

[278] Arso Civil, M., Quick, N., Mews, S., Hague, E., Cheney, B.J., Thompson, P.M. and Hammond, P.S. (2021). *Improving understanding of bottlenose dolphin movements along the east coast of Scotland.* Final report. Report number SMRUC-VAT-2020-10 provided to European Offshore Wind Deployment Centre (EOWDC), March 2021 (unpublished).

[279] Robinson, K.P., Tetley, M.J. and Mitchelson-Jacob.E.G. (2009). *The distribution and habitat preference of coastally occurring minke whales (Balaenoptera acutorostrata) in the outer southern Moray Firth, northeast Scotland.* Journal of Coastal Conservation. 13:39-48.

[280] Risch, D., Wilson, S.C., Hoogerwerf, M. van Geel, N., Edwards, E. and Brookes.K. (2019). *Seasonal and diel acoustic presence of North Atlantic minke whales in the North Sea.* Sci Rep 9, 3571. https://doi.org/10.1038/s41598-019-39752-8

[281] Waggitt, J.J., Evans, P.G.H., Andrade, J., Banks, A., Boisseau, O., Bolton, M., Bradbury, G., Brereton, T., Camphuysen, C., Durinck, J., Felce, T., Fijn, C., Garcia-Baron, I., Garthe, S., Geelhoed, S., Gilles, A., Goodall, M., Haelters, H., Hamilton, S., Hartney-Mills, L., Hodgins, N., James, K., Jessopp, M., Kavanagh, A., Leopold, M., Lohrengel, K., Louzao, M., Markones, N., Martinez-Cedeira, J., O Cadhla, O., Perry, S., Pierce, G., Ridoux, V., Robinson, K., Santos, M., Saavedra, C., Skov, H., Stienen, E., Sveegaard., S., Thompson, P., Vanermen, N., Wall, D., Webb, A., Wilson, J., Wanless, S. and Geert Hiddink, H. (2020). *Distribution maps of cetacean and seabird populations in the North-East Atlantic*. J Appl Ecol; 57: 253–269. Available at: https://besjournals.onlinelibrary.wiley.com/doi/10.1111/1365-2664.13525 (Accessed: February 2024).

[282] Baxter, J. M., Boyd, I., Cox, M., Donald, A.E., Malcolm, S.J., Miles, H., Miller, B. and Moffat, C. F. (2011). *Scotland's Marine Atlas: Information for the national marine plan,* Marine Scotland, Edinburgh.

[283] Lowry, l. F., K. J. Frost, J. M. Ver Hoef and R. Delong. (2001). *Movements of satellite-tagged harbor seals in Prince William Sound, Alaska, 1992-1997*. Marine Mammal Science 17:OOO-000

[284] Sharples, R., Moss, S., Patterson, T. and Hammond, P. (2012). *Spatial Variation in Foraging Behaviour of a Marine Top Predator (Phoca vitulina) Determined by a Large-Scale Satellite Tagging Program*. Available at: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0037216 (Accessed: March 2024).

[285] Russell, D.J.F., Jones, E.L. and Morris, C.D. (2017). *Updated Seal Usage Maps: The Estimated at-sea Distribution of Grey and Harbour Seals*. Scot. Mar. and Freshwater Sci. 8(25), 25pp.

[286] Carter, M.I., Boehme, L., Duck, C.D., Grecian, J., Hastie, G.D., McConnell, B.J., Miller, D.L., Morris, C., Moss, S., Thompson, D. and Thompson, P. (2020). *Habitat-based predictions of at-sea distribution for grey and harbour seals in the British Isles: Report to BEIS, OESEA-16-76, OESEA-17-78*. Available at: https://assets.publishing.service.gov.uk/media/6022c0bf8fa8f51478436975/SMRU_2020_Habitat-based_predictions_of_at-sea_distribution_for_grey_and_harbour_seals_in_the_British_Isles.pdf (Accessed: 30 January 2024)

[287] Martin, E., Banga, R. and Taylor, N.L. (2023) *Climate Change Impacts on Marine Mammals around the UK and Ireland*. MCCIP Science Review 2023, 22pp. Available at: Climate Change Impacts on Marine Mammals around the UK and Ireland.pdf (mccip.org.uk) (Accessed: 20 March 2024)

[288] Gilles, A, Authier, M, Ramirez-Martinez, NC, Araújo, H, Blanchard, A, Carlström, J, Eira, C, Dorémus, G, Fernández-Maldonado, C, Geelhoed, SCV, Kyhn, L, Laran, S, Nachtsheim, D, Panigada, S, Pigeault, R, Sequeira, M, Sveegaard, S,Taylor, NL, Owen, K, Saavedra, C, Vázquez-Bonales, JA, Unger, B, Hammond, PS (2023). *Estimates of cetaceanabundance in European Atlantic waters in summer 2022 from the SCANS-IV aerial and shipboard surveys. Final report published 29 September 2023*. 64 pp. Available at: https://www.researchgate.net/publication/374504552_Estimates_of_cetacean_abundance_in_European_Atlantic_waters_in_summer_2022_from_the_SCANS-IV_aerial_and_shipboard_surveys (Accessed: 30 January 2024).

[289] JNCC. (2010). *Statutory nature conservation agency protocol for minimising the risk of injury to marine mammals from piling noise*. Available at https://data.jncc.gov.uk/data/31662b6a-19ed-4918-9fab-8fbcff752046/JNCC-CNCB-Piling-protocol-August2010-Web.pdf (Accessed: 18 January 2024).

[290] Bristow, T. and Reeves, E.I.S. (2001). *Site fidelity and behaviour of bottlenose dolphins (Tursiops truncatus) in Cardigan Bay, Wales.* Aquatic Mammals 27: 1-10.

[291] Gregory, P.R. and Rowden, A.A. (2001). *Behaviour patterns of bottlenose dolphins (Tursiops truncatus) relative to tidal state, time of day and boat traffic in Cardigan Bay, West Wales.* Aquatic Mammals 27: 105-113.

[292] Leung Ng, S. and Leung, S. (2003). *Behavioural response of Indo-Pacific humpback dolphin (Sousa chinensis) to vessel traffic.* Marine Environmental Research 56: 555-567

[293] Buckstaff, K.C. (2004). *Effects of watercraft noise on the acoustic behaviour of bottlenose dolphins, Tursiops truncatus, in Sarasota Bay, Florida.* Marine Mammal Science 20: 709-725.

[294] Vanderlaan, A.S.M. and Taggart, C.T. (2007). *Vessel collisions with whales: the probability of lethal injury based on vessel speed.* Mar. Mamm. Sci. 23, 144-156. Doi: 10.1111/j.1748-7692.2006.00098.x

[295] David, L., Alleaume, S. and Guinet, C. (2011). *Evaluation of the potential of collision between fin whales and maritime traffic in the north-western Mediterranean Sea in summer, and mitigation solutions*. Journal of Marine Animals and Their Ecology Vol, 4(1).

[296] Conn, P. B. and Silber, G. K. (2013). *Vessel speed restrictions reduce risk of collision-related mortality for North Atlantic right whales*. Ecosphere, 4(4), 1–16. Available at: https://besjournals.onlinelibrary.wiley.com/doi/pdf/10.1890/ES13-00004.1 (Accessed: February 2024).

[297] Caruso, F., Hickmott, L., Warren, J. D., Segre, P., Chiang, G., Bahamonde, P., EspaÑol-JimÉnez, S., Li, S., & Bocconcelli, A. (2020). *Diel differences in blue whale (Balaenoptera musculus) dive behavior increase nighttime risk of ship strikes in northern Chilean Patagonia.* Integrative Zoology. Available at: https://doi.org/10.1111/1749-4877.12501 (Accessed: February 2024).

[298] Dyndo, M., Wiśniewska, D. M., Rojano-Doñate, L. and Madsen, P. T. (2015). *Harbour porpoises react to low levels of high frequency vessel noise*. Scientific Reports, 5, 11083. Available at: https://doi.org/10.1038/srep11083 (Accessed: February 2024).

[299] Sparling, C.E., Coram, A.J., McConnell, B., Thompson, D., Hawkins, K.R. and Northridge S.P. (2013). *Wave & Tidal Consenting Position Paper Series: Marine Mammal Impacts. NERC.* Available at: https://tethys.pnnl.gov/sites/default/files/publications/NERC-2013-Marine-Mammal.pdf (Accessed: 18 January 2024)

[300] Benjamins, S., Harnois, V., Smith, H.C.M., Johanning, L., Greenhill, L., Carter, C. and Wilson, B. (2014). *Understanding the potential for marine megafauna entanglement risk from renewable marine energy developments*. Scottish Natural Heritage Commissioned Report No. 791.

[301] MacLennan, E., Hartny-Mills, L., Read, F.L., Dolman, S.J., Philp, A., Dearing, K.E., Jarvis, D. and Brownlow, A.C. (2021). *Scottish Entanglement Alliance (SEA) - understanding the scale and impacts of marine animal entanglement in the Scottish creel fishery*. NatureScot Research Report 1268. Available at: https://www.nature.scot/doc/naturescot-research-report-1268-scottish-entanglement-alliance-sea-understanding-scale-and-impacts (Accessed: February 2024).

[302] Oliveira, F., Monteiro, P., Bentes L., Henriques, N.S., Aguilar, R., and Goncalves, J.M.S. (2015). *Marine litter in the upper Sao Vincente submarine canyon (SW Portugal): abundance, distribution, composition and fauna interactions.* Marine Pollution Bulletin 97, 7.

[303] NRDC. (2022). *New Recommendations Reduce Floating Wind Entanglement Risk.* Available at: https://www.nrdc.org/bio/francine-kershaw/new-recommendations-reduce-

floating-wind-entanglement-risk#:~:text=The%20recommended%20monitoring%20approach%20uses,inspections%20of%20the%20full%20length (Accessed: February 2024).

[304] Brasseur, S.M.J.M., Scheidat, M, Aarts, G.M., Cremer, J.S.M. and Bos, O.G. (2008). *Distribution of marine mammals in the North Sea for the generic appropriate assessment of future offshore wind farms* Wageningen IMARES Report Number C046/08. Available at: https://www.researchgate.net/publication/40096819_Distribution_of_marine_mammals_in_the_North_Sea_for_the_generic_appropriate_assessment_of_future_offshore_wind_farms (Accessed: 21 February 2024)

[305] Kremers, D., Marulanda, J.L., Hausberger, M., Lemasson. A. (2014). *Behavioural evidence of magnetoreception in dolphins: detection of experimental magnetic fields*. The Science of Nature Naturwissenschaften, 101 (11), pp.907-911. ff10.1007/s00114-014-1231-xff. ffhal-01134557

[306] Kirschvink, J. L., Dizon, A.E. and Westphal, J.A. (1986). *Evidence from strandings for geomagnetic sensitivity in cetaceans*. J Exp Biol 120:1-24

[307] Tricas, T. and Gill. A. (2011). *Effects of EMFs from Undersea Power Cables on Elasmobranchs and Other Marine Species*. U.S. Dept. of the Interior, Bureau of Ocean Energy Management, Regulation, and Enforcement, Pacific OCS Region, Camarillo, CA. OCS Study BOEMRE 2011-09

[308] Bauer, G.B., Fuller, M., Perry, A., Dunn, J.R. and Zoeger, J. (1985). *Magnetoreception and biomineralization of magnetite in cetaceans.* In: Kirschvink JL, Jones DS, MacFadden BJ (eds) Magnetite biomineralization and magnetoreception in organisms: A new biomagnetism. Plenum Press, New York, pp 489-507

[309] Harwood, J., King, S., Schick, R., Donovan, C. and Booth, C. (2013). *A Protocol for Implementing the Interim Population Consequences of Disturbance (PCoD) Approach: Quantifying and Assessing the Effects of UK Offshore Renewable Energy Developments on Marine Mammal Populations.* Scottish Marine and Freshwater Science 5(2). Available at: http://www.gov.scot/Resource/0044/00443360.pdf (Accessed 13 March 2024)

[310] Harwood, J. and King, S.L. (2017). *The Sensitivity of UK Marine Mammal Populations to Marine Renewables Developments - Revised Version*. Report number SMRUC-MSS-2017-005. Available at: https://data.marine.gov.scot/dataset/interim-population-consequences-disturbance-ipcod-code-update-version-3 (Accessed: February 2024).

[311] King, S. L., Schick, R. S., Donovan, C., Booth, C. G., Burgman, M., Thomas, L., *et al.* (2015). *An interim framework for assessing the population consequences of disturbance.* Methods in Ecology and Evolution, 6(10), 1150e1158. Available at: https://dx.doi.org/10.1111/2041-210X.12411 (Accessed: 13 March 2024)

[312] Southall *et al* (2019). *Marine Mammal Noise Exposure Criteria: Updated Scientific Recommendations for Residual Hearing Effects*. Available at: https://sea-inc.net/wp-content/uploads/2019/10/Southall-et-al_2019_MM-Noise-critieria-update-with-errata_Aq-Mammals.pdf (Accessed: February 2024).

[313] NMFS. (2018). *2018 Revisions to: Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 2.0) Underwater Thresholds for*

Onset of Permanent and Temporary Threshold Shifts. Available at: https://www.fisheries.noaa.gov/s3/2023-05/TECHMEMOGuidance508.pdf (Accessed: February 2024).

[314] Wang, L., Heaney, K., Pangerc, T., Theobald, P., Robinson, S. and Ainslie, M. (2014). *Review of underwater acoustic propagation models*. NPL report AC12: October 2014. Available at: AC12.pdf (npl.co.uk) (Accessed: 20 February 2024

Ornithology References

[315] European Commission (1992). *Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora*. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A31992L0043 (Accessed: March 2024).

[316] European Commission (2009). *Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds (Codified version).* Available at: https://eur-lex.europa.eu/eli/dir/2009/147/oj (Accessed: March 2024).

[317] Official Journal of the European Communities (1979). *Convention on the conservation of European wildlife and natural habitats*. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A21979A0919%2801%29 (Accessed: March 2024).

[318] *The Marine Environment (EU Exit) (Scotland) (Amendment) Regulations 2019*. Available at: https://www.legislation.gov.uk/ssi/2019/55/contents/made (Accessed: March 2024).

[319] *The Conservation (Natural Habitats &c.) Regulations 1994 (as amended).* Available at: https://www.legislation.gov.uk/uksi/1994/2716/contents (Accessed: March 2024).

[320] *The Conservation of Habitats and Species Regulations 2017*. Available at: https://www.legislation.gov.uk/uksi/2017/1012/contents. (Accessed: March 2024).

[321] *The Conservation of Offshore Marine Habitats and Species Regulations 2017*. Available at: https://www.legislation.gov.uk/uksi/2017/1013/contents (Accessed: March 2024).

[322] *The Conservation (Natural Habitats, etc.) (EU Exit) (Scotland) (Amendment) Regulations 2019*. Available at: https://www.legislation.gov.uk/ssi/2019/113/contents/made (Accessed: March 2024).

[323] *Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019*. Available at: https://www.legislation.gov.uk/uksi/2019/579/contents/made (Accessed: March 2024).

[324] *Wildlife and Countryside Act 1981 (as amended).* Available at: https://www.legislation.gov.uk/ukpga/1981/69 (Accessed: March 2024).

[325] *Wildlife and Natural Environment (Scotland) Act 2011*. Available at: https://www.legislation.gov.uk/asp/2011/6/contents (Accessed: March 2024).

[326] *Marine (Scotland) Act 2010*. Available at: https://www.legislation.gov.uk/asp/2010/5/contents (Accessed: March 2024).

[327] *Marine and Coastal Access Act 2009*. Available at: https://www.legislation.gov.uk/ukpga/2009/23/contents (Accessed: March 2024).

[328] Scottish Government (2022). *Scottish Biodiversity Strategy to 2045 Tackling the Nature Emergency in Scotland*. Available at: https://www.gov.scot/publications/scottish-biodiversity-strategy-2045-tackling-nature-emergency-scotland/documents/ (Accessed: March 2024).

[329] JNCC and Defra (2012). *UK Post-2010 Biodiversity Framework*. Available at: https://data.jncc.gov.uk/data/587024ff-864f-4d1d-a669-f38cb448abdc/UK-Post2010-Biodiversity-Framework-2012.pdf (Accessed: March 2024).

[330] Marine Scotland (2015). *Scotland's National Marine Plan*. Available at: https://www.gov.scot/publications/scotlands-national-marine-plan/documents/ (Accessed: March 2024).

[331] CIEEM (2022). *Guidelines for Ecological Impact Assessment in the UK and Ireland Terrestrial, Freshwater, Coastal and Marine. Version 1.2*. Available at: https://cieem.net/wp-content/uploads/2018/08/ECIA-Guidelines-2018-Terrestrial-Freshwater-Coastal-and-Marine-V1.2-April-22-Compressed.pdf (Accessed: March 2024).

[332] NatureScot. (2023). *Advice on marine renewables development*. Available at: https://www.nature.scot/professional-advice/planning-and-development/planning-and-development-advice/renewable-energy/marine-renewables/advice-marine-renewables-development (Accessed: 2 February 2024).

[333] NatureScot (2020). *Seasonal Periods for Birds in the Scottish Marine Environment*. Available at: https://www.nature.scot/doc/guidance-note-9-guidance-support-offshore-wind-applications-seasonal-periods-birds-scottish-marine (Accessed: March 2024).

[334] Scottish Natural Heritage (2018). *Environmental Impact Assessment Handbook. Guidance for competent authorities, consultation bodies, and others involved in the Environmental Impact Assessment process in Scotland*. Available at: https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=6ed33b65-9df1-4a2f-acbb-a8e800a592c0 (Accessed: March 2024).

[335] Marine Industry Group for ornithology (MIG-Birds) et al. (2022). *Joint SNCB Interim Displacement Advice Note*. Available at: https://data.jncc.gov.uk/data/9aecb87c-80c5-4cfb-9102-39f0228dcc9a/joint-sncb-interim-displacement-advice-note-2022.pdf (Accessed: March 2024).

[336] Statutory Nature Conservation Bodies (s). (2014). *Joint Response from the Statutory Nature Conservation Bodies to the Marine Scotland Science Avoidance Rate Review*. SNCB.

[337] Woodward, I., Thaxter, C. B., Owen, E. and Cook, A.S.C.P. (2019). *Desk-based revision of seabird foraging ranges used for HRA screening*. BTO research report number 724.

[338] Furness, R.W. (2015). *Non-breeding season populations of seabirds in UK waters: Population sizes for Biologically Defined Minimum Population Scales (BDMPS).* Natural England Commissioned Reports, No.164.

[339] NatureScot. (2023a). *Guidance Note 2: Guidance to support Offshore Wind Applications: Advice for Marine Ornithology Baseline Characterisation Surveys and Reporting*. Available at: https://www.nature.scot/doc/guidance-note-2-guidance-support-offshore-wind-applications-advice-marine-ornithology-baseline (Accessed: March 2024).

[340] Marine Directorate - Licensing Operations Team (2023). *Scoping Opinion adopted by the Scottish Ministers under: The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 and The Marine Works (Environmental Impact Assessment) Regulations 2007. Cenos Offshore Windfarm*. Available at: https://marine.gov.scot/sites/default/files/cenos_offshore_windfarm_-_flotation_energy_ltd_-_eia_scoping_opinion.pdf (Accessed: March 2024).

[341] Wade H.M., Masden. E.A., Jackson, A.C. and Furness, R.W. (2016). *Incorporating data uncertainty when estimating potential vulnerability of Scottish seabirds to marine renewable energy developments*. Marine Policy 70, 108-113.

[342] Searle, KR; O'Brien, SH; Jones, EL, Cook, ASCP; Trinder, MN; McGregor, RM; Donovan, C; McCluskie, A; Daunt, F; Butler, A (2023). *A framework for improving treatment of uncertainty in offshore wind assessments for protected marine birds*. Available at: https://academic.oup.com/icesjms/advance-article/doi/10.1093/icesjms/fsad025/7065501 (Accessed: March 2024).

[343] NorthConnect. (2018). *HVDC Cable Infrastructure EIAR, Volume 3, Appendix F.1: Report on Ornithological Surveys.* Natural Research (Projects) Limited.

[344] APEM. (2022). *Green Volt Offshore EIAR: Volume 2. Technical Appendix 12.1 Offshore and Intertidal Ornithology Baseline Technical Report*. APEM Scientific Report P0008351.

[345] APEM. (2021). *Digital Aerial Seabird and Cetacean Surveys Off the East Coast of Scotland. Scottish Government. Final Report*. APEM Scientific Report P0003988.

[346] Kober, K., Wilson, L.J., Black, J., O'Brien, S., Allen, S., Win, I., Bingham, C. & Reid, J.B. (2012). *The identification of possible marine SPAs for seabirds in the UK: The application of Stage 1.1 – 1.4 of the SPA selection guidelines (Revised 2018).* JNCC Report No 461. JNCC, Peterborough, ISSN 0963-8091.

[347] Wakefield, E.D., Owen, E., Baer, J., Carroll, M.J., Daunt, F., Dodd, S.G., Green, J.A., Guilford, et al. (2017). *Breeding density, fine-scale tracking, and large-scale modelling reveal the regional distribution of four seabird species*. Ecological Applications, 27(7), 2074-2091.

[348] Waggitt, J.J., Evans, P.G., Andrade, J., Banks, A.N., Boisseau, O., Bolton, M., Bradbury, G., Brereton, T. et al. (2020). *Distribution maps of cetacean and seabird populations in the North-East Atlantic*. Journal of Applied Ecology, 57(2), 253-269.

[349] Buckingham, L., Bogdanova, M.I., Green, J.A., Dunn, R.E., Wanless, S., Bennett, S., Bevan, R.M., et al. (2022). *Interspecific variation in non-breeding aggregation: a multi-colony tracking study of two sympatric seabirds*. Marine Ecology Progress Series. 684: 181-197.

[350] Vattenfall (2023). *Auk tagging project: final report*. Available at: https://group.vattenfall.com/uk/contentassets/c65a13553f864f599431d69c8c6a57b4/auk-tagging-final-report-january-2023.pdf (Accessed: March 2024).

[351] Garthe, S. and Hüppop, O. (2004) *Scaling possible adverse effects of marine wind farms on seabirds: developing and applying a vulnerability index*. Journal of Applied Ecology, 41(4), 724-734.

[352] Furness, R.W. and Wade, H. (2013). *Vulnerability of Scottish seabirds to offshore wind turbines*. Unpublished report to The Scottish Government, MacArthur Green Ltd, Glasgow

[353] Bradbury, G., Trinder, M., Furness, B., Banks, A.N., Caldow, R.W. and Hume, D. (2017). *Correction: Mapping seabird sensitivity to offshore wind farms*. Plos one, 12(1): e0170863.

[354] Cleasby, I.R., Owen, E., Wilson, L., Wakefield, E.D., O'Connell, P. and Bolton, M. (2020). *Identifying important at-sea areas for seabirds using species distribution models and hotspot mapping*. Biological Conservation, 241, 108375.

[355] Searle, K., Mobbs, D., Butler, A., Bogdanova, M., Freeman, S., Wanless, S. and Daunt, F. (2014). *Population consequences of displacement from proposed offshore wind energy developments for seabirds breeding at Scottish SPAs (CR/2012/03). Final Report to Marine Scotland*. Marine Scotland, Edinburgh.

[356] Searle, K.R., Mobbs, D.C., Butler, A., Furness, R.W., Trinder, M.N. and Daunt. F. (2018). *Finding out the fate of displaced birds (FCR/2015/19).* Scottish Marine and Freshwater Science, 9(8).

[357] Band, W. (2012). *Using a collision risk model to assess bird collision risks for offshore wind farms*. Report to the Crown Estate Strategic Ornithological Services (SOSS).

[358] Cook, A.S.C.P., Humphreys, E.M., Masden, E.A. and Burton, N.H.K. (2014). *The avoidance rates of collision between birds and offshore turbines*. Scottish Marine and Freshwater Science Report Volume 5 No. 16. Marine Scotland Science.

[359] Johnston, A., Cook, A.S., Wright, L.J., Humphreys, E.M. and Burton, N.H. (2014). *Modelling flight heights of marine birds to more accurately assess collision risk with offshore wind turbines*. Journal of Applied Ecology, 51(1), 31-41.

[360] Dierschke, V., Furness, R.W. and Garthe, S. (2016). *Seabirds and offshore wind farms in European waters: Avoidance and attraction*. Biological Conservation, 202, 59-68

[361] Bowgen, K. and Cook, A. (2018). *Bird Collision Avoidance: Empirical evidence and impact assessments*. JNCC Report No. 614, JNCC, Peterborough, ISSN 0963-8091.

[362] Skov, H., Heinänen, S., Norman, T., Ward, R.M., Méndez-Roldán, S. and Ellis, I. (2018). *ORJIP Bird Collision and Avoidance Study. Final report – April 2018*. The Carbon Trust. United Kingdom, 247.

[363] Pavat, D., Harker, A.J., Humphries, G., Keogan, K., Webb, A. and Macleod, K. (2023). *Consideration of avoidance behaviour of northern gannet (Morus bassanus) in collision risk modelling for offshore wind farm impact assessments*. NECR490. Natural England.

[364] Searle, K., Mobbs, D., Daunt, F., and Butler, A. (2019). *A Population Viability Analysis Modelling Tool for Seabird Species. Centre for Ecology and Hydrology report for Natural England*. Natural England Commissioned Report NECR274. Pp.23

[365] Marine Scotland (2018). *Marine Scotland Consenting and Licensing Guidance For Offshore Wind, Wave and Tidal Energy Applications*. Available at: https://www.gov.scot/publications/marine-scotland-consenting-licensing-manual-offshore-wind-wave-tidal-energy-applications/documents/ (Accessed: March 2024).

[366] Caneco, B., Humphries, G., Cook, A. and Masden E. (2022). *Estimating bird collisions at offshore windfarms with stochLAB*. Available at: https://hidef-aerial-surveying.github.io/stochLAB/ (Accessed: February 2024).

[367] Jital, M., Burthe, S., Freeman, S., and Daunt, F. (2017). *Testing and Validating Metrics of Change Produced by Population Viability Analysis (PVA)*. Scottish Marine and Freshwater Science, 8(23).

[368] Sparling, C.E., Coram, A.J., McConnell, B., Thompson, D., Hawkins, K.R. and Northridge S.P. (2013). *Wave & Tidal Consenting Position Paper Series: Marine Mammal Impacts. NERC*. Available at: https://tethys.pnnl.gov/sites/default/files/publications/NERC-2013-Marine-Mammal.pdf (Accessed: 18 January 2024)

[369] Benjamins, S., Harnois, V., Smith, H.C.M., Johanning, L., Greenhill, L., Carter, C. and Wilson, B. (2014). *Understanding the potential for marine megafauna entanglement risk from renewable marine energy developments*. Scottish Natural Heritage Commissioned Report No. 791.

[370] NRDC. (2022). *New Recommendations Reduce Floating Wind Entanglement Risk*. Available at: https://www.nrdc.org/bio/francine-kershaw/new-recommendations-reduce-floating-wind-entanglement-risk (Accessed: February 2024).

[371] UK Centre for Ecology & Hydrology (2024). *Cumulative Effects Framework for Key Ecological Receptors*. Available at: https://www.ceh.ac.uk/our-science/projects/cumulative-effects-framework-key-ecological-receptors (Accessed: March 2024).

[372] Scott-Hayward, L.A.S., Oedekoven, C.S., Mackenzie, M.L., Walker, C.G. and Rexstad, E. (2013). *User Guide for the MRSea Package: Statistical Modelling of bird and cetacean distributions in offshore renewables development areas*. University of St. Andrews contract for Marine Scotland, SB9 (CR/2012/05).

[373] Horswill, C. and Robinson, R.A. (2015). *Review of seabird demographic rates and density dependence*. JNCC Report No. 522.

[374] Ozsanlav-Harris, L., Inger, R., and Sherley, R. (2023). *Review of data used to calculate avoidance rates for collision risk modelling of seabirds*. JNCC Report 732, JNCC, Peterborough, ISSN 0963-8091.

[375] Cook, A.S.C.P. and Robinson, R.A. (2016). *Testing sensitivity of metrics of seabird population response to offshore wind farm effects*. JNCC Report No. 553, JNCC, Peterborough, ISSN 0963-8091.

Fish Ecology References

[376] European Commission (2012). *Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora*. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A01992L0043-20130701 (Accessed: 09 February 2024).

[377] *The Conservation (Natural Habitats, &c) Regulations 1994*. Available at: https://www.legislation.gov.uk/uksi/1994/2716/contents/made (Accessed: March 2024).

[378] *Conservation of Offshore Marine Habitats and Species Regulations 2017*. Available at: https://www.legislation.gov.uk/uksi/2017/1013/contents/made (Accessed: March 2024).

[379] *Salmon and Freshwater Fisheries (Consolidation) (Scotland) Act 2003*. Available at: https://www.legislation.gov.uk/asp/2003/15/contents (Accessed: March 2024).

[380] *Nature Conservation (Scotland) Act 2004*. Available at: https://www.legislation.gov.uk/asp/2004/6 (Accessed: March 2024).

[381] Scottish Government. (2022). *Scottish Wild Salmon Strategy*. Available at: https://www.gov.scot/publications/scottish-wild-salmon-strategy/ (Accessed: March 2024).

[382] DEFRA. (2010). *Eel Management plans for the United Kingdom – Scotland River Basin District*. Available at: https://www.eelregulations.co.uk/pdf/demp.pdf (Accessed: March 2024).

[383] Howson, C. M., Steel. L., Carruthers, M. & Gillham, K. (2012). *Identification of Priority Marine Features in Scottish territorial waters*. Scottish Natural Heritage Commissioned Report No. 388. Available at: https://www.nature.scot/sites/default/files/2017-08/Publication%202012%20-%20SNH%20Commissioned%20Report%20388%20-%20Identification%20of%20Priority%20Marine%20Features%20in%20Scottish%20territorial%20waters.pdf (Accessed: March 2024)

[384] Tyler-Walters, H., James, B., Carruthers, M. (eds.), Wilding, C., Durkin, O., Lacey, C., Philpott, E., Adams, L., Chaniotis, P.D., Wilkes, P.T.V., Seeley, R., Neilly, M., Dargie, J. & Crawford-Avis, O.T. (2016). *Descriptions of Scottish Priority Marine Features (PMFs). Scottish Natural Heritage Commissioned Report No. 406*. Available at: https://www.nature.scot/sites/default/files/Publication%202016%20-%20SNH%20Commissioned%20Report%20406%20-%20Descriptions%20of%20Scottish%20Priority%20Marine%20Features%20%28PMFs%29.pdf (Accessed: March 2024).

[385] SNH (2016) *Priority Marine Features Guidance*. *Scottish Nature Heritage Document A2086517*. Available at: https://www.nature.scot/sites/default/files/2017-10/Priority%20Marine%20Features%20Guidance%20-%2020%20Oct%202017.pdf (Accessed: March 2024).

[386] The Scottish Government (2018). *Offshore wind, wave and tidal energy applications: consenting and licensing manual*. Marine Directorate ISBN 9781787812352. Available at: https://www.gov.scot/binaries/content/documents/govscot/publications/consultation-paper/2018/10/marine-scotland-consenting-licensing-manual-offshore-wind-wave-tidal-energy-applications/documents/00542001-pdf/00542001-pdf/govscot%3Adocument/00542001.pdf (Accessed: March 2024).

[387] CIEEM. (2022). *Guidelines for Ecological Impact Assessment in the UK and Ireland – Terrestrial, Freshwater, Coastal and Marine* (Updated April 2022). Chartered Institute of Ecology and Environmental Management. Available at: https://cieem.net/wp-content/uploads/2018/08/ECIA-Guidelines-2018-Terrestrial-Freshwater-Coastal-and-Marine-V1.2-April-22-Compressed.pdf (Accessed: March 2024).

[388] Cook, E.J., Payne, R.D. & Macleod, A. (2014). *Marine biosecurity planning – Identification of best practice: A review*. Scottish Natural Heritage Commissioned Report No. 748. Available at: https://www.nature.scot/sites/default/files/2017-07/Publication%202014%20-%20SNH%20Commissioned%20Report%20748%20-%20Marine%20biosecurity%20planning%20-%20Identification%20of%20best%20practice%20-%20A%20review.pdf (Accessed: March 2024).

[389] Judd, A. (2012). *Guidelines for Data Acquisition to Support Marine Environmental Assessments of Offshore Renewable Energy Projects*. Report by Centre for Environment Fisheries and Aquaculture Science (CEFAS). Available at:

tethys.pnnl.gov/sites/default/files/publications/CEFAS_2012_Eenvironmental_Assessment_Guidance.pdf. (Accessed: March 2024).

[390] CEFAS. (2004). *Offshore Wind Farms: Guidance Note for Environmental Impact Assessment in Respect of FEPA and CPA Requirements*. *Prepared by the Centre for Environment, Fisheries and Aquaculture Science (CEFAS) on behalf of the Marine Consents and Environment Unit (MCEU)*. Available at: https://www.cefas.co.uk/publications/files/windfarm-guidance.pdf (Accessed: March 2024).

[391] Natural England. (2016). *Designing and applying a method to assess the sensitivities of highly mobile marine species to anthropogenic pressures*. Natural England Commissioned Report NECR213. Available at: https://publications.naturalengland.org.uk/publication/4972830704795648 (Accessed: March 2024).

[392] OSPAR. (2008). *OSPAR Guidance on Environmental Considerations for Offshore Wind Farm Development*. OSPAR Convention for the Protection of the Marine Environment of the North-East Atlantic. OSPAR Agreement 2008-03.

[393] Malcolm, I.A., Godfrey, J. & Youngson, A.F. (2010). *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, 1(14).

[394] OBIS (2014). *Ocean Biodiversity Information System*. Available at: https://mapper.obis.org/ (Accessed: March 2024).

[395] ICES. (2023). *ICES Database on Trawl Surveys (DATRAS)*. Available at: https://www.ices.dk/data/data-portals/Pages/DATRAS.aspx (Accessed: March 2024).

[396] ICES. (2024). *ICES Eggs and Larvae Database*. Available at: https://www.ices.dk/data/data-portals/Pages/Eggs-and-larvae.aspx (Accessed: March 2024).

[397] Marine Scotland. (2023). *2022 Scottish Sea Fisheries Statistics – Landing Data*. Available at: https://data.marine.gov.scot/dataset/2022-scottish-sea-fisheries-statistics-fishing-effort-and-quantity-and-value-landings-ices-1 (Accessed: March 2024).

[398] JNCC. (2023). *Special Areas of Conservation (SAC).* Available at: https://jncc.gov.uk/our-work/special-areas-of-conservation/ (Accessed: March 2024).

[399] MarLIN. (2020). *Marine Biological Association of the United Kingdom Species Database*. Available at: https://www.marlin.ac.uk/species (Accessed: March 2024).

[400] NBN Atlas. (2024). *National Biodiversity Network Trust Database*. Available at: https://records.nbnatlas.org/search#tab_spatialSearch (Accessed: March 2024).

[401] DBEIS. (2022). *UK Offshore Energy Strategic Environmental Assessment (SEA): Appendix 1a.4 Fish & Shellfish. OESEA4 Environmental Report*. Department of Business, Energy & Industrial Strategy. Available at: https://assets.publishing.service.gov.uk/media/6319b419e90e077dc0c6d693/OESEA4_Public_Consultation_Government_Response.pdf (Accessed: January 2024).

[402] NatureScot. (2020). *Priority Marine Features in Scotland's seas*. Available at: https://www.nature.scot/doc/priority-marine-features-scotlands-seas-habitats (Accessed: March 2024).

[403] Coull, K., A., Johnstone, R. and Rogers, S., I. (1998). *Fisheries sensitivity maps in British waters*. Published and distributed by UKOOA Ltd. Available at: https://www.cefas.co.uk/media/o0fgfobd/sensi_maps.pdf (Accessed: March 2024).

[404] Ellis, C.; Milligan, S.; Readdy, L.; Taylor, N.; Brown, M. (2012). *Spawning and nursery grounds of selected fish species in UK waters (Report No. 147)*. Report by Cefas Lowestoft Laboratory. Available at: tethys.pnnl.gov/sites/default/files/publications/Ellisetal2012.pdf. (Accessed: March 2024).

[405] Marine Scotland. (2014). *Fisheries Sensitivity Maps.* Available at: https://data.marine.gov.scot/dataset/updating-fisheries-sensitivity-maps-british-waters/resource/e3124b35-ff72-4859-986e (Accessed: March 2024).

[406] Marine Scotland. (2024). *Healthy and Biologically Diverse Datasets*. Available at: https://marine.gov.scot/themes/healthy-and-biologically-diverse (Accessed: March 2024).

[407] Marine Scotland. (2021). *Lesser Sandeel (Ammodytes marinus) predicted density & probability of presence*. Available at: https://marine.gov.scot/information/lesser-sandeel-habitat (Accessed: March 2024).

[408] OSPAR. (2024). *List of Threatened and/or Declining Fish*. Available at: https://www.ospar.org/work-areas/bdc/species-habitats/list-of-threatened-declining-species-habitats/fish (Accessed: March 2024).

[409] EUSeaMap. (2021). *EMODnet broad-scale seabed habitat map for Europe*. Available at: emodnet.ec.europa.eu/geoviewer/. (Accessed: March 2024).

[410] Nordheim, L.V, Kotterba, P., Moll, D., Polte, P. (2017). Impact of Spawning Substrate Complexity on Egg Survival of Atlantic Herring (*Clupea harengus*, L.) in the Baltic Sea. *Estuaries and Coasts*, 41, pp. 549–559.

[411] Rankine, P. W., & Morrison, J. A. (1989). Predation on Herring Larvae and Eggs by Sand-Eels *Ammodytes Marinus* (Rait) and *Hyperoplus lanceolatus* (Lesauvage). *Journal of the Marine Biological Association of the United Kingdom*, 69(2), pp. 493-498.

[412] Frost, M., Diele, K. (2022). Essential spawning grounds of Scottish herring: current knowledge and future challenges. *Reviews in Fish Biology and Fisheries*, 32, pp. 721-744.

[413] Harder-Jones, F.R. (1968). *Fish migration*. London: Edward Arnold.

[414] Peck, M.A., Baumann, H., Bernreuther, M., Clemmesen, C., Herrmann, J.-P., Haslob, H., Huwer, B., Kanstinger, P., Köster, F.W., Petereit, C. (2012). Reprint of: The ecophysiology of *Sprattus sprattus* in the Baltic and North Seas. *Progress in Oceanography*, 107, pp. 31-46.

[415] ICES. (2018). B*enchmark Workshop on Sprat (WKSPRAT 2018): 5-9 November 2018*. Available at: https://ices-library.figshare.com/articles/report/Benchmark_Workshop_on_Sprat_WKSPRAT_2018_/19291145 (Accessed: February 2024).

[416] Wahl, E. F. & Juergen, A. (1988). Changes in distribution and abundance of sprat eggs during spawning season. *ICES Council Meeting 1988/H:45.*

[417] Norwegian Environment Agency. (2024). *Norwegian marine spatial management tool – Fish Environmental Values (Nordsjømakrell – gyting)*. Available at: https://kart.barentswatch.no/ (Accessed: March 2024).

[418] Regnier, T., Wright, PJ & Harris, M., Gibb, F., Newell, M & Eerkes-Medrano, D., Daunt, F. & Wanless, S. (2024). *The effect of timing and abundance of lesser sandeel on the breeding success of a North Sea seabird community.* Marine Ecology Progress Series, 727, pp.1-17.

[419] Wright, P.J., Jensen, H., Tuck, I. (2000). *The influence of sediment type on the distribution of the lesser sandeel*, *Ammodytes marinus.* Journal of Sea Research, 44(3-4), pp. 243-256.

[420] van Deurs, M., Christensen, A., Frisk, C., & Mosegaard, H. (2010). *Overwintering strategy of sandeel ecotypes from an energy/predation trade-off perspective*. Marine Ecology Progress Series, 416, pp. 201–214.

[421] JNCC (2014*). Turbot Bank MPA: Site Summary Document*. Available at: https://data.jncc.gov.uk/data/351e88d3-c5c8-4376-8a04-b7148b4865b4/TurbotBank-1-SiteSummaryDocument-July14.pdf (Accessed: March 2024).

[422] Bigné, M., Nielsen, J.R., Bastardie, F. (2019). *Opening of the Norway pout box: will it change the ecological impacts of the North Sea Norway pout fishery?* ICES Journal of Marine Science, 76(1), pp. 136–152.

[423] Cormon X., Ernande B., Kempf A., Vermard Y., Marchal P. (2016). *North Sea saithe (Pollachius virens) growth in relation to food availability, density dependence and temperature*. Marine Ecology Progress Series, 542, pp. 141–151.

[424] Nash, R. D.M., Wright, P.J., Matejusova, I., Dimitrov, S.P., O'Sullivan, M., Augley, J., Höffle, H. (2012). *Spawning location of Norway pout (Trisopterus esmarkii Nilsson) in the North Sea.* ICES Journal of Marine Science, 69(8), pp.1338-1346.

[425] McCully, S.R., Scott, F., Ellis, J.R. (2012). *Lengths at maturity and conversion factors for skates (Rajidae) around the British Isles, with an analysis of data in the literature.* ICES Journal of Marine Science, 69(10), pp. 1818-1822.

[426] Doherty, P. D., Baxter, J. M., Gell, F. R., Godley, B. J., Graham, R. T., Hall, G., Hall, J., Hawkes, L. A., Henderson, S. M., Johnson, L., Speedie, C. & Witt, M. J. (2017). *Long-term satellite tracking reveals variable seasonal migration strategies of basking sharks in the north-east Atlantic*. Scientific Reports, 7.

[427] Strong, W. R. Jr. (1989). *Behavioral Ecology of Horn Sharks, Heterodontus francisci, at Santa Catalina Island, California, with Emphasis on Patterns of Space Utilization*. Long Beach: California State University.

[428] Gore, M., Camplisson, E. & Ormond, R. (2023). *Chapter Four - The biology and ecology of the basking shark: A review*, Advances in Marine Biology, 95, pp.113-257.

[429] Paxton, C.G.M., Scott-Hayward, L.A.S. & Rexstad, E. (2014). *Statistical approaches to aid the identification of Marine Protected Areas for minke whale, Risso's dolphin, white-beaked dolphin and*

basking shark. Scottish Natural Heritage Commissioned Report No. 594. Available at: https://marine.gov.scot/information/basking-sharks (Accessed: March 2024).

[430] Cotton, P.A., Sims, D.W., Fanshawe, S., Chadwick, M. (2005). *The effects of climate variability on zooplankton and basking shark (Cetorhinus maximus) relative abundance off southwest Britain*. Fisheries Oceanography, 14, pp. 151-155.

[431] MarLIN. (2024). *Basking shark* (*Cetorhinus maximus*). Available at: https://www.marlin.ac.uk/species/detail/1438 (Accessed: 15 March 2024).

[432] Dulvy, N.K., Rogers, S.I., Jennings, S., Stelzenmüller, V., Dye, S.R. and Skjoldal, H.R. (2008). *Climate change and deepening of the North Sea fish assemblage: a biotic indicator of warming seas*. Journal of Applied Ecology, 45, pp. 1029-1039.

[433] Jones, D.L., Meithe, T., Clarke, E.D., Marshall, T.C. (2023). *Disentangling the effects of fishing and temperature to explain increasing fish species richness in the North Sea*. Biodiversity and Conservation, 32, pp. 3133-3155.

[434] Cote, D., Konecny, C., Seiden, J., Hauser, T., Kristiansen, T., Laurel, B.J. (2021). *Forecasted Shifts in Thermal Habitat for Cod Species in the Northwest Atlantic and Eastern Canadian Arctic*. Marine Ecosystem Ecology, 8.

[435] Henriksen, O., Rindorf, A., Mosegaard, H., Payne, M. R., & van Deurs, M. (2021). *Get up early: Revealing behavioral responses of sandeel to ocean warming using commercial catch data*. Ecology and Evolution, 11, pp.16786–16805.

[436] Utne, K.R., Skagseth, O., Wennevik, V., Broms, C.T., Melle, W., Thorstad, E.B. (2022). Impacts of a Changing Ecosystem on the Feeding and Feeding Conditions for Atlantic Salmon During the First Months at Sea. *Frontier in Marine Science*, 9.

[437] Farr, H., Ruttenberg, B., Walter, R.K., Wang Y., White, C. (2021). Potential environmental effects of deepwater floating offshore wind energy facilities. *Ocean and Coastal Management*, 207.

[438] Gill, A., Taylor, H. (2001). *The Potential Effects of Electromagnetic Fields Generated by Cabling Between Offshore Wind Turbines upon Elasmobranch Fishes. Report by Countryside Council for Wales*. Available at: The potential effects of electromagnetic fields generated by cabling between offshore wind turbines upon elasmobranch fishes (pnnl.gov). (Accessed: March 2024).

[439] Gill, A.B., Bartlett, M.D. (2011). *Literature review on the potential effects of electromagnetic fields and subsea noise from marine renewable energy developments on Atlantic salmon, sea trout and European eel. Scottish Natural Heritage Commissioned Report*. Available at: Literature review on the potential effects of electromagnetic fields and subsea noise from marine renewable energy developments on Atlantic salmon, sea trout and European eel. Scottish Natural Heritage Commissioned Report (cranfield.ac.uk). (Accessed: March 2024).

[440] NorthConnect. (2018). Appendix E.1: Literature Review of Electromagnetic Field (EMF) and Sediment Heating Effects on Marine Ecological Receptors. Available at: e.1 marine sepcies sensitivity to emf and sediment heating.pdf. (Accessed: March 2024).

[441] Benjamins, S., Harnois, V., Smith, H.C.M., Johanning, L., Greenhill, L., Carter, C. and Wilson, B. (2014). *Understanding the potential for marine megafauna entanglement risk from renewable marine energy developments*. Scottish Natural Heritage Commissioned Report No. 791.

[442] Oliveira, F., Monteiro, P., Bentes L., Henriques, N.S., Aguilar, R., and Goncalves, J.M.S. (2015). Marine litter in the upper Sao Vincente submarine canyon (SW Portugal): abundance, distribution, composition and fauna interactions. Marine Pollution Bulletin 97, 7.

[443] MarLIN. (2024). *The Marine Life Information Network information on the biology of species and the ecology of habitats found around the coasts and seas of the British Isles.* Available at: https://www.marlin.ac.uk/ (Accessed: 14 February 2024).

[444] NorthConnect (2018). *NorthConnect HVDC Cable Infrastructure EIAR: Volume 1*. Available at: https://marine.gov.scot/data/northconnect-hvdc-cable-environmental-impact-assessment-report-volume-1 (Accessed: 25 January 2024).

[445] NRDC. (2022). *New Recommendations Reduce Floating Wind Entanglement Risk*. Available at: https://www.nrdc.org/bio/francine-kershaw/new-recommendations-reduce-floating-wind-entanglement-risk (Accessed: February 2024).

Commercial Fisheries References

[446] Scottish Government (2015). *Scotland's National Marine Plan*. Available at: https://www.gov.scot/publications/scotlands-national-marine-plan/documents/ (Accessed: March 2024).

[447] Marine Scotland, (2022). *Good Practice Guidance for assessing fisheries displacement by other licenced marine activities*. Available at: https://www.gov.scot/publications/good-practice-guidance-assessing-fisheries-displacement-licensed-marine-activities/ (Accessed: March 2024).

[448] Marine Scotland (2020). *Guidance on preparing a Fisheries Management and Mitigation Strategy (FMMS).* Available at: https://marine.gov.scot/sites/default/files/fmms_draft_guidance_document_1.pdf (Accessed: March 2024).

[449] FLOWW (2014). *Best Practice Guidance for Offshore Renewable Developments: Recommendations for Fisheries Liaison*. https://www.thecrownestate.co.uk/media/1775/ei-km-in-pc-fishing-012014-floww-best-practice-guidance-for-offshore-renewables-developments-recommendations-for-fisheries-liaison.pdf (Accessed: February 2024).

[450] FLOWW (2015). *Best Practice Guidance for Offshore Renewables Developments: Recommendations for Fisheries Disruption Settlements and Community Funds.* Available at: https://www.thecrownestate.co.uk/media/1776/floww-best-practice-guidance-disruption-settlements-and-community-funds.pdf (Accessed: February 2024).

[451] RenewableUK, (2013). *Cumulative impact assessment guidelines, guiding principles for cumulative impacts assessments in offshore wind farms*. Available at: https://tethys.pnnl.gov/publications/cumulative-impacts-assessment-guidelines-guiding-principles-cumulative-impacts (Accessed: February 2024).

[452] Sea Fish Industry Authority and UK Fisheries Economic Network (2012). *Best practice guidance for fishing industry financial and economic impact assessments.* Available at: https://www.seafish.org/document/?id=aa0cb236-1e2a-4d2a-9f86-49ceb2b6dd5e (Accessed: February 2024).

[453] Cefas (2012). Guidelines for data acquisition to support marine environmental assessments of offshore renewable energy projects. Contract report: ME5403, May 2012.

[454] Blythe-Skyrme, R. E. (2010). Options and opportunities for marine fisheries mitigation associated with windfarms. London: Final report for COWRIE. Env contract FISHMITIG09.

[455] International Cable Protection Committee (ICPC) (2009). *Fishing and Submarine Cables: Working Together*. Available at: https://www.iscpc.org/documents/?id=142 (Accessed: March 2024).

[456] MMO (2023) *UK fisheries statistics data (surveillance sightings, landings, fishing activity)*. Available at: https://www.gov.uk/government/collections/monthly-uk-sea-fisheries-statistics (Accessed: March 2024).

[457] Marine Scotland (2023) UK under 12m fisheries statistics data. Available at: https://marine.gov.scot/information/fishing-activity (Accessed: March 2024).

[458] ICES (2021). *OSPAR request on the production of spatial data layers of fishing intensity/pressure. ICES Advice: Special Requests*. Available at: https://ices-library.figshare.com/articles/report/OSPAR_request_on_the_production_of_spatial_data_layers_of_fishing_intensity_pressure/18639182 (Accessed: February 2024).

[459] Marine Scotland Science (2017). *Creel Fishing Effort Study*. Available at: https://www.gov.scot/publications/creel-fishing-effort-study/documents/ (Accessed: March 2024).

Shipping and Navigation References

[460] MCA (2021). '*MGN 654 (Merchant and Fishing) Offshore Renewable Energy Installations (OREI) – Guidance on UK Navigational Practice, Safety and Emergency Response'*. Southampton: MCA.

[461] Scottish Government (2015). *Scotland's National Marine Plan*. Available at: https://www.gov.scot/publications/scotlands-national-marine-plan/documents/ (Accessed: March 2024).

[462] IMO (2018). '*Revised Guidelines for Formal Safety Assessment'*. London: IMO.

[463] IALA (2021a). '*Guidance G1162 on the Marking of Man-Made Offshore Structures*'. Saint Germaine en Laye, France: IALA.

[464] IALA (2021b). '*Recommendation O-139 on the Marking of Man-Made Offshore Structures*'. Saine Germaine en Laye, France: IALA.

[465] RYA (2019). '*The RYA's Position on Offshore Energy Developments: Paper 1 – Wind Energy'*. Southampton: MCA.

[466] MCA and HSE (2017) *Regulatory Expectations on Moorings For Floating Wind And Marine Devices*. Southampton: MCA.

[467] UKHO (2021). '*Admiralty Sailing Directions North Sea (West) Pilot, 12th Edition NP54'*. Taunton: UKHO.

[468] RYA (2019). *UK Coastal Atlas of Recreational Boating*. Southampton; RYA.

[469] MCA (2021). '*MGN 372 Amendment 1 (Merchant and Fishing) Safety of Navigation: Guidance to Mariners Operating in the Vicinity of UK Offshore Renewable Energy Installations (OREIs).* Southampton: MCA.

Marine Cultural Heritage and Archaeology References

[470] United Nations (1982). *United Nations Convention on the Law of the Sea*. Available at: https://www.un.org/depts/los/convention_agreements/convention_overview_convention.htm (Accessed: March 2024).

[471] Council of Europe (1992). *The European Convention on the Protection of the Archaeological Heritage (revised).* Available at: https://rm.coe.int/168007bd25 (Accessed: March 2024).

[472] UNESCO (2001) *Convention on the Protection of the Underwater Cultural Heritage*. Available at: https://unesdoc.unesco.org/ark:/48223/pf0000126065 (Accessed: March 2024).

[473] *Protection of Wrecks Act 1973*. Available at: https://www.legislation.gov.uk/ukpga/1973/33 (Accessed: March 2024).

[474] *Ancient Monuments and Archaeological Areas Act 1979*. Available at: https://www.legislation.gov.uk/ukpga/1979/46 (Accessed: March 2024).

[475] *The Protection of Military Remains Act 1986*. Available at: https://www.legislation.gov.uk/ukpga/1986/35/contents (Accessed: March 2024).

[476] *Merchant Shipping Act 1995*. Available at: https://www.legislation.gov.uk/ukpga/1995/21/contents (Accessed: March 2024).

[477] *Marine and Coastal Access Act 2009*. Available at: https://www.legislation.gov.uk/ukpga/2009/23/contents (Accessed: March 2024).

[478] *Marine (Scotland) Act 2010*. Available at: https://www.legislation.gov.uk/asp/2010/5/contents (Accessed: March 2024).

[479] Scottish Government (2014). *Marine (Scotland) Act Factsheet*. Available at: https://www.gov.scot/publications/marine-scotland-act/#:~:text=Published%2016%20June%202014&text=The%20Marine%20(Scotland)%20Act%20provides,areas%20such%20as%20marine%20renewables. (Accessed: March 2024).

[480] UK Government (2011) *UK Marine Policy Statement*. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69322/pb3654-marine-policy-statement-110316.pdf (Accessed 6 February 2024).

[481] Scottish Government (2015). *Scotland's National Marine Plan*. Available at: https://www.gov.scot/publications/scotlands-national-marine-plan/documents/ (Accessed: March 2024).

[482] Historic Environment Scotland (2016). Historic Environment Scotland Policy Statement. Available at: https://www.gov.scot/binaries/content/documents/govscot/publications/factsheet/2019/09/historic-environment-scotland-hes---core-documents-library/documents/historic-environment-policy-statement-2016/historic-environment-policy-statement-

2016/govscot%3Adocument/HES%2BPolicy%2BStatement%2B2016%2B%25281%2529.pdf (Accessed: March 2024).

[483] Scottish Government (2014). *Scottish Planning Policy*. Available at: https://www.gov.scot/publications/scottish-planning-policy/documents/ (Accessed: March 2024).

[484] Scottish Government (2023) *National Planning Framework 4 (NPF4).* Available at: https://www.gov.scot/publications/national-planning-framework-4/ (Accessed: 07 February 2024).

[485] Wessex Archaeology Ltd, (2007), *Historic Environment Guidance for the Offshore Renewable Energy Sector*. Available at https://www.wessexarch.co.uk/sites/default/files/field_file/COWRIE_2007_Wessex_%20-%20archaeo_%20guidance_Final_1-2-07.pdf (Accessed: 31 January 2024).

[486] Oxford Archaeology, (2008), *Guidance for Assessment of Cumulative Impacts on the Historic Environment from Offshore Renewable Energy*. Available on https://www.biofund.org.mz/wp-content/uploads/2018/11/F1349.Cowrie-Ciarch-Web.pdf (Accessed: 31 January 2024).

[487] Joint Nautical Archaeology Policy Committee and The Crown Estate, (2006), *JNAPC Code of Practice for Seabed Development.* Available at https://www.historicenvironment.scot/media/2374/jnapc_brochure_may_2006.pdf (Accessed: 31 January 2024).

[488] COWRIE, (2011), *Offshore Geotechnical Investigations and Historic Environment Analysis: Guidance for the Renewable Energy Sector*. Available at https://www.historicenvironment.scot/media/2376/2011-01-offshore-geotechnical-investigations-and-historic-environment-analysis-guidance-for-the-renewable-energy-sector.pdf (Accessed: 31 January 2024).

[489] Wessex Archaeology, (2011), *Assessing Boats and Ships 1860-1913; Assessing Boats and Ships 1914-1938 & Assessing Boats and Ships 1939-1950*. Available at: https://archaeologydataservice.ac.uk/archives/view/boatsandships_eh_2011/downloads.cfm (Accessed: 31 January 2024).

[490] Chartered Institute for Archaeologists (CIfA), (2020), *Standards and Guidance for Historic Environment Desk Based Assessment*. Available at: https://www.archaeologists.net/sites/default/files/CIfAS%26GDBA_4.pdf (Accessed: 31 January 2024)

[491] The Chartered Institute for Archaeologists (CIfA), (2022), *Code of conduct: professional ethics in archaeology*. Available at: https://www.archaeologists.net/sites/default/files/Code%20of%20conduct%20revOct2022.pdf (Accessed: 31 January 2024).

[492] The Crown Estate, (2021), *Archaeological Written Schemes of Investigation for Offshore Wind Farm Project*s. Available at: https://www.thecrownestate.co.uk/media/3917/guide-to-archaeological-requirements-for-offshore-wind.pdf (Accessed: 31 January 2024)

[493] Historic Environment Scotland, (2021), *Scotland's Historic Marine Protected Areas*. Available at: https://www.historicenvironment.scot/archives-and-

research/publications/publication/?publicationId=fe248e27-0c19-4e4e-8d65-a62d00a2ce6a (Accessed: 31 January 2024).

[494] Scottish Archaeological Research Framework (ScARF), (2024), *Marine and Maritime*. Available at https://scarf.scot/thematic/scarf-marine-maritime-panel-report/ (Accessed: 31 January 2024)

[495] Historic Environment Scotland, (2020), *Managing Change in the Historic Environment: Setting.* Available at https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=80b7c0a0-584b-4625-b1fd-a60b009c2549 (Accessed 11 March 2024)

[496] *The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017* Available at: https://www.legislation.gov.uk/ssi/2017/115/regulation/5 (Accessed: 31 January 2024)

[497] *The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2007* Available at: https://www.legislation.gov.uk/uksi/2007/1518/contents (Accessed: 12 March 2024)

[498] Scottish Government, (2014), *Our Place in Time: Historic Environment Strategy for Scotland.* Available at: https://www.gov.scot/publications/place-time-historic-environment-strategy-scotland/ (Accessed 31 January 2024)

[499] Historic England, (2016), Management Guidelines for military aviation sites. Available at https://historicengland.org.uk/images-books/publications/historic-military-aviation-sites/heag048-historic-military-aviation-sites/ (Accessed 31 January 2024)

[500] United Kingdom Hydrographic Office, (2024), *Admiralty Marine Data Portal*. Available at: https://seabed.admiralty.co.uk (Accessed: 31 January 2024).

[501] Historic Environment Scotland (HES), (2019), *Historic Environment Policy for Scotland* Available at https://www.historicenvironment.scot/advice-and-support/planning-and-guidance/historic-environment-policy-for-scotland-heps/ (Accessed: 31 January 2024)

Seascape, Landscape and Visual Impact Assessment References

[502] *Electricity Act 1989*. Available at: https://www.legislation.gov.uk/ukpga/1989/29/contents (Accessed: February 2024).

[503] Council of Europe (2000). *Council of Europe Landscape Convention* Available at: https://rm.coe.int/16807b6bc7 (Accessed: March 2024).

[504] Scottish Government (2023) *National Planning Framework 4 (NPF4).* Available at: https://www.gov.scot/publications/national-planning-framework-4/ (Accessed: 07 February 2024).

[505] Scottish Government (2015). *Scotland's National Marine Plan*. Available at: https://www.gov.scot/publications/scotlands-national-marine-plan/documents/ (Accessed: March 2024).

[506] Aberdeenshire Council (2023). *Aberdeenshire Local Development Plan 2023*. Available at: https://aberdeenshire.gov.uk/planning/plans-and-policies/ldp-2023/ (Accessed: March 2024).

[507] Aberdeenshire Council (2020). *Natural Heritage Strategy 2019-2022*. Available at: http://publications.aberdeenshire.gov.uk/dataset/natural-heritage-strategy/resource/5596fc91-f5d1-4eb6-971e-695c992b9389 (Accessed: March 2024).

[508] IEMA (2013). *Guidelines for Landscape and Visual Impact Assessment Third Edition*. London: Routledge.

[509] Landscape Institute (2019). *Visual Representation of Development Proposals, Technical Guidance Note 06/19.* Available at: https://www.landscapeinstitute.org/wp-content/uploads/2019/09/LI_TGN-06-19_Visual_Representation-1.pdf (Accessed: February 2024).

[510] Marine Management Organisation (2019). *An approach to seascape sensitivity assessment (MMO1204).* Available at: https://assets.publishing.service.gov.uk/media/5f0f29d8d3bf7f03a36faab3/MMO1204_An_Approach_to_seascape_sensitivity_assessment_for_publication_a.pdf (Accessed: February 2024).

[511] NatureScot (2022). *Landscape Sensitivity Assessment Guidance (Methodology).* Available at: https://www.nature.scot/doc/landscape-sensitivity-assessment-guidance-methodology (Accessed: February 2024).

[512] NatureScot (2021). *Guidance - Assessing the cumulative landscape and visual impact of onshore wind energy developments*. Available at: https://www.nature.scot/doc/guidance-assessing-cumulative-landscape-and-visual-impact-onshore-wind-energy-developments (Accessed: February 2024).

[513] Scottish Natural Heritage (2017). *Guidance Note. Coastal Character Assessment*. Available at: https://www.nature.scot/sites/default/files/2018-02/Guidance%20Note%20-%20Coastal%20Character%20Assessment.pdf (Accessed: February 2024).

[514] NatureScot (2022). *Landscape Character Assessment.* Available at: https://www.nature.scot/professional-advice/landscape/landscape-character-assessment (Accessed: February 2024).

[515] Scottish Natural Heritage (2012). *Guidance – Offshore Renewables – assessing the impact on coastal landscape and seascape – Guidance for scoping an Environmental Statement*. Available at: https://www.nature.scot/doc/archive/guidance-offshore-renewables-assessing-impact-coastal-landscape-and-seascape-guidance-scoping (Accessed: February 2024).

[516] Scottish Natural Heritage (2017) *Visual Representation of Wind Farms, Version 2.2*. Available at: https://www.nature.scot/doc/visual-representation-wind-farms-guidance (Accessed: February 2024).

[517] IEMA (2017) *Delivering Proportionate EIA*. Available at: https://www.iema.net/resources/reading-room/2017/07/18/delivering-proportionate-eia (Accessed: 09 February 2024).

[518] Marine Directorate (2023) *Scoping Opinion adopted by the Scottish Ministers under: The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 and The Marine Works (Environmental Impact Assessment) Regulations 2007 Cenos Offshore Windfarm*. Available at:

https://marine.gov.scot/sites/default/files/cenos_offshore_windfarm_-_flotation_energy_ltd_-_eia_scoping_opinion.pdf (Accessed: 09 February 2024).

[519] Scott, KE; Anderson, C; Dunsford, H; Benson, JF & MacFarlane, R (2005). *An Assessment of the sensitivity and capacity of the Scottish seascape in relation to offshore windfarms. Scottish Natural Heritage Commissioned Report No.103.* Available at: https://www.nature.scot/doc/naturescot-commissioned-report-103-assessment-sensitivity-and-capacity-scottish-seascape-relation (Accessed: February 2024).

[520] Scottish Natural Heritage (2018). *Coastal Character Assessment*. Available at: https://www.nature.scot/professional-advice/landscape/coastal-character-assessment (Accessed: February 2024).

[521] Northlink Ferries (2023). *Our Routes*. Available at: https://www.northlinkferries.co.uk/booking-info/our-routes/ (Accessed: February 2024).

[522] White Consultants (2020). *Review and Update of Seascape and Visual Buffer study for Offshore Wind Farms*. Available at: https://assets.publishing.service.gov.uk/media/5ef9a3abd3bf7f769a4e7742/White_Consultants_2020_Seascape_and_visual_buffer_study_for_offshore_wind_farms.pdf (Accessed: February 2024).

[523] Omni (n.d). *Earth Curvature Calculator*. Available at: https://www.omnicalculator.com/physics/earth-curvature (Accessed: February 2023).

Marine Infrastructure and Other Users References

[524] Scottish Government (2015). *Scotland's National Marine Plan*. Available at: https://www.gov.scot/publications/scotlands-national-marine-plan/documents/ (Accessed: March 2024).

[525] Scottish Government (2023) *National Planning Framework 4 (NPF4).* Available at: https://www.gov.scot/publications/national-planning-framework-4/ (Accessed: 07 February 2024).

[526] Scottish Government (2014). *Scottish Planning Policy*. Available at: https://www.gov.scot/publications/scottish-planning-policy/documents/ (Accessed: March 2024).

[527] Aberdeenshire Council (2023). *Aberdeenshire Local Development Plan 2023*. Available at: https://aberdeenshire.gov.uk/planning/plans-and-policies/ldp-2023/ (Accessed: March 2024).

[528] European Commission (2024). *EMODnet Map Viewer*. Available at: https://emodnet.ec.europa.eu/geoviewer/ (Accessed: February 2024).

[529] Marine Scotland Information (2021) Evaporite resources (hidden below 1:500,000). Available at: Evaporite resources (hidden below 1:500,000) | Marine Scotland Information. (Accessed: March 2024).

[530] Marine Scotland (2024). *Maps NMPI*. Available at: https://marinescotland.atkinsgeospatial.com/nmpi// (Accessed: February 2024).

[531] Scottish Government (2020). Waste disposal – dredge material. Available at: sma2020_-_waste_disposal_-_dredge_material_-_productive.pdf (marine.gov.scot) (Accessed: March 2024).

[532] Energy Technologies Institute (2016). UK SAP Final Report. Available at: UKSAP_Final_Report.pdf (rl.ac.uk) (Accessed: March 2024).

[533] UK Parliament (2023). *UKPOSTNote 706 What is a just transition for environmental targets?* Available at: https://researchbriefings.files.parliament.uk/documents/POST-PN-0706/POST-PN-0706.pdf (Accessed: March 2024).

[534] Marine Scotland (2024). *Maps NMPI*. Available at: https://marinescotland.atkinsgeospatial.com/nmpi// (Accessed: February 2024).

Military and Civil Aviation References

[535] *Civil Aviation Act 1982*. Available at: https://www.legislation.gov.uk/ukpga/1982/16/contents (Accessed: March 2024).

[536] *The Rules of the Air Regulations 2015*. Available at: https://www.legislation.gov.uk/uksi/2015/840/pdfs/uksi_20150840_en.pdf (Accessed: March 2024).

[537] *The Air Navigation Order 2016*. Available at: https://www.legislation.gov.uk/uksi/2016/765/contents/made (Accessed: March 2024).

[538] Civil Aviation Authority (CAA), (2021*). CAP393 Air Navigation: Regulations made under powers in the Civil Aviation Act 1982 and the Air Navigation Order 2016*. Available at: https://publicapps.caa.co.uk/docs/33/CAP393%20Regulations%20made%20under%20powers%20in%20the%20Civil%20Aviation%20Act%201982%20and%20the%20Air%20Navigation%20Order%202016.pdf (Accessed: 9 February 2024).

[539] *Civil Aviation Act 1982 (c.16).* Available at: https://www.legislation.gov.uk/ukpga/1982/16/contents (Accessed: 9 February 2024).

[540] *Air Navigation Order 2016 (SI 2016/765).* Available at: https://www.legislation.gov.uk/uksi/2016/765/contents (Accessed: 9 February 2024).

[541] *Rules of the Air Regulations 2015. (SI 2015/840).* Available at: https://www.legislation.gov.uk/uksi/2015/840/memorandum/contents (Accessed: 9 February 2024).

[542] Civil Aviation Authority (CAA), (2023). *CAP 493 Standards for Offshore Helicopter Landing Areas*. Available at: https://publicapps.caa.co.uk/docs/33/CAP437%20Standards%20for%20offshore%20helicopter%20landing%20areas%20E9%20(1).pdf (Accessed: 9 February 2024)

[543] Civil Aviation Authority (CAA), (2019). *CAP 670 – Air Traffic Safety Requirements.* Available at: https://publicapps.caa.co.uk/docs/33/CAP670%20Issue3%20Am%201%202019(p).pdf (Accessed: 9 February 2024).

[544] Civil Aviation Authority (CAA), (2016). *CAP 764: Policy and Guidance on Wind Turbines*. Available at:

https://publicapps.caa.co.uk/docs/33/CAP764%20Issue6%20FINAL%20Feb.pdf (Accessed: 9 February 2024).

[545] Civil Aviation Authority (CAA), (2024). *Sitelink*. Available at: https://www.caa.co.uk/ (Accessed: 9 February 2024).

[546] Civil Aviation Authority (CAA), (2021). *CAP 774 The UK Flight Information Services*. Available at: https://publicapps.caa.co.uk/docs/33/CAP774_UK%20FIS_Edition%204.pdf (Accessed: 9 February 2024).

[547] Military Aviation Authority (MAA), (2024*). MAA Regulatory Publication 3000 Series: Air Traffic Management Regulations (Issue 28, 10 January 2024).* Available at: https://www.gov.uk/government/publications/regulatory-article-ra-3000-series-air-traffic-management-regulations-atm (Accessed: 9 February 2024)

[548] Military Aviation Authority (MAA), (2024). *Manual of Military Air Traffic Management (MAA, Issue 13, 10 January 2024).* Available at: https://www.gov.uk/government/publications/manual-of-military-air-traffic-management-mmatm (Accessed: 9 February 2024)

[549] UK Aeronautical Information Publication (AIP), (2024). *Sitelink*. Available at: https://www.aurora.nats.co.uk/htmlAIP/Publications/2024-01-25-AIRAC/html/index-en-GB.html (Accessed: 9 February 2024).

[550] Norwegian Aeronautical Information Publication (AIP), (2024). *Sitelink* Available at: https://ais.avinor.no/no/AIP/View/129/2024-01-25-AIRAC/html/index-en-GB.html?target=https%3A//ais.avinor.no/no/AIP/View/129/2024-01-25-AIRAC/html/EN-cover-en-GB.html&menuState=https%3A//ais.avinor.no/no/AIP/View/129/2024-01-25-AIRAC/html/eAIP/EN-menu-en-GB.html?,GEN,ENR,AD (Accessed: 9 February 2024)

[551] UK Military Aeronautical Information Publication (AIP), (2024). *UK MiL AIP Sitelink*. Available at: https://www.aidu.mod.uk/aip/ (Accessed: 9 February 2024).

[552] Maritime and Coastguard Agency (MCA), (2021). *MGN 654 (M+F) Safety of Navigation: Offshore Renewable Energy Installations (OREIs) - Guidance on UK Navigational Practice, Safety and Emergency Response.* Available at: https://assets.publishing.service.gov.uk/media/64637cd60b72d3000c34454c/MGN_654.pdf and MGN 654 Annex 5 https://assets.publishing.service.gov.uk/media/65a695fc640602000d3cb75d/OREI_SAR_Requirements_v4_.pdf (Accessed: 9 February 2024).

[553] NATS (2024). *Sitelink*. Available at: https://www.nats.aero/ (Accessed: 9 February 2024).

Socio-economics References

[554] *Equality Act 2010*. Available at: https://www.legislation.gov.uk/ukpga/2010/15/contents (Accessed: March 2024).

[555] Department for Energy Security and Net Zero (2023). *Overarching National Policy Statement for Energy (EN-1)*. Available at: https://www.gov.uk/government/publications/overarching-national-policy-statement-for-energy-en-1 (Accessed: March 2024).

[556] Scottish Government (2023) *National Planning Framework 4 (NPF4).* Available at: https://www.gov.scot/publications/national-planning-framework-4/ (Accessed: 07 February 2024).

[557] Scottish Government (2014). *National Planning Framework 3*. Available at: https://www.gov.scot/publications/national-planning-framework-3/documents/ (Accessed: March 2024).

[558] Scottish Government (2014). *Scottish Planning Policy*. Available at: https://www.gov.scot/publications/scottish-planning-policy/documents/ (Accessed: March 2024).

[559] Scottish Government (2021). *A fairer, greener Scotland Programme for Government 2021-22*. Available at: https://www.gov.scot/publications/fairer-greener-scotland-programme-government-2021-22/documents/ (Accessed: March 2024).

[560] Scottish Government (2020). *The Environment Strategy for Scotland*. Available at: https://www.gov.scot/publications/environment-strategy-scotland-vision-outcomes/ (Accessed: March 2024).

[561] Scottish Government (2017). *The future of energy in Scotland: Scottish energy strategy*. Available at: https://www.gov.scot/publications/scottish-energy-strategy-future-energy-scotland-9781788515276/documents/ (Accessed: March 2024).

[562] Scottish Government (2020). *Offshore wind policy statement*. Available at: https://www.gov.scot/publications/offshore-wind-policy-statement/documents/ (Accessed: March 2024).

[563] Scottish Government (2015). *Scotland's National Marine Plan*. Available at: https://www.gov.scot/publications/scotlands-national-marine-plan/documents/ (Accessed: March 2024).

[564] Aberdeenshire Council (2020). *Aberdeen City and Shire Strategic Development Plan*. Available at: http://publications.aberdeenshire.gov.uk/dataset/b5991364-41ff-4827-b5d4-06aa48c0616a/resource/27bcc9ff-8b5f-4dc3-b322-519f9800ac2c/download/abdnandshirestrategicdevplanfinal2020.pdf (Accessed: March 2024).

[565] Aberdeenshire Council (2023). *Aberdeenshire Local Development Plan 2023*. Available at: https://aberdeenshire.gov.uk/planning/plans-and-policies/ldp-2023/ (Accessed: March 2024).

[566] HM Treasury, (2022). *The Green Book*. Available at: https://www.gov.uk/government/publications/the-green-book-appraisal-and-evaluation-in-central-government/the-green-book-2020 (Accessed: 07 February 2024)

[567] Homes and Community Agency (now known as Homes England), (2014). *The Additionality Guide*. Available at: https://assets.publishing.service.gov.uk/media/5a7ec4b9e5274a2e87db1c92/additionality_guide_2014_full.pdf (Accessed: 07 February 2024)

[568] Scottish Government, (2016). *Draft Advice on Net Economic Benefit and Planning*. Available at: https://www.gov.scot/publications/draft-advice-on-net-economic-benefit-and-planning/ (Accessed: 07 February 2024)

[569] Marine Scotland (now known as Marine Directorate), (2022). *Defining 'Local Area' for assessing impact of offshore renewables and other marine developments*. Available at: https://www.gov.scot/publications/defining-local-area-assessing-impact-offshore-renewables-marine-developments-guidance-principles/documents/ (Accessed: 07 February 2024)

[570] Glasson, J., *et al*., (2020). *Guidance on assessing the socioeconomic impacts of offshore wind farms.* Available at: https://group.vattenfall.com/uk/contentassets/c66251dd969a437c878b5fec736c32aa/best-practice-guidance---final-oct-2020.pdf (Accessed: 07 February 2024)

[571] Marine Analytical Unit, (2022). *General Advice for Socio-Economic Impact Assessment*. Edinburgh; Marine Scotland.

[572] Institute of Environmental Management and Assessment, (2022). *Effective Scoping of Human Health in Environmental Impact Assessment*. Available at: https://www.iema.net/resources/blog/2022/11/17/launch-of-the-eia-guidance-for-considering-impacts-on-human-health (Accessed: 07 February 2024)

[573] Institute of Environmental Management and Assessment, (2022). *Determining Significance for Human Health in Environmental Impact Assessment*. Available at: https://www.iema.net/resources/blog/2022/11/17/launch-of-the-eia-guidance-for-considering-impacts-on-human-health (Accessed: 07 February 2024)

[574] UK Health Security Agency (formally Public Health England), (2017). *Health and Environmental Impact Assessment: A Briefing for Public Health Teams in England*. Available at: https://assets.publishing.service.gov.uk/media/5a82312440f0b6230269b540/Health_and_environmental_impact_assessment.pdf (Accessed: 07 February 2024)

[575] NOMIS Official Census and Labour Market Statistics, (2024). *Local Authority Profiles*. Available at: https://www.nomisweb.co.uk/reports/lmp/la/1946157406/report.aspx#tabquals (Accessed: 29 January 2024)

[576] Office for National Statistics, (2024). *UK small area gross value added (GVA) estimates*. Available at: https://www.ons.gov.uk/economy/grossvalueaddedgva/datasets/uksmallareagvaestimates (Accessed: 07 February 2024)

[577] Fraser of Allander Institute, (2022). *The Economic Impact of Scotland's Renewable Energy Sector – 2022 Update*. Available at: https://fraserofallander.org/wp-content/uploads/2022/10/The-Economic-Impact-of-Scotlands-Renewable-Energy-Sector1-1.pdf (Accessed: 01 February 2024)

[578] NorthConnect (2018). *NorthConnect HVDC Cable Infrastructure EIAR: Volume 1*. Available at: https://marine.gov.scot/data/northconnect-hvdc-cable-environmental-impact-assessment-report-volume-1 (Accessed: 25 January 2024).

[579] Scottish Sea Kayaking, (2024). *Scottish Sea Kayaking*. Available at: https://scottishseakayaking.co.uk/trips/south-east-scotland/bullers-of-buchan/#foogallery-5094/p:3 (Accessed: 01 February 2024)

[580] Visit Scotland, (2024). *Misty Angling Trips*. Available at: https://www.visitscotland.com/info/see-do/misty-angling-trips-p1173871#:~:text=Welcome%20to%20Misty%20Sea%20Angling,%2C%20Ling%2C%20Coley%20and%20Mackerel (Accessed: 08 February 2024)

[581] Green Howe Marine Services, (2024). *Aberdeen Harbour Tours*. Available at: https://www.greenhowemarineservices.co.uk/aberdeen-harbour-tours/ (Accessed: 07 February 2024)

[582] Nomad Surfers, (2024). *Destinations*. Available at: https://nomadsurfers.com/peterhead-sandford-bay/ (Accessed: 01 February 2024)

[583] Angling Trust, (2024). *Map*. Available at: https://anglingtrust.net/map/ (Accessed: 08 February 2024)

[584] UK Climbing, (2023). *Longhaven Craig*. Available at: https://www.ukclimbing.com/logbook/crags/longhaven_craig-27208/#overview (Accessed: 08 February 2024)

[585] North Link Ferries, (2024). *Our Routes*. Available at: https://www.northlinkferries.co.uk/booking-info/our-routes/ (Accessed: 07 February 2024)

[586] Visit Scotland, (2020). *Grampian Factsheet 2019*. Available at: https://www.visitscotland.org/research-insights/regions/aberdeen-aberdeenshire (Accessed: 07 February 2024)

[587] National Records of Scotland, (2022). *Life Expectancy*. Available at: https://www.nrscotland.gov.uk/files/statistics/council-area-data-sheets/aberdeenshire-council-profile.html#Life_Expectancy (Accessed: 07 February 2024)

[588] Public Health Scotland, (2023). *ScotPHO Profiles*. Available at: https://scotland.shinyapps.io/ScotPHO_profiles_tool/ (Accessed: 07 February 2024)

[589] Scottish Government, (2018). *Scottish Health Survey – Data Trends*. Available at: https://scotland.shinyapps.io/sg-scottish-health-survey/ (Accessed: 07 February 2024)

[590] Scottish Government, (2020). *Scottish Index of Multiple Deprivation 2020*. Available at: https://www.gov.scot/news/scottish-index-of-multiple-deprivation-2020/ (Accessed: 07 February 2024)

[591] National Records of Scotland, (2024). *Population Projections for Scottish Areas (2018-based): Data Tables*. Available at: https://www.nrscotland.gov.uk/files/statistics/council-area-data-sheets/aberdeenshire-council-profile.html#table_pop_proj (Accessed: 02 February 2024)

[592] *The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017*. Available at: https://www.legislation.gov.uk/ssi/2017/102/contents/made (Accessed: February 2024).

Materials and Waste References

[593] European Parliament (2008). *Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives*. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32008L0098 (Accessed: 09 February 2024).

[594] European Parliament (1999). *Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste.* Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A31999L0031 (Accessed: 09 February 2024).

[595] Scottish Government (2023). *Circular Economy Bill Published*. Available at: https://www.gov.scot/news/circular-economy-bill-published/ (Accessed: 09 February 2024).

[596] *The Environmental Protection (Duty of Care) (Scotland) Regulations 2014.* Available at: https://www.legislation.gov.uk/ssi/2014/4/contents/made (Accessed: 09 February 2024).

[597] *The Waste (Scotland) Regulations 2012*. Available at: https://www.legislation.gov.uk/ssi/2012/148/contents (Accessed: 09 February 2024),

[598] *The Waste Management Licensing (Scotland) Regulations 2011*. Available at: https://www.legislation.gov.uk/ssi/2011/228/contents (Accessed: 09 February 2024),

[599] *The Special Waste Regulations 1996*. Available at: https://www.legislation.gov.uk/uksi/1996/972/note (Accessed: 09 February 2024),

[600] *Environmental Protection Act 1990*. Available at: https://www.legislation.gov.uk/ukpga/1990/43/contents (Accessed: 09 February 2024),

[601] Department for Energy Security & Net Zero (2023) *National Policy Statement for Renewable Energy Infrastructure (EN-3)*. Available at https://www.gov.uk/government/publications/national-policy-statement-for-renewable-energy-infrastructure-en-3 (Accessed: 09 February 2024),

[602] Department of Energy & Climate Change (2011). *National Policy Statement for Renewable Energy Infrastructure (EN-3).* Available at https://www.gov.uk/government/publications/national-policy-statements-for-energy-infrastructure (Accessed: 09 February 2024),

[603] Department for Energy Security & Net Zero (2023). *Overarching National Policy Statement for Energy (EN-1).* Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47854/1938-overarching-nps-for-energy-en1.pdf (Accessed: 09 February 2024).

[604] Scottish Government (2023) *National Planning Framework 4*. Available at https://www.gov.scot/publications/national-planning-framework-4/documents/ (Accessed: 09 February 2024),

[605] Scottish Government (2010) *Scotland's Zero Waste Plan.* Available at: https://www.gov.scot/binaries/content/documents/govscot/publications/strategy-plan/2010/06/scotlands-zero-waste-plan/documents/00458945-pdf/00458945-pdf/govscot%3Adocument/00458945.pdf (Accessed: 09 February 2024),

[606] Scottish Government (2015) *'Scotland's National Marine Plan'*. Available at: https://www.gov.scot/binaries/content/documents/govscot/publications/strategy-plan/2015/03/scotlands-national-marine-plan/documents/00475466-pdf/00475466-pdf/govscot%3Adocument/00475466.pdf

[607] IEMA (2020). *IEMA Guide to Materials and Waste in Environmental Impact Assessment*. IEMA; Cambridgeshire.

[608] Marine Directorate (2023) *Scoping Opinion adopted by the Scottish Ministers under: The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 and The Marine Works (Environmental Impact Assessment) Regulations 2007 Cenos Offshore Windfarm*. Available at: https://marine.gov.scot/sites/default/files/cenos_offshore_windfarm_-_flotation_energy_ltd_-_eia_scoping_opinion.pdf (Accessed: 09 February 2024).

[609] British Geological Survey (2013) *The Mineral Resources of Scottish Waters and the Central North Sea*. Available at https://nora.nerc.ac.uk/id/eprint/502151/1/OR13013.pdf (Accessed: 09 February 2024).

[610] SEPA (2022) *Waste from all sources – Summary data 2021*. Available at: https://www.sepa.org.uk/environment/waste/waste-data/waste-data-reporting/waste-data-for-scotland/ (Accessed: 09 February 2024).

[611] SEPA (2022) *Waste Sites and Capacity Tool*. Available at: https://www.sepa.org.uk/data-visualisation/waste-sites-and-capacity-tool/ (Accessed: 09 February 2024).

[612] Global Wind Energy Council (2023) *Global Offshore Wind Report*. Available at: https://gwec.net/wp-content/uploads/2023/08/GWEC-Global-Offshore-Wind-Report-2023.pdf

[613] Vestas (2024) *Our sustainability strategy'*. Available at https://www.vestas.com/en/sustainability/sustainability-strategy (Accessed 22 March 2024)

[614] GE Renewable Energy (n.d.) '*Sustainability'*. Available at: https://www.ge.com/renewableenergy/sustainability (Accessed 22 March 2024)

[615] Siemens Gamesa Renewable Energy (2024) '*Sustainability'*. Available at: https://www.siemensgamesa.com/sustainability/environment (Accessed 22 March 2024)

[616] Marine Scotland (2023). *Maps National Marine Plan Interactive*. Available at: https://marinescotland.atkinsgeospatial.com/nmpi/ (Accessed: 09 February 2024).

[617] SEPA (2023) *Scottish Waste site and Capacity Tool*. Available at https://www.sepa.org.uk/environment/waste/waste-data/waste-data-reporting/waste-site-information/ (Accessed: 09 February 2024).

[618] SEPA (2023) *Waste from all sources – Summary data 2021*. Available at: https://www.sepa.org.uk/environment/waste/waste-data/waste-data-reporting/waste-data-for-scotl (Accessed: 09 February 2024).

[619] Enva (2023) *Enva launches wind turbine blade recycling service*. Available at: https://enva.com/news-pr/enva-launches-wind-turbine-blade-recycling-service#:~:text=Around%2085%20to%2090%25%20of,nacelle%20have%20established%20recycling%20practices (Accessed: 09 February 2024)..

[620] Orsted (n/d/) *'Can wind turbines be recycled?*'. Available at: https://orsted.com/en/insights/the-fact-file/can-wind-turbines-be-recycled (Accessed: 09 February 2024).

[621] Vestas (2024) *Our sustainability strategy'*. Available at https://www.vestas.com/en/sustainability/sustainability-strategy (Accessed 22 March 2024)

[622] GE Renewable Energy (n.d.) '*Sustainability'*. Available at: https://www.ge.com/renewableenergy/sustainability (Accessed 22 March 2024)

[623] Siemens Gamesa Renewable Energy (2024) '*Sustainability'*. Available at: https://www.siemensgamesa.com/sustainability/environment (Accessed 22 March 2024)

Major Accidents and Disasters References

[624] *The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017* (SSI 2017:0101) (as amended). Available at: https://www.legislation.gov.uk/ssi/2017/101/contents (Accessed 6 February 2024).

[625] *The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017* (SSI 2017:0115) (as amended). Available at: https://www.legislation.gov.uk/ssi/2017/115/contents (Accessed: 6 February 2024).

[626] Institute of Environmental Management & Assessment, (2020). '*Major Accidents and Disasters in EIA: A Primer*'. Available at: https://www.iema.net/resources/blog/2020/09/23/iema-major-accidents-and-disasters-in-eia-primer (Accessed: 1 February 2024).

[627] Department for Environment, Food & Rural Affairs, (2011). '*Guidelines for Environmental Risk Assessment Green Leaves III*'. Available at: https://www.gov.uk/government/publications/guidelines-for-environmental-risk-assessment-and-management-green-leaves-iii (Accessed: 1 February 2024).

[628] International Standards Organisation, (2018). '*ISO 31000:2018 Risk management – Guidelines*'. Available at: https://www.iso.org/standard/65694.html (Accessed: 1 February 2024).

[629] Global Offshore Wind Health and Safety Organisation, (2024). '*The G + Global Offshore Wind Health and Safety Organisation: Good Practice Guidelines Database*'. Available at: https://www.gplusoffshorewind.com/work-programme/workstreams/guidelines (Accessed: 1 February 2024).

[630] International Maritime Organization, (2018). '*Revised Guidelines for Formal Safety Assessment (FSA) for use in the IMO Rule-Making Process*'. Available at: https://wwwcdn.imo.org/localresources/en/OurWork/HumanElement/Documents/MSC-MEPC.2-Circ.12-Rev.2%20-%20Revised%20Guidelines%20For%20Formal%20Safety%20Assessment%20(Fsa)For%20Use%20In%20The%20Imo%20Rule-Making%20Proces...%20(Secretariat).pdf (Accessed: 1 February 2024).

[631] HM Government, (2023). '*National Risk Register 2023 edition*'. Available at: https://assets.publishing.service.gov.uk/media/64ca1dfe19f5622669f3c1b1/2023_NATIONAL_RISK_REGISTER_NRR.pdf (Accessed: 1 February 2024).

[632] North of Scotland Regional Resilience Partnership, (2022). '*Community Risk Register 2022*'. Available at: https://www.firescotland.gov.uk/media/5sxfakof/sfrs-north-community-risk-register-2022-digital.pdf (Accessed: 1 February 2024).

[633] British Geological Survey, (2020). '*GeoIndex Onshore*'. Available at: http://mapapps2.bgs.ac.uk/geoindex/home.html (Accessed: 1 February 2024).

[634] British Geological Survey, (2024). '*GeoIndex Offshore*'. Available at: https://mapapps2.bgs.ac.uk/geoindex_offshore/home.html (Accessed: 1 February 2024).

[635] Prevention Web Europe, (2005). '*Tsunamis Hazard Map*'. Available at: https://www.preventionweb.net/english/professional/maps/v.php?id=3831 (Accessed: 1 February 2024).

[636] Centre for Research on the Epidemiology of Disasters, (2009). '*The International Disaster Database*'. Available at: https://www.emdat.be/ (Accessed: 1 February 2024).

[637] Health and Safety Executive, (2024). '*Planning Advice Web App*'. Available at: https://pa.hsl.gov.uk/ (Accessed: 1 February 2024).

[638] Health and Safety Executive, (2024). '*COMAH 2015 Public Information Search*'. Available at: https://notifications.hse.gov.uk/COMAH2015/Search.aspx (Accessed: 1 February 2024).

[639] Google, (2024). *Aerial and street view maps covering Study Area*. Available at: https://www.google.com/maps/ (Accessed: 1 February 2024).

[640] International Federation of Red Cross and Red Crescent Societies, (2008). '*What is a Disaster?*' Available at: http://www.ifrc.org/en/what-we-do/disaster-management/about-disasters/what-is-a-disaster/ (Accessed: 1 February 2024).

[641] '*The Management of Health and Safety at Work Regulations 1999*'. Available at: https://www.legislation.gov.uk/uksi/1999/3242/contents/made (Accessed: 1 February 2024).

[642] '*The Workplace (Health, Safety and Welfare) Regulations 1992*'. Available at: https://www.legislation.gov.uk/uksi/1992/3004/contents/made (Accessed: 1 February 2024).

[643] *The Electricity at Work Regulations 1989*. Available at: https://www.legislation.gov.uk/uksi/1989/635/contents/made (Accessed: 1 February 2024)

Climate Change Resilience References

[644] *The Climate Change (Scotland) Act 2009*. Available at: https://www.legislation.gov.uk/asp/2009/12/contents (Accessed: March 2024).

[645] *Climate Change (Emissions Reduction Targets) (Scotland) Act 2019*. Available at: https://www.legislation.gov.uk/asp/2019/15 (Accessed: March 2024).

[646] Department for Energy Security & Net Zero (2023). *Overarching National Policy Statement for Energy (EN-1).* Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/47854/1938-overarching-nps-for-energy-en1.pdf (Accessed: 09 February 2024).

[647] Department for Energy Security & Net Zero (2023) *National Policy Statement for Renewable Energy Infrastructure (EN-3)*. Available at

https://www.gov.uk/government/publications/national-policy-statement-for-renewable-energy-infrastructure-en-3 (Accessed: 09 February 2024),

[648] Scottish Government (2023) *National Planning Framework 4 (NPF4).* Available at: https://www.gov.scot/publications/national-planning-framework-4/ (Accessed: 07 February 2024).

[649] Scottish Government (2015). *Scotland's National Marine Plan*. Available at: https://www.gov.scot/publications/scotlands-national-marine-plan/documents/ (Accessed: March 2024).

[650] Institute of Environmental Management and Assessment (2020) *IEMA EIA Guide to: Climate Change Resilience and Adaptation*. Available at: https://www.iema.net/resources/reading-room/2020/06/26/iema-eia-guide-to-climate-change-resilience-and-adaptation-2020 (Accessed: 16 January 2024).

[651] International Standards Organisation (2021). *ISO 14091:2021 Adaptation to climate change — Guidelines on vulnerability, impacts and risk assessment*. Available at: https://www.iso.org/standard/68508.html (Accessed: 16 January 2024).

[652] Met Office (2020) *UK Climate Averages. Aberdeen Airport*. Available at: https://www.metoffice.gov.uk/research/climate/maps-and-data/uk-climate-averages/gfnmmyh91 (Accessed: 16 January 2024).

[653] Met Office. (2022). *State of the UK Climate*. Available at: https://www.metoffice.gov.uk/research/climate/maps-and-data/about/state-of-climate (Accessed: 16 January 2024).

[654] Met Office (2018). *UKCP18 Marine Report.* Available at: https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18-marine-report-updated.pdf (Accessed: March 2024).

[655] Met Office (2018) *UKCP18 Fact Sheet: Sea Level Rise and Storm Surges*. Available at: https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18-fact-sheet-sea-level-rise-and-storm-surge.pdf (Accessed 16 January 2024).

[656] Met Office. (2018a). *UKCP Data*. Available at: https://www.metoffice.gov.uk/research/approach/collaboration/ukcp/data/index (Accessed: 16 January 2024).

[657] Nigel Arnell. (2021). *The Climate Risk Indicators*. Available at: https://uk-cri.org/ (Accessed: 16 January 2024).

[658] National Tidal and Sea Level Facility (2022) *Sea Level Trends*. Available at: https://ntslf.org/products/sea-level-trend-charts?name=Aberdeen (Accessed: 16 January 2024).

[659] HM Government (2017) *Future of the Sea: Ocean Acidification.* Available at: https://assets.publishing.service.gov.uk/media/5a81e073e5274a2e87dbff33/Ocean_Acidification_final_v3.pdf (Accessed: 16 January 2024).

[660] Hahmann, A.,Garcia-Santiago, O. and Pena, A. (2022) *Current and future wind energy resources in the North Sea according to CMIP6*. Available at:

https://wes.copernicus.org/preprints/wes-2022-52/wes-2022-52.pdf (Accessed: 16 January 2024).

[661] Bonaduce, A., et al (2019). *Wave Climate Change in the North Sea and Baltic Sea.* Journal of Marine Science and Engineering. Available at: https://www.mdpi.com/2077-1312/7/6/166 (Accessed: March 2024).

[662] Met Office (N.D) *Beaufort wind force scale*. Available at: https://www.metoffice.gov.uk/weather/guides/coast-and-sea/beaufort-scale (Accessed: 16 January 2024).

[663] Belcher, S., Slingo, J., Scaife, A., McCarthy, M., Saulter, A., McBeath, K., Parry, S. (2014). *The recent storms and floods in the UK*. Met Office, 29

[664] International Electrotechnical Commission (2005) *IEC 61400-1: Wind Turbines Part 1 – Design Requirements*. Available at: https://webstore.iec.ch/preview/info_iec61400-1%7Bed3.0%7Den.pdf (Accessed: 16 January 2024).

Carbon and Greenhouse Gases References

[665] UK Government. (2017). *Environment Impact Assessment 2017*. Available at: https://www.gov.uk/guidance/environmental-impact-assessment (Accessed: February 2024).

[666] United Nations (1992). *United Nations Framework Convention on Climate Change*. Available at: https://unfccc.int/resource/docs/convkp/conveng.pdf (Accessed: February 2024).

[667] United Nations (1997). *Kyoto Protocol to the United Nations Framework Convention on Climate Change*. Available at: https://unfccc.int/documents/2409 (Accessed: February 2024).

[668] *Climate Change Act 2008*. Available at: https://www.legislation.gov.uk/ukpga/2008/27/contents (Accessed: February 2024).

[669] Climate Change (Scotland) Act 2009. Available at: https://www.legislation.gov.uk/asp/2009/12/contents (Accessed 31 January 2024)

[670] United Nations (2015). *Paris Agreement*. Available at: https://unfccc.int/sites/default/files/english_paris_agreement.pdf (Accessed: February 2024).

[671] Scottish Government (2023) *National Planning Framework 4 (NPF4).* Available at: https://www.gov.scot/publications/national-planning-framework-4/ (Accessed: 07 February 2024).

[672] Scottish Government (2020). *Securing a green recovery on a path to net zero: climate change plan 2018–2032 – update*. Available at: https://www.gov.scot/publications/securing-green-recovery-path-net-zero-update-climate-change-plan-20182032/ (Accessed: March 2024).

[673] Scottish Government (2022). *Sectoral marine plan - offshore wind for innovation and targeted oil and gas decarbonisation: initial plan framework*. Available at: https://www.gov.scot/publications/initial-plan-framework-sectoral-marine-plan-offshore-

wind-innovation-targeted-oil-gas-decarbonisation-intog/documents/ (Accessed: March 2024).

[674] Department for Energy Security and Net Zero and Department for Business, Energy & Industrial Strategy (2021). *Net Zero Strategy: Build Back Greener*. Available at: https://www.gov.uk/government/publications/net-zero-strategy (Accessed: March 2024).

[675] Department for Business, Energy & Industrial Strategy, Department for Energy Security & Net Zero & Prime Minister's Office, 10 Downing Street (2022). *British Energy Security Strategy*. Available at: https://www.gov.uk/government/publications/british-energy-security-strategy/british-energy-security-strategy (Accessed: March 2024).

[676] Aberdeenshire Council (2023). *Aberdeenshire Local Development Plan 2023*. Available at: https://aberdeenshire.gov.uk/planning/plans-and-policies/ldp-2023/ (Accessed: March 2024).

[677] IEMA. (2022). Institute of Environmental Management & Assessment (IEMA) Guide. Assessing Greenhouse Gas Emissions and Evaluating their Significance 2nd Edition. Available at: https://www.iema.net/preview-document/assessing-greenhouse-gas-emissions-and-evaluating-their-significance (Accessed: 24 January 2024).

[678] Institution of Civil Engineers (ICE). (2023) Guidance Document for PAS 2080: Practical actions and examples to accelerate the decarbonisation of buildings and infrastructure. Available at: https://www.ice.org.uk/media/vm0nwehp/2023-03-29-pas_2080_guidance_document_april_2023.pdf (Accessed: 31 January 2024)

[679] World Resources Institute and World Business Council for Sustainable Development. (2015). *The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard*. Available at: https://ghgprotocol.org/sites/default/files/standards/ghg-protocol-revised.pdf (Accessed 24 January 2024)

[680] Royal Institution of Chartered Surveyors (RICS). (2023). *Methodology to Calculate Embodied Carbon of Materials (2nd ed.).* London; RICS.

[681] Climate Change Committee. (2020)*The Sixth Carbon Budget Electricity generation.* Available at: https://www.theccc.org.uk/wp-content/uploads/2020/12/Sector-summary-Electricity-generation.pdf (Accessed: 25 January 2024).

[682] Marine Directorate - Licensing Operations Team (2022), *Scoping Opinion adopted by the Scottish Ministers: Cenos Offshore Windfarm*. Available at: https://marine.gov.scot/sites/default/files/cenos_offshore_windfarm_-_flotation_energy_ltd_-_eia_scoping_opinion.pdf (Accessed 29 January 2024)

[683] Climate Change Committee. (2016). *Guidance: Carbon Budgets*. Available at: https://www.gov.uk/guidance/carbon-budgets (Accessed 31 January 2024).

[684] *Climate Change (Emissions Reduction Targets) (Scotland) Act 2019*. Available at: https://www.legislation.gov.uk/asp/2019/15/contents/enacted (Accessed 31 January 2024)

[685] *Climate Change (Scotland) Act 2009*. Available at: https://www.legislation.gov.uk/asp/2009/12/contents (Accessed 31 January 2024)

[686] Department of Energy and Climate Change (2011). UK Renewable Energy Roadmap. Available at: https://assets.publishing.service.gov.uk/media/5a79e9bae5274a18ba50fb84/2167-uk-renewable-energy-roadmap.pdf (Accessed: 25 January 2024).

[687] UK Government. (2022). *The Green Book 2022*. Available at: https://www.gov.uk/government/publications/the-green-book-appraisal-and-evaluation-in-central-government/the-green-book-2020 (Accessed: January 2024).

[688] International Maritime Organization (IMO). (2020). *Fourth Greenhouse Gas Study 2020*. Available at: https://www.imo.org/en/OurWork/Environment/Pages/Fourth-IMO-Greenhouse-Gas-Study-2020.aspx (Accessed: January 2024).