STROMAR

Stromar Offshore Wind Farm

Environmental Impact Assessment: Offshore Scoping Report

Proposed Offshore Development

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Glossary of Terminology

Term	Definition
Action Levels	The non-statutory thresholds assigned to chemical contaminants in sediments, originally used to assess the suitability for disposal of dredged material, but subsequently broadened to consider sediment disturbance from any activity in the marine environment. Contaminant concentrations measured below Action Level 1 are considered unlikely to cause adverse environmental effects, and contaminant concentrations above Action Level 2 are considered highly likely to lead to adverse environmental effects. Contaminant concentrations between the two values are subject to professional assessment.
Allision	Contact between a vessel and a stationary object.
Archaeological Exclusion Zone	An area around a heritage asset in which construction activities and anchoring are prohibited to avoid impacts to the asset.
Array Area	The area in which the generation infrastructure will be located, including the Wind Turbine Generators (WTGs) and associated foundations, inter-array/interconnector cables, and offshore substations.
Automatic Identification System (AIS)	A system by which vessels automatically broadcast their identity and key statistics including location, destination, length, speed and current status. Most commercial vessels and European Union fishing vessels over 15 metres (m) in length are required to carry AIS.
Background Assessment Concentration	The assessment threshold for testing whether contaminant concentrations are 'near background levels' for man-made substances.
Banner Bank	A tidal sand bank that is located near headlands, islands or large rocks and separated from them by a channel that is swept clear by strong currents. Often the bank(s) on one side of the obstacle will be better developed than on the other but in areas of tidal currents where the sand supply and current speeds are similar on either side, then the arrangement of banks will be symmetrical. In areas of unidirectional flow (non-tidal) there will be banks on only one side, and they will be attached to the obstacle rather than separated by a channel (Kenyon and Cooper, 2005).
Bathing Water	Coastal or inland waters designated under the Bathing Waters (Scotland) Regulations 2008. To be classified as a Bathing Water, bathing must be explicitly authorised, or not prohibited and practiced traditionally by a large number of people.
Beam Trawl	A method of bottom trawling with a net that is held open by a beam, which is generally a heavy steel tube supported by steel trawl heads at each end. Tickler chains or chain mats, attached between the beam and the ground rope of the net, are used to disturb fish and crustaceans that rise up and fall back into the attached net.
Carbon	Used interchangeably to refer to greenhouse gas emissions.
Coastal Character Area (CCA)	A distinct, recognisable, geographical area which has a consistent overall character. Coastal character can be identified at different scales: Regional CCA at a strategic level (e.g., a loch within a larger system, a stretch of coastline or a whole island) or Local (shorter stretches of coast or shore).
Collision	Contact between two or more moving objects.
Commitment	A term used interchangeably with mitigation and enhancement measures.

Term	Definition
	Commitments are embedded mitigation measures. The purpose of Commitments is to reduce and/or eliminate Likely Significant Effect (LSE), in EIA terms. Primary (Design) Commitments or Tertiary (Inherent) Commitments are both embedded within the assessment at the relevant point in the EIA (e.g., at Scoping or EIAR). Secondary commitments are incorporated to reduce Likely Significant Effects to environmentally acceptable levels following initial assessment. Commitment measures are presented in **Appendix A: Offshore Commitments Register**.
Confidence Interval (CI)	The mean of the estimate plus and minus the variation in that estimate.
Consultation Bodies (with reference to the Marine Works (EIA) Regulations 2007, the Marine Works (EIA) (Scotland) Regulations 2017 and the Electricity Works (EIA) (Scotland) Regulations 2017)	'consultation bodies' means— a) the local planning authority; identified as: i) Any authority that is a planning authority for the purposes of the Town and Country Planning (Scotland) Act 1997 in or adjacent to whose area the regulated activity is proposed to be carried out; and ii) Where the regulated activity is carried out in or adjacent to a National Park, the National Park authority for the National Park. b) other public bodies: i) The Scottish Environment Protection Agency; ii) Historic Environment Scotland; iii) NatureScot (previously Scottish Natural Heritage); and iv) any additional nature conservation bodies that the appropriate authority considers likely to have an interest in the activity by reason of their responsibilities (such as the Joint Nature Conservation Committee, Natural England and Natural Resources Wales). c) Any relevant authority (including the Secretary of State, the Welsh Ministers and any Northern Irish department as appropriate where the regulated activity is likely to have a significant effect on the environment of other parts of the United Kingdom); d) Any consenting authority, which is any authority whose consent to any activity to be undertaken in the course of a project is required under any enactment; and e) Such other bodies as the appropriate authority considers likely to have an interest in the regulated activity (whether by virtue of their having specific environmental responsibilities or local or regional competencies under an enactment or otherwise).
Controlled Airspace	Defined airspace within which pilots must follow Air Traffic Control instructions implicitly. In the UK, Classes A, C, D and E are areas of controlled airspace.
Creel	Typically, a Scottish term for a pot or trap deployed by an inshore vessel. Pots and traps are generally rigid structures into which fish or shellfish are guided or enticed through funnels that make entry easy but from which escape is difficult. There are many different styles and designs, each one has been designed to suit the behaviour of its target species.
Cumulative Effects	The combined potential effect of the Project in combination with the potential effects from consented and future projects, on the same single receptor/resource. Cumulative effects also refers to potential effects from both the Proposed Offshore Development and Proposed Onshore Development on the same receptor.
Deadweight	Outcomes that would have taken place without the intervention under consideration

Term	Definition
Demersal	Living or used on or near the seabed.
Derogation	The process by which a proposal which has failed the integrity test (e.g., cannot rule out adverse effect on site integrity) is allowed to go ahead. In order for a derogation to be granted two legal tests must be applied and passed: a) There are no feasible alternatives that would be less damaging to the site; b) The proposal must be carried out for Imperative Reasons Overriding Public Interest (IROPI); and c) The necessary compensatory measures can be secured.
Developer	Stromar Offshore Wind Farm Limited. A consortium comprising Ørsted, Renantis, and BlueFloat Energy.
Displacement	The degree to which an increase in economic activity or social welfare that is promoted by an intervention is offset by reductions elsewhere.
Effect	Term used to express the consequences of an impact. The significance of an effect is determined by correlating the magnitude of the impact with the importance, or sensitivity, of the receptor or resource in accordance with defined significance criteria.
Electrical Infrastructure Study Area (EISA)	The initial search area for the Offshore Export Cable Corridor (ECC) during the Route Planning and Site Selection Process (RPSS)
'Electricity Works EIA Regulations 2017'	The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017.
Environmental Assessment Criteria	The OSPAR defined value for contaminants, below which chronic effects are not expected to occur.
Environmental Impact Assessment (EIA)	An environmental impact assessment is a process consisting of: a) The preparation of an EIA report by the applicant; b) The carrying out of consultation, publication and notification as required by legislation; c) The examination by the Scottish Ministers of the information presented in the EIA report and any other environmental information; d) The reasoned conclusion by the Scottish Ministers on the significant effects of the works on the environment, taking into account the results of the examination referred to at (c) and, where appropriate, their own supplementary examination; and e) The integration of the Scottish Ministers' reasoned conclusion into the decision notice.
Environmental Impact Assessment (EIA) Directive	Directive 2011/92/EU of the European Parliament and of the Council on the assessment of the effects of certain public and private projects on the environment.
Environmental Impact Assessment (EIA) Regulations	Collectively the EIA Regulations which apply to the Proposed Offshore Development; namely: a) The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017;

Term	Definition
	b) The Marine Works (Environmental Impact Assessment) Regulations 2007; and c) The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017.
Environmental Quality Standards	The set concentrations thresholds for individual substances, below which, adverse environmental effects are unlikely to occur.
Fish stock	Any natural population of fish which an isolated and self-perpetuating group of the same species.
Fishery	A group of vessel voyages which target the same species or use the same gear.
Fishing ground	An area of water or seabed targeted by fishing activity.
Fleet	A physical group of vessels sharing similar characteristics (e.g., nationality).
Flight Information Region	Airspace managed by a controlling authority with responsibility for ensuring air traffic services are provided to aircraft flying within it.
Formal Safety Assessment	A structured and systematic process for assessing the risks and costs (if applicable) associated with shipping activity as defined by the International Maritime Organization.
Foundations	The foundations on which the wind turbine generators or offshore substations are installed. These can be floating or fixed to the seabed.
Frontal zone	Zone marking boundaries between water masses with different oceanographic conditions
Gear type	The method/equipment used for fishing.
Good Chemical Status (GCS)	Chemical status is assessed, achieving either Pass or Fail/Poor (dependent on surface water and groundwater assessments). Chemical status is determined by compliance with the 'Priority Substances' and 'Priority Hazardous Substances' lists, with all EQS needing to be met for Good status to be achieved. All waterbodies have the target to achieve GCS
Good Ecological Potential	For heavily modified waterbodies, the ecological quality that could be achieved by affected waterbodies without significant adverse impacts on benefits provided by the waterbody, or significant adverse impacts on the wider environment.
Good Ecological Status (GES)	Describes the quality of the structure and functioning of surface water ecosystems. The assessment elements for achieving GES include biological (e.g., fish, invertebrates, phytoplankton), physico-chemical (dissolved inorganic nitrogen, dissolved oxygen), specific pollutants or supporting elements (e.g., hydromorphology). The lowest scoring element denotes the overall status, so to achieve good status, all elements must be at 'good' standard.
Greenhouse Gas	A gas that absorbs and emits radiant energy at thermal infrared wavelengths causing the greenhouse effects.
Gross Value Added	This is a measure of economic value added by an organisation, industry or region and is typically estimated by subtracting the non-staff operational costs from the turnover of an organisation.
Habitats Regulations Appraisal (HRA)	A process which helps determine likely significant effects and (where appropriate) assesses adverse impacts on the integrity of European conservation sites and

Term	Definition
	Ramsar sites. The process consists of up to four stages of assessment: screening, appropriate assessment, assessment of alternative solutions and assessment of IROPI. Should a proposal fail the initial tests, it may bring forward a derogation and compensation case, allowing it to be built in spite of potential damage to European site(s). For derogation to be granted the two derogation tests must be passed and suitable compensation measures implemented.
Heritage asset	A building, monument, site, place, area or landscape identified as having a degree of significance meriting consideration in planning decisions, because of its heritage interest.
High Voltage Direct Current (HVDC)	Refers to high voltage electricity in direct current form. In relation to transmission, HVDC is often selected for longer transmission infrastructure on the basis that losses are typically lower when compared to transmission infrastructure utilising alternating current.
Historic environment	The physical evidence for past human activity, including surviving physical remains whether visible, buried or submerged.
Horizontal Directional Drilling (HDD)	A trenchless method of cable installation, wherein the cable is drilled beneath a feature without the need for trenching.
Hydromorphological Designation	The designation distinguishing the waterbody as either heavily modified (and by what purpose) or artificial.
In-combination	Resulting from the combination of other plans/projects on European Sites within the national site network.
Indirect Effect	The effects not directly/immediately caused by the Project but arise as a result of it. Secondary effects are included under the umbrella of indirect effects in this case.
Induced Effect	The economic effects from the spending of staff salaries within the wider economy
Inter-related Effects	Effects through different phases of the Project and the cumulation of different environmental impacts on the same receptor – e.g. construction noise and construction dust.
Intertidal	The area located between Mean Low Water Springs (MLWS) and Mean High Water Springs (MHWS)
Jigging	Jigging is a method of fishing that has evolved over many centuries, where hooks attached to artificial lures are used to attract and capture fish. The lures are designed to resemble small fish that the target species would normally feed on.
Jobs	This is a measure of employment which considers the headcount employment in an organisation or industry. This measure is used when considering long term impacts such as the jobs supported during the O&M phase of the Proposed Offshore Development.
Landfall	The location (from MLWS) where the Offshore Export Cables will interface with and are connected to the Onshore Export Cables at a transition joint bay.
Landfall Development Zone	The area within which all permanent and temporary works required to bring the Offshore Export Cables onshore at landfall and connect to the Onshore Export Cables will take place. The final location of these works within this area would be presented through a later planning application for approval of matters specified in conditions should planning permission in principle be granted.

Term	Definition
Landings	Quantitative description of the amount of fish returned to port for sale, in terms of value or weight.
Landscape	An area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors.
Leakage	The extent to which effects 'leak out' of a target area into others e.g., supply chain companies from outside the study areas working on the Proposed Offshore Development
Likely Significant Effect (LSE)	It is a requirement of Environmental Impact Assessment Regulations to determine the likely significant effects of the Proposed Development on the environment which should relate to the level of an effect and the type of effect.
Magnitude	The extent, duration, frequency, and reversibility of an impact.
Marine Directorate	The Directorate responsible for the integrated management of Scottish waters. Acts on behalf of the Scottish Ministers.
Marine Directorate - Licensing Operations Team (MD-LOT)	The division of MD responsible for the regulation of marine licence applications within the Scottish inshore region (between 0 and 12 nm) under the Marine (Scotland) Act 2010 and in the Scottish offshore region (between 12 and 200 nm) under the Marine and Coastal Access Act 2009.
Marine Guidance Note	Guidance released by the Maritime and Coastguard Agency for the purposes of providing advice relating to the improvement of the safety of shipping and of life at sea.
Marine heritage asset	Archaeological heritage which is in (visible or buried), or has been removed from, an underwater environment. It includes submerged sites and structures, wreck sites and wreckage and their archaeological and natural context.
Marine Licence	Licence granted by the Scottish Ministers under the Marine (Scotland) Act 2010 (for activities between MHWS and 12 nm) and/or the Marine and Coastal Access Act 2009 (for activities between 12 and 200 nm).
'Marine Works EIA Regulations 2007'	The Marine Works (Environmental Impact Assessment) Regulations 2007.
'Marine Works EIA Regulations 2017'	The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017.
Marine Works Licence	Licence granted by Crown Estate Scotland (CES)for activities proposing to disturb the seabed (such as benthic surveying/grab coring).
Maximum Design Scenario	The maximum design parameters for each project design asset (both intertidal and offshore) considered to be a worst case for any given assessment.
Mean High Water Springs	The height of MHWS 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 mean high water spring tide.
Mitigation	Any features of the development and any measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment including any such features or measures required by the virtue of a condition imposed on the grant of consent.

Term	Definition
Navigational Risk Assessment	A post-Scoping Report that undertakes an assessment of navigational risk posed to sea users by the presence of the Project.
Non-Statutory Stakeholders	Interest groups/environmental bodies and other consultees who are not consultation bodies as identified above, but who are likely to have a key interest in the Proposed Offshore Development. For the purpose of Scoping non-statutory stakeholders and the general public are invited to make representations to the Developer, and not directly to MD-LOT.
Offshore Export Cable Corridor (Offshore ECC)	The specific corridor of seabed (seaward of MHWS) from Array Area to the landfall, within which the offshore export cable(s) will be located.
Offshore Export Cable Corridor Study Area	The broad area in which the offshore export corridor(s) being considered are located and where the preferred Offshore ECC and ultimately the final offshore export cable route will be located
Offshore Export Cables	The subsea electricity cabling, running from the Offshore Substation(s) (OSSs) to the landfall, which transmits electricity generated by the WTGs to the onshore cabling for transmission onwards to the onshore substation and the national electrical transmission system.
Offshore Innovation Platform	Supports innovative power-to-X technologies for conversion of electricity to other fuels. Power-to-X means using renewable electricity to create an energy carrier ('X'). The 'X' created is usually renewable hydrogen – which can power medium to heavy-duty transport or industry.
Offshore Project Boundary	The boundary within which all offshore development will take place, and the Offshore Wind farm will be located.
Offshore Substation (OSS)	Substations which function to convert the power generated by WTGs to higher voltages and/or to HVDC in order to transmit the power more efficiently (reduced electrical losses) to shore. The number of substations will depend on their size i.e., either fewer larger substations, or more numerous smaller substations, or a combination.
Offshore Wind Farm (OWF)	Onshore and offshore infrastructure comprising wind turbines and associated foundations and substructures, substation(s) and associated foundations, export cables and inter-array/interconnector cables.
Onshore Substation/Converter Station	Comprises a compound containing the electrical components for transforming the power supplied from Stromar to 400 kV and to adjust the power quality and power factor, as required to meet the UK System-Operator Code for supply to the national electricity transmission network. If a HVDC system is used the Onshore Substation will also house equipment to convert the power from HVDC to High Voltage Alternating Current (HVAC).
Option to Lease Agreement	'Lease/Lease Agreement' is a legal agreement from CES 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.
Otter trawl	A net with large rectangular boards (otter boards) which are used to keep the mouth of the trawl net open. Otter boards are made of timber or steel and are positioned in such a way that the hydrodynamic forces, acting on them when the

Term	Definition
	net is towed along the seabed, pushes them outwards and prevents the mouth of the net from closing.
Pelagic	Of or relating to the open sea.
Pelagic trawl	A net used to target fish species in the mid water column.
Permanent Threshold Shift	A permanent increase in the threshold of hearing (minimum intensity needed to hear a sound) at a specific frequency above a previously established reference level.
Pre-Application Consultation (PAC)	The statutory pre-application consultation process which Stromar will apply to the Project in accordance with the Marine Licensing (Pre-application Consultation) (Scotland) Regulations 2013 and the Town and Country Planning (Development Management Procedure) (Scotland) Regulations 2013.
Pre-Application Consultation (PAC) Regulations 'The PAC Regulations'	Marine Licensing (Pre-application Consultation) (Scotland) Regulations 2013.
Pre-Application Consultation (PAC) Report 'The PAC Report'	The report submitted to MD-LOT alongside the Marine Licence application, detailing the PAC activities conducted by the Project.
Primary Commitment	Measures that form an intrinsic part of the design that are described in the design evolution narrative and included within the project description e.g., reducing development heights to reduce visual impact.
Primary Surveillance Radar	A radar system that measures bearing and distance of targets using the detected reflections of radio signals.
Project	Stromar OWF.
Proposed Offshore Development	The offshore project elements to which the Offshore Scoping Report relates.
Protocol for Archaeological Discoveries (Protocol)	A system implemented to ensure that chance discoveries of heritage during works are reported for archaeological advice.
Residual Effect	The potential impacts associated with the Project, after embedded commitments have been implemented.
River Basin Management Plan	These plans are used to set legally binding, locally specific, environmental objectives that underpin regulation and planning activities for the marine environment. These plans are updated and re-published every six years.
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 mat of steel rings is fitted. A heavy net cover (back) 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 the Proposed Offshore Development.

Term	Definition
Scottish Ministers	The Ministers of the devolved Scottish Government, who exercise statutory functions transferred from the UK Government. The Scottish Ministers are the Regulatory Authority regarding the necessary consents and licences required for the construction and operation of an OWF project in Scotland. Developers are required to provide information demonstrating compliance with relevant legislation and understanding of material considerations, in order for Scottish Ministers to consider development proposals.
Scottish seine	An encircling net shot in the open sea using very long ropes to lay out the net, and ropes on the seabed prior to towing the net closed and hauling from a boat under its own power.
Seascape	An area, as perceived by people, where the sea is a key element of the physical environment. In Scotland, this comprises the visual and physical conjunction of land and sea which combines maritime, coast and hinterland character.
Secondary Commitment	Measures that require further activity in order to achieve the anticipated outcome, e.g., development of the optimal reinstatement measures for restoring a disturbed sensitive natural habitat.
Secondary Surveillance Radar (SSR)	A radar system that transmits interrogation pulses and receives transmitted responses from suitably equipped aircraft.
Section 36 Consent	Consent under Section 36 of the Electricity Act 1989 for the construction, or extension, and operation of electricity generating stations.
Sectoral Marine Plan for Offshore Wind Energy (SMP-OWE)	Published by the Scottish Government in October 2020 This document identified the most suitable PO's for future development of commercial-scale offshore wind technology in Scottish inshore and offshore waters. These POs were later released in the ScotWind Leasing Round, which included the PO for the Project.
Sensitivity	The vulnerability, recoverability, and/or value/importance of a receptor.
Shellfish Water Protected Areas	These areas are designated under the Water Framework Directive, for the protection of shellfish growth and production. They are classified as sensitive areas, as adverse impacts on water quality could impact the quality of the shellfish.
Significance	A determination of the potential effect based on the magnitude of the impact and the sensitivity of the receptor.
Sound Exposure Level	The decibel level of the time integral (summation) of the squared pressure over the duration of a sound event; units of dB re 1 µPa2/s.
Sound Pressure Level	A means of characterising the amplitude of a sound. There are several ways sound pressure can be measured. The most common of these are the root-mean-square (rms) pressure, the peak pressure, and the peak-to-peak pressure.
Statutory Stakeholders	Both the consultation bodies and public bodies identified above.
Stock assessment	An assessment of the biological stock of a species and its status in relation to defined references points for biomass and fishing mortality.
Stratification	Vertical density gradients over relatively short distances within the water column caused by varying temperature and/or salinity structure.
Stromar Offshore Wind Farm	The Project.

Term	Definition
Study Area	The area in which effects from technical topics are being considered, all offshore infrastructure will be located within these study areas and seaward of Mean High Water Springs.
Submerged landscape	Areas of former dry land that have been submerged due to environmental processes (most commonly sea level rise). Sediments within these landscapes may contain associated artefacts.
Subsea	Subsea comprises everything existing or occurring below the surface of the sea.
Substitution	Where one type of factor of production such as capital equipment is substituted for another but there is no increase in employment or output
Subtidal	The region of shallow waters which are below low tide.
Swept Area Ratio (SAR)	SAR (derived from Vessel Monitoring System data) indicates the number of times in an annual period that a fishing gear makes contact with (or sweeps) the seabed surface. Surface SAR provides a proxy for fishing intensity.
Tertiary Commitment	Measures which will be required regardless of the EIA process as they are imposed e.g., as a result of legislative requirements and/or standard industry practices e.g. via a Construction Environmental Management Plan (CEMP), Code of Construction Practice (CoCP) or similar.
The '2004 Act'	The Energy Act 2004.
The '2009 Act'	Marine and Coastal Access Act 2009.
The '2010 Act'	Marine (Scotland) Act 2010.
Threshold of Hearing	The minimum intensity at which a sound of a specific frequency is reliably detected i.e., by marine mammals, in absolute quiet conditions. The intensity level (of the sound detected, measured in decibels (dB)) varies with frequency.
Transboundary	Crossing the boundary between two or more countries or areas.
Transboundary Effects	When the impacts from developments in one country significantly affect the interest or environment of another country.
Uncontrolled Airspace	Defined airspace in which Air Traffic Control does not exercise exclusive authority but may provide basic information services to aircraft in radio contact. In the UK, Class G is uncontrolled airspace.
Urban Waste Water Treatment Directive Sensitive Areas	Waterbodies which are found to be eutrophic, or at risk of becoming eutrophic in the future, surface freshwaters intended for the abstraction of drinking water, and areas where further than secondary treatment is necessary. Sensitive areas could be freshwater bodies (e.g., lakes), estuaries, or coastal waters.
Vessel Monitoring System (VMS)	A system used in commercial fishing to allow environmental and fisheries regulatory organizations to monitor, minimally, the position, time at a position, and course and speed of fishing vessels.
Wind Turbine Generator (WTG)	The wind turbines that generate electricity consisting of tubular towers and blades attached to the nacelle housing mechanical and electrical generating equipment.
Years of Employment	This is a measure of employment which is equivalent to one person being employed for a year and is typically used when considering short to medium term

Term	Definition
	employment impacts, such as those associated with the construction phase of the Proposed Offshore Development.

Glossary of Acronyms and Abbreviations

Acronym	Definition
AA	Appropriate Assessment
AD	Air Defence
AD&OW	Air Defence and Offshore Wind
ADD	Acoustic Deterrent Device
AEZ	Archaeological Exclusion Zone
AIP	Aeronautical Information Publication
AIS	Automatic Identification System
AL	Action Level
AL1	Action Level 1
AL2	Action Level 2
ATC	Air Traffic Control
ATS	Air Traffic Service
AWB	Artificial Waterbody
BEIS	Business, Energy and Industrial Strategy
BERR	Business, Enterprise and Regulatory Reform
BGS	British Geological Survey
BoCC	Birds of Conservation Concern
BRAG	Black, Red, Amber and Green
BSI	British Standards Institution
BTO	British Trust for Ornithology
BWD	Bathing Water Directive
CA	Competent Authority
CAA	Civil Aviation Authority
CaP	Cable Plan

Acronym	Definition
CAP	Civil Aviation Publication
CBRA	Cable Burial Risk Assessment
CCC	Climate Change Committee
CCR	Climate Change Resilience
CCS	Carbon Capture and Storage
CD	Chart Datum
CEA	Cumulative Effects Assessment
Cefas	Centre for Fisheries and Aquaculture Science
CEMP	Construction Environmental Management Plan
CES	Crown Estate Scotland
CES MU	Coastal East Scotland Management Unit
CFE	Controlled Flow Excavation
CGNS MU	Celtic and Greater North Seas Management Unit
CH_4	Methane
CIA	Cumulative Impact Assessment
CIEEM	Chartered Institute of Ecology and Environmental Management
CIs	Confidence Intervals
CMS	Construction Method Statement
CO_2	Carbon Dioxide
CoEMP	Coordinated Environmental Monitoring Programme
CoP	Construction Programme
COWRIE	Collaborative Offshore Wind Research Into the Environment
CPA	Coastal Protection Act
CPT	Cone Penetration Tests
CRM	Collision Risk Modelling
ANO	Air Navigation Order
CSEMP	Clean Seas Environmental Monitoring Programme
CTA	Control Area

Acronym	Definition
CTMP	Construction Traffic Management Plan
DAS	Digital Aerial Survey
DCF	Data Collection Framework
DDV	Drop Down Video
DECC	Department for Energy and Climate Change
DEFRA	Department for Environment, Food and Rural Affairs
DGC	Defence Geographic Centre
DP	Decommissioning Programme
DSLP	Development Specification and Layout Plan
EAC	Environmental Assessment Criteria
ECC	Export Cable Corridor
ECOMMAS	East Coast Marine Mammal Acoustic Study
eDNA	Environmental Deoxyribonucleic Acid
EDR	Effective Deterrence Range
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EISA	Electrical Infrastructure Study Area
EMF	Electromagnetic Field
EMODnet	European Marine Observation and Data Network
EMP	Environmental Management Plan
EMSA	European Maritime Safety Agency
EPS	European Protected Species
EQS	Environmental Quality Standards
ERCoP	Emergency Response and Cooperation Plan
ES	Environmental Statement
ESCA	European Subsea Cables Association
ETRS89	European Terrestrial Reference System 1989

Acronym	Definition
FEPA	Food and Environment Protection Act
FIR	Flight Information Region
FL	Flight Level
FLO	Fisheries Liaison Officer
FLOWW	Fishing Liaison with Offshore Wind and Wet Renewables Group
FMMS	Fisheries Management and Mitigation Strategy
FSA	Formal Safety Assessment
GBP	Great British Pounds
GCS	Good Chemical Status
GES	Good Ecological Status
GHG	Greenhouse Gas
GIS	Geographic Information Systems
GLVIA3	Guidelines for Landscape and Visual Impact Assessment, Third Edition
GNS MU	Greater North Sea Management Unit
GoBe	GoBe Consultants Ltd
GPP	Guidance for Pollution Prevention
GVA	Gross Value Added
HAT	Highest Astronomical Tide
HCA	Helideck Certification Association
HDD	Horizontal Directional Drilling
HER	Historic Environment Record
HES	Historic Environment Scotland
HIAL	Highlands and Islands Airports Limited
HMRI	Helicopter Main Routing Indicators
HMWB	Heavily Modified Waterbody
HRA	Habitat Regulations Appraisal
HSE	Health and Safety Executive
HVAC	High Voltage Alternating Current

Acronym	Definition
HVDC	High Voltage Direct Current
IALA	International Association of Marine Aids to Navigation and Lighthouse Authorities
IAMMWG	Inter-Agency Marine Mammal Working Group
ICCI	In-combination Climate Change Impact
ICES	International Council for the Exploration of the Sea
ICPC	International Cable Protection Committee
IEEM	Institute of Ecology and Environmental Management
IEMA	Institute of Environmental Management and Assessment
IF	Intermediate Approach Fix
IFP	Instrument Flight Procedure
IFR	Instrument Flight Rules
IMO	International Maritime Organisation
INNS	Invasive Non-Native Species
INTOG	Innovation and Targeted Oil and Gas
IOF	Important Ornithological Features
IPCC	Intergovernmental Panel on Climate Change
IROPI	Imperative Reasons of Overriding Public Interest
IUCN	International Union for Conservation of Nature
JCP	Joint Cetacean Protocol
JNCC	Joint Nature Conservation Committee
JV	Joint Venture
KIS-ORCA	Kingfisher Information Service - Offshore Renewable and Cable Awareness
LAT	Lowest Astronomical Tide
LCCA	Local Coastal Character Areas
LCT	Landscape Character Type
LMP	Lighting and Marking Plan
LOD	Limit of Detection
LSE	Likely Significant Effect

Acronym	Definition
MARPOL	International Convention for the Prevention of Pollution from Ships
MCA	Maritime and Coastguard Agency
MCEU	Marine Consents and Environment Unit
mCRM	Migratory Collision Risk Modelling
MD-LOT	Marine Directorate – Licensing Operations Team
MDS	Maximum Design Scenario
MET	Meteorological
MGN	Marine Guidance Note
MHWS	Mean High Water Springs
MLWS	Mean Low Water Springs
MMMP	Marine Mammal Mitigation Protocols
MMO	Marine Management Organisation
MOD	Ministry of Defence
MORL	Moray Offshore Renewables Limited
MPA	Marine Protected Area
MPCP	Marine Pollution Contingency Plan
MSA	Minimum Sector Altitude
MSL	Mean Sea Level
MU	Management Unit
MW	Megawatt
MW&SQ	Marine Water and Sediment Quality
N_2O	Nitrous Oxide
NAFC	North Atlantic Fisheries College
NASA	National Aeronautics and Space Administration
NATS	National Air Traffic Services
NCMPA	Nature Conservation Marine Protected Area
NE3 PO	North East 3 Plan Option
NEOG	North East Ornithology Group

Acronym	Definition
NERC	Natural Environment Research Council
NERIFG	North East Regional Inshore Fisheries Group
NERL	NATS En-Route Navigation plc
NEWS	Non-Estuarine Waterbird Surveys
NF_3	Nitrogen Trifluoride
NIEA	Northern Ireland Environment Agency
NIRAS	NIRAS A/S
NLB	Northern Lighthouse Board
NMP2	National Marine Plan 2
NMPi	National Marine Plan interactive
NPF	National Performance Framework
NPF4	National Planning Framework 4
NPS	National Planning Statement
NRA	Navigational Risk Assessment
NRW	National Resources Wales
NS MU	North Sea Management Unit
NSIBTS	North Sea International Benthic Trawl Survey
NSP	Navigational Safety Plan
NSTA	North Sea Transitional Authority
NTSLF	National Tide and Sea Level Facility
O&G	Oil and Gas
O&M	Operations and Maintenance
OESEA	Offshore Energy Strategic Environmental Assessment
OESEA3	Offshore Energy Strategic Environmental Assessment 3
OESEA4	Offshore Energy Strategic Environmental Assessment 4
OLA	Option to Lease Agreement
OMP	Operation and Maintenance Plan
ONS	Office for National Statistics

Acronym	Definition
OnSS	Onshore Substation
OREI	Offshore Renewable Energy Installation
ORJIP	Offshore Renewables Joint Industry Programme
OSPAR	Oslo Paris Convention
OSS	Offshore Substation
OWF	Offshore Wind Farm
OWSMRF	Offshore Wind Strategic Monitoring and Research Forum
PAC	Pre-Application Consultation
PAH	Polycyclic Aromatic Hydrocarbons
PAS	Publicly Available Specification
PBDE	Polybrominated Diphenyl Ether
PCB	Polychlorinated Biphenyls
PEMP	Project Environmental Management Plan
PEXAs	Practice Exercise Areas
PMF	Priority Marine Feature
PO	Plan Option
PPP	Pollution Prevention Plan
PrePARED	Predators and Prey Around Renewable Energy Developments
PRoW	Public Right of Way
PS	Piling Strategy
PSA	Particle Size Analysis
PSR	Primary Surveillance Radar
PTS	Permanent Threshold Shift
PVA	Population Viability Analysis
Radar	Radio Detection and Ranging
RAF	Royal Air Force
RBMP	River Basin Management Plan
rBWD	Revised Bathing Water Directive

Acronym	Definition
RCCA	Regional Coastal Character Areas
RCP	Representative Concentration Pathway
RCS	Reactive Compensation Station
RIAA	Report to Inform Appropriate Assessment
RLG	Regional Locational Guidance
RLoS	Radar Line of Sight
ROV	Remotely Operated Vehicle
RPSS	Route Planning and Site Selection
RYA	Royal Yachting Association
SAC	Special Area of Conservation
SAMS	Scottish Association for Marine Science
SAR	Swept Area Ratio
SaR	Search and Rescue
SBP	Sub-Bottom Profiler
SCA	Seascape Character Area
SCANS	Small Cetaceans in European Atlantic Waters
SCDS	Supply Chain Development Statement
SCOS	Special Committee on Seals
ScotMER	Scottish Marine Energy Research
SCT	Seascape Character Type
SEA	Strategic Environmental Assessment
SEL	Sound Exposure Level
SEPA	Scottish Environment Protection Agency
SF_6	Sulfur Hexafluoride
SFF	Scottish Fishermen's Federation
SLA	Special Landscape Area
SLR	SLR Consulting Ltd
SLVIA	Seascape, Landscape and Visual Impact Assessment

Acronym	Definition
SMP	Sectoral Marine Plan
SMP-OWE	Sectoral Marine Plan for Offshore Wind Energy
SMRU	Sea Mammal Research Unit
SMU	Seal Management Unit
SNCB	Statutory Nature Conservation Body
SNH	Scottish Natural Heritage
SOLAS	International Regulations for the Safety of Life at Sea
SPA	Special Protected Area
SPL	Sound Pressure Level
SPM	Suspended Particulate Matter
SSCs	Suspended Sediment Concentrations
SSCS	Sustainable Supply Chain Statement
SSR	Secondary Surveillance Radar
SSS	Sidescan Sonar
SSSI	Site of Special Scientific Interest
STECF	Scientific, Technical and Economic Committee for Fisheries
SWD	Shellfish Water Directive
SWFPA	Scottish White Fish Producers Association
SWPA	Shellfish Water Protected Area
TCE	The Crown Estate
tCO_2e	Tonnes of Carbon Dioxide Equivalent
TJB	Transition Joint Bay
TLP	Tension-Leg Platform
TMZ	Transponder Mandatory Zone
TRA	Temporary Reserved Area
TRSA	Tourism and Recreation Study Area
TTS	Temporary Threshold Shift
UHI	University of Highlands and Islands

Acronym	Definition
UK	United Kingdom
UKCP18	United Kingdom Climate Projection 18
UKHO	United Kingdom Hydrographic Office
UKMMAS	United Kingdom Marine Monitoring and Assessment Strategy
UKMPS	United Kingdom Marine Policy Statement
UTM	Universal Transverse Mercator
UWN	Underwater Noise
UWWTD	Urban Waste Water Treatment Directive
UXO	Unexploded Ordnance
VFR	Visual Flight Rules
VMP	Vessel Management Plan
VMS	Vessel Monitoring System
WeBS	Wetland Birds Survey
WETREP	Western European Tanker Reporting System
WFD	Water Framework Directive
WSI	Written Scheme of Investigation
WTG	Wind Turbine Generator
ZoI	Zone of Influence

Glossary of Units

Acronym	Definition
GW	Gigawatt
m	Metre
nm	Nautical mile

Executive Summary

In response to the Scottish Government's target of net-zero emissions of all greenhouse gases by 2045 and the aim to generate 50% of Scotland's overall energy consumption from renewable sources by 2030, Crown Estate Scotland (CES) launched the ScotWind Leasing process in 2021, which released new areas of seabed within Scottish waters for future offshore development. The Scottish Government identified the most suitable areas for development as set out within the Sectoral Marine Plan (SMP) for Offshore Wind. In January 2022, as part of the ScotWind bidding round, Ørsted, BlueFloat and Renantis (hereafter the Developer) was successfully awarded an Option to Lease Agreement (OLA) (granting exclusive rights) to develop an Offshore Wind Farm (OWF) within the NE3 Plan Option (NE3 PO), which is located off the northeast coast of Scotland (approximately 50 km east of Wick) in the outer Moray Firth. The Terms of the Agreement are dependent upon the Developer being awarded all key consents and permissions to construct and operate the OWF from the relevant regulatory authorities. This process will be subject to Environmental Impact Assessment (EIA), with a separate EIA Report (EIAR) prepared for offshore and onshore elements, underpinning any applications.

An Offshore Habitats Regulations Appraisal (HRA) Screening Report will be submitted to Marine Directorate – Licensing Operations Team (MD-LOT) alongside this Offshore Scoping Report, detailing the outcome of Likely Significant Effect (LSE) screening on the qualifying features of relevant European sites for the Proposed Offshore Development.

The Developer is currently progressing the proposals, including the EIAR for this OWF, which has been named the Stromar OWF (hereafter the 'Project'). The name 'Stromar' comes from a combination of the Scottish island of Stroma (that lies approximately 27 km north of Wick), and the Scots Gaelic word 'mar' which means sea.

This report forms the Scoping element of the EIA process for the offshore infrastructure. The Array Area is approximately 256 km^2 in size and the Project will consist of the following components:

- A maximum of 71 Wind Turbine Generators (WTGs) will be located within the Array Area, and associated infrastructure, floating foundations, and seabed anchorages;
- An Offshore Substation (OSS) and its foundations;
- Scour protection for WTGs and OSS foundations;
- Inter-array cables – cables connecting the WTGs to each other on strings terminating at the OSS;
- Offshore Export Cables – these connect the OSS with the onshore infrastructure at landfall; and
- Cable protection and joint pits on unburied or shallow buried sections of cables and at cable crossings where required.

Water depths in the Array Area vary from 60 to 100 m, and this is why a floating WTG design is recommended. This offers the preferred solution, due to the significant water depth, as well as presenting an opportunity to utilise the latest technology.

Floating foundations have already been successfully proven in the Aberdeenshire coast; the Hywind project off the coast of Peterhead was the first project of this kind and started generating electricity in 2017. The opinion of stakeholders is sought on the likely significance of potential impacts, to assist in the production of a Proportionate EIAR.

The Proposed Offshore Development has secured a connection to the National Electricity Transmission System. National Grid Electricity System Operator has stated that the Grid Connection Point will be at New Deer. Onshore cabling landfall points are expected to be in the vicinity of Fraserburgh. The onshore transmission infrastructure and grid connection will be considered separately within an Onshore Scoping Report to be submitted separately to Aberdeenshire Council, the local authority that manage the development of this area and planning permissions.

The Scottish Ministers are the Regulatory Authority with respect to the necessary offshore consents and licences required for the construction and operation of an OWF project. To enable the Scottish Ministers to properly consider development proposals, developers are required to provide information which demonstrates compliance with the relevant legislation and allows for adequate understanding of the material considerations associated with the Project. The Scoping Opinion is being requested under Regulation 12 of the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017, Regulation 13 and Schedule 4 of the Marine Works (Environmental Impact Assessment) Regulations 2007 (for Scottish offshore waters) and Regulation 14 of the Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (for Scottish inshore waters) (herein referred to as 'the EIA Regulations').

This Offshore EIA Scoping Report considers all the offshore infrastructure of the Project seaward of Mean High Water Springs (MHWS) which is hereafter referred to as the 'Proposed Offshore Development'. A combined view of offshore and onshore elements of the Project will be adopted for the EIAR, where appropriate, to develop a robust and comprehensive EIA. For example, offshore Cumulative Impact Assessment (CIA) will include effects which could occur with the onshore elements of the Project.

The purpose of the Offshore EIA Scoping Report will be to request a formal Scoping Opinion from MD-LOT, on behalf of the Scottish Ministers in relation to the Proposed Offshore Development, the scope of the Offshore EIA, and the content of the supporting Offshore EIAR for the Proposed Offshore Development. As part of the Scoping Opinion the following is sought:

- Any further information on constraints to siting the Proposed Offshore Development to assist in refining the design envelope; and
- The opinion of statutory and non-statutory stakeholders on the scope of the EIA which will be submitted with the application for the relevant consents required for the construction, Operation and Maintenance (O&M) and decommissioning of the Proposed Offshore Development.

This Offshore EIA Scoping Report provides details of the Proposed Offshore Development, along with baseline environmental information currently available.

For this Offshore EIA Scoping Report, the following technical topics have been considered:

- **Chapter 7: Marine and Coastal Processes**;
- **Chapter 8: Marine Water and Sediment Quality**;
- **Chapter 9: Benthic and Intertidal Ecology**;
- **Chapter 10: Fish and Shellfish Ecology**;
- **Chapter 11: Offshore Ornithology**;
- **Chapter 12: Marine Mammals**;

- **Chapter 13: Commercial Fisheries**;
- **Chapter 14: Shipping and Navigation**;
- **Chapter 15: Marine Archaeology and Cultural Heritage**;
- **Chapter 16: Military and Civil Aviation**;
- **Chapter 17: Seascape, Landscape and Visual Impact**;
- **Chapter 18: Socio-economics, Tourism and Recreation**;
- **Chapter 19: Greenhouse Gas and Climate Change**; and
- **Chapter 20: Other Human Activities**.

Details of the Proposed Offshore Development, based on the Scoping design envelope, along with baseline environmental information currently available are provided in this Offshore Scoping Report. The report also summarises key legislation and policy, outlines the proposed EIA methodology, identifies potential impacts that may arise because of the Proposed Offshore Development and describes how these impacts are proposed to be assessed. Within this Offshore Scoping Report, several studies and surveys are recommended to inform the EIA process and preliminary discussion on potential commitments are included.

1 Introduction

1.1 Background

1.1.1 Scotland has high ambitions with respect to providing a secure energy supply and reducing the impact of climate change, with renewable energy identified and supported at government level as a key industry which can deliver on these ambitions. To reflect this, Stromar Offshore Wind Limited (a Joint Venture (JV) between Ørsted, Renantis, and BlueFloat Energy – the Developer) successfully bid in the ScotWind Leasing Round and were awarded an OLA for development within the NE3 PO. The NE3 PO is located approximately 50 km eastwards from Wick in the Outer Moray Firth (**Figure 1.1**) (Scottish Government, 2020a). The OLA covers an area of 256 km^2 within water depths ranging between 60 m and 100 m below chart datum.

1.1.2 In order to construct and operate the Project within NE3 PO, the Developer requires relevant consents and approvals (**Chapter 2: Legislation and Policy Context**). These include the completion of the EIA process for both onshore and offshore elements of the Project. The current consenting strategy is to submit separate Offshore and Onshore Scoping Reports. An Offshore HRA Screening Report will also be submitted alongside this Offshore Scoping Report to address the requirements of The Conservation (Natural Habitats &c.) Regulations 1994; The Conservation of Habitats and Species Regulations 2017; and The Conservation of Offshore Marine Habitats and Species Regulations 2017 (which apply to Marine Licences and Section 36 applications within the Scottish Offshore region).

1.1.3 For the purpose of EIA, the following distinction is made regarding the onshore and offshore consenting regimes in relation to the intertidal area located between MHWS and Mean Low Water Springs (MLWS):

- The Offshore EIA considers all activities associated with the Project extending seawards from MHWS, referred to as the Proposed Offshore Development. It is proposed that a single route and landfall be identified in the EIAR. However, if necessary, an assessment may be required to evaluate and present more than one option within the application; and
- The Onshore EIA considers all activities associated with the onshore transmission aspects of the Project extending landwards from MLWS. This includes the Landfall Development Zone, Onshore Export Cable Corridor (Onshore ECC), Onshore Substation/Converter Station and associated infrastructure (such as construction compounds and lay down areas).

1.1.4 Where there is an overlap in jurisdiction of consenting and regulatory regimes (i.e., within the intertidal area between MHWS and MLWS), both the Onshore Scoping Report and the Offshore Scoping Report (and subsequent EIARs) will jointly present the relevant technical assessments.

1.1.5 Further information regarding the Proposed Offshore Development is presented in **Chapter 3: Proposed Offshore Development Description**.

1.1.6 The Developer is being supported by GoBe Consultants Ltd (GoBe) with respect to the delivery of the overall EIA (including Scoping Reports and EIAR) and consents management of the Project with assistance from SLR Consulting Ltd (SLR) for the onshore EIA/HRA. The Developer is also supported by NIRAS A/S (NIRAS) for the Offshore HRA.

1.2 Developer Description

1.2.1 The Developer, Stromar Offshore Wind Farm Limited, is a joint venture between Ørsted, BlueFloat Energy and Renantis.

1.2.2 For Ørsted, the Project will represent its first commercial scale offshore wind farm in Scotland, having already gained significant English and international experience. Ørsted pioneered the first offshore wind farm in 1991 and has since solidified its reputation as a leading developer in the offshore wind market. Ørsted brings over 30 years of experience to the joint venture, with a current installed global capacity of approximately 7.5 gigawatts (GW) and the ambition to achieve 30 GW of global offshore wind installed by 2030. Within the UK, Ørsted currently has approximately 6.2 GW of installed capacity, with full or part ownership in 13 Offshore Wind Farms (OWFs).

1.2.3 Renantis operates an installed capacity of 1,420 MW in Italy, the UK, the US, Spain, France, Finland, Sweden and Norway. The company also offers business and technical consulting, engineering and mergers and acquisitions services, with more than 5,100 MW of solar and wind energy managed for third parties and 17 plants with community benefit schemes. Renantis and BlueFloat Energy are partnered in seven OWF projects currently under development in the UK, five of which comprise floating OWFs in Scottish waters. This Scottish experience will lend itself well to the ongoing stakeholder and community engagement, due to Renantis' established presence and reputation in this market.

1.2.4 BlueFloat Energy is a global offshore wind developer with a team across key project development functions with technical capabilities in floating offshore wind. With a circa 33 GW portfolio of both fixed-bottom and floating developments, BlueFloat Energy is now positioned as one of the leaders in the floating offshore wind sector. This market-leading expertise in floating wind technology will lend itself to developing the proposed Stromar Offshore Wind Farm (the Project) in an environmentally conscious and sustainable way.

1.3 Purpose and Objective of this Report

1.3.1 This Offshore Scoping Report supports a request made to the Scottish Ministers for a formal Scoping Opinion in relation to the offshore[1] elements of the Project (**Figure 1.1**). This Offshore Scoping Report has been produced in accordance with legislative requirements (**Chapter 2: Legislation and Policy Context**), the 'Marine Scotland Consenting and Licensing Guidance for Offshore Wind, Wave and Tidal Energy Applications' (Scottish Government, 2018a) and other Marine Directorate online guidance associated with offshore wind applications.

1.3.2 The purpose of this document is to engage with the Marine Directorate (on behalf of the Scottish Ministers) and key statutory and non-statutory stakeholders during the pre-application phase of the EIA process to ensure that, through feedback and comment on the proposed approach to the EIA, a

[1] Offshore EIA considers all activities associated with the Project extending seawards from MHWS and includes the Array Area, Offshore Export Cable Corridor Study Area and Landfall Development Zone. Relevant technical aspects applicable to the intertidal area between MHWS and MLWS will be presented within both the Onshore and Offshore Scoping Reports (and subsequent EIARs).

thorough and robust EIAR can be produced and submitted to underpin the consent application submission.

1.3.3 The objective of this document is to fully inform the issue of a Scoping Opinion by providing information on the following aspects of the Proposed Offshore Development:

- A brief background and description of the Proposed Offshore Development;
- The associated legislative and policy framework;
- An overview and an understanding of the existing baseline conditions and key environmental receptors;
- The environmental receptors/impacts proposed to be 'Scoped In' to the subsequent EIA, where potentially significant effects may result on the biological, physical, and human environment and further detailed assessment is required within the EIAR;
- The environmental receptors/impacts proposed to be 'Scoped In' to the subsequent EIA, where significant effects are not expected (including when embedded commitments and best practice guidance are adhered to) and no further assessment or consideration is included in the EIAR;
- The environmental topics currently proposed to be 'Scoped In' but, as a result of emerging evidence, removal of uncertainty/data gaps and refinements to the Project post-Scoping, it may be determined that there are no potential significant effects and the topic does not require a detailed assessment in the EIAR. Instead, a justification (within **Appendix B: Impact Register**) or simple assessment within the EIAR will be used to document this assessment.
- An outline of the proposed assessment approach to be adopted in order to gain a comprehensive understanding of the existing baseline characterisation, allowing a robust EIA to be undertaken and potential effects arising from the Proposed Offshore Development to be determined and accounted for through mitigation/management, while developing as sympathetic a project design as possible; and
- Outline the planned approach to consultation.

1.3.4 A proportionate approach to the EIA will be adopted (as presented in **Appendix C: Proportionate EIA Position Paper**), with this Offshore Scoping Report seeking to 'Scope Out' those issues demonstrated through repeated assessments in other OWF EIAs to be not significant, or where post-Scoping it may be possible through subsequent industry/strategic research and reduction of uncertainty through new data gathering to scope out or provide a reduced EIA assessment. This approach is essential with respect to the Scottish and UK Government desires to reduce the timeframe associated with the consenting process while providing a robust yet streamlined and concise EIAR.

1.4 Report Structure

1.4.1 The structure of this Offshore Scoping Report follows the outline presented in **Table 1.1**. The authors of the various chapters are also presented.

1.4.2 Where programming has allowed, site-specific baseline survey data has been incorporated into this Offshore Scoping Report in order to provide sufficient evidence-based justification for the 'Scoping In' and 'Scoping Out' of specific impacts/effects.

Table 1.1: Structure of the Offshore Scoping Report.

Chapter	Chapter Title	Overview and (Author)
1	Introduction	Provides an introduction to the Developer, the Proposed Offshore Development and outlines the purpose and key objectives of the Offshore Scoping Report (GoBe).
2	Legislation and Policy Context	Sets out the need for the Proposed Offshore Development and presents the relevant policy and legislative context (GoBe).
3	Proposed Offshore Development Description	Provides a description of the key components comprising the Proposed Offshore Development (Ørsted).
4	Consultation	Outlines the approach to stakeholder consultation for the Proposed Offshore Development (GoBe).
5	Site Selection and Consideration of Options	Provides an overview of the decisions made to inform project development and design/layout and presents justification for the Proposed Offshore Development as currently identified and assessed for Scoping (Ørsted).
6	EIA Approach and Methodology	Presents the proposed methodology to be adopted during completion of the EIA (and any site-specific survey campaigns), and demonstrates measures taken to develop a Proportionate EIA (GoBe).
7-20	Offshore Scoping Topics	Provides existing baseline characterisation and identifies key receptors/impacts to be Scoped In/Out of any future EIAR, along with receptors/impacts that could possibly be Scoped In (simple assessment/justification provided in the Offshore Impacts Register) post-Scoping if sufficient data/research becomes available pre-EIAR. Topics included comprise: Marine and Coastal Processes (GoBe); Marine Water and Sediment Quality (GoBe); Benthic and Intertidal Ecology (GoBe); Fish and Shellfish (GoBe); Offshore Ornithology (GoBe); Marine Mammals (Sea Mammal Research Unit (SMRU) Consulting); Commercial Fisheries (Nima Consultants); Shipping and Navigation (Anatec); Marine Archaeology and Cultural Heritage (Wessex Archaeology); Military and Civil Aviation (Cyrrus); Seascape, Landscape and Visual Impact (OPEN); Socioeconomics, Tourism and Recreation (BiGGAR Economics); Greenhouse Gas and Climate (GoBe); and Other Human Activities (GoBe).
21	Summary of Offshore EIA Scoping	Provides a summary of the Scoping approach and the key findings of this Offshore Scoping Report (GoBe).
22	Proposed Structure of the EIA Report	Presents the proposed structure of the subsequent EIAR based upon current consenting strategy (GoBe).

Chapter	Chapter Title	Overview and (Author)
23	Next Steps	Presents an overview of the next steps for the Proposed Offshore Development in order to develop a Proportionate EIA (GoBe).
24	References	Sets out the full references to documents and publications used to inform the Offshore Scoping Report (GoBe).
Appendix A	Offshore Commitments Register	Sets out the commitments to be undertaken by the Project (Ørsted/GoBe).
Appendix B	Offshore Impacts Register	Presents all of the impacts relevant to the Offshore Scoping Report (Ørsted/GoBe).
Appendix C	Proportionate EIA Position Paper	Presents the Project's approach to Proportionate EIA, and planned next steps following Scoping Report submission (Ørsted).
Appendix D	Year 1 Digital Aerial Survey (DAS) Report	Presents a summary of the Year 1 DAS data collected for the Array Area (HiDef).
Appendix E	SLVIA Visualisations	Presents the additional figures of relevance to the SLVIA chapters (OP-EN).

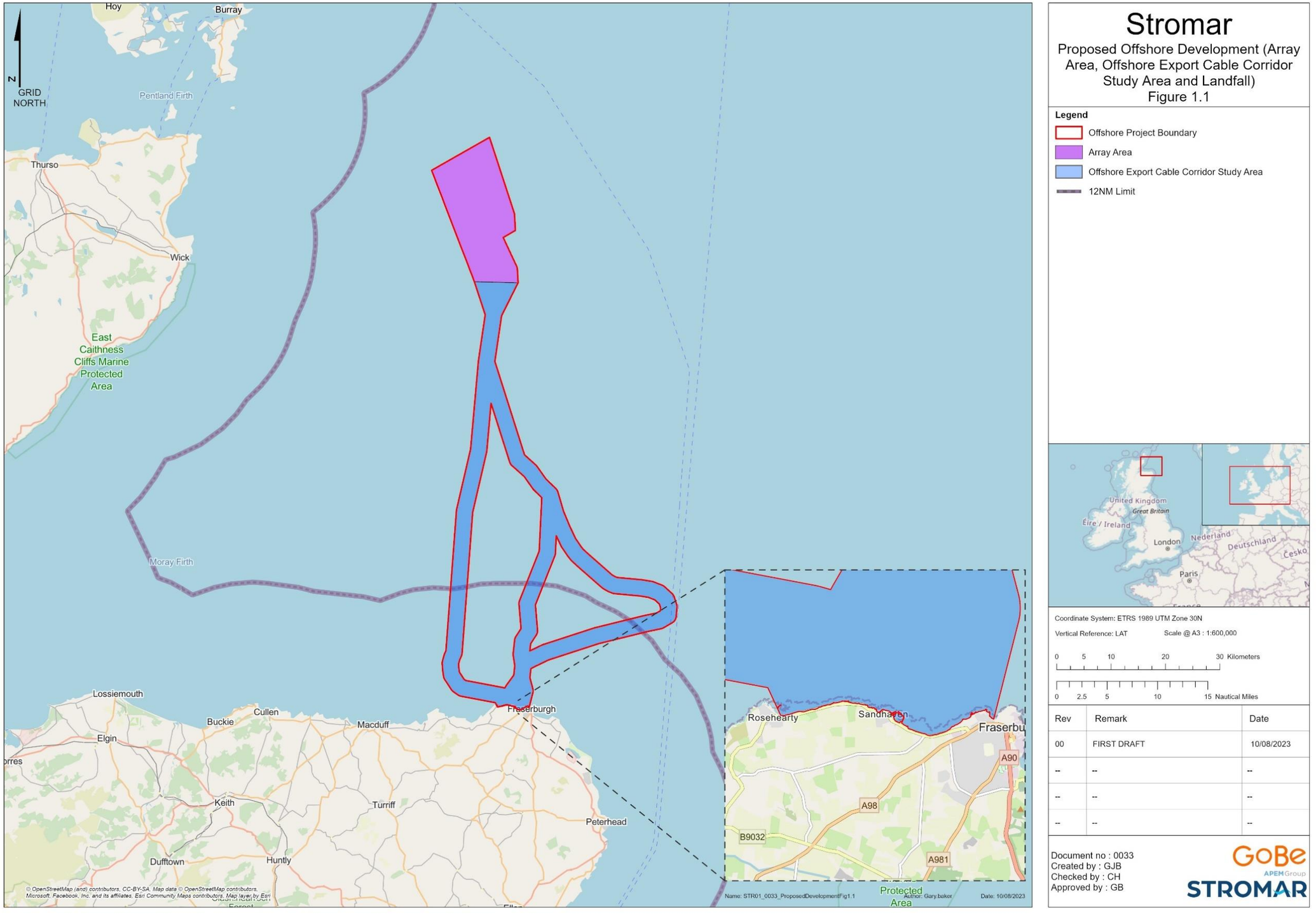


Figure 1.1: **Proposed Offshore Development (Array Area, Offshore Export Cable Corridor Study Area and Landfall).**

1.5 Scoping Questions

1.5.1 The following questions refer to the introduction chapter and are designed to inform the Scoping Opinion and focus the Scoping exercise:

1. Is it clear which infrastructure and associated activities a Scoping Opinion is being sought for?

2 Legislation and Policy Context

2.1 Introduction

2.1.1 This chapter summarises the key legislation and policy relevant to the Project.

2.1.2 This chapter includes a brief overview of:

- The applicable climate change and renewable energy policy and legislation;
- The marine planning framework;
- An overview of the consents sought in relation to the Proposed Offshore Development and the applicable legislation relevant to these applications;
- The legislation relevant to the preparation and submission of an EIA;
- The applicable nature conservation legislation and policy; and
- An overview of requirements associated with pre-application consultation (PAC).

2.2 Climate Change and Renewable Energy

2.2.1 One of the key drivers for legislative change in recent years has been climate change, and the push for countries to do more globally to mitigate this. Under the 2015 Paris Agreement (United Nations, 2015), Scotland has a commitment to limit the average global temperature increase to 1.5 °C or less. This limit was set by the United Nations Intergovernmental Panel on Climate Change who indicated that exceeding this threshold could lead to more severe climate change impacts (such as more frequent, and severe natural disasters). To achieve this target, GHG emissions must both peak before 2025 and significantly decline by 2030. The advancement of renewable energy developments in Scotland supports this target on limiting the increasing average global temperature, by decarbonising the energy sector and thus reducing GHG emissions.

2.2.2 Scotland was the first devolved jurisdiction in the UK to declare a climate emergency (with the declaration made on 28 April 2019), and among one of the first countries in the world to make the declaration. This led to changes in existing legislation to increase climate targets. In response to the declared climate emergency, emissions reduction targets for Scotland set out in the Climate Change (Scotland) Act 2009 were amended by the Climate Change (Emissions Reduction Targets) (Scotland) Act 2019 (Scottish Government, 2009; 2019b). These updated emissions reduction targets include:

- A net-zero emissions target for 2045 (which is ahead of many other countries' net-zero targets) on the advice of the Climate Change Committee (CCC). The CCC is a statutory body formed under the Climate Change Act 2008 who function to provide advice to the UK and devolved Governments on climate change targets;

- Interim targets in advance of the 2045 net-zero ambition[2]:
  - A 75% reduction in emissions by 2030; and
  - A 90% reduction in emissions by 2040.
- Statutory annual targets for every year, leading up to net-zero in 2045 (which are relative to the same baseline as the interim targets). An annual target report must be published, detailing whether this annual emissions reduction target has been met. The latest report was for the 2021 target year, which was published in June 2023.

2.2.3 The UK/Scottish targets consider decarbonising energy and achieving net-zero GHG and it is recognised that renewable energy developments will contribute positively to achieving these national targets.

2.2.4 The Project will constitute an important contribution to achieving the national climate change targets described in **Paragraph 2.2.1**.

Scottish Energy Strategy and British Energy Strategy

2.2.5 The Scottish Energy Strategy (Scottish Government, 2017) presents the Scottish Government's vision for the future energy system in Scotland and details the Government's ambition to support the offshore wind industry in boosting the Scottish supply chain and reaching the scale required to support Scotland's energy needs. The updated Draft Energy Strategy and Just Transition Plan (Scottish Government, 2023a) states the target that 50% of the energy used for Scotland's heat, electricity, and transport, is to be supplied by renewable energy sources by 2030. The Offshore Wind Policy Statement previously set an ambition of 8-11 GW of installed offshore wind in Scottish waters by 2030, although the Draft Energy Strategy and Just Transition Plan seeks consultation on whether this value should be increased for a further offshore deployment ambition (Scottish Government, 2023a).

2.2.6 Scotland's Draft Energy Strategy and Just Transition Plan (Scottish Government, 2023a) has recently been consulted upon. It proposes to deliver an additional 20 GW of renewable electricity by 2030. Renantis and both Ørsted submitted responses to this consultation (Ørsted submitted its response on 9 May 2023), including views on the Scottish 2030 and 2045 OWF deployment targets. The strategy aims to significantly scale up renewable energy production, helping to secure a just transition away from fossil fuels. The Plan also aims to secure continued and increased investment in the net-zero energy economy, resulting in more jobs, increased skills and a growing supply chain and manufacturing capabilities.

2.2.7 The British Energy Security Strategy (HM Government, 2022) sets targets from the UK Government, including ambitions to deliver up to 50 GW of offshore wind by 2030, including up to 5 GW of floating wind. The 'Powering up Britain' UK Government plans set out how the UK will provide energy security, seize the economic opportunities of the transition to net zero, and deliver on net zero commitments[3].

[2] Interim targets relative to 1990 levels of carbon dioxide, methane and nitrous oxide, and 1995 levels of hydrofluorocarbons, perfluorocarbons, sulphur hexafluoride and nitrogen trifluoride.

[3] UK Government (2023) Powering Up Britain, Department for Energy Security and Net Zero (available: Powering Up Britain: Net Zero Growth Plan - GOV.UK (www.gov.uk) – accessed 23 October 2023

Scottish Offshore Wind Policy Statement

2.2.8 The Scottish Offshore Wind Policy Statement (Scottish Government, 2020b) details the importance of offshore wind technology in relation to the Government's net-zero commitments for 2045 in accordance with the Climate Change (Emissions Reduction Targets) (Scotland) Act 2019, in addition to providing the context for Marine Scotland's SMP for Offshore Wind Energy (Scottish Government, 2020a). The Scottish Offshore Wind Policy Statement was prepared by building upon the content of the Scottish Energy Strategy and relies on the identification of suitable OWF development areas. Further information is provided in **Section 2.3: Sectoral Marine Plans for Offshore Wind Energy**.

2.3 Marine Planning Framework

2.3.1 The adoption of the Marine (Scotland) Act 2010 (the 2010 Act) and the Marine and Coastal Access Act 2009 (the 2009 Act) established a framework for legislative management measures in Scottish inshore and offshore waters. These Acts allowed for a tiered approach to planning for marine developments in Scotland and the UK. The UK's devolved administrations share the overall target of having clean, healthy and biologically diverse waterbodies. The UK Marine Policy Statement (UKMPS) 2011 (HM Government, 2011) sets out the framework put in place for the preparation of Marine Plans and contributes to the accomplishment of sustainable development in the UK marine environment (HM Government, 2011).

Scotland's National Marine Plan

2.3.2 In response to the enactment of the 2010 Act and the 2009 Act, the Scottish Government published Scotland's National Marine Plan in 2015. This document provides an overarching framework for all the activities taking place within the Scottish marine waters (out to 200 nautical miles (nm)), against which marine activities can be assessed to determine their environmental and economic sustainability, serving to guide the marine planning decisions in Scotland. The National Marine Plan details eight objectives for offshore wind and renewable energy development in Scotland:

1. Sustainable development of offshore wind, wave and tidal renewable energy in the most suitable locations;
2. Economic benefits from offshore wind, wave and tidal energy developments maximised by securing a competitive local supply chain in Scotland;
3. Alignment of marine and terrestrial planning and efficient consenting and licensing processes, including but not limited to data sharing, engagement and timings, where possible;
4. Aligned marine and terrestrial electricity transmission grid planning and development in Scottish waters;
5. Contribute to achieving the renewables target to generate electricity equivalent to 100% of Scotland's gross annual electricity consumption from renewable sources by 2020;
6. Contribute to achieving the decarbonisation target of 50 gCO_2/kWh by 2030 (to reduce carbon emissions from electricity generation by more than four-fifths);
7. Sustainable development and expansion of test and demonstration facilities for offshore wind and marine renewable energy devices; and
8. Co-ordinated Government and industry-wide monitoring.

2.3.3 The Scottish Government are currently producing the National Marine Plan 2 (NMP2), which will deliver an updated framework for licensing/consenting decisions that reflect changes since 2015 in terms of global climate, net-zero, blue economy and the nature crisis. The NMP2 will also account for the increased competition for sea space. The ambition is for NMP2 to be published for consultation in Summer 2024 and then potentially adopted in Autumn 2025 and so will likely require consideration alongside the National Marine Plan within any future EIA process for the Project. As part of this National Marine Plan review Scotland's Marine Assessment 2020 (Moffat *et. al*., 2020) was published and sets out the findings of an assessment of the key pressures across the Scottish Marine Regions.

Sectoral Marine Plans for Offshore Wind Energy

2.3.4 SMPs are established by the Scottish Ministers to set out the spatial strategies for specific industries, for both the Scottish Territorial and Offshore Marine Regions. The SMPs are informed by Strategic Environmental Assessment (SEA), HRA, Regional Locational Guidance (RLG) and Socio-Economic Impact Assessment (SEIA), as well as extensive statutory consultation.

2.3.5 In response to the 2017 CES announcement of the upcoming ScotWind Leasing Round, the Scottish Government completed a site screening and selection exercise to identify locations with least environmental and socio-economic constraint for the purposes of offshore wind development. This exercise was published in the form of the 'Scoping 'Areas of Search' Study for offshore wind energy in Scottish Waters, 2018' report (Marine Scotland Science, 2018). Following desk-based assessment and detailed consultation, the results of this spatial review were published in the 'Sectoral Marine Plan for Offshore Wind Energy' (Scottish Government, 2020a). The Proposed Offshore Development areas identified within the Sectoral Marine Plan for Offshore Wind Energy (SMP-OWE) (referred to as PO areas) represent locations where commercially feasible projects were identified as best sited. These POs were originally released as draft POs for the ScotWind bidding process and were later finalised following further consultation, with some modification to the final number and size of POs. Many factors were taken into consideration during this process, including a detailed review of environmental constraints and use of the sea space in terms of existing users (e.g., commercial fishermen, shipping traffic, aviation and military needs and other renewable energy developments) alongside extensive consultation. It was the responsibility of each ScotWind bidder to assess the commercial viability of their bid with the draft POs. The SMP-OWE was supported by a plan level HRA. A total of 15 POs were identified, split across four regions.

2.3.6 In additional to the publication of the SMP-OWE, a finalised RLG document was also produced. This was produced within the process of developing the SMP-OWE, in order to support project-level spatial planning within the finalised POs. The RLG provides high-level information on finalised POs and informs key stakeholders (and other) interested parties of the key regional issues for development of offshore wind. This RLG was published for draft in December 2019, and finalised in October 2020.

2.3.7 The ScotWind Leasing Round contributes to the energy and climate change objectives set within Scotland and the UK. There have been 20 seabed OLAs awarded from this leasing process, of which 17 were announced in April 2022 and the further three announced in October 2022 following the 'Clearing' process. These OLAs afforded up to 27.6 GW of renewable energy to be supplied into the Scottish National Grid and if this is achieved it will make a significant contribution to the 2045 net-zero target. The initial total commitments for all 20 sites came to £28.8bn, indicating an average of £1.4bn of investment in Scotland per project built, and £1bn investment in Scotland per GW of capacity built.

2.3.8 The most recent SMP to be published is the 'Initial Plan Framework SMP for Offshore Wind for Innovative and Targeted Oil and Gas Decarbonisation (INTOG)' (Scottish Government, 2022a). This SMP identified nine key areas for the potential location of INTOG projects. In total 13 projects were offered Exclusivity Agreements for a proposed capacity of up to 5.5 GW. The spatial footprint of these projects will form the basis of the INTOG Draft SMP expected to be released for statutory consultation in November 2023 and for formal adoption in 2024. Once this INTOG SMP is formally adopted Crown Estate Scotland will issue OLAs to successful projects. These projects will require consideration as part of any future EIA for the Project.

2.3.9 The SMP-OWE will be subject to a forthcoming iterative plan review, which will assess the suitability of the original plan. This iterative plan review incorporates new scientific evidence which has been gathered since this plan was originally published ahead of the ScotWind Leasing Round. The outcomes of this iterative plan review are due to be released in November 2023, for adoption in Spring 2024.

Regional Marine Plan

2.3.10 Eleven Scottish Marine Regions (SMR) have been created under the 2010 Act. The SMR boundaries were established under The Scottish Marine Regions Order 2015. Marine Planning Partnerships are currently developing Regional Marine Plans covering these SMRs, in accordance with existing legislation in Scotland and the UK (such as the National Marine Plan and UKMPS). In addition, consideration will also be afforded to the CES's ScotWind POs, and any attached grid connection requirements.

2.3.11 Of note is that some of the transmission infrastructure associated with the Proposed Offshore Development will be located within the boundary of the Moray Firth SMR.

Strategic Environmental Assessment

2.3.12 The SEA Directive is implemented in Scotland by the Environmental Assessment (Scotland) Act 2005 and requires public bodies and organisations to undertake an SEA for their plans which are likely to have a significant environmental effect. The approach to undertaking an SEA, in order to ensure proportionality is guided by Section 5(3) and Section 5(4) of the 2005 Act, which determines whether pre-screening is a minimum option or whether screening is required.

2.4 Application and Consenting Process

Electricity Act 1989

2.4.1 The Project will be required to submit an application to the Scottish Ministers for consent under Section 36 of the Electricity Act 1989. Such consent allows for the construction, operation or extension of a generating station (e.g., WTGs).

2.4.2 Consent under Section 36 of the Electricity Act 1989 is required where:

- The generating capacity exceeds 1 megawatt (MW), where the generation station is within Scottish Territorial Waters (MHWS to 12 nm); or
- The generating capacity exceeds 50 MW, where the generation station is in the Scottish Offshore Region (12 to 200 nm).

2.4.3 Scottish Ministers have the power to make a declaration under Section 36A of the Electricity Act 1989 to extinguish public rights of navigation in areas of proposed wind farm development.

2.4.4 Scottish Ministers can grant consent under Section 36 of the Electricity Act 1989 with consideration of recommendations from the MD-LOT.

2.4.5 The application shall be for the construction and operation of an OWF with a generating capacity of greater than 50 MW in the Scottish offshore region.

Marine (Scotland) Act 2010

2.4.6 The 2010 Act provides a framework for management for the marine environment in Scottish Territorial Waters. The 2010 Act introduced measures to boost growth in sectors relating to the marine environment, such as marine renewable energy. These measures included (but were not limited to):

- Introducing a statutory marine planning system to sustainably manage the demands on the seas;
- Adopting a simpler marine licensing system, which would minimise the number of licenses required for development and encourage economic investment; and
- Introducing new powers to protect and manage the marine wildlife, habitats, and historic monuments.

2.4.7 Section 21, Part 4 (Marine Licensing) of the 2010 Act details licensable marine activities. MD-LOT can grant a Marine licence under Part 4 of the 2010 Act on behalf of the Scottish Ministers.

2.4.8 Under Section 21 of the 2010 Act, the Project will require a Marine licence for the construction of works and deposition of substances or objects in Scottish Territorial Waters.

Marine and Coastal Access Act 2009

2.4.9 The 2009 Act created provisions for the management and protection of the marine environment, setting out the requirements for a UK Marine Policy Statement, a marine licensing system, powers to designate Marine Protected Areas (MPAs), and relevant enforcement powers. In Scotland, this Act applies to the Scottish Offshore Region (12 to 200 nm).

2.4.10 After the departure of the UK from the EU, some minor updates were made to the 2009 Act (to make it more relevant for the UK) and it remains in UK legislation as retained EU law.

2.4.11 Section 66, Part 4 (Marine Licensing) of the 2009 Act details licensable marine activities. MD-LOT can grant a Marine Licence under Part 4 of the 2009 Act on behalf of the Scottish Ministers.

2.4.12 Under Section 66 of the 2009 Act, the Project will require a Marine Licence for the construction of works and deposition of substances or objects in the Scottish Offshore Region.

Marine Licence Exemptions

2.4.13 A Marine Licence is not needed for an activity that is an exempt activity. The Marine Licensing (Exempted Activities) (Scottish Inshore Region) Order 2011, the Marine Licensing (Exempted Activities) (Scottish Offshore Region) Order 2011 and the Marine Licensing (Exempted Activities) (Scottish Inshore and Offshore Regions) Amendment Order 2012 set out exempted activities and the

conditions of such. Should an activity fulfil the conditions of an exemption, it may be considered exempt from the requirement of a Marine Licence. It should be noted that notification of undertaking an exempt activity or approval from the Scottish Ministers may be required should it be a condition of the exemption.

The Town and Country Planning (Scotland) Act 1997

2.4.14 There is a requirement for the onshore aspects of the Project to obtain planning permission under the Town and Country Planning (Scotland) Act 1997. The Town and Country Planning (Scotland) Act 1997 is the basis for onshore planning system in Scotland, extending to MLWS. This onshore planning permission can either be applied for to the Scottish Ministers alongside the Section 36 consent as a deemed planning permission under section 57 of the 1997 Act; or alternatively it can be a separate planning application under the 1997 Act to the Local Authority. As the 2010 Act extends to MHWS, there is an overlap in jurisdiction between the two regimes. To address this overlap, the intertidal area will be assessed within both the Offshore Scoping Report and Onshore Scoping Report.

The Energy Act 2004

2.4.15 The Energy Act 2004 (the 2004 Act) provides a legal framework to support and encourage the development of renewable energy sources beyond territorial waters (among other aspects) and brings into effect within domestic law, selected international agreements relating to pipelines and offshore installations.

2.4.16 Sections 95 to 98 of the 2004 Act relate to safety zones around offshore renewable installations, giving discretionary power to the Scottish Ministers to designate safety zones around the area where a renewable energy project is proposed to be constructed. Safety zones are declared as to ensure the safety of a renewable energy installation during the various project life stages (construction, Operation and Maintenance (O&M), extension, and decommissioning). The 2004 Act allows the Scottish Ministers to decide which activities are prohibited within the safety zone, as well as which vessels may enter or remain within the zone to conduct said activities. As such this may exclude non-OWF vessels from navigating through a designated safety zone for a period. The Developer expects to apply for standard safety zones during construction and notable O&M activities, and around the infrastructure during operation.

2.4.17 Sections 105 to 114 of the 2004 Act require developers to prepare decommissioning plans for renewable energy installations for approval by the Scottish Ministers.

The Crown Estate Scotland (CES) Licensing

2.4.18 As the governing body responsible for managing and leasing areas of the seabed in Scottish Territorial Waters, licensing applications for activities which propose to interact with the seabed must be submitted to CES. The CES licensing requirements of relevance to the Proposed Offshore Development include those relating to subsea cables and site-specific survey campaigns.

2.4.19 The CES may provide licences which give the right to lay, maintain, and operate cables and pipelines on the seabed in the Scottish Territorial Waters and Offshore Region (for renewable energy generation). This includes all cabling associated with the Proposed Offshore Development, such as export cables and interconnector cables.

2.4.20 In order to conduct site-specific surveys which disturb the seabed within the Scottish Territorial Waters and Offshore Region limit, a Marine Works Licence may be required. However, if this survey will involve the disturbance of the seabed (e.g., the collection of grab samples) within an OLA site, then a Marine Works Licence would not be required. In this instance, written consent from CES is needed to carry out the activity, in the absence of the Marine Works Licence requirement.

2.5 Environmental Impact Assessment

2.5.1 The purpose of the EIA Directive is to ensure that potential impacts from a proposed development are taken into consideration during the planning and application phases. If a relevant proposed development is deemed to have potential to cause a significant adverse effect on the environment, then an EIA will be required. The Competent Authority (CA) cannot grant consent for a proposed development without taking the EIAR into account.

2.5.2 The requirements of the EIA Directive are set out in the relevant Scottish legislation for electricity generation projects (which require consent under Section 36 of the Electricity Act 1989) by the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017.

2.5.3 The requirements of the EIA Directive relevant to marine licensing are enacted through the Marine Works (Environmental Impact Assessment) Regulations 2007 (the MW Regulations 2007) and the Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (the MW Regulations 2017).

2.5.4 These EIA Regulations set out the statutory process and minimum requirements for EIA.

2.6 Nature Conservation Legislation and Policy

Habitats Regulations

2.6.1 The EU Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (Habitats Directive) and the EU Directive 2009/147/EC on the Conservation of Wild Birds (Birds Directive) were transposed into Scottish law via the Conservation (Natural Habitats, &c.) Regulations 1994 (in Scottish Territorial Waters), the Conservation of Habitats and Species Regulations 2017 (of relevance to consents under Section 36 of the Electricity Act 1989) and the Conservation of Offshore Marine Habitats and Species Regulations 2017 (beyond 12nm) (referred to as the Habitats Regulations). In light of the departure of the UK from the European Union, the Scottish Parliament made changes to the Habitats Regulations through the Conservation (Natural Habitats, &c.) (EU Exit) (Scotland) (Amendment) Regulations 2019, so that Scotland maintained the same standards as set out in the Habitats and Birds Directives.

2.6.2 The Habitat Regulations require the establishment of a European network of highly important conservation sites. These include Special Areas of Conservation (SACs), Special Protection Areas (SPAs), candidate SACs and proposed SPAs, and RAMSAR sites. Although the UK is no longer a Member State of the EU, all SACs and SPAs formerly part of the EU Natura 2000 ecological network are now contained within the newly established ‘UK National Site Network’ on land and sea to replace this Natura 2000 network within the UK. The policy and regulations on protection and standards afforded to these designated sites remains the same as the EU counterparts.

2.6.3 National Planning Framework 4, Policy 4 (b) states that *"proposals that are likely to have a significant effect on an existing or proposed European site (SACs or SPAs) and are not directly connected with or necessary to their conservation management are required to be subject to an "appropriate assessment" of the implications for the conservation objectives".* Under the Habitats Regulations, where a plan or project is not directly connected with, or necessary to site management for nature conservation of a European site and is predicted to have LSE (either individually or in combination with other plans or projects) then the CA must carry out an Appropriate Assessment (AA) of the implications of that site in view of that site's Conservation Objectives, a process known as HRA.

2.6.4 In accordance with the Habitats Regulations, the HRA process will be undertaken for the Project (both offshore and onshore), with an Offshore HRA Screening exercise being conducted alongside submission of the Offshore Scoping Report. The HRA and EIA elements will be reported separately but will draw from similar ecological datasets and baseline information. The Offshore HRA Screening Report will be submitted to MD-LOT and will detail the outcome of LSE screening on the qualifying features of relevant European sites, alongside the Offshore Scoping Report (NatureScot, 2023a; Scottish Government, 2023b).

European Protected Species

2.6.5 European protected species (EPS) are animals and plants listed within Annex IV of the Habitats Directive and therefore, are protected under the Habitats Regulations. In order to legally conduct activities that may result in disturbance or injury to EPS (such as underwater noise (UWN) during surveys) an EPS licence must be obtained from the Statutory Authorities. An application is usually submitted alongside an EPS Risk Assessment which provides detailed information on the proposed source of disturbance/injury and how this will potentially impact upon EPS. Licenses are only granted when there is no satisfactory alternative and potential effects can be managed or mitigated to an acceptable level. This makes it possible to permit certain activities that would otherwise be illegal.

2.6.6 In the Scottish Territorial Sea, EPS are protected under the Conservation (Natural Habitats, &c.) Regulations 1994. In Scottish Offshore Waters, EPS are protected under the Conservation of Offshore Marine Habitats and Species Regulations 2017. EPS licences are issued by MD-LOT (on behalf of the Scottish Ministers) or NatureScot depending on the location, species and the purpose of the activity. For commercial activities (e.g., geophysical surveys, installation of renewable energy devices), MD-LOT (on behalf of the Scottish Ministers) is the relevant licensing authority.

2.6.7 The Developer is responsible for submitting applications for EPS licences when appropriate. Should additional licences be required across the lifecycle of the Project, these will be discussed and agreed with the relevant CA.

Basking Shark (Cetorhinus maximus)

2.6.8 Basking sharks are protected in Scottish Waters from intentional or reckless disturbance or harassment under Schedule 5 of the Wildlife and Countryside Act 1981. If there is a risk that an activity is likely to cause disturbance or injury to a basking shark that cannot be removed or sufficiently reduced by using alternative methods or mitigation measures, then a licence is required to undertake the activity.

2.6.9 Licensing requirements under the Wildlife and Countryside Act 1981 are similar to those presented above for EPS. For basking sharks, licences are required for commercial activities (e.g., geophysical

surveys) and MD-LOT (on behalf of the Scottish Ministers) is the licensing authority for these activities under the Wildlife and Countryside Act 1981.

Nature Conservation Marine Protected Areas (NCMPAs)

2.6.10 Under the 2010 Act and the 2009 Act there is a requirement for MD-LOT to consider whether a licensable activity is capable of significantly impacting the protected feature(s) of a NCMPA (or any protected geomorphological or ecological process which a protected feature is dependent). The Proposed Offshore Development's Offshore Export Cable Corridor (Offshore ECC) crosses the Southern Trench NCMPA, which is designated for burrowed mud, fronts, minke whale *Balaenoptera acutorostrata*, quaternary of Scotland, shelf deeps, and submarine mass movement. Any relevant NCMPAs will be considered in detail within the subsequent EIAR.

Priority Marine Features (PMFs)

2.6.11 A total of 81 PMFs were identified in 2014, developed by Marine Scotland, Joint Nature Conservation Committee (JNCC) and NatureScot and adopted by the Scottish Ministers. PMF's cover a variety of habitats and species that are considered a priority for conservation in Scotland's seas and, of which, many are considered characteristic of the Scottish marine environment. PMF's may also be protected under other designations and legislation. The list includes a range of intertidal, deep and continental shelf habitats as well as various species of mammals, fish, shellfish and other invertebrates (NatureScot, 2020a).

2.7 Relevant Scottish Marine Policy and Guidance

Policy

2.7.1 The UK Government and Scottish Government regularly review, update and publish policy documentation for the purpose of advising and informing consent decision making and ensure all marine development contributes to the wider political ambitions while supporting and delivering sustainability/environmental targets. **Table 2.1** outlines the various key policy, plan or strategy documents that will be relevant to the Proposed Offshore Development and that will be reviewed as part of the EIA process.

Table 2.1: Key UK and Scottish Policy, Plans and Strategy Relevant to the Proposed Offshore Development.

Subject Matter	Policy/Plan/Strategy
All Topic Areas	UK Renewable Energy Roadmap: 2013 update (HM Government, 2013).
	Scottish Energy Strategy and British Energy Strategy (Scottish Government, 2017).
	The Clean Growth Strategy: Leading the way to a low carbon future (HM Government, 2017).
	UK Marine Policy Statement (HM Government, 2011).
	National Planning Framework 4 (NPF4) (Scottish Government, 2023c).
	Scotland's Climate Change Plan 2018-2032 (Scottish Government, 2020).

Subject Matter	Policy/Plan/Strategy
	Scottish Government: Programme for Government 2023-2024 (Scottish Government, 2023).
	Scotland's National Marine Plan: A Single Framework for Managing Our Seas (Scottish Government, 2015a).
	Sectoral Marine Plan for Offshore Wind Energy (Scottish Government, 2020a).
	Scottish Electricity Generation Policy Statement – 2013 (Scottish Government, 2013).
	Draft Energy Strategy and Just Transition Plan – Delivering a Fair and Secure Zero Carbon Energy System for Scotland (Scottish Government, 2023a).
	Scottish Energy Strategy: The future of energy in Scotland (Scottish Government, 2017).
	Climate Change Plan: third report on proposals and policies 2018-2032 (RPP3) (Scottish Government, 2018b) and update (Scottish Government, 2020d).
	Scotland's National Strategy for Economic Transformation (Scottish Government, 2022b)
	Marine Planning Position Statement (NatureScot, undated).
Benthic and Intertidal Ecology	Scottish Priority Marine Features (NatureScot, 2023b).
	The Scottish Biodiversity Strategy to 2045: Tackling the Nature Emergency in Scotland (Scottish Government, 2022c).
Offshore Ornithology	The European Biodiversity Strategy for 2030 (European Commission, 2020).
	The Scottish Biodiversity Strategy to 2045: Tackling the Nature Emergency in Scotland (Scottish Government, 2022c).
Marine Mammals	Scottish Priority Marine Features (NatureScot, 2023b).
	The Scottish Biodiversity Strategy to 2045: Tackling the Nature Emergency in Scotland (Scottish Government, 2022c).
Commercial Fishing	Assessments have made reference to general policy and topic-specific guidance, rather than topic-specific policy.
Seascape, Landscape and Visual Impact	Position Statement on Renewable Energy and the Natural Heritage (SNH, 2014).

Marine European Protected Species Guidance

2.7.2 The relevant Scottish consenting guidance will be adhered to, namely the Marine Scotland Consenting and Licensing Guidance for Offshore Wind, Wave and Tidal Energy Applications (Scottish Government, 2018a) and Marine Directorate online guidance associated with offshore wind applications. Other relevant guidance to be adhered to includes:

- The protection of Marine European Protected Species from injury and disturbance: Guidance for Scottish Inshore Waters (July 2020 Version) (Scottish Government, 2020e);

- Dolphins, whales and porpoises and licensing (NatureScot, 2023c); and
- European Protected Species (NatureScot, 2023d).

Other Guidance

2.7.3 Other relevant guidance includes the Guidance Note series published by NatureScot as advice for renewable energy development (NatureScot, 2023e).

2.7.4 This series of eleven guidance documents provides a core resource to inform offshore wind development proposals in Scotland. These guidance notes will take stakeholders and developers through each step of the EIA and HRA processes to guide provision of the supporting information required to inform and support an application.

2.8 Pre-Application Consultation (PAC)

2.8.1 The Marine Licensing (Pre-application Consultation) (Scotland) Regulations 2013 (PAC Regulations) and Sections 22 to 24 of the 2010 Act require that Pre-Application Consultation (PAC) is carried out for prescribed classes or descriptions of licensable marine activity. The process involves undertaking public consultation prior to submission of certain Marine Licence applications. These requirements only apply to the area within the jurisdiction of the 2010 Act as there is no similar provision within the 2009 Act. Whilst the requirements do not apply beyond the Scottish Territorial Waters, the principles of the PAC Regulations will be applied to all offshore aspects of the Proposed Offshore Development.

2.8.2 For offshore wind development activities, developers must hold at least one public event for local communities, environmental groups, non-governmental organisations, regulators and other interested parties to have the opportunity to consider and comment upon the proposed project and its associated design. Developers must also notify the Maritime and Coastguard Agency (MCA), the Northern Lighthouse Board (NLB), NatureScot and Scottish Environment Protection Agency (SEPA) along with any delegate for the relevant marine region (if established) that an application for a Marine Licence will be submitted to the Scottish Ministers as well as notification of any planned public event(s). Additionally, developers must publish a notice in a local newspaper containing the description of the activity, details where more information may be found, the date and location of the PAC event(s), and how to submit comments to the developer and within which timeframe. A PAC report should then be prepared and submitted to MD-LOT at the same time as any Marine Licence application (Scottish Government, 2020c). Further information on the consultation process is presented within **Chapter 4: Consultation** of this Offshore Scoping Report.

2.9 Scoping Questions

2.9.1 The following questions refer to the legislation and policy context chapter and are designed to inform the Scoping Opinion and focus the Scoping exercise:

1. Are you satisfied that all relevant overarching legislation, policy and guidance has been identified within this chapter?

3 Proposed Offshore Development Description

3.1 Introduction

3.1.1 This chapter presents a description of the Proposed Offshore Development. It sets out the design and main components of the offshore infrastructure associated with the OWF. It also describes the key activities that will be undertaken before and during construction, O&M and decommissioning, including key parameters along with indicative timescales.

3.1.2 At this early stage, the proposed offshore development description is indicative, and the 'envelope' has been designed to include sufficient flexibility to accommodate further refinement during detailed design. This chapter therefore sets out a series of options and/or parameters for which maximum values are used to constitute a realistic Maximum Design Scenario (MDS).

3.1.3 Detailed project design and likely construction approach will be refined throughout the EIA process; therefore this proposed offshore development description is high-level to provide context for the development of the offshore EIA scope.

3.2 Design Envelope Approach

3.2.1 The Developer has adopted a design envelope approach to inform the EIA. Currently the Project is in the early stages of definition, and it is not possible to apply exact specifications. An Offshore Project Boundary is therefore identified at this Scoping stage, which is a wider area within which the Proposed Offshore Development will be located.

3.2.2 At EIAR, a single Offshore ECC will be selected between the Array Area and Landfall Development Zone.

3.2.3 The design envelope identifies a range of parameters associated with each aspect of the Proposed Offshore Development, enabling a realistic assessment of the likely worst-case environmental effects upon a particular receptor. A more developed design envelope will be presented in the EIAR than that used in this Offshore Scoping Report. The EIAR will provide the maximum envelope of the consent sought, allowing appropriate flexibility to enable the refinement of the Proposed Offshore Development design after consent (if granted). Each topic-specific assessment within the EIAR will consider the relevant design parameters that give rise to the greatest potential impact for the receptors in question, while only considering realistic solutions. Any design parameter that is equal or less than those assessed will have an equal or lesser impact.

3.2.4 With reference to WTGs, impacts are not linked directly to the capacity of the WTG, but rather its physical dimensions such as tip height and rotor diameter. It is therefore not considered necessary to constrain the design envelope based on WTG capacity and as such this is not referred to within this Scoping Report.

3.2.5 By employing the design envelope approach, the Developer seeks to retain a reasonable level of flexibility in the design of the Proposed Offshore Development within certain maximum extents and ranges, all of which will be fully assessed in the EIAR. The design envelope will be developed in parallel with the wider iterative EIA, and design development (including the identification of embedded commitments) process and will be influenced by the results of environmental and technical studies where relevant, as well as taking on board feedback through stakeholder consultation.

3.3 Offshore Scoping Area

3.3.1 To inform the Offshore Scoping Report an Offshore Project Boundary has been used. The Offshore Project Boundary identifies a wider area within which the Proposed Offshore Development will be located, to be refined throughout the EIA process.

3.3.2 The Offshore Project Boundary is split into a number of areas, as set out below and presented in **Figure 1.1**:

- Array Area: comprises the majority of the NE3 PO area, around 50 km east of Wick with a surface area of 256 km^2. Water depths vary from approximately 60 m below Chart Datum (CD) to more than 100 m below CD. This is where the offshore wind generating station will be located, which will include the WTGs, offshore platforms, foundation and mooring system, and inter-array cables.
- Offshore ECC: comprises up to three 3 km wide corridors up to 126 km long connecting to a number of landfall options along the north Aberdeenshire coast. This is where the offshore electrical infrastructure, specifically the Offshore Export Cable(s) and possibly a Reactive Compensation Station (RCS), will be located. The Offshore ECC runs from the Array Area south to MHWS at landfall.
- Landfall: extends along the north Aberdeenshire coastline between Rosehearty and Fraserburgh. This is the area between MHWS and MLWS through which the Offshore Export Cable(s) will be installed. The Offshore Export Cable will be installed via trenched or trenchless methods or a combination of both, which will be determined following more detailed engineering design.

3.4 Project Infrastructure Overview

The Wind Farm Site

3.4.1 The Proposed Offshore Development will comprise of WTGs and all offshore electrical infrastructure required to transmit power generated by the WTGs to the Onshore Substation. The key components are described in **Table 3.1** and illustrated in **Figure 3.1**.

3.4.2 The Proposed Offshore Development may also comprise any other infrastructure required to optimise and maintain the wind farm, such as an Offshore Innovation Platform, offshore wave buoys and wind measurement devices.

3.4.3 There are two main transmission technologies being considered, defined by the type of current: High Voltage Alternating Current (HVAC) and High Voltage Direct Current (HVDC). The appropriate transmission type will be determined during the detailed design and procurement stage, post-consent, based on a range of factors including project economics and technology risk.

3.4.4 The main offshore components may include:

- Up to 71 WTGs;
- Floating WTG foundation substructures;
- Mooring and anchoring systems;
- Inter-array/interlink cables (including dynamic and static parts);

- Scour and/or cable protection;
- Up to three OSSs;
- One RCS (if HVAC technology is selected);
- One Offshore Innovation Platform;
- One Accommodation Platform; and
- Up to three Offshore Export Cable(s).

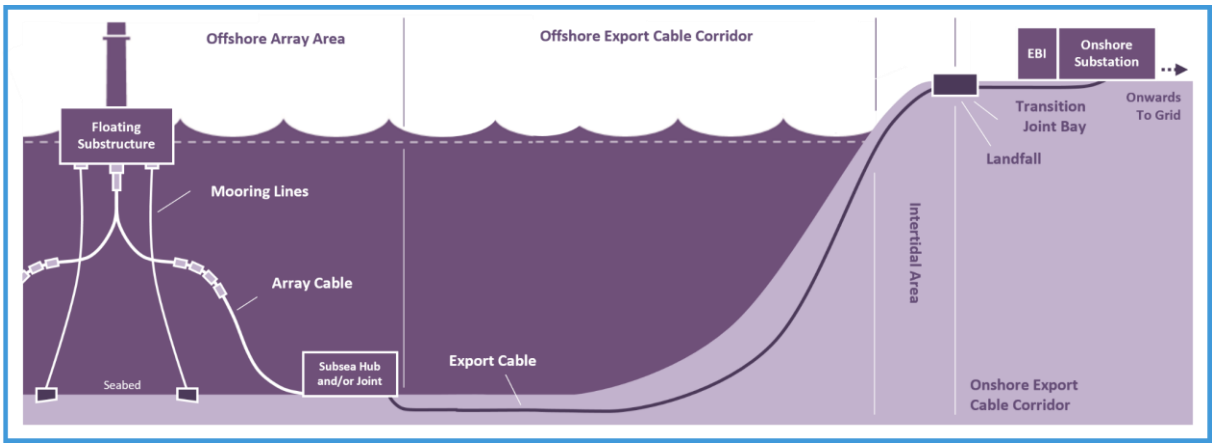


Figure 3.1: Overview of the Main Offshore Components (not to scale).

Table 3.1: Stromar Offshore Infrastructure Overview.

Infrastructure	Components	Detail
Array Area	Offshore Accommodation Platform	The Proposed Offshore Development may include an accommodation platform to provide permanent on-site facilities for operations staff and their tools, equipment and spare parts.
	Offshore Innovation Platform	Supports innovative power-to-X technologies for conversion of electricity to other fuels. Power-to-X means using renewable electricity to create an energy carrier ('X').
	Inter-array Cables and Interlink Cables	Electrical cables connect the WTGs to one another and the OSSs, typically in branched strings, or in a ring configuration, or via subsea electrical hub(s) and/or joint(s). This electrical transmission system consists of inter-array cables installed between the individual WTGs to collect their power output, and a number of Offshore Export Cables running from the Array Area to the landfall point to export the combined power produced. If floating substructures are selected, the Proposed Offshore Development will require the use of dynamic cables for all or part of the inter-array cables between WTGs. The Proposed Offshore Development may trench and/or bury the portions of the cable running along the seabed for their protection. If fixed bottom foundations are selected, the cables may be of static design. The cables will be routed through j-tubes to the seabed and buried by trenching. On some occasions cable protection sleeves and/or rock dump will be required. In order to improve the reliability of the transmission system, interlink cables may be installed connecting the OSSs to each other. Similarly, a cable may connect to the accommodation platform and/or Offshore Innovation Platform, to provide it with power.

Infrastructure	Components	Detail
	Scour Protection	In order to protect foundation structures from seabed scour, material may be placed on the seabed to protect them from current and wave action.
	OSS	Up to three OSSs to convert the power to higher voltages and/or to HVDC in order to transmit the power more efficiently (reduced electrical losses) to shore. The number of substations will depend on their size i.e., either fewer larger substations, or more numerous smaller substations, or a combination.
	WTGs	WTGs convert wind energy to electricity. Key components include rotor blades, gearboxes, transformers, power electronics and control equipment. Offshore turbine models are continuously evolving and improving, therefore the exact wind turbine model will be selected post-consent from the range of models available at the point of procurement. However, they are likely to have three blades and a horizontal rotor axis.
	Wind Turbine Foundations	There are a large number of floating substructures under development, which can be classified into four main categories namely, spar, Tension-Leg Platform (TLP), semi-submersible and barge; fixed bottom foundations will also be considered; consequently, the EIA will consider a range of foundation types.
	Wind Turbine Anchors/Mooring Lines	There are numerous anchor types and mooring systems under consideration at present, to secure the floating foundation to the seabed. Anchor types include: drag embedment, vertical load, pile, suction and gravity. Mooring systems include: catenary, semi-taut, taut and tension.
Offshore ECC	Export Cables	Cables connecting the OSSs to the landfall. There may be up to three Export Cable(s) which will touch down on the seabed before leaving the Array Area and no dynamic cable will be present in the ECC. Cables will be routed to avoid major seabed obstacles and minimise electrical losses. Cables will be delivered in sections and jointed in-situ.
	HVAC Reactive Compensation Substation	The distance that HVAC electrical export infrastructure can operate is limited because of electrical losses. However, this range can be extended by installing Reactive Compensation Substations. If required, these substations will be located offshore, approximately halfway between the Array Area and the grid connection point. They are similar in design but smaller than the main OSS. Typically, an RCS would be designed as surface structures, however seabed structures are also considered.
	Cable Protection	In order to protect the cables from scour, materials may be placed on the seabed to protect them from currents and wave action.

3.4.5 All the key offshore components of the Proposed Offshore Development are located within the Offshore Project Boundary as illustrated in **Figure 1.1**.

Wind Turbine Generators

3.4.6 The MDS for the WTGs is outlined in **Table 3.2** and illustrated in **Figure 3.2**.

3.4.7 The WTGs convert wind energy to electricity and consist of rotor blades, a tower, gearboxes, transformers, power electronics and control equipment. WTG technology is constantly evolving so the final model of WTG will be selected post-consent.

3.4.8 The Proposed Offshore Development may include up to 71 WTGs. A range of WTG models will be considered; however, they will most likely all follow the traditional WTG design with three blades and a horizontal rotor axis as illustrated in **Figure 3.2**.

3.4.9 The layout of WTGs within the Array Area will be determined once the design optimisation process has been completed and will need to balance a number of key sensitivities including WTG type, prevailing wind directions, geophysical characteristics, metocean conditions, benthic habitats, the specific floating substructure and anchor design chosen and navigational safety considerations.

3.4.10 Personnel access and egress of the foundations and WTGs may be either from a vessel via a boat landing, or a stabilised gangway via the foundation or transition piece, or by an active heave compensated hoist on the foundation, or by hoisting from a helicopter to a heli-hoist platform on the nacelle. Any helicopter access would be designed in accordance with relevant Civil Aviation Authority (CAA) guidance and standards.

Table 3.2: Maximum Design Scenario for WTGs.

Parameter	Design envelope
Maximum number	≤ 71
Maximum rotor diameter (m)	≤ 320
Maximum hub height (m, Highest Astronomical Tide (HAT))	≤ 225
Maximum blade tip height (m, HAT)	≤ 385
Minimum blade tip height (m, HAT)	≥ 30

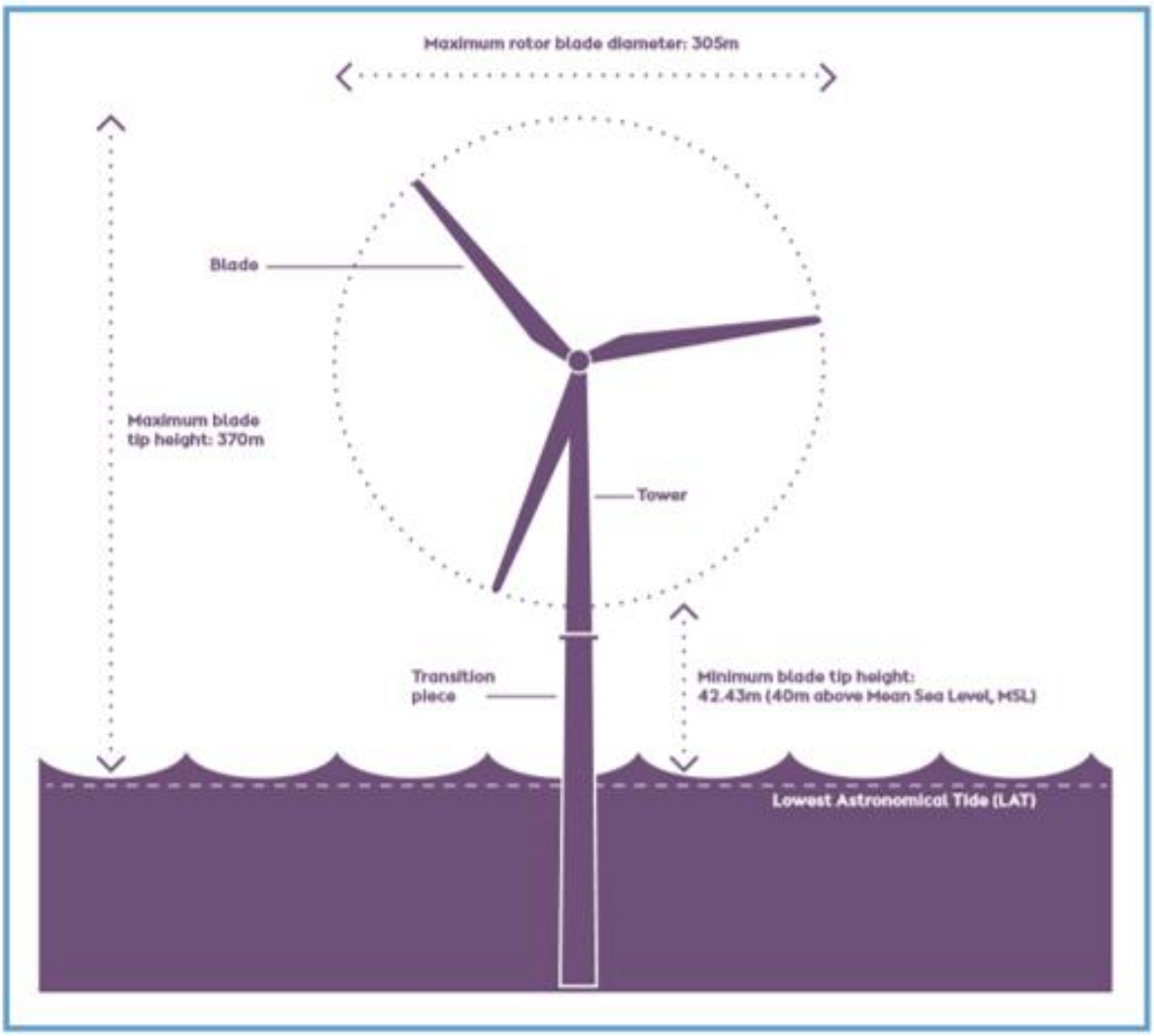


Figure 3.2: Overview of Typical Floating Offshore WTG (not to scale).

Wind Turbine Foundations

Floating Foundations

3.4.11 There are a large number of floating substructures under development, which can be classified into four main categories namely, spar, TLP, semi-submersible and barge; consequently, the Proposed Offshore Development EIA will consider a range of foundation types as set out in **Figure 3.3**. These four main categories are characterised as follows:

- The spar buoy platform is a slender and self-stable buoy with a ballast weight on the bottom acting as a counterweight with a large draught.
- The barge is a self-stable platform with a large waterplane area and reduced draught.

- The TLP is a semi-submerged buoyant structure, anchored to the seabed with tensioned mooring lines or tendons. The combination of the structure buoyancy and tension in the anchor/mooring system provides the platform stability.
- The semi-submersible is a buoyancy-stabilised platform which floats partially submerged on the surface of the ocean whilst anchored to the seabed. The structure gains its stability through the buoyancy force associated with its large footprint and geometry which ensures the wind loading on the structure and turbine are countered by an equivalent buoyancy force on the opposite side of the structure.

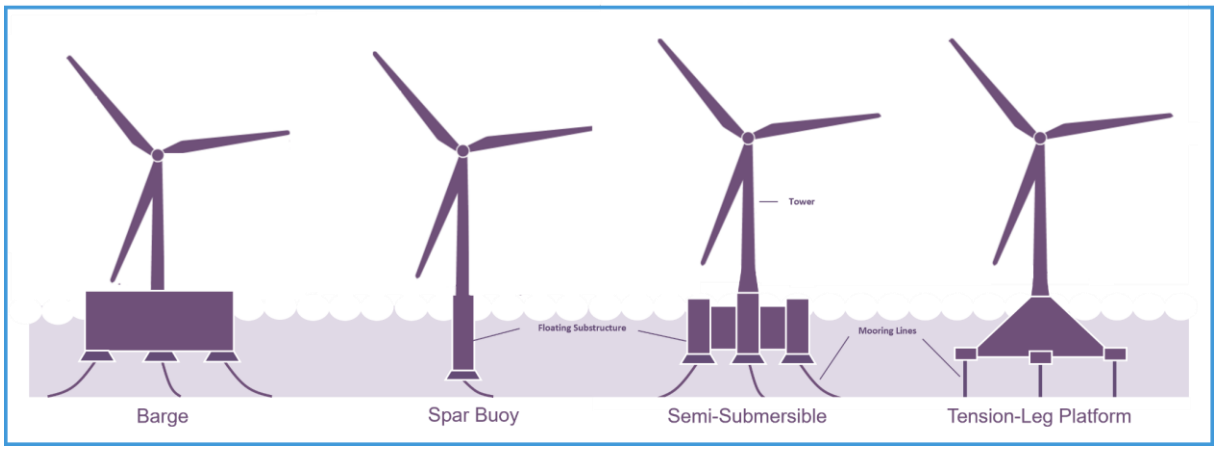


Figure 3.3: Overview of Floating Wind Turbine Foundation Types (not to scale).

3.4.12 The Proposed Offshore Development may use either spar, TLP, barge, or semi-submersible foundation structures (or use a hybrid of these structures). The primary structure of the floating substructure will be manufactured from either steel, concrete, or a combination of the two.

3.4.13 The final selection will depend on factors including WTG type, seabed conditions, water depth, wave, wind and tidal conditions, economics and procurement approach. Should sediment conditions vary across the Array Area, it is possible that more than one foundation type is selected.

3.4.14 The EIA will consider different foundation types based on the most recent understanding of the Proposed Offshore Development. The maximum design parameters of each foundation type (e.g., number of foundations, diameter, footprint) will be considered within the EIA.

3.4.15 The floating substructure piece is usually painted yellow and marked per relevant regulatory guidance.

3.4.16 The floating substructure may be equipped with impressed current cathodic protection or sacrificial anodes, which are required for corrosion protection. These sacrificial anodes are fastened to an external structure and corrode away preferentially thereby preventing the corrosion of the primary structure's steel. The Proposed Offshore Development may use aluminium, zinc or magnesium alloys with only small quantities of other metals.

3.4.17 The floating substructure may include boat landing features, ladders, a crane, and other ancillary components (such as radar (radio detection and ranging) or other monitoring equipment).

3.4.18 Additionally, the floating substructure may contain an active ballast system which can move air and/or seawater in to and out of the structure to adapt the buoyancy of the structure and maintain the vertical alignment of the WTG, both during installation and operation.

Fixed Bottom Foundations

3.4.19 The foundation type for fixed bottom WTG foundations will depend on final site investigations and procurement negotiations, which will be completed post-consent. Consequently, the EIA will consider a range of foundation types, such as:

- Fixed foundation structures such as lattices (with three or four legs), anchored to the seabed with suction buckets, driven piles or drilled piles as appropriate;
- Guyed towers with tensioned wires at different elevations from the lattice tower, anchored to the seabed with clump weights, gravity, vertical load anchors, micro suction piles or micro driven piled as appropriate; or
- Gravity base structures.

Mooring and Anchoring Systems (Floating Foundations)

3.4.20 The mooring and anchoring systems are responsible for the station-keeping of the floating substructure and need to maintain the position of the WTGs even during the most extreme events or energetic storms.

3.4.21 The Proposed Offshore Development may use mooring lines attached to each floating substructure. The mooring lines are laid out in multiple directions holding the platform stable and may use either taut, catenary or semi-taut moorings, depending on the specifics of the chosen floating substructure, anchor type and the seabed and metocean conditions onsite. These are illustrated in **Figure 3.4**.

3.4.22 A catenary mooring consists of steel chains and/or wires and in some cases synthetic elements whose weight and curved shape holds the floating platform in place. The lower section of the mooring chain rests on the seafloor and provides restoring forces through the suspended weight of the mooring lines. The mooring line terminates at the seabed horizontally and the anchor point is only subjected to horizontal loads.

3.4.23 A taut mooring consists of synthetics fibres/rigid tendons/wire rope/chain, which use the buoyancy of the floater and a firm anchor to the seabed to maintain high tension in the mooring lines for floater stability. Taut mooring lines require tensioning and may terminate at an angle to the seabed, potentially requiring the transfer of both horizontal and vertical loads.

3.4.24 A semi-taut mooring may utilise buoyancy modules or clump weights to combine elements of the taut and catenary mooring systems. The motion of the floating platform is decoupled from the lower sections of the mooring and the resulting line tension can be optimised along the mooring line.

3.4.25 Tension mooring utilises braces (wires that are anchored to the seabed) that must always be stretched and pre-tensioned as the buoyancy is greater than the weight of the structure.

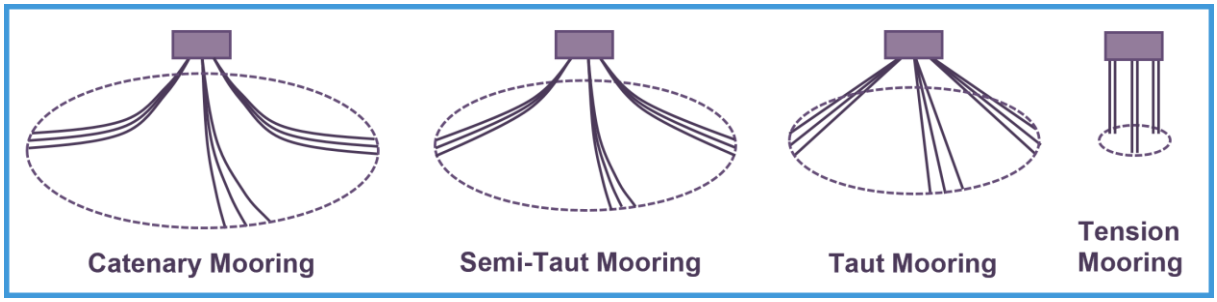


Figure 3.4: Overview of Typical Floating Foundation Mooring Configurations (not to scale).

3.4.26 The end of each mooring line connects to an anchor as shown in **Figure 3.5**. There are a number of anchoring solutions available, depending on the mooring configuration, seabed condition, and holding capacity required.

3.4.27 The Proposed Offshore Development may use one or a combination of the following anchor types: drag-embedment, vertical load, pile (including drilled micro-piles), suction or gravity. These different anchor types are illustrated in **Figure 3.6**.

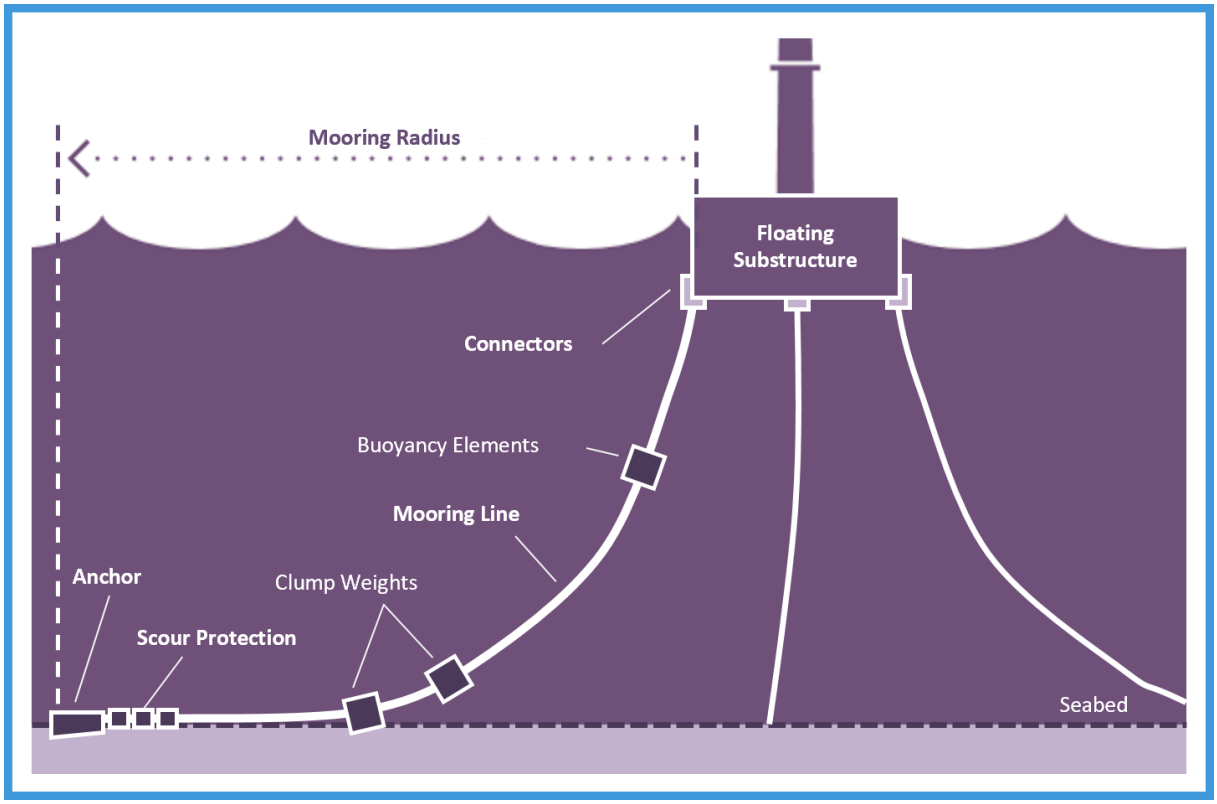


Figure 3.5: Components of a Typical Floating Foundation Mooring System (not to scale).

3.4.28 Drag-embedment anchors are installed by being dragged along the seabed until the required depth and holding capacity is reached; to function correctly they need to be fully submerged into the seabed. Drag-embedment anchors use soil resistance to hold the anchor in place and are best suited for cohesive sediments. Where the seabed is stiff clay or sandy there can be limited penetration. Drag-embedment anchors have limited suitability vertical loading and as such are mainly used for catenary moorings where the loads are horizontal to the seabed.

3.4.29 Vertical load anchors are similar to drag-embedded anchors and can also be installed by dragging along the seabed (or with a suction bucket). In contrast to drag anchors, vertical load anchors can withstand both horizontal and vertical loads.

3.4.30 Pile anchors consist of one or more cylindrical piles and can be installed by driving, drilling screwing, or a hybrid of driving/drilling depending on the seabed conditions. Piled anchors have a high holding capacity and can resist both vertical and horizontal loads. Alternative anchor pile shapes may be considered (such as flat plated shapes) if these are deemed more effective.

3.4.31 Suction anchors (also known as suction piles or suction caissons) use an upside-down 'bucket' from which the seawater is pumped out, creating a pressure differential that drives the structure into the seabed. Suction anchors minimise the disturbance during installation but are only feasible in specific seabed conditions, such as sands and clays.

3.4.32 Gravity anchors will penetrate the seabed to a depth depending on their weight and geometry and the soil characteristics of the site. Their holding potential is proportional to their weight, and they can resist both vertical and horizontal loads. Gravity anchors require medium to hard soil conditions.

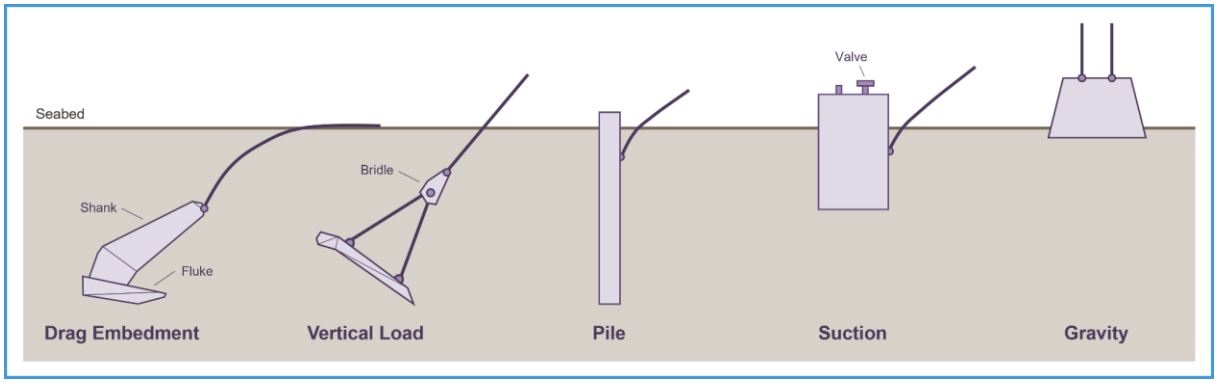


Figure 3.6: Overview of Typical Floating Foundation Anchor Types (not to scale).

3.4.33 Some form of seabed preparation may be required for each foundation type. Seabed preparations may include seabed levelling, removing surface and subsurface debris such as boulders, fishing nets, lost anchors etc. If debris are present below the seabed surface, then excavation may be required for access and removal.

3.4.34 Depending on the anchor solution selected there may also be a requirement to install scour protection to prevent the structure being undermined by sediment processes and seabed erosion. The touchdown point may be stabilised through the use of a tether and tether clamp, an associated anchor, or by the use of a cable support structure.

3.4.35 Any unexploded ordnances (UXO) found with live ammunition will be removed where practicable. Consent for UXO removal will be sought in a future Marine Licence application when survey data of suitable spatial resolution is available to identify and quantify the number and location of UXO.

3.4.36 The parameters of the mooring and anchoring system envelope are presented in **Table 3.3**.

Table 3.3: Maximum Design Scenario for Mooring and Anchoring System.

Design parameter	Design envelope
Mooring Line Radius	1000 m
Anchor Types	• Suction • Pile • Gravity • Vertical Load Anchor • Drag Embedment

Electrical Infrastructure

3.4.37 The Proposed Offshore Development will use offshore cables to transmit the electrical power produced by the WTGs. The offshore cables typically consist of the following items, although this can vary depending on the specific supplier and/or project requirements/design: up to three conductors of either copper or aluminium, insulation for the conductors, screens for the conductors and insulation, filler material, optical fibres, sheath (bedding), bindings, armour wire (multiple layers depending on design) and an outer jacket (see **Figure 3.7**).

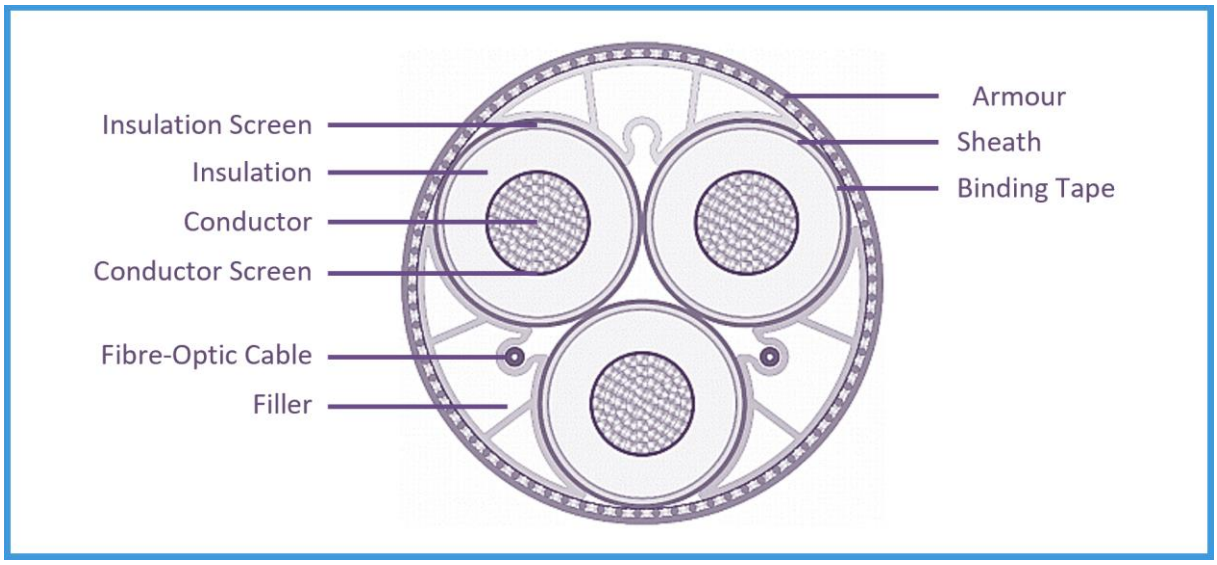


Figure 3.7: Cross-Section Through a Typical Offshore Cable (not to scale).

3.4.38 The electrical transmission system will consist of inter-array cables installed between the individual WTGs to collect their power output, OSSs, and a number of Offshore Export Cables running from the Array Area to landfall and connection to onshore infrastructure.

3.4.39 Although the transmission system will be constructed by the Developer, ownership will be transferred to an Offshore Transmission Operator after the Proposed Offshore Development is constructed in a

transaction overseen by the Government regulator for gas and electricity markets, Office of Gas & Electricity Markets.

Floating

3.4.40 If floating foundation substructures are selected, the Proposed Offshore Development will require the use of dynamic cables for all or part of the inter-array cable connections between WTGs. The inter-array cables between individual WTGs may touch down to the seabed for a portion of their length, as shown in **Figure 3.8**. They may be arranged in a number of different configurations; typically in branched strings, but also in a ring configuration (linking together adjacent strings), or via subsea electrical hub(s) and/or joint(s).

3.4.41 The Offshore Export Cable(s) will be positioned on the seabed before leaving the Array Area.

3.4.42 The Proposed Offshore Development may choose to trench and/or bury the portions of inter-array cable sitting on the seabed for their protection. The burial method and target burial depth will be defined post consent based on a Cable Burial Risk Assessment (CBRA) (or similar) considering ground conditions and the risk to the cables from activities such as trawling and vessel anchors.

3.4.43 Burial depths will typically be between 1 – 2 m below seabed, with a maximum of typically up to 4 m locally; this will vary across the Array Area and Offshore ECC.

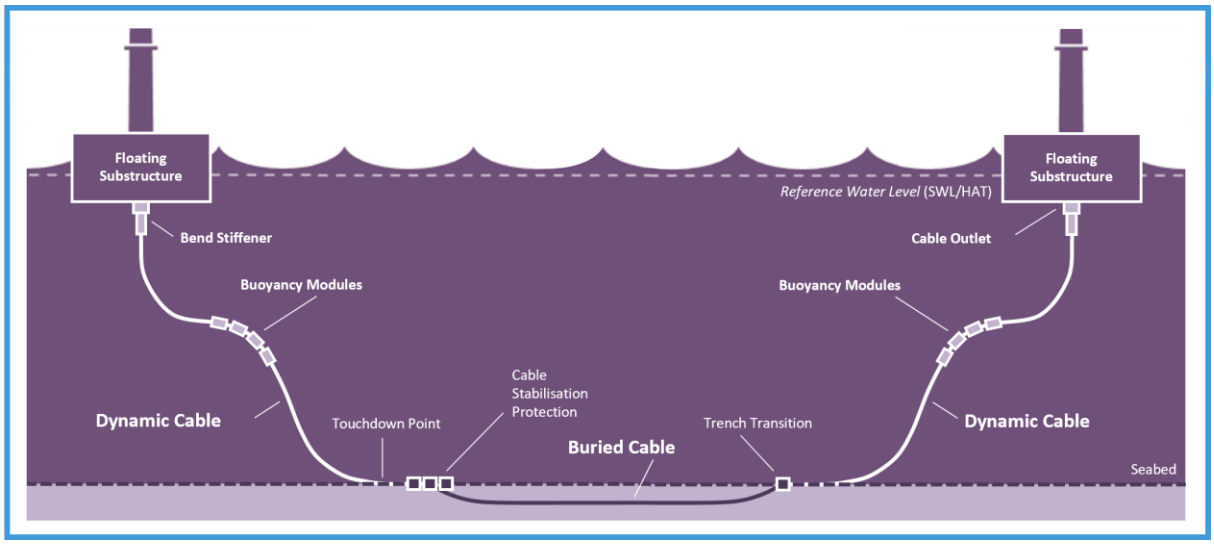


Figure 3.8: Typical Inter-Array Cable Configuration (not to scale).

3.4.44 The Proposed Offshore Development cable system must be able to accommodate the movement of a floating foundation substructure without imparting any direct load to the cables. Therefore, the cable design may include ancillary equipment, such as buoyancy modules, bend stiffeners and tethering systems (which may include cable anchoring structures fixed onto seabed), as shown in **Figure 3.9**. This allows the cable configuration to move in response to movement of the foundation substructure.

3.4.45 The number and type of buoyancy modules required and their position within the water column will be driven by a combination of factors such as: water depth, environmental conditions, metocean conditions and the dynamic cable specifications.

3.4.46 Bend restrictors may be used to reduce fatigue in the cables at key points. The connection between a floating substructure and the dynamic cable can be subject to movements from both components, as opposed to just the cable system in the case of a fixed-bottom WTG. If fixed bottom foundation substructures are selected, the array cables will run down the WTG foundations through j-tubes. The last cable in each array will be pulled into a similar j-tube on the OSS.

3.4.47 Certain combinations of weather conditions, foundation type and mooring system may result in a need for a subsea riser support structure to avoid damage to the array cables due to extreme weather or fatigue. Need for such subsea structure will be determined during the project design phase.

3.4.48 Scour and/or cable protection may also be required at the seabed touch-down points to protect the integrity of the cable installation.

3.4.49 Cables will need to be made secure where they cross obstacles such as exposed bedrock, and pre-existing cables or pipelines, which prevent the cable from being buried. There also may be instances where ground conditions do not allow cables to be buried and some form of armouring to maintain the integrity of the cable if required, methods may include: rock placement, concrete mattresses, frond mattresses, metal or plastic protective half shell sleeves, or rock bags:

- Rock placement involves a fall pipe vessel placing rocks of different grades over the cable. This can provide protection from both direct anchor strikes and anchor dragging.
- Mattresses are formed by interweaving a number of concrete blocks with rope and wire. They are lowered to the seabed on a frame, the frame released, and the mattress deployed. This single mattress placement will be repeated over the length of cable which is either unburied or has not achieved target depth. Mattresses provide protection from direct anchor strikes but are less capable of dealing with anchor drag.
- Frond mattresses are installed following the same procedure as general mattress placement operations. They include fronds designed with the aim to form protective, localised, sand berms.
- Rock bags consist of various sized rocks constrained within a rope or wire netting containment. They are placed via a crane and thus deployed to the seabed in the correct position.

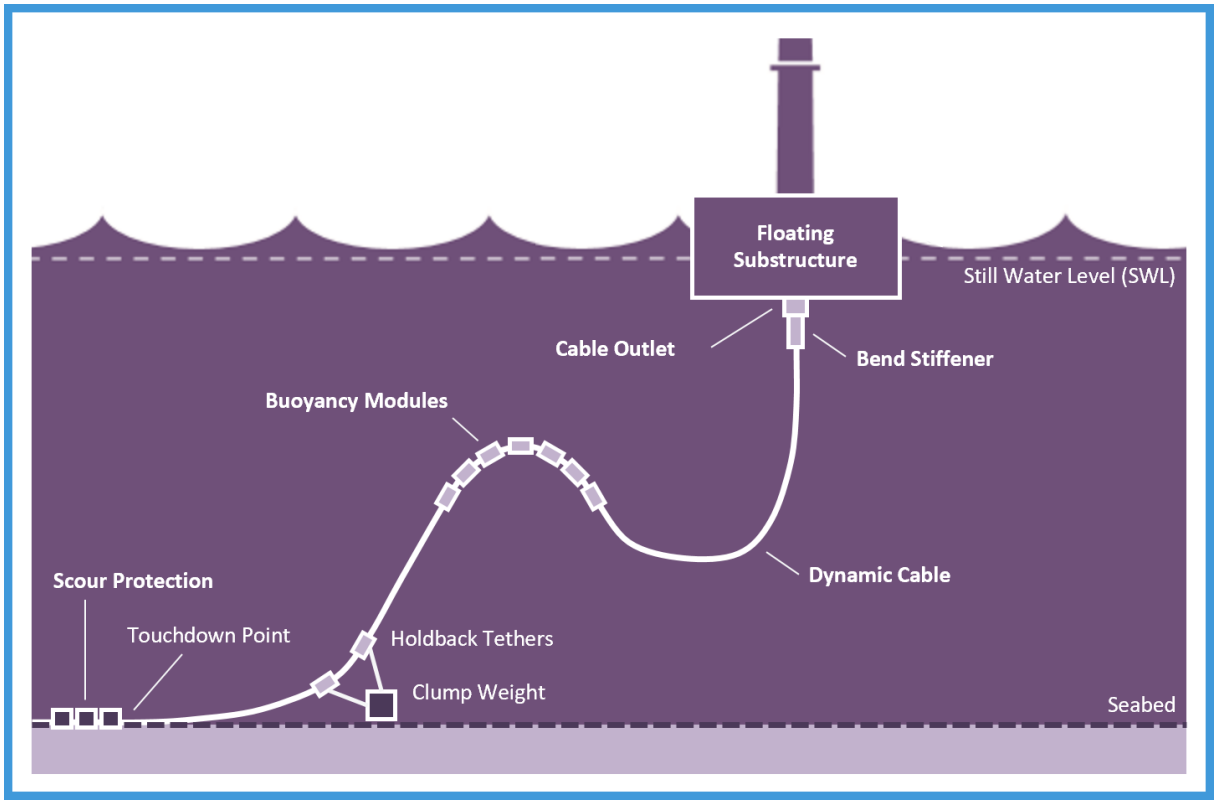


Figure 3.9: Typical Example of Dynamic Cable Arrangement (not to scale).

3.4.50 The cables may need to cross existing cables or pipelines on the seabed. The design and methodology of these crossings will be confirmed in agreement with the asset owners. However, it is likely that a berm of rock will be placed over the existing asset for protection, known as a pre-lay berm, or separation layer. The cables would then be laid across this at an angle close to 90 degrees and covered by a second post lay berm to ensure that the cable remains protected and in place.

3.4.51 The electrical infrastructure envelope is presented in **Table 3.4**.

Table 3.4: Maximum Design Scenario for Offshore Electrical Infrastructure.

Package	Parameter	Design Envelope
Landfall infrastructure	Number of trenches	3
	Number of cable drills	11
	HDD exit offshore pit length (m)	50
	HDD exit offshore pit width (m)	10
	Transition joint bay working area dimensions length (each Transition Joint Bay (TJB), with a maximum of three) (m)	40

Package	Parameter	Design Envelope
	Transition joint bay working area dimensions width (each TJB, with a maximum of three) (m)	40
	Cable installation methodology	Direct burial or trenchless techniques
Offshore Export Cables	Number	3
	Corridor length (km)	126
	Corridor width (km)	3
	Cable trench width (m)	7.5
	Target cable burial depth (m)	4
	Cable disturbance corridor width (m)	40 (including cable installation, cable protection, boulder and sandwave clearance)
	Seabed preparation methodology	Boulder and debris clearance, seabed levelling
	Cable installation methodology	Trenching, dredging, jetting, ploughing, vertical injection, surface-lay, Controlled Flow Excavation (CFE)
	Cable protection methodology	Primary: burial. Secondary: Sand bags, rock placement, concrete mattresses, fronded mattress, rock bags, metal or plastic protective half shell sleeves
Inter-array cables	Number	71
	Cable length (km)	720
	Cable trench width (m)	7.5
	Target cable burial depth (m)	4
	Cable disturbance corridor width (m)	40 (including cable installation, cable protection, boulder and sandwave clearance)
	Seabed preparation methodology	Boulder and debris clearance, seabed levelling
	Cable installation methodology	Trenching, dredging, jetting, ploughing, vertical injection, surface-lay, CFE
	Cable protection methodology	Primary: burial. Secondary: Sandbags, rock placement, concrete mattresses, fronded mattress, rock bags, metal or plastic protective half shell sleeves
Interlink cables	Number	5

Package	Parameter	Design Envelope
	Cable length (km)	<20
	Cable trench width (m)	7.5
	Cable disturbance corridor width (m)	40 (including cable installation, cable protection, boulder and sandwave clearance)
	Seabed preparation methodology	Boulder and debris clearance, seabed levelling
	Cable installation methodology	Trenching, dredging, jetting, ploughing, vertical injection
	Cable installation methodology	Primary: burial Secondary: Sand bags, rock placement, concrete mattresses, fronded mattress, rock bags, metal or plastic protective half shell sleeves

Offshore Substations

3.4.52 The OSSs are the interface between inter-array cables and the Offshore Export Cables, and transform the electricity generated by the WTGs to a higher voltage allowing a more efficient transmission to shore.

3.4.53 The design envelope includes a maximum of three OSSs within the Array Area, each consisting of a foundation and topside facility. These can vary in shape and size, but the MDS is presented in **Table 3.5**.

Offshore Substation Foundations

3.4.54 The OSSs will be permanently secured to the seabed with either a fixed or floating foundation structure. The foundations are typically fabricated from steel and/or concrete. A range of both fixed and floating foundation options are currently under consideration including monopile, monopod suction caisson, suction caisson jacket, piled jacket, gravity-based structure; and semi-submersible, tension leg platform, barge and spar buoy floating foundation concepts.

3.4.55 The final selection will depend on factors including OSS type, seabed conditions, water depth, wave, wind and tidal conditions, economics and procurement approach. As site conditions vary across the Array Area, it is possible that more than one foundation type is used but the MDS is presented in **Table 3.5**.

3.4.56 The EIA will consider different foundation types based on the most recent understanding of the Proposed Offshore Development. The maximum design parameters of each foundation type (e.g., number of foundations, diameter, footprint) will be considered within the EIA.

Offshore Reactive Compensation Substation

3.4.57 If required, a HVAC RCS may be located approximately halfway between the Array Area and grid connection point, either above the sea surface or on the seabed. They will be permanently secured to the seabed with a fixed structure.

3.4.58 If an above sea surface design is chosen, the RCS will be of a similar design to the OSSs. If a subsea design is chosen however, the electrical plant would be protected within a structure permanently attached to the seabed. The MDS is presented in **Table 3.5**.

Offshore Accommodation Platform

3.4.59 One Offshore Accommodation Platform to allow operations staff to be housed at the Array Area for several weeks at a time, and to allow spares and tools to be stored offshore. This aims to reduce vessel/helicopter trips offshore and time spent in transit.

3.4.60 The Offshore Accommodation Platform will be located within the Array Area and accessed by vessel and/or helicopter and may have associated collocated vessels to access the WTGs and substations. The Offshore Accommodation Platform may also be co-sited with an OSS, including bridge access (bridge link) between the two platforms. The MDS is presented in **Table 3.5**.

Offshore Innovation Platform

3.4.61 An Offshore Innovation Platform may be constructed within the Array Area. This could support innovative power-to-X[4] technologies for conversion of electricity to other fuels. This may include a need for additional technologies like an export infrastructure system or offshore storage facility.

3.4.62 The design envelope includes a maximum of one Offshore Innovation Platform within the Array Area, consisting of a foundation and topside facility. The MDS is presented in **Table 3.5.**

Table 3.5: Maximum Design Scenario for Offshore Platforms.

Package	Parameter	Design Envelope
OSS (fixed or floating)	Number	3
OSS (fixed foundation)	Length of topside (m)	180
	Width of topside (m)	100
	Height of topside (including auxiliary structures, however excluding antennae, radar and masts) (m, LAT)	100
	Length of foundation (m)	100
	Width of foundation (m)	100
	Installation methodology	Transport barge with crane vessel to lift in place; alternatives such as skidding also under consideration.

[4] Power-to-X means using renewable electricity, from for example wind power, to create something else ('X'). The 'X' created is an energy carrier – usually renewable hydrogen – which can power medium to heavy-duty transport or industry. Renewable hydrogen, or green hydrogen, can in turn be synthesised into other green fuels, such as e-methanol for shipping, e-kerosene for aviation, and e-ammonia for industrial use in fertilisers or as a shipping fuel. For further information see: Power-to-X Technology: Producing Green Fuels | Ørsted (orsted.com).

Package	Parameter	Design Envelope
OSS (floating foundation)	Length of topside (m)	140
	Width of topside (m)	140
	Height of topside (including auxiliary structures, however excluding antennae, radar and masts) (m, LAT)	100
	Length of foundation (footprint) (m)	<100
	Width of foundation (footprint) (m)	<100
Offshore reactive compensation station substation (subsea concept)	Number	1
	Structure length (m)	50
	Structure width (m)	50
	Structure height (m)	20
	Installation methodology	Transport barge and lift down to the seabed.
Offshore reactive compensation station substation (surface concept)	Number	1
	Length of topside (m)	60
	Width of topside (m)	60
	Height of topside (including auxiliary structures, however excluding antennae, radar and masts) (m, LAT)	100
	Length of foundation (footprint) (m)	<70
	Width of foundation (footprint) (m)	<70
	Installation methodology	Crane vessel or float out; piled or other method as per substation foundation.
Offshore accommodation platform	Number	1
	Length of topside (m)	80
	Width of topside (m)	60

Package	Parameter	Design Envelope
	Height of topside (including auxiliary structures) (m, LAT)	100
	Length of foundation (footprint) (m)	<100
	Width of foundation (footprint) (m)	<100
	Installation methodology	Crane vessel or float out; piled or other method as per substation foundation.
Offshore Innovation Platform	Number	1
	Length of topside (m)	100
	Width of topside (m)	60
	Height of topside (including auxiliary structures) (m, LAT)	100
	Length of foundation (footprint) (m)	<100
	Width of foundation (footprint) (m)	<100
	Installation methodology	Transport barge with crane vessel to lift in place; alternatives such as skidding also under consideration.

3.4.63 It should be noted that the maximum dimensions (length x width) presented in **Table 3.5** for the topside of the OSS are valid where one large substation is used. If three small OSSs are used, these dimensions may be reduced.

3.5 Construction Programme

3.5.1 The indicative construction programme for the Proposed Offshore Development is presented in **Figure 3.10**. This programme illustrates the likely duration of the major installation elements, and how they may relate to one another in the construction campaign.

3.5.2 Activities may not be continuous, and the sequence of activities may change. The detailed construction programme will be developed as design and procurement activities progress.

3.5.3 The current programme assumes the Proposed Offshore Development will become commercially operational between 2030 and 2033.

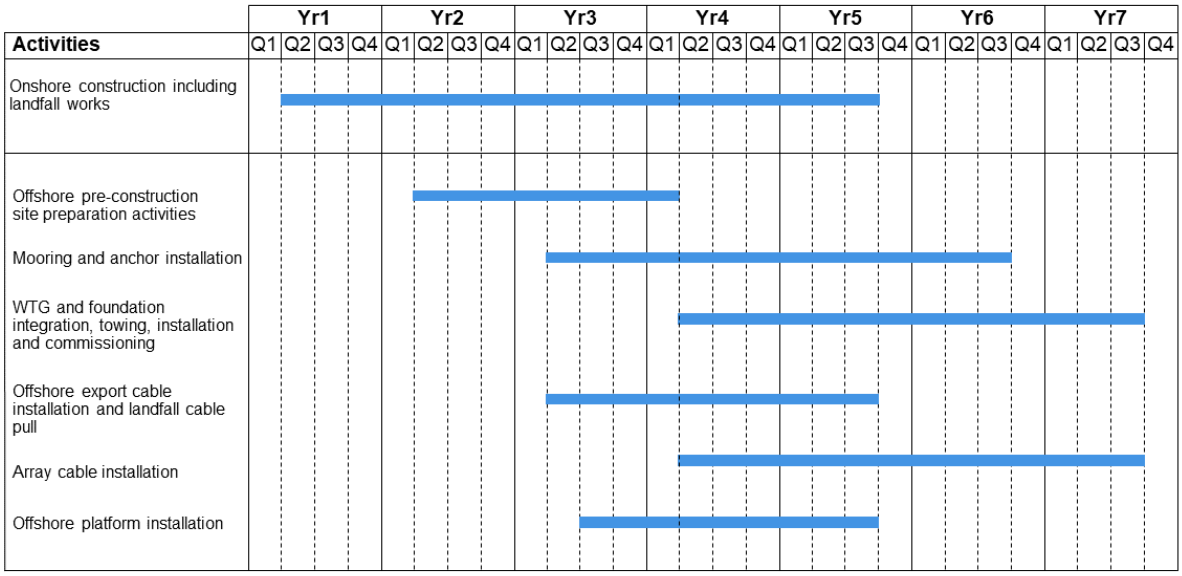


Figure 3.10: Indicative Construction Programme.

3.6 Pre-Construction Phase

3.6.1 Numerous activities are required to prepare the Proposed Offshore Development locations prior to construction. Pre-construction surveys will be undertaken several years prior to the start of construction works to identify in detail the site conditions and morphology, and the presence/absence of any potential obstructions or hazards.

3.6.2 Offshore (and landfall), geophysical and geotechnical surveys will be conducted across the Array Area and Offshore ECC comprising techniques such as Side Scan Sonar (SSS), Sub-Bottom Profiling (SBP), multibeam bathymetry and backscatter, high-density magnetometer surveys, geotechnical boreholes, multichannel seismic, Cone Penetration Tests (CPTs) and vibrocores.

3.6.3 Offshore surveys will take place from specialist vessels and may require the use of Remote Operated Vehicles (ROVs), uncrewed surface vessels or autonomous underwater vehicles. Some of these surveys have taken place in 2023 and further surveys are planned in 2024 and beyond.

3.6.4 Depending on the outcome of the surveys, the Proposed Offshore Development may require boulder clearance activities. Two clearance methodologies are possible; either a displacement plough or a subsea grab. Where a high density of boulders is encountered, a displacement plough is utilised. Where a low density of boulders is observed, it is possible infrastructure may be micro-sited to avoid clearance.

3.6.5 Following the pre-construction survey and clearance works, it is likely that a pre-lay grapnel run and an associated route clearance survey are undertaken along the final Offshore ECC. A multipurpose vessel will be mobilised with a series of grapnels, chains, recovery winch and survey spread suitable for vessel positioning and data logging.

3.6.6 In some areas within the Array Area and along the Offshore ECC existing sandwaves and similar bedforms may need to be removed before cables, anchors and mooring lines are installed. Many of the installation tools require a relatively flat seabed surface in order to work properly. Additionally,

cables must be buried to a depth where they may be expected to stay buried for the duration of the Proposed Offshore Development lifetime. Sandwaves are generally mobile in nature, therefore the cable must be buried beneath the level where natural sandwave movement would uncover it. Sometimes this can only be done by removing the mobile sediments before installation takes place.

3.6.7 Ecological surveys, archaeological investigation, and marine traffic surveys will also take place where relevant. These works are generally non-intrusive or require only very targeted seabed intrusion.

3.6.8 It is not unknown to encounter UXO during construction. This poses a health and safety risk where it coincides with the planned location of infrastructure and associated vessel activity, and therefore it is necessary to survey for UXO and carefully manage their clearance where they cannot be avoided.

3.6.9 Consent for any required UXO removal will be sought in a future Marine Licence application when geophysical data of a suitable spatial resolution is available to identify and quantify UXO. This UXO removal consent will be sought in advance of the construction phase commencing, but not too far in advance to ensure risks associated with UXO removal are as low as reasonably practicable.

3.7 Construction Phase

3.7.1 During the construction of the Proposed Offshore Development, a variety of vessels and vehicles will be used for installation, support and transport of equipment and infrastructure to the Array Area and the Offshore ECC.

3.7.2 The Proposed Offshore Development will satisfy the safety requirements of the MCA as well as the marking, lighting and fog-horn specifications of the NLB and aviation marking and lighting requirements of the CAA.

3.7.3 For construction, the Proposed Offshore Development may apply for a 500 m safety zone around offshore infrastructure that is under construction. During this period there may be a requirement to wet store cables and anchor components. If construction is temporarily paused, guard vessels and/or safety zones of up to 200 m may be sought for incomplete infrastructure.

Wind Turbine Generator Installation

3.7.4 The WTGs may be installed either directly on site within the Array Area by a heavy-lift vessel or by a quayside crane, or similar, in port prior to the combined foundation and WTG being transported to the Array Area.

3.7.5 WTG components may be pre-installed in port, and transported to site with the floater. Alternatively, components may be transported on the deck of a heavy lift installation vessel (or barge or transport vessels if a heavy lift vessel is unsuitable). The exact methodology for the assembly is dependent on WTG type and installation contractor and will be defined in the pre-construction phase after grant of consent.

3.7.6 The primary method of WTG installation will be in port, with transportation on the floaters. If this is not possible and installation or barge vessels are used, these installation vessels or barges may be assisted by a range of support and transport vessels. These are typically smaller vessels such as tugs, guard vessels, anchor handling vessels, or similar. These vessels will primarily make the same movements to, from and around the Array Area as the installation vessels they are supporting.

Floating Foundation Installation

3.7.7 The foundations may be assembled at a quayside either onshore, in a dry-dock or on a semi-submersible barge or in the water.

3.7.8 In the case of spar/semi-submersible foundation technology the completed floating substructures, either with or without a pre-installed WTG, would then be towed to the Array Area where it is hooked to the pre-installed mooring system. Vessels such as tugboats, anchor handlers or similar, will be used to steer the structure into position while the mooring is connected. If TLP foundation technology is utilised this installation may deviate slightly, whereby mooring lines/tendons are installed (either in part or fully) during the hook-up process. The hook-up of mooring lined will be performed by either anchor handlers or offshore construction vessels with the support of station keeping tugs/anchor handling tugs, with supper vessels available to provide access means or line handling support.

3.7.9 Depending on the location of the assembly site, the substructures may be towed by sea to a different site for integration of the WTG and/or additional structural work.

3.7.10 Additionally, there may be a need for wet storage of the substructures during their assembly and/or prior to their installation within the Array Area, either at the initial assembly site, the WTG integration site, or a separate dedicated storage location.

3.7.11 Once the detailed requirements for wet storage are known, a consenting route will be determined in line with any guidance and this may be a separate Marine Licence/planning permission application if outside of the Offshore Project Boundary.

Moorings and Anchoring Installation (Floating)

3.7.12 Installation of the mooring and anchoring system begins with anchor installation, the methodology of which will heavily depend on the specific type selected, and can include traditional anchor handling vessels, construction vessels, work-class ROV's and/or piling spreads.

3.7.13 Mooring lines may be installed with anchors or subsequently hooked to pre-installed anchors. To ensure efficient installation the mooring system is usually installed and wet-stored in their permanent position in the Array Area prior to the arrival of the WTG and floating foundation substructure.

3.7.14 Wet storage of mooring systems involves the mooring lines being laid on the seabed ahead of being connected to the floating substructure. Alternatively, the ends of the mooring lines can be attached to buoys which maintain the ends of the mooring lines at the sub-surface/surface and act as installation aids for floating assembly hook-up.

3.7.15 Depending on the anchor solution selected there may also be a requirement to install scour protection prior to and/or following anchor installation, to prevent the structure being undermined by sediment processes and seabed erosion.

Fixed Bottom Foundation Installation

3.7.16 If fixed bottom foundation substructures are selected, the lattice towers would be built onshore, moved nearby the quayside and then loaded-out on a barge or semi-submergible barge. The structures would then be towed to the offshore site.

Offshore Cable Installation

3.7.17 Pre-lay surveys of proposed cable corridors will be undertaken to identify any requirement for obstacle removal along the cable route. If required, identified obstacles such as boulders, UXO and discarded fishing gear will be removed pre-construction and during construction along the proposed cable route. Pre-installation surveys will also be conducted prior to anchor and mooring line installation.

3.7.18 The Proposed Offshore Development may also need to dredge the Offshore ECC prior to installation to level any seabed features that may hinder effective cable installation.

3.7.19 The cable will be loaded onto the installation vessel and move to the site of the pre-installed floating structure where the cable is pulled into the floating structure and secured. The cable with buoyancy modules, support structures, or tether anchors is then deployed into the water column. The second end of the cable is then deployed, pulled and secured into another floating structure. Alternatively, the cable may be pre-installed and wet-stored until the floating structure is on site and then hooked-up to the floating structure once it has been connected to its moorings.

3.7.20 Cable burial will either be carried out by the cable installation vessel, or by a separate cable burial vessel in a second step. Possible direct installation methods include jetting, vertical injection, cutting, CFE and ploughing, whereby the seabed is opened and the cable laid within the trench simultaneously using a tool towed behind the installation vessel.

3.7.21 Alternatively, a number of operations such as jetting, cutting or controlled flow excavation can occur post cable lay to bury the cable in a second step. It may also be necessary to install the cable by pre-trenching or rock cutting whereby a trench is opened in one operation and then the cable laid subsequently from another vessel.

3.7.22 Burial depths are typically 1 – 2 m, with a maximum of up to approximately 4 m locally; this will vary across the Array Area and ECC based on the post-consent CBRA (or similar).

3.7.23 Cable installation and route preparation will be undertaken by specialist vessels. A small jack-up vessel or a flat top barge may also be required for export cable installation in shallow water near to landfall.

3.7.24 The parameters of the cable installation envelope are presented in **Table 3.6**.

Table 3.6: Maximum Design Scenario for Offshore Cable Installation.

Design parameter	Design envelope
Cable Installation Corridor (m)	40
Installation Methods	• Ploughing • Trenching • Jetting • Rock-Cutting • CFE
Burial depth (m)	4

Landfall Cable Installation

3.7.25 The landfall is the interface between the onshore and offshore aspects of the Proposed Offshore Development, and construction will thus typically involve both onshore and offshore plant and installation methods. The Offshore Export Cables will reach the landfall along the north Aberdeenshire coast.

3.7.26 The Landfall Development Zone is the area within which all permanent and temporary works required to bring the Offshore Export Cables onshore at landfall and connect to the Onshore Export Cables will take place. These works may include construction of a landfall compound including welfare and temporary office facilities, construction of TJBs either landward of MHWS or between MLWS and MHWS for installation and jointing of offshore and onshore high-voltage cables, backfilling of TJBs and reinstatement works.

3.7.27 The Proposed Offshore Development may use either a direct burial or trench-less landfall cable installation technique, such as Horizontal Directional Drilling (HDD) or similar or a combination of both.

3.7.28 Direct burial installation can be carried out using one of a number of methods such as ploughs, rock cutters or jetting tools, similar to those used offshore, which can be pulled from the offshore installation vessel, or from winches within the landfall compound. Installation tools may be pulled along the beach on skids or be tracked. Prior to the vessel arrival, piled rollers may be placed on the beach, which are removed once the cables have been installed.

3.7.29 Trenchless installation for example via HDD or similar, may exit either in the intertidal or subtidal zone. If in the intertidal zone, it may be necessary to consider dewatering (pumping dry) and water exclusion (e.g., cofferdams). Works in the intertidal may require use of pontoons, barges or jack-up vessels, which would be maintained in place by a minimum of a 4-point mooring system, which will be set-up with the support of tugboats and anchor handling vessels, and removed once installation is complete.

3.7.30 A temporary access track may be required for beach access during construction for personnel and construction related vehicles and plant. This may require upgrading existing access or creating a new access, potentially either a stone aggregate track or trackway approximately 10 m wide to allow for around a 6 m running track.

3.7.31 In addition, equipment may also need to be brought to landfall by sea by utilising and beaching a barge, or similar vessel, throughout the construction period. Whilst installation is ongoing, access to working areas on the beach will need to be managed for operational, and health and safety reasons.

3.7.32 Further details will be provided in future iterations of the proposed offshore development description within the EIAR. The current maximum parameters of the landfall envelope are presented in **Table 3.4** and **Table 3.7**.

Table 3.7: Maximum Design Scenario for Landfall Cable Installation.

Design parameter	Design envelope
Method	• Direct burial • Trenchless
Trenchless Duct Diameter (m)	1.2
Number of Transition Joint Bays	3
Transition Joint Bay Footprint (m)	10 x 25 (each TJB)
Transition Joint Bay Depth (m)	6

3.8 Operations, Maintenance and Decommissioning Phases

3.8.1 The overall O&M strategy for the Proposed Offshore Development will be finalised once the O&M base location and technical specification are known, including WTG type, floating foundation concept, electrical transmission design and final project layout.

3.8.2 The O&M strategy could include either an onshore O&M base (which would be an existing facility or consented separately under local planning regulations), an offshore O&M base (accommodation platform), or both. The general O&M strategy will rely primarily on vessels, offshore accommodation, supply vessels, and helicopters for the O&M services that will be performed at the wind farm.

3.8.3 Maintenance activities will be categorised into two levels: preventive and corrective maintenance. Preventive maintenance will be undertaken according to scheduled services whereas corrective maintenance would be needed to cover unexpected repairs, component replacements, retrofit campaigns and breakdowns.

3.8.4 The replacement of major WTG components, for example blades, blade bearings, hub generators, yaw rings or nacelles (like-for-like or as within the Project Envelope) is expected to be performed by towing the assembly to port. The floating substructure, mooring and inter-array/export cable arrangements will be designed to enable the safe and efficient disconnection of the structure from its moored position. The structure will also be designed to allow for towing with conventional tugs between the array area and a suitable port. Anchor-handling vessels may be required for disconnection of the mooring system along with support vessels with work-class ROV for disconnection of the cables. Multiple tugs and an offshore construction vessel may be required during the towing operation. While the floating assembly is offsite, the mooring system will remain in situ and the connection to the substructure will be wet-stored on the seabed or connected to a temporary buoy to maintain the connections at the surface for easier reconnection. The location of a stored mooring system will be

marked by a navigation buoy. Re-connection of the floating assembly after repairs are complete will follow the same process as used during construction. Should towing to port not be feasible, major component exchange may instead be performed directly on site using a heavy-lift vessel or by using modular/self-installing systems, supported by at least one CTV. Smaller maintenance tasks will also be performed on site with access to the floating assembly via CTV or a walk-to-work vessel. The floating assembly may require touch up painting during construction and commissioning and during the Project's operation in order remain in compliance with marking regulations and maintain the integrity of the asset. Technicians and equipment, largely hand tools, will be deployed from a CTV or similar vessel. Abrasive surface preparation is required to break down existing surface coatings and any associated corrosion.

3.8.5 In line with the Scottish Government's position on the decommissioning of Offshore Renewable Energy Installations (OREI), at the end of the operational lifetime of the wind farm it is anticipated that the site will be restored and all structures above the seabed or ground level will be completely removed.

3.8.6 The decommissioning sequence will generally be the reverse of the construction sequence, involving similar types and numbers of vessels and equipment.

3.8.7 The Energy Act 2004 and the Scotland Act 2016 require that a Decommissioning Programme (DP) must be submitted to MD-LOT following consultation, for approval by the Scottish Ministers. A draft of which would be submitted alongside the EIAR prior to the construction of the Proposed Offshore Development, supported by appropriate financial security.

3.8.8 The DP will be updated throughout the Proposed Offshore Development's operation in order to take account of changing best practice and new technologies. The approach employed at decommissioning will be compliant with the legislation and policy requirements at the time of decommissioning.

3.8.9 The overarching principles that will be followed when developing an appropriate DP are derived from Marine Scotland's Guidance Note (2022) (Scottish Government, 2022d).

3.9 Scoping Questions

3.9.1 The following questions refer to the proposed offshore development description chapter and are designed to inform the Scoping Opinion and focus the Scoping exercise:

1. Is the definition of the Proposed Offshore Development clear?

4 Consultation

4.1 Introduction

4.1.1 The Developer is mindful of the considerable benefits that focussed and discursive engagement with statutory and non-statutory consultees, in addition to the public, can provide to the Project. Since award of the OLA, the Developer had proactively engaged with a number of consultees to understand relevant matters/issues/concerns. This chapter of the Offshore Scoping Report presents both the completed and planned consultation relevant to the Proposed Offshore Development.

4.2 Requirement for Statutory Consultation

4.2.1 Consultation will be undertaken in accordance with legislative requirements specified in the EIA Regulations, the Marine (Scotland) Act 2010 and the PAC Regulations. Further detail is provided in **Chapter 2: Legislation and Policy Context**.

4.2.2 Onshore consultation and public engagement associated with onshore consent requirements will be undertaken in accordance with Town and Country Planning (Development Management Procedure) (Scotland) Regulations 2013. In order to reduce the likelihood for consultation fatigue, the Developer intends to align onshore and offshore consultation activities, where appropriate and meaningful. In the instance that consultation is solely undertaken for the Proposed Offshore Development, reference and information links will be made to the Proposed Onshore Development and associated consultation activities (and vice versa). There will be overlap between the Proposed Onshore Development and Proposed Offshore Development in the landfall area, with the relevant elements covered in each Scoping Report separately. The offshore and onshore discussions points around landfall will be covered by the respective consultation activities.

4.3 Pre-Application Consultation

Consultation to Date

4.3.1 The SMP-OWE (Scottish Government, 2020a) presented a suite of key concerns/issues relevant to the Proposed Offshore Development (**Chapter 1: Introduction**). In summary, these include the following topics/groups:

- Commercial fishing;
- Commercial shipping;
- Ministry of Defence (MOD); and
- Ornithology.

4.3.2 Active engagement on these topics has been ongoing during the consenting process to date, providing a means to not only further understanding of the baseline conditions within the Proposed Offshore Development, but also inform decision making during route planning and site selection (RPSS), design envelope refinement and survey design (**Table 4.1**).

Table 4.1: Pre-Scoping Consultation.

Topic	Stakeholder Group(s)	Outcome(s) from Consultation	Consultation Dates
Commercial fishing	Scottish Fishermen's Federation (SFF). Scottish Whitefish Producers Association (SWFPA) North East Regional Inshore Fisheries Group (NERIFG) Local commercial fishing interests.	Constraint information (location of fishing activity, activity levels, quotas, catch, market information, seabed substrate) communicated via stakeholder groups. Information used to inform RPSS for offshore ECCs and landfall locations. Introduction of Fishing Industry Representative and Fisheries Liaison Officer (FLO) to stakeholder groups.	September 2022 - ongoing
Commercial shipping	MCA NLB	Understanding of navigation risk relevant to site-specific metocean and geophysical surveys discussed and developed. Information used to inform survey planning. Consultation and agreement on shipping and navigation survey strategy	March 2023 - ongoing
Military and Defence	MOD.	Offshore practice and exercises areas and potential Highly Surveyed Routes identified and discussed. Information used to inform Array Area planning.	February 2023 - ongoing
Ornithology	Royal Society for the Protection of Birds British Trust for Ornithology. NatureScot. North East and East ScotWind developers.	Collaboration via the North East Ornithology Group developing targeted surveys and desk-based research to address the evidence gaps in the Ornithology Roadmap. Active collaboration between North East Ornithology Group and the East Ornithology Group to financially contribute to, and support scope of works for regional SPA colony counts being undertaken by Royal Society for the Protection of Birds in 2023 and 2024.	March 2022 - ongoing

4.3.3 In addition to the topic focussed consultation discussions listed in **Table 4.1**, and since March 2022, the Developer has attended regular quarterly Project meetings with the MD-LOT (previously Marine Scotland-Licensing Operations Team) and NatureScot. These meetings provide the opportunity for the Developer to provide Project updates on progress to MD-LOT/NatureScot, and for MD-LOT/NatureScot to provide any industry updates on new guidance/research projects or upcoming developments or changes to the consenting process. There is also the opportunity for clarification on any specific Project related issues or risks.

4.3.4 Consultation has also taken place with MD-LOT, NatureScot and CES regarding Marine Licensing and EPS licence requirements for site-specific geophysical, metocean and benthic ecology survey campaigns (**Table 4.2**).

Table 4.2: Project Specific Survey Consultation.

Topic Consulted Upon	Stakeholder Group(s)	Outcome(s) from Consultation	Consultation Dates
Confirmation of the process for obtaining Marine Scotland licenses/exemption.	MD-LOT	Signposting to licence application forms and timescales for Marine Scotland-Licensing Operations Team consideration.	January 2023
Navigational risk.	MCA NLB	Discussions held to introduce the Project, the metocean and geophysical surveys. Minutes circulated. Maritime and Coastguard Agency and Northern Lighthouse Board provided written confirmation of their approval.	February 2023
Confirmation of the process for obtaining CES licenses.	CES	Works within the array site require CES written consent, which is granted after all licences and/or Marine Licence exemptions are granted and consultations with Maritime and Coastguard Agency and Northern Lighthouse Board are complete and evidenced. Works outwith the array site require a completed Marine Works application form, in addition to all licences and/or Marine Licence exemptions granted and consultations with the Maritime and Coastguard Agency and Northern Lighthouse Board complete.	April 2023
Advice on EPS/disturbance licences required.	MD-LOT NatureScot	EPS licence for nearshore disturbance is required. A EPS licence for offshore is not required. A Basking Shark licence is not required. An AA is required for Moray Firth SAC bottlenose dolphin.	June 2023
Suitability of Benthic In Principle Project Execution Plan	NatureScot	Discussions held regarding the proposed survey methodology for the benthic survey campaign planned to commence in 2024. NatureScot confirmed the suitability of the proposed survey methodology.	August 2023
Advice on landfall walkover and drone surveys	NatureScot CES	Discussions held regarding the licensing requirements and proposed methodology for the planned intertidal survey campaign 9possibly involving a walkover and remote-operated drone).	September 2023

4.3.5 A pre-Scoping consultation workshop was held with MD-LOT and NatureScot in November 2023. This workshop included attendees from MD-LOT, NatureScot, SFF, SWFPA, HES and technical topic experts. This workshop provided an opportunity to gain feedback on the proposed assessment methodologies at Scoping and get an early indication on the Proportionate EIA methodology. NatureScot confirmed they were broadly supportive of this approach but will provide a written response prior to Christmas.

Planned Consultation

4.3.6 Throughout all the stages of the Proposed Offshore Development (pre-application, application submission and review, pre-construction, construction, commissioning, O&M and decommissioning), the Project will continue to engage with relevant stakeholders. The Developer will develop a Stakeholder Management Plan, which will detail the stakeholders and consultation programme.

4.3.7 Following receipt of the Scoping Opinion, stakeholder engagement and consultation is anticipated as per **Table 4.3**. The Developer notes that this list is not exhaustive and will develop throughout the EIA process, as to be documented in the Stakeholder Management Plan (to be submitted alongside the EIAR).

Table 4.3: Post-Scoping Consultation.

Topic	Stakeholder Group(s)	Objective (s)
General EIA	MD-LOT NatureScot	Continued quarterly meetings to discuss project and licensing updates.
Scoping Opinion	Individual stakeholders and consultees dependent upon specific environmental topic raised in Scoping Opinion	Discussion of feedback and solutions, as appropriate, to potential issues or concerns. To be continued throughout the EIA process as necessary.
Project-specific surveys	NatureScot	Continued technical consultation regarding survey methodologies and findings (e.g., Year 1 DAS report, benthic ecology survey data analysis).
Ornithology	NatureScot. Royal Society for the Protection of Birds British Trust for Ornithology. North East and East ScotWind developers.	Continued engagement to discuss strategic/regional impacts and research opportunities. Technical discussions to seek advice regarding CIA, in-combination assessment and potential compensatory measures for HRA purposes.
Commercial fishing/ Commercial shipping/ Military and Defence	SFF SWFPA NERIFG Local commercial fishing interests. MCA NLB MOD	Continued engagement to discuss strategic/regional impacts and possible commitments, where appropriate.
CIA	MD-LOT NatureScot	Continued engagement to discuss approaches for CIA.
Public engagement events	All interested parties	Public engagement events (covering both onshore and offshore topics) are planned to be held ahead of application

Topic	Stakeholder Group(s)	Objective (s)
		This is to seek public input/feedback in advance of the Offshore and Onshore application submissions in 2025.

4.4 Stakeholder Identification

4.4.1 For the purposes of this Offshore Scoping Report, a desk-based review of existing and known marine activities and environmental constraints within the Proposed Offshore Development and the surrounding vicinity was undertaken using relevant spatial and scientific data sources (**Chapter 20: Other Human Activities**). An initial list of key stakeholders and other consultees/interested bodies has been developed based upon the identified key marine activities and environmental constraints within the northeast of Scotland. These will be further developed throughout the EIA process, aligned within those consultation, public and non-statutory bodies approached by MD-LOT for a Scoping Opinion and will be documented within the Stakeholder Management Plan (to be submitted alongside the EIAR). An indicative list of the stakeholder categories per topic, to be consulted by the Project, is provided below:

- Government;
- Local Authorities and Organisations;
- Grid Operators;
- Environmental Organisations;
- Aviation;
- Tourists and Recreation;
- Fisheries;
- Navigation; and
- Wind Energy Interest.

4.5 Scoping Questions

4.5.1 The following questions refer to the consultation chapter and are designed to inform the Scoping Opinion and focus the Scoping exercise:

1. Do you agree with the Developers approach to consultation?
2. Are there any other stakeholder groups you wish the Developer to engage with beyond those set out in this chapter?

5 Site Selection and Consideration of Options

5.1 Introduction

5.1.1 This chapter presents a summary of the process followed for RPSS that is being followed by the Developer. A comprehensive RPSS process commenced in 2022, following an iterative approach to ensure the most appropriate solution was identified efficiently, with due consideration of environmental, technical and socio-economic matters. The five key stages are as follows:

- Stage 1: Identification of the Option to Lease Agreement (OLA) and Grid Connection;
- Stage 2: Identification of an Electrical Infrastructure Study area;
- Stage 3: Identification of the landfall;
- Stage 4: Identification of the Onshore Substation (OnSS) site; and
- Stage 5: Identification of the Offshore and Onshore ECC.

5.1.2 This process is ongoing and further refinements will occur once more detailed information, such as offshore surveys and further consultation with stakeholders, is obtained. The EIAR will provide further details on the RPSS work including how the design, routes and locations have evolved over time and any refinements that take place specifically as a result of the EIA process and in response to stakeholder feedback.

5.2 Option to Lease Agreement and Grid Connection

5.2.1 The site selection process for the Proposed Offshore Development was primarily driven by the ScotWind leasing process, which awarded 17 projects OLAs. The Developer saw potential in the NE3 PO and proceeded to bid for the site. Factors influencing site selection for electricity transmission networks are summarised in Section 2.2 of National Planning Statement (NPS) EN-5. In particular "*the general location of an electricity network project is determined by the location of a particular generating station and the existing network infrastructure available to take electricity to centres of energy use*" (NPS EN-5, paragraph 2.2.2). In the context of the Proposed Offshore Development, the two end points are defined as the OLA area and the SSEN grid connection point.

5.3 Electrical Infrastructure Study Area

5.3.1 An Electrical Infrastructure Study Area (EISA) was defined and used as an initial search area for the RPSS work. The EISA is largely defined by the OLA area (location of the Array Area) and the grid connection point at New Deer 2 (location of the OnSS). These two locations formed the northern and southern extent of the EISA, shown in **Figure 5.1**.

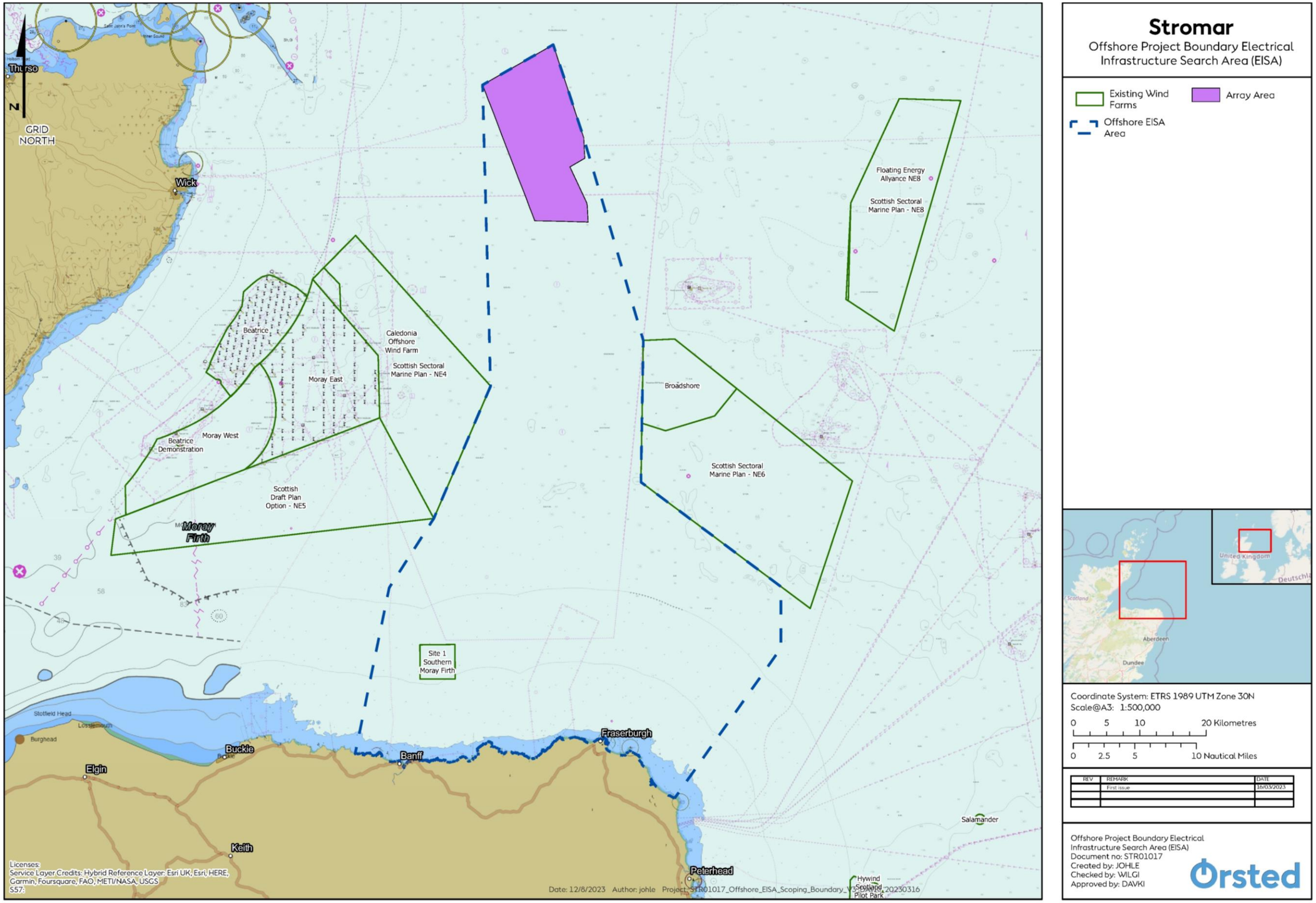


Figure 5.1: Stromar Offshore Wind Farm Offshore EISA.

5.4 Landfall Location

5.4.1 The landfall search area included the coastal stretch within the EISA. This was sub-divided into a series of zones. Zones that backed on to residential or recreational areas were removed from consideration at an early stage. The remaining zones were visited and rated against Black, Red, Amber and Green (BRAG) criteria.

5.4.2 Identification of suitable options for the landfall, Onshore Substation, and Onshore and Offshore ECCs each followed a similar iterative process:

- A search area was defined for which constraints data were collected.
- A number of options that avoided key constraints were identified within the search area based on project requirements (e.g., land requirement, corridor width). Site visits were undertaken for the onshore components to provide additional data.
- The Developer created selection criteria for a BRAG appraisal to be undertaken in order to rank the options from most to least preferred.

5.4.3 The BRAG ratings were defined as follows:

- Black: Unacceptable level of constraint;
- Red: High potential for the Proposed Offshore Development to be constrained;
- Amber: Intermediate potential for the Proposed Offshore Development to be constrained; and
- Green: Low potential for the Proposed Offshore Development to be constrained.

5.4.4 Black and red constraints are critical in determining features that should be avoided wherever possible to avoid consenting risk, reduce EIA complexity and reduce the cost of mitigation. Constraints were mapped in the Project Geographical Information System (GIS).

5.4.5 The Developer subsequently made commitments based on the avoidance of features that were rated as black and red constraints (e.g., national and international environmental designations). These commitments are set out in the **Appendix A: Offshore Commitments Register**. The Developer will continue to identify where commitments can be made to avoid constraints through the RPSS process in order to reduce project risk and deliver a Proportionate EIA.

5.4.6 Amber and green constraints are those that may be more readily minimised or managed by employing appropriate commitments. Based on the BRAG appraisal the number of options were reduced. The remaining options will continue to be reduced as preferred options and alternatives are identified and refined for the final application. For additional information on the Proposed Onshore Development RPSS Process refer to the Onshore Scoping Report (Ørsted, 2023a).

5.5 Offshore Export Cable Corridors

5.5.1 The Offshore ECC routing was undertaken based on incrementally decreasing parameters, from an initial 10 km EISA presented in **Figure 5.1** and refined through a BRAG appraisal to the 3 km wide corridors at Scoping.

5.5.2 The Offshore ECC began as straight lines connecting the Array Area to the preferred landfall locations.

5.5.3 Initial Offshore ECC options were routed at a low resolution using publicly available datasets mapped in GIS representing the known constraints at the time. The receptors and approach to constraints are presented in **Table 5.1**.

5.5.4 A centreline was established, by routing around features rated as black and red constraints and a 3 km buffer area was applied to represent the indicative cable installation works area for Scoping EIA purposes.

5.5.5 The Southern Trench NCMPA is a designated site that could not be avoided and therefore careful consideration and consultation was given to this receptor in the RPSS process. In order to give the Developer sufficient design flexibility and facilitate ongoing discussions with consultees, it was deemed most appropriate to present a number of Offshore ECC options through the NCMPA. Each option offers various advantages in terms of avoidance of mapped PMFs and so it is anticipated that by presenting a number of carefully considered options, a thorough review of any additional data and stakeholder feedback can be incorporated into future refinement and selection of the Offshore ECC.

5.5.6 **Figure 5.2** presents the Offshore Scoping boundary and how the Offshore ECC have been routed to avoid black and red constraints and minimise travelling through areas of amber constraints. Avoidance of these constraints became primary commitments of the Proposed Offshore Development as presented in **Appendix A: Offshore Commitments Register**.

Table 5.1: Offshore Export Cable Corridor Constraints Appraisal.

	Appraisal Rating			
Receptor Type	**Black**	**Red**	**Amber**	**Green**
Offshore ECC Total Length	>150 km	100-150 km	75-100 km	<75 km
Seabed Geology	None	Hard strata	Areas of soft Holocene material and/or gravelly material	n/a
Sandwave Height	≥8 m	4-8 m	1-4 m	≤1 m
Bedforms	≥10 km of sandwave fields and/or ≥8 sandwave interactions	Between 5–10 km of sandwave fields and/or ≤8 sandwave interactions.	Up to 5 km of sandwave fields and/or ≤5 sandwave interactions.	Limited distance of sandwave fields and/or
Seabed Obstructions	Significant obstructions preventing installation	Obstructions hampering installation	Minor obstructions hampering installation	≤3 sandwave interactions.
Seabed Slope	None	≥15°	8 - 14.9°	No obstruction
Bathymetry Depth (shallow)	N/A	<3m	3m-15m	0-7.9°
Marine Protected Areas (MPAs)	Direct overlap and mitigation cannot be applied	≤1000 m	≤2000 m	≥2000 m
SPAs	Direct overlap	≤1000 m of high intensity bird breeding colony	≤1000 m of low intensity bird breeding colony	≥1000 m from bird colony
PMFs	None	Direct overlap	≤1000 m¿//	≥1000 m
Annex I species/habitats	Direct overlap	Direct overlap	≤1000 m	≥1000 m
Seal Haul-Out Sites	≤20 km	20-50 km	None	≥50 km
Wrecks & Seabed Archaeology	n/a	≤100 m	≤500 m	≥500 m
TSS, International Maritime Organisation (IMO) Route or High-Density Shipping	Direct overlap	On boundary	≤1000 m	≥1000 m
Military Practice and Exercise Areas	Direct overlap	≤10000 m danger area	≤10000 m exercise area	No overlap
High Density Commercial Fishing Areas	Consultation with fishing industry representatives supported route appraisal.			
OWF Array Areas	n/a	n/a	No overlap	No overlap
Subsea Cable Corridors	Direct overlap	≤100 m	100-500 m	≥500 m
Oil & Gas Infrastructure	Direct overlap	≤100 m	100-500 m	≥500 m
Carbon Capture & Storage	Direct overlap	≤5000 m	≤7500 m	≥7500 m
Seabed Disposal Sites	Direct overlap	≤500 m	n/a	≥1000 m
Dredging Sites	Direct overlap	≤500 m	n/a	≥1000 m
Designated Anchorages	Direct overlap	≤500 m	≤1000 m	≥1000 m
Navigational Aids	Direct overlap	0m-100mm	100m-500m	>500m

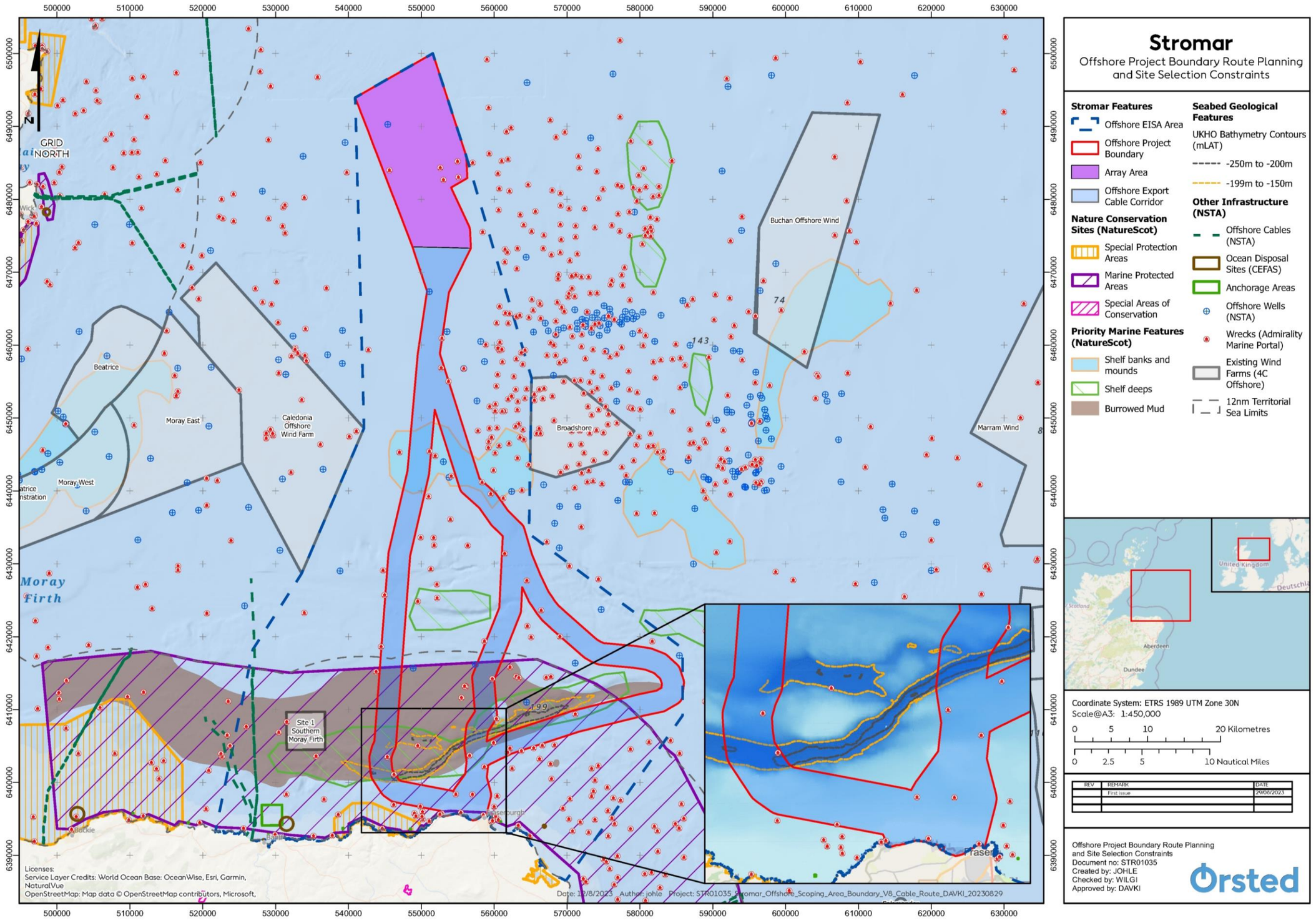


Figure 5.2: Stromar Offshore Wind Farm Offshore Export Cable Corridor Route Planning and Site Selection Constraints.

5.6 Refinement and Next Steps

5.6.1 The Offshore Project Boundary presented in this chapter is a composite of the search areas adopted at this stage in design and RPSS development to identify the location of a landfall, Onshore Substation, Offshore and Onshore ECCs.

5.6.2 As design and RPSS development continues, the number of Offshore ECCs, the corridor width and the HVAC search area will all reduce ahead of EIAR. This incremental process is set out in **Table 5.2**.

Table 5.2: Stages of Route Planning and Site Selection.

Stage	Description
EIA Scoping	Three 3 km wide Offshore ECCs Three HVAC search areas Various landfall options within a 4 km length of coastline
EIA Report	One 1 km wide Offshore ECC One HVAC search area Landfall options within a specified length of coastline

5.7 Scoping Questions

5.7.1 The following questions refer to the site selection and consideration of options chapter and are designed to inform the Scoping Opinion and focus the Scoping exercise:

1. Do you agree with the process outlined in this chapter regarding RPSS?

6 EIA Approach and Methodology

6.1 Introduction

6.1.1 The purpose of this chapter is to describe the principles of an EIA and explain the approach being taken to identify and assess any LSE on the environment from the Project. Further information on proposed stakeholder engagement is presented in **Chapter 4: Consultation**.

6.1.2 The EIA process will culminate in the production of an EIAR, which will be written in accordance with the legislation presented in **Chapter 2: Legislation and Policy Context**.

6.1.3 Schedule 4 of the Electricity Works Regulations 2017 and Schedule 4 of the Marine Works EIA Regulations 2017 set out a list of requirements for inclusion in an EIAR. These information requirements are summarised below in **Table 6.1**.

Table 6.1: EIAR Information Requirements as set out in the EIA Regulations.

Information for Inclusion in Environmental Impact Assessment Reports	
A description of the development	• A description of the location of the development; • A description of the physical characteristics of the development, including relevant demolition works and land-use requirements during construction and operational phases; • A description of the main characteristics of operational phase of the development (e.g., energy demand and energy used, nature and quantity of materials and natural resources); and • An estimate (by type and quantity) of expected residues and emissions (e.g., water, air, soil, noise, vibration, etc.) and quantities and types of waste produced during the construction and operation phases.
A description of the reasonable alternatives	• These must be relevant to the proposed project and its specific characteristics, with an indication of the main reasons for proceeding with the chosen option (including a comparison of environmental effects).
A description of the current environmental state	• A description of the 'baseline scenario' and an outline of the likely evolution without implementation of the proposed project (as far as natural changes can be assessed with reasonable effort).
A description of the factors specified in regulation 4(3)/5(3) likely to be significantly affected by the development	• Population; • Human health; • Biodiversity (e.g., flora and fauna); • Land (e.g., land take); • Soil (e.g., erosion, compaction, etc.); • Water (e.g., hydromorphological changes, quantity, quality); • Air; • Climate (e.g., GHG emissions, etc.); • Material assets; and • Cultural heritage (e.g., architectural and archaeological aspects

Information for Inclusion in Environmental Impact Assessment Reports	
	• landscape.
A description of the LSE of the development resulting from the factors opposite	• The construction and existence of the proposed project (including any demolition works); • The use of natural resources (e.g., land, soil, water, biodiversity) considering the sustainable availability of resources; • The emissions of pollutants (e.g., noise, vibration, light, heat, radiation, nuisances, disposal and recovery of waste); • The risks to human health, cultural heritage or the environment; • The cumulation of effects with other planned/built developments, considering existing environmental problems relating to areas of particular environmental importance; • The impact of the development on climate and vulnerability of the proposed project to climate change; and • The technologies and substances used. This should cover direct, indirect, secondary, cumulative, transboundary, short-term, medium-term, long-term, temporary, permanent, beneficial and adverse effects from the proposed project.
A description of the forecasting methods or evidence used to identify significant effects	• This should include details of difficulties encountered (e.g., technical deficiencies or lack of knowledge) when compiling the required information and the main uncertainties involved.
A description of methods proposed to avoid, prevent, reduce, or offset any identified significant adverse effects	• This description should explain the extent to which the significant adverse effects are avoided/prevented/reduced/offset, covering the construction and operational phases. • This should also include relevant proposed monitoring strategies.
A description of the expected significant adverse effects on the environment deriving from the vulnerability of the proposed project to risks of major accidents/disasters	• Relevant information available and obtained through relevant or risk assessments may be used for this purpose; • Where appropriate this description should include measures proposed to mitigate or prevent the significant adverse effects on the environment and details for the preparedness for and proposed response to such emergencies.
A non-technical summary	• Should summarise all the information presented within this table.
A reference list	• This should include all sources used for the descriptions and assessments within the EIAR.

6.2 Approach to the EIA

6.2.1 The Offshore EIA for the Proposed Offshore Development will be undertaken in accordance with the regulatory requirements, including the production of an effective, proportionate and robust EIAR.

6.2.2 Scoping is intended to inform this proportional and robust approach to further assessment through the initial identification and evaluation of environmental impacts. Regulation 5 (3) of the Electricity Works Regulations 2017 and Regulation 6 (3) of the Marine Works EIA Regulations 2017 state that where a Scoping Opinion is provided, the subsequent EIAR must be based upon this Scoping Opinion. Regulation 13 (3) of the Marine Works EIA Regulations 2007 provides that where a Scoping Opinion is given, the Environmental Statement (ES) should contain all of the information specified in the

Scoping Opinion (noting that this is in the context of an ES rather than EIAR). Relevant information (e.g., current knowledge and methods of assessment) must be provided so regulators can reasonably reach a conclusion on the significance of effects of the Proposed Offshore Development on the environment. Project-specific surveys and thorough desk-based reviews will be undertaken and presented in the EIAR to characterise the environmental baseline and LSE.

6.2.3 The EIA undertaken for the Proposed Offshore Development will be proportional, in alignment with the most recent guidance 'Delivering Proportionate EIA: A Collaborative Strategy for Enhancing UK Environmental Impact Assessment Practice' (Institute of Environmental Management and Assessment (IEMA), 2017). The EIAR will focus only on potential significant effects rather than listing all potential effects (such as those recognised or deemed insignificant). This will be accomplished by this Offshore Scoping Report seeking to scope out environmental impacts which are unlikely to produce significant adverse effects.

6.2.4 The Developer acknowledges the guidance stipulating a preference for shorter, more concise reports focused on project-specific issues, rather than including extensive background and generic information. This Offshore Scoping Report will also endeavour to identify potential significant effects currently proposed to be 'Scoped In' but, as a result of emerging evidence, removal of uncertainty/data gaps and refinements to the Project post-Scoping, it may be determined that there are no potential significant effects and the topic does not require a detailed assessment in the EIAR. Instead, a justification (within the Impact Register) or simple assessment within the EIAR will be used to document this assessment, alongside setting out of the mechanisms applied to reach this decision.

Proportionate EIA approach

6.2.5 Since the advent of the EIA regime, it is widely acknowledged that EIA practice has become increasingly complex and the scope of assessment and page count of EIAs has increased. As noted by IEMA in its 2017 report (IEMA, 2017), the need for delivering proportionate EIA is a key issue. The IEMA notes *"the drive for improved quality in EIA, combined with the UK's evidence-based and precautionary approach, has led to substantial changes for the future of the practice. The increased complexity of multi-faceted decisions and wider range of stakeholders who seek transparency and clear audit trails, has further compounded the problems. The combined impact of the above good intentions has often led to individual EIAs being too broadly scoped and their related Environmental Statements to be overly long and cumbersome."*

6.2.6 This Offshore Scoping Report is intended to inform a proportional and robust approach to assessment through initial evaluation and reporting of identified LSE associated with the Proposed Offshore Development. Where appropriate, this Offshore Scoping Report seeks to scope out the technical subject areas that are unlikely to be subject to significant environmental effects with suitable justification and evidence provided. The aim of this process is to focus the subsequent EIA on the development's LSE only (rather than any potential impacts) and not be any longer than necessary to properly assess those effects.

6.2.7 Developing a more Proportionate EIA is described in **Appendix C: Proportionate EIA Position Paper** and summarised below. This position paper details the tools and steps that will be utilised throughout the consenting process to deliver Proportionate EIA:

- An Impacts Register: which lists all potential impacts identified as part of the Proposed Offshore Development's development, construction, operation and decommissioning; and

- A Commitments Register: throughout development the Proposed Offshore Development will make commitments to mitigate, where possible, against the impacts identified in the Impacts Register.

6.2.8 A key aspect of the Proportionate EIA approach to Scoping is the initial identification of LSE of the Proposed Offshore Development.

Scoping Strategy and Identification of LSE

6.2.9 This Offshore Scoping Report adopts a comprehensive and proportionate approach to EIA. It will set out the LSE anticipated to arise from all phases of the construction, operation and decommissioning of the Proposed Offshore Development.

6.2.10 This Offshore Scoping Report provides an initial assessment of the potential for LSE. The initial assessment of all Proposed Offshore Development impacts is presented in **Appendix B: Offshore Impacts Register**. In this Offshore Scoping Report, impacts are broadly categorised into one of three categories: 'LSE', 'Possible LSE', and 'No LSE' as follows:

- LSE without secondary commitment measures – the impact will be Scoped In to the EIAR and include an appropriate level of assessment;
- Possible LSE without secondary commitment measures, whereby it may become clear post-Scoping stage that the impact does not require a detailed assessment in the EIAR – the impact will be Scoped In at the Scoping stage, with a clear process proposed within this Scoping Report to determine the treatment of the specific topic within the EIAR ; and
- No LSE identified at Scoping stage – the impact will be Scoped Out.

6.2.11 LSE impacts will be presented in an assessment in the EIAR. No LSE impacts will be presented in the Impacts Register part of the EIAR. For Possible LSE impacts, the Scoping Report proposes mechanisms to refine assessment requirements post issue which, if agreed in time, could then be set out in the Scoping Opinion. Ahead of the EIAR being submitted, more evidence may become available in relation to the Proposed Offshore Development, its likely impacts and parameters. Impacts that fall into the 'Possible LSE' category are Scoped In at the Scoping stage and may then follow one of two routes:

- Scoped In with an appropriate level of assessment in the EIAR; and/or
- Scoped In with the justification for no LSE to be narrated in the Impacts Register.

6.2.12 Leading up to the submission of the EIAR, the Developer will provide the relevant stakeholders with the additional evidence (position papers and/or technical notes) to support the conclusions in relation to the 'Possible LSE' category that are set out in the Impacts Register. The Project will continue to engage with the Scottish Ministers and consultees as relevant in order to confirm areas where all are confident that no LSE can be concluded, and those areas narrated in the Impacts Register. In the case of the Section 36 consent application for the offshore infrastructure, this may include pre-EIAR validation workshops with relevant consultees, where outcomes, including areas where detailed assessment in the EIAR is not required, would be minuted.

6.2.13 The EIAR will be based on the best and most recent evidence. The EIAR will be submitted at application stage and its content will reflect the Scoping Opinion and any further agreements/decisions with stakeholders and consultees through post-Scoping consultation and workshops. Irrespective of

the conclusion of LSE or no LSE contained in the EIAR at application, stakeholders will have had the opportunity to review, feedback, and agree to the conclusions and the route/methodology of assessment through this process.

6.2.14 In order to achieve this proportionate approach to EIA, it is proposed that the Scoping Opinion expressly states that it will be possible to undertake refinement of certain areas where there is a likelihood that the conclusion will be no LSE as further evidence becomes available and the Project parameters are finalised through further consultation. The Developer will be responsible for ensuring post Scoping discussions/agreements are secured and for these to be documented formally and presented at the application stage through the Impacts Register submitted as part of the EIAR.

6.2.15 Where the Proposed Offshore Development indicates potential for LSE on the environment at an early stage, embedded commitment measures are identified during the design phase and applied in order to prevent/reduce/mitigate these adverse environmental effects. The current list of proposed embedded commitment measures for the Proposed Offshore Development are presented in **Appendix A: Offshore Commitments Register**. This incorporates standard industry best-practice mitigation measures, as well as project-specific remediation measures. In addition to the embedded commitment measures (which work to reduce/prevent adverse effects from the Proposed Offshore Development) there are several enhancement commitment measures proposed. These project-level commitments seek to provide additional benefit during the development of the Project (e.g., are not in response to specific potential significant effects that have been identified).

6.2.16 Upon receipt of a Scoping Request, MD-LOT is required to consult with stakeholders who provide their individual views on whether specific key receptors and potential effects should be Scoped In to or Scoped Out of the EIAR. MD-LOT considers all representations received and produces a Scoping Opinion concluding which specific key receptors and potential effects should be Scoped In to or Out of the EIAR. Upon receipt of this Scoping Opinion, the Developer will incorporate all comments into further EIA planning, including any comments in relation to consultation and project-specific surveys. If further information is requested for certain technical topics, this will be provided in the subsequent EIAR to allow an informed decision to be made regarding the level of significance of environmental effects resulting from the Proposed Offshore Development.

6.2.17 The EIA will be undertaken in line with the most relevant and up to date 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 provides a general overview of some of the key overarching documents that will help to inform the EIA process (but is not an exhaustive list and specific professional guidance related to specialist topics will be identified within **Chapters 7 to 20**):

- Scottish and UK Guidance:
- Scottish Government webpages on Marine Environment: licensing and consenting requirements;
- Scottish Government (2013), ‘Planning Advice Note 1/2013 Environmental Impact Assessment’;
- Scottish Government (2017), ‘Planning Circular 1/2017: Environmental Impact Assessment’;

- Scottish Government (2022), ‘Guidance for Applicants on Using the Design Envelope for Applications under Section 36 of the Electricity Act 1989’;
- 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)’;
- Scottish Natural Heritage (SNH) (2018), ‘A Handbook on Environmental Impact Assessment’;
- Scottish Natural Heritage (SNH) and Historic Environment Scotland (2018), ‘Environmental Impact Assessment Handbook: Guidance for competent authorities, consultation bodies, and others involved in the Environmental Impact Assessment process in Scotland’;
- RenewableUK (2013), ‘Cumulative Impact Assessment Guidelines: Guiding Principles for Cumulative Impacts Assessment in Offshore Wind Farms’; and
- IEMA (2017), ‘Delivering Proportionate EIA: A Collaborative Strategy for Enhancing UK EIA Practice’.
- European Commission Guidance:
  - European Commission (2001), ‘Assessment of plans and projects significantly affecting Natura 2000 sites’;
  - European Commission (2006), ‘Nature and Biodiversity Cases Rulings of the European Court of Justice’;
  - European Commission (1999), ‘Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions’;
  - European Commission (2017), ‘Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report’; and
  - OSPAR Commission (2009), ‘Assessment of the environmental impacts of cables'.

6.3 Assessment Methodology

Baseline Characteristics

6.3.1 The baseline characterisation of the existing environment will initially be established in order to identify and confirm the current conditions that occur within the Array Area, Offshore ECC Study Area, landfall study area and the specific study area identified for each environmental technical topic. This will be completed for all key receptors where potential significant effects have been identified. This characterisation will involve:

- The definition of the study area for each technical topic/receptor, based on the characteristics of the receptor/s concerned (e.g., mobility, range);
- A review of all publicly available data/information;
- A review of available data for other OWF projects in the vicinity of the Proposed Offshore Development;
- A review of the potential impacts which may be expected to arise as a result of the Proposed Offshore Development, based on a realistic MDS;

- Determination of whether there is sufficient data available to draw the EIA conclusions with appropriate confidence;
- If there is insufficient data and further data is required, ensuring that data gathered is targeted at answering key questions and filling data/knowledge gaps; and
- A thorough review of the information gathered to ensure the environmental baseline conditions can be appropriately characterised.

Assessment of Potential Impacts

6.3.2 This Offshore Scoping Report details the potential environmental impacts associated with the Proposed Offshore Development and identifies the impacts proposed to be Scoped In, or Out, of the EIA process. The Scoping assessment conducted as part of the EIA process also considers embedded commitments implemented through either project-specific design or standard industry best practice (presented in **Appendix A: Offshore Commitments Register**).

6.3.3 The potential impacts that are Scoped In to the subsequent EIA will be described within the EIAR, either as a simple or detailed assessment (dependent on levels of additional information/data sources becoming available posing-Scoping). Potential impacts may be subsequently Scoped In to the EIAR and will simply be presented in **Appendix B: Offshore Impacts Register** rather than as a simple or detailed assessment in the main body of the EIAR. The significance of the effect anticipated will be determined using well established EIA methodology. This assessment process will consider the potential magnitude of change from the environmental baseline conditions as a result of the Proposed Offshore Development, the sensitivities of receptors concerned, and relevant embedded commitments.

6.3.4 The Project has the potential to result in beneficial and adverse environment effects and so the impact identification process will assess whether potential impacts are considered beneficial or adverse.

Magnitude

6.3.5 The categorisation of magnitude of impacts will vary for particular pathways, receptors, and technical assessments. This characterisation will generally follow:

- High: a total change or major alteration to the key elements/features of the environmental baseline conditions;
- Medium: a partial change or alteration to one (or more) key elements/features of the environmental baseline conditions;
- Low: a minor change to the environmental baseline conditions; and
- Negligible: a very slight change from the environmental baseline conditions.

6.3.6 For topics where there is the potential for both beneficial and adverse impacts, magnitude definitions will be included for both.

Sensitivity

6.3.7 The sensitivity scale for a receptor is dependent on the EIA topic concerned, but will generally be defined in terms of quality, value, rarity, or importance. The ability of a receptor to adapt to/tolerate/recover from a change is key in assessing its sensitivity to the respective impact. The sensitivity scale will be broken down into negligible, low, medium, or high.

6.3.8 A more specific scale for determining sensitivity will be defined in relevant topic specific assessments. Guidance on the scale of sensitivity will also be taken from the value assigned to elements through designation/protection under law. An element of professional judgement is essential when determining the sensitivity of receptors in the EIA process and this will also be applied.

Evaluation of Significance

6.3.9 The consideration for magnitude and sensitivity of a receptor will determine the significance of the effects. This significance expression may be quantitative or qualitative and will be further informed by professional judgement. The combination of magnitude and sensitivity in the assessment of significance are presented in **Table 6.2**.

Table 6.2: Assessment of Significance of Effect.

Significance of Effect		Sensitivity of Receptor			
		Negligible	**Low**	**Medium**	**High**
Magnitude of Effect	**Negligible**	Negligible	Negligible	Negligible	Negligible
	Low	Negligible	Negligible	Minor	Moderate
	Medium	Negligible	Minor	Moderate	Moderate
	High	Negligible	Moderate	Moderate	Major

6.3.10 The significance categories provide a threshold to determine whether significant effects (in EIA terms) may arise from the Proposed Offshore Development, with Moderate to Major being defined as 'significant'. A general definition for each of the categories (devised specifically based on professional judgment) is presented in **Table 6.3**.

Table 6.3: Definitions of Significance Categories.

Category	Definition
Negligible	No detectable change to the environmental baseline or receptor, resulting in no significant effect.
Minor	A detectable but non-material change to the baseline environment or receptor, which does not result in significant or small-scale temporary changes.
Moderate	A material but non-fundamental change to the baseline environment or receptor, resulting in a possible significant effect.
Major	A fundamental change to the baseline environment or receptor, resulting in a significant effect.

6.3.11 The technical topics within the EIAR will provide topic-specific definitions for sensitivity, magnitude, and significance, if required. These topic-specific definitions will consider available guidance and specialist knowledge relevant to the technical topic.

6.3.12 Following completion of the determination of significance in line with **Table 6.3**, where the EIA identifies an aspect of the Proposed Offshore Development that is likely to lead to significant adverse environmental effects, commitments will be incorporated into the assessment process to reduce significance of adverse effects to non-significant levels (provided in **Appendix A: Offshore Commitments Register**). These commitments will be in addition to the embedded commitments and design changes already incorporated. At this stage, the predicted significance levels will be re-assessed (taking into account these additional commitments) to determine the residual effect. These assessments will acknowledge and consider the degree of inherent uncertainty in the baseline data collected, identification of activities, and sensitivity of receptors.

6.4 Cumulative and Indirect Effects

6.4.1 In addition to considering the potential impacts of the Proposed Offshore Development alone, the EIA Regulations require consideration for the potential impacts cumulatively with other relevant plans/projects/activities. Each technical topic chapter within the EIAR will include a CIA, considering the topic-specific receptors. Each technical chapter contained within this Offshore Scoping Report has provided an indicative overview of these cumulative impacts, relevant to that topic, to denote where cumulative impacts may be relevant in the subsequent EIA.

6.4.2 A list of plans/project/activities that may interact cumulatively with effects from the Proposed Offshore Development will be identified in the preparation of the EIAR and consulted upon (for more information on the consultation process, see **Chapter 4: Consultation**). This list of cumulative impacts for each technical topic will be dependent on the zone of influence and any project-specific modelling. The most recent publicly available parameters for each of the plans will be utilised to inform the CIA. Where information is not publicly available, the Project will seek to consult the relevant parties to obtain the relevant project parameters for the CIA (e.g., through participation in ScotWind, strategic or other offshore wind working groups). The CIA will consider the temporal and spatial nature of impacts associated with the various development phases for the Proposed Offshore Development (e.g., pre-construction, construction, O&M, and decommissioning), and present an understanding of the overlap with other relevant plans/projects/activities.

6.4.3 The region the Proposed Offshore Development is in may contain numerous other offshore renewable projects, at various development stages, which may contribute towards the cumulative impacts on a range of receptors and pathways (as shown in **Figure 20.2**). These other projects will likely include (but potentially not be limited to):

- Concept/early planning phase projects:
  - Caledonia OWF (Ocean Winds);
  - Ayre OWF (Cluaran Ear-Thuath);
  - Broadshore OWF (BlueFloat Energy, Renantis);
  - Buchan OWF (Floating energy Allyance Elicio nv, Baywar r.e., BW Ideol);
  - Sinclair OWF (BlueFloat Energy, Renantis); and

- Scaraben OWF (BlueFloat Energy, Renantis).

- Other nearby existing offshore wind developments include Moray West OWF (currently under construction), Moray East OWF and Beatrice OWF (both in the operational phase).

6.4.4 The CIA for each technical topic chapter will take into account other projects/plans when assessing the potential cumulative impacts of the Proposed Offshore Development on the receiving environment.

6.4.5 While the CIA is being undertaken, it is important to note that some of the proposed OWF projects may not be taken forward or developed as currently planned. For example, the outcomes of the SMP Iterative Plan Review process may influence future OWF development or projects may seek consent for a larger/reduced capacity than currently granted under ScotWind/INTOG OLAs. Therefore, there is some uncertainty regarding potential impacts that may arise in accumulation with the Proposed Offshore Development. The development 'phase' of a proposed project will be considered (in relation to level of uncertainty whether the development will be carried out as planned) when drawing conclusions on cumulative effects. It is assumed that projects which are currently operational or active at the time of baseline data collation will be considered part of the existing baseline conditions (and receptors already adapted to them). Any effects these projects may have previously had will be reflected in the baseline characterisation, although it is noted that some operational effects may be ongoing, and require incorporation within the CIA (e.g., collision risk).

6.4.6 The potential for in-combination effects on European sites will be considered through a separate offshore HRA process (as shown in the **Offshore HRA Screening Report** (Ørsted, 2023b)). A list of in-combination projects will be determined from those which are in planning, consented, construction or operational development phases.

6.4.7 A 'cumulative effect' is the term used to describe an environmental effect of a development together with other developments on the same single receptor.

6.4.8 The EIA for the Proposed Offshore Development will include:

- A cumulative assessment of the potential effects of the Proposed Offshore Development together with other elements of the Project; and
- A further cumulative assessment which, in addition to including the other elements of the Project, will also consider other proposed development projects.

6.4.9 The cumulative assessment with other elements of the Project will include the Proposed Onshore Development works. If relevant and sufficient information is available at the time of submission, it will also include any other aspects of the Project intended to be progressed as separate consent applications to the Proposed Offshore and Onshore Developments – for example the potential wet storage.

6.4.10 The further cumulative assessment will consider any other developments that are under construction, consented but not yet built or are the subject of valid planning or consent applications. Other development projects which are reasonably foreseeable and for which there is sufficient information in the public domain may also be included if requested by consultees. Developments that are already built and operational at the time of assessment will be considered as part of the baseline instead.

6.4.11 The search for other development projects will include (but will not be limited to):

- Relevant renewable energy developments;
- Relevant INTOG developments;
- Other relevant strategic and national development projects.

6.4.12 It is proposed that that the cumulative effects assessment (both with other elements of the Project and with other proposed development projects) be included within each of the topic chapters within the Offshore EIAR rather than as a separate chapter.

6.4.13 Subject to consultee feedback, a separate chapter identifying the likely impacts of all of the elements of the Project as a whole is not proposed in the Offshore EIAR. However, where there is considered to be the potential for cumulative LSE associated with other elements of Project, for example, noise disturbance from near shore works during cable laying activities, these will be reported within the Offshore EIAR. It is considered that this approach will deliver a Proportionate EIA that avoids lengthy duplication with the Onshore EIAR yet allows for a whole project assessment of all the onshore and offshore elements of the Project.

6.5 Transboundary Effects

6.5.1 The Offshore EIA will consider the potential for transboundary effects to arise. These effects arise when impacts from a development within one country's territory significantly affects the interests of another country. The assessment of transboundary effects is a requirement under the EIA Directive, and hence the EIA Regulations following the UK departure from the EU. Any relevant transboundary impacts requiring further consideration in the subsequent EIA will be identified in this Offshore Scoping Report in each technical topic chapter.

6.6 Inter-related Effects

6.6.1 Inter-related effects will be considered further within the subsequent EIAR. These inter-related effects are the potential effects of multiple impacts from construction, O&M, and decommissioning of the Proposed Offshore Development affecting one receptor. These effects are assessed via the consideration of all effects on a receptor by the Proposed Offshore Development.

6.6.2 The intertidal area will lead to overlap between the Onshore Scoping Report and the Offshore Scoping Report. In order to appropriately handle this overlap, the Offshore Scoping Report will address the area up to MHWS and the potential effects on the marine receptors, whereas the Onshore Scoping Report will deal with the area down to MLWS and the onshore receptors. This will lead to an overlap in the area coverage assessed, ensuring a full assessment for both marine and terrestrial receptors is undertaken. The EIAR will contain a summary of the LSE identified for onshore receptors, with the full list of potential impacts included in the Onshore Impacts Register (to be submitted alongside the EIAR).

6.7 Approach to HRA

6.7.1 The Habitats Regulations present a process by which the effects of plans or projects on European sites is to be assessed. This staged process is collectively referred to as a HRA.

6.7.2 This HRA process comprises up to four stages:

- Screening – this stage aims to determine whether a planned project may have LSE on the qualifying features of a European site. This may be in isolation, or cumulatively with other plans/projects. Where it is identified that there may be LSE, then this will be 'Screened In' and taken forward for the AA. This will be submitted to MD-LOT alongside this Offshore Scoping Report;
- AA – A Report to Inform Appropriate Assessment RIAA is prepared, to provide the Competent Authority with the necessary information to determine whether the plan or project will have an adverse effect on the integrity AEOI of any European sites. The consideration of appropriate commitment measures will constitute part of this HRA stage;
- Consideration of Alternative Solutions – this stage only becomes relevant if the AA cannot rule out an adverse effect on European site integrity, and the project proceeds on a derogation case. This stage must present whether there is an alternative solution to carrying out the project which would lead to less adverse impact on the European site(s). If there are deemed to be no suitable alternatives, the HRA proceeds to the next stage;
- Determination of the presence/absence of priority features/habitats – if confirmed, the next step will be required; and
- Assessment of Imperative Reasons of Overriding Public Interest (IROPI) – this stage aims to determine whether there is an IROPI case for why the proposed project must go ahead. The project must be able to justify its development, in spite of the adverse effects on European site(s). This is possible if the project is deemed imperative, in the public interest, and/or overriding (e.g., public interest outweighs the risk/harm).

6.7.3 The HRA process will be progressed alongside the EIA but will constitute a separate report. A HRA Screening Report will be submitted to MD-LOT alongside this Offshore Scoping Report, which will present the outcome from the LSE screening on the qualifying features of European sites of relevance to the Proposed Offshore Development.

6.8 Proportionate EIA Methodology

6.8.1 This Offshore Scoping Report aims to deliver a robust, yet Proportionate EIA[5]. Regulators, stakeholders, and practitioners have recognised the need for proportionate and accessible EIAs, with IEMA developing specific guidelines regarding this standard (IEMA, 2017).

6.8.2 The Project ambition is to ensure production of a robust yet Proportionate EIA and the approach to delivering this is as follows:

[5] A Proportionate EIA approach is one which focuses on producing a clear, concise report. The reporting focuses on significant environmental impacts, rather than all potential impacts from a proposed development.

- A thorough consideration of standard industry best practice and embedded commitments from the outset - these embedded commitments are built into the concept of the Proposed Offshore Development, rather than implemented due to a significant effect identified during the EIA process. There has been a range of embedded commitments considered and identified for the Proposed Offshore Development during concept design and the RPSS;
- Following consideration and identification, the implementation of a Commitments Register (**Appendix A: Offshore Commitments Register**) which will encompass all the embedded commitments which the Proposed Offshore Development has committed to (including primary, secondary, and tertiary commitments), and how these will be secured through the relevant consents/licences. This Commitments Register (**Appendix A: Offshore Commitments Register**) will then be kept as a 'live' document, to be updated throughout the EIA process, to ensure the most up-to-date embedded commitments are captured. The relevance of each commitment to the technical topic and project development phase are presented in this register;
- Updating and production of a final Commitments Register to accompany the EIAR. As well as the current embedded commitments, this will include all of the additional commitments measures that the Proposed Offshore Development will require to implement in order to reduce potential adverse significant effects to not significant effects. As well as mitigating any potential adverse impacts of the project, additional commitments may also act pro-actively in delivering positive outcomes. The technical topics and development phases concerned with each additional commitment measure will be presented within the final Commitments Register supporting the EIAR;
- A robust Scoping process, with the Scoping Report pulling together significant industry experience and the knowledge of the local area, to determine what the key impacts are likely to be. Additional information/data sources which become available post-Scoping will be taken into account, building upon the outcomes of the Scoping Report to determine how to assess impacts which are subsequently determined to have no LSE. This will focus the EIAR on only the likely significant impacts; and
- A robust post-Scoping and pre-application EIA process driven by stakeholder engagement and consultation, collaboration, research and pro-active investigation and closure of potential concerns and issues to reduce the need for EIA uncertainty and post-application discussions.

6.9 Additional EIA Matters and Scoped Out Topics

6.9.1 Under the EIA Regulations, an EIA must present a description of the LSE of the proposed development. Under the EIA Regulations there is also a requirement to consider the following:

- The risk to human health;
- Air quality;
- Offshore airborne noise and vibration;
- The vulnerability of the works to major accidents or disasters; and
- The climate, potential for GHG emissions, and the vulnerability of the Proposed Offshore Development to climate change.

6.9.2 It is proposed to Scope Out Offshore Air Quality, and Offshore Airborne Noise and Vibration as part of this Offshore Scoping Report, with justification provided in **Table 6.4**. It is also proposed to Scope In the Human Health and Major Accidents/Disasters, included within other Offshore Scoping chapters rather than as standalone chapters. The relevant chapters which will address Major Accidents/Disasters include: **Chapter 14: Shipping and Navigation**, and **Chapter 19: Greenhouse Gas and Climate Change.**

6.9.3 Due to its status as a renewable energy development, it is not anticipated that the Proposed Offshore Development will have significant adverse effects resulting from the impact of the development on climate (for example GHG emissions), although there are likely to be benefits. It is therefore proposed that this topic will be Scoped In to the subsequent EIA, with the assessment based on the available design envelope and construction approach to be taken forward for assessment. A separate chapter is therefore included in this Offshore Scoping Report, considering the impacts of the Proposed Offshore Development on Climate (see **Chapter 19: Greenhouse Gas and Climate Change**). In addition to assessing the potential adverse effects of the Proposed Offshore Development in relation to emissions, the EIAR will outline the potential benefits of the Project, including contributing to a reduction in GHG emissions and meeting national renewable energy targets.

Table 6.4: Offshore Technical Topics Proposed to be Scoped Out of the EIA.

Scoped Out Topic	Justification
Offshore Air Quality	The emissions from the engines of vessels active during construction, O&M, and decommissioning will contribute to the atmospheric emissions at a small, local scale. A Vessel Management Plan (VMP) will present the final vessel strategies for the Proposed Offshore Development, ensuring the vessels are used as efficiently as possible. This VMP will also ensure compliance with national and international air quality standard and legislation/guidance. The number of vessels active at site for project-specific purposes will be limited by comparison to the number of vessels regionally operating and would contribute a small fraction of emissions relevant to the air quality baseline. It is recognised that there might be an insignificant increase to emission levels in the immediate vicinity of the Proposed Offshore Development, however these will be short-term and associated with vessel activity only. There are limited receptors that are likely to be impacted by this minor, local increase in the immediate area. It is anticipated that the Project will generate enough emissions free renewable energy to power upwards of one million Scottish homes, and will therefore positively contribute to a reduction in emissions (at a national and international level) by facilitating reduced reliance on fossil fuels over the long term. The Project will help Scotland in achieving its goal of net zero emissions of all GHG by 2045. Therefore, it is proposed that offshore air quality effects are Scoped Out of any further assessment as there is anticipated to only be insignificant impacts upon the identified receptors, considering the proposed primary commitment measures presented in **Appendix A: Offshore Commitments Register**.
Offshore Airborne Noise and Vibration	Numerous potential Offshore airborne noise and vibration effects on human receptors have been identified, occurring during the construction, O&M, and decommissioning phases of the Proposed Offshore Development. This includes the potential for piling and auxiliary construction activities generating airborne noise/vibration that may impact other marine users. The cable installation activities (including those to take place in the intertidal area) generating airborne noise/vibration may also impact other marine users and the onshore human receptors. It is anticipated the noise produced during the construction phase will be short-term in during, and of a limited spatial extent (localised to the source of the noise). Commercial vessels will be required to maintain a minimum passing distance to construction activities; however, vessels are transient in nature and will only be in the vicinity of construction activities for a short period of time. The effect of offshore airborne noise and vibration from piling on receptors onboard other transiting marine vessels is anticipated to be negligible, when considering existing sources of anthropogenic and natural noise/vibration. Noise impacts

Scoped Out Topic	Justification
	associated with maintenance works are expected to highly localised around the active vessels, and unlikely to result in significant generation of airborne noise considering the existing vessel presence in the area, and other anthropogenic and natural noise sources. The airborne noise impacts associated with the installation of subsea cabling will result from the cable laying vessels. Noise levels associated with these vessels is generally low, localised around the active vessels, short in duration, and transient in nature. With this in mind, it is considered unlikely that this airborne noise will result in significant increases to baseline conditions (due to the existing vessel presence in the area (as shown in **Chapter 14: Shipping and Navigation**), other anthropogenic and natural noise sources). The cable installation techniques to be deployed at landfall are likely to involve trenchless techniques, such as HDD and/or cable burial. Any works to be undertaken above the MHWS mark in the intertidal area are subject to procedures and commitments implemented for onshore construction noise (as captured within the Onshore Scoping Report (Ørsted, 2023a)). Potential noise associated with intertidal cable installation will be highly localised, of short duration, and transient. There are also other noise sources contributing to the baseline conditions at the intertidal including road traffic, residential noise, industrial noise, vessel presence, and natural noise sources (such as wave/wind action). Therefore, it is considered unlikely that the works within the intertidal area (MLWS to MHWS) will result in a significant impact upon onshore anthropogenic receptors. There may be low levels of airborne noise production from the movement of the WTG blades, but this is considered inaudible by onshore receptors or transient marine users owing to the distance from onshore receptors (Array Area is approximately 50 km from the east coast of Wick) and existing anthropogenic and natural noise sources associated with the intertidal area. Consequently, it is proposed to Scope Out offshore airborne noise and vibration effects regarding the offshore elements of the Proposed Offshore Development. Relevant proposed primary commitment measures are presented in **Appendix A: Commitment Register**.

6.10 Scoping Questions

6.10.1 The following questions refer to the EIA approach and methodology chapter and are designed to inform the Scoping Opinion and focus the Scoping exercise:

1. Do you agree with the proposed approach to EIA and methodology outlined in this chapter?
2. Do you agree with the proposed approach to Proportionate EIA?

7 Marine and Coastal Processes

7.1 Introduction

7.1.1 This chapter of the Offshore Scoping Report identifies the marine and coastal processes receptors of relevance to the Proposed Offshore Development and considers the potential impacts from the construction, O&M and decommissioning phases.

7.1.2 For the purposes of both this Offshore Scoping Report and the EIAR, marine and coastal processes include the following elements:

- Morphology, including bathymetry, geology, surficial sediments, seabed features and coastal forms;
- Sediment transport, including bedload and suspended sediment; and
- Hydrodynamics, including tidal and non-tidal influences, and waves.

7.1.3 Marine and coastal processes pathways are closely linked to seabed, coastal and water quality receptors. This chapter covers the marine and coastal processes sources, pathways and receptors present within the study areas described in **Section 7.2.** Designated sites with relevant (marine/coastal processes) features are presented in **Section 7.3: Designated Sites and Protected Species**.

7.1.4 This chapter should be read alongside the following chapter:

- **Chapter 8: Marine Water and Sediment Quality**.

7.1.5 This chapter of the Offshore Scoping Report has been prepared by GoBe.

7.2 Study Area

7.2.1 As presented in **Figure 7.1** the marine and coastal processes study area for the purposes of this Scoping Report, includes the:

- Array Area;
- Offshore ECC;
- Land Development Zone; and
- Coastal and seabed areas outside the Offshore Project Boundary, but which may still be influenced by marine and coastal processes.

7.2.2 The marine and coastal processes study area will be further refined during EIA with consideration to the tidal excursions and specifically sediment plume pathways to allow a definition of the Zone of Influence (ZoI).

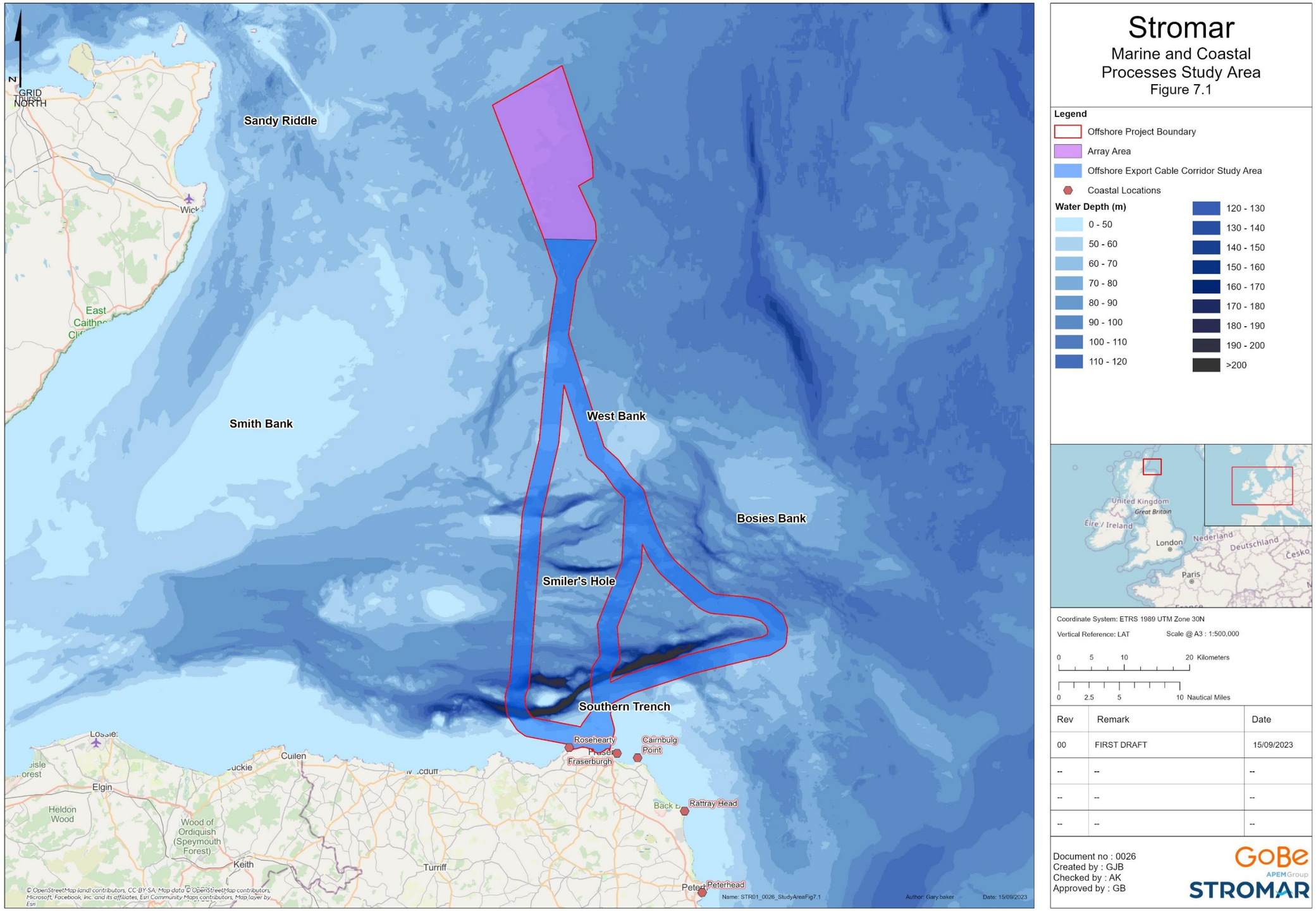


Figure 7.1: **The Proposed Offshore Development Marine and Coastal Processes Study Area.**

7.3 Baseline Environment

Data Sources

7.3.1 For the purposes of this Offshore Scoping Report, a desk-based review of existing and known publications and data was undertaken using the spatial and scientific data sources presented within **Table 7.1**.

7.3.2 These data sources will be taken forward, reviewed and updated as appropriate to inform the subsequent EIA, along with additional site-specific data being collected for the Project.

Table 7.1: Key Sources of Marine and Coastal Processes Data.

Source, Author and Year	Summary	Coverage of the Array Area and Offshore ECC Study Area	Data Quality
Morphology (bathymetry, geology, surficial sediments, seabed features and coastal form)			
European Marine Observation and Data Network (EMODnet), EMODnet Data Portal	Interactive bathymetry, geology and surficial sediment maps.	Full coverage (Array Area and Offshore ECC Study Area)	Data provides UK wide coverage for use in baseline characterisation. Represents most up-to-date data source for regional characterisation.
Barne *et al.*, (1996), JNCC Coastal Directory Series: Regional Report 3 North East Scotland: Cape Wrath to St. Cyrus	Regional characterisation of geology, morphology, coastal processes and form.	Partial coverage	Provides regional summary of coastal form including landfall area. There are no expected updates to this report.
British Geological Survey (BGS) (2020), Offshore GeoIndex Map	Seabed sediment maps (based on Folk classification) and borehole records from point locations.	Full coverage (Array Area) and partial coverage (Offshore ECC Study Area)	Coarse data resolution with no returns in the coastal zone. There are no expected updates to this map.
Ørsted (2023), Project specific surveys	Project specific geophysical (Summer/Autumn 2023) and benthic ecology (Autumn 2023/Spring 2024) surveys.	Full coverage	High resolution data anticipated within Array Area, Offshore ECC Study Area including landfall.
Holmes *et al.*, (2004), Strategic Environmental Assessment 5 – SEA5 Seabed and Superficial Geology and Sediments Survey report	Regional characterisation of geology, morphology, surficial sediments and sediment transport, including geophysical survey outputs.	Partial coverage (Array Area and Offshore ECC Study Area)	Provides regional summary for baseline characterisation. There are no expected updates to this report.
Sediment Transport			
Ramsay and Brampton (2000), Coastal Cells in Scotland: Cell 3 – Cairnbulg Point to Duncansby Head	Regional characterisation of sediment transport, geology, morphology, and coastal form, focused on nearshore processes.	Partial coverage (Offshore ECC Study Area)	Provides regional summary of coastal form including landfall area. There are no expected updates to this report.
Centre for Fisheries and Aquaculture Science (Cefas)	Monthly and seasonal Suspended Particulate Matter (SPM) maps.	Full coverage Offshore ECC Study Area	SPM concentrations in surface waters derived from satellite data for the period 1998 to 2015.

Source, Author and Year	Summary	Coverage of the Array Area and Offshore ECC Study Area	Data Quality
(2016), Suspended Sediment Climatologies around the UK			Provides monthly, seasonal and annual indications of SPM for UK Territorial Waters.
Metocean Data (tides, non-tidal influences, waves, and frontal zones and stratification)			
ABPmer *et al.*, (2008), Atlas of UK Marine Renewables Energy Resources	Low resolution modelled hindcast wave, wind and hydrodynamic data. Summary data provided only.	Full coverage Offshore ECC Study Area	Coarse resolution of wave, tide and wind parameters derived from hindcast numerical modelling.
British Oceanographic Data Centre (BODC) (2022), BODC	Hydrodynamic data (including current speed and direction, and depth profiles of water temperature and salinity) from point locations within the study area.	Partial coverage (Array Area and Offshore ECC Study Area)	Measured data for different locations within the Moray Firth for a range of temporal periods and from different years. Collected using a range of instruments by different survey contractors.
Ørsted (2023/2024), Project specific surveys	Project specific metocean (deployed Autumn 2023 for up to 24 months) surveys.	Partial coverage (Array Area)	High temporal resolution data over a 24-month period anticipated within the Array Area using calibrated instruments, undergoing rigorous data quality checks.
ABPmer (2018), SEASTATES Metocean Data and Statistics Map	Modelled hindcast wave and hydrodynamic data.	Full coverage Offshore ECC Study Area	Coarse resolution of wave parameters derived from hindcast numerical modelling.
Future Changes			
IHE Delft Institute for Water Education (2021), Coastal Futures Interactive Map	Sea level rise predictions for coastal locations.	Partial coverage (Offshore ECC Study Area)	Sea level rise predictions for selected coastal locations based on numerical modelling.
Centre of Expertise for Water (2021), Dynamic Coast 2: Scotland's Coastal Change Assessment	Sea level rise predictions for coastal locations around Scotland.	Partial coverage (Offshore ECC Study Area)	Strategic evidence base on the extent of coastal erosion in Scotland. There are no expected updates to this report.
Intergovernmental Panel on Climate change (IPCC), Sixth Assessment	Sea level rise predictions for coastal locations.	Partial coverage (Offshore ECC Study Area)	Regional information on the potential effects of climate change on various environmental

Source, Author and Year	Summary	Coverage of the Array Area and Offshore ECC Study Area	Data Quality
Report: Impacts, Adaption and Vulnerability			parameters using best available evidence and numerical modelling
National Aeronautics and Space Administration (NASA) (2021), Sea Level Projection Tool (NASA) Sea Level Change Portal	Sea level rise predictions for coastal locations.	Partial coverage (Offshore ECC Study Area)	Sea level rise predictions for selected coastal locations based on numerical modelling.
Palmer *et al.*, (2018), UK Climate Projects Science report (UK Climate Projection 18 (UKCP18)) Marine Report	Sea level rise predictions for coastal locations.	Partial coverage (Offshore ECC Study Area)	Sea level rise projections for selected coastal locations under different emission scenarios based on numerical modelling, with supporting assessments provided.
Department for the Environment, Food and Rural Affairs (Defra) (2002), UK FUTURECOAST	Sea level rise predictions for coastal locations and assessments of shoreline behaviour.	Partial coverage (Offshore ECC Study Area)	Sea level rise predictions as changes in water level based on historic coastal evolution evidence.
General			
Marine Scotland (2022), Marine Scotland National Marine Plan Interactive Mapping Tool (NMPi)	Interactive map containing data on geology, morphology, surficial sediments, coastal processes, and hydrodynamics.	Full coverage (Array Area and Offshore ECC Study Area)	A range of mapped data sources with differing pedigrees and spatial/temporal distribution available for viewing and assessment,
Marine Scotland (2021a), Marine Scotland Regional Assessments	Regional summaries of coastal processes and hydrodynamics.	Partial coverage (Array Area and Offshore ECC Study Area)	Regional information which is not expected to be updated.
Department for Business, Energy and Industrial Strategy (BEIS) (2022), Offshore Energy Strategic Assessment 4 (OESEA4)	Regional characterisation of geology, morphology, surficial sediments, coastal processes, and hydrodynamics.	Partial coverage (Array Area and Offshore ECC Study Area)	Regional information which is not expected to be updated.
Department for Energy and Climate Change (DECC) (2004), Strategic Environmental Assessment 5 (SEA5)	Regional characterisation of geology, morphology, surficial sediments, coastal processes, and hydrodynamics.	Partial coverage (Array Area and Offshore ECC Study Area)	Regional information which is not expected to be updated.

Source, Author and Year	Summary	Coverage of the Array Area and Offshore ECC Study Area	Data Quality
Existing and proposed OWFs within the public domain, including: Beatrice, Moray East, Moray West, MarramWind, Physical Processes Scoping Reports, ESs, and technical reports	Baseline marine and coastal processes (hydrodynamic; morphological; coastal) conditions of relevance to the respective OWFs.	Partial and full coverage (Array Area and Offshore ECC Study Area) relative to the location of the respective OWFs	Information and assessments for OWF developments within the Moray Firth based on the best available evidence at the time of publication.

Description of Baseline Environment

7.3.3 The following sections provide an overview of the baseline (existing) marine and coastal processes.

Morphology

7.3.4 This section provides an overview of the bathymetry, geology, surficial sediments and seabed features of relevance to the Proposed Offshore Development.

Bathymetry

7.3.5 Water depths across the Array Area range between approximately 60 m and 100 m (Lowest Astronomical Tide (LAT); NMPi, 2023) with water depths increasing towards the east, as shown in **Figure 7.1**.

7.3.6 Along the Offshore ECC Study Area water depths generally range between 50 m and 100 m LAT, with variations corresponding to the presence of seabed features, for which further information is provided in **Section 7.3: Seabed Features**. Over bathymetric highs such as West Bank, depths range between approximately 50 m and 60 m, whereas in enclosed basin features depths may reach between 150 m and 215 m (Smiler's Hole and the Southern Trench respectively (NMPi, 2023)), **Figure 7.1**.

7.3.7 South of the Southern Trench, water depths are generally shallow uniformly towards the coast with the exception of an un-named bank feature approximately 5 km offshore, with depths between 35 m and 45 m LAT.

Geology

7.3.8 The Array Area is underlain by Cretaceous chalk and Palaeocene sedimentary rocks, with Devonian sandstones present in the north (BGS, 1984; 1987).

7.3.9 The Offshore ECC Study Area is underlain by similar strata in the offshore regions, with Lower Cretaceous clay, Permian and Triassic sedimentary rocks, and Dalradian outcrops closer to the coast (BGS, 1982; 2020; Andrews *et al.*, 1990). The bedrock geology is overlain by Quaternary sediments comprising of pebbly tills (boulder clays), with higher mud content towards the south of the Offshore ECC Study Area. The thickness of these Quaternary deposits is generally less than 20 m across the region, with thinner sediments to the east of the Pentland Firth, where bedrock outcrops at the seabed (BGS, 1987; Barne *et al.*, 1996). These Quaternary sediments (where present) are in turn overlain by a thin veneer of marine sediments, measuring less than 2 m in thickness (BGS, 1984; 1987).

Surficial Sediments

7.3.10 Surficial sediments within the Array Area are typically comprised of sands, with an increasing proportion of gravel towards the northern end (**Figure 7.2**). Sediments to the northwest of the Array Area are generally coarser as a result of proximity to the Pentland Firth, where the seabed is scoured of surface sediments by strong tidal currents (DECC, 2004).

7.3.11 Surficial sediments along the Offshore ECC Study Area transition from sands and gravels to more muddy sediments towards the shore which then coarsen towards the shore. Further, as water depths increase beyond the muddy region, sediments become progressively finer. Enclosed basins within the region act as sinks for fine-grained sediments settling out of suspension, with relatively high mud content (30 to 65%) within the deepest parts. The exception to this pattern is within the Southern

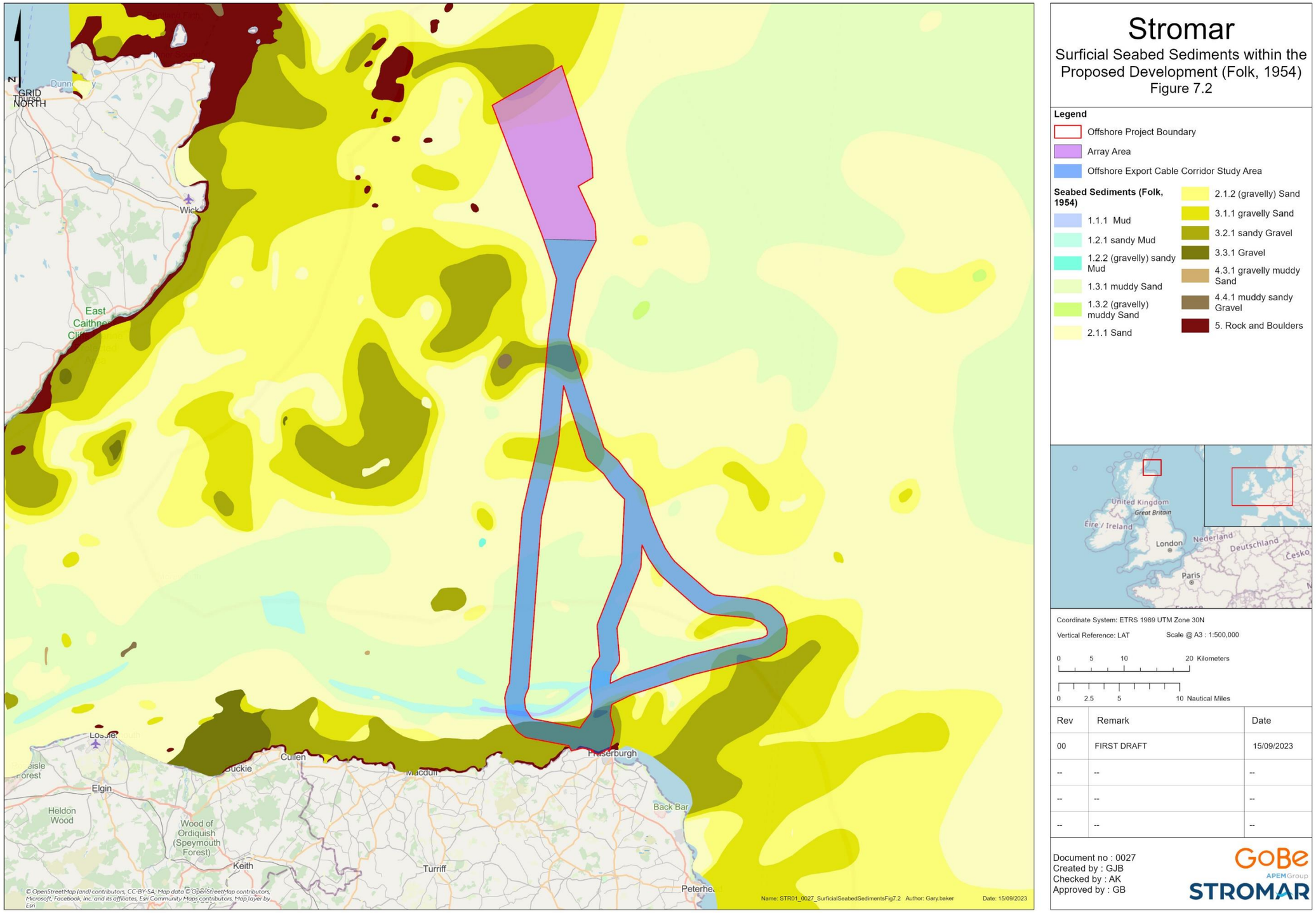
Trench, where although fine-grained sediments accumulate on the trench flanks, sediment samples taken from the trench axes identified well-sorted fine sands with little silt content, thought to be a result of high current speeds (further detail provided in **Section 7.3: Seabed Features**; Holmes *et al.*, 2004).

7.3.12 Within approximately 10 km of the coastline, the seabed is characterised by an increased fraction of gravel and coarse sediment as the water depth decreases.

Seabed Features

7.3.13 The Array Area is located approximately 30 km to the east of the Sandy Riddle, a narrow bank located at the east end of the Pentland Firth (shown on **Figure 7.1**), which may be considered as a Banner Bank, attributed to the presence of tidal eddies to either side of headlands (Holmes *et al.*, 2004; Stewart *et al.*, 2021). The Sandy Riddle is approximately 10 km in length, 1 km to 2 km wide and up to 60 m high and is composed of carbonate gravels and sands, with sandwaves and megaripples superimposed on the flanks (Andrews *et al.*, 1990). Sediment transport and the resulting geomorphology of the Sandy Riddle is determined by the complex pattern of eddies generated around the Pentland Skerries under the influence of tidal and wave-induced currents (BEIS, 2022a). The area is characterised by high current velocities generated from tidal streams, with near-bed spring tidal current speeds exceeding 2.75 m/s at the head of the Sandy Riddle, although decreasing rapidly to around 0.88 m/s further to the southeast (Holmes *et al.*, 2004).

7.3.14 Many large-scale features of the modern seabed topography are a result of marine reworking of former glaciogenic bedforms. The study area is characterised by isolated and irregular shallow banks, which divide a series of tunnel valleys formed sub-glacially by the flow of pressurised water, which act as sinks for fine-grained sediments (Holmes *et al.*, 2004; Graham *et al.*, 2009). Approximately 15 km to the east of the Offshore ECC Study Area is Bosies Bank, a large moraine feature (BEIS, 2022a).



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Surficial Seabed Sediments within the Proposed Development (Folk, 1954)
Figure 7.2

Legend

- Offshore Project Boundary
- Array Area
- Offshore Export Cable Corridor Study Area

Seabed Sediments (Folk, 1954)

- 1.1.1 Mud
- 1.2.1 sandy Mud
- 1.2.2 (gravelly) sandy Mud
- 1.3.1 muddy Sand
- 1.3.2 (gravelly) muddy Sand
- 2.1.1 Sand
- 2.1.2 (gravelly) Sand
- 3.1.1 gravelly Sand
- 3.2.1 sandy Gravel
- 3.3.1 Gravel
- 4.3.1 gravelly muddy Sand
- 4.4.1 muddy sandy Gravel
- 5. Rock and Boulders

Coordinate System: ETRS 1989 UTM Zone 30N
Vertical Reference: LAT
Scale @ A3 : 1:500,000

0 5 10 20 Kilometers
0 2.5 5 10 Nautical Miles

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00	FIRST DRAFT	15/09/2023
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Checked by : AK
Approved by : GB

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Figure 7.2: Surficial Seabed Sediments within the Proposed Offshore Development (Folk, 1954).

7.3.15 Notable offshore seabed features located along the Offshore ECC Study Area (**Figure 7.1**) are summarised below.

- Southern Trench: an enclosed seabed basin approximately 58 km long and up to 250 m deep is located in the southeastern part of the Moray Firth, approximately 10 km north of the Fraserburgh – Banff coastline. This feature was formed predominantly as a result of glacial processes, including subglacial hydrology and, potentially catastrophic, meltwater flooding (Brooks *et al.*, 2013; BEIS, 2022a). There is some evidence that gravity-driven down-slope failure has locally affected modern seabed variability within this feature. Like other enclosed seabed basins in the Moray Firth, the Southern Trench acts as a sink for fine-grained sediments, although this mainly occurs on the trench flanks as opposed to the axes. The trench axes are characterised by well-sorted fine-grained sands, thought to be distributed by the acceleration of tidal flow through constricted trench passages below approximately 190 m water depth (Holmes *et al.*, 2004).
- Smiler's Hole: an arcuate enclosed basin approximately 25 km long and more than 175 m deep is located in close proximity to the Offshore ECC Study Area, with the convex side facing north. This was formed at the margin of a former ice sheet. Sediment samples taken from within the basin are classed as muddy sands, with polymodal distribution patterns consistent with an environment allowing both sedimentation of the finest-grained muds and a process of re-suspension under conditions of stronger near-bed currents. The overall trend of increasing mud content with water depth on the basin flanks is consistent with the feature acting as a sink for fine-grained sediments (Holmes *et al.*, 2004).
- To the north of Smiler's Hole, the Offshore ECC Study Area crosses through a series of bathymetric lows, interpreted as a presumed former fluvioglacial channel complex, and an associated bathymetric high known as the West Bank, a possible former terrestrial moraine (Holmes *et al.*, 2004).

Coastal Form

7.3.16 The southern coastline of the Moray Firth consists of mainly Dalradian metamorphic rocks with some outcrops of Devonian sandstone, of predominantly rocky character with a series of small bays and coves. The coastal area is generally plateau-like with 30 m to 90 m high cliffs, fronted by a rocky platform and cut in places by deep ravines. Just west of Rosehearty, the cliff level falls, giving way to a low shore that extends to Peterhead (Barne *et al.*, 1996). This is initially comprised of thin beaches overlying a rock platform, which outcrops nearly continuously along the coastline. A 3 km sand beach is present at Fraserburgh, constrained between two low rock headlands at either end, which is the largest beach and dune complex along this stretch of coast (Ramsay and Brampton, 2000).

7.3.17 Although the coastline between Rosehearty and Cairnbulg Point is extremely exposed to storm wave conditions, the rocky and shallow-sloping offshore bathymetry means that most of the storm wave energy is dissipated before reaching the intertidal beach. Littoral processes are therefore not particularly significant, with little wave induced coastal erosion evident (Ramsay and Brampton, 2000). Individual bay-head units on this part of the coast are small and isolated from each other by headlands and relatively deep water, preventing longshore sediment movement outside that within single beach cells and resulting in a low rate of erosion, little accretion and minimal evidence of significant longshore drift (Barne *et al.*, 1996).

Sediment Transport

7.3.18 Regional scale assessments suggest that bedload sediment is transported into the Moray Firth from the north, passing along the Caithness coast and towards the Inner Moray Firth (Kenyon and Cooper, 2005) (**Figure 7.3**). Linear sand patches suggest that sediment transport along the Buchan coast is directed in both east and west directions, possible reflecting specific tidal patterns within the area (Holmes *et al.*, 2004). In the vicinity of the Array Area, sediment transport is likely to be directed towards the southeast, becoming more eastward along the Offshore ECC Study Area towards the coast (Reid and McManus, 1987).

7.3.19 Sediment transport within the Moray Firth is wave-dominated as tidal current energy is low and largely incapable of bedload sediment transport beyond fine sand-sized material and smaller (Holmes *et al.*, 2004; Moray Offshore Renewables Limited (MORL), 2012a). This is supported by the general lack of contemporary large-scale bedform features in the Outer Moray Firth, indicative of low sediment transport energy, as well as the observed trend of decreasing sediment grain size with increasing water depth within the Firth, reflecting the relative importance of wave energy to sediment transport processes (MORL, 2012a). The exception to this is in the vicinity of the Pentland Firth and around Rattray Head, where tidal currents are accelerated and therefore more significant for sediment transport processes. The top of Sandy Riddle, for example, located approximately 30 km west of the Array Area as shown on **Figure 7.1**, is characterised by energetic bedload transport as a result of tidal eddies (Holmes *et al.*, 2004).

7.3.20 Sediment transport within the wider Firth is limited in frequency and related to low-frequency, high-energy storm events – where the combination of tidal, non-tidal, and wave-induced currents during storm events results in considerably higher current speeds at the seabed, leading the mobilisation of medium-grained sand. This is likely to be enhanced in areas of greater depth and correspondingly higher current speeds, as well as around Rattray Head.

7.3.21 SPM provides an indication of turbidity and is highly variable according to water depth and hydrodynamic processes within the study area (i.e., tide, current, and wind regimes). SPM concentrations are typically low in the Array Area, approximately <5 mg/l (**Figure 7.4**), although near the seabed levels may be significantly elevated during storm events. Fine sand, which is widespread across the study area, is likely to be regularly mobilised in this area during storms.

Hydrodynamics

7.3.22 This section provides an overview on the influences of tidal, non-tidal, and wave processes on the Proposed Offshore Development.

Tides

7.3.23 Modelled mean spring and neap tidal ranges across the Array Area are approximately 2.4 m and 1.2 m respectively, with slightly higher values along the Offshore ECC Study Area as the tidal range increases into the Moray Firth and closer to the coast (ABPmer *et al.,* 2008). The mean spring range measured at Fraserburgh (shown on **Figure 7.1**) is 3.7 m (MORL, 2012a). Tidal currents are generally oriented to the south-southeast on the flood tide and to the north-northwest on the ebb tide; however, regional tidal ellipses indicated variation between the Array Area and Offshore ECC Study Area (ABPmer *et al.*, 2008).

7.3.24 Tidal streams present in the Moray Firth are complex and variable in direction, with stronger tidal currents in the outer Firth due to the passage of tidal wave currents, particularly through the Pentland Firth and off Rattray Head, where mean spring peak flow can reach up to 1.5 m/s (**Figure 7.5**). Further inshore, local gyral patterns occur, resulting in benign current speeds of generally less than 0.5 m/s (mean spring peak flow) (Adams and Martin, 1986; ABPmer *et al.*, 2008). Within the Array Area, tidal current speeds are generally low, with mean spring peak flow measuring approximately 0.4 m/s (ABPmer *et al.*, 2008).

7.3.25 Variations in current speeds within the Array Area and further afield occur in response to the presence of notable seabed and coastal features. Near bed peak spring tidal currents in the Southern Trench are estimated to exceed 0.7 m/s in some parts, oriented west to east, although tidal currents outside of the trench are generally between 0.35 and 0.65 m/s (DECC, 2004). Along the Offshore ECC Study Area close to the coast, current speeds are generally higher than further offshore (**Figure 7.5**), due primarily to the acceleration of tidal currents around Rattray Head (shown on **Figure 7.1**), and tidal excursion distances here may be correspondingly larger.

7.3.26 A notable feature along the southern shore of the Moray Firth is a flood lasting approximately nine hours of the tidal cycle, with insignificant ebb flow for the remaining three hours. This feature occurs up to 8 km offshore and is due to the southern Moray coastline sheltering the area from the northward flowing ebb current, resulting in an eastward flow along the southern shore (Adams and Martin, 1986; DECC, 2004). This is reflected in regional tidal ellipses, which in this area are oriented east to west, parallel to the coastline (ABPmer *et al.*, 2008).

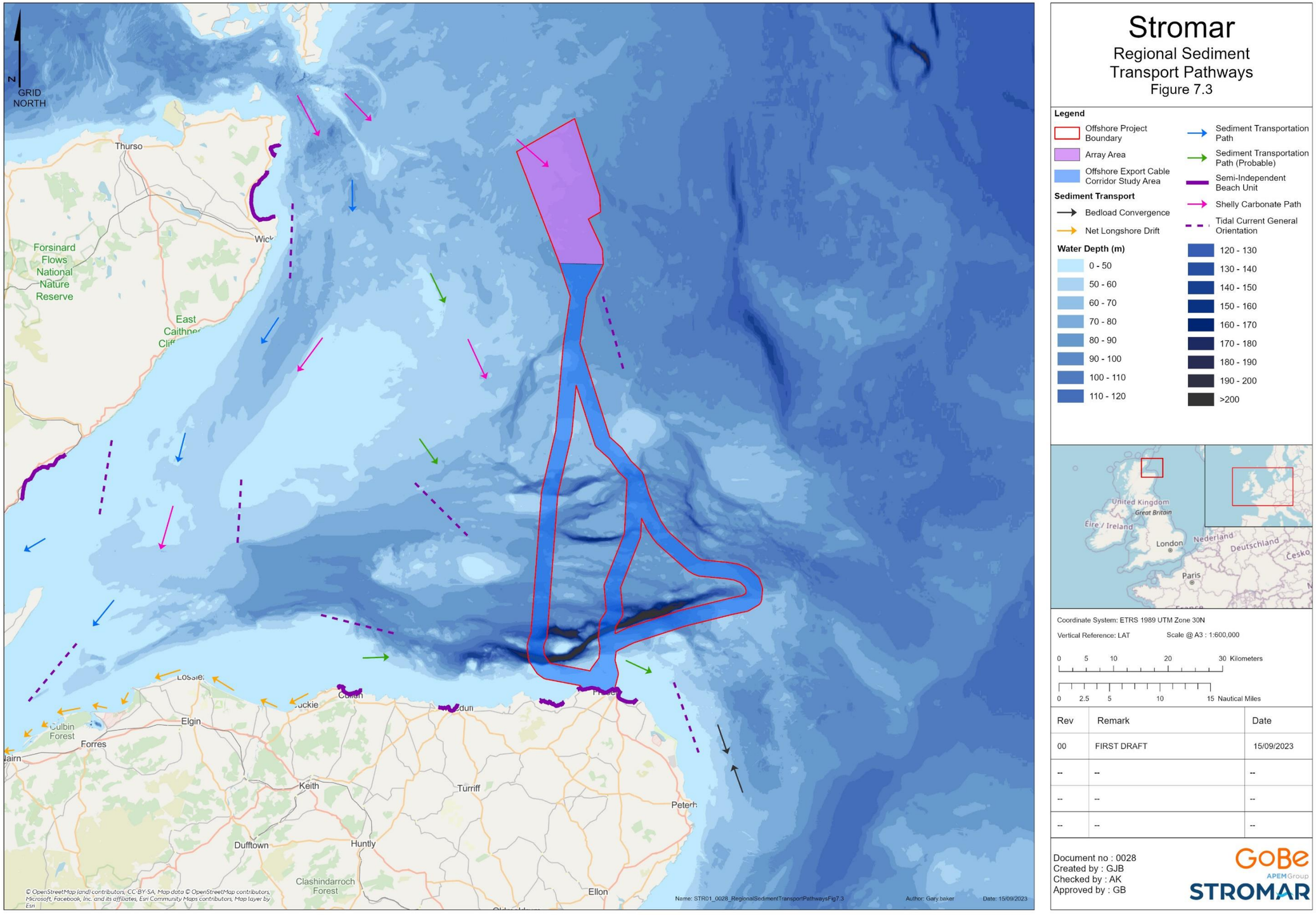

Figure 7.3: **Regional Sediment Transport Pathways (Kenyon and Cooper, 2005).**

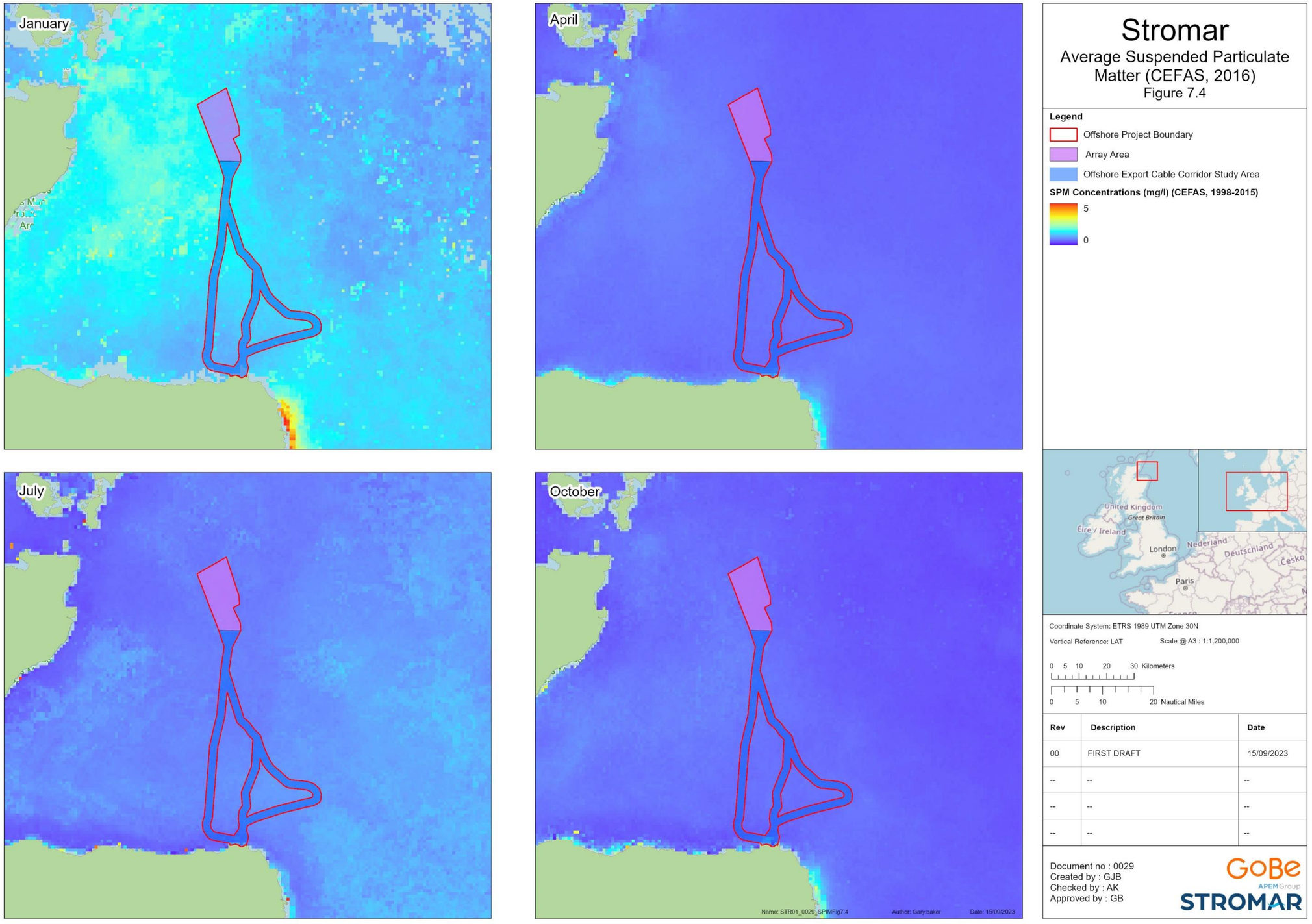

Figure 7.4: Average Suspended Particulate Matter (Cefas, 2016).

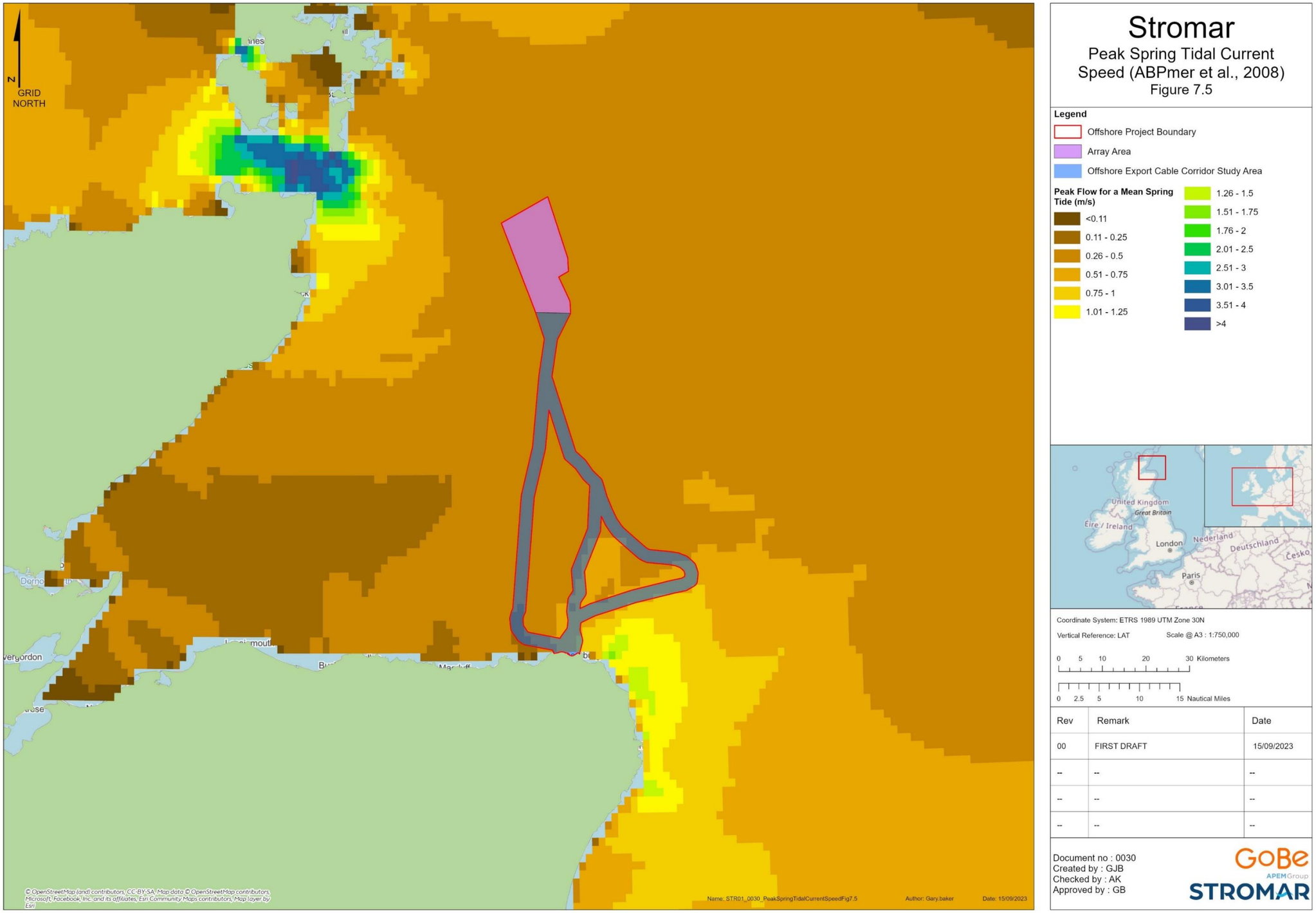

Figure 7.5: Peak Spring Tidal Current Speed (ABPmer *et al.*, 2008).

Non-tidal Influences

7.3.27 Superimposed on regular tidal behaviours are various non-tidal influences, which mainly originate from meteorological effects. An example is surges, formed by rapid changes in atmospheric pressure causing the water levels to fluctuate considerably above or below the tidal level. This effect can be further impacted by the wind strength and direction. Moving low pressure systems and associated strong and persistent wind fields may generate strong positive surges, often referred to as a 'storm surge'. The height of a 1 in 50-year return period storm surge has been defined as 1.25 m at the nearby Moray East OWF, approximately 30 km to the southwest of the Array Area (MORL, 2012a).

7.3.28 Storm surges may cause short-term modification of astronomically driven tidal currents. Under an extreme (1 in 50-year return period) storm surge, current speeds may be more than twice that encountered under normal peak spring tide conditions.

7.3.29 The Moray Firth is also influenced by non-tidal residual circulation patterns, most notably the Fair Isle Current, which transports Atlantic water into the North Sea through the Fair Isle Channel before flowing southward down the Scottish east coast (Turrell *et al.*, 1992; BEIS, 2022b). Shoreward of the Fair Isle Current, which approximately follows the 100 m depth contour into the North Sea, local currents transport water into the Moray Firth through the Pentland Firth, where they circulate in an anticyclonic circulation cell around Smith Bank (shown on **Figure 7.1**; McManus, 1992). Coastal waters within the Firth further subdivide into eastward or westward-directed lobes off the southern shore and northbound residual stream off the Caithness coast, although the central cell of motion remains largely separated from the marginal waters (McManus, 1992).

Waves

7.3.30 Within the Array Area, mean annual significant wave heights[6] are approximately 2.0 m, reaching up to 2.7 m in the winter months and decreasing closer to shore due to shallowing water effects (ABPmer *et al.*, 2008). The most frequent wave direction is from the southeast and north, with a smaller proportion from the northeast and southwest (**Figure 7.6**). Southward along the Offshore ECC Study Area, waves originate increasingly from the west, with the northern component becoming dominant close to the shore (ABPmer, 2018).

7.3.31 A detailed assessment of the metocean conditions was carried out at the Moray East OWF site (MORL, 2012a), which found that during extreme events wave heights originating from the more exposed offshore sectors (from north through southeast) may be between 6 m and 7 m during relatively frequent (annual) events or up to 9 m for a one in 50-year return period. Waves originating from other directions within the Moray Firth (southeast through to northwest) are generally smaller during extreme events (4 m to 5 m or up to 7 m, respectively) due to the relatively shorter distances available for wave growth (MORL, 2012a).

7.3.32 The Moray Firth is generally characterised by low tidal current energy; therefore, wave and winds constitute the main energy inputs to the coastal system (Reid and McManus, 1987).

[6] Defined as the mean of the highest one third (33%) of waves (measured from trough to crest) occurring within a year.

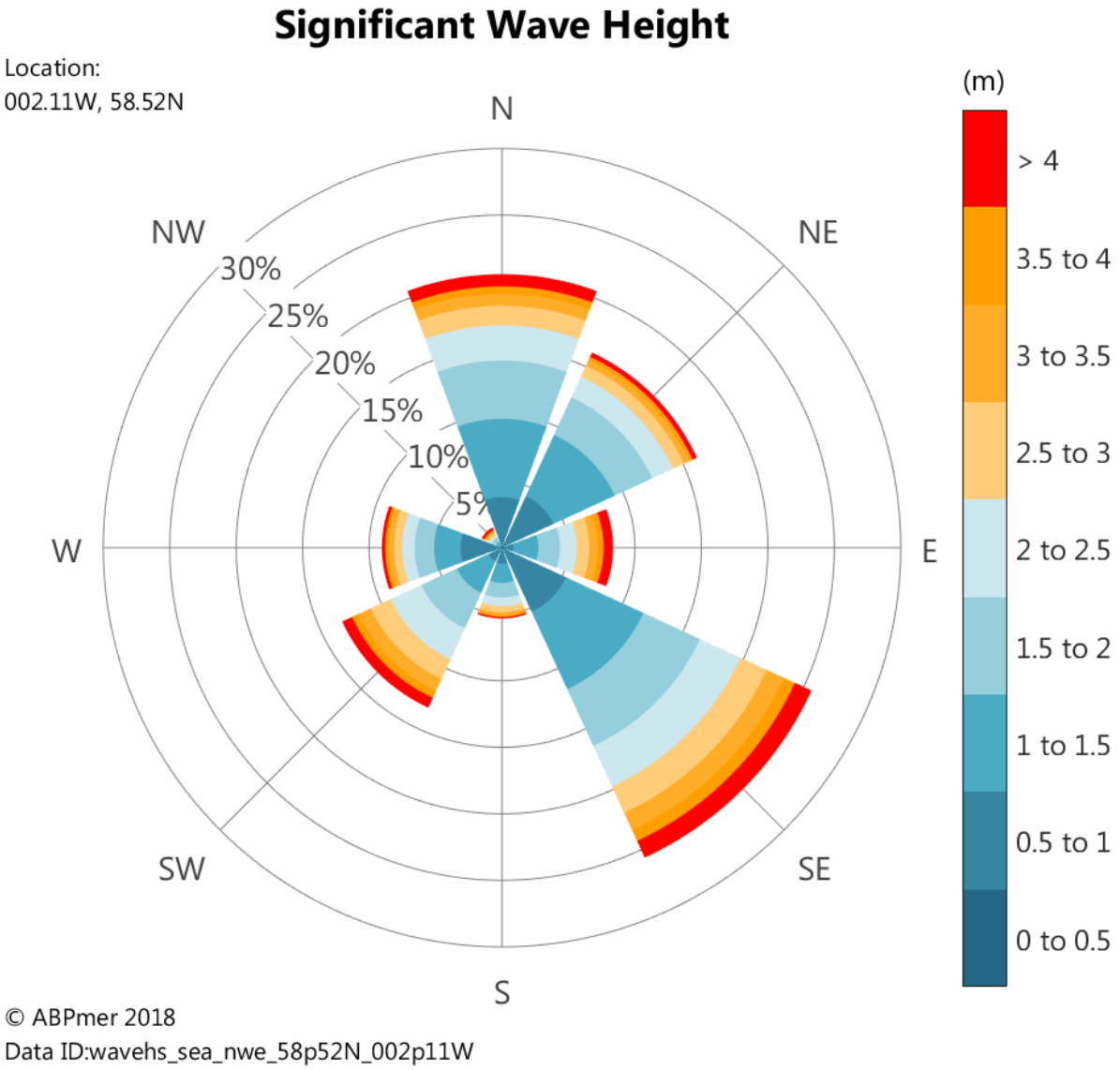

Figure 7.6: Significant wave height in the centre of the Array Area (ABPmer, 2018).

Frontal Zones and Stratification

7.3.33 Frontal zones mark boundaries between water masses, including tidally mixed and stratified areas, and are numerous on the European continental shelf (BEIS, 2022b). Fronts play an important role in enabling the circulation and transport of nutrients and heat, and frequently reoccurring fronts (e.g., spatially and/or seasonally) are widely recognised as supporting enhanced biological activity (NatureScot, 2020b).

7.3.34 Stratification is a hydrodynamic feature characterised by vertical density gradients over relatively short distances within the water column and is related to the distribution of seawater temperature and salinity. Naturally occurring stratification occurs across the wider study area due to seasonal heating of the upper water column and vertical fronts are also observed between regions of slight freshwater influence coming from the Moray Firth (Adams and Martin, 1986; Connor *et al.*, 2006).

7.3.35 Analysis of monthly climatological temperature and salinity values from the Array Area (shown in **Figure 7.7**) (Scottish Association for Marine Sciences (SAMS), 2023) indicate that conditions are largely unstratified during the winter, with the exception of occasional and relatively weak salinity-driven stratification. Spring and summer stratification is largely thermal, with the top to bottom temperature difference approximately 1.5° to 2°C from June to August. The Array Area is situated in an area with residual surface flow to the south and southeast, associated with the gradient between coastal waters and the more stratified, saline waters in the deeper northern North Sea. As a result, surface waters in the Array Area may have recently passed through well-mixed areas of the Pentland Firth and Fair Isle Gap (SAMS, 2023).

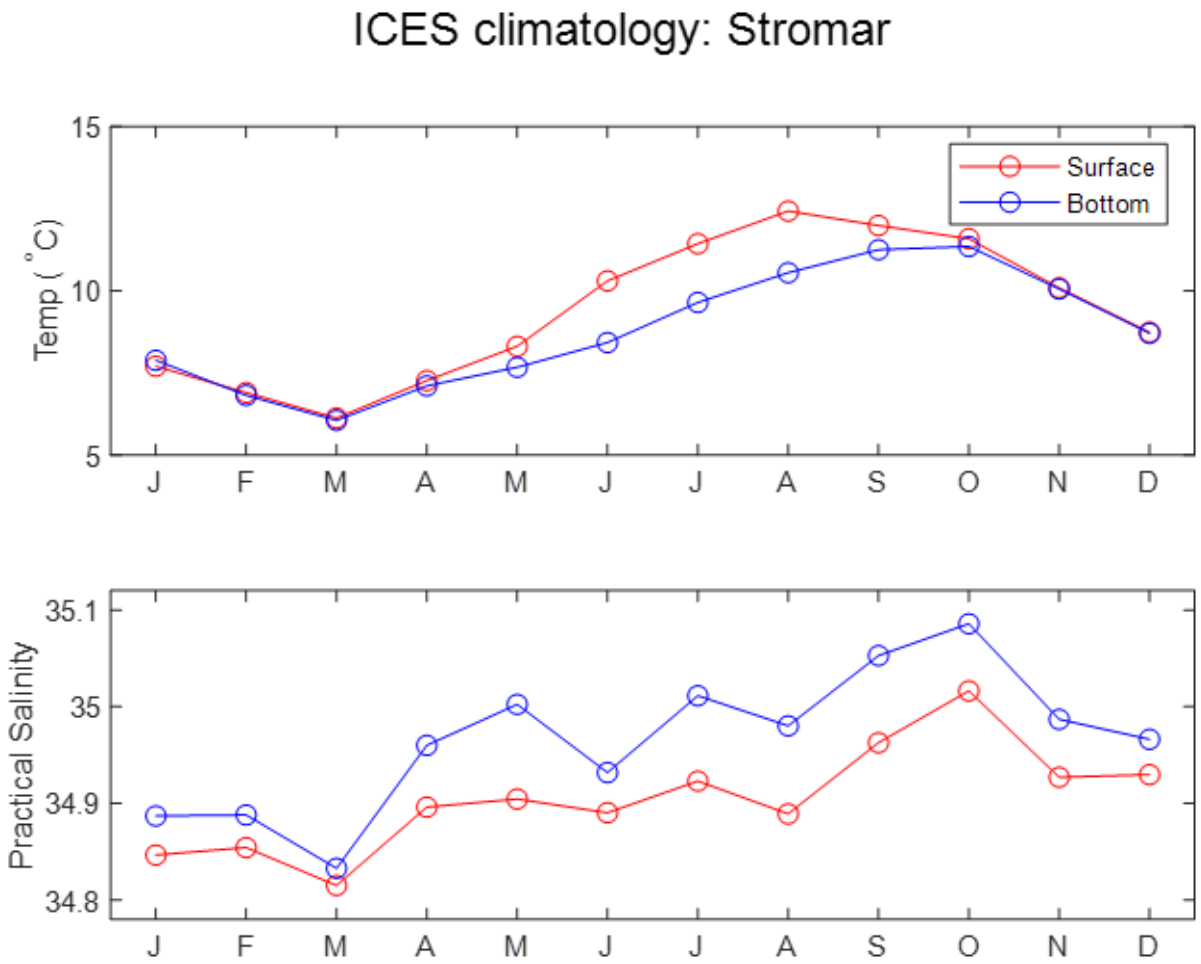

Figure 7.7: Monthly International Council for the Exploration of the Sea (ICES) climatological values for surface (red) and bottom (blue) temperature and salinity at the Array Area (SAMS, 2023).

7.3.36 A thermal front is present year-round along the southeast coast of the Moray Firth, over the Southern Trench. In autumn and winter the front, which is maintained by tidal currents, is located close to the coast, whereas in spring and summer the additional stratification generated by summer warming generates additional surface thermal fronts that extend beyond the coastal zone (NatureScot, 2014). The position of the front corresponds to a relatively narrow, shallow, inner shelf associated with enhanced tidal mixing (Miller *et al.*, 2014; NatureScot, 2019a).

Future Changes

7.3.37 A consideration of the future baseline, including the associated variation, is provided in the context of the operating lifetime of the Proposed Offshore Development. For the current purposes of this Offshore Scoping Report, the Representative Concentration Pathway (RCP) 8.5 (high-emissions) climate change scenario (Palmer *et al.*, 2018) has been presented.

7.3.38 The UKCP18 report suggests an increase in Mean Sea Level (MSL) of 0.5 m to 0.6 m by the year 2100 along the coast of the Moray Firth (Palmer *et al.*, 2018). Future changes in storm surges have been predicted to be indistinguishable from background variation (Lowe *et al*., 2009), although extreme surge level event frequency is likely to increase (IPCC, 2021).

7.3.39 In addition, the United Kingdom is affected by isostatic readjustment, a regional change in land surface elevation following the removal of the weight of the British-Irish Ice Sheet. Due to this post-glacial uplift the sea in the Moray Firth region is estimated to change by approximately -0.6 to -0.8 mm/year (Palmer *et al.*, 2018), although this is outpaced by rates of global sea level rise (BEIS, 2022a).

7.3.40 Wave energy is predicted to decrease, such that by 2100 a decrease larger than 10% has been modelled in the North Sea (RCP8.5 scenario; Bonaduce *et al.*, 2019; Meucci *et al.*, 2020). Inter-decadal variability may be largely due to the influence of local weather in the North Sea (EDF Energy, 2020).

Designated Sites and Protected Species

7.3.41 Designated sites in the vicinity of the study area, which are designated for the protection and conservation of marine habitats of relevance to marine and coastal processes are shown in **Figure 7.9**. A comprehensive list, with detail of the relevant (marine processes) protected features, is provided in **Table 7.2.**

Table 7.2: Designated Sites Relevant for Marine and Coastal Processes.

Designated Site	Marine Processes Protected Feature(s)
Southern Trench NCMPA:	• Burrowed mud, fronts • Quaternary of Scotland • Shelf deeps • Submarine mass movement. Several of the protected features are believed to be functionally linked. The trench represents two geodiversity features (Quaternary of Scotland, represented by the sub-glacial tunnel valley feature, and Submarine Mass Movement, represented by slide scars on the flanks of the trench) as well as one large-scale biodiversity feature (shelf deeps, defined as enclosed topographic depressions on the seabed, formed in most cases by glacial erosion during periods of lower sea level) (NatureScot, 2020b).
Moray Firth SAC:	• Subtidal sandbanks.
East Caithness Cliffs SAC	• Vegetated sea cliffs.
Noss Head MPA	• Horse mussel beds.
Whitehills to Melrose Coast Sites of Special Scientific Interest (SSSI)	• Notable geology.
Gamrie and Pennan Coast SSSI	• Coastal features (maritime cliff); • Notable geology; • Quaternary of Scotland.
Rosehearty to Fraserburgh Coast SSSI	• Notable geology.
Cairnbulg to St Combs Coast SSSI	• Notable geology.
Loch of Strathbeg SSSI	• Coastal habitats (including saltmarsh and sand dunes); • Coastal geomorphology of Scotland.

7.3.42 Although only the Rosehearty to Fraserburgh Coast SSSI overlaps with the Offshore ECC Study Area, other designated sites which may be impacted by increases to suspended sediments or changes to seabed morphology which may affect littoral transport have also been identified as potential receptors.

7.3.43 Whilst relevant to this Scoping stage of the EIA, project refinement including that of the Offshore ECC Study Area and associated landfall will inherently result in a refinement of the designated sites considered within the EIA stage of the Proposed Offshore Development (designated features and sites of relevance are presented in **Chapter 9: Benthic and Intertidal Ecology**, **Chapter 10: Fish and Shellfish Ecology** and **Chapter 12: Marine Mammals**).

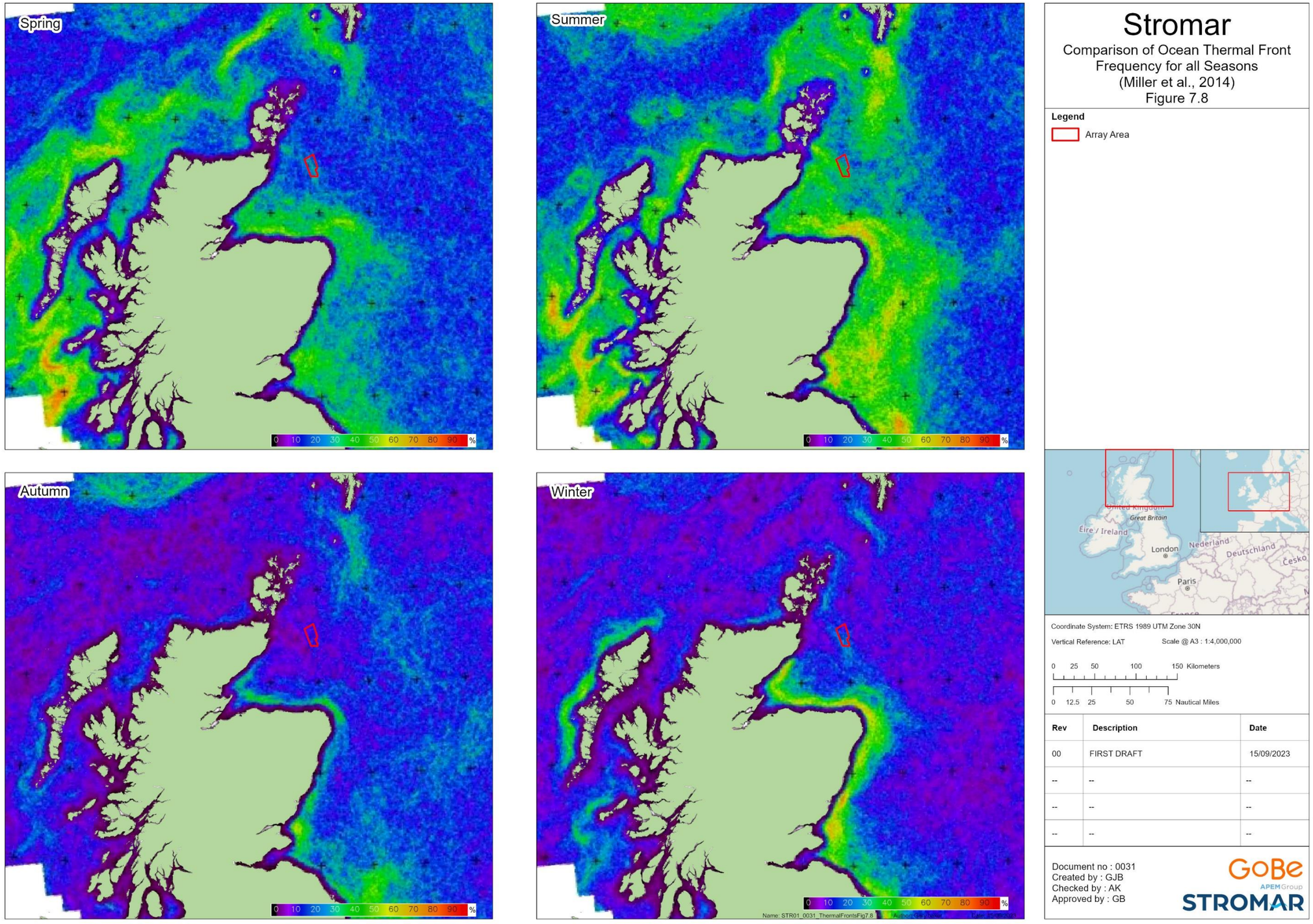

Figure 7.8: **Comparison of Ocean Thermal Front Frequency for all Seasons (Miller *et al.*, 2014).**

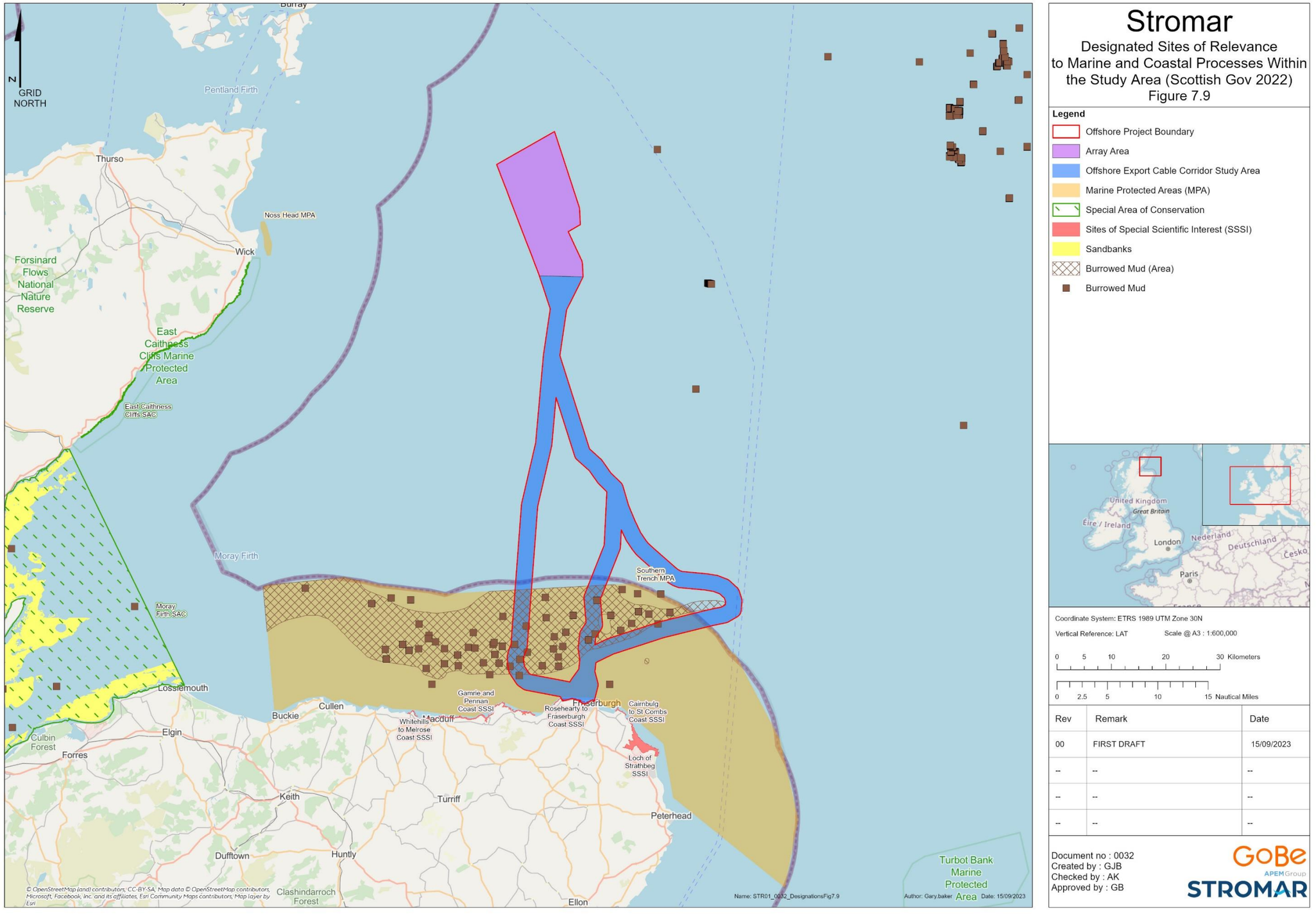

Figure 7.9: **Designated Sites of relevance to Marine and Coastal processes within the study area (Scottish Government, 2022).**

7.4 Embedded Commitments

7.4.1 The Proposed Offshore Development has adopted various primary commitments (primary design principles intrinsically part of the Project design, installation techniques and engineering designs/modifications) as part of the pre-application phase to eliminate and/or reduce LSE arising from a number of impacts (as far as possible). These are outlined in **Appendix A: Offshore Commitments Register**. Further commitments (imposed as a result of legislative requirements and/or standard sectoral practice, regardless of EIA assessment), referred to as tertiary commitments are embedded as an inherent aspect of the EIA process. Secondary commitments (which require further activity to achieve anticipated outcome- often secured through planning conditions and/or management plans) are incorporated to reduce LSE to environmentally acceptable levels following initial assessment, i.e., so that residual effects are reduced to environmentally acceptable levels.

7.4.2 The commitments adopted by the project in relation to marine and coastal processes are presented in **Table 7.3**. The full list of commitments can be found in **Appendix A: Offshore Commitments Register**.

Table 7.3: The Proposed Commitments Relevant to Marine and Coastal Processes Receptors.

Commitment Code	Commitment Measure
C-OFF-07	Offshore infrastructure will be micro-sited (where possible) around sensitive seabed habitats including Annex 1 habitats (if present), the Scottish Biodiversity List and PMFs (in consultation with the relevant Statutory Nature Conservation Body (SNCB)), to avoid detrimental impacts to these conservation features.
C-OFF-08	A Construction Method Statement (CMS) will be developed, which will detail the proposed construction methods and roles and responsibilities of parties involved.
C-OFF-09	Development of, and adherence to a Cable Plan (CaP). The CaP will confirm planned cable routing, burial and any additional protection and will set out methods for post-installation cable monitoring as secured by Section 36 and Marine Licence consent conditions. The CaP is likely to be supported by a CBRA, which will outline how external cable protection shall be used and/or minimised, should cable burial be achieved.
C-OFF-17	CBRA surveys will be undertaken. Where sufficient burial is not achievable, suitable implementation and monitoring or cable protection will be developed.
C-OFF-18	Scour protection to be implemented around foundations and offshore structures. Ideally this will reduce the change to hydrodynamic and sedimentary regimes that may expose archaeological receptors leading to increased rates of deterioration through biological, chemical and physical processes.
C-OFF-32	In accordance with marine licensing requirements a Development Specification and Layout Plan (DSLP) will be submitted and approved prior to construction. Confirming layout and relevant design parameters, including the maximum height of WTGs and lighting details. The works will be constructed in accordance with the approved DSLP.
C-OFF-63	Development of and adherence to a DP, secured under Section 36 and/or Marine Licence consent conditions.

7.4.3 As a result of the commitment to implement these measures, and to align with various standard sectoral practices and procedures, the embedded (primary) commitments are considered inherently

part of the design of the Proposed Offshore Development and have, therefore, been included in the assessment presented in **Section 7.5**.

7.4.4 The requirement and feasibility of any additional commitments will be dependent on the residual significance of the effects upon marine and coastal processes and will be consulted upon with statutory consultees throughout the EIAR stage.

7.5 Scoping of Impacts

7.5.1 Potential impact pathways relevant to marine and coastal processes which may occur during the construction, O&M, or decommissioning phases of the Proposed Offshore Development have been identified in **Table 7.4**.

7.5.2 The assessment is based on a combination of the following:

- The definition of the Proposed Offshore Development at the Scoping stage (as shown in **Chapter 3: Proposed Offshore Development Description**);
- Embedded commitments (as shown in **Section 7.4** and **Appendix A: Offshore Commitments Register**);
- The level of understanding of the existing physical environment at the Scoping stage,
- The existing evidence base for marine and coastal processes effects due to Project activities,
- Relevant policy (as shown in **Section 7.8: Guidance**); and
- The professional judgement of qualified marine and coastal processes specialists.

7.5.3 Marine and coastal processes are typically best described as pathways in most cases, rather than receptors. Accordingly, although outputs from the marine and coastal processes assessments will be reported in a stand-alone EIAR chapter, for the most part they will not be accompanied by statements of effect significance. Instead, the information on changes to the marine and coastal processes pathways will be used to inform other EIA topic assessments, including:

- **Chapter 8: Marine Water and Sediment Quality**;
- **Chapter 9: Benthic and Intertidal Ecology**;
- **Chapter 10: Fish and Shellfish Ecology**;
- **Chapter 12: Marine Mammals**; and
- **Chapter 13: Commercial Fisheries**.

7.5.4 The Scoping of indirect impacts from the identified marine and coastal processes pathways will be assessed within the relevant topics.

7.5.5 The marine and coastal processes features that are considered as potential receptors will be guided by tidal excursion, as to be further quantified using project-specific numerical modelling, and will include the following features:

- The adjacent coastline;

- Nearby offshore, designated, subtidal sandbanks and sandwave areas; and
- Nationally or internationally designated sites with interest features below MHWS (seabed/sedimentary/geological interest features).

Table 7.4: Scoping Assessment for Marine and Coastal Processes.

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
Construction (and Decommissioning)				
Increases in Suspended Sediment Concentrations (SSCs) and changes to seabed levels.	C-OFF-08 C-OFF-09 C-OFF-12 C-OFF-63	Scoped In	Temporary elevations in SSCs due to construction activities, for example cable installation. This could in turn result in changes to the underlying seabed/coastal bed levels, through deposition of the suspended material and changes to the surficial sediment type. Increase in SSC and associated deposition may have indirect, adverse impacts on other receptor groups including **Chapter 9: Benthic and Intertidal Ecology, Chapter 10: Fish and Shellfish Ecology, Chapter 12: Marine Mammals** and **Chapter 13: Commercial Fisheries**. Decommissioning activities, such as foundation and cable removal (if required) can cause increases in SSC as a result of seabed disturbance. The transport of the disturbed material and the eventual deposition could in turn result in variations in bed levels and changes to the sediment type.	Possible LSE without secondary commitment measures, however, it may become clear post-Scoping stage that the impact does not require detailed assessment in the EIAR.
Potential impacts to seabed morphology (sandbanks, sandwave areas and notable bathymetry depressions).	C-OFF-09 C-OFF-08 C-OFF-17 C-OFF-63	Scoped In	Activities such as seabed preparation, sandwave levelling and cable trenching have the potential to directly disturb the seabed morphology. This disturbance may have adverse impacts on other receptor groups including **Chapter 9: Benthic and Intertidal Ecology**, **Chapter 10: Fish and Shellfish Ecology** and **Chapter 13: Commercial Fisheries**. Decommissioning activities relating to the removal of infrastructure (if required) have the potential to directly disturb the local seabed morphology.	Possible LSE without secondary commitment measures, however, it may become clear post-Scoping stage that the impact does not require detailed assessment in the EIAR.
Modifications to littoral transport and coastal behaviour (erosion), including at landfall.	C-OFF-09 C-OFF-08 C-OFF-17 C-OFF-63	Scoped In	Where the Offshore ECC makes landfall, it must transition through the intertidal and coastal zones. The methods available for installing cables in such environments may physically disturb or disrupt the coastal morphology to differing degrees depending on the construction methods employed, the duration and any structures installed, for example cofferdams within the intertidal. At the time of construction, any disturbance is likely to be localised to the landfall site. This disturbance may have adverse impacts on other receptor groups including **Chapter 9: Benthic and Intertidal Ecology.** There is also the potential to impact the Fraserburgh to Rosehearty SSSI, potentially impacting on the designated features.	Possible LSE without secondary commitment measures, however, it may become clear post-Scoping

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
			The methods identified for removing or decommissioning the cable and/or cable protection aspects may physically disturb the local morphology.	stage that the impact does not require detailed assessment in the EIAR.
Operations and Maintenance				
Potential impacts to seabed morphology.	C-OFF-08 C-OFF-18	Scoped In	There is the potential for the introduction of localised seabed abrasion associated with wind farm infrastructure that moves, for example anchor or mooring chains, under the influence of waves, currents, and movement of the turbines (Maxwell *et al.*, 2022). This could result in localised change to seabed morphology. In addition, the Offshore ECC Study Area will cross the Southern Trench NCMPA. The presence of the cable and any cable protection in this offshore area and along the Offshore ECC has the potential to change the form and function of the seabed locally, potentially impacting on the designated features of the NCMPA.	Possible LSE without secondary commitment measures, however, it may become clear post-Scoping stage that the impact does not require detailed assessment in the EIAR.
Modifications to the wave and tidal regime, and associated impacts to morphological features.	C-OFF-07	Scoped Out	The interaction between the planned infrastructure, for example the WTGs and OSS and RCS foundations, cable protection or cable crossings, and the baseline metocean regime (waves; tides) may result in localised changes to tidal current speeds, wave energy and turbulence. These changes may, in turn, impact on adjacent physical features, both offshore and along the coast. It is considered that the impacts potentially introduced by floating offshore structures will be greatly reduced relative to fixed offshore structures, due to the vertical cross section of infrastructure in the water column being much less. Impact assessments for previous offshore wind developments, based on fixed turbine foundations, have demonstrated that there are no significant impacts on waves and tidal regime (Repsol and EDP Renewables, 2013; Moray Offshore Renewables Limited (MORL), 2014a). In combination with generally low tidal currents in the area, with mean peak spring flows in the Array Area modelled as approximately 0.4 m/s, as well as the distance offshore (approximately 50 km), these impacts are considered unlikely to significantly impact adjacent morphological features or the coast and are therefore proposed to be Scoped Out of further assessment. All relevant commitments are presented in **Appendix A: Offshore Commitments Register**.	No LSE identified at Scoping.

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
Seabed scouring.	C-OFF-08 C-OFF-18	Scoped In	The wind farm infrastructure has the potential to cause localised seabed scouring, resulting in bathymetric changes and localised alterations to sediment transport patterns. This is likely to occur both around foundations for OSSs and RCSs, as well as around anchors and clump weights that may be part of floating WTG infrastructure.	Possible LSE without secondary commitment measures, however, it may become clear post-Scoping stage that the impact does not require detailed assessment in the EIAR.
Modifications to stratification and frontal features.	n/a	Scoped Out	Interactions between planned infrastructure and the baseline metocean regime (waves, tides) may result in localised changes to tidal currents speeds, wave energy and turbulence. These changes result in the generation of localised turbulent wakes (Dorrell *et al.*, 2022). However, floating offshore wind farms in deeper water are expected to be less disruptive to current and wave regimes (and hence seasonal stratification) than fixed turbines in shallower waters (Farr *et al*., 2021). The frontal features in the region are predominately coastal (**Figure 7.8**) thus due to distance from these features, the Array Area is expected to have limited impact on stratification. The detailed assessment of the frontal feature, as previously presented, indicates that, due to its location, the Project is unlikely to influence the front's formation and structure (SAMS, 2023). All relevant commitments are presented in **Appendix A: Offshore Commitments Register**.	No LSE identified at Scoping.

7.6 Potential Cumulative Impacts

7.6.1 The process by which potential cumulative impacts will be assessed through the CIA is described in **Chapter 6: EIA Approach and Methodology**, with examples provided of the projects likely to be included in that assessment. For marine and coastal processes, cumulative interactions may, depending upon construction timelines, occur with other planned OWFs such as Caledonia and Broadshore, as well as other activities, for example dredge deposit sites, in the study area. Further information on the industries present/planned within proximity to the Proposed Offshore Development are presented in **Chapter 20: Other Human Activities**.

7.6.2 Impacts that are Scoped In to the assessment for the Proposed Offshore Development are generally spatially restricted to being within close proximity to the Array Area and Offshore ECC Study Area. However, certain potential impacts, such as an increase in SSC, have the potential to be observed over a wider area. Potential cumulative impacts on marine and coastal processes receptors will be guided by tidal excursions, to be further quantified using project-specific numerical modelling.

7.6.3 The CIA for marine and coastal processes will consider the MDS for each of the projects, plans and activities in line with the methodology outlined in **Chapter 6: EIA Approach and Methodology.**

7.7 Potential Transboundary Impacts

7.7.1 No transboundary impacts on marine and coastal processes pathways are anticipated to occur as a result of the Proposed Offshore Development activities during construction, O&M or decommissioning. Due to the distance of the Proposed Offshore Development to the Territorial Boundary (located approximately 200 km to the east), any predicted impacts on these pathways will largely be localised to within the study area and will not give rise to effects on the marine environment beyond UK waters. As such, it is proposed to scope out transboundary impacts with regards to marine and coastal processes.

7.8 Proposed Approach to EIA

Additional Data Sources

7.8.1 A thorough, desk-based collation and review of the relevant data will be undertaken to inform the subsequent EIA, building upon the high-level outline provided within this Offshore Scoping Report. Project-specific survey outputs will be used to enhance the understanding of the baseline conditions. These may include the following across the Array Area and Offshore ECC Study Area:

- Geophysical surveys – planned to commence in Summer 2023 - 2024; and
- Benthic ecology surveys – planned to commence in Autumn 2023 - Summer 2024.

7.8.2 A metocean wave buoy was deployed within the Array Area in Summer 2023, to collect metocean data for 12 to 24 months.

7.8.3 A numerical model will be developed to factor in the project-specific surveys, metocean data collection and a range of representative baseline conditions. This will involve a validated hydrodynamic model that will be used to drive any sediment plume scenarios defined following Scoping. The model will be applied to investigate the source-pathway-receptor relationship for several of those issues Scoped In (**Table 7.4**), based on the realistic MDS, as provided in **Chapter 3: Proposed Offshore Development**

Description. Numerical model outputs will be supplemented with the evidence base, using existing studies from comparable projects.

Guidance

7.8.4 In addition to the approach and guidance (of general relevance) outlined in **Chapter 6: EIA Approach and Methodology** the assessment of marine and coastal processes receptors will also comply with the following guidance:

- EIA for offshore renewable energy projects (British Standards Institution (BSI), 2015);
- Coastal Process Modelling for Offshore Wind Farm EIA; Best Practice Guide (Lambkin *et al.*, 2009);
- Guidelines in the use of metocean data through the lifecycle of a marine renewable development (Cooper *et al.*, 2008);
- Guidelines for Data Acquisition to Support Marine Environmental Assessments of Offshore Renewable Energy Projects (Cefas, 2012);
- Marine Scotland Consenting and Licensing Guidance for Offshore Wind, Wave and Tidal Energy Applications (MS-LOT, 2018);
- National Resources Wales (NRW) Monitoring Evidence Report No: 243 Guidance on Best Practice for Marine and Coastal Physical Processes Baseline Survey and Monitoring Requirements to inform EIA of Major Development Projects (Brooks *et al.*, 2018);

7.8.5 Other documents which have relevance to the marine and coastal processes assessment include:

- Review of Cabling Techniques and Environmental Effects applicable to the Offshore Wind farm Industry. Department for Business Enterprise and Regulatory Reform (BERR) in association with Defra (BERR, 2008a);
- Offshore Windfarms: Guidance note for EIA in Respect of Food and Environmental Protection Act 1985 (FEPA) and Coast Protection Act 1949 (CPA) requirements (Cefas, 2004);
- Review of environmental data associated with post-consent monitoring of licence conditions of offshore wind farms. Marine Management Organisation (MMO) Project No: 1031 (MORL, 2014b);
- Offshore wind cabling: ten years' experience and recommendations (Natural England, 2018);
- Best Practice Advice for Evidence and Data Standards for offshore renewables projects (Natural England, 2022);
- Further review of sediment monitoring data (Collaborative Offshore Windfarm Research Into the Environment (COWRIE) ScourSed-09) (ABPmer *et al.*, 2010);
- Review of Round 1 Sediment process monitoring data – lessons learnt (Sed01) (ABPmer *et al.*, 2007);
- Dynamics of scour pits and scour protection – Synthesis report and recommendations (Sed02) (HR Wallingford *et al.*, 2007); and

- Potential effects of offshore wind developments on coastal processes (ABPmer and METOC, 2002).

Assessment Methodology

7.8.6 The EIA will follow the approach to Proportionate EIA outlined in **Chapter 6: EIA Approach and Methodology** of this Offshore Scoping Report.

7.8.7 The study area for marine and coastal processes baseline within the EIA will be as outlined in **Section 7.2** but will be further refined with consideration to the tidal excursions and specifically sediment plume pathways to allow a definition of the ZoI, as well as to focus on a single refined Offshore ECC. The scope of the marine and coastal processes assessment is to characterise and understand the marine and coastal processes present within the Proposed Offshore Development area, particularly with respect to the metocean regime and associated sediment transport pathways. These will be used to inform other topic specific assessments, for example benthic and intertidal ecology and fish and shellfish (further information on topics informed by the marine and coastal processes assessment are shown in **Paragraph 7.5.3**).

7.8.8 The marine and coastal processes assessment will identify the potential impact sources and consider the magnitude and duration of the potential impact, the reversibility of the impact and the timing and frequency of the activity/infrastructure. An assessment of the potential impacts of the Proposed Offshore Development will be undertaken through application of the evidence base, alongside outputs from numerical modelling. The significance of any changes will be evaluated against the likely naturally occurring variability in, or long-term changes to, the marine physical environment within the Proposed Offshore Development lifetime due to natural cycles, for example storm events, and/or climate change.

Key Consultees

7.8.9 Following Scoping and the receipt of the Scoping Opinion, consultation will be undertaken throughout the EIA process to ensure that the approach, including the application of the evidence base, satisfies the requirements of both stakeholders and regulators. The scope and approach for the numerical modelling will also be consulted upon with MD-LOT and NatureScot to ensure it is fit-for-purpose.

7.9 Scoping Questions

7.9.1 The following questions refer to the marine and coastal processes chapter and are designed to inform the Scoping Opinion and focus the Scoping exercise:

1. Do you agree with the study area as defined for marine and coastal processes?
2. Do you agree with the use of data listed in **Section 7.3**, and any additional data listed in **Section 7.8**, being used to inform the Offshore EIA Report?
3. Are there any further data sources or guidance documents that should be considered?
4. Do you agree that all receptors, pathways, and potential impacts related to marine and coastal processes have been identified?
5. Do you agree with the Scoping In and Scoping Out of impact pathways in relation to marine and coastal processes?

6. Do you agree with the assessment of transboundary effects in relation to marine and coastal processes?
7. Do you agree with the methodology proposed for the assessment of cumulative effects in relation to marine and coastal processes?
8. Do you agree with the proposed assessment methodology for marine and coastal processes?
9. Do you agree on the suitability of the proposed commitments to reduce or eliminate LSE relevant to marine and coastal processes?

8 Marine Water and Sediment Quality

8.1 Introduction

8.1.1 This chapter of the Offshore Scoping Report aims to identify the marine water and sediment quality (MW&SQ) receptors of relevance to the Proposed Offshore Development. This chapter will also consider the potential impacts from the construction, O&M, and decommissioning (up to MHWS). This chapter seeks confirmation from stakeholders on proposed data sources, guidance documents to be adhered to, proposed assessment methodology, and agreement to the Scoping of impacts for further assessment in the EIA.

8.1.2 There is potential for significant disturbance to MW&SQ receptors due to numerous impact pathways. Construction and decommissioning activities for example may lead to a reduction in water clarity due to suspension of sediment (potentially leading to release of sediment bound contaminants, and reduction in designated waterbodies and Bathing Waters classifications) and release of drilling mud. Many potential impacts can be managed by following standard best-practice guidance, although project-specific commitments are also implemented to mitigate potential impacts and reduce the potential for LSE.

8.1.3 The MW&SQ stakeholders potentially affected include MD-LOT, NatureScot and the SEPA. The consultation undertaken to date is summarised in **Chapter 4: Consultation**.

8.1.4 This chapter of the Offshore Scoping Report has been prepared by GoBe.

8.2 Study Area

8.2.1 The MW&SQ study area for the Proposed Offshore Development can be characterised as the:

- Array Area;
- Offshore ECC;
- Land Development Zone; and
- Coastal and seabed areas outside the Offshore Project Boundary, but which may still be influenced by MW&SQ.

8.2.2 The study area used within this MW&SQ chapter is consistent with that used in **Chapter 7: Marine and Coastal Processes**.

8.2.3 A ZoI buffer has been identified for the assessment of MW&SQ and encompasses the area over which suspended sediment might disperse following disturbance as a result of Proposed Offshore Development activities. For the purposes of Scoping, this has been determined as the extent of the spring tidal excursion, a distance of between 4 km and 6 km (ABPmer *et al.,* 2008) resulting in the adoption of a precautionary buffer of 6 km. The extent of the buffer has been informed by previous project experience at Moray West OWF (located 38 km from its nearest point to the Proposed Offshore Development, at the Offshore ECC Study Area), as well as expert judgement of the range over which indirect effects of the Proposed Offshore Development may impact on MW&SQ receptors (e.g., increased SSCs and deposition). The intertidal ecology study area is defined by the Landfall Development Zone which extends from MLWS to MHWS within the Offshore Proposed Offshore Development Boundary, with inclusion of the ZoI (**Figure 8.1**).

8.2.4 This study area may be further refined as required at post-Scoping stages to reflect project-specific sediment plume modelling work that may be undertaken within the marine and coastal processes assessment (see **Chapter 7: Marine and Coastal Processes**), as well as outputs from stakeholder consultation and the evolution of the Design Envelope. This may result in an adapted and refined study area for the EIAR which will be based on all activities carried out throughout the Proposed Offshore Development stages.

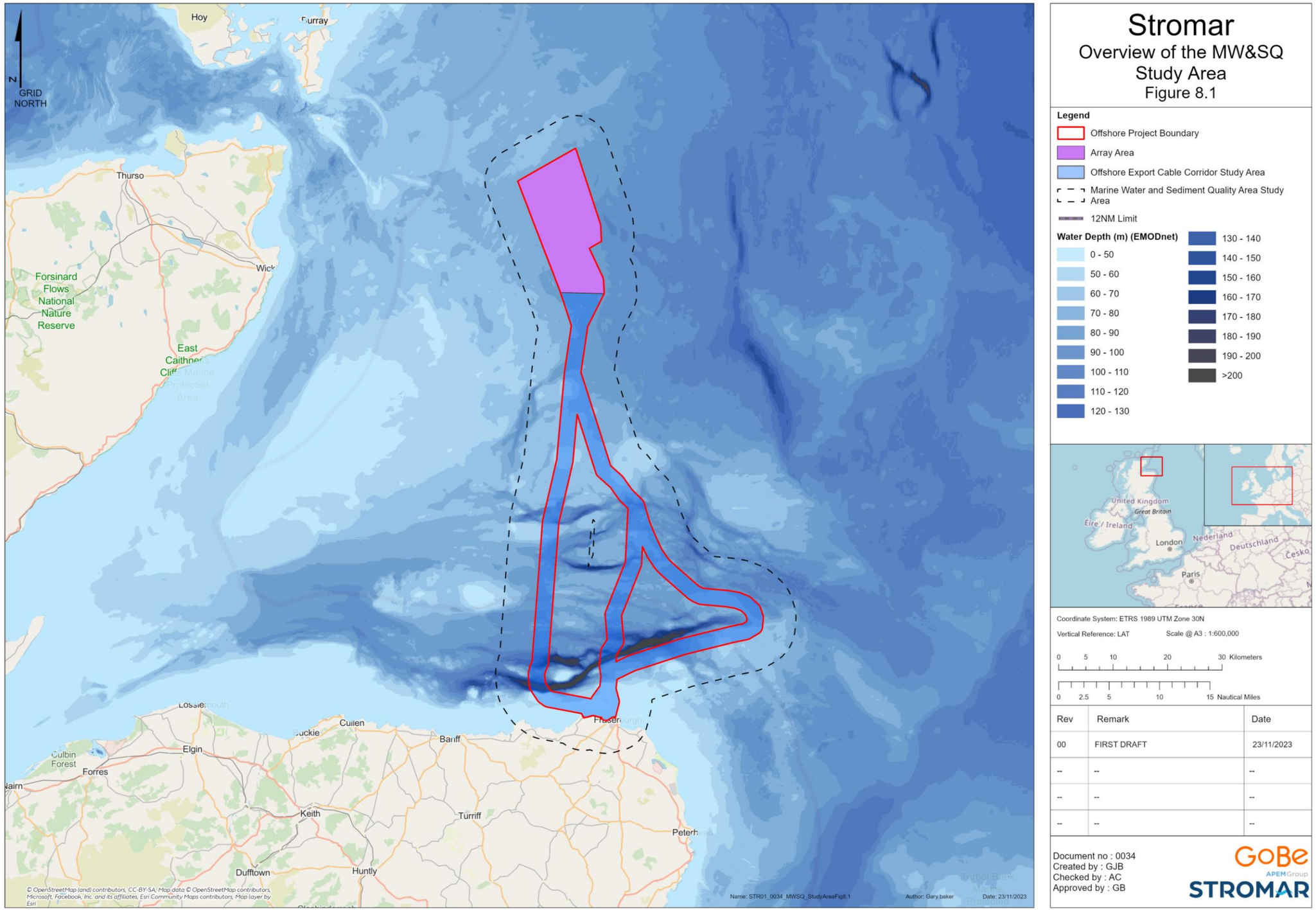

Figure 8.1: **The Proposed Offshore Development MW&SQ Study Area.**

8.3 Baseline Environment

Data Sources

8.3.1 For the purposes of this Offshore Scoping Report a desk-based review of existing and known activities was undertaken using relevant spatial and scientific data sources.

8.3.2 The data sources that have been used to inform the MW&SQ chapter are presented within **Table 8.1**. These identified data sources will be taken forward and used to inform the subsequent EIA, alongside additional site-specific data being collected for the Project. Further information on these Project-specific surveys is provided in **Section 8.8: Additional Data Sources**.

Table 8.1: Key Sources of MW&SQ Data.

Source, Author and Year	Summary	Coverage of the Array Area and Offshore ECC Study Area	Data Quality
SEPA (2022/2023), 'Bathing Waters results for Scotland'. https://www2.sepa.org.uk/bathingwaters/Locations.aspx	Data outputs from the annual sampling programme SEPA runs for designated Bathing Waters in Scotland (running from 15 May to 30 September). The current status of each designated Bathing Water is available online. This dataset is included within the NMPi database.	Bathing Water samples are taken from select locations annually, with some samples in the vicinity of the Proposed Offshore Development landfall (up to 18 samples per site in this sampling year). These designations will be considered within the EIA. This dataset provides partial coverage of the Offshore ECC Study Area (inshore region). This includes data collected in the annual monitoring programme, covering 2022-23.	This data is considered to be up-to-date and is updated on an annual basis.
SEPA (2020), 'Water Classification Hub'. https://www.sepa.org.uk/data-visualisation/water-classification-hub/	An interactive map produced by SEPA which features the current status for various quality elements of Scottish waterbodies (e.g., surface-/groundwaters and protected areas). This dataset is included within the NMPi database.	Water quality elements of relevance to the Proposed Offshore Development will be considered within the EIA. This dataset provides partial coverage of the Offshore ECC Study Area (inshore region). This data is collected annually, with data available dating back to 2007.	This data comprises the most up-to-date information on Water Framework Directive (WFD) waterbody status. This dataset will be updated, as data is collected annually (although 2020 is currently the most recent data available).
SEPA (2022), 'Shellfish Water Protected Areas' https://www.sepa.org.uk/environment/water/shellfish-water-protected-areas/	A map produced by the Scottish Government, presenting the designated Shellfish Water Protected Areas (SWPAs) in Scottish territorial waters. These waterbodies are designated under the	Relevant designated waterbodies under SWD will be considered within the EIA. This dataset provides partial coverage of the Offshore ECC Study Area. A classification is assigned	This dataset comprises the most up-to-date information on shellfish wate protected areas and is updated annually. The next update is expected to summarise the 2022-23 data.

Source, Author and Year	Summary	Coverage of the Array Area and Offshore ECC Study Area	Data Quality
	Shellfish Waters Directive (SWD). This data is available on the NMPi, although the SEPA website provides the updated information.	annually, with classifications dating back to 2014 available.	
Defra (2012), 'Waste Water Treatment in the United Kingdom-2012. Implementation of the European Union Urban Waste Water Treatment Directive-91/271/EEC'. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69592/pb13811-waste-water-2012.pdf	A report providing an overview of the various designated sensitive waters in Scottish territorial limits (maps produced reflect spatial data reporting and submission guidelines rather than legal designations). This dataset is not available on the NMPi.	The various 'designated' waterbodies of relevance to the Proposed Offshore Development, which will be considered within the EIA. This dataset provides partial coverage of the Offshore ECC Study Area (inshore region).	This 2012 report presents a map of the designated waterbodies at the time. Although this report is not recent, it supports the designations of the SEPA, 2019 map.
SEPA (2019), 'Urban Waste Water Treatment Directive (UWWTD) Sensitive Areas'. https://www.gov.scot/publications/urban-waste-water-treatment-sensitive-areas-map/	A map produced by SEPA presenting the Scottish waters sensitive to the effects of sewage dischargers, as designated under the Urban Waste Water Treatment (Scotland) Regulations. This dataset is not available on the NMPi.	Relevant waterbodies designated under the UWWTD will be considered within the EIA. This dataset provides partial coverage of the Offshore ECC Study Area (inshore region). This data includes the 2019 designated sensitive areas, but no other temporal data.	This map provides the most up-to-date information on designated sensitive areas in Scottish waters. It is unknown when this data will be updated.
Scottish Government and SEPA (2021), 'Welcome to the 2021 Update to the Water Environment Hub'. https://informatics.sepa.org.uk/RBMP3/	A report produced by the Scottish Government and SEPA describing the third River Basin Management Plan (RBMP) for Scotland. The data utilised in the production of this report is available on the interactive Water Environment Hub of the SEPA website. This data is available on the NMPi database.	The RBMPs relevant to the Proposed Offshore Development will be considered within the EIA. This dataset provides partial coverage of the Offshore ECC Study Area (inshore region).	This 2021 update covers the third RBMP (2021-2027), with the website providing the most up-to-date information.
Marine Scotland (NMPi) (2017a), 'Annual Mean Sea Surface Salinity (‰) – Climatology of the North-West European Continental Shelf 1971-2000'. https://marine.gov.scot/maps/74	The data available on the Marine Scotland NMPi map, displaying the salinity of the surface waters in the Scottish Continental Shelf areas of the North Sea. This information is taken from the NMPi database.	The sea surface salinity of waters relevant to the Proposed Offshore Development will be considered within the EIA. This dataset provides full coverage of the Proposed Offshore Development (Array Area and Offshore ECC Study Area).	This dataset provides the most recent information on salinity available on the NMPi. This particular dataset is not expected to be updated, although more recent analysis of salinity trends may be made available. In this instance, the most recent/reliant

Source, Author and Year	Summary	Coverage of the Array Area and Offshore ECC Study Area	Data Quality
			information will be utilised in the EIAR.
Marine Scotland (NMPi) (2017b), 'Annual Mean Surface Temperature (°C) – Climatology of the North-West European Continental Shelf for 1971-2000'. https://marine.gov.scot/maps/72	The data available on the Marine Scotland NMPi map, displaying the temperature of the surface waters in the Scottish Continental Shelf areas of the North Sea. This information is taken from the NMPi database.	The sea surface temperature of the waters relevant to the Proposed Offshore Development will be considered within the EIA. This dataset provides full coverage of the Proposed Offshore Development (Array Area and Offshore ECC Study Area).	This dataset provides the most recent information on temperature available on the NMPi. This particular dataset is not expected to be updated, although more recent analysis of temperature trends may be made available. In this instance, the most recent/reliant information will be utilised in the EIAR.
Scottish Association for Marine Science (SAMS) (2023), 'Understanding the impacts of floating turbine structures on shelf sea stratification, nutrient fluxes and primary production'.	This report was commissioned by Ørsted, Renantis, and BlueFloat Energy to conduct analysis on a potential seasonal stratification issue within the Stromar, Broadshore, and Bellrock development sites. This data is not available on the NMPi database and was a project-specific commissioned report functioning as an additional data source.	Data was collected covering the entirety of the Array Area, but none along the Offshore ECC Study Area. This dataset provides partial coverage of the Proposed Offshore Development (Array Area and Offshore ECC).	This project-specific commissioned report is very recent and incorporates information relevant to the development area. This data is considered to be high-quality and reliable.
UK Marine Monitoring and Assessment Strategy (UKMMAS) Community (2010), 'Charting Progress 2'. https://tethys.pnnl.gov/sites/default/files/publications/UKMMAS_2010_Charting_Progress_2.pdf	An updated report published building upon the original Charting Progress report (which was an overall assessment of the current state of the UK seas). This update presented a more structured and co-ordinated approach to the assessment of UK seas. This information is not available on the NMPi.	This is a general report covering UK waters, so encompasses the entirety of the Offshore Project Boundary. This dataset provides full coverage of the Proposed Offshore Development (Array Area and Offshore ECC Study Area). This report includes analysis for temporal trends from decades worth of data.	This report provides the most recent update to the original Charting Progress document, although it is now over a decade old. This update divided the UK waters into eight reporting regions, which must report on the state of their oceans/seas. These reporting regions were updated in 2022. It is not expected that this report will be updated.
Oslo and Paris (OSPAR) Conventions Commission (2022), 'Levels and trends in marine contaminants and their biological effects – CEMP Assessment report 2022'. https://oap-cloudfront.ospar.org/media/filer_public/7c/3e/7c3e836c-2ac2-4b73-be1a-	A subsection of a report conducted to assess the current status of the northeast Atlantic waters. This subsection included information on sediment contamination from various chemical compounds.	These contaminant assessments cover the Northern North Sea region, which covers the Offshore Project Boundary. This dataset provides full coverage of the Proposed Offshore Development	This assessment report provides the most recent update on the Coordinated Environmental Monitoring Programme (CoEMP) assessment. An assessment report is produced annually, with a 2023 version anticipated in advance on the EIAR

Source, Author and Year	Summary	Coverage of the Array Area and Offshore ECC Study Area	Data Quality
3dd50d083724/p00894_cemp_assessment_2022.pdf	This data is not available on the NMPi.	(Array Area and Offshore ECC).	submission. The newest version will be incorporated in the EIA.
Marine Scotland (2022), 'Contaminant data in sediment used in the 2020 assessment of the UK's Clean Seas Environment Monitoring Programme (CSEMP)'. https://data.marine.gov.scot/dataset/2020-csemp-assessment-contaminant-and-biological-effect-data-1999-2019/resource/7b9282d5#{view-map:{lonField:!longitude,latField:!latitude}}	A dataset providing records from 1999-2019, utilised in the assessment for the UK's CSEMP. Long-term environmental monitoring is being undertaken in the UK, including measurements taken regarding sediment contamination. This data is not available on the NMPi.	Monitoring stations were chosen from within the 'Moray Firth' and 'Fladen' regions, which were of most relevance to the Proposed Offshore Development. These sampling locations were not necessarily within the Offshore Project Boundary but were included as notable differentiation are not expected within neighbouring regions. This dataset provides partial coverage of the Proposed Offshore Development (Array Area and Offshore ECC Study Area). This data was collected between 1999-2019.	This dataset provides the most up-to-date information related to the 2020 CSEMP assessment. As this monitoring aims to identify long-term trends, it is anticipated this dataset will be updated. If more recent information becomes available prior to EIAR submission, this will be incorporated into future assessment.
Cefas (2016), 'Suspended Sediment Climatologies Around the UK'. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/584621/CEFAS_2016_Suspended_Sediment_Climatologies_around_the_UK.pdf	A report produced by Cefas supporting the Offshore Energy Strategic Environmental Assessment (OESEA3), presenting background on the spatial and temporal variations associated with suspended sediment concentrations around the UK. This data is not available on the NMPi.	This report is general and covers the UK waters, so applies to the Offshore Project Boundary. This dataset provides full coverage of the Proposed Offshore Development (Array Area and Offshore ECC Study Area). The suspended sediment concentration data was taken from 1998-2015.	This dataset comprises the most up-to-date data regarding suspended sediment climate around the UK. There is not expected to be significant variation from between when this data was collected and submission of the EIAR. This dataset is not anticipated to be updated.
Moray Offshore Renewables (2019a), 'Environmental Statement Volume 2 Chapter 3: Physical Environment (Offshore)'. https://marine.gov.scot/data/environmental-statement-maccoll-telford-and-stevenson-offshore-wind-farms-moray-east-offshore	A chapter within the ES produced for the Moray East Offshore Windfarm, presenting results from site-specific surveys undertaken. This is used as a resource when commenting on the background suspended sediment concentrations for the Proposed Offshore Development, with the location in relation to this sampling site making it a relevant resource. This information is not available on the NMPi.	This chapter was produced to support the ES submitted for the Moray East OWF. This dataset provides partial coverage of the Proposed Offshore Development (Array Area and Offshore ECC Study Area). The data was collected during project-specific surveys carried out just prior to report preparation.	This dataset provides recent information, relevant to the location of the Proposed Offshore Development Offshore ECC Study Area. It is not anticipated there would be significant changes between the data collection and EIAR submission. This dataset will not be updated but will be supplemented with project-specific survey data collection.

Source, Author and Year	Summary	Coverage of the Array Area and Offshore ECC Study Area	Data Quality
Marine Scotland (2013), 'Scottish Marine and Freshwater Science Volume 4 Number 1: Annual Cycles of Physical, Chemical and Biological Parameters in Scottish Waters (2013 Update) Tables'. https://www.gov.scot/binaries/content/documents/govscot/publications/consultation-paper/2013/03/scottish-marine-freshwater-science-volume-4-number-1-annual-cycles/documents/00416607-pdf/00416607-pdf/govscot%3Adocument/00416607.pdf	A report produced assessing the annual cycles of various physical, chemical, and biological parameters of Scottish territorial waters. This dataset is available on the NMPi.	This report covers various defined data collection locations, some of which are of relevance to the Proposed Offshore Development. This dataset provides partial coverage of the Proposed Offshore Development (Array Area and Offshore ECC Study Area).	This dataset provides a summary of the 2013 baseline conditions. It is not anticipated there would be significant changes between this data collection and submission of the EIAR. It is not anticipated this particular dataset will be updated. This data will be supplemented by the project-specific surveys planned for commencement in 2023/24.
Ørsted (2023/2024), Project-specific surveys.	Project-specific geophysical (Summer 2023-2024) and benthic ecology (Autumn 2023/Summer 2024) surveys. This data will not be available on NMPi.	This dataset will provide full coverage of the Proposed Offshore Development (Array Area and Offshore ECC Study Area).	These project-specific surveys will involve data collection for water quality and sediment particle analysis. These surveys will provide the most recent information and will supplement the publicly available information collected in the desk-based study.

Description of Baseline Environment

8.3.3 An understanding of the MW&SQ baseline has been derived from project-specific and publicly available data sources and literature, as presented in **Table 8.1**.

8.3.4 Designations of relevant waterbodies are also considered within this MW&SQ chapter (such as WFD waterbodies, Bathing Waters, SWPAs), alongside the physical characteristics of the environment. This baseline understanding will be developed further through the completion of project-specific surveys, which will help inform the subsequent EIAR (for further information, see **Section 8.8: Additional Data Sources**).

Water Quality

8.3.5 The annual mean surface temperature and salinity within the Array Area and Offshore ECC Study Area of the Proposed Offshore Development was collected from publicly available data sources (namely the National Marine Plan Interactive Map (NMPi), as presented in **Table 8.1**.

8.3.6 The available data layers present decades of temperature and salinity climatology data for surface waters in the northwest European shelf seas. This dataset was compiled from data originally extracted from the ICES data centre and the World Ocean Data Centre. The mean monthly sea surface temperature and salinity can be calculated based on this data, as well as a climatic mean annual cycle.

8.3.7 There were six data cells identified of relevance to the Array Area (8028, 8178, 8328, 8027, 8177, and 8327), and 23 identified as relevant to the Offshore ECC Study Area (9378, 9228, 9078, 8928, 8778, 8626, 8478, 9377, 9227, 9077, 8927, 8777, 8627, 8477, 9229, 9079, 8929, 9230, 9080, 8930, 9231, 9081, and 8931) for both salinity and sea surface temperature.

8.3.8 As presented in **Marine and Coastal Processes**.

8.3.9 Table 8.2 and **Figure 8.2,** the mean monthly surface temperatures of the Proposed Offshore Development range from 5.65 °C (Offshore ECC Study Area) in March to 12.92 °C (Offshore ECC Study Area) in August. This temperature variation follows the anticipated annual pattern, with the Offshore ECC Study Area presenting slightly more variation in values then the Array Area (e.g., both the highest and lowest values were recorded in the Offshore ECC Study Area). This higher variation in the Offshore ECC Study Area may be explained by the more variable water depths, with shallower water near the coastline. A thermal front is present year-round along the southeast coast of the Moray Firth, over the Southern Trench. In autumn and winter the front, which is maintained by tidal currents, is located close to the coast, whereas in spring and summer the additional stratification generated by summer warming generates additional surface thermal fronts that extend beyond the coastal zone (NatureScot, 2014). The Developer recently commissioned a SAMS study on the thermal stratification of the Array Area, which is largely unstratified in winter, and a greater degree of stratification in Spring/Summer months (although surface and seabed temperature differences are less significant than that of other nearby offshore wind developments) (SAMS, 2023).

8.3.10 The salinity ranges associated with the Array Area and Offshore ECC Study Area of the Proposed Offshore Development are also presented in **Marine and Coastal Processes**.

8.3.11 Table 8.2 and **Figure 8.3**. Along the Offshore ECC Study Area, the salinity ranged from 34.67 ‰ in April to 35.05 ‰ in October. Similar to surface temperature, there was a greater degree of variation

in the values in the Offshore ECC Study Area than the Array Area (with both the highest and lowest values being recorded in the Offshore ECC Study Area).

8.3.12 SSCs in the vicinity of the Proposed Offshore Development are anticipated to be generally low. Measurements taken by the constructed Moray East OWF in support of the offshore EIA found SSCs are generally very low near the seabed (<5 mg/l) but can be significantly increased during storm events due to the increased wave action. Coarser sediments may be transported over short distances and reposited, where finer sediments may persist in suspension and be transported over greater distances (Moray Offshore Renewables, 2019a). Similar sampling conducted by the Moray West OWF (currently in pre-construction) found similar results to the Moray East OWF. The suspended sediment climatologies presented in the Cefas report also support this conclusion (Cefas, 2016), as presented in **Figure 7.4, Chapter 7: Marine and Coastal Processes**.

8.3.13 Further details on sediment characterisation, sediment transport, and SSCs can be found in **Chapter 7: Marine and Coastal Processes**.

Table 8.2: Mean Monthly Sea Surface Temperature and Salinity in the Array Area and Offshore ECC Study Area (Source: Marine Scotland NMPi).

Month	Mean Sea Surface Temperature (°C)		Mean Surface Salinity (‰)	
	Array Area	Offshore ECC Study Area	Array Area	Offshore ECC Study Area
January	7.70	7.43	34.83	34.79
February	6.88	6.60	34.84	34.77
March	6.13	5.79	34.81	34.77
April	7.27	7.13	34.88	34.75
May	8.31	8.28	34.89	34.79
June	10.29	10.50	34.88	34.80
July	11.41	11.47	34.91	34.88
August	12.41	12.79	34.87	34.82
September	12.01	12.10	34.95	34.91
October	11.62	11.73	35.01	34.99
November	10.10	9.92	34.91	34.88
December	8.71	8.77	34.92	34.90

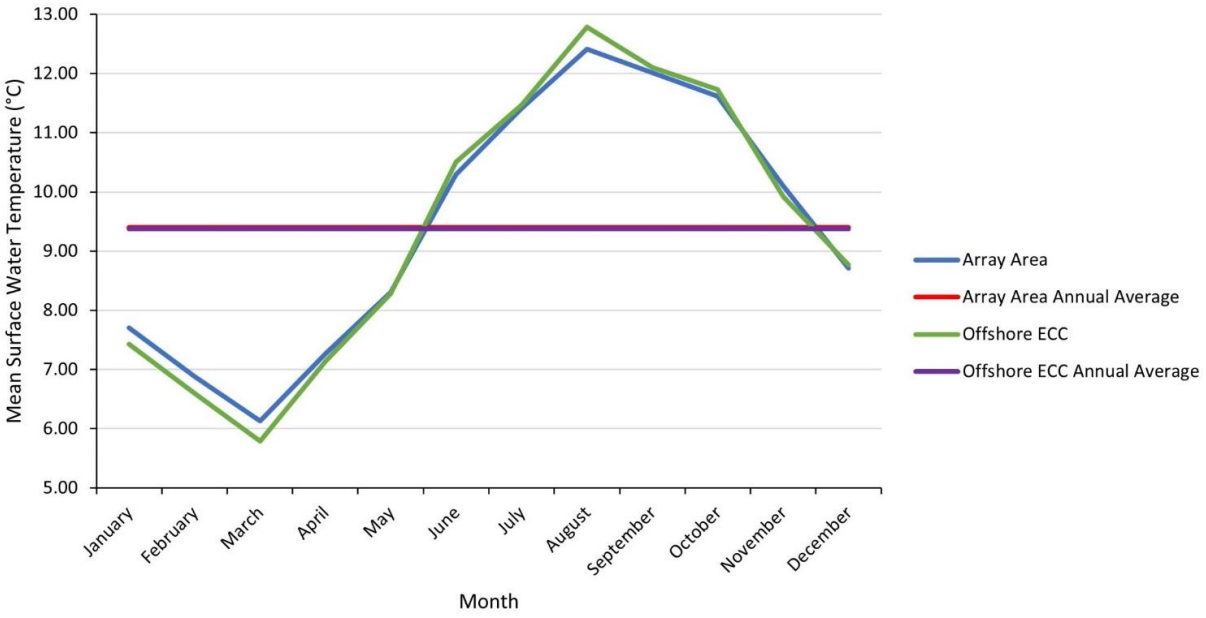

Figure 8.2: Mean Monthly Sea Surface Temperature (°C) within the Array Area and Offshore ECC Study Area. Source: Marine Scotland (NMPi), 2017b.

This climatology data is pulled from approximately three decades of data collection, which took place between 1971-2000.

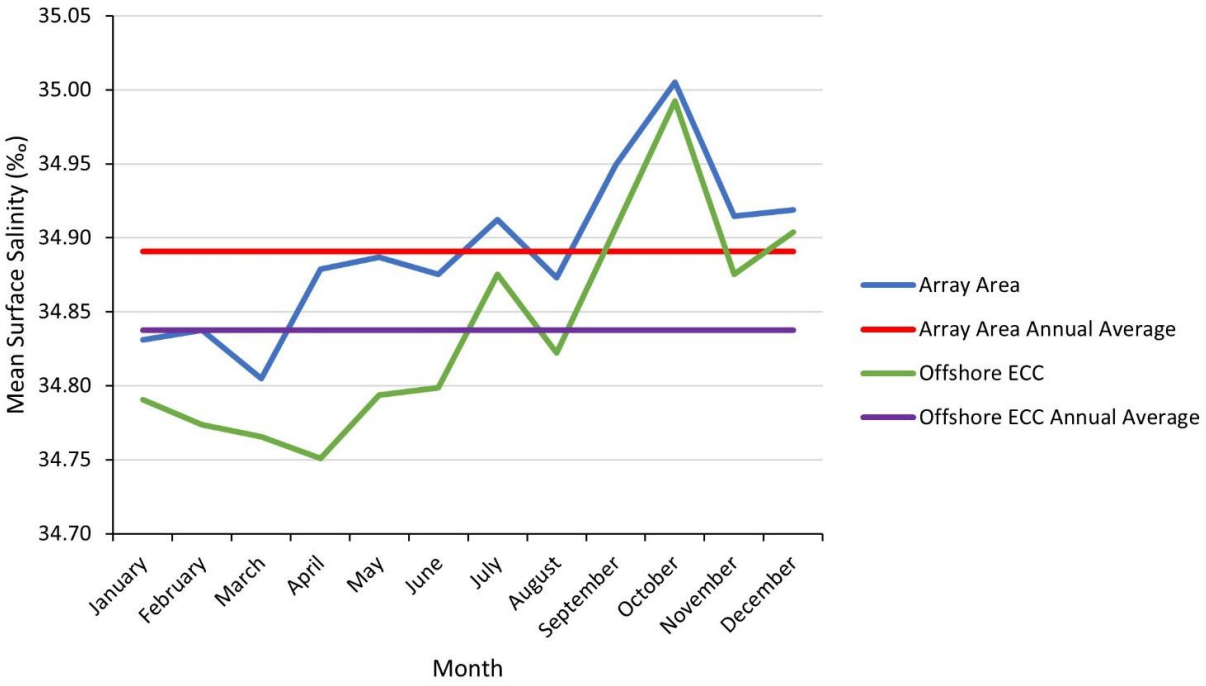

Figure 8.3: Mean Monthly Sea Surface Salinity (‰) within the Array Area and Offshore ECC Study Area. Source: Marine Scotland (NMPi), 2017a.

8.3.14 Data was also collected on the dissolved oxygen concentration (% saturation) in a sampling location relevant to the Proposed Offshore Development, the Outer Moray Firth. The mean dissolved oxygen concentration of surface waters varied across the year but reached a low in December (of 95%) and peaked in July (with 113%) (Marine Scotland, 2013). This decrease in dissolved oxygen from summer

to winter months may be due to algal blooms (which typically occur in summer and fall months), which drain the oxygen in the water until they die off in winter months.

Water Framework Directive

8.3.15 The WFD (2000/60/EC) established a framework to assist with the protection and management of Europe's aquatic resources. This is implemented in Scotland through the Water Environment and Water Services (Scotland) Act 2003, and the Water Environment (Controlled Activities) (Scotland) Regulations 2011. Together, this legislation is known as the Controlled Activities Regulations.

8.3.16 The WFD works by dividing various interconnected waterbodies into discrete surface waterbodies for assessment (between MLWS and one nm). These discrete surface waters are assessed on the basis of their ecological and chemical health, with objectives set for each. The over-arching goal is for each inland and coastal waterbody to achieve 'Good' overall status, which is only possible when 'Good Ecological Status' (GES) and 'Good Chemical Status' (GCS) are both attained. Chemical status is assessed as either 'Pass' or 'Fail', whereas ecological status is assessed as 'High', 'Good', 'Moderate', or 'Bad'. To support achieving this GES and GCS target, there is a general 'no deterioration' provision.

8.3.17 Each discrete waterbody assigned under the WFD is also assigned a hydromorphological designation, describing how altered the waterbody is from its natural state (e.g., without anthropogenic interference). This hydromorphological designation is assessed as:

- Undesignated (e.g., unaltered by anthropogenic factors/in its natural state);
- Heavily Modified Waterbody (HMWB) (e.g., a waterbody substantially changed in character due to physical alterations from anthropogenic interference); or
- Artificial Waterbody (AWB) (e.g., a surface waterbody which was created by human activity).

8.3.18 The default objective assigned to HMWBs and AWBs under the WFD is to attain 'Good Ecological Potential', which ensures the ecology of the waterbody is protected while also taking into consideration the role of the waterbodies to human use.

8.3.19 Ecological status of surface waterbodies is assessed through multiple quality elements, including physico-chemical (e.g., salinity and dissolved oxygen), biological (e.g., fish, angiosperms, phytoplankton, etc.), hydromorphological (e.g., hydrological regime), and specifical metallic pollutants.

8.3.20 Chemical status is assessed via Environmental Quality Standards (EQS), which present a list of 'priority' and 'priority hazardous' substances which require assessment. Further amendments to the WFD have since outlined EQS for specific pollutants (by the introduction of the Priority Substances Directive (2008/205/EC), also known as the 'EQS Directive', and (2013/39/EU)). The application of these environmental standards is regulated by the River Basin District (Standard) Directions 2014.

8.3.21 Also developed under the WFD are RBMPs which seek to define distinct River Basin Districts. Similar to surface waterbodies, these River Basin Districts are assessed individually on common parameters, with objectives set for improving the quality of the surface and groundwater bodies where necessary. RBMPs are reviewed and updated on a six-yearly cycle, allowing changes in quality to be tracked over time. The first RBMP for Scottish waters (covering the Solway Tweed and 'Scotland' districts) was published by the Scottish Government in 2009, covering a period from 2009 to 2015. The second report was published in 2015, which updated the status and objectives set within the original report.

The most recent cycle (the third cycle) was published in 2021, updating this second report for a period from 2021 to 2027.

8.3.22 A summary of the latest classification status of the coastal and transitional waterbodies of relevance to the Proposed Offshore Development is presented in **Table 8.3**. There are two coastal waterbodies of relevance to the Proposed Offshore Development, and no transitional waterbodies of relevance. Both of these coastal waterbodies are currently attaining 'Good' status, as of the 2020 interim classification (SEPA, 2020; SEPA, 2023).

Table 8.3: Summary of the Latest Classification Status for WFD Coastal and Transitional Waterbodies in the Vicinity of the Proposed Offshore Development (Source: SEPA, 2020; SEPA, 2023).

Parameter	Coastal and Transitional Waterbodies	
	Rosehearty to Cairnbulg Point	Macduff to Rosehearty
Waterbody ID	200500	200499
Waterbody Type	Coastal	Coastal
Waterbody Size (km^2)	92.5	130.9
Overall Status	Good	Good
Overall Ecology	Good	Good
Physico-chemical	High	High
Dissolved Oxygen	High	High
Dissolved Inorganic Nitrogen	High	High
Biological Elements	Good	Good
Invertebrate Animals	Good	Good
Imposex Assessment	Good	-
Benthic Invertebrates (Infaunal Quality Index)	Good	Good
Macroalgae	High	High
Macroalgae Full Species List	High	High
Macroalgae Reduced Species List	High	High
Phytoplankton	High	High
Specific Pollutants	Pass	Pass
Copper	-	-
Zinc	-	-
Unionised Ammonia	Pass	Pass
Hydromorphology	High	High
Morphology	High	High
Water Quality	Good	Good

Information on Copper, Zinc, and Imposex Assessment (for Macduff to Rosehearty) was unavailable.

Bathing Waters

8.3.23 The EU's revised Bathing Water Directive (rBWD) (2006/7/EC) was brought into effect in 2006. This Directive has been implemented in Scotland via the Bathing Waters (Scotland) Regulations 2008. When undergoing assessment, Bathing Waters have been classified against standards presented in the rBWD since 2015. This updated Bathing Water Directive (BWD) provides more rigid standards for assessment than the original BWD (76/160/EEC), highlighting the importance of making information freely available to the public. The rBWD was transposed and implemented in Scottish law through the Bathing Waters (Scotland) Amendment Regulations 2012.

8.3.24 Discrete Bathing Waters under the rBWD are classified according to measured levels of certain bacteria (e.g., intestinal enterococci and *Escherichia coli*) during the bathing season, which runs from May until September every year. These Bathing Waters are monitored annually, with the newer classification system considering all samples collected throughout the previous four years. The classification of performance for each Bathing Water is assessed as:

- Excellent: the highest and cleanest class;
- Good: generally good water quality;
- Sufficient: water quality meeting the minimum required standards; and
- Poor: water quality that does not meet the minimum required standards.

8.3.25 There is only one designated Bathing Water within the MW&SQ study area, Rosehearty (**Figure 8.4)**. The other designated Bathing Waters in the immediate area of the Offshore ECC Study Area (but not present within the MW&SQ study area) are presented n **Table 8.4**.

Table 8.4: Bathing Water Classifications of Relevance to the Proposed Offshore Development (Source: SEPA, 2023).

Bathing Water	Classification				
	2018/2019	2019/2020	2020/2021	2021/2022	2022/2023
Rosehearty	Good	Excellent	-	Excellent	Excellent
Fraserburgh (Tiger Hill)	Sufficient	Good	-	Good	Excellent
Fraserburgh (Philorth)	Excellent	Excellent	-	Excellent	Excellent

It should be noted there were no classifications in the year 2020/2021 due to the shortened bathing season and reduced sampling due to the COVID-19 pandemic.

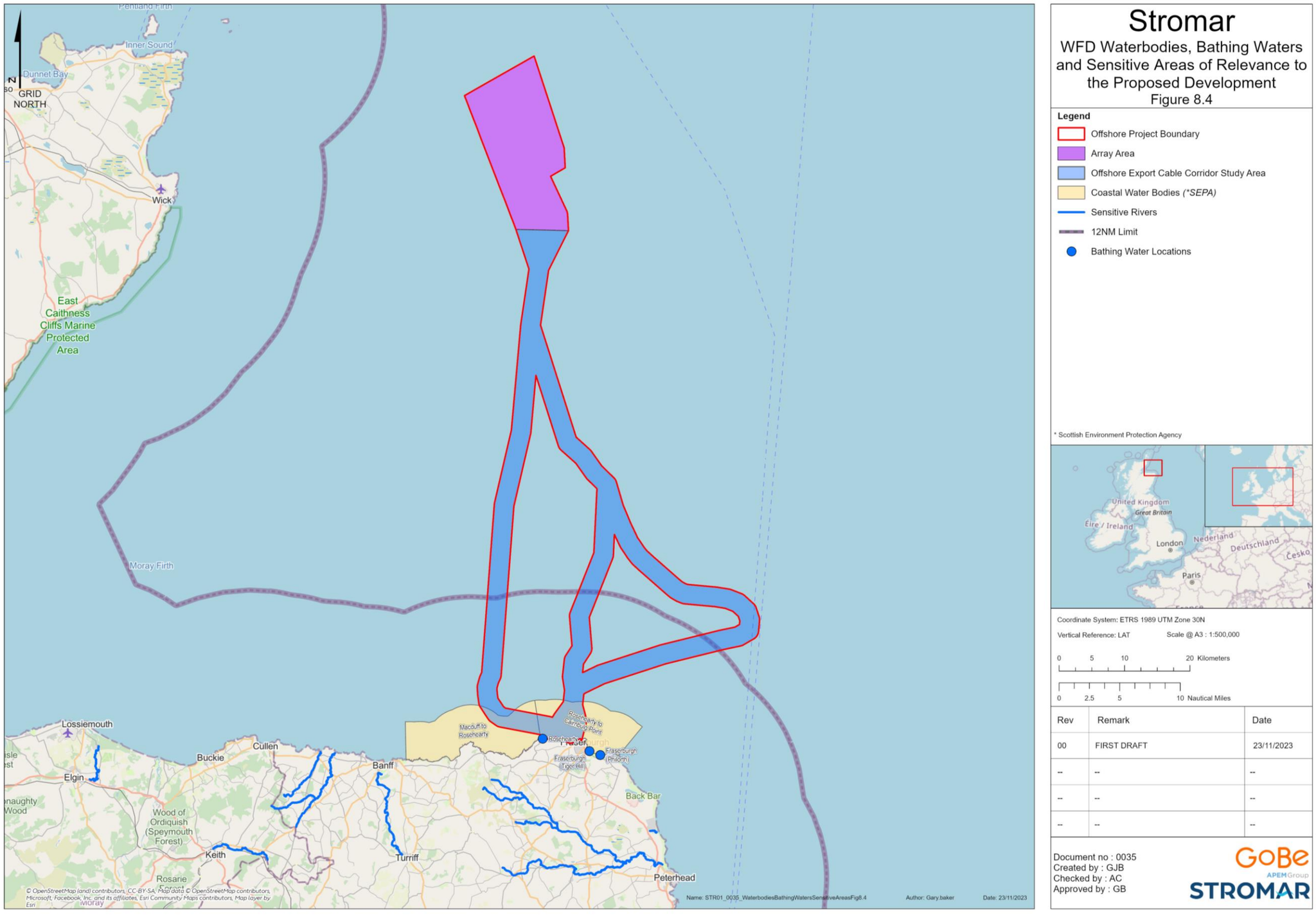

Figure 8.4: **Water Framework Directive Waterbodies, Bathing Waters and Sensitive Areas of Relevance to the Proposed Offshore Development (SEPA).**

Shellfish Water Protected Areas

8.3.26 The Water Environment (Shellfish Water Protected Areas: Designation) (Scotland) Order 2013 identified 85 coastal areas within Scottish territorial limits as shellfish waters, which are presented in a series of maps (Scottish Government, 2019c).

8.3.27 There are only two designated SWPAs within the Moray Firth, which are the Cromarty Bay and Dornoch Firth. Both of these SWPAs are located outwith the MW&SQ study area, being 106 km and 101 km (respectively) away from the Offshore Project Boundary at the closest point.

Sensitive Areas

8.3.28 The UWWTD (91/27/EEC) is implemented in Scotland via the Urban Waste Water Treatment (Scotland) Regulations 1994. These Regulations aim to provide environmental protection against adverse impacts associated with urban waste water (e.g., arising from collection, treatment, and discharge).

8.3.29 There are no 'Sensitive Areas (Eutrophic and Freshwater Fish) Rivers' which drain into the MW&SQ study area. The nearest sensitive areas are found to the west of the Proposed Offshore Development on the Macduff-Fraserburgh coastline, or on the east on the Fraserburgh-Peterhead coastline. This is shown in **Figure 8.4.**

8.3.30 There are no 'Sensitive Areas (Bathing Waters)' within the MW&SQ study area, although there are some outwith this study area along the Macduff-Fraserburgh coastline. These Sensitive Bathing Waters are shown on **Figure 8.4.**

Sediment Quality

8.3.31 There are no formal quantitative EQS for sediment assessment, unlike those for water quality. The standards presented within the EQS Directive are mainly related to contaminant concentrations in the water column, rather than sediment bound. As the Proposed Offshore Development will not result in the direct release of contaminants into the water column, the following assessment will focus on the potential disturbance to sediment bound contaminants.

8.3.32 In the absence of quantified standards regarding sediment quality, the baseline is commonly characterised by comparing contaminant concentrations against the Action Levels (AL) for the disposal of dredged material, as defined by Marine Scotland (2017c), shown in **Table 8.5**. These ALs are used as part of a 'weight of evidence' approach to the assessment of material suitable for disposal at sea.

8.3.33 In general, contaminant levels falling below Action Level 1 (AL1) are considered suitable for disposal at sea and are unlikely to impact licensing decisions. Contaminants concentrations falling above Action Level 2 (AL2) are generally considered unsuitable for disposal at sea. Dredged materials wherein the contaminant concentrations fall between AL1 and AL2 require professional judgement to be employed regarding suitability for disposal at sea. These ALs should not be considered as a binary pass/fail system but help to provide an appropriate context for professional consideration for sediment bound contaminant concentrations (where there is potential to disturb the seabed).

Table 8.5: Action Levels Used in Sediment Contaminant Assessment (Source: Marine Scotland, 2017c).

Contaminant	ALs	
	Action Level 1 (mg/kg)	Action Level 2 (mg/kg)
Arsenic	20	70
Cadmium	0.4	4
Chromium	50	370
Copper	30	300
Lead	50	400
Mercury	0.25	1.5
Nickel	30	150
Zinc	130	600
Tributyltin	0.1	0.5
Polychlorinated Biphenyls (PCBs)	0.02	0.18
Polyaromatic Hydrocarbons (PAHs)	0.1*	-
Total Hydrocarbons	100	-

* The AL1 for all contaminants within the United States Environmental Protection Agency Suite of 16 compounds is defined as 0.1 mg/kg, except Dibenzo(a,h)anthracene (which was set at 0.01 mg/kg).

8.3.34 The UK's CSEMP 2020 assessment described the status and trends of chemical contaminant and biological effect levels at monitoring stations in UK territorial waters. The results from the individual time series of offshore and coastal monitoring points were utilised to conduct a regional assessment. There are nine monitoring stations relevant to the Proposed Offshore Development, covering both the Array Area and Offshore ECC Study Area, which are presented in **Figure 8.5**. The Fladen monitoring points are shown east of the Proposed Offshore Development, with the Moray Firth, Cromarty, and Whiteness Head monitoring points shown to the west of the Proposed Offshore Development.

8.3.35 A summary of the metallic contaminant concentrations reported at the nine CSEMP monitoring stations, with data collected between 1999 to 2018 presented in **Table 8.6**.

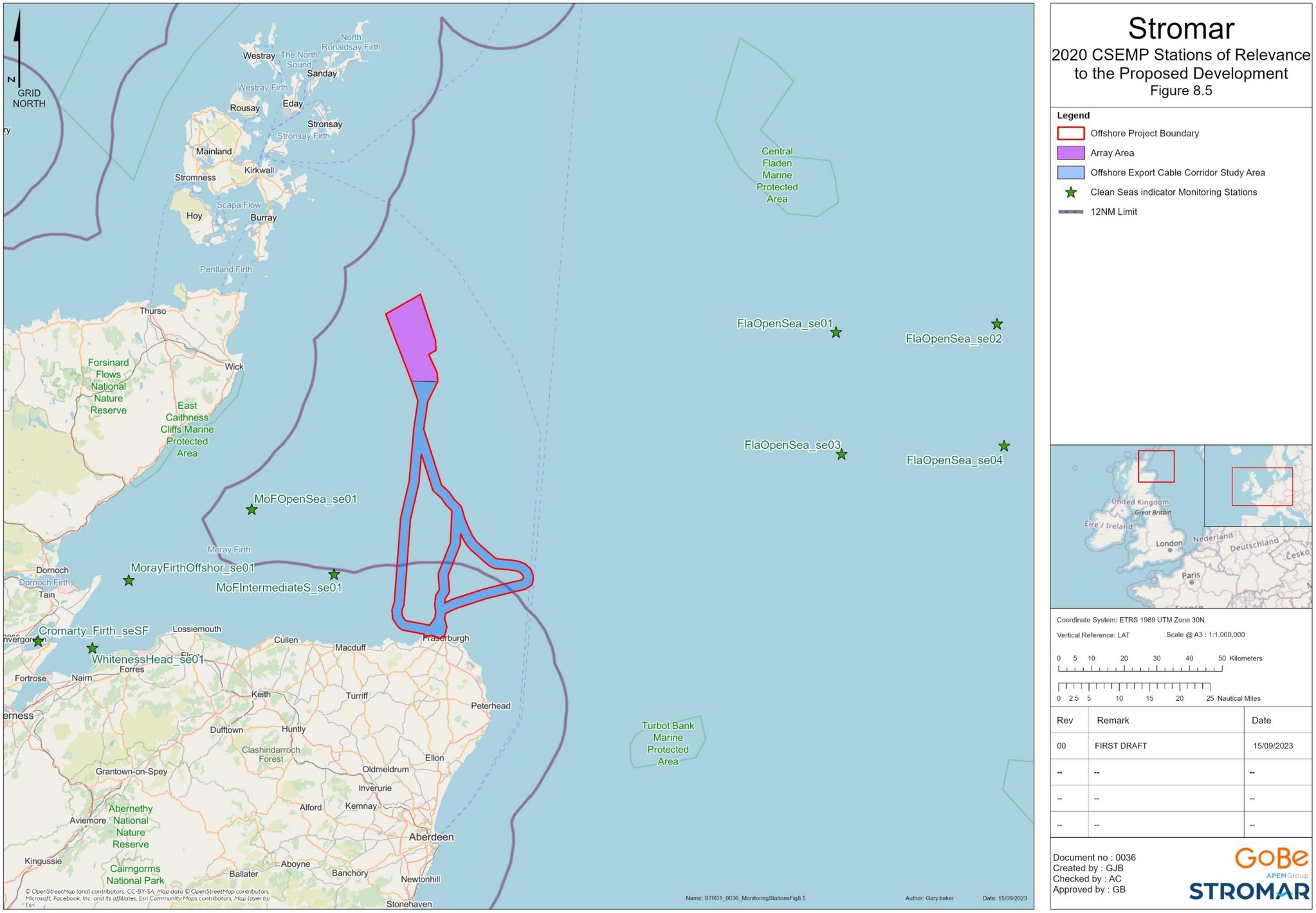

Figure 8.5: **2020 Clean Seas Environmental Monitoring Programme Stations of Relevance to the Proposed Offshore Development (Marine Scotland, 2022).**

Table 8.6: Summary of Metallic Contaminant Concentrations in Sediment from 2020 CESMP Monitoring Points of Relevance (Source: Marine Scotland, 2022a).

Metal	Sediment Contaminant Concentration (mg/kg)								
	Fladen Open Sea 1 (2018)	Fladen Open Sea 2 (2018)	Fladen Open Sea 3 (2018)	Fladen Open Sea 4 (2018)	Moray Firth Intermediate (2006-2016)	Moray Firth Open Sea (1999-2016)	Moray Firth Offshore (2006-2016)	Cromarty Firth (2003-2015)	Whiteness Head (1999-2016)
Arsenic	$\bar{X}$ = 3.62 (2.96-4.48), n=3	$\bar{X}$ = 3.74 (2.89-4.27), n=3	$\bar{X}$ = 0 (0-0), n=0	$\bar{X}$ = 4.16 (3.42-4.71), n=3	$\bar{X}$ = 4.02 (0.40-7.64), n=110	$\bar{X}$ = 0 (0-0), n=0	$\bar{X}$ = 5.28 (1.00-11.80), n=55	$\bar{X}$ = 9.33 (5.74-21.30), n=49	$\bar{X}$ = 7.63 (3.02-10.30), n=44
Cadmium	$\bar{X}$ = 0.08 (0.08-0.09), n=3	$\bar{X}$ = 0.08 (0.08-009), n=3	$\bar{X}$ = 0.09 (0.08-0.10), n=3	$\bar{X}$ = 0.09 (0.09-0.09), n=3	$\bar{X}$ = 0.10 (0.03-0.24), n=110	$\bar{X}$ = 0.14 (0.06-0.36), n=53	$\bar{X}$ = 0.09 (0.06-0.19), n=55	$\bar{X}$ = 0.18 (0.05-0.37), n=49	$\bar{X}$ = 0.18 (0.07-1.46), n=44
Chromium	$\bar{X}$ = 38.03 (29.20-54.00), n=3	$\bar{X}$ = 36.53 (27.40-51.30), n=3	$\bar{X}$ = 42.10 (37.90-49.30), n=3	$\bar{X}$ = 51.70 (49.40-52.90), n=3	$\bar{X}$ = 31.03 (9.60-53.90), n=110	$\bar{X}$ = 17.81 (6.01-47.30), n=53	$\bar{X}$ = 32.42 (11.10-66.20), n=55	$\bar{X}$ = 49.76 (23.50-76.60), n=49	$\bar{X}$ = 50.51 (25.10-69.80), n=44
Copper	$\bar{X}$ = 5.72 (3.58-7.31), n=3	$\bar{X}$ = 5.12 (3.43-7.91), n=3	$\bar{X}$ = 4.81 (4.17-5.99), n=3	$\bar{X}$ = 7.12 (6.78-7.68), n=3	$\bar{X}$ = 5.83 (1.35-56.40), n=110	$\bar{X}$ = 0 (0-0), n=0	$\bar{X}$ = 4.59 (0.15-12.50), n=55	$\bar{X}$ = 13.46 (4.81-33.90), n=49	$\bar{X}$ = 9.41 (6.85-12.40), n=44
Lead	$\bar{X}$ = 16.17 (13.50-21.20), n=3	$\bar{X}$ = 16.47 (13.60-20.10), n=3	$\bar{X}$ = 15.30 (14.10-17.70), n=3	$\bar{X}$ = 18.63 (17.70-19.70), n=3	$\bar{X}$ = 11.91 (5.90-32.30), n=110	$\bar{X}$ = 9.10 (5.86-11.60), n=53	$\bar{X}$ = 14.02 (7.01-31.40), n=55	$\bar{X}$ = 28.59 (18.40-44.50), n=49	$\bar{X}$ = 27.33 (20.60-38.30), n=44
Mercury	$\bar{X}$ = 0.02 (0.01-0.04), n=3	$\bar{X}$ = 0.02 (0.01-0.02), n=3	$\bar{X}$ = 0.01 (0.01-0.01), n=3	$\bar{X}$ = 0.02 (0.02-0.02), n=3	$\bar{X}$ = 0.02 (0.01-0.03), n=100	$\bar{X}$ = 0.06 (0.01-0.29), n=52	$\bar{X}$ = 0.02 (0.01-0.09), n=50	$\bar{X}$ = 0.13 (0.02-0.62), n=49	$\bar{X}$ = 0.09 (0.05-0.29), n=43
Nickel	$\bar{X}$ = 14.10 (10.50-21.30), n=3	$\bar{X}$ = 14.60 (10.10-21.20), n=3	$\bar{X}$ = 15.70 (13.90-18.70), n=3	$\bar{X}$ = 21.27 (20.10-22.30), n=3	$\bar{X}$ = 9.79 (3.20-18.80), n=110	$\bar{X}$ = 5.12 (0.94-9.32), n=53	$\bar{X}$ = 10.24 (3.16-24.80), n=55	$\bar{X}$ = 15.38 (8.16-21.80), n=49	$\bar{X}$ = 17.61 (13.40-22.30), n=44
Zinc	$\bar{X}$ = 27.43 (20.50-40.40), n=3	$\bar{X}$ = 28.47 (20.20-40.20), n=3	$\bar{X}$ = 27.93 (25.00-33.80), n=3	$\bar{X}$ = 39.23 (37.80-41.80), n=3	$\bar{X}$ = 25.23 (9.97-68.60), n=110	$\bar{X}$ = 18.51 (4.56-73.00), n=53	$\bar{X}$ = 30.41 (9.92-71.00), n=55	$\bar{X}$ = 60.18 (36.80-95.40), n=49	$\bar{X}$ = 58.72 (49.40-71.50), n=44

X = mean concentration (minimum-maximum), n=no. of samples.

8.3.36 The contaminant concentrations in sediments were generally low, although there were minor exceedances of AL1 for arsenic (Cromarty Firth), cadmium (Whiteness Head), chromium (Fladen Open Sea 1, Fladen Open Sea 2, Fladen Open Sea 4, Moray Firth Intermediate, Moray Firth Offshore, Cromarty Firth, and Whiteness Head), copper (Moray Firth Intermediate, and Cromarty Firth), and mercury (Moray Firth Open Sea, Cromarty Firth, and Whiteness Head). There were no samples from any monitoring stations which exceeded the respective AL2 values.

8.3.37 The 2022 CoEMP (as prepared by OSPAR, 2022) reviewed and compared the zinc, nickel, mercury, lead, copper, chromium, cadmium, arsenic, organotin, Polychlorinated Biphenyls (PCBs), PAHs, and Polybrominated Diphenyl Ether (PBDE) contaminant concentrations in sediments. Within this CoEMP, the region relevant to the Proposed Offshore Development comprises the Northern North Sea.

8.3.38 The summary of regional assessments of trends and environmental status for metals in sediment within this CoEMP indicated arsenic, cadmium, copper, nickel, and zinc contaminant concentrations in sediment were measured significantly below the Background Assessment Concentrations in the Northern North Sea. The sediment-bound mercury, lead, and chromium were measured significantly below Environmental Assessment Criteria (EAC) (or equivalent).

8.3.39 As documented within the CoEMP, the summary of regional assessments of trends and environmental status of PAHs, PCBs, and PBDE's in sediment were all significantly below the EAC (or equivalent). These results show the metal, PAH, PCB, and PBDE concentrations in sediment to be present in relatively low background levels in the Northern North Sea.

8.3.40 Sediment contaminant characterisation from the nearby Moray West OWF revealed all metallic contaminants were present in concentrations below their respective guidelines (where available), with no samples present in concentrations above the UK/Dutch/Canadian standards. The sediment-bound PAH concentrations were also generally low (mostly below the limit of detection (LOD)), although it is worth noting the LOD for Acenaphthene, Acenaphthylene, and Dibenzo(a,h)anthracene were slightly higher than the Canadian threshold effect values (Moray Offshore Windfarm (West) Ltd., 2018a). Further information can be found in **Chapter 9: Benthic and Intertidal Ecology**.

Blue Carbon Assessment

8.3.41 SNH commissioned a report (in 2014) assessing the blue carbon stores around the Scottish coastline. This report then led to the output of various blue carbon maps, which present the predicted and observed habitat extent for various blue carbon stores (e.g., saltmarsh meadows, seagrass, etc.). These mapping outputs indicate there is predicted kelp habitat in the vicinity of the Offshore ECC and Landfall Development Zone, which will need consideration in the EIA. There are no predicted kelp habitats within the Array Area, and no predicted seagrass recorded within the Array Area or Offshore ECC Study Area (Burrows *et al*., 2014).

8.3.42 Subtidal sediments are the main repositories of carbon in the marine environment, with an estimated 18,000,000 tonnes of organic carbon stored within the surficial layers (top 10 cm) of marine sediment in Scottish waters (Burrows *et al*., 2014). It is known that finer sediments (such as silts and clays) retain more organic carbon than coarser sediments (such as sand). As shown in **Figure 8.2, Chapter 7: Marine and Coastal Processes** the sediments present within the Array Area are typically sand dominated, with the Offshore ECC Study Area transitioning from sands and gravels to muddy sediment. This may indicate a higher degree of carbon sequestration would occur along the Offshore

ECC Study Area, rather than within the Array Area. One of the designated features of the Southern Trench NCMPA include burrowed mud, which may contribute to this carbon storage along the Offshore ECC Study Area. Phytoplankton and kelp are the main vessels for carbon to be sequestered in carbon storage, with coastal species also contributing (although less significantly due to the limited habitat extents).

8.3.43 A blue carbon assessment will be undertaken in the EIA, which will build further upon assessments undertaken in **Chapter 9: Benthic and Intertidal Ecology**, focusing on the potential impacts of the Proposed Offshore Development on marine sediments. This carbon assessment will be presented within the Greenhouse Gas and Climate Change chapter of the subsequent EIAR.

8.4 Embedded Commitments

8.4.1 The Proposed Offshore Development has adopted various primary commitments (primary design principles intrinsically part of the Project design, installation techniques and engineering designs/modifications) as part of the pre-application phase to eliminate and/or reduce LSE arising from a number of impacts (as far as possible). These are outlined in **Appendix A: Offshore Commitments Register**. Further commitments (imposed as a result of legislative requirements and/or standard sectoral practice, regardless of EIA assessment), referred to as tertiary commitments are embedded as an inherent aspect of the EIA process. Secondary commitments (which require further activity to achieve anticipated outcome- often secured through planning conditions and/or management plans) are incorporated to reduce LSE to environmentally acceptable levels following initial assessment, i.e., so that residual effects are reduced to environmentally acceptable levels.

8.4.2 The commitments adopted by the project in relation to MW&SQ are presented in **Table 8.7**. The full list of commitments can be found in **Appendix A: Offshore Commitments Register**.

Table 8.7: The Proposed Commitments Relevant to MW&SQ Receptors.

Commitment Code	Commitment Measure
C-OFF-09	Development of, and adherence to a CaP. The CaP will confirm planned cable routing, burial and any additional protection and will set out methods for post-installation cable monitoring as secured by Section 36 and Marine Licence consent conditions. The CaP is likely to be supported by a CBRA, which will outline how external cable protection shall be used and/or minimised, should cable burial be achieved.
C-OFF-13	A Project Environmental Management Plan (PEMP) will be developed, to include a Marine Pollution Contingency Plan and Invasive Non-Native Species (INNS) Management Plan. This PEMP will also include information on chemical usage, dropped objects, and waste management.
C-OFF-18	Scour protection to be implemented around foundations and offshore structures. Ideally this will reduce the change to hydrodynamic and sedimentary regimes that may expose archaeological receptors leading to increased rates of deterioration through biological, chemical and physical processes.
C-OFF-63	Development of and adherence to a DP, secured under Section 36 and/or Marine Licence consent conditions.

8.4.3 As a result of the commitment to implement these measures, and to align with various standard sectoral practices and procedures, the embedded (primary) commitments are considered inherently

part of the design of the Proposed Offshore Development and have, therefore, been included in the assessment presented in **Section 8.5**.

8.4.4 The requirement and feasibility of any additional commitments will be dependent on the significance of the effects upon MW&SQ and will be consulted upon with statutory consultees throughout the EIA process.

8.4.5 There is also potential for MW&SQ to interact with other receptors (via other impact pathways), with information of these potential pathways to be used to inform subsequent EIA technical topic assessment, such as:

- **Chapter 9: Benthic and Intertidal Ecology**;
- **Chapter 10: Fish and Shellfish Ecology**;
- **Chapter 12: Marine Mammals**; and
- **Chapter 13: Commercial Fisheries**.

8.5 Scoping of Impacts

8.5.1 Potential impact pathways relevant to MW&SQ which may occur during the construction, O&M, or decommissioning phases of the Proposed Offshore Development have been identified and are presented in **Table 8.8**. These impacts are based on a consideration of the baseline environmental conditions. There were no 'Possible LSE' impacts identified for MW&SQ.

Table 8.8: Scoping Assessment for MW&SQ.

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
Construction and Decommissioning				
Deterioration in water quality due to the suspension of sediments	C-OFF-09 C-OFF-13 C-OFF-18 C-OFF-63	Scoped In	Sediment disturbance and resuspension arising from construction and decommissioning activities are likely. This may result in adverse effects on water quality, due to the potential for increased nutrients, decreased dissolved oxygen, and a reduction in water clarity. This may arise as a result of cofferdam installation/removal, cable installation and repair works, and installation and repair activities in the Array Area.	LSE without secondary commitment measures
Release of sediment-bound contaminants from disturbance of sediments	C-OFF-09 C-OFF-13	Scoped In	Sediment disturbance associated with the construction and decommissioning phases may result on adverse effects on water quality (including potential cofferdam installation/removal). This can be caused by temporary re-suspension and redistribution of previously contaminated sediments.	LSE without secondary commitment measures
Deterioration in water clarity due to the release of drilling mud	C-OFF-09 C-OFF-13 C-OFF-63	Scoped In	If there is a requirement to undertake HDD at the landfall, an inert drilling mud (such as bentonite) will be needed. This may result in the release of drilling mud at the punch-out point, which may result in increased turbidity and reduced bacterial mortality in the water column (as opposed to a contamination issue). Dependent on foundation anchors, drilling may also be undertaken for piled/micro-piled anchors, which may lead to a similar release of drilling mud.	LSE without secondary commitment measures
Accidental release or spills of materials/chemicals	C-OFF-13 C-OFF-63	Scoped Out	There is potential for some substances to be accidentally released into the marine environment (such as grease, fuel, oil, anti-fouling paints, etc.). There are no planned chemical discharges (either continuous or intermittent) for the Proposed Offshore Development which may be toxic to the receiving environment. Any impacts associated with accidental release of construction materials or chemicals are anticipated to be short-lived and localised, as hydrocarbons would be rapidly dispersed or diluted. All vessels associated with the Proposed Offshore Development will be required to comply with strict environmental protocol set out in the PEMP and MPCP, which will minimise the initial risks and detail response procedures for dealing with spills and accidental releases (all relevant commitments are presented in **Appendix A: Commitment Register**). Due to the	No LSE identified at Scoping.

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
			implementation of such controls, and the low quantities of hydrocarbons and chemicals, it is proposed for this impact to be Scoped Out of the subsequent EIA.	
Deterioration in the status of WFD transitional and/or coastal waterbody	C-OFF-09 C-OFF-13 C-OFF-63	Scoped In	The seabed disturbance associated with construction and decommissioning activities would result in in a deterioration of status of designated transitional and coastal waterbodies. Given that the boundaries of WFD coastal waterbodies only extend up to 1 nm from the low water mark, potential impacts will be associated with landfall and ECC works. A WFD compliance assessment will be produced within the subsequent EIA.	LSE without secondary commitment measures
Deterioration in Bathing Water quality	C-OFF-09 C-OFF-13 C-OFF-63	Scoped In	A deterioration in Bathing Water classifications may result from construction and decommissioning activities associated with the Proposed Offshore Development. Increased turbidity associated with sediment plumes (e.g., from cable installation) may lead to reduced bacterial mortality, impacting the bathing season. It is anticipated that potential impacts will be limited to landfall and Offshore ECC works (due to the coastal locations of the Bathing Waters).	LSE without secondary commitment measures
Operation and Maintenance				
Deterioration in water quality due to the suspension of sediments	C-OFF-09 C-OFF-13 C-OFF-18 C-OFF-63	Scoped In	Should a section of cabling become damaged or exposed, remedial burial/replacement work would be required. This would be undertaken with similar techniques to those used for the initial cable installation.	LSE without secondary commitment measures
Accidental release or spills of materials/chemicals	C-OFF-13 C-OFF-63	Scoped Out	As with the construction/decommissioning phases, there is potential for accidental release or spills of material from vessels associated with the O&M of the Proposed Offshore Development. These impacts would likely be short-lived and localised, with released hydrocarbons being rapidly dispersed and diluted. All vessels associated with the Proposed Offshore Development will be required to comply with strict environmental protocol set out in the PEMP and MPCP, which will minimise the initial risks and detail response procedures for dealing with spills and accidental releases (all relevant commitment measures are presented in **Appendix A: Commitment Register**). Due to the implementation of such controls, and the low quantities of	No LSE identified at Scoping

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
			hydrocarbons and chemicals, it is proposed for this impact to be Scoped Out of the subsequent EIA.	
Deterioration in water quality due to re-suspension and redistribution of sediments from scour	C-OFF-13 C-OFF-18	Scoped Out	There is potential for sediment resuspension to be associated with the Proposed Offshore Development scour infrastructure, although this would likely be a smaller magnitude than that resuspension associated with construction/decommissioning. It is proposed for this impact to be Scoped Out of the subsequent EIA for these reasons. The effects would be associated with mobile sediments, so would be highly localised, with mobile sediment and contaminant volumes considered within the range of natural variability. All relevant commitment measures are presented in **Appendix A: Commitment Register.**	No LSE identified at Scoping
Changes in water and sediment quality associated with infrastructure cleaning	C-OFF-13	Scoped Out	The routine maintenance activities for infrastructure have potential to result in reduced water and sediment quality (in the immediate vicinity). This operational cleaning work may release anti-fouling paints into the marine environment, although impacts from such events are considered likely to be temporary, short-lived, small-scale, and highly localised. The Proposed Offshore Development will manage risks through embedded commitments, including use of anti-biofouling paints which are not harmful the marine environment. All relevant commitment measures are presented in **Appendix A: Commitment Register**.	No LSE identified at Scoping
Deterioration in the status of WFD transitional and/or coastal waterbody	C-OFF-09 C-OFF-13 C-OFF-63	Scoped In	There is potential for some O&M activities to result in deterioration of status in coastal/transitional waterbodies (e.g., seabed disturbance from cable repair/maintenance activities). Given that the boundaries of WFD coastal waterbodies only extend up to 1 nm from the low water mark, potential impacts will be associated with landfall and ECC works. A WFD compliance assessment will be produced within the subsequent EIA.	LSE without secondary commitment measures
Deterioration in Bathing Water quality	C-OFF-09 C-OFF-13 C-OFF-63	Scoped In	Activities associated with the O&M phase have the potential to result in the deterioration of status of designated Bathing Waters in the vicinity of the works. The boundaries of designated WFD waterbodies only extend out to one nm, meaning only activities associated with the Landfall Development Zone and Offshore ECC Study Area would be relevant. A WFD compliance assessment will be produced alongside	LSE without secondary commitment measures

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
			the EIAR, to fully assess potential impacts to WFD waterbodies and protected areas.	

8.6 Potential Cumulative Impacts

8.6.1 The process by which potential cumulative impacts will be assessed through the CIA is described in **Chapter 20: Other Human Activities**, as well as giving examples of projects likely to be subject to assessment. For MW&SQ, these cumulative interactions may occur with other planned OWFs, or other industries with operations or developments in the study area.

8.6.2 The MW&SQ study area is consistent with that presented in **Chapter 9: Benthic and Intertidal Ecology** and may be refined further following assessment and analysis of tidal excursions and sediment transport pathways, to present a ZoI in the subsequent EIA. This ZoI approach will refine the CIA to be undertaken. The effects of the Proposed Offshore Development are anticipated to be localised to the footprint of the works, although there is potential for certain impacts to interact with other developments, resulting in a larger cumulative effect. For MW&SQ, these cumulative interactions may occur with other planned projects such as Caledonia OWF, Broadshore OWF and Ayre OWF (dependent on construction timelines), as well as two potential innovation developments (Sinclair and Scaraben) in the vicinity of the Offshore ECC. There is potential for cumulative effects in the construction, O&M, and decommissioning phases of the Proposed Offshore Development. It should be noted the potential for these cumulative interactions is dependent upon the further assessment and modelling to be undertaken. Further information on the planned/present developments in the vicinity of the Proposed Offshore Development is presented in **Chapter 20: Other Human Activities**.

8.6.3 The CIA for MW&SQ will consider the MDS for the Proposed Offshore Development with the other development in questions, aligned with the methodology presented in **Chapter 6: EIA Approach and Methodology**.

8.7 Potential Transboundary Impacts

8.7.1 There are no transboundary impacts on MW&SQ pathways expected resulting from the construction, O&M, or decommissioning activities associated with the Proposed Offshore Development. Any predicted impacts on these pathways are likely to be highly localised (e.g., remain within the study area), and will not affect the marine environment beyond UK waters. Therefore, it is proposed for transboundary impacts regarding MW&SQ to be Scoped Out of the subsequent EIA.

8.8 Proposed Approach to EIA

Additional Data Sources

8.8.1 A thorough, desk-based collation and review of the relevant data will be undertaken to inform the subsequent EIA, including updated classifications of designated WFD waterbodies and protected areas. The Developer will request any relevant MW&SQ data held by SEPA for areas of relevance to the Proposed Offshore Development. This desk-based information will be supplemented by site-specific surveys with sediment sampling and subsequent laboratory analysis providing details of particle size distribution and sediment-bound contaminant concentration. This sediment sampling is planned for Q3 2023/Q1 2024. The methodology for this survey will be agreed with NatureScot, and all required marine licencing (or exemptions agreed) obtained from the Marine Directorate, Ports Authorities and CES, in advance of the surveys being undertaken.

8.8.2 The Project-specific survey outputs will be used to enhance the understanding of the baseline conditions. These may include the following across the Array Area and Offshore ECC Study Area:

- Geophysical surveys: planned to commence in Summer 2023 - 2024; and
- Benthic surveys: planned to commence in Autumn 2023 - Summer 2024.

8.8.3 A metocean wave buoy was deployed within the Array Area in Summer 2023, to collect metocean data for 12 to 24 months.

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Guidance

8.8.4 In addition to the approach and guidance (of general relevance) outlined in **Chapter 6: EIA Approach and Methodology**, the assessment of MW&SQ receptors will also comply with the following guidance:

- Pre-disposal Sampling Guidance. Version 2 - November 2017 (Marine Scotland, 2017c);
- Marine Scotland Consenting and Licensing Guidance for Offshore Wind, Wave and Tidal Energy Applications (Marine Scotland, 2018) and any subsequent web-based updates;
- Guidance for Pollution Prevention (GPP) Note 5 (GPP5) - Works and maintenance in or near water produced by NRW, and Northern Ireland Environment Agency (NIEA) and SEPA (2018);
- Guidelines for Data Acquisition to Support Marine Environmental Assessments of Offshore Renewable Energy Projects (Cefas, 2012);
- EIA for offshore renewable energy projects (BSI, 2015);
- Coastal Processes Modelling for Offshore Wind Farm Environment Impact Assessment: Best Practice Guide (Lambkin et al., 2009);
- Review of Cabling Techniques and Environmental Effects Applicable to the Offshore Wind Farm Industry (BERR, 2008a); and
- OSPAR Assessment of the Environmental Impacts of Cables (OSPAR, 2009).

8.8.5 In the absence of formal Scottish guidance on the preparation of WFD compliance assessments, the standard approach is to follow the Environment Agency's 'Clearing the Waters for All' process, as well as Advice Note Eighteen: The Water Framework Directive (Planning Inspectorate, 2017). If alternative guidance is suggested in consultation, this approach will be adopted going forward. This guidance outlines how to assess the impact(s) of activities on coastal/transitional waterbodies in relation to WFD objectives, as set out in the following key stages:

- Screening: for the exclusion of activities which do not need to be taken forward to the Scoping or impact assessment stages;
- Scoping: for the identification of receptors and quality elements which are potentially at risk from the proposed activities, and will require further assessment; and
- Assessment: for the consideration of the potential impacts from an activity, identification of ways to avoid/minimise impacts, and indication if an activity may cause deterioration in waterbody status/jeopardise potential of waterbody to achieve 'Good' status.

Assessment Methodology

8.8.6 The EIA will follow the general Proportionate EIA approach outlined in **Chapter 6: EIA Approach and Methodology** of this Offshore Scoping Report.

8.8.7 The study area for the MW&SQ baseline within the EIA will be as outlined here but will be refined further following desk-based literature review and site-specific surveys being undertaken. The scope of this MW&SQ assessment is to characterise the physical and chemical conditions within the study area and assess how these may be impacted from the Proposed Offshore Development. This information will be used to assess the potential impacts to MW&SQ receptor in isolation, as well as helping to inform other technical topic assessments, such as **Chapter 9: Benthic and Intertidal Ecology, Chapter 10: Fish and Shellfish Ecology, Chapter 12: Marine Mammals, and Chapter 13: Commercial Fisheries**.

8.8.8 The MW&SQ assessment will take into account the magnitude and duration of the impact, the reversibility of the impact, and the timing and frequency of the activity. An assessment of the potential impacts will be undertaken through application of numerical modelling (as described in **Chapter 7: Marine and Coastal Processes**) and the Evidence Base (which will include site-specific survey outputs). The significance of environmental changes will be compared against the anticipated natural variability within (or long-term changes to) the marine environment due to natural cycles (such as storm events).

8.8.9 Consultation will be undertaken throughout the EIA process (e.g., with MD-LOT, NatureScot, and SEPA), ensuring the approach taken and proposed evidence base satisfy the requirements of stakeholders and regulators. The scope and approach for the upcoming numerical modelling will also be consulted upon with MD-LOT and NatureScot to ensure it is appropriate for its purpose.

8.9 Scoping Questions

8.9.1 The following questions refer to the MW&SQ chapter and are designed to inform the Scoping Opinion and focus the Scoping exercise:

1. Do you agree with the study area defined for MW&SQ?
2. Do you agree with the use of data listed in **Table 8.1**, and any additional data listed in **Paragraph 8.8.1**, being used to inform the Offshore EIA Report?
3. Are there any further data sources or guidance documents that should be considered?
4. Do you agree that all receptors, pathways, and potential impacts related to MW&SQ have been identified?
5. Do you agree with the Scoping In and Scoping Out of impact pathways in relation to MW&SQ?
6. Do you agree with the assessment of transboundary effects in relation to MW&SQ?
7. Do you agree with the assessment of cumulative effects in relation to MW&SQ?
8. Do you agree with the proposed assessment methodology for MW&SQ?
9. Do you agree on the suitability of the proposed commitments to reduce or eliminate LSE relevant to MW&SQ?
10. Do you agree that water quality samples will need to be collected from within a Water Framework Directive designated area (which will be used in the subsequent WFD Assessment)?

9 Benthic and Intertidal Ecology

9.1 Introduction

9.1.1 This chapter of the Offshore Scoping Report identifies the benthic and intertidal ecology receptors of relevance to the Proposed Offshore Development and considers the potential impacts from the construction, O&M and decommissioning of the Proposed Offshore Development on benthic and intertidal ecology up to MHWS.

9.1.2 The Proposed Offshore Development has the potential to cause a variety of adverse effects on benthic subtidal and intertidal ecology. The construction, O&M and decommissioning of the Proposed Offshore Development can impact sensitive benthic receptors through the increase of SSC which can smother benthic habitats and species. Furthermore, the infrastructure has the potential to have further adverse effects, such as habitat loss, disturbance or the emittance of Electromagnetic Fields (EMFs) from cables.

9.1.3 This Scoping chapter should be read alongside the following other chapters:

- **Chapter 7: Marine and Coastal Processes**;
- **Chapter 8: Marine Water and Sediment Quality**; and
- **Chapter 10: Fish and Shellfish Ecology**.

9.1.4 This chapter of the Offshore Scoping Report has been prepared by GoBe.

9.2 Study Area

9.2.1 The benthic and intertidal ecology study area is defined by the Proposed Offshore Development plus an appropriate buffer (6 km), as presented in **Figure 9.1.** This includes the Array Area, Offshore ECC Study Area, the proposed intertidal Landfall Development Zone, as well as the wider ZoI associated with potential secondary impacts.

9.2.2 The ZoI buffer for the assessment of benthic and intertidal ecology encompasses the area over which suspended sediment might disperse following disturbance as a result of Proposed Offshore Development activities. For the purposes of Scoping, this has been determined as the extent of the spring tidal excursion, a distance of between 4 km and 6 km (ABPmer *et al.,* 2008) resulting in the adoption of a precautionary buffer of 6 km. The extent of the buffer has been informed by previous project experience at Moray West OWF (located 38 km from its nearest point to the Proposed Offshore Development, at the Offshore ECC Study Area), as well as expert judgement of the range over which indirect effects of the Proposed Offshore Development may impact on benthic ecology receptors (e.g., increased SSC and deposition). The intertidal ecology study area is defined by the Landfall Development Zone extending from the MLWS mark up to the MHWS mark within the Offshore Proposed Offshore Development Boundary, with inclusion of the ZoI (**Figure 9.1**).

9.2.3 This study area may be further refined as required at post-Scoping stages to reflect project-specific sediment plume modelling work that may be undertaken within the marine and coastal processes assessment (see **Chapter 7: Marine and Coastal Processes**), as well as outputs from stakeholder consultation and the evolution of the Design Envelope. This may result in an adapted and refined study

area for the EIAR which will be based on all activities carried out throughout the Proposed Offshore Development stages.

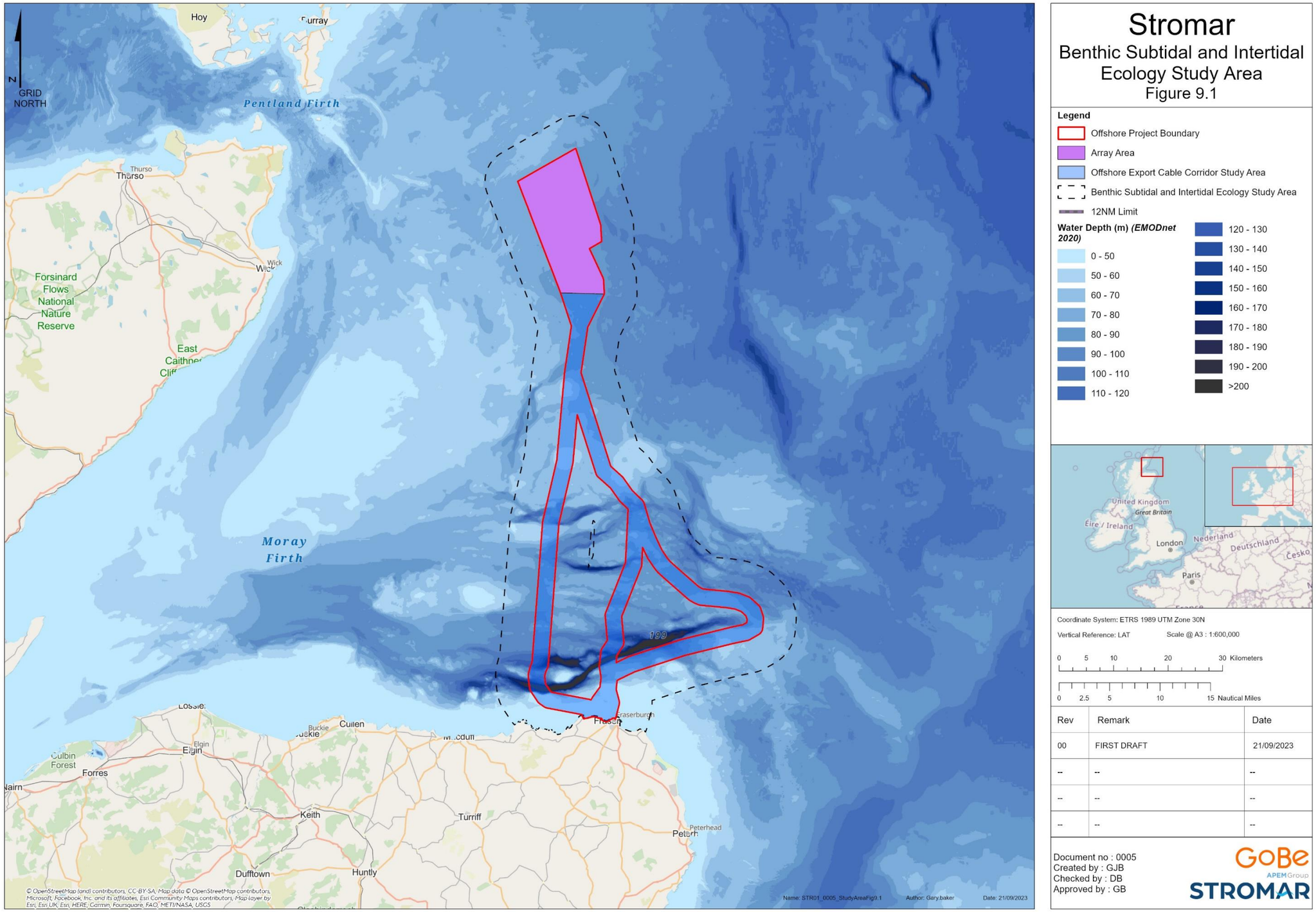


Figure 9.1: **The Proposed Offshore Development Benthic and Intertidal Ecology Study Area.**

9.3 Baseline Environment

Data Sources

9.3.1 The data sources that have been used to inform this chapter of the Offshore Scoping Report are presented within **Table 9.1**. These data sources will be reviewed for relevance and taken forward as appropriate and to inform the EIA baseline characterisation, alongside any additional project-specific data that will be collected from the study area.

9.3.2 In addition, new and up to date information and evidence is regularly coming into the public domain and such new information will be reviewed as it becomes available during the relevant stages of the assessment. This will include consideration of evidence gaps identified and subsequent work planned through the Scotland Marine Energy Research (ScotMER) programme.

Table 9.1: Key Sources of Benthic Subtidal and Intertidal Ecology Data.

Source, Author and Year	Summary	Coverage of the Array Area and Offshore ECC Study Area	Data Quality
Existing OWF Data			
APEM (2022), Beatrice OWF Post-Construction Monitoring Year 2 (2021): Benthic Grab Survey Report	A site-specific benthic survey report at the Beatrice OWF site undertaken in July 2021, as part of the year two post construction surveys for the project.	No direct coverage (approximately 35 km from the ECC and 36 km from the Array Area). Located to the west of the Proposed Offshore Development in the Moray Firth	Recently collected, relevant data.
MORL (2014c), Moray Offshore Renewables Ltd. ES – Subtidal Ecology Characterisation (Moray East)	A site-specific subtidal survey report for the Moray Firth OWF characterising the subtidal benthic ecology of the proposed cable route corridor and transmission infrastructure.	No direct coverage (approximately 22 km from the ECC and 31 km from the Array Area). Located to the west of the Proposed Offshore Development in the Moray Firth.	Relevant data. More recent data will be considered if published from this source.
MORL (2011a), Moray Offshore Renewables Ltd. ES – Benthic Ecology Characterisation Survey (Moray East)	A site-specific benthic ecology survey report for the Moray Firth OWF characterising and defining the benthic environment within the Array Area.	No direct coverage (approximately 22 km from the ECC and 31 km from the Array Area). Located to the west of the Proposed Offshore Development in the Moray Firth.	Relevant data. More recent data will be considered if published from this source.
Moray Offshore Windfarm (West) Ltd. (2018a), Moray Offshore Windfarm (West) Ltd. –EIAR	EIAR for the Moray Firth OWF	No direct coverage of Array Area or Offshore ECC (approximately 37 km from the ECC and 46 km from the Array Area). Located to the west of the Proposed Offshore Development in the Moray Firth.	Relevant data. More recent data will be considered if published from this source.
Publicly Available Data Sets			

Source, Author and Year	Summary	Coverage of the Array Area and Offshore ECC Study Area	Data Quality
EMODnet (2021), EMODnet Broad-Scale Seabed Habitat Map for Europe (EUSeaMap) (2021) European Nature Information System (EUNIS) 2022 habitat types	Broad-scale seabed habitat map for Europe.	Full coverage (Array Area and Offshore ECC).	Recently collected, relevant data.
OneBenthic faunal data points (Cefas, 2019).	Broad-scale faunal data point maps.	Full coverage (Array Area and Offshore ECC).	Recently collected, relevant data.
MPA Network, Marine Scotland National Marine Plan Interactive (NMPi, (2023))[7].	A definition and overview of the Scottish MPA Network.	Full coverage (Array Area and Offshore ECC).	Relevant data. More recent data will be considered if published from this source.
Kelp bed data, Marine NMPi (2023).[8]	Scottish kelp bed habitat data layers.	Full coverage (Array Area and Offshore ECC).	Relevant data. More recent data will be considered if published from this source.
Burrowed mud data Marine NMPi (2023)[9].	Scottish burrowed mud habitat data layers.	Full coverage (Array Area and Offshore ECC).	Relevant data. More recent data will be considered if published from this source.
Ocean Quahog data Marine NMPi (2023)[10].	Records of ocean quahog in Scottish waters data layers.	Full coverage (Array Area and Offshore ECC).	Relevant data. More recent data will be considered if published from this source.
Proposed Offshore Development-Specific Data			
Benthic Subtidal and Intertidal Ecology Survey Campaign, planned to commence in Q3 2023/Q1 2024.	Site specific data to be collected across the Proposed Offshore Development. The Method Statement for this survey will be agreed with Marine Scotland Directorate and NatureScot in advance of the surveys being undertaken.	Representative coverage of the Array Area and Offshore ECC Study Areas, to be agreed with NatureScot.	Planned, relevant data collection, to be considered.

[7] https://marine.gov.scot/node/12790

[8] https://marine.gov.scot/node/14689

[9] https://marine.gov.scot/node/14626

[10] https://marine.gov.scot/node/12704

Description of Baseline Environment

9.3.3 The characterisation of the species found within the benthic and intertidal ecology study area has drawn upon work that was undertaken by OWF developments within the vicinity of the Proposed Offshore Development, as well as wider information from publicly available sources (**Table 9.1**). The Moray West OWF, Moray East OWF and Beatrice OWFs are located approximately 37 km, 22 km and 35 km respectively from the closest point to the Proposed Offshore Development. Data from these OWFs have been drawn upon for this chapter as they provide a useful contextualisation of the wider area and the sedimentary habitats present. A full, in-depth description of the sedimentary environment is discussed in **Chapter 7: Marine and Coastal Processes**.

Array Area

9.3.4 A total of two broadscale sediment habitats have been identified within the Array Area through a review of the EUSeaMap (2021) data (**Figure 9.2**):

- Deep circalittoral sand predominately characterises the Array Area; and
- Patches of deep circalittoral coarse sediment are present in the north and northwest of the Array Area.

9.3.5 There are no recorded PMFs, or sites designated for nature conservation within the Array Area (**Figure 9.2** and **Figure 9.4)**.

9.3.6 Benthic characterisation surveys carried out in the Moray West OWF Array Area (37 km west of the Proposed Offshore Development; which included infaunal grab sampling, Drop Down Video (DDV) surveillance and contaminant analysis) indicated that seabed habitats were characterised by extensive areas of rippled sublittoral sands and muddy sands, with occasional stones and cobbles sporadically recorded. In some areas of the Moray West site, primarily in the eastern half of the survey area, a habitat comprising of mixed gravelly sediment was recorded at a number of stations. Coarser sediments were also located across Moray West, with variable coarse/mixed sediments with sand or sandy gravel and patchy stones/cobble recorded at the eastern fringe. Occasional areas of more consolidated surface cobble were recorded, including a small area which could be considered to be a stony reef (Moray Offshore Windfarm (West) Ltd., 2018b). These results are broadly similar to the habitats presented within the broadscale data of the Array Area illustrated in **Figure 9.2** (EMODnet, 2021).

9.3.7 The following habitats (or slight variants of) were recorded across the Moray West OWF Array Area:

- *Fabulina fabula* and *Magelona mirabilis* with venerid bivalves and amphipods in infralittoral compacted fine muddy sand (EUNIS biotope code: MB5236);
- *Mediomastus fragilis*, *Lumbrineris* spp. and venerid bivalves in circalittoral coarse sand or gravel (EUNIS biotope code: MB3212);
- *Moerella* spp. with venerid bivalves in infralittoral gravelly sand (which is a PMF) (EUNIS biotope code: MB5326);
- *Echinocyamus pusillus*, *Ophelia borealis* and *Abra prismatica* in circalittoral fine sand (EUNIS biotope code: MC5211);
- *Branchiostoma lanceolatum* in circalittoral coarse sand with shell gravel (EUNIS biotope code: MC3215);

- *Owenia fusiformis* and *Amphiura filiformis* in offshore circalittoral sand or muddy sand (EUNIS biotope code: MD5212); and
- Sparse sponges, *Nemertesia* spp. and *Alcyonidium diaphanum* on circalittoral mixed substrata (EUNIS biotope code: MC1217).

9.3.8 Results from the Moray West benthic environment survey report are similar to the results detailed within the Beatrice OWF post-construction monitoring benthic survey report from 2021 (APEM, 2022). The Beatrice OWF is located approximately 35 km southwest to its closest point to the Proposed Offshore Development and the report indicates that the sediment type across the entire survey area was predominantly made up of sandy sediments with mud and gravel representing a very small proportion of the total sediment composition. The most dominant biotope recorded during the post-construction survey was *Echinocyamus pusillus, Ophelia borealis* and *Abra prismatica* in circalittoral fine sand (EUNIS biotope code: MC5211; APEM, 2022). Coarser sediments were also located across Moray West, with variable coarse/mixed sediments with sand or sandy gravel and patchy stones/cobble recorded at the eastern fringe. Occasional areas of more consolidated surface cobbles were recorded (MORL, 2011a).

9.3.9 Site-specific surveys (Moray Offshore Renewables Ltd., 2011a; Fugro, 2014) conducted for the Moray East OWF (located approximately 31 km to the southwest of the Proposed Offshore Development Array Area) identified the presence of four habitat biotopes across the respective Array Area:

- Sublittoral sand and muddy sediments with patches of circalittoral coarse sediment;
- Seapens and megafauna in circalittoral fine mud;
- Seapens and megafauna in circalittoral fine mud; and
- Cobbles, boulder and bedrock reef habitat with encrusting algae present.

Offshore ECC Study Area

9.3.10 The EUSeaMap (2021) data indicates that there are at least six broadscale habitats present within the Offshore ECC Study Area (**Figure 9.2**). The most seaward portion of the Offshore ECC Study Area is mainly characterised by:

- Deep circalittoral sand; and
- Circalittoral coarse sediment.

9.3.11 Further inshore is characterised by:

- Deep circalittoral mud;
- Deep circalittoral coarse sediment;
- Circalittoral coarse sediment; and
- Circalittoral and infralittoral rock.

9.3.12 EUNIS habitat survey point data is available for the inshore region of the Offshore ECC Study Area (EUSeaMap, 2021) (**Figure 9.2**). These habitat points present information from site-specific surveys from a range of sources and therefore present detail that is not defined in the broadscale habitat mapping data. For example, in the region classified as infralittoral coarse sediment under broadscale mapping data, habitat survey point data describes the presence of:

- Atlantic and Mediterranean high energy infralittoral rock;
- Atlantic and Mediterranean moderate energy infralittoral rock; and
- Features of infralittoral rock.

9.3.13 OneBenthic faunal data points (Cefas, 2019) are also presented in **Figure 9.2**. Offshore portions of the Offshore ECC Study Area and wider study area were characterised by the following macrofaunal assemblages:

- D2a - characterised by members of the polychaete families *Spionidae, Glyceridae, Terebellidae, Capitellidae* and *Phyllodocidae* and also the Phylum *Nemertea.* This faunal assemblage is likely to be located on a variety of sandy substrates; and
- D2b - characterised by the polychaete families *Spionidae, Nephtyidae, Lumbrineridae, Oweniidae, Cirratulidae, Capitellidae* and *Ampharetidae*, bivalve molluscs *Semelidae*, brittlestars and Nemerteans. This faunal assemblage is widely found across the northern North Sea and Celtic Shelf and is typically associated with low energy, deep water muddy habitats.

9.3.14 Substrates present within the intertidal areas of the Offshore ECC Study Area are shown in **Figure 9.3.** This area consists predominantly of rock platforms and boulders with loose rock. Intertidal areas located within the 6 km ZoI contain sand, gravel, rock platforms with loose rock and man-made surfaces (MAGICMap, 2023).

9.3.15 As part of the Moray West OWF benthic survey (Moray Offshore Windfarm (West) Ltd., 2018b), site-specific samples taken throughout the Moray West OWF Offshore ECC revealed that inshore areas were characterised by relatively clean sublittoral sand with small portions of shell grit or fine gravel. There were also areas of coarse mixed sediments and some areas of cobbles and boulders, which were often characterised by patchy hydroid and/or bryozoan turf. Brittle star beds were also recorded across the Moray West OWF Offshore ECC.

9.3.16 The deeper water regions of the Moray West OWF Offshore ECC were characterised by areas of sandy mud or very muddy sand with an abundance of burrows and pits evident (Moray Offshore Windfarm (West) Ltd., 2018b); of note is that areas of burrowed muds habitat are classified as a PMF. Communities were characterised by the sea pens *Pennatula phosphorea* and *Virgularia mirabilis*, curled octopus *Eledone cirrhosa*. Sparse populations of hydroids and bryozoa and plaice *Pleuronectes platessa* may also be present.

9.3.17 The following biotopes (or slight variants of) were recorded across the Moray West OWF Offshore ECC:

- *Echinocyamus pusillus*, *Ophelia borealis* and *Abra prismatica* in circalittoral fine sand (EUNIS biotope code: MC5211);

- Seapens and burrowing megafauna in circalittoral fine mud in areas of deeper muddy sediment (EUNIS biotope code: MC6216; PMF);
- *Flustra foliacea* and *Hydrallmania falcata* on tide-swept circalittoral mixed sediment (EUNIS biotope code: MC4214); and
- Sparse sponges, *Nemertesia* spp. and *Alcyonidium diaphanum* on circalittoral mixed substrata (EUNIS biotope code: MC1217).

9.3.18 Site-specific surveys of Moray East OWF Offshore ECC[11] (MORL, 2011a) indicate that the region was predominantly made up of homogenous sedimentary habitat with areas of muddy sand, fine sandy mud, mixed sandy gravels. Fauna recorded from infaunal grab samples included seapens *Pennatula phosphorea* and *Virgularia mirabilis*. The offshore region of the Moray East OWF Offshore ECC was largely made up of fine, sandy mud with some patches of more mixed coarse sand, gravel and shell material. Further inshore, the sediment type was more varied with mixed sediment types being recorded including cobbles, boulders and exposed bedrock.

9.3.19 As with the Array Area for Beatrice OWF, the post-construction monitoring benthic survey revealed that the most dominant biotope recorded across the Beatrice Offshore ECC (located approximately 95 km from the Proposed Offshore Development Offshore ECC Study Area) was MC5211 *Echinocyamus pusillus, Ophelia borealis* and *Abra prismatica* in circalittoral fine sand (APEM, 2022).

9.3.20 Inshore areas for Beatrice OWF were characterised by relatively clean sublittoral sand with small portions of shell grit or fine gravel. There were also areas of coarse mixed sediments and some areas of cobbles and boulders, which were often characterised by patchy hydroid and/or bryozoan turf. Similarly, Brittle star beds were also recorded across the Moray West OWF ECC (Moray Offshore Windfarm (West) Ltd., 2018b).

9.3.21 Contaminant analysis of sediment samples across the Moray West OWF site (Moray Offshore Windfarm (West) Ltd., 2018b) revealed that all metals were at concentrations below respective guidelines (where available) with no samples above UK limits or Dutch/Canadian standards. PAH concentrations were also low and generally below the limit of detection (LOD) for the analytical tests although LODs for Acenaphthene, Acenaphthylene, Dibenzo(ah)anthracene were slightly higher than the Canadian threshold effect levels values. This has been discussed further in **Chapter 8: Marine Water and Sediment Quality**.

9.3.22 The EIA for Moray East OWF concluded that sediment contaminants were all below guideline values, and therefore no deleterious effects on marine life were expected as a result of the Moray East OWF development (MORL, 2011a).

9.3.23 Surficial sediments along the Proposed Offshore Development's Offshore ECC Study Area transition from sands and gravels at the Array Area to more muddy sediments towards the inshore waters, with progressively finer sediments as water depth increases (EMODnet, 2021). Enclosed basins within the region act as sinks for fine-grained sediments settling out of suspension, with relatively high mud content

[11] It should be noted that after the publication of the Moray East OWF documents referenced within this Chapter (Moray Offshore Renewables Ltd., 2011, EMU Ltd., 2011), the Moray East Offshore ECC location and landfall was revised. However, the sediment characteristics found between the original and updated Offshore ECC are broadly similar and have been discussed further in this Offshore Scoping Report **Chapter 8: Marine and Coastal Processes**.

(30 to 65%) within the deepest parts (Holmes *et al.*, 2004). Within approximately 10 km of the coastline, the seabed is characterised by an increased fraction of gravel and coarse sediment as the water depth decreases (Holmes *et al.*, 2004, and further detailed within **Chapter 7: Marine and Coastal Processes**).

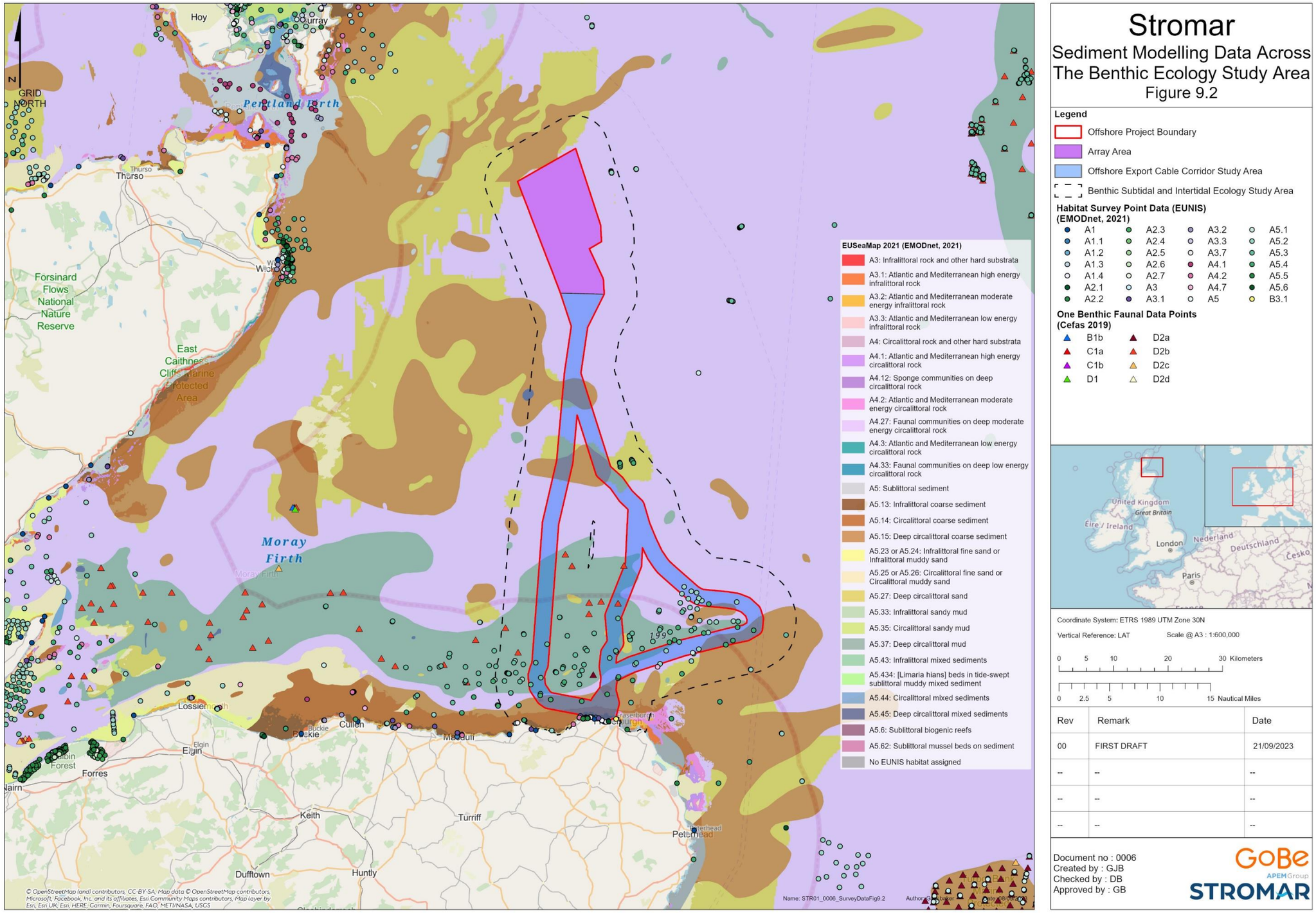


Figure 9.2: **Sediment Modelling Data Across the Benthic Ecology Study Area (EMODnet, Cefas).**

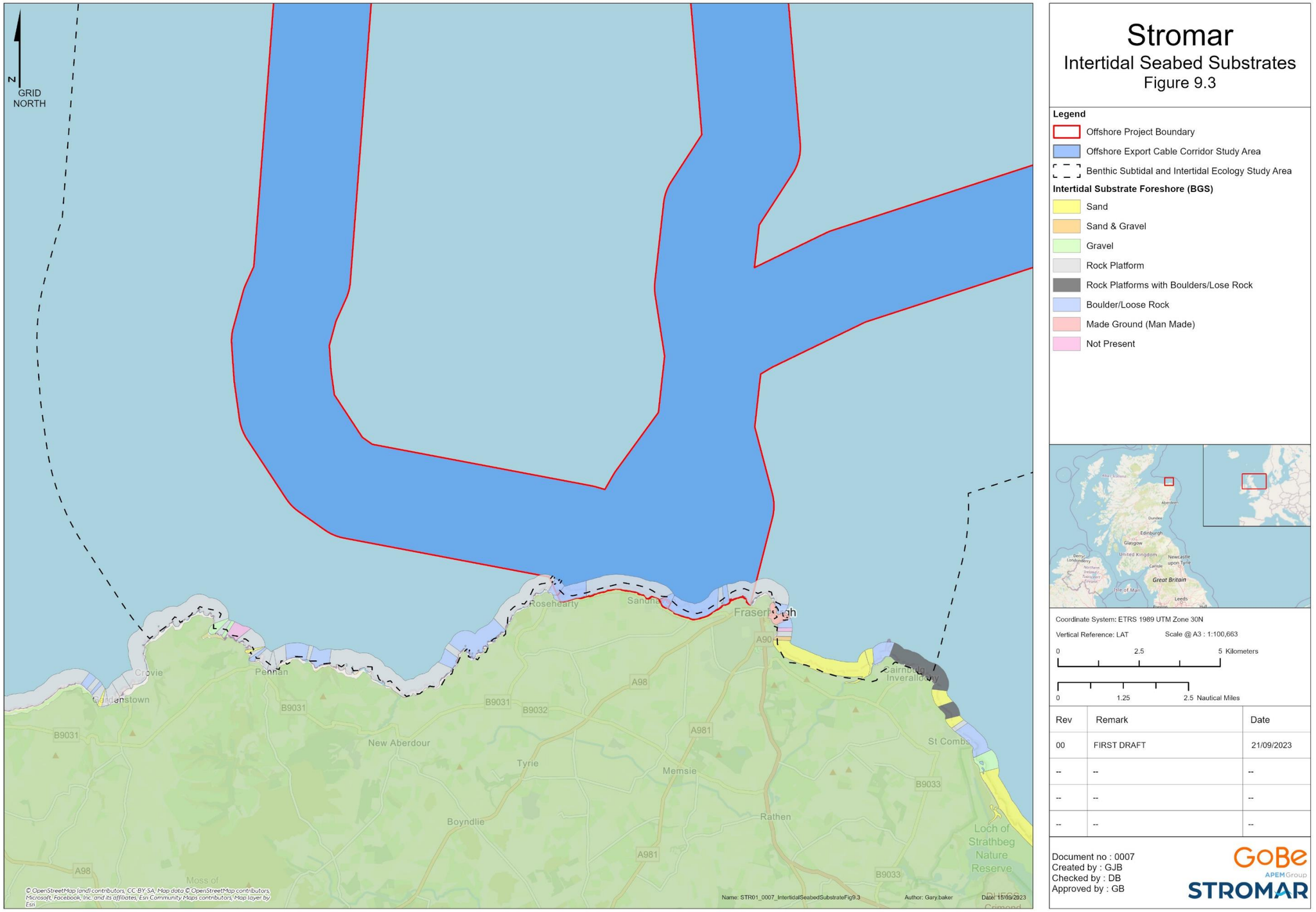


Figure 9.3: **Intertidal Seabed Substrates Across the Landfall Development Zone (BGS).**

Designated Sites and Features of Conservation Interest

9.3.24 As part of this Scoping exercise, a review has been undertaken to identify sites designated for nature conservation as well as protected species historically identified within the study area. Sites designated for nature conservation within, or in close proximity to, the Proposed Offshore Development 6 km ZoI have been detailed in **Table 9.2** and presented spatially in **Figure 9.4.** Designated sites that fall within the 6 km ZoI and surrounding areas include NCMPA, SAC, SSSI's and SPAs. Designated sites that have a qualifying feature related to benthic subtidal or intertidal ecology, or a qualifying feature that is dependent on benthic subtidal or intertidal ecology have been listed within **Table 9.2.** Of the designated sites highlighted in **Figure 9.4**, the East Caithness Cliffs NCMPA, Noss Head NCMPA, Moray and Nairn Coast SPA, Moray Firth SAC and Moray Firth SPA do not have any benthic designated features or fall outside of the benthic and intertidal ecology study area, and therefore have not been considered further.

9.3.25 A number of designated sites and PMFs have been identified within the study area and at adjacent locations, some of which directly overlap with the Offshore ECC Study Area (**Figure 9.4**). Scottish Ministers identified a list of 81 PMFs in 2014 that were named for their significant role within Scottish marine ecosystems. There are three known PMFs present within the study area, namely:

- Burrowed mud habitat;
- Ocean quahog *Arctica islandica*; and
- Kelp beds (predominantly made up of *Laminaria hyperboria*.

9.3.26 Ocean quahog are a large, slow growing and long-lived bivalve mollusc. They are found in the subtidal benthic environment around the UK, with 70% of records being from Scottish seas including within the Offshore ECC Study Area for the Proposed Offshore Development (**Figure 9.4**). It is also an OSPAR threatened and/or declining species.

9.3.27 Kelp beds are present within the Offshore ECC Study Area (**Figure 9.4**). These habitats form a key part of marine ecosystems throughout Scottish seas, providing food and shelter for fish, invertebrates, and marine mammal species. Coralline algae often forms on the rocks below the kelp canopy, along with fauna such as sponges, sea squirts and sea anemones. Crustaceans and worms will often live on the kelp holdfasts and sea urchins and snails will graze on the kelp itself, whilst fish species will use the kelp to hide from predators. Kelp beds are a PMF in Scotland and activities that alter wave exposure or tidal flow can impact kelp beds and the associated ecosystem they create.

9.3.28 Kelp beds are a key vessel in contributing to carbon sequestration and acting as a blue carbon store. SNH commissioned a report (Burrows *et. al.,* 2014) assessing the blue carbon stores around the Scottish coastline. Due to their importance as natural carbon sinks, marine vegetated ecosystems are believed to play a key role in mitigating against the effects of climate change (Macreadie *et al*., 2019). Research assessing the contribution of marine ecosystems to global blue carbon stocks is growing. For instance, high carbon burial rates are also predicted for macroalgal-dominated systems (Macreadie *et al*., 2019). Additionally, non-vegetated marine sediments are being recognised as large organic carbon repositories (Graves *et al*., 2022). Further information is provided in **Section 8.3: Blue Carbon Assessment**.

9.3.29 The ability of marine and coastal ecosystems to sequester carbon dioxide is also increasingly recognised by resource managers and policy makers (Steven *et al*., 2019). For example, blue carbon

stocks are being included in national carbon inventories (Steven *et al*., 2019), and the conservation and restoration of blue carbon ecosystems are being considered in national carbon offset and climate change mitigation schemes (Macreadie *et al*., 2019; Steven *et al*., 2019).

9.3.30 A blue carbon assessment will be undertaken as part of the EIA, to determine the influence of the Proposed Offshore Development on blue carbon stocks and sequestration through direct and indirect effects to marine ecosystems. Further information is provided in **Section 8.3: Blue Carbon Assessment**.

9.3.31 The Southern Trench NCMPA, which overlaps with the Offshore ECC Study Area, is designated for its burrowed mud feature as well as marine mammal and geological features. Burrowed mud is mainly found in deep water or sheltered conditions where there is very little water movement and provides habitat for burrowing marine animals, like Norway lobster *Nephrops norvegicus*, fireworks anemone *Pachycerianthus multiplicatus* and sea pens including *Virgularia mirabilis, Pennatula phosphorea* and *Funiculina quadrangularis*. Burrowed mud is a PMF, and an Oslo/Paris Convention (OSPAR) threatened and/or declining habitat. Conservation advice for this NCMPA includes minimising the potential impact of renewable energy development on burrowed mud habitats via the existing licensing process. Early pre-application discussion is recommended and will assist with the identification of the need for any surveys to map habitats to inform siting and design. The Developer has, and will continue to, engage(d) with MD-LOT and NatureScot during the RPSS process (further information provided in **Chapter 5: Site Selection and Consideration of Options**), and has sought opportunities to avoid sensitive aspects of the Southern trench NCMPA.

9.3.32 A number of SSSI's are located at the landfall area of the Offshore ECC Study Area and within the ZoI (**Figure 9.4**) these include;

- The Gamrie and Pennan Coast SSSI - designated for nationally important colonies of cliff nesting seabirds, including kittiwake, guillemot, razorbill, fulmar, gannet and puffin (Marine Scotland, 2012).
- The Cairnbulg to St Combs Coast SSSI - designated for Dalradian rock cliff face which acts as a natural flood defence. The Gamrie and Pennan Coast and Cairnbulg to St Combs Coast SSSI'S are not designated for any benthic qualifying features, and therefore have not been considered further (Marine Scotland, 2012).
- The Rosehearty to Fraserburgh Coast SSSI - designated to support feeding grounds for colonies of seabirds, including curlew, eider, purple sandpiper and turnstone (Marine Scotland, 2012).

9.3.33 Although these sites are not designated specifically for benthic or intertidal qualifying features, the supporting habitats are protected for ornithology, so impacts to any supporting features will be considered within the EIAR. No other designated sites overlap with the Proposed Offshore Development.

Table 9.2: Sites designated for nature conservation within the Benthic and Intertidal Ecology study area.

Site	Location (Relative to the Proposed Offshore Development)	Benthic Qualifying Feature
Southern Trench NCMPA	Intersects with the inshore region of the Offshore ECC Study Area	Burrowed mud
Rosehearty to Fraserburgh SSSI	Intersects with the inshore region of the Offshore ECC Study Area (see **Figure 9.4**)	Supports feeding grounds for colonies of seabirds

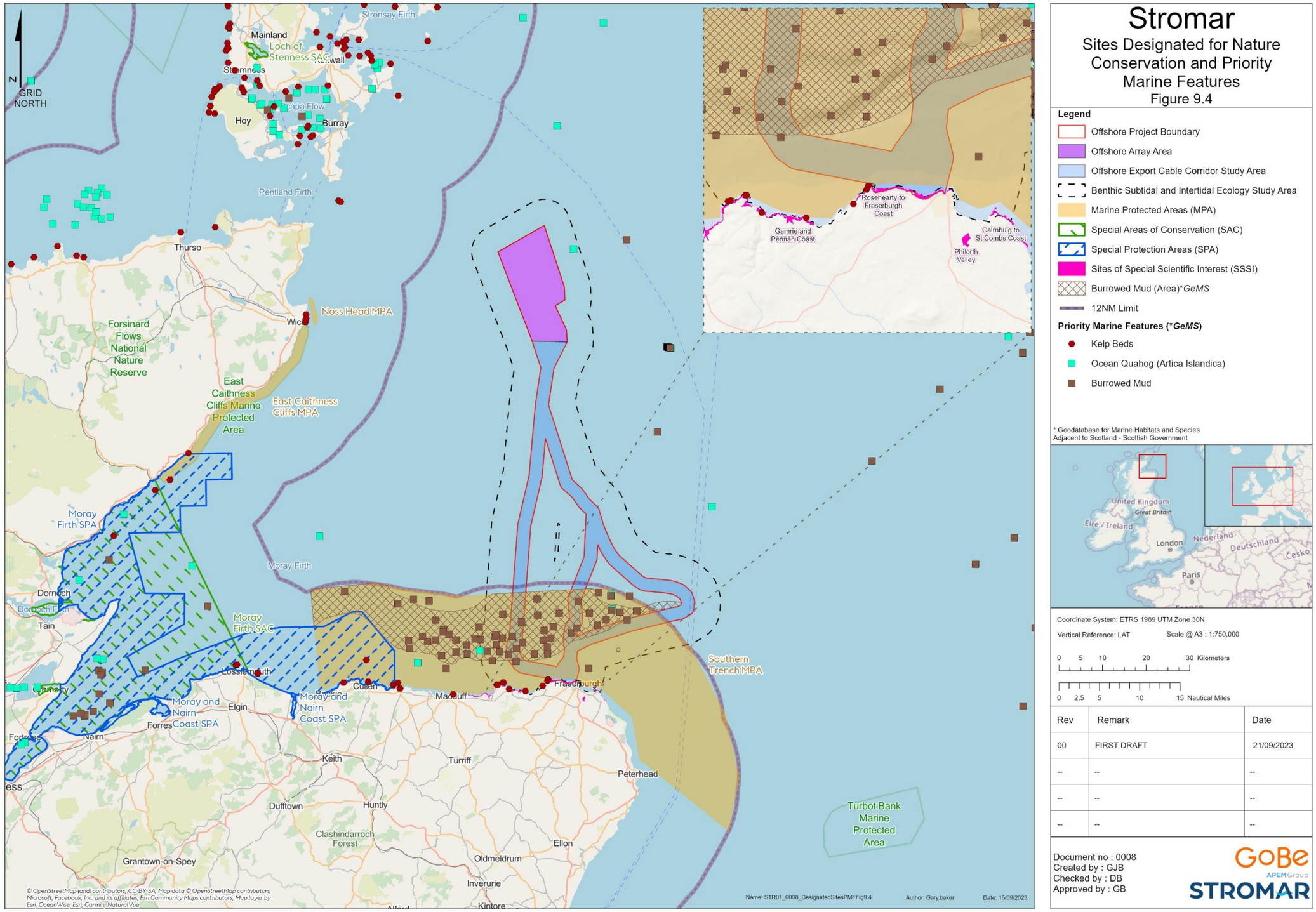


Figure 9.4: **Sites Designated for Nature Conservation and Priority Marine Features (GeMS).**

9.4 Embedded Commitments

9.4.1 The Proposed Offshore Development has adopted various primary commitments (primary design principles intrinsically part of the Project design, installation techniques and engineering designs/modifications) as part of the pre-application phase to eliminate and/or reduce LSE arising from a number of impacts (as far as possible). These are outlined in **Appendix A: Offshore Commitments Register**. Further commitments (imposed as a result of legislative requirements and/or standard sectoral practice, regardless of EIA assessment), referred to as tertiary commitments are embedded as an inherent aspect of the EIA process. Secondary commitments (which require further activity to achieve anticipated outcome- often secured through planning conditions and/or management plans) are incorporated to reduce LSE to environmentally acceptable levels following initial assessment, i.e., so that residual effects are reduced to environmentally acceptable levels.

9.4.2 The commitments adopted by the project in relation to benthic and intertidal ecology are presented in **Table 9.3**. The full list of commitments can be found in **Appendix A: Offshore Commitments Register**.

Table 9.3: The Proposed Commitments Relevant to Benthic and Intertidal Ecology Receptors.

Commitment Code	Commitment Measure
C-OFF-07	Offshore infrastructure will be micro-sited (where possible) around sensitive seabed habitats including Annex 1 habitats (if present), the Scottish Biodiversity List and Priority Marine Features (PMF) (in consultation with the relevant Statutory Nature Conservation Body (SNCB)), to avoid detrimental impacts to these conservation features.
C-OFF-08	A CMS will be developed, which will detail the proposed construction methods and roles and responsibilities of parties involved.
C-OFF-09	Development of, and adherence to a CaP. The CaP will confirm planned cable routing, burial and any additional protection and will set out methods for post-installation cable monitoring as secured by Section 36 and Marine Licence consent conditions. The CaP is likely to be supported by a CBRA, which will outline how external cable protection shall be used and/or minimised, should cable burial be achieved.
C-OFF-13	A PEMP will be developed, to include a Marine Pollution Contingency Plan and INNS Management Plan. This PEMP will also include information on chemical usage, dropped objects, and waste management.
C-OFF-15	A Pollution Prevention Plan (PPP) will be developed as part of the Project Environmental Monitoring Plan.
C-OFF-17	CBRA surveys will be undertaken. Where sufficient burial is not achievable, suitable implementation and monitoring or cable protection will be developed.
C-OFF-18	Scour protection to be implemented around foundations and offshore structures. Ideally this will reduce the change to hydrodynamic and sedimentary regimes that may expose archaeological receptors leading to increased rates of deterioration through biological, chemical and physical processes.
C-OFF-42	A VMP will be developed, which will detail the types and numbers of vessels involved in the Project work.

Commitment Code	Commitment Measure
C-OFF-63	Development of and adherence to a DP, secured under Section 36 and/or Marine Licence consent conditions.

9.4.3 As a result of the commitment to implement these measures, and to align with various standard sectoral practices and procedures, the embedded (primary) commitments are considered inherently part of the design of the Proposed Offshore Development and have, therefore, been included in the assessment presented in **Section 9.5.**

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

9.5 Scoping of Impacts

9.5.1 An initial assessment of the likelihood of effects on benthic and intertidal ecology due to the Proposed Offshore Development for the Scoping stage of the EIA process is provided in **Table 9.4**. The assessment is based on a combination of the following:

- The Proposed Offshore Development definition at the Scoping stage (as shown in **Chapter 3: Proposed Offshore Development Description**);
- Embedded commitments (as set out in **Section 9.4** and **Appendix A: Offshore Commitments Register**, together with the means by which it will be secured);
- The level of understanding of the baseline at the Scoping stage;
- The existing evidence base for benthic and intertidal ecology effects resulting from the Proposed Offshore Development activities;
- Relevant policy and guidance (see **Section 9.8: Guidance**); and
- The professional judgement of a qualified benthic subtidal and intertidal ecologist.

Table 9.4: Scoping Assessment for Benthic and Intertidal Ecology.

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
Construction and Decommissioning				
Temporary increases in Suspended Sediment Concentrations (SSCs) and changes to seabed levels.	C-OFF-09 C-OFF-17	Scoped In	Temporary elevations in SSCs due to construction (i.e., cable installation) activities. This could in turn result in changes to the underlying seabed/coastal bed levels, through deposition of the suspended material and changes to the surficial sediment type. Increases in SSC and associated deposition may have indirect, adverse impacts upon other receptor groups including, **Chapter 10: Fish and Shellfish Ecology** and **Chapter 13: Commercial Fisheries**.	Possible LSE without secondary commitment measures, however, it may become clear post-Scoping stage that the impact does not require detailed assessment in the EIAR.
Temporary habitat disturbance	C-OFF-42	Scoped In	There is potential for temporary, direct habitat disturbance during construction activities in the Array Area and along the Offshore ECC Study Area due to seabed preparation, cable laying (including the installation of cofferdams in the intertidal area), foundation installation and the use of jack up vessels or vessel anchoring.	Possible LSE without secondary commitment measures, however, it may become clear post-Scoping stage that the impact does not require detailed assessment in the EIAR.
Direct and indirect seabed disturbance leading to release of sediment contaminants	C-OFF-07 C-OFF-13	Scoped In	Seabed disturbance during construction could lead to the mobilisation of existing sediment contaminants that could have an impact on the benthos. Effects on benthic and intertidal ecology as a result of changes in water quality will be informed by the conclusions of the marine and sediment quality assessments.	Possible LSE without secondary commitment measures, however, it may become clear post-Scoping stage that the impact does not require detailed assessment in the EIAR.
Permanent and/or long-term habitat loss/alteration due to the removal of infrastructure	C-OFF-07 C-OFF-63	Scoped In	Following the decommissioning of Proposed Offshore Development there is potential for long-term habitat loss or alteration directly associated with the removal of infrastructure.	Possible LSE without secondary commitment measures, however, it may become clear post-Scoping stage that the impact does not require detailed assessment in the EIAR.
Accidental pollution events during construction or	C-OFF-13 C-OFF-15	Scoped Out	Chemical and oil inventories on vessels working during construction and decommissioning stages will be small in size. In the event of an accidental chemical or oil spill, hydrocarbons would rapidly be dispersed or diluted. As well as this, all vessels on the project will be required to	No LSE identified at Scoping.

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
decommissioning activity	C-OFF-63		comply with strict environmental controls set out in the EMP which will minimise the risk and set out provisions for responding to spills during construction or decommissioning. Due to the implementation of control measures and small quantities of hydrocarbons and chemicals it is proposed to scope this impact out of further consideration within the EIA. All relevant commitment measures are presented in **Appendix A: Commitment Register**.	
Operation & Maintenance				
Permanent and/or long-term habitat loss/alteration due to the addition of infrastructure to the area	C-OFF-08	Scoped In	Following the construction of the Proposed Offshore Development there is potential for long-term habitat loss or alteration directly associated with the presence of, for example, WTGs and Offshore Substation Platform foundations, scour and cable protection.	Possible LSE without secondary commitment measures, however, it may become clear post-Scoping stage that the impact does not require detailed assessment in the EIAR.
Temporary habitat disturbance	C-OFF-08 C-OFF-17 C-OFF-42	Scoped In	There is the potential for direct habitat disturbance of the seabed during planned and unplanned maintenance through (e.g., the use of jack up vessels or cable repair or replacement).	Possible LSE without secondary commitment measures, however, it may become clear post-Scoping stage that the impact does not require detailed assessment in the EIAR.
Colonisation of hard substrates	C-OFF-08 C-OFF-18	Scoped In	Man-made substructures such as WTG and Offshore Substation Platform foundations and any associated scour/cable protection on the seabed are expected to be colonised by marine organisms. This colonisation is expected to then result in an increase in local biodiversity and alterations to the near field benthic ecology of the area.	Possible LSE without secondary commitment measures, however, it may become clear post-Scoping stage that the impact does not require detailed assessment in the EIAR.
Changes in physical processes resulting from the presence of the Proposed Offshore Development's	C-OFF-08 C-OFF-17 C-OFF-18	Scoped In	With embedded commitments implemented it is unlikely there will be significant impacts to benthic ecology features from changes in physical processes as any impact will be spatially and temporally minimal. Physical processes modelling of other OWF projects has predicted small, local impacts on benthic communities from disturbances of this nature. However, this impact will be fully assessed.	Possible LSE without secondary commitment measures, however, it may become clear post-Scoping stage that the impact does

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
subsea infrastructure (e.g., scour effects, changes in wave/tidal current regimes and resulting effects on sediment transport)				not require detailed assessment in the EIAR.
Accidental pollution events during O&M activity	C-OFF-08 C-OFF-13 C-OFF-15	Scoped Out	See justification described for accidental pollution events during construction and decommissioning activity above. All relevant commitment measures are presented in **Appendix A: Commitment Register**.	No LSE identified at Scoping.
Increased risk of introduction and/or spread of INNS	C-OFF-08 C-OFF-13	Scoped In	This impact is proposed to be Scoped Out in consideration of the commitments and control of invasive species measures in line with International Maritime Organization (IMO, 2019). These standards and procedures will be incorporated into the EMP and are embedded in the project design and as such ensure that no significant effects arise from INNS.	Possible LSE without secondary commitment measures, however, it may become clear post-Scoping stage that the impact does not require detailed assessment in the EIAR.
Electromagnetic field (EMF) effects generated by inter-array and export cables. This may have indirect effects on benthic ecology.	C-OFF-09	Scoped In	EMF may impact sensitive species, including invertebrates which are thought to be magneto-sensitive, with this being used for navigational purposes (Scott *et al.,* 2018; Scott *et al.,* 2021, Tricas & Gill, 2011) The magnitude of this impact will depend in part on the project design and the burial and cable protection measures which are utilised. For floating foundations, EMF effects will be considered for suspended cables in the water column. It is acknowledged that there is limited, but emerging research on EMF impacts on benthic ecological species, especially for dynamic cables. The impact assessment will draw on the latest relevant available literature on this impact. With embedded commitments implemented it is unlikely there will be significant impacts to benthic ecology features from EMF. However, this impact will be fully assessed. All relevant commitment measures are presented in **Appendix A: Commitment Register**.	No LSE identified at Scoping.

9.6 Potential Cumulative Impacts

9.6.1 The process by which potential cumulative impacts will be assessed through the CIA is described in **Chapter 6: EIA Approach and Methodology** with examples provided of the projects likely to be included in that assessment.

9.6.2 Advice provided in the RLG indicates the areas of highest biodiversity in the northeast region of Scotland are located around the Orkney islands. The RLG also identifies the presence of PMFs in the vicinity of the Proposed Offshore Development, which will be taken into consideration in all assessments, including cumulative impacts (Marine Scotland, 2020a).

9.6.3 For benthic and intertidal ecology, cumulative interactions may, depending upon construction timelines, occur with other planned OWFs such as Caledonia OWF and Broadshore OWF, as well as other activities, for example cable maintenance activities. **Figure 9.5** demonstrates the Proposed Offshore Development as well as the 6 km ZoI in relation to other human activities of relevance. It is important to note however that the 6 km ZoI may be subject to change as the Proposed Offshore Development is refined and project-specific numerical modelling is undertaken (as discussed in **Section 9.2**). Further information on the industries present/planned within the Moray Firth and in relation to the Proposed Offshore Development are presented in **Chapter 20: Other Human Activities**.

9.6.4 Impacts that are Scoped In to the assessment for the Proposed Offshore Development are generally spatially restricted to being within close proximity to the Array Area and Offshore ECC Study Area. However, certain potential impacts, such as an increase in SSC, have the potential to be observed over a wider area. Potential cumulative impacts on benthic ecology receptors will be guided by tidal excursions, to be further quantified using project-specific numerical modelling.

9.6.5 Due to refining of the ZoI as the Proposed Offshore Development evolves, nearby developments cannot be Scoped Out as being subject to potential cumulative impacts. A full appraisal of projects to include within the CIA will be undertaken as part of the EIAR. The CIA for benthic and intertidal ecology will consider the MDS for each of the projects, plans and activities in line with the methodology outlined in **Chapter 6: EIA Approach and Methodology**.

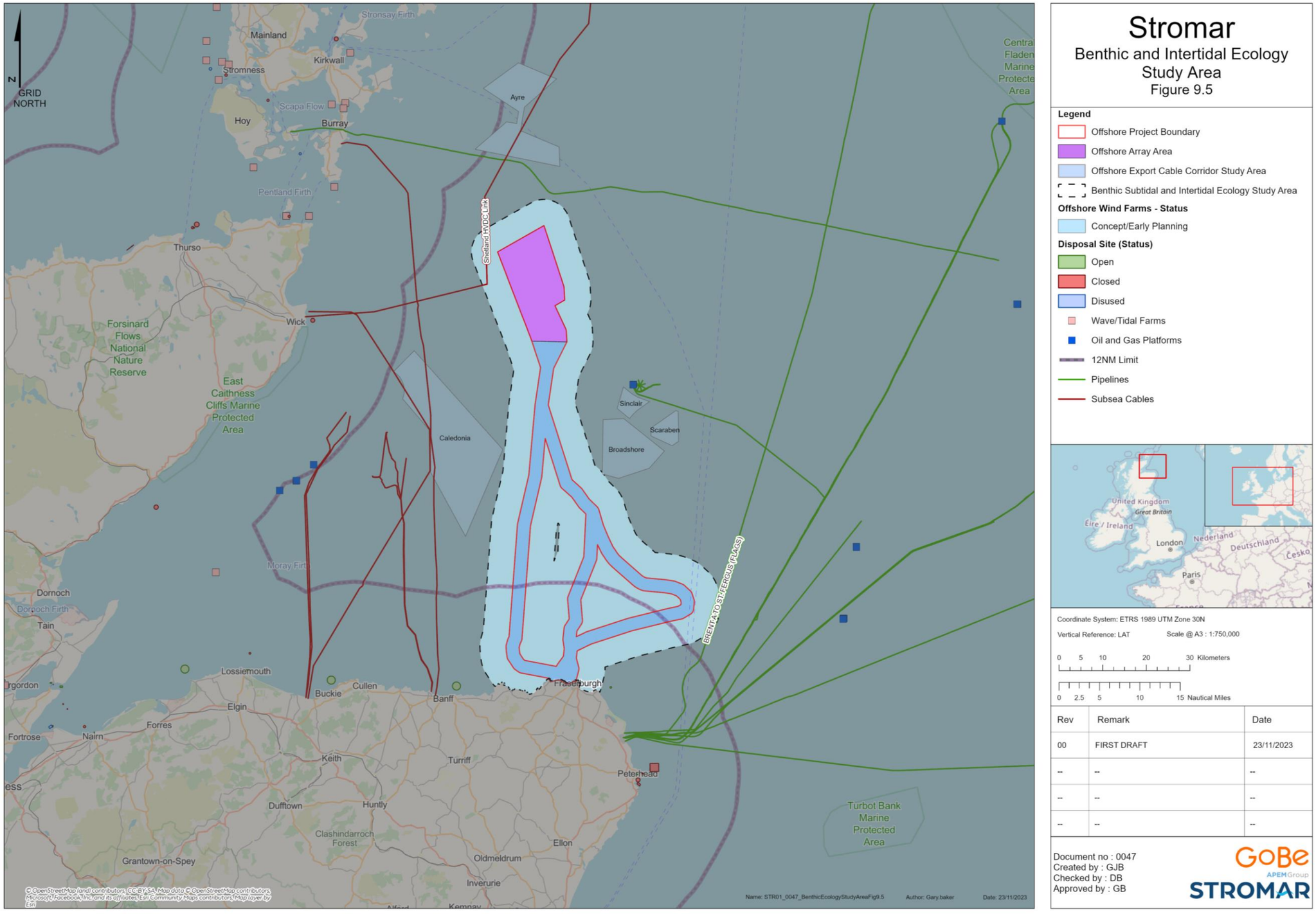


Figure 9.5: **Other Human Activities for consideration within the CIA for Benthic and Intertidal Ecology.**

9.7 Potential Transboundary Impacts

9.7.1 Transboundary impacts related to benthic and intertidal ecology are not anticipated to arise from construction, O&M or decommissioning stages of the Proposed Offshore Development. Any impacts on benthic and intertidal ecology receptors will be localised in nature and any indirect effects will likely be limited to one tidal excursion from the impact source. The Proposed Offshore Development is a significant distance (approximately 410 km) from the nearest adjacent Economic Exclusive Zone (EEZ) of another state (Denmark) and, therefore, it is considered that transboundary impacts will not occur and will therefore be Scoped Out from further consideration within the EIA.

9.8 Proposed Approach to EIA

9.8.1 This section outlines the proposed Proportionate EIA approach to the Proposed Offshore Development for benthic and intertidal ecology. This includes proposed assessment methodology, relevant embedded commitments, as well as those measures Scoped In to and Out of assessment.

Additional Data Sources

9.8.2 A thorough, desk-based collation and review of the relevant data will be undertaken to inform the subsequent EIA, as well as detailed site-specific surveys. Impact assessments will be undertaken in line with current SNCB guidance, particularly NatureScot, Chartered Institute of Ecology and Environmental Management (CIEEM) EIA guidance (2018; updated 2023) and expert opinion. Consideration will also be given to results from past, present and ongoing research projects from ScotMer, the Offshore Wind Strategic Monitoring and Research Forum (OWSMRF), and the Offshore Renewables Joint Industry Programme (ORJIP) where relevant.

9.8.3 It is proposed that the characterisation of the benthic subtidal and intertidal environments found within the vicinity of the Proposed Offshore Development will be completed by drawing upon work that has been undertaken in support of various OWF projects in the region, as well as wider information from publicly available sources.

9.8.4 A site-specific Benthic Ecology Survey Campaign is scheduled take place in Autumn 2023-Summer 2024. This survey campaign will collect site specific data using sediment grabs for the analysis of faunal composition, Particle Size Analysis (PSA) and sediment contaminants as well as obtaining DDV data. It is proposed that novel Environmental Deoxyribonucleic Acid (eDNA) methods are also employed to supplement the species data collected. The results of the benthic ecology surveys will be used to characterise and understand the seabed habitat and faunal composition at the Proposed Offshore Development. A Method Statement outlining the scope of this survey will be agreed with MD-LOT and NatureScot in advance of the surveys being undertaken (as further discussed in **Chapter 8: Marine Water and Sediment Quality**).

Guidance

9.8.5 In addition to the general policy and guidance outlined in **Chapter 2: Legislation and Policy Context**, the assessment of benthic and intertidal ecology receptors will also comply with the following guidance documents where they are specific to this topic:

- Guidelines for Ecological Impact Assessment in the UK and Ireland. Terrestrial Freshwater, Coastal and Marine (CIEEM, 2018);

- Guidelines for Ecological Impact Assessment in Britain and Ireland. Marine and Coastal. Final Document, August 2010 (CIEEM, 2010);
- Guidance document on wind energy developments and EU nature legislation (European Commission,2021a);
- Strategic Review of Offshore Wind farm Monitoring Data Associated with FEPA Licence Conditions (Cefas, 2004);
- CIA guidelines, guiding principles for cumulative impacts assessments in offshore wind farm (RenewableUK, 2013);
- Guidance note for EIA in respect of FEPA and CPA requirements (Centre for Environment, Fisheries and Aquaculture (Cefas, 2004);
- Marine Scotland Habitats Regulations Appraisal of Draft Plan for Offshore Wind Energy in Scottish Territorial Waters: Information for Appropriate Assessment (ABPmer, 2011);
- Guidelines for data acquisition to support marine environmental assessments of offshore renewable energy projects (Judd, 2012);
- Guidance on Environmental Considerations for Offshore Wind Farm Development (OSPAR, 2008); and
- Sensitivity of features based upon the Marine Evidence-based Sensitivity Assessment (MarESA) framework where possible (Tyler-Walters *et al.,* 2018).

Assessment Methodology

9.8.6 The EIA will follow the general Proportionate EIA approach (outlined in **Chapter 6: EIA Approach and Methodology)** of this Offshore Scoping Report.

9.8.7 To enable the potential impacts of the Proposed Offshore Development to be assessed, a description of the existing benthic communities, focusing particularly on any areas of conservation interest, will be produced. Potential impacts that may occur on the subtidal and intertidal physical, chemical and biological environment as a result of the planned construction, O&M and decommissioning will then be identified. The sensitivities of the communities present to the types of impact expected from wind farm construction, O&M and decommissioning activities will be assessed. Where necessary, measures will be proposed to mitigate the impacts.

9.8.8 In the event that the Proposed Offshore Development has a direct impact on any sites that are designated for conservation at the European (SAC or SPA; now forming part of the UK's National Site Network) or international level (Ramsar), as a result of qualifying habitats or species that they support, then the requisite information will be provided alongside the EIA to assist the CA to carry out an AA.

9.8.9 Cumulative impacts will be assessed by taking into consideration any other relevant plans or projects proposed or in construction, that are in the vicinity of the study area.

9.9 Scoping Questions

9.9.1 The following questions are designed to focus on the Scoping exercise and inform the Scoping Opinion:

1. Do you agree with the study area(s) defined benthic and intertidal ecology?

2. Do you agree with the use of those data listed in **Section 9.3**, and any additional anticipated data listed in **Section 9.8**, being used to inform the Offshore EIA?
3. Are there any additional data sources or guidance documents that should be considered?
4. Do you agree that all receptors related to benthic and intertidal ecology have been identified?
5. Do you agree with the Scoping In and Out of impact pathways in relation to benthic and intertidal ecology?
6. Do you agree with the assessment of transboundary effects in relation to benthic and intertidal ecology?
7. Do you agree with the assessment of cumulative effects in relation to benthic and intertidal ecology?
8. Do you agree with the proposed assessment methodology for benthic and intertidal ecology?
9. Do you agree on the suitability of the proposed commitments to reduce or eliminate LSE relevant to benthic and intertidal ecology?

10 Fish and Shellfish Ecology

10.1 Introduction

10.1.1 This chapter of the Offshore Scoping Report identifies the fish and shellfish receptors of relevance to the Proposed Offshore Development and considers the potential impacts from construction, O&M, and decommissioning of the Proposed Offshore Development on fish and shellfish ecology receptors.

10.1.2 The Proposed Offshore Development has the potential to cause a variety of adverse effects on fish and shellfish ecology. The construction, O&M and decommissioning of the Proposed Offshore Development can impact sensitive fish and shellfish receptors through the increase of UWN through piling, which harm or disturb sensitive species or cause them to flee. Furthermore, the infrastructure has the potential to have further adverse effects, such as habitat loss, disturbance or the emittance of EMFs from cables.

10.1.3 This chapter should be read alongside the following chapters:

- **Chapter 7: Marine and Coastal Processes**;
- **Chapter 9: Benthic and Intertidal Ecology**; and
- **Chapter 13: Commercial Fisheries**.

10.1.4 This chapter of the Offshore Scoping Report has been prepared by GoBe.

10.2 Study Area

10.2.1 The fish and shellfish ecology study area is defined by the Proposed Offshore Development, plus two appropriate buffers, as presented in **Figure 10.1** This includes the Array Area, Offshore ECC Study Area, the wider ZoI associated with potential secondary impacts and the UWN ZoI.

10.2.2 The secondary impacts buffer for the assessment of fish and shellfish ecology encompasses the area over which suspended sediment might disperse following disturbance as a result of Proposed Offshore Development activities. For the purposes of Scoping, this has been determined as the extent of the spring tidal excursion, a distance of between 4 km and 6 km (ABPmer *et al.,* 2008) resulting in the adoption of a precautionary buffer of 6 km. The extent of the buffer has been informed by previous project experience at Moray West OWF (located 38 km from its nearest point to the Proposed Offshore Development, at the Offshore ECC Study Area), as well as expert judgement of the range over which indirect effects of the Proposed Offshore Development may impact on benthic ecology receptors (e.g., increased SSC and deposition).

10.2.3 This study area may be further refined as required at post-Scoping stages to reflect project-specific sediment plume modelling work that may be undertaken within the marine and coastal processes assessment (see **Chapter 7: Marine and Coastal Processes**), as well as outputs from stakeholder consultation and the evolution of the Design Envelope. This may result in an adapted and refined study area for the EIAR which will be based on all activities carried out throughout the Proposed Offshore Development stages.

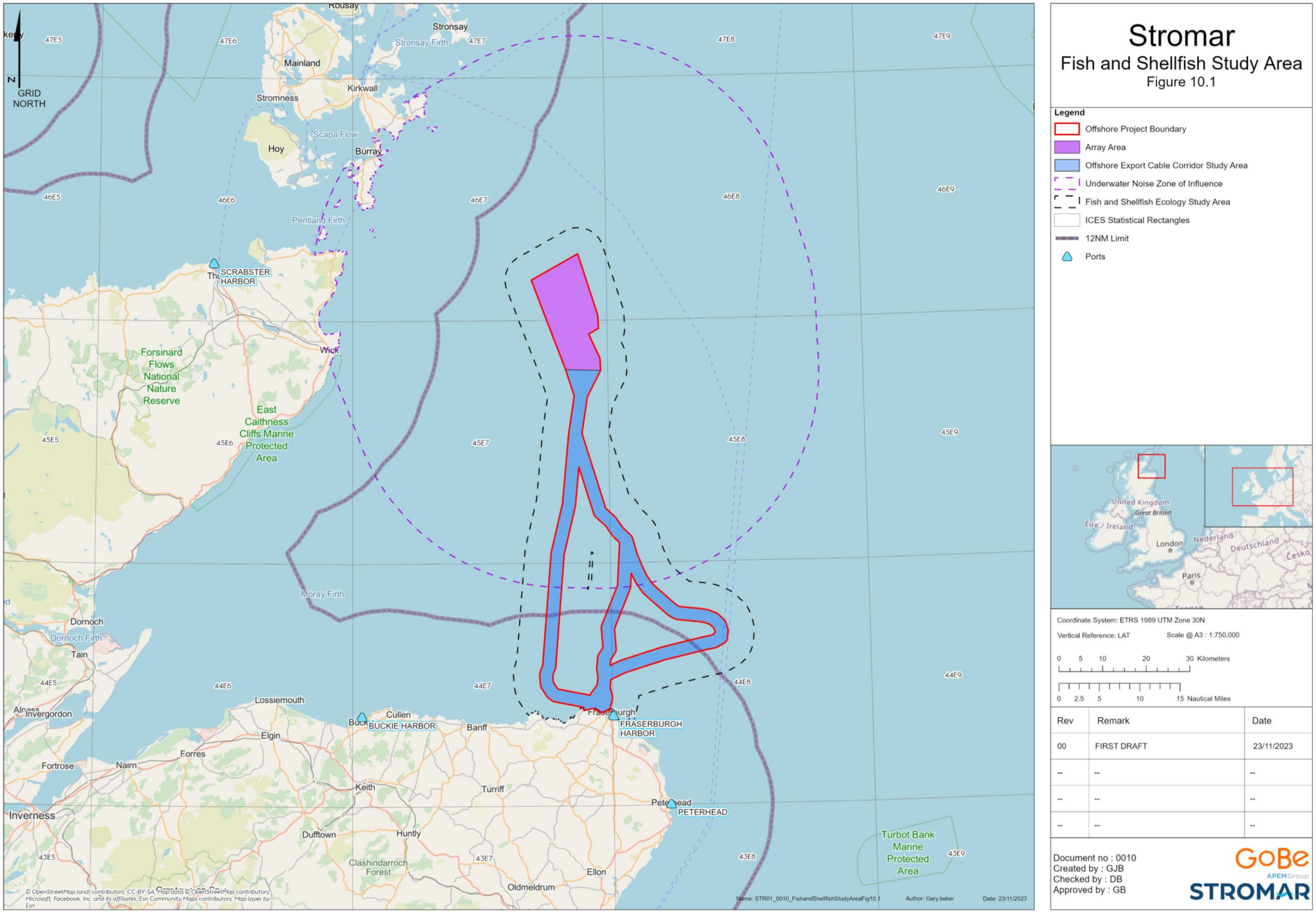
The largest ZoI relates to worst case UWN resulting from piling within the Array Area. Until recently, fish were assumed to flee the noise stimulus at a rate of 1.5 m/s, however recent projects (Awel y Môr

OWF, Sheringham Shoal and Dudgeon OWF Extensions, Hornsea Four OWF and Norfolk Boreas OWF) have been advised to also consider stationary receptor modelling for some species groups. The maximum impact ranges for both stationary (e.g., substrate dependant demersal spawners such as herring *Clupea harengus*) and fleeing receptors (e.g., pelagic spawners such as sprat *Sprattus sprattus*) from recent OWF applications are presented in **Table 10.1**. Taking the maximum impact ranges as informed by UWN modelling for recent OWF projects, a 50 km ZoI for UWN impacts is deemed suitably precautionary for the Proposed Offshore Development. The UWN ZoI is shown in **Figure 10.1**.

Table 10.1: Impact Ranges from UWN Modelling for Recent Offshore Wind Farm EIAs.

Proposed Offshore Development	Maximum impact range for a fleeing receptor (km)	Maximum impact range for a stationary receptor (km)
Awel y Môr OWF (RWE, 2022)	17	36
Sheringham Shoal and Dudgeon OWF Extensions (Equinor, 2022)	10	19
Hornsea Four OWF (Ørsted, 2021)	26	38
Norfolk Boreas OWF (Vattenfall, 2019)	6.5	18

10.2.4 The study areas may be refined as required post-Scoping to reflect site-specific sediment plume modelling work that will be undertaken as part of the Marine and Coastal Processes assessments, as well as stakeholder consultation and refinements to the Proposed Offshore Development's design. The study areas for the UWN element of the EIAR may also be refined based on site-specific UWN modelling to account for potential impacts from noise, which will be considered in relation to the species and habitats found throughout the study area and the wider biogeographic region.



Stromar
Fish and Shellfish Study Area
Figure 10.1

Legend

- Offshore Project Boundary
- Array Area
- Offshore Export Cable Corridor Study Area
- Underwater Noise Zone of Influence
- Fish and Shellfish Ecology Study Area
- ICES Statistical Rectangles
- 12NM Limit
- Ports

Coordinate System: ETRS 1989 UTM Zone 30N
Vertical Reference: LAT
Scale @ A3 : 1:750,000

0 5 10 20 30 Kilometers
0 2.5 5 10 15 Nautical Miles

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STROMAR

Figure 10.1: The Proposed Offshore Development Fish and Shellfish Study Area.

10.3 Baseline Environment

Data Sources

10.3.1 The data sources that have been used to inform this chapter of the Offshore Scoping Report are presented within **Table 10.2**. These identified data sources will be taken forward and used to inform the subsequent EIAR, alongside additional site-specific data that will be collected for the Proposed Offshore Development.

10.3.2 In addition, new and up to date information and evidence is regularly coming into the public domain and such new information will be reviewed as it becomes available during the relevant stages of the assessment. This will include consideration of evidence gaps identified and subsequent work planned through the ScotMER programme.

Table 10.2: Key sources of Fish and Shellfish Data.

Source, Author and Year	Summary	Coverage of the Array Area and Offshore ECC Study Area	Data Quality
Existing OWF Data			
Moray Offshore Renewables Ltd. (2012b), Moray East OWF ES Technical Appendices – Sandeel Survey Report	Site-specific survey report investigating and detailing the distribution of sandeel within the Moray East project area.	The Moray East OWF lies within the Moray Firth. The Offshore ECC Study Area lies, approximately, 22 km from its closest point to Moray East OWF.	Relevant data. More recent data will be considered if published from this source.
Moray Offshore Renewables Ltd. **(**2011b), Moray East OWF ES – Chapter 7.2 and 10.2: Fish and Shellfish Ecology	Provides an analysis of data collected across the wider northern North Sea biogeographic region and has been drawn upon to inform this chapter.		Relevant data. More recent data will be considered if published from this source.
Moray OWF (East) Ltd. (2018), Moray East OWF Herring Larvae Annual Review	Provides an analysis of data collected across the wider northern North Sea biogeographic region and has been drawn upon to inform this review of herring larvae intensities within the vicinity of the Moray East OWF.		Relevant data. More recent data will be considered if published from this source.
Moray OWF (West) Ltd. (2018b), Moray West OWF ES – Chapter 8: Fish and Shellfish Ecology	Provides an analysis of data collected across the wider northern North Sea biogeographic region and has been drawn upon to inform this chapter.	The Moray West OWF lies within the Moray Firth. The Array Area lies, approximately, 37 km its closest point from the Moray West OWF.	Relevant data. More recent data will be considered if published from this source.
Beatrice OWF Ltd. (2012a), Beatrice OWF ES – Annex 11A: Fish and Shellfish Ecology Technical Report	Details the fish and shellfish ecology baseline for the Beatrice OWF development.	The Beatrice OWF lies within the Moray Firth. The Offshore ECC Study Area lies approximately 35 km from the Beatrice OWF.	Relevant data. More recent data will be considered if published from this source.

Source, Author and Year	Summary	Coverage of the Array Area and Offshore ECC Study Area	Data Quality
Beatrice OWF Ltd. (2012b), Beatrice OWF ES – Chapter 9: Fish and Shellfish Ecology	Provides an analysis of data collected across the wider northern North Sea biogeographic region and has been drawn upon to inform this chapter.		Relevant data. More recent data will be considered if published from this source.
Beatrice OWF Ltd. (2014), Beatrice OWF Farm Pre-Construction Baseline Sandeel Survey – Technical Report	Pre-construction monitoring reports describing the sandeel distributions within the project area, through data collection (modified shellfish dredge).		Relevant data. More recent data will be considered if published from this source.
Beatrice OWF Ltd. (2021), Beatrice OWF Farm Post-Construction Baseline Sandeel Survey – Technical Report	Post-construction monitoring reports describing the sandeel distributions within the project area, through data collection (modified shellfish dredge).		Recently collected, relevant data.
Beatrice OWF Ltd. (2015), Beatrice OWF – Pre-Construction Cod (*Gadus morhua*) Spawning Survey – Technical Report	Pre-construction monitoring reports describing the degree of cod spawning activity throughout the project area.		Relevant data. More recent data will be considered if published from this source.
Beatrice OWF Ltd. (2021), Beatrice OWF – Post-Construction Cod (*G.morhua*) Spawning Survey – Technical Report	Post-construction monitoring reports describing the degree of cod spawning activity throughout the project area.		Recently collected, relevant data.
Beatrice OWF Ltd. (2016), Beatrice OWF Pre-Construction Baseline Herring Larval Surveys Summary Technical Report	Pre-construction monitoring report to form a baseline data set of herring larvae density within the project area during spawning.		Relevant data. More recent data will be considered if published from this source.
Beatrice OWF Ltd. (2017), Beatrice OWF– Atlantic Salmon *Salmo Salar* smolt movements survey	Survey on Atlantic salmon *S.salar* smolt movements in the Cromarty and Moray Firths.		Relevant data. More recent data will be considered if published from this source.
Publicly Available Datasets			
ICES (2010), ICES North Sea International Bottom Trawl Survey (2019-2023)	Data of the species caught during Beam Trawl surveys.	Full coverage (Array Area and Offshore ECC).	Relevant data. More recent data will be considered if published from this source.

Source, Author and Year	Summary	Coverage of the Array Area and Offshore ECC Study Area	Data Quality
MMO (2019), UK sea fisheries annual statistics reports, 2021	Information on landings of the UK fishing fleet, and the status of commercial fish stocks.	Full coverage (Array Area and Offshore ECC).	Relevant data. More recent data will be considered if published from this source.
EMODnet (2023), EMODnet broad scale seabed habitat map for Europe (EUSeaMap)	EUSeaMap is a predictive habitat map covering the North Sea. Habitats are described in the EUNIS 2019 classification system.	Full coverage (Array Area and Offshore ECC).	Recently collected, relevant data.
Fisheries datasets available from the NMPi, including ScotMap data	An interactive map providing a data overview of the Scottish marine environment.	Full coverage (Array Area and Offshore ECC).	Recently collected, relevant data.
BGS Marine Sediment Particle Size dataset sourced from the BGS GeoIndex Offshore portal	National PSA dataset.	Full coverage (Array Area and Offshore ECC).	Recently collected, relevant data.
ICES (2023), International Herring Larval Survey (IHLS) data	Herring larvae surveys conducted across the North Sea and adjacent areas to provide quantitative estimates of herring larval abundance used as a relative index of changes of herring spawning stock biomass.	Full coverage (Array Area and Offshore ECC).	Recently collected, relevant data.
IFISH (Integrated Fisheries System Holding) Database	Fisheries data, including landings and fishing effort data.	Full coverage (Array Area and Offshore ECC).	Recently collected, relevant data.
Cefas research publications and broad scale survey data	Broadscale trawl survey data.	Full coverage (Array Area and Offshore ECC).	Recently collected, relevant data.
Coull *et al*, (1998); Ellis *et al*, (2010), North Sea fish spawning and nursery grounds	These studies map the distribution of North Sea fish and/or shellfish species' spawning and nursery grounds using various survey data	Full coverage (Array Area and Offshore ECC).	Relevant data. More recent data will be considered if published from this source.
JNCC (2007), Information on species of conservation interest	Species specific data, of native species of conservation interest.	Full coverage (Array Area and Offshore ECC).	Relevant data. More recent data will be considered if published from this source.
ICES Reports and Research Publication	International research reports and publications.	Full coverage (Array Area and Offshore ECC).	Relevant data. More recent data will be considered if published from this source.

Source, Author and Year	Summary	Coverage of the Array Area and Offshore ECC Study Area	Data Quality
Gonzalez-Irusta, (2014), Updating Fisheries Sensitivity Maps in British Waters	An update to the fish spawning and nursery grounds as mapped by Coull *et al.,* 1998, to provide accurate spatial information.	Full coverage (Array Area and Offshore ECC).	Relevant data. More recent data will be considered if published from this source.
Site Specific Surveys			
Site-specific eDNA data	Site-specific eDNA data is considered sufficient to establish a robust baseline for an OWF at this specific location, which will the basis for the EIA for the Proposed Offshore Development.	Full coverage (Array Area and Offshore ECC).	Planned, relevant data collection, to be considered.
Benthic ecology surveys	Benthic ecology surveys, including drop down videos and sediment grabs, will be used to understand the suitability of the seabed habitat at the Proposed Offshore Development for sandeel and herring spawning.	Full coverage (Array Area and Offshore ECC).	Planned, relevant data collection, to be considered.

Description of Baseline Environment

10.3.3 This characterisation of the species found within the fish and shellfish ecology study area has been completed by drawing upon work that was undertaken in support of various OWF projects in the vicinity of the Proposed Offshore Development, as well as wider information from publicly available sources. The Moray West OWF, Moray East OWF and the Beatrice OWF are located 37 km, 22 km and 35 km respectively from the closest point of the Proposed Offshore Development. Data from these OWFs have been drawn upon to inform this chapter, as the species and habitats found within these areas are broadly similar due to the environmental conditions being largely the same across this area (see **Chapter 9: Benthic and Intertidal Ecology**, for further detail).

Species Present

10.3.4 Bottom trawl surveys were undertaken throughout the greater North Sea, inclusive of the study area, in 2020 and 2021 as part of the North Sea International Bottom Trawl Survey (NSIBTS). The NSIBTS identified an assemblage across the region that predominantly consisted of haddock *Melanogrammus aeglefinus*, whiting *Merlanguis merlangus*, plaice *Pleuronectes platessa,* American plaice *Hippoglossoides platessoides*, common dab *Limanda limanda*, grey gurnard *Eutrigla gurnardus* and lemon sole *Microstomus kitt* (ICES, 2010). The survey also recorded the presence of several species of conservation importance, notably; herring, anglerfish *Lophius piscatorius* and cod *Gadus morhua*; all of which are PMFs. Elasmobranch species were also recorded within the surveys, which included thornback ray *Raja clavata,* cuckoo ray *Leucoraja naevus*, and small-spotted catshark *Scyliorhinus canicula* all of which are on the OSPAR list of Threatened and Declining Species due to their removal as both target and non-target species (Marine Scotland, 2020b).

10.3.5 Epibenthic beam trawl surveys conducted in the Moray West OWF site between May and June 2017 (Moray OWF (West) Ltd., 2018b) revealed a species assemblage typical of this area of the North Sea. The fish community was largely characterised by demersal species, including dragonet *Callionymus lyra*, dab and plaice. Lemon sole, pogge *Agonus cataphractus* and grey gurnard were also recorded. Typically, areas with higher diversity tended to be recorded in more heterogenous seabed habitats often present in these areas which included patches of coarser mixed sediment, gravels and stones/cobble. A similar trend was evident at both the Moray East and Beatrice OWF surveys (Moray Offshore Renewables Ltd., 2011b; Beatrice OWF Ltd., 2011). Other fish species recorded included monkfish *Lophius spp*., Norwegian topknot *Phrynorhombus norvegicus*, sandeel and elasmobranchs such as the cuckoo ray and small-spotted catshark (Moray OWF (West) Ltd., 2018b).

10.3.6 Between January and March 2012, dredge tow surveys were conducted across the Moray East OWF and Western Moray Firth area to identify sandeel distributions (Moray Offshore Renewables Ltd., 2012b). Raitt's sandeel *Ammodytes marinus*, smooth sandeel *Gymnammodytes semisquamatus* and greater sandeel *Hyperoplus lanceolatus* were identified. Overall, the distribution of sandeels was patchy and abundance was low, with the majority captured in areas characterised with sandy substrates (sand, sandy gravel, gravelly sand, sandy gravel).

10.3.7 Similarly, results from sandeel surveys across the Beatrice OWF site in December 2020 indicated patchy distribution with low abundance, with Raitt's sandeel being the most prevalent species (Beatrice OWF Ltd., 2021). The Beatrice OWF post-construction survey findings indicated an increase in sandeel abundance, and consequently concluded that there was no indication that the construction of the Beatrice OWF had resulted in negative impacts on the local sandeel population (Beatrice OWF Ltd., 2014; 2021).

10.3.8 Otter trawl surveys conducted in March 2021 to identify fish distributions across the Beatrice OWF site revealed haddock was the most abundant species accounting for much of the total by-catch, followed by whiting and squid, whilst cod abundance was relatively low (Beatrice OWF Ltd., 2021).

10.3.9 Several shellfish species are known to be abundant within the study area, including Nephrops *Nephrops norvegicus* (particularly significant for commercial fisheries within the study area) squid *Loligo spp.,* and king scallop *Pecten maximus* (ICES, 2022). Moray West OWF site epibenthic trawls recorded hermit crabs *Pagurus prideaux* and *Pagurus bernhardu*s, contracted crab *Hyas coarctatus*, long legged crab *Macropodia rostrata*, squat lobster *Galathea intermedia* and saddle oyster *Anomia ephippium*. Prawn *Pandalina brevirostris* and pink shrimp *Pandalus montagui* were present but generally at low abundances (Moray Offshore Windfarm (West) Ltd., 2018b).

10.3.10 Elasmobranch species are also known to be present in the Moray Firth area (Scottish Government, 2011). Elasmobranch populations identified within the region include spurdog *Squalus spp.*, lesser spotted dogfish, starry ray *Amblyraja radiata*, cuckoo ray, thornback ray and spotted ray (Ellis *et al*., 2004; ICES, 2022).

10.3.11 Basking shark *Cetorhinus maximus* (a species of conservation importance) migrate from the western English Channel in spring to western Scottish waters, where they spend the summer and early autumn before moving offshore in winter. This is supported by the Hywind Scotland Pilot ES (located off the east coast of Scotland), which recorded no basking shark observations (NRP, 2015). However, in more recent years, there have been reports of basking shark sightings and displays of feeding behaviours within the Moray Firth (BBC, 2019).

Species of Commercial Importance

10.3.12 Detailed information on species of commercial importance is provided in **Chapter 13: Commercial Fisheries** which identifies 12 top species landed from the commercial fisheries regional study area (as shown in **Figure 13.1**) by value and weight from 2017 to 2021. These 12 species consisted of: Nephrops, haddock, brown crab, mackerel, squid, scallops, lobsters, angler fish, octopus, whiting, cod and velvet crab (**Chapter 13: Commercial Fisheries**)**,** MMO, 2021; MMO, 2023a).

10.3.13 The study area used for the assessment of the fish and shellfish ecology receptors is shown in **Figure 10.1** and is located in ICES rectangles 44E7, 44E8, 45E7, 45E8 and 46E7. As detailed in landings by UK-registered vessels from the commercial fisheries local study area (as shown in **Figure 13.1**) had an annual average landings value of approximately £20.9 million across the years 2017 to 2021 (MMO, 2023a), with landings values peaking in 2019 at £28.8 million and being at their lowest in 2020 at £17 million (likely due to a combination of COVID-19 restrictions and the UK EU-exit). The main landing ports local to the Proposed Offshore Development include (but are not limited to) Fraserburgh, Peterhead, Scrabster and Buckie (**Figure 10.1**).

10.3.14 In 2021, landings into Scrabster port (approximately 72 km from the Proposed Offshore Development's Array Area at its closest point) were dominated by demersal species, with an overall landing total of 14.3 tonnes at a value of £33.4 million (MMO), 2021). In the Fraserburgh port (approximately less than 10 km from the Proposed Offshore Development's Offshore ECC Study Area at its closest point) the landings were dominated by shellfish, with an overall landing total of 11.3 tonnes at a value of £28.6 million (MMO, 2021).

10.3.15 Provisional datasets provided for Scrabster port in 2023 (MMO, 2023b) indicate that demersal landings were dominated by: Hake, cod, ling, haddock, anglerfish and whiting. Provisional datasets provided for Scrabster port in 2023 (MMO, 2023b) indicate that shellfish landings were dominated by scallops and brown crab. Further information of weight and value of landings are described within **Chapter 13: Commercial Fisheries**.

Spawning and Nursery Grounds

10.3.16 Spawning and nursery grounds of several fish species are known to be located within, or in close proximity to the fish and shellfish ecology study area (**Figure 10.2, Figure 10.3, Figure 10.4, Figure 10.5, Figure 10.6, Figure 10.7** and **Figure 10.8**; Coull *et al.,* 1998; Ellis *et al.,* 2010; 2012).

10.3.17 Spawning grounds for cod, herring, sprat, whiting, sandeel, lemon sole and Nephrops overlap with both the Array Area and Offshore ECC Study Area, with plaice spawning grounds overlapping only with the Offshore ECC Study Area. These spawning grounds also extend over much of the Moray Firth and northern North Sea (see **Figure 10.2** and **Figure 10.3**) (Coull *et al*., 1998; Ellis *et al*., 2010; 2012).

10.3.18 The Proposed Offshore Development and the inshore area of the Moray Firth is identified as a high intensity spawning ground for sandeel, with low intensity spawning grounds to the west and in the northern North Sea (Coull *et al*., 1998; Ellis *et al*., 2010; 2012). Sandeel are of relevance when considering impacts to spawning areas as they are demersal spawners that lay their eggs onto or into seabed sediments; they also exhibit substrate dependency, preferring sandy substrates on which to spawn. Sandeel surveys were undertaken by both Moray East OWF and Beatrice OWF, in 2012 and 2014 respectively; both surveys reported similar findings, indicating patchy sandeel distributions across the sites, with sandeel recorded in relatively low numbers (Moray Offshore Renewables Ltd., 2012b; Beatrice OWF Ltd., 2014). Post-construction monitoring at Beatrice OWF undertaken in 2021 reported significant increases in sandeel numbers, when compared to the 2014 pre-construction surveys (Beatrice OWF Ltd., 2014; 2021).

10.3.19 The Proposed Offshore Development overlaps with both low and high intensity cod spawning areas (with spawning occurring in winter) and, again, both high and low intensity nursery grounds (Coull *et al*., 1998; Ellis *et al*., 2010; 2012). More recent mapping of spawning and nursery grounds also indicates the presence of cod nursery grounds within the Array Area (González-Irusta *et al*., 2014). Cod are of particular importance due to their sensitivity to noise (cod possess a swim bladder which is involved in hearing). In addition, cod exhibit substrate dependency during spawning, with a preference for coarse sands. Within areas of suitable substrates, males identify small territories (known as leks) that they subsequently defend from other males (González-Irusta and Wright, 2016; Grabowski *et al*., 2009; Nordeide and Folstad, 2000). Cod spawning surveys were conducted across the Moray East OWF in 2013 (Brown and May Marine, 2013) and more recently otter trawl surveys were conducted for pre- and post-construction monitoring of the Beatrice OWF (Beatrice OWF Ltd., 2015; 2021). Results from these surveys found spawning cod densities to be very low across the sites, indicating that the Moray Firth is not a spawning ground of key importance to this species (Brown and May Marine, 2013, Beatrice OWF Ltd., 2015; 2021).

10.3.20 Herring spawning grounds are located to the north and south of the Proposed Offshore Development and within the fish and shellfish ecology study area (**Figure 10.2**; Coull *et al.,* 1998). Herring are demersal spawners that lay their eggs onto or into seabed sediments, they also exhibit substrate dependency, with a preference for gravelly substrates on which to spawn. Furthermore, herring are particularly sensitive to noise impacts as they have swim bladders which are involved in hearing. Pre-

construction herring larvae surveys were undertaken by Beatrice OWF in 2014 and 2015 (Beatrice OWF Ltd., 2014; 2016), as well as for the Moray East OWF (Moray Offshore Renewables Ltd., 2011b). The data collected across Beatrice OWF identified larvae in the north of the Beatrice OWF Array Area (approximately 35 km from the Proposed Offshore Development) with the larvae originating from well-established spawning grounds located around Orkney and Shetland and being transported south with the tides and currents.

10.3.21 Larval spatial distributions reported in the Moray East OWF identified lower larval densities in the vicinity of the Moray East OWF Array Area and Offshore ECC (approximately 22 km from the Proposed Offshore Development) compared to areas around Shetland and Orkney. The spatial distribution of herring larvae indicated the highest distributions were found north-east of the Moray East Array Area (Moray OWF Ltd, 2018).

10.3.22 Spawning grounds for Nephrops and scallops are also present within the Moray Firth (Keltz and Bailey, 2010). The distribution of Nephrops is largely dependent on the presence of seabed habitats comprising muddy substrates. Scallop spawning grounds have been identified in the northern area of the Moray Firth, with scallop exhibiting a preference for fine or sandy gravel substrates (Keltz and Bailey, 2010).

10.3.23 The Proposed Offshore Development also coincides with high intensity herring, cod, anglerfish and whiting nursery grounds, and many low intensity nursery grounds including lemon sole, sprat, blue whiting, Nephrops, hake, ling, mackerel, plaice, sandeel, spotted ray, spurdog and thornback ray (as presented in **Figure 10.4**, **Figure 10.5**, **Figure 10.6**, **Figure 10.7** and **Figure 10.8**) (Ellis *et al*., 2010). Common skate and tope shark have low intensity nursery grounds overlapping with the Array Area (**Figure 10.4** and **Figure 10.8**) (Ellis *et al*., 2010), with saithe nursery grounds coinciding within the Offshore ECC Study Area (**Figure 10.8**) (Coull *et al*., 1998).

10.3.24 In a broader context, the study area has a spatially limited interaction with a small portion of the overall spawning sites and nursery grounds for these species. The spawning and nursery grounds of the species that overlap the study area form part of far greater spawning and nursery grounds within the North Sea system. Therefore, any impacts from the Proposed Offshore Development are anticipated to be small in the context of the wider spawning and nursery grounds.

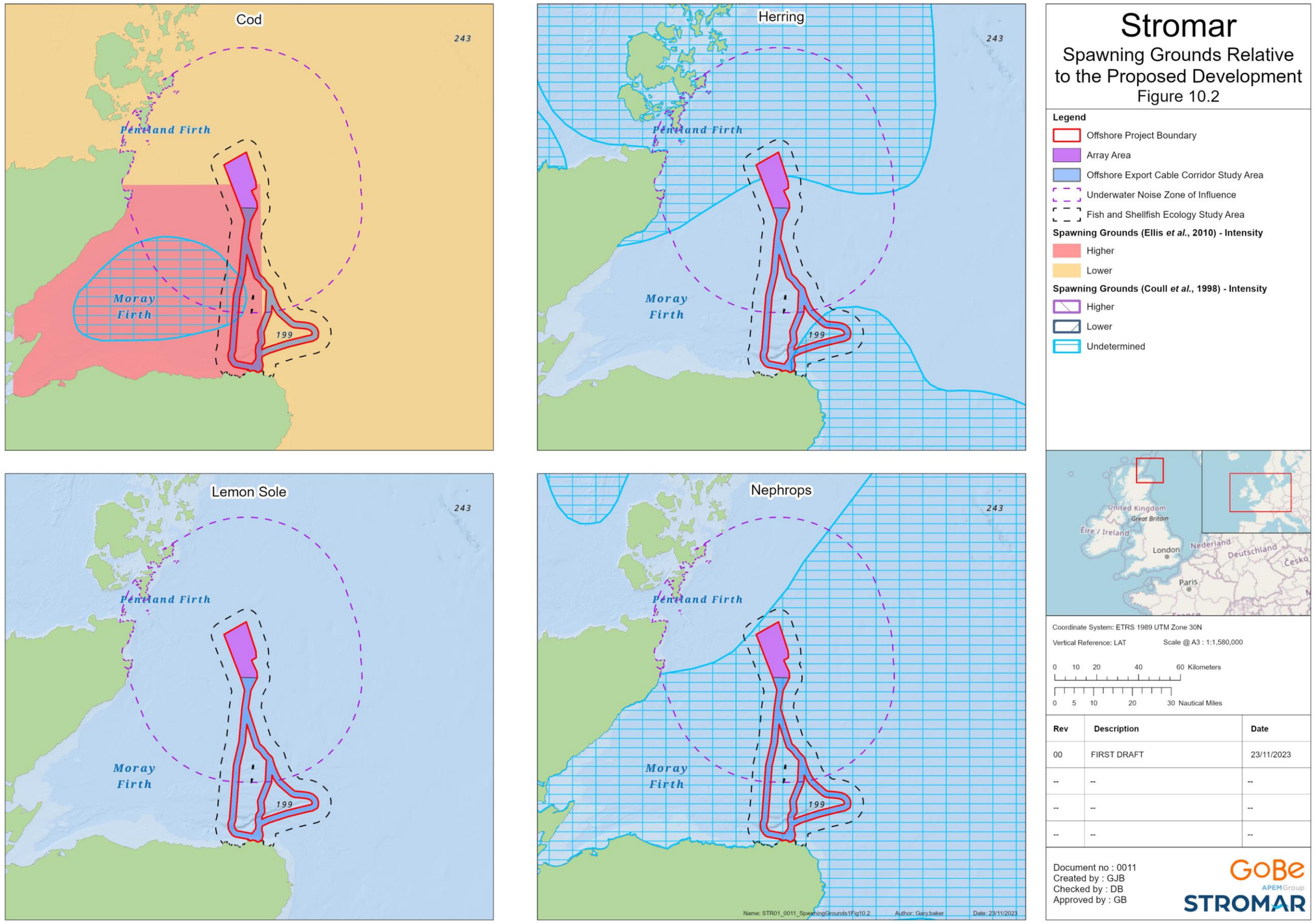


Figure 10.2: **Cod, Herring, Lemon Sole and Nephrops Spawning Grounds Relative to the Proposed Offshore Development (Ellis, Coull).**

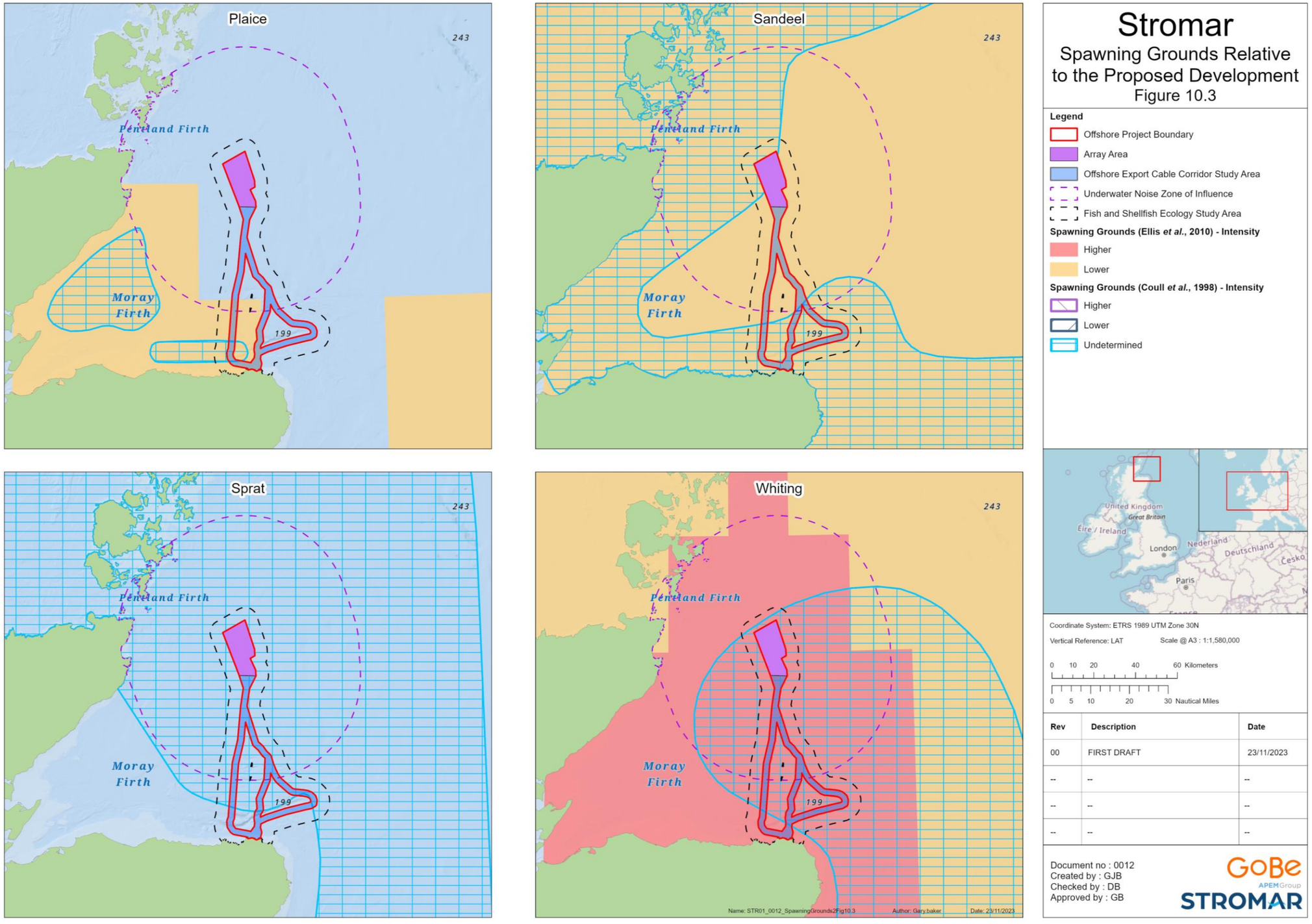


Figure 10.3: **Plaice, Sandeel, Sprat and Whiting Spawning Grounds Relative to the Proposed Offshore Development (Ellis, Coull).**

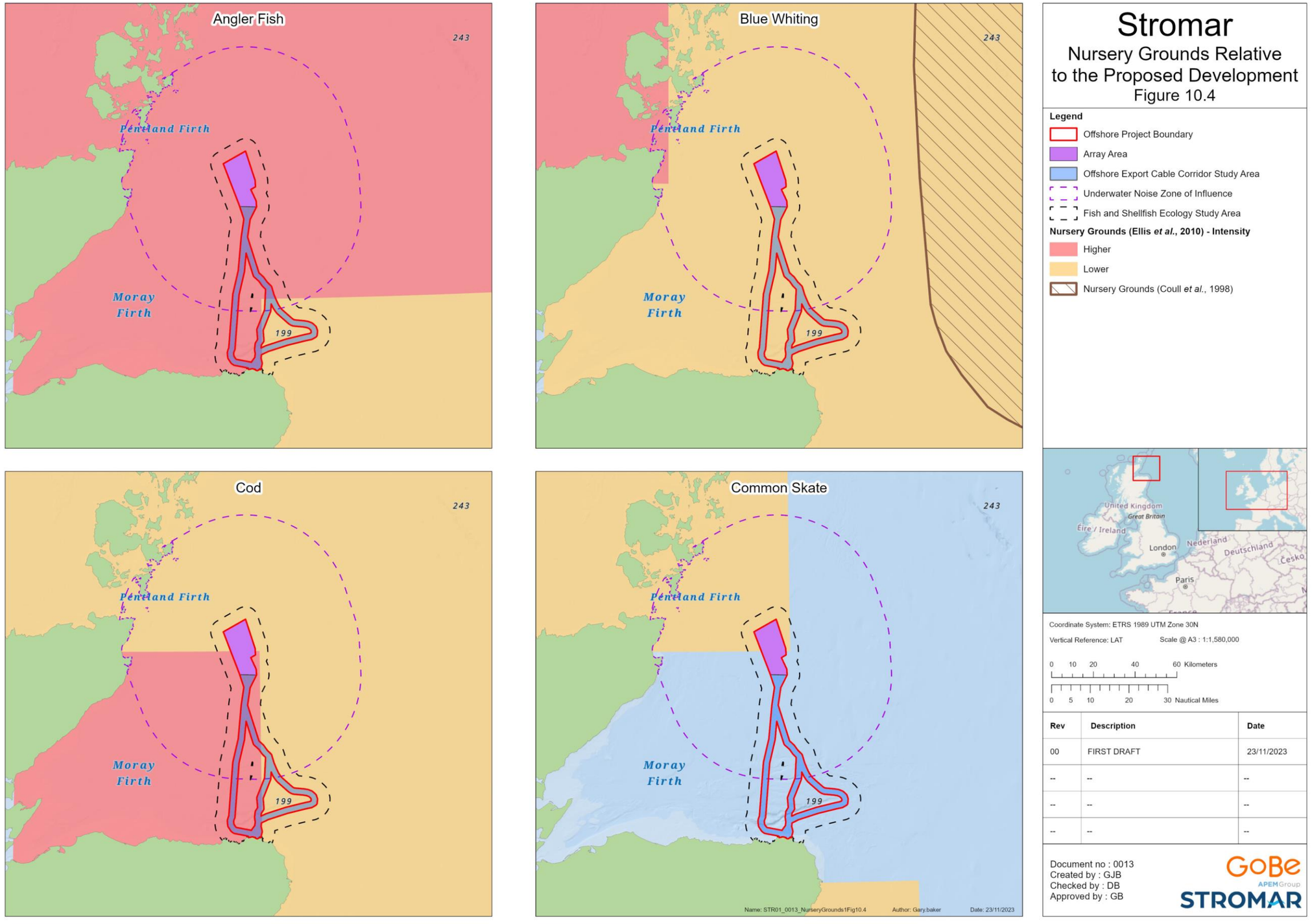


Figure 10.4: **Angler Fish, Blue Whiting, Cod and Common Skate Nursery Grounds Relative to the Proposed Offshore Development (Ellis).**

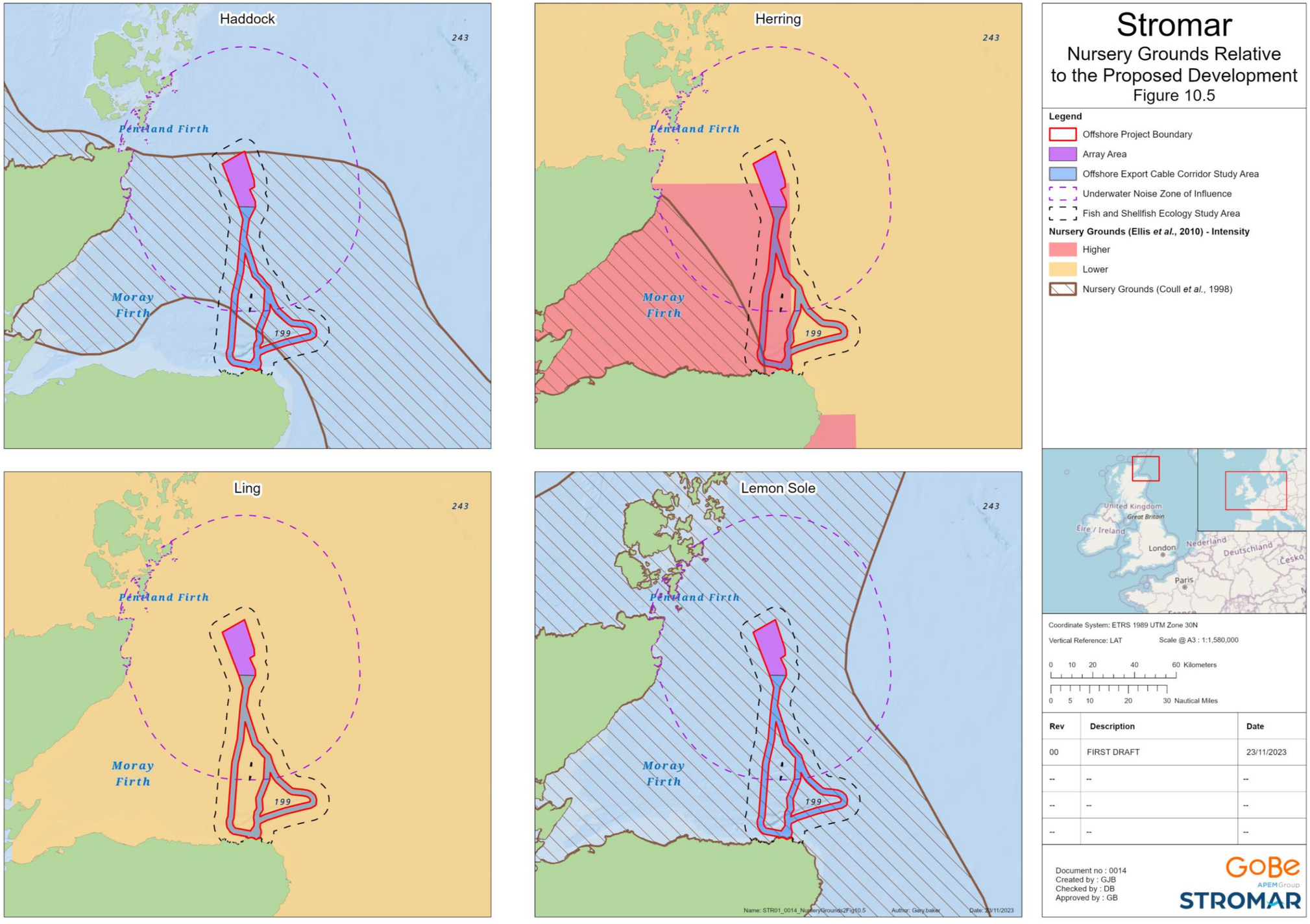


Figure 10.5: Haddock, Herring, Ling and Lemon Sole Nursery Grounds Relative to the Proposed Offshore Development (Ellis).

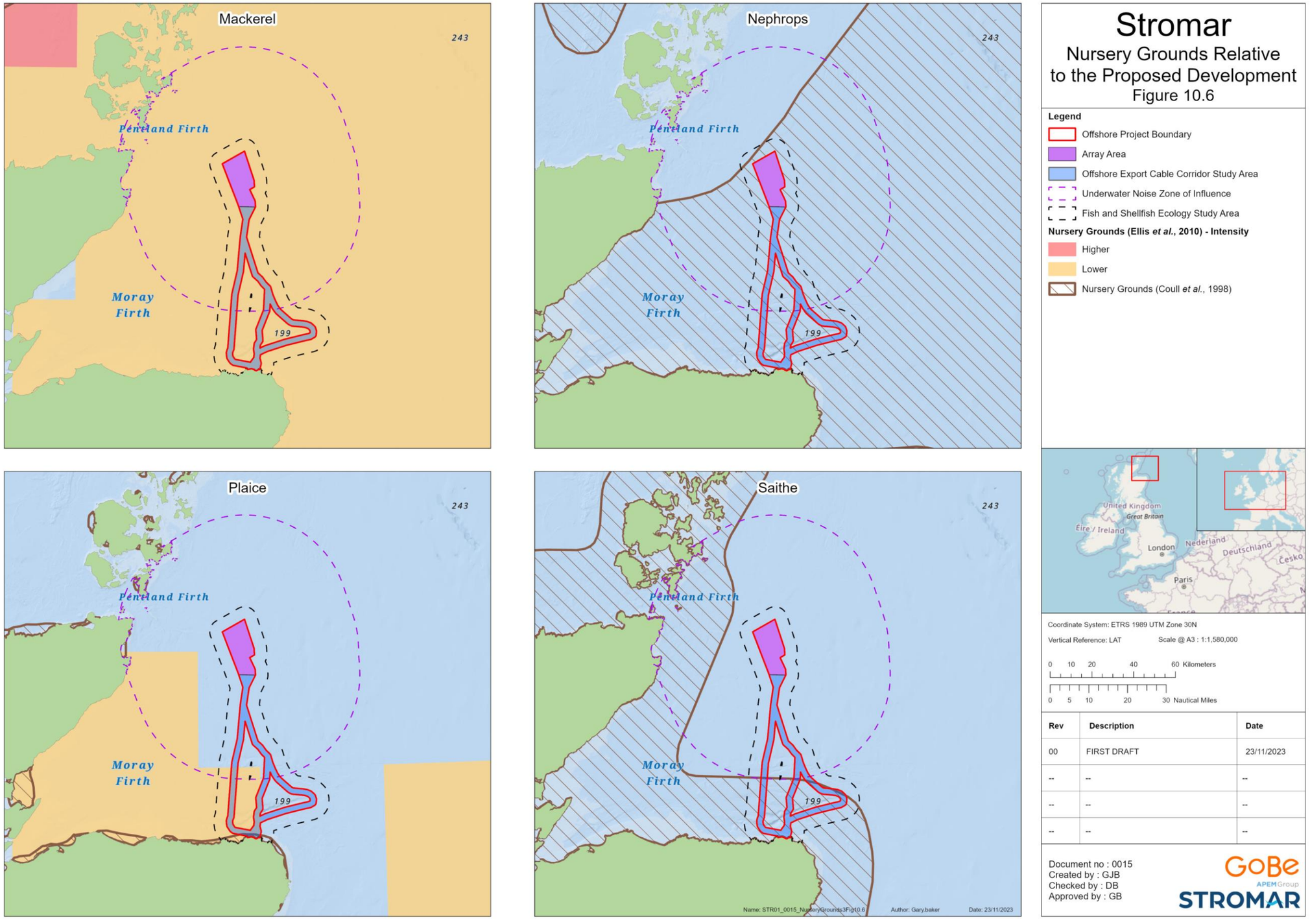


Figure 10.6: **Mackerel, Nephrops, Plaice and Saithe Nursery Grounds Relative to the Proposed Offshore Development (Ellis).**

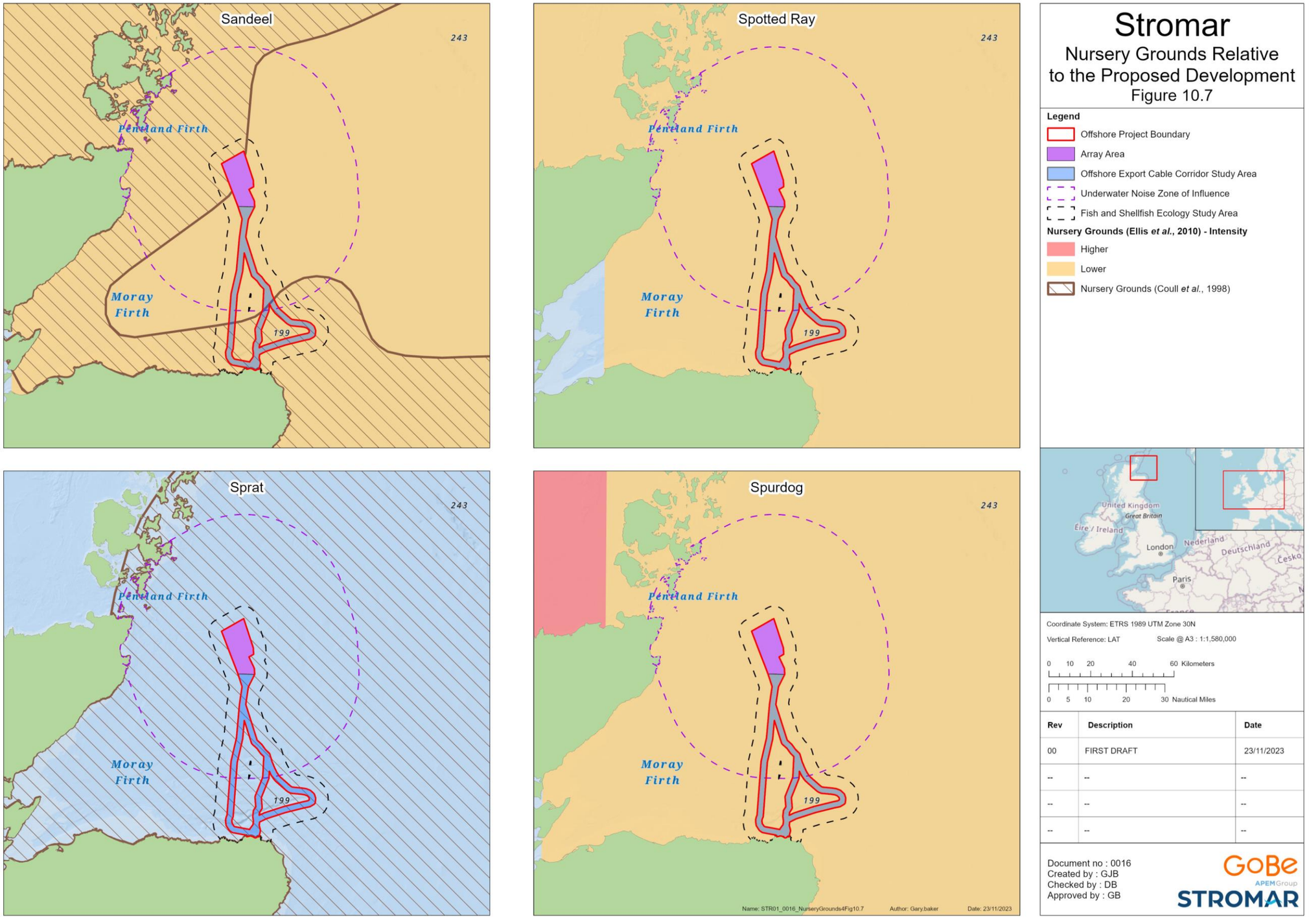


Figure 10.7: **Sandeel, Spotted Ray, Sprat and Spurdog Nursery Grounds Relative to the Proposed Offshore Development (Ellis).**

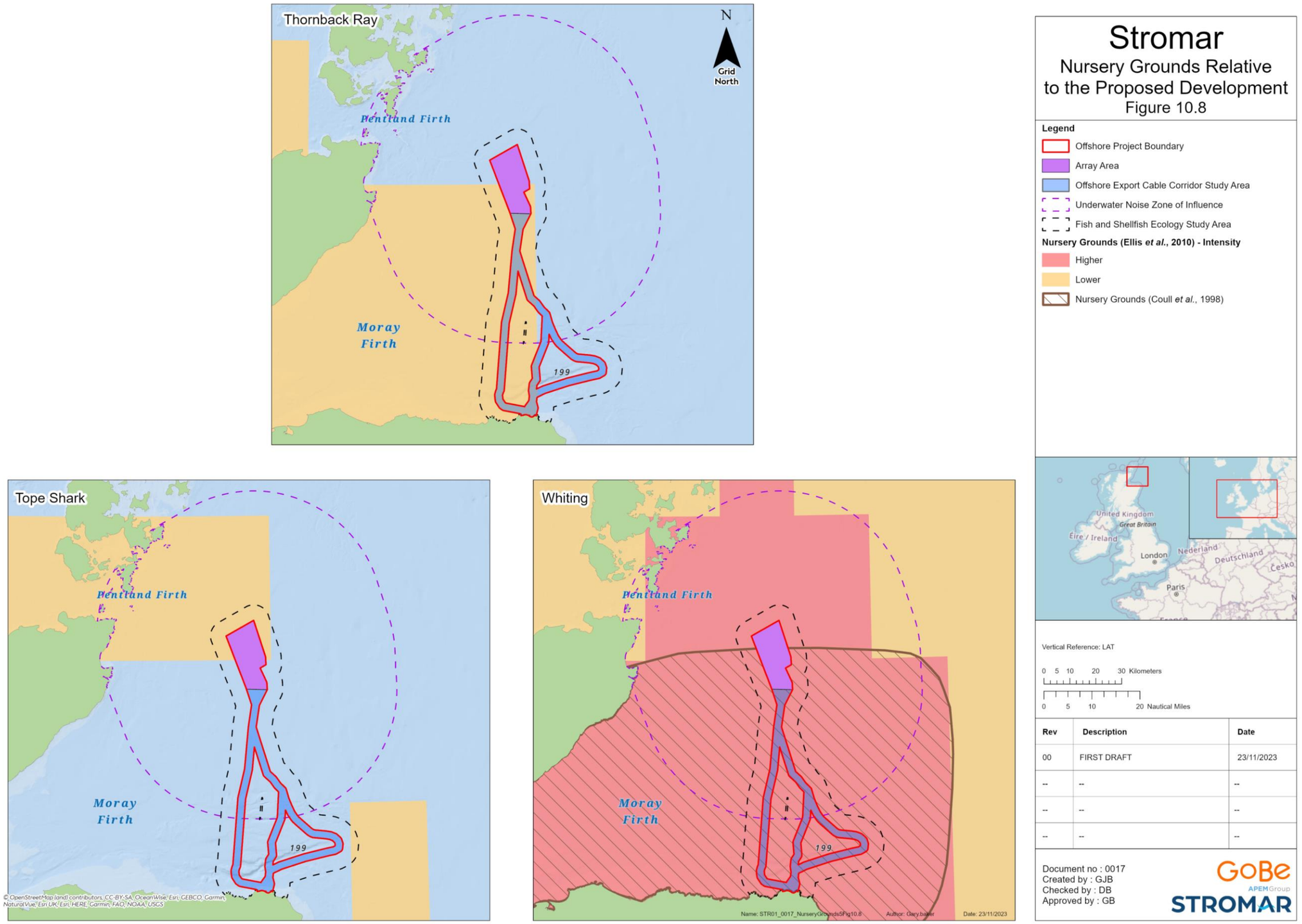


Figure 10.8: **Thornback Ray, Tope Shark and Whiting Nursery Grounds Relative to the Proposed Offshore Development (Ellis).**

Designated Sites and Protected Species

Species of Conservation Importance

10.3.25 Within the northern North Sea region, there are records of several marine and estuarine species protected under national, European and international legislation. Species of conservation importance that have the potential to be present within the study area are listed below in **Table 10.3** alongside their associated designations. On account of the conservation importance of these species to the region, all species are considered sensitive receptors to the Proposed Offshore Development and, therefore, potential impacts on these species from the Proposed Offshore Development will be taken into consideration in the fish and shellfish ecology assessment.

Table 10.3: Fish and shellfish species that are protected or considered threatened/declining, which are potentially present within the Proposed Offshore Development study area and wider geographic region.

Fish and Shellfish Species	
OSPAR List of threatened and/or declining species	
Allis shad *Alosa alosa;*	Greenland hablibut *Reinhardtius hippoglossoides*;
Atlantic salmon *Salmo salar;*	Sea lamprey *Petromyzon marinus*;
Cod *Gadus morhua;*	Gulper Shark *Centrophorus granulosus*;
European eel *Anguilla anguilla;*	Leafscale gulper shark *Centrophorus squamosus*;
Basking shark *Cetorhinus maximus;*	Porbeagle *Lamna nasus*;
Spurdog *Squalus acanthias;*	Portuguese dogfish *Centroscymnus coelolepi*;
Spotted ray Raja montagui;	Common skate *Dipturus batis*; and
Thornback ray Raja clavata;	White skate *Dipturus alba*.
UK Post-2010 Biodiversity Framework Priority Species	
Allis shad *Alosa alosa;*	Ling *Molva molva;*
Anglerfish *Lophius piscatorius*;	Plaice *Pleuronectes platessa;*
Atlantic halibut *Hippoglossus hippoglossus;*	Porbeagle *Lamna nasus;*
Basking shark *Cetorhinus maximus;*	Portuguese dogfish *Centroscymnus coelolepis;*
Blue ling *Molva dipterygia*;	Raitt's sandeel *Ammodytes marinus;*
Blue shark *Prionace glauca*;	Sandy ray *Leucoraja circularis*;
Cod *Gadus morhua;*	Sea trout *Salmo trutta trutta;*
Common skate *Dipturus batis;*	Smelt *Osmerus epelanus;*
European eel *Anguilla anguilla;*	Spurdog *Squalus acanthias;*
Greenland halibut *Reinhardtius hippoglossoides;*	Tope *Galeorhinus galeus*;
Gulper Shark *Centrophorus granulosus;*	Twaite shad *Alosa fallax;*
Hake *Merluccius merluccius;*	White skate *Bathyraja spinosissima;* and
Horse mackerel *Trachurus trachurs;*	Whiting *Merlangius merlangus.*
Leafscale gulper shark *Centrophorus squamosus;*	
Lesser sandeel *Ammodytes tobianus*;	

Fish and Shellfish Species	
Scottish Priority Marine Features	
Anglerfish *Lophius piscatorius*; Blue ling *Molva dypterygia;* Ling *Molva molva;* Norway pout *Trisopterus esmarkii;* Lesser sandeel *Ammodytes tobianus;* Whiting (juveniles) *Merlangius merlangus;* Common skate *Dipturus batis;* Atlantic Halibut; *Hippoglossus hippoglossus;* Black scabbardfish; *Aphanopus carbo;* Eel *Anguilla anguilla;* Flapper skate *Dipturus itermedius;* Blue skate *Dipturus batis;* Greenland halibut *Reinhardtius hippoglossoides;* Orange roughy Hoplostethus atlanticus; Porbeagle shark *Lamna nasus;* Portuguese dogfish *Centroscymnus coelolepis;* Sea lamprey *Petromyzon marinus;* Native oyster *Ostrea edulis;* Spiny lobster *Palinurus elephas*	Mackerel *Scromber scrombrus;* Cod *Gadus morhua;* Herring *Clupea harengus;* Saithe (juveniles) *Pollachius virens;* Raitt's sandeel *Ammodytes marinus;* Basking shark *Cetorhinus maximus;* Spurdog *Squalus acanthias;* Atlantic salmon *Salmo salar;* Blue whiting *Micromesistius poutassou;* River Lamprey *Lampetra fluviatilis;* Horse mackerel *Trachurus trachurus;* Leafscale gulper shark *Centrophorus squamosus;* Round-nose grenadier *Coryphaenoides rupestris;* Sand goby *Pomatoschistus minutus;* Sandy ray *Leucoraja circularis;* Sea trout *Salmo trutta;* Sparling *Osmerus eperlanus; and* *Ocean quahog Artica islandica.*
Nature Conservation (Scotland) Act 2004	
Basking shark *Cetorhinus maximus*	
ICUN Red List	
Atlantic salmon *Salmo salar* (Vulnerable); Cod *Gadus morhua* (Vulnerable); European eel *Anguilla anguilla (*Critically Endangered); Basking shark *Cetorhinus maximus* (Endangered); Blue shark *Prionace glauca (*Near Threatened); Spurdog *Squalus acanthias* (Vulnerable); Tope *Galeorhinus galeus* (Vulnerable); Sandy ray *Leucoraja circularis (*Vulnerable); Thornback ray *Raja clavata* (Near Threatened);	Halibut *Hippoglossus hippoglossus (*Endangered); Greenland Halibut *Reinhardtius hippoglossoides* (Near threatened); Gulper Shark *Centrophorus granulosus* (Vulnerable); Leafscale gulper shark *Centrophorus squamosus* (Vulnerable); Porbeagle *Lamna nasus (*Vulnerable); Portuguese dogfish *Centroscymnus coelolepis (*Near Threatened); Common skate *Dipturus batis (*Critically Endangered); Long-nosed skate *Beringraja rhina (*Near Threatened); and While skate *Bathyraja spinosissima* (Endangered).
Annex II Fish Species EU Habitats Directive (92/43/EEC)	

Fish and Shellfish Species	
Allis shad *Alosa alosa;*	River lamprey *Lampetra fluviatilis;*
Atlantic salmon *Salmo salar;*	Sea lamprey *Petromyzon marinus;* and
European eel *Anguilla anguilla;*	Twaite shad *Alosa fallax.*

Designated Sites

10.3.26 Sites designated for nature conservation within or in proximity to the study area have been detailed in **Table 10.4** and presented spatially in **Figure 10.9**. These sites are inclusive of nature conservation MPAs, SAC and SPAs. Sites that have a qualifying feature related to fish and shellfish ecology, or a qualifying feature that is dependent on fish and shellfish ecology have been listed within this table.

10.3.27 The Southern Trench NCMPA intersects with the Offshore ECC Study Area and has been designated for the minke whale *Balaenoptera acutorostrata*. The NCMPA has a conservation objective to maintain productivity, reduce and limit pressures for local mobile species and the minke whale, as both juveniles and adults are regularly observed feeding in the NCMPA. Minke whale utilisation of the Southern Trench NCMPA is likely to be related to the bathymetry and large-scale features such as fronts (NatureScot, 2019a). The consistent fronts are likely to influence the distribution and availability of minke whale prey (NatureScot, 2019a, Anderwald *et al*., 2012). It was recommended that the NCMPA is designated to reduce potential impacts on the habitat of sandeels (as they are a key minke whale prey species).

Table 10.4: Sites designated for nature conservation in the vicinity of the Fish and Shellfish Ecology study area.

Site	Location (Relative to the Proposed Offshore Development)	Qualifying Feature
Southern Trench NCMPA	Intersects with the entire inshore region of the Offshore ECC Study Area.	Minke whales. Included for presence of sandeels as a prey species for minke whales.
River Spey SAC	Southwest of the Array Area (98 km) and Offshore ECC Study Area (49 km).	Freshwater pearl mussel (Annex II species), sea lamprey and Atlantic salmon.
Berriedale and Langwell Waters SAC	West of the Array Area (80 km) and Offshore ECC Study Area (77 km).	Atlantic salmon (Annex II species).

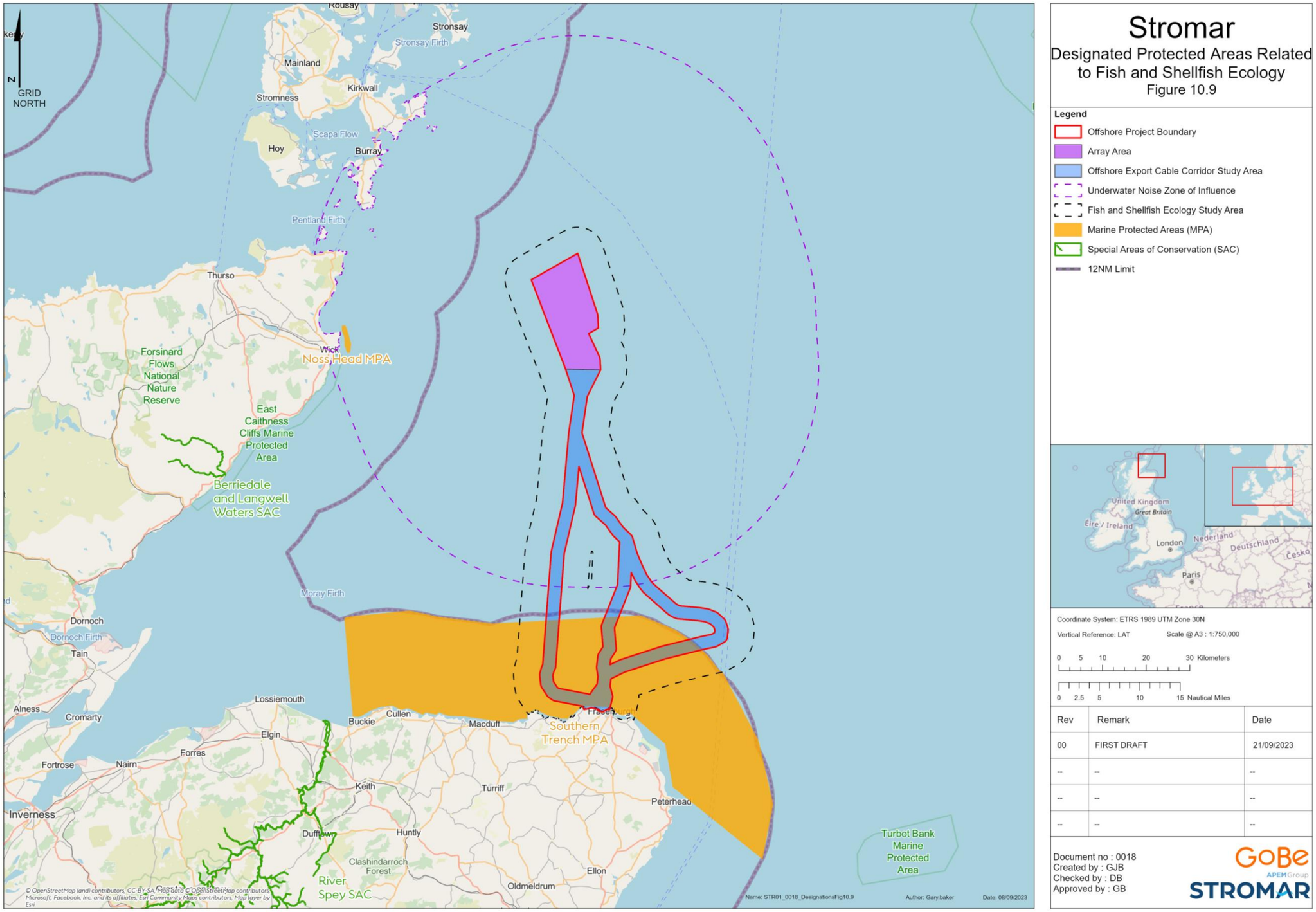


Figure 10.9: **Designated Protected Areas in Relation to the Proposed Offshore Development.**

Migratory Species

10.3.28 Migratory fish are species that spend part of their life cycle in freshwater and part in seawater; such species are termed diadromous (migrate between freshwater and saltwater) and can be either anadromous (return from the sea to freshwater to spawn) or catadromous (return from freshwater to sea to spawn). A number of migratory fish species have the potential to occur in the study area, migrating to and from rivers and other freshwater bodies in the area. The rivers of conservation importance discussed within this section are presented in **Figure 10.9**.

10.3.29 Migratory fish species including Atlantic salmon, sea trout, European eel, smelt, Twaite shad, and Allis shad are likely to occur in the Moray Firth, nearby rivers and estuaries. Several species of fish living in Scottish rivers migrate between the sea and the upper reaches of rivers during their life cycle. Atlantic salmon, sea trout, river lamprey and sea lamprey spend the majority of their adult lives in the oceans but return to freshwater to reproduce. European eel are also migratory diadromous fish, but their lifestyle differs from anadromous fish; adult eels migrate out to sea to spawn and their larvae make the return journey (catadromous).

10.3.30 Some diadromous species may cross the Proposed Offshore Development as part of their migration or transit surrounding areas as part of their foraging activity. The rivers Berriedale and Langwell Waters and Spey (77 km and 49 km from the closest point to the Proposed Offshore Development, respectively), are the closest SACs with a qualifying interest in diadromous species (Atlantic salmon and sea lamprey), whose dominant migratory routes have potential to pass through the Array Area and Offshore ECC Study Area (Beatrice OWF Ltd, 2017; Gilbey *et al*., 2021).

Elasmobranchs

10.3.31 Elasmobranchs (sharks and rays) are a particularly sensitive species group due to their slow growth rates and low fecundity (Scottish Government, 2011; Marine Scotland, 2020b). All sharks and rays living in Scottish waters are included in the OSPAR list of threatened and/or declined species (**Table 10.3**) (Marine Scotland, 2020b). There are low intensity nursery grounds for common skate, spotted ray, spurdog, thornback ray and tope shark throughout the study area and ZoI (Ellis *et al*., 2010; Coull *et al*., 1998) (**Figure 10.7** and **Figure 10.8**).

10.4 Embedded Commitments

10.4.1 The Proposed Offshore Development has adopted various primary commitments (primary design principles intrinsically part of the Project design, installation techniques and engineering designs/modifications) as part of the pre-application phase to eliminate and/or reduce LSE arising from a number of impacts (as far as possible). These are outlined in **Appendix A: Offshore Commitments Register**. Further commitments (imposed as a result of legislative requirements and/or standard sectoral practice, regardless of EIA assessment), referred to as tertiary commitments are embedded as an inherent aspect of the EIA process. Secondary commitments (which require further activity to achieve anticipated outcome- often secured through planning conditions and/or management plans) are incorporated to reduce LSE to environmentally acceptable levels following initial assessment, i.e., so that residual effects are reduced to environmentally acceptable levels.

10.4.2 The commitments adopted by the project in relation to fish and shellfish ecology are presented in **Table 10.5** The full list of commitments can be found in **Appendix A: Offshore Commitments Register**.

Table 10.5: The Proposed Commitments Relevant to Fish and Shellfish Receptors.

Commitment Code	Commitment Measure
C-OFF-08	A CMS will be developed, which will detail the proposed construction methods and roles and responsibilities of parties involved.
C-OFF-09	Development of, and adherence to a CaP. The CaP will confirm planned cable routing, burial and any additional protection and will set out methods for post-installation cable monitoring as secured by Section 36 and Marine Licence consent conditions. The CaP is likely to be supported by a CBRA, which will outline how external cable protection shall be used and/or minimised, should cable burial be achieved.
C-OFF-12	Development of a PEMP, which will set out environmental monitoring in pre-, during, and post-construction phases.
C-OFF-13	A PEMP will be developed, to include a Marine Pollution Contingency Plan and INNS Management Plan. This PEMP will also include information on chemical usage, dropped objects, and waste management.
C-OFF-15	A PPP will be developed as part of the Project Environmental Monitoring Plan.
C-OFF-16	A Piling Strategy (PS) will be developed and followed, detailing the methods of pile installation and associated noise levels. It will include any mitigation measures to be put in place during piling to manage the effects of underwater noise on sensitive receptors.
C-OFF-17	CBRA surveys will be undertaken. Where sufficient burial is not achievable, suitable implementation and monitoring or cable protection will be developed.
C-OFF-18	Scour protection to be implemented around foundations and offshore structures. Ideally this will reduce the change to hydrodynamic and sedimentary regimes that may expose archaeological receptors leading to increased rates of deterioration through biological, chemical and physical processes.
C-OFF-63	Development of and adherence to a DP, secured under Section 36 and/or Marine Licence consent conditions.

10.4.3 As a result of the commitment to implement these measures, and to align with various standard sectoral practices and procedures, the embedded (primary) commitments are considered inherently part of the design of the Proposed Offshore Development and have, therefore, been included in the assessment presented in **Section 10.5**.

10.5 Scoping of Impacts

10.5.1 An initial assessment of the likelihood of effects on fish and shellfish ecology due to Proposed Offshore Development's activities for the Scoping stage of the EIA process is set out in **Table 10.6**. The assessment is based on a combination of the following:

- The definition of the Proposed Offshore Development at the Scoping stage (as shown in **Chapter 3: Proposed Offshore Development Description**);
- Embedded commitments (as set out in **Section 10.4** and **Appendix A: Commitment Register**), together with the means by which it will be secured);
- The level of understanding of the baseline at the Scoping stage;

- The existing evidence base for fish and shellfish ecology effects due to Proposed Offshore Development activities;
- Relevant policy and guidance (as set out in **Section 10.8: Guidance**); and
- The professional judgement of qualified fish and shellfish ecology specialists.

Table 10.6: Scoping Assessment for Fish and Shellfish Ecology.

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
Construction and Decommissioning				
Increases in suspended sediment concentration (SSC) and changes to seabed levels.	C-OFF-08 C-OFF-09 C-OFF-12 C-OFF-17 C-OFF-63	Scoped In	Temporary elevations in SSCs have the potential to occur during construction (i.e., cable and foundation installation) activities and decommissioning activities. This could in turn lead to smothering of slow moving or sessile species and also localised changes in sediment type which may potentially impact seabed dependent species (e.g., sandeel and herring).	Possible LSE without secondary commitment measures, however it may become clear post-Scoping stage that the impact does not require detailed assessment in the EIAR.
Temporary habitat disturbance	C-OFF-08 C-OFF-12 C-OFF-16 C-OFF-63	Scoped In	There is potential for temporary, direct habitat disturbance during construction activities in the Array Area and along the Offshore ECC due to seabed preparation, cable laying (including the installation of cofferdams in the intertidal area), foundation installation and the use of jack up vessels or vessel anchoring. Temporary habitat disturbance has the potential to negatively impact species that are dependent on the seabed for some or all of their life cycle.	Possible LSE without secondary commitment measures, however it may become clear post-Scoping stage that the impact does not require detailed assessment in the EIAR.
Direct and indirect seabed disturbance leading to release of sediment contaminants	C-OFF-13 C-OFF-15 C-OFF-63	Scoped In	Seabed disturbance during construction could lead to the mobilisation of existing sediment contaminants that could have an impact on fish and shellfish receptors. Effects on fish and shellfish ecology as a result of changes in water quality will be informed by the conclusions of the marine and sediment quality assessments.	Possible LSE without secondary commitment measures, however it may become clear post-Scoping stage that the impact does not require detailed assessment in the EIAR.
Direct damage (e.g., crushing) and disturbance to mobile demersal and pelagic fish and shellfish species	C-OFF-08 C-OFF-12 C-OFF-63	Scoped Out	There is potential for direct damage to occur during construction activities in the Array Area and along the Offshore ECC due to seabed preparation, cable laying, foundation installation and the use of jack up vessels or vessel anchoring. There is also the potential for direct damage to occur as a result of decommissioning activities. Affected species are however likely to be mobile and can move away from disturbance, furthermore, crushing impacts on stationary receptors will be small scale, and will not result in population level effects.	No LSE identified at Scoping.

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
			Relevant commitment measures are presented in **Appendix A: Commitment Register**.	
Mortality, injury, behavioural impacts and auditory masking arising from noise and vibration from the installation of infrastructure and UXO clearance	C-OFF-08 C-OFF-12 C-OFF-16 C-OFF-63	Scoped In	Potential effects from construction activities may arise from noise and vibrations from pile-driving for the installation of Offshore Substation Platform foundations (with the potential for anchor/mooring piling for floating foundations). Cable laying (including the installation of cofferdams in the intertidal), dredging and vessel movements also have the potential to result in underwater noise. Noise from piling has the potential to cause significant impacts to fish and shellfish species ranging from lethal trauma to behavioural changes in susceptible fish species. Underwater noise modelling will be undertaken as part of the EIA in line with worst case scenarios.	Possible LSE without secondary commitment measures, however it may become clear post-Scoping stage that the impact does not require detailed assessment in the EIAR.
Accidental pollution during construction or decommissioning activity	C-OFF-13 C-OFF-15 C-OFF-63	Scoped Out	Accidental releases of pollutants may arise as a result of accidental spills from vessels or other equipment and have detrimental effects on fish and shellfish. However, the risk and impact of accidental releases of hazardous substances will be reduced through the implementation of the EMP, including measures for compliance with international requirements of the International Convention for the Prevention of Pollution from Ships MARPOL) convention, as well as best practice for works in the marine environment (e.g., preparation of Shipboard Oil Pollution Emergency Plans (SOPEP)). In this manner, accidental release of potential contaminants from construction vessels will be strictly controlled and procedures will be in place to minimum the impact of any accidental release if it occurs, and hence the impact has been Scoped Out of the EIA. Relevant commitment measures are presented in **Appendix A: Commitment Register**.	No LSE identified at Scoping.
Increased risk of introduction and/or spread of INNS	C-OFF-08 C-OFF-13 C-OFF-63	Scoped Out	This impact is being proposed to be Scoped Out in consideration of the commitments and control of invasive species measures in line with International Maritime Organization (IMO, 2019). These standards and procedures will be incorporated into the EMP and are embedded in the project design and as such ensure that no significant effects arise from INNS. Increased risk of introduction or spread of Marine INNS due to increased vessel movements during construction (e.g., ballast water) may facilitate the spread of non-native species and may subsequently impact biodiversity and Fish and Shellfish ecology of the area. INNS (plant and	No LSE identified at Scoping.

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
			animal) can be spread inadvertently in soil which is moved around the construction site and on machinery etc which is moved between construction sites, which may result in an offence under wildlife legislation and negative impacts on the ecosystems to which the species are transferred. Relevant commitment measures are presented in **Appendix A: Commitment Register**.	
Operation and Maintenance				
Permanent and/or long-term habitat loss/alteration due to the addition of infrastructure to the area	C-OFF-08 C-OFF-09 C-OFF-12	Scoped In	Potential effects during the operational phase will mostly result from the physical presence of infrastructure (i.e., anchors, foundations, scour and cable protection above the seabed) which will result in long-term habitat loss. For floating foundations, abrasion from the mooring lines/anchor chains may also result in long-term habitat disturbance and will be considered. These effects have the potential for impacts on substrate dependent fish and shellfish, in particular those that have substrate specific spawning behaviours (e.g., sandeel, herring), or those with designated conservation status. Furthermore, the introduction of infrastructure has the potential to alter the fish and shellfish assemblage ecology within the area due to disturbance and/or removal of feeding grounds for these species and the subsequent changes in prey availability. Impacts on sensitive fish and shellfish species will be considered in terms of long-term loss of spawning habitats and impacts on species of conservation importance. The area of habitat loss will be defined using a worst-case scenario to determine the maximum loss of seabed, and the potential loss herring and sandeel spawning grounds. It is considered that there are sufficient existing data to inform this assessment, and therefore no further surveys are proposed.	Possible LSE without secondary commitment measures, however it may become clear post-Scoping stage that the impact does not require detailed assessment in the EIAR.
Direct disturbance resulting from maintenance during operational phase	C-OFF-08	Scoped In	There is the potential for direct habitat disturbance of the seabed during planned and unplanned maintenance activities (e.g., the use of jack up vessels or cable repair or replacement). However, affected fish and shellfish species are likely to be mobile and can move away from disturbance.	Possible LSE without secondary commitment measures, however it may become clear post-Scoping stage that the impact does not require detailed assessment in the EIAR.

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
EMF effects arising from cables during operational phase	C-OFF-08 C-OFF-09 C-OFF-17	Scoped In	EMF may impact sensitive species, including elasmobranchs, teleost fish (i.e., flat fish, salmonids and gadoids) and crustaceans (e.g., brown crab (Scott *et al.,* 2018; Scott *et al.,* 2021, Tricas & Gill, 2011)) by altering foraging or migratory behaviour (Hutchison *et al.,* 2020). The magnitude of this impact will depend in part on the project design and the burial and cable protection measures which are utilised. For floating foundations, EMF effects will be considered for suspended cables in the water column. It is acknowledged that there is limited, but emerging research on EMF impacts on fish and shellfish, especially for dynamic cables. The impact assessment will draw on the latest relevant available literature on this impact.	Possible LSE without secondary commitment measures, however it may become clear post-Scoping stage that the impact does not require detailed assessment in the EIAR.
Introduction of new hard substrates and potential for fish aggregation	C-OFF-08 C-OFF-18	Scoped In	Installed infrastructure may introduce new hard substrate for colonisation by encrusting marine organisms, including by marine fauna that are not currently found in the existing environment. The EMP will include measures to reduce the spread of invasive species. Offshore infrastructure may act as a Fish Aggregation Device (FAD), providing refuge for some species and also habitat for some shellfish and benthic species, whilst also potentially attracting larger predators which could indirectly increase entanglement or collision risk for both fish and marine mammal species.	Possible LSE without secondary commitment measures, however it may become clear post-Scoping stage that the impact does not require detailed assessment in the EIAR.
Accidental pollution events during O&M activity	C-OFF-08 C-OFF-13 C-OFF-15	Scoped Out	See justification described for accidental pollution events during construction and decommissioning activity above. Relevant commitment measures are presented in **Appendix A: Commitment Register**.	No LSE identified at Scoping.
Increased risk of introduction and/or spread of INNS	C-OFF-08 C-OFF-13	Scoped In	Increased risk of introduction or spread of Marine INNS due to the presence of the subsea infrastructures and increased vessel movements may facilitate the spread of non-native species and may subsequently impact biodiversity and assemblages of Fish and Shellfish ecology of the area. The potential introduction or spread of Marine INNS and subsequent impact to local Fish and Shellfish ecology receptors will be assessed based on current industry understanding, available literature and expert knowledge. The assessment will take into consideration the commitments and control of invasive species measures that will be incorporated into a EMP.	Possible LSE without secondary commitment measures, however it may become clear post-Scoping stage that the impact does not require detailed assessment in the EIAR.

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
			Consideration of the commitments and control of invasive species measures in line with IMO will be given (IMO, 2019). These standards and procedures will be incorporated into the EMP and are embedded in the project design and as such ensure that no significant effects arise from INNS.	
Underwater noise as a result of operational turbines	C-OFF-08 C-OFF-12	Scoped In	Underwater noise as a result of operational turbines, has a relatively low frequency and pressure level (Andersson *et al.,* 2011). A desk-based literature review of existing data and past studies of underwater noise associated with operational OWFs will be conducted to gain an understanding of the likely magnitude of the effect on Fish and Shellfish communities within the EIAR. It is important to note, operational noise generated from maintenance vessel traffic is likely to be low would only have an impact on fish species if they remained in close proximity to the vessel for hours.	Possible LSE without secondary commitment measures, however it may become clear post-Scoping stage that the impact does not require detailed assessment in the EIAR.
Ghost fishing due to lost fishing gear becoming entangled in installed infrastructure	n/a	Scoped In	There is the potential for lost gear to become entangled within mooring lines and suspended cables associated with floating substructures, if this technology is utilised, leading to ghost fishing which may negatively impact fish and shellfish.	Possible LSE without secondary commitment measures, however it may become clear post-Scoping stage that the impact does not require detailed assessment in the EIAR.

10.6 Potential Cumulative Impacts

10.6.1 The process by which potential cumulative impacts will be assessed through the CIA is described in **Chapter 6: EIA Approach and Methodology**, with examples provided of the projects likely to be included in that assessment.

10.6.2 For fish and shellfish ecology, cumulative interactions may, depending upon construction timelines, occur with other planned projects such as Caledonia and Broadshore OWFs, as well as other activities, for example cable maintenance activities. **Figure 10.10** presents the Proposed Offshore Development study area in relation to other human activities of relevance. It is important to note however, that the ZoI may be subject to change as the Proposed Offshore Development is refined and project-specific numerical modelling is undertaken (as discussed in **Section 10.2**). Further information on the industries present/planned within the Moray Firth and in relation to the Proposed Offshore Development are presented in **Chapter 20: Other Human Activities**.

10.6.3 Impacts that are Scoped In to the assessment for the Proposed Offshore Development are generally spatially restricted to being within close proximity to the Array Area and Offshore ECC Study Area. However, certain potential impacts, such as an increase in SSC and UWN, have the potential to be observed over a wider area.

10.6.4 Due to refining of the ZoI as the Proposed Offshore Development evolves, nearby developments cannot be Scoped Out as being subject to potential cumulative impacts. A full appraisal of projects to include within the CIA will be undertaken as part of the EIAR. The CIA for fish and shellfish ecology will consider the MDS for each of the projects, plans and activities in line with the methodology outlined in **Chapter 6: EIA Approach and Methodology.** For this reason, the following impacts on fish and shellfish ecology receptors are being proposed for further consideration within the EIAR, subject to route refinement:

- Temporary increase in suspended sediment and sediment deposition arising from construction and decommissioning activities; and
- Mortality, injury and behavioural changes resulting from UWN arising from construction and decommissioning activities.

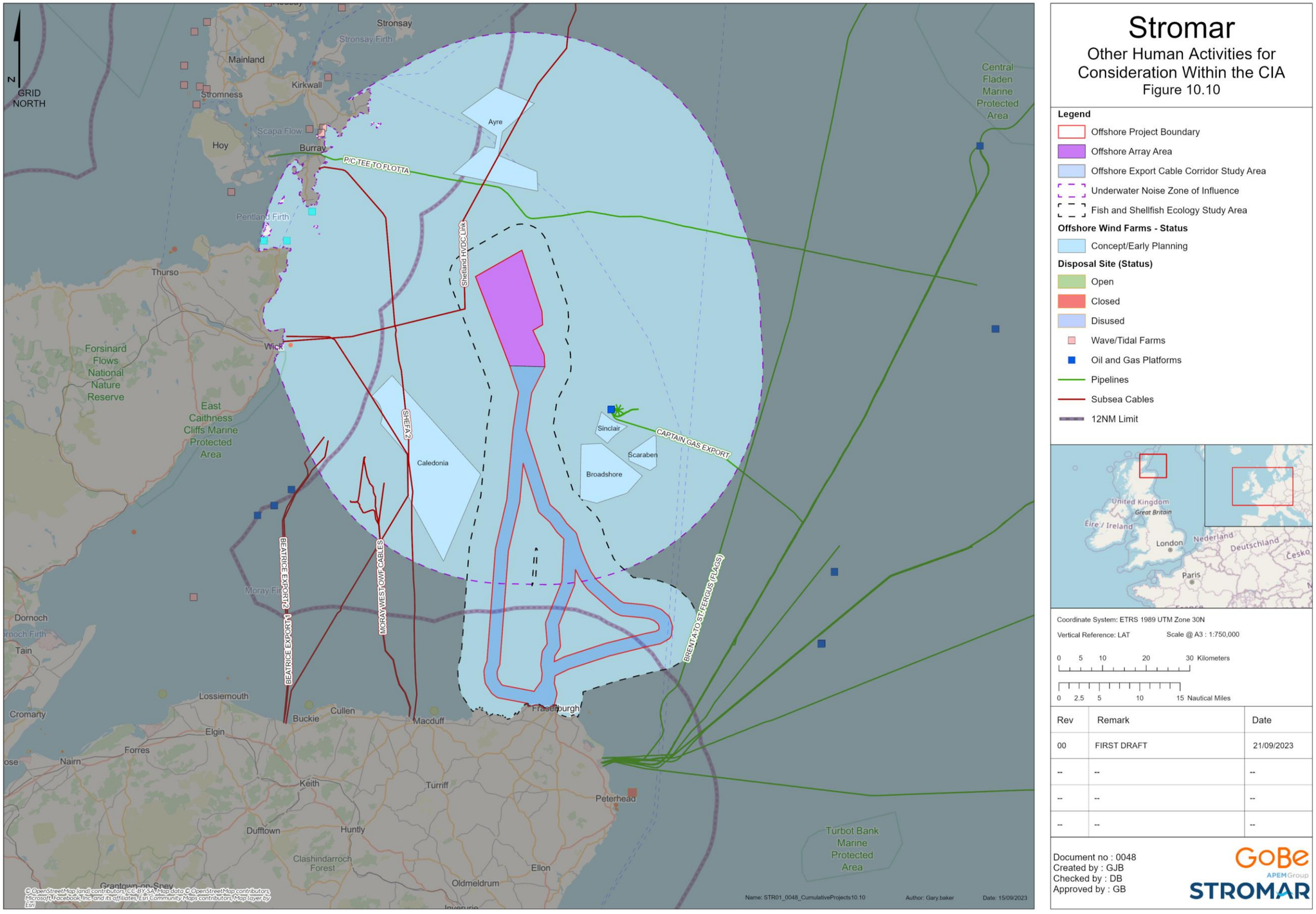


Figure 10.10: Other Human Activities for Consideration within the CIA for Fish and Shellfish Ecology.

10.7 Potential Transboundary Impacts

10.7.1 Transboundary impacts related to fish and shellfish ecology are not anticipated to arise from construction, O&M or decommissioning stages of the Proposed Offshore Development. Any impacts on fish and shellfish receptors will be localised in nature (including those giving rise to the greatest footprint of effect such as UWN from piling), and any indirect effects will likely be limited to one tidal excursion from the impact source. The Proposed Offshore Development is a significant distance (approximately 410 km) from the nearest adjacent EEZ of another state (Denmark) and therefore it is considered that transboundary impacts will not occur. As such these are Scoped Out from further consideration within the EIAR.

10.8 Proposed Approach to EIA

10.8.1 This section outlines the proposed Proportionate EIA approach to fish and shellfish ecology for the Proposed Offshore Development. This includes the proposed assessment methodology, relevant embedded commitments, as well as those measures Scoped In to and Out of the assessment.

Additional Data Sources

10.8.2 A thorough desk-based collation and review of the relevant data will be undertaken to inform the subsequent EIA including the data sources listed within **Table 10.2**, as well as site specific surveys. Impact assessments will be undertaken in line with current SNCB guidance, particularly NatureScot, CIEEM EIA guidance (2018; updated 2023) and expert opinion. Consideration will also be given to results from past, present and ongoing research projects from ScotMer, the OWSMRF, and the ORJIP where relevant.

10.8.3 The characterisation of the fish and shellfish species found within the vicinity of the Proposed Offshore Development will be completed by drawing upon work that has been undertaken in support of various OWF projects in the region, as well as wider information from publicly available sources. Additional data sources will include:

- ‘Essential Fish Habitat Maps for Fish and Shellfish Species in Scotland’, developed by the ScotMER programme, with publication expected later this year;
- Understanding the Potential for Marine Megafauna Entanglement Risk from Marine Renewable Energy Developments, a NatureScot commissioned report (2014);
- Publications and reports by the Predators and Prey Around Renewable Energy Developments (PrePARED) Project;
- Any updated data available from the Moray Firth Tracking Project;
- Any new research or publications concerning the effects of EMF;
- Site-specific drop-down video and sediment grab benthic survey; and
- Site specific eDNA data and geophysical surveys.

10.8.4 The use of publicly available datasets for fish and shellfish ecology combined with site-specific eDNA data is considered sufficient to establish a robust baseline for an OWF at this specific location, which will the basis for the EIA for the Proposed Offshore Development. The results of the benthic ecology surveys (including drop down videos and sediment grabs) will be used to understand the suitability of the seabed habitat at the Proposed Offshore Development for sandeel and herring spawning.

Guidance

10.8.5 In addition to the approach and guidance outlined in **Chapter 6: EIA Approach and Methodology**, the assessment of fish and shellfish ecology cumulative receptors will also comply with the following guidance documents where they are specific to this topic:

- Guidelines for Ecological Impact Assessment in the UK and Ireland. Terrestrial, Freshwater, Coastal and Marine from the Chartered Institute for Ecology and Environmental Management (CIEEM, 2018);
- Guidance note for EIA in respect of the Food and Environment Protection Act, 1985 (FEPA and Coastal Protection Act, 1949 (CPA) requirements (Cefas *et al.,* 2004);
- Strategic Review of OWF Monitoring Data Associated with FEPA Licence Conditions (Walker *et al.,* 2009);
- Guidelines for Data Acquisition to Support Marine Environmental Assessments of Offshore Renewable Energy projects (Judd, 2012);
- Guidance on Environmental Considerations for OWF Development (OSPAR, 2008).
- Sensitivity of features based upon the Marine Evidence Based Sensitivity Assessment (MarESA) framework where possible (MarLIN, 2022);
- Sound Exposure Guidelines for Fishes and Sea Turtles: A Technical Report (Popper *et al.,* 2014);
- Information gaps in understanding the effects of noise on fishes and invertebrates (Hawkins *et al.,* 2014);
- A sound approach to assessing the impact of underwater noise on marine fishes and invertebrates (Hawkins and Popper, 2016);
- Monitoring Guidance for Underwater Noise in European Seas, Part II Monitoring Guidance Specifications (Dekeling *et al.,* 2014);
- Options and opportunities for marine fisheries mitigation associated with wind farms (Blyth-Skyrme, 2010);
- Offshore Wind Marine Environmental Assessments: Best Practice Advice for Evidence and Data Standards - Phase I (Natural England, 2021a); and
- Offshore Wind Marine Environmental Assessments: Best Practice Advice for Evidence and Data Standards - Phase III (Natural England, 2021b).

10.8.6 In addition, the fish and shellfish ecology EIA will follow the legislative framework as defined by the Conservation of Habitats and Species Regulations 2017, the Conservation of Offshore Marine Habitats and Species Regulations 2017, the Wildlife and Countryside Act 1981 and the Marine Coastal Access Act 2009.

Assessment Methodology

10.8.7 To enable the potential impact of the Proposed Offshore Development to be assessed, a description of the existing fish and shellfish populations, focusing particularly on any areas of conservation interest, will be undertaken. Potential impacts that may occur on fish and shellfish ecology as a result of the planned construction, O&M and decommissioning will then be identified. The sensitivities of the

populations present to the types of impact expected from wind farm construction, O&M and decommissioning will be assessed. Where necessary, measures will be proposed to mitigate the impacts.

10.8.8 The benthic ecology survey campaign will include DDV, grab samples, contaminant and PSA analysis and eDNA analysis. The methodology will be agreed with stakeholders beforehand. The benthic ecology survey, geophysical data and predictive habitat maps will be used to determine seabed suitability for sandeel and herring spawning, as well as link to consideration of changes to prey availability. There will be UWN modelling undertaken during the EIA to assess the potential for mortality, permanent and temporary injury and behavioural disturbance of noise sensitive fish and shellfish receptors based on impact thresholds reported in Popper *et al*., (2014). This will be carried out on fish and shellfish as both stationary and fleeing receptors.

10.8.9 In the event that the Proposed Offshore Development has a direct impact on any sites that are designated for conservation at the European (SAC, now forming part of the UK's National Site Network) or international level (Ramsar), as a result of qualifying habitats or species that they support, then the requisite information will be provided alongside the EIAR to assist the CA to carry out an AA.

10.8.10 Cumulative impacts will be assessed by taking into consideration any similar developments, proposed or existing, that are in the vicinity of the Proposed Offshore Development, as discussed in **Section 10.6**.

10.9 Scoping Questions

10.9.1 The following questions refer to the fish and shellfish ecology chapter and are designed to focus the Scoping exercise and inform the Scoping Opinion:

1. Do you agree with the study area(s) defined for fish and shellfish ecology?
2. Do you agree with the use of those data listed in **Section 10.3**, and any additional anticipated data listed in **Section 10.8**, being used to inform the Offshore EIA?
3. Are there any additional data sources or guidance documents that should be considered?
4. Do you agree that all receptors related to fish and shellfish ecology have been identified?
5. Do you agree with the Scoping In and Out of impact pathways in relation to fish and shellfish ecology?
6. Do you agree with the assessment of transboundary effects in relation to fish and shellfish ecology?
7. Do you agree with the assessment of cumulative effects in relation to fish and shellfish ecology?
8. Do you agree with the intention to not undertake site-specific fish (trawl) surveys but to undertake eDNA analysis as a component of the benthic ecology surveys?
9. Do you agree on the suitability of the proposed commitments to reduce or eliminate LSE relevant to fish and shellfish ecology?

11 Offshore Ornithology

11.1 Introduction

11.1.1 This section of the Offshore Scoping Report identifies the offshore ornithology receptors of relevance to the Proposed Offshore Development, and considers the potential impacts from the construction, O&M and decommissioning of the Proposed Offshore Development, up to MHWS (and thus captures both intertidal and marine/offshore ornithological receptors and sets out the proposed scope of the EIA).

11.1.2 Key ornithological receptors relevant to the Proposed Offshore Development are identified in this chapter based on the results of site-specific surveys and available guidance and literature. Consideration is then given to potential impacts from the Proposed Offshore Development on these receptors, with key impacts expected to be distributional responses (i.e., impacts resulting from disturbance and displacement, and potential barrier effects) and collision impacts.

11.1.3 This chapter should be read alongside the following chapter:

- **Chapter 10: Fish and Shellfish Ecology**.

11.1.4 This chapter of the Offshore Scoping Report has been prepared by GoBe.

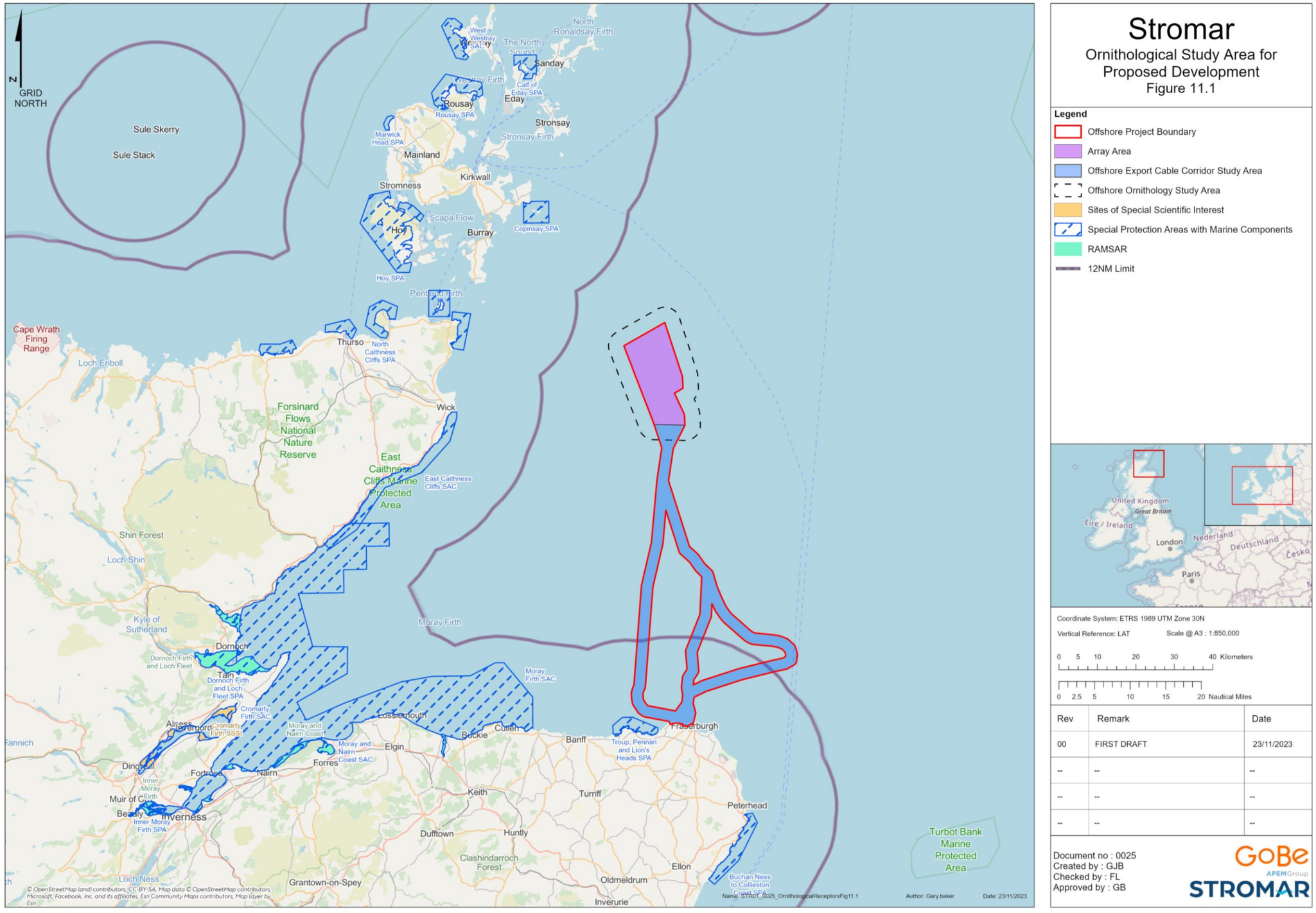
11.2 Study Area

11.2.1 The offshore ornithology study area is the area considered to represent a realistic maximum spatial extent of potential impacts on Important Ornithological Features (IOFs). This includes the Array Area with a 4 km buffer[12], the Offshore ECC Study Area and the Landfall Development Zone, thereby encapsulating both the offshore and intertidal ornithological receptors. Account also must be taken of the mobility of birds, noting that for instance, birds that nest outside the study area might be in foraging range and fly in to or across the study area to feed during the breeding season, might fly into the study area outside of the breeding season to spend the winter or might fly across the study area on migration.

11.2.2 The Array Area comprises the majority of the NE3 PO, located approximately 50 km to the east of Wick, Caithness, and covering an area of 256 km². The Offshore ECC Study Area comprises up to three 3 km wide corridors extending 126 km from the Array Area to MHWS at landfall. The landfall area of the Offshore ECC extends approximately 4 km along the north Aberdeenshire coastline between Rosehearty and Fraserburgh, and covers the area between MHWS and MLWS through which the Offshore ECC will be installed.

11.2.3 The study area for offshore ornithology is shown in **Figure 11.1** which covers the area where Proposed Offshore Development impacts may occur**.** Key designated sites and IOFs are determined based on connectivity to the study area based on species-specific foraging ranges (**Table 11.6**).

[12] Note survey methodology was agreed with NatureScot prior to updated guidance referencing the need for DAS data to be collected within a 6 km buffer, with the Project approach of collecting data within a 4 km buffer deemed acceptable.



Stromar

Ornithological Study Area for Proposed Development
Figure 11.1

Legend

- Offshore Project Boundary
- Array Area
- Offshore Export Cable Corridor Study Area
- Offshore Ornithology Study Area
- Sites of Special Scientific Interest
- Special Protection Areas with Marine Components
- RAMSAR
- 12NM Limit

Coordinate System: ETRS 1989 UTM Zone 30N
Vertical Reference: LAT
Scale @ A3 : 1:850,000

0 5 10 20 30 40 Kilometers
0 2.5 5 10 15 20 Nautical Miles

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Document no : 0025
Created by : GJB
Checked by : FL
Approved by : GB

GoBe APEM Group
STROMAR

Figure 11.1: The Proposed Offshore Development Ornithological Study Area.

11.3 Baseline Environment

11.3.1 An initial desk-based review of literature and data sources has been undertaken to support this Offshore Scoping Report. The data sources listed below provide coverage of the study area and the wider region of interest for offshore and intertidal bird species.

Overview of Available Data Sources

11.3.2 A variety of sources of information will also be considered as part of a desk-based study to describe the baseline environment, including site-specific DAS data, peer-reviewed scientific literature and 'grey literature' such as other OWF project submissions and reports. Published literature on seabird ecology and distribution, and the potential impacts of offshore wind developments will also be considered (**Table 11.1**).

11.3.3 In addition, new and up to date information and evidence is regularly coming into the public domain, and such new information will be reviewed as it becomes available during the relevant stages of the assessment. This will include consideration of evidence gaps identified and subsequent work planned through the ScotMER[13] programme. An overarching roadmap for addressing evidence gaps was produced through the SMP – Roadmap of actions[14].

Table 11.1: Key Sources used for Scoping: Offshore.

Source, Author and Year	Summary	Coverage of the Array Area and Offshore ECC Study Area	Data Quality
Existing Project Survey Data			
HiDef Aerial Surveying Ltd (March 2022 to February 2023), DAS data	DAS conducted by HiDef Digital Surveying Ltd on a monthly basis between March 2022 and February 2023. This initial 12 months of survey data (March 2022 to February 2023) has been summarised below in **Table 11.2**. Notably data collection is ongoing, with 24-months of data collection expected.	Array Area plus 4 km buffer	Recently collected relevant data (between March 2022 and February 2023)
HiDef Aerial Surveying Ltd (March 2023 to February 2024 (data collection ongoing)), DAS data	DAS conducted by HiDef Digital Surveying Ltd on a monthly basis between March 2023 and February 2024. This second 12 months of survey data (March 2023 to February 2024) will be incorporated into the EIA, concluding the 24-months of data collection.	Array Area plus 4 km buffer	High data quality expected, recent data acquisition (from March 2023 to February 2024)

[13] https://www.gov.scot/publications/ornithology-specialist-receptor-group/

[14] https://www.gov.scot/binaries/content/documents/govscot/publications/research-and-analysis/2022/12/sectoral-marine-plan-roadmap-actions/documents/sectoral-marine-plan-roadmap-actions/sectoral-marine-plan-roadmap-actions/govscot%3Adocument/sectoral-marine-plan-roadmap-actions.pdf

Source, Author and Year	Summary	Coverage of the Array Area and Offshore ECC Study Area	Data Quality
SLR (October 2022 to present), Intertidal Wetland Birds Surveys (WeBS)	Monthly counts of wetland birds undertaken at the Offshore ECC Study Area since October 2022.	Offshore ECC Study Area	Updated monthly
North-East & East Ornithology Groups (Present/ongoing)	Collaborative studies & surveys via the North-East & East Ornithology groups, including: - Bird tagging with British Trust for Ornithology (BTO) and the Royal Society for the Protection of Birds (RSPB) of key species at key SPAs: Breeding season GPS and non-breeding season geolocator deployment. - Financial contribution to the RSPB led 2023 HPAI colony counts. - North Caithness Cliffs colony counts in support of wider SPA network HPAI counts - Support of East Caithness Cliffs SPA 2023 HPAI colony counts. - Availability Bias correction factors by University of Liverpool.	Relevant data for across the broader region	Current/ongoing data collection
Publicly Available Datasets			
NatureScot (various dates), Designated sites	Information on SPAs and other designations relevant to IOFs with potential connectivity to the Project. NatureScot SiteLink: https://sitelink.nature.scot/home	Relevant data for across the broader region	Various dates with consideration given to any updated data where relevant
BTO (various dates), Seabirds Count national colony census data	BTO Seabird Monitoring Programme: https://app.bto.org/seabirds/public/index.jsp	Relevant data for across the broader region	Relevance varies across colonies (i.e., some sites updated annually, others lack recent data)
Scottish Government (2020), SMP	The SMP aims to identify the most sustainable plan options for the future development of commercial-scale offshore wind energy in Scotland, including ornithological risks within the area around the Proposed Offshore Development.	Array Area and broader region	Recently collected relevant data
BTO (various dates), Intertidal bird surveys	Information on intertidal birds will be derived from annual surveys of wetland waterbirds undertaken through the BTO WeBS, and intertidal surveys through the BTO Non-Estuarine Waterbird Surveys (NEWS)	Partial coverage of the Offshore ECC Study area, as well as data across the broader region	WeBS counts collected monthly, NEWS data collected periodically with the most recent period being 2015/16.

Source, Author and Year	Summary	Coverage of the Array Area and Offshore ECC Study Area	Data Quality
(Various sources and dates), Existing OWF 'grey literature'	Information obtained from various OWF Environmental Statements, EIARs and pre-construction aerial survey reports (i.e., Beatrice OWF, Moray East OWF and Moray West OWF)	Relevant data for across the broader region	Various dates and relevance
(Various sources and dates), Seabird Tracking Data	http://seabirdtracking.org/mapper/index.php; plus, other published tracking data: e.g., Buckingham *et al*. (2022); Waggit *et al*. (2019); Cleasby *et al*. (2020).	Relevant data for across the broader region, including coverage of the Array Area plus 4 km buffer	Various dates and relevance
Literature			
(Various sources and dates), Potential impacts of OWFs on birds	Peer reviewed scientific literature regarding the potential impacts from OWFs: e.g., Garthe and Hüppop (2004); Drewitt and Langston (2006); Stienen *et al*. (2007); Speakman *et al*. (2009); Langston (2010); Band (2012); Cook *et al.* (2012); Furness and Wade (2012); Wright *et al.* (2012); Furness *et al.* (2013); Johnston *et al.* (2014); Cook *et al.* (2014; 2018); Dierschke *et al.* (2017); Jarrett *et al*. (2018); Leopold and Verdaat (2018); Mendel *et al.* (2019); Goodale and Milman (2020).	Generic information applicable to the Project IOFs	Various dates and relevance
(Various sources and dates), Bird distribution	Publicly available reports of seabird distribution: e.g., Stone *et al.* (1995); Brown and Grice (2005); Kober *et al*. (2010); Bradbury *et al*. (2014); HiDef Ltd. (2015); Waggitt *et al.* (2019); Cleasby *et al*. (2020); Davies *et al*. (2021).	Generic information applicable to the Project IOFs	Various dates and relevance
(Various sources and dates), Bird breeding ecology	Publicly available information on the breeding ecology of various bird species: e.g., Cramp and Simmons (1977-94); Del Hoyo *et al*. (1992-2011); Robinson (2005).	Generic information applicable to the Project IOFs	Various dates and relevance
(Various sources and dates), Bird population estimates and demographic rates	Publicly available reports/data on seabird populations and demographic rates for use in assessments: e.g., Mitchell *et al.* (2004); BirdLife International (2004); Holling *et al*. (2011); Musgrove *et al.* (2013); Furness (2015); Horswill *et al.* (2017); Frost *et al.* (2019); BTO (2023).	Generic information applicable to the Project IOFs	Various dates and relevance
(Various sources and dates), Bird migration and foraging movements	Publicly available reports of bird movements during breeding season foraging trips and migration: e.g., Wernham *et al.* (2002); Thaxter *et al*. (2012); Wright *et al.* (2012); Wakefield *et al.* (2013; 2017); Furness *et al*. (2018); Woodward *et al*. (2019).	Generic information applicable to the Project IOFs	Various dates and relevance

Overview of Baseline Environment

11.3.4 Following an initial desk-based review of the data sources identified in **Table 11.1** the distribution, abundance, conservation status, biological seasons, behaviour and characteristics of birds in the offshore and intertidal environment have been used to characterise the study area for the purposes of this Offshore Scoping Report.

Moray Firth

11.3.5 The Proposed Offshore Development is located in the northern North Sea on the outskirts of the Moray Firth, which represents an important region for numerous bird species throughout the year. The Moray Firth is situated in the northeast of the Scottish mainland stretching from Caithness in the north to Aberdeenshire in the south/east. The Moray Firth is mainland Britain's most northerly large estuary, characterised predominantly by shallow (<20 m) water over a sandy substrate.

11.3.6 The area supports a variety of pelagic and demersal fish and is an important spawning ground and/or nursery for several species (**Chapter 10: Fish and Shellfish Ecology**) and is an important area for shellfish, such as Norway lobster *Nephrops norvegicus*, Blue mussel *Mytilus edulis* and other bivalves, all of which are important prey species for marine waterbirds (Marine Scotland, 2020c). The Moray Firth has several designated sites due to its importance for birds and these are discussed in detail in **Section 11.3: Designated Sites**.

11.3.7 Across the breeding season, the coastline of the Moray Firth supports a variety of breeding habitats for seabirds including gannet *Morus bassanus*, puffin *Fratercula arctica* and guillemot *Uria aalge* (RSPB, 2014).

11.3.8 The Moray Firth is also important for a number of bird species in the non-breeding season, providing an important refuge for wintering birds (including great northern diver *Gavia immer*, red-throated diver *Gavia stellata* and Slavonian grebe *Podiceps azurites*), alongside regularly supporting migratory birds that have migrated from breeding grounds in northern Europe and western Siberia (Marine Scotland, 2020c).

Array Area

11.3.9 The Proposed Offshore Development Array Area is located approximately 50 km offshore, and therefore the birds present within the Array Area are expected to be those found further offshore (e.g., auk species) and those that have large foraging ranges (e.g., fulmar *Fulmars glacialis*).

11.3.10 Site specific DAS are currently being undertaken by HiDef Aerial Surveying Limited (HiDef). Surveys commenced in March 2022 and are planned to continue for 24 months, with this data providing the most detailed and up-to-date site-specific data for offshore ornithology. At this stage, 12 months of DAS data is available (March 2022 to February 2023), with the raw counts of birds recorded to date presented in **Table 11.2**.

Table 11.2: Raw counts of birds recorded for each species during the first 12 monthly surveys in the Array Area plus 4 km buffer (all behaviours).

Species	Number of birds												
	Mar 22	Apr 22	May 22	Jun 22	Jul 22	Aug 22	Sep 22	Oct 22	Nov 22	Dec 22	Jan 23	Feb 23	Species Total
Wigeon	0	0	0	0	0	0	0	4	0	0	0	0	**4**
Kittiwake	48	47	1	15	408	70	9	14	9	16	21	7	**665**
Great black-backed gull	1	8	0	1	0	0	0	40	16	26	46	26	**164**
Herring gull	0	3	0	0	0	0	0	0	4	7	36	1	**51**
Lesser black-backed gull	0	1	0	0	0	0	0	0	0	0	0	0	**1**
Common tern	0	0	0	0	0	1	0	0	0	0	0	0	**1**
Arctic tern	0	0	0	0	17	0	0	0	0	0	0	0	**17**
Great skua	0	0	2	0	2	1	0	0	0	0	0	0	**5**
Arctic skua	0	0	0	0	0	0	1	0	0	0	0	0	**1**
Guillemot	82	300	171	206	1,174	2,853	1,270	48	111	8	415	35	**6,673**
Razorbill	3	18	8	22	423	83	21	1	0	3	5	5	**592**

Species	Number of birds												
	Mar 22	Apr 22	May 22	Jun 22	Jul 22	Aug 22	Sep 22	Oct 22	Nov 22	Dec 22	Jan 23	Feb 23	Species Total
Puffin	3	21	140	59	143	437	399	15	0	0	0	0	**1,217**
Red-throated diver	0	1	0	0	0	0	0	0	0	0	0	0	**1**
European storm-petrel	0	0	0	14	0	0	0	0	0	0	0	0	**14**
Fulmar	47	109	21	78	404	116	58	163	118	77	220	160	**1,571**
Manx shearwater	0	0	2	0	11	0	0	0	0	0	0	0	**13**
Sooty shearwater	0	0	0	0	0	0	1	0	0	0	0	0	**1**
Gannet	26	16	6	6	52	16	23	24	1	0	29	6	**205**
No ID	15	20	8	20	129	123	64	3	6	10	12	1	**411**
Monthly Total	**225**	**544**	**359**	**421**	**2,763**	**3,700**	**1,846**	**312**	**265**	**147**	**784**	**244**	**11,607**

11.3.11 To date, 18 seabird species have been recorded. Of these, potential IOFs were identified based on their abundance/frequency in surveys to date and their sensitivity to OWF developments. Notably, with 12 months of data currently available, current IOFs are considered to be preliminary, with the final list of species to Scope In to the EIAR to be confirmed when the second year of data is available. An overview of IOFs identified from current DAS data is presented in **Table 11.3**, along with their conservation status.

11.3.12 Species which were recorded during DAS data collection in low numbers and/or are considered to be of low sensitivity to disturbance and displacement impacts were not considered to be IOFs, notably:

- Wigeon *Anas Penelope*, Manx shearwater *Puffinus puffinus*, European storm petrel *Hydrobates pelagicus* and sooty shearwater *Ardenna grisea* were all recorded in low numbers and are not considered sensitive to disturbance and collision impacts; and
- Lesser black-backed gull *Larus fuscis*, common tern *Sterna hirundo*, arctic tern *Sterna paradisaea*, arctic skua *Stercorarius parasiticus*, great skua *Stercorarius skua*, and red-throated diver, show varying levels of sensitivity to collision or displacement impacts, though were all recorded in low numbers in surveys to date. This position will be re-evaluated once 24 months of DAS data is available to inform the decision.

Table 11.3: Overview of IOFs identified from DAS data to date.

Species	Frequency of Occurrence (no. months species observed out of the 12 months surveyed)	Variation in Abundance	Vulnerability to OWF Impacts
Fulmar *Fulmars glacialis*	High (12)	Numbers peaked in July, though relatively high abundance across all survey months	Low vulnerability to both collision and displacement impacts (included on a precautionary basis)
Kittiwake *Rissa tridactyla*	High (12)	Numbers peaked in July, with comparatively lower numbers recorded across other months	Vulnerable to both collision and displacement impacts
Guillemot *Uria aalge*	High (12)	Numbers highest in July, August and September, though birds present in moderate to high numbers across all survey months	Vulnerable to displacement impacts
Razorbill *Alca torda*	High (11)	Numbers peaked in July, with comparatively lower numbers recorded across other months	Vulnerable to displacement impacts
Puffin *Fratercula arctica*	Medium (8)	Numbers were highest between May and September, with comparatively lower numbers recorded across other months	Vulnerable to displacement impacts
Herring gull *Larus Argentatus*	Medium (5)	Numbers were highest in January. Across the other months, numbers were comparatively low	Vulnerable to collision impacts
Great black-backed gull *Larus marinus*	High (9)	Numbers were highest in August and January, with comparatively lower numbers in other months	Vulnerable to collision impacts
Gannet *Morus bassanus*	High (11)	Numbers recorded were relatively consistent, though gannet occurrences peaked in July	Vulnerable to both collision and displacement impacts

11.3.13 For the eight identified IOFs, the relevant nature conservation value is presented in **Table 11.4** based on the Birds of Conservation Concern (BoCC) and the International Union for Conservation of Nature (IUCN) definitions. The relevant seasonal definitions for these species is also provided in **Table 11.5**, based on NatureScot guidance[15]. It should be noted that, despite their low abundance in DAS data to date meaning they are not considered IOFs, lesser black-backed gull and great skua have also been included in this table to provide insight into how they may be assessed if their abundance increases across the second year of data collection.

Table 11.4: Species conservation value table for current key IOFs.

Species	Nature Conservation Value
Fulmar	BoCC Amber listed, Birds Directive Migratory Species, IUCN Red List 'Least Concern' status
Kittiwake	BoCC Red listed, Birds Directive Migratory Species, IUCN Red List 'Vulnerable' status
Guillemot	BoCC Amber listed, Birds Directive Migratory Species, IUCN Red List 'Least Concern' status
Razorbill	BoCC Amber listed, Birds Directive Migratory Species, IUCN Red List 'Least Concern' status
Puffin	BoCC Red listed, Birds Directive Migratory Species, IUCN Red List 'Vulnerable' status
Herring gull	BoCC Red listed, Birds Directive Migratory Species, IUCN Red List 'Least Concern' status
Great black-backed gull	BoCC Amber listed, Birds Directive Migratory Species, IUCN Red List 'Least Concern' status
Gannet	BoCC Amber listed, Birds Directive Migratory Species, IUCN Red List 'Least Concern' status

[15]https://www.nature.scot/sites/default/files/2020-10/Guidance%20note%20-%20Seasonal%20definitions%20for%20birds%20in%20the%20Scottish%20Marine%20Environment.pdf

Table 11.5: Species-specific defined seasons for identified IOFs, with seasons to be used in assessments highlighted in bold.

Species	Breeding	Post-breeding migration	Non-breeding	Pre-breeding migration
Fulmar	**April – mid-September**	-	**Mid-September - March**[16]	-
Kittiwake	**April - August**	-	**September - March**	-
Guillemot	**April – mid-August**	Late August	**Late-August - March**	February – March
Razorbill	**April – mid- August**	Late August	**Mid-August- March**	March
Puffin	**April – mid- August**	Late August	**September – mid - March**	Late March
Herring gull	**April - August**	-	**September - February**	March
Lesser black-backed gull	**Mid-March - August**	-	**September – mid-March**	-
Great black-backed gull	**April - August**	-	**September - March**	March
Gannet	**Mid-March - September**	-	**October – mid-March**	Mid-February – mid-March
Great Skua	**Mid-April – Mid September**	-	-	Early April – mid-April

Offshore ECC Study Area and Landfall Study Area

11.3.14 As presented in **Figure 11.1** the Offshore ECC Study Area lies to the east of the Moray Firth, with the Landfall Development Zone of the Offshore ECC in close proximity to the Troup, Pennan and Lion's Heads SPA. The features of this SPA have been included in **Table 11.4** as IOFs.

11.3.15 In addition, further survey data specific to the Offshore ECC Study Area is ongoing via the BTO WeBS surveys, with multiple survey locations in close proximity to the landfall study area. Regular (monthly) data collection has been undertaken between Fraserburgh and Rosehearty. Based on five years of annual reports, the most abundant species are dunlin *Calidris alpina*, wigeon, kittiwake and redshank *Tringa tetanus*, all having a five-year average count of over 100 individuals at this site. Intertidal survey data from 2015/16 from the BTO NEWS surveys, which includes coverage across the landfall area of the Offshore ECC, will also be used to inform the baseline characterisation of the Offshore ECC Study Area.

[16] For seasons which start or finish mid-month, a review of the DAS data (timing of survey and seasonal trends in abundance) and species ecology will be undertaken to determine the appropriate season for data to be assigned to.

11.3.16 Potential risks to ornithological receptors in the Offshore ECC and landfall will be further determined through site-specific intertidal WeBS surveys which have been undertaken by SLR since October 2022 (there are wintering bird surveys running between October and March 2022 to 2023).

Designated Sites

11.3.17 Though the EIA focuses on a broader scale than individual designated sites, it is acknowledged that there will be interaction with these sites. Therefore, a review has been undertaken to identify key designated sites with ornithology interest features that may be relevant to the Proposed Offshore Development.

11.3.18 The Array Area has no direct overlap with any designated sites for ornithological features, with the closest SPA being approximately 37.5 km from the site. However, during the breeding season birds can travel considerable distances while foraging and therefore it is necessary to consider sites beyond the Array Area. In addition, there is potential for further connectivity during the non-breeding season (where foraging distances may be greater) and during migration. Key designated sites at this stage are provided in **Table 11.6**, representing the sites within closest proximity to the Proposed Offshore Development and being designated for relevant ornithological features.

Table 11.6: Key designated sites relevant to the Proposed Offshore Development and their proximity to the Offshore Ornithology Study Area.

Designated site	Distance to the Array Area (km)
Copinsay SPA	37.5
North Caithness Cliffs SPA	40.7
East Caithness Cliffs SPA	46.8
Hoy SPA	59.0
Calf of Eday SPA	72.3
Moray Firth SPA	73.4
Rousay SPA	75.0
Troup, Pennan and Lions Heads SPA	76.5
Marwick Head SPA	83.0
West Westray SPA	85.1
Moray and Nairn Coast SPA and Ramsar	97.6
Fair Isle SPA	97.8
Buchan Ness to Collieston Coast SPA	102.6
Dornoch Firth and Loch Fleet SPA and Ramsar	111.6
Cromarty Firth SPA, Ramsar and SSSI	130.5
Inner Moray Firth SPA and Ramsar	138.4
North Rona and Sula Sgeir SPA	208.8
Forth Islands SPA	244.5

11.3.19 Full consideration of potential connectivity with European Sites (SPAs and Ramsar sites) will be provided in a separate Offshore HRA Screening Report (Ørsted, 2023b) submitted alongside this Offshore Scoping Report, which will cover matters associated with the National Site Network in more detail.

11.3.20 It should be noted that the Project is also actively working towards filling relevant information gaps at a number of key SPAs through the North East Ornithology Working Group (NEOG) (as outlined in **Table 11.1**), including seabird colony counts at the East Caithness Cliffs SPA and the North Caithness Cliffs SPA, and tracking data collection at the Buchan Ness to Collieston Coast SPA.

11.4 Embedded Commitments

11.4.1 The Proposed Offshore Development has adopted various primary commitments (primary design principles intrinsically part of the Project design, installation techniques and engineering designs/modifications) as part of the pre-application phase to eliminate and/or reduce LSE arising from a number of impacts (as far as possible). These are outlined in **Appendix A: Offshore Commitments Register**. Further commitments (imposed as a result of legislative requirements and/or standard sectoral practice, regardless of EIA assessment), referred to as tertiary commitments are embedded as an inherent aspect of the EIA process. Secondary commitments (which require further activity to achieve anticipated outcome- often secured through planning conditions and/or management plans) are incorporated to reduce LSE to environmentally acceptable levels following initial assessment, i.e., so that residual effects are reduced to environmentally acceptable levels.

11.4.2 The commitments adopted by the Proposed Offshore Development in relation to offshore ornithology are presented in **Table 11.7**. The full list of commitments can be found in **Appendix A: Offshore Commitments Register**.

Table 11.7: The Proposed Commitments Relevant to Offshore Ornithology Receptors.

Commitment Code	Commitment Measure
C-OFF-02	Minimum blade clearance of 30 m above HAT. HAT used due to floating nature of turbine technology.
C-OFF-07	Offshore infrastructure will be micro-sited (where possible) around sensitive seabed habitats including Annex 1 habitats (if present), the Scottish Biodiversity List and PMF (in consultation with the relevant SNCB), to avoid detrimental impacts to these conservation features.
C-OFF-08	A CMS will be developed, which will detail the proposed construction methods and roles and responsibilities of parties involved.
C-OFF-12	Development of a PEMP, which will set out environmental monitoring in pre-, during, and post-construction phases.
C-OFF-13	A PEMP will be developed, to include a Marine Pollution Contingency Plan and INNS Management Plan. This PEMP will also include information on chemical usage, dropped objects, and waste management.
C-OFF-15	A PPP will be developed as part of the Project Environmental Monitoring Plan.
C-OFF-16	A PS will be developed and followed, detailing the methods of pile installation and associated noise levels. It will include any mitigation measures to be put in place during piling to manage the effects of underwater noise on sensitive receptors.
C-OFF-19	The layout of offshore infrastructure will be designed in such a way as to minimise the impacts on offshore ornithology.

Commitment Code	Commitment Measure
C-OFF-33	Development of and adherence to a Lighting and Marking Plan (LMP), which will confirm compliance with legal requirements with regards to shipping, navigation, and aviation.
C-OFF-39	Buoys will be deployed at construction sites in accordance with NLB guidance and advice.
C-OFF-42	A VMP will be developed, which will detail the types and numbers of vessels involved in the Project work.
C-OFF-63	Development of and adherence to a DP, secured under Section 36 and/or Marine Licence consent conditions.

11.4.3 As a result of the commitment to implement these measures, and to align with various standard sectoral practices and procedures, the embedded (primary) commitments are considered inherently part of the design of the Proposed Offshore Development and have, therefore, been included in the assessment presented in **Section 11.5**.

11.4.4 In addition to the above commitments above, the Project is involved with a collaborative studies and surveys via the North-East & East Ornithology Groups, including BTO birds tagging at key SPAs, RSPB funded colony counts, and research on more accurate availability bias calculations.

11.5 Scoping of Impacts

11.5.1 Potential impacts on offshore ornithological receptors that may occur during the construction, O&M and decommissioning phases of the Proposed Offshore Development have been identified and outlined in **Table 11.8** below. The scoping of impacts is based on the following:

- Available evidence (as presented in **Section 11.3: Baseline Environment**);
- Relevant guidance (as presented in **Section 11.8: Data Sources and Relevant Guidance**); and
- Other regional consultation responses and Scoping Opinions.

11.5.2 In line with the proposed approach to Proportionate EIA, relevant impacts are either Scoped In or Out, or are identified as ‘Possible LSE’ representing impacts which are Scoped In at this stage but are to be confirmed when further information is obtained post-Scoping but pre-application.

Table 11.8: EIA Scoping assessment for Offshore Ornithology.

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
Construction and Decommissioning				
Disturbance and displacement (Offshore ECC)	C-OFF-07 C-OFF-12 C-OFF-19 C-OFF-42	Scoped In	Construction activities associated with export cable installation may lead to disturbance and displacement of species within the Offshore ECC Study Area and potentially within surrounding buffers to a lower extent. This includes the potential use of cofferdams which are not expected to increase displacement impacts to a greater extent than vessel activity. Potential impacts also limited temporally due to limited duration of the construction phase.	LSE without secondary commitment measures
Disturbance and displacement (Array Area)	C-OFF-07 C-OFF-12 C-OFF-19 C-OFF-42	Scoped In	Construction activities associated with the Array Area installation (foundations and WTGs) may lead to disturbance and displacement of species within the Array Area and potentially within surrounding buffers to a lower extent. Potential impacts also limited spatially to a small number of foundations/WTGs being constructed at any one time. Impacts are also limited temporally due to the limited duration of the construction (and decommissioning) phase. As per NatureScot guidance (NatureScot, 2023f), this assessment accounts for all potential distributional responses (i.e., disturbance and displacement and barrier effects).	LSE without secondary commitment measures
Disturbance and displacement from wet storage for floating WTGs	C-OFF-08 C-OFF-42	Scoped In	The presence of WTGs in wet storage may lead to disturbance and displacement of species within this area. Potential impacts will be temporally limited due to the limited duration of wet storage during the construction phase. As per NatureScot guidance (NatureScot, 2023f), this assessment accounts for all potential distributional responses (i.e., disturbance and displacement and barrier effects).	Possible LSE without secondary commitment measures, however, it may become clear post-Scoping stage that the impact does not require detailed assessment in the EIAR
Collision risk from wet storage for floating WTGs	C-OFF-02 C-OFF-08	Scoped In	There is a risk of birds in flight colliding with WTG during wet storage for maintenance and during turbine testing. The susceptibility of species to collision risk depends upon morphological and behavioural characteristics of the species, in addition to the project design specifications. Impacts are expected to be spatially and temporally limited in comparison to the operation and maintenance phase, with a limited number of WTGs in wet	Possible LSE without secondary commitment measures, however, it may become clear post-Scoping stage that the impact does

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
			storage, and turbines being present in wet storage for a limited time period. Collision risk will be assessed for seabird species that may interact with WTGs in wet storage.	not require detailed assessment in the EIAR
Indirect impacts due to impacts on prey species	C-OFF-08 C-OFF-16	Scoped In	Impacts include those resulting from underwater noise (e.g., during piling) or the generation of suspended sediments (e.g., during preparation of the seabed for foundations) that may alter the distribution, physiology or behaviour of bird prey species and thereby have an indirect effect. These mechanisms could potentially result in less prey being available in the area adjacent to active construction works to foraging seabirds.	Possible LSE without secondary commitment measures, however, it may become clear post-Scoping stage that the impact does not require detailed assessment in the EIAR
Impacts resulting from accidental pollution during construction	C-OFF-08	Scoped Out	Spills and contaminant release associated with accidental pollution during the construction of infrastructure and the use of supply/service vessels may result in direct mortality of birds or reduction in prey availability, impacting species' survival rates. During consent applications for other OWFs, it has been agreed with stakeholders that with the implementation of an appropriate CoP, direct mortality within the wind farm Array Area plus buffer is very unlikely to occur, and a major incident that may impact any species at a population level is considered extremely unlikely. It has been predicted for other OWFs that any impact would be of local spatial extent, short term duration, and not significant in EIA terms. This is therefore considered equally applicable to the Proposed Offshore Development, for which construction will be comparable in scale and operation and within the same environment, whilst implementing an appropriate CoP. Proposed construction methods and roles and responsibilities of parties involved will be detailed in a CMS. Therefore, subject to consultation with the stakeholders and feedback received on this Offshore Scoping Report, it is intended to Scope Out this impact pathway from further consideration within the EIA. All relevant commitments are presented in **Appendix A: Offshore Commitments Register**.	No LSE identified at Scoping.
Impacts resulting from artificial light	C-OFF-33	Scoped In	Impacts resulting from artificial light are expected to be minimal and not requiring further assessment. Although, there is some evidence that Manx shearwater and European storm petrel can be impacted by artificial light,	Possible LSE without secondary commitment

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
			both were recorded in low numbers in site-specific surveys to date. However, this will be considered further when full baseline survey data is available.	measures, however, it may become clear post-Scoping stage that the impact does not require detailed assessment in the EIAR
Operation and Maintenance				
Disturbance and displacement (Offshore ECC)	C-OFF-07 C-OFF-12 C-OFF-19 C-OFF-42	Scoped In	Activities associated with the maintenance of the ECC, namely vessels, may disturb and displace species within the Offshore ECC Study Area. This impact is likely to be both spatially and temporally restricted, with maintenance being temporary and only being undertaken on restricted areas of the Offshore ECC Study Area. As per NatureScot guidance (NatureScot, 2023f), this assessment accounts for all potential distributional responses (i.e., disturbance and displacement and barrier effects).	LSE without secondary commitment measures
Disturbance and displacement (Array Area)	C-OFF-07 C-OFF-12 C-OFF-19 C-OFF-42	Scoped In	Activities associated with the O&M of WTGs and the presence of WTGs themselves may disturb and displace species within the Array Area and potentially within surrounding buffers to a lower extent. As per NatureScot guidance (NatureScot, 2023f), this assessment accounts for all potential distributional responses (i.e., disturbance and displacement and barrier effects).	LSE without secondary commitment measures
Collision risk	C-OFF-02 C-OFF-07 C-OFF-08	Scoped In	There is a risk of birds in flight colliding with rotating WTG blades. The susceptibility of species to collision risk depends upon morphological and behavioural characteristics of the species, in addition to the project design specifications. Collision risk will be assessed for seabird species with regular connectivity with the Array Area (e.g., during the breeding season) and separately for migratory seabird and non-seabird species that may pass through the array during migration.	LSE without secondary commitment measures
Indirect impacts due to impacts on prey species	C-OFF-16 C-OFF-19	Scoped In	The presence of turbines may alter the distribution, physiology or behaviour of bird prey species and thereby have an indirect effect on prey availability. These mechanisms could potentially result in less prey being	Possible LSE without secondary commitment measures, however, it may become clear

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
			available in the area adjacent to the Array Area impacting foraging seabirds.	post-Scoping stage that the impact does not require detailed assessment in the EIAR
Barrier effects	C-OFF-07 C-OFF-12 C-OFF-19 C-OFF-42	Scoped Out	For the purposes of assessment of displacement for resident birds, it is usually not possible to distinguish between displacement and barrier effects. For example, to define where individual birds may have intended to travel to, or beyond an offshore wind farm, even when tracking data are available. Within the displacement assessment, both sitting and flying birds will be included. The inclusion of sitting birds within the analysis provides for an assessment of those individuals potentially displaced from an area of sea in which they reside, whilst the inclusion of flying birds provides an assessment of any potential barrier effects to birds moving through the area of interest. Therefore, in the impact assessment the effects of displacement and barrier effects on resident IOFs are considered together, with the impacts from barrier effects alone not considered further. This is also supported in NatureScot guidance (NatureScot, 2023f), with the assessment undertaken for displacement considered to cover distributional responses (i.e., both displacement and barrier effects). The small energetic cost to migrating birds resulting from flying around rather than through the WTG array of an offshore wind farm is considered a potential barrier effect but has been Scoped Out of the assessment. Masden *et al*. (2010, 2012) and Speakman *et al*. (2009) calculated that the costs of one-off avoidances during migration were small, accounting for less than 2% of available fat reserves. Therefore, the impacts on birds that only migrate through the ornithological study area (including seabirds, waders and waterbirds on passage) are considered negligible and consequently Scoped Out. All relevant commitments are presented in **Appendix A: Offshore Commitments Register**.	No LSE identified at Scoping.
Impacts resulting from artificial light	C-OFF-33	Scoped In	Impacts resulting from artificial light are expected to be minimal and not requiring further assessment. Although, there is some evidence that Manx shearwater and European storm petrel can be impacted by artificial light, both were recorded in low numbers in site-specific surveys to date.	Possible LSE without secondary commitment measures, however, it may become clear post-Scoping stage

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
			However, this will be considered further when full baseline survey data is available.	that the impact does not require detailed assessment in the EIAR

Possible LSE impacts

11.5.3 Potential effects resulting from wet storage (both collision and displacement), and indirect impacts due to impacts on prey species are included in the 'Possible LSE' category at this stage.

11.5.4 The inclusion of potential effects arising from both collision and displacement from WTGs in wet storage is included in this category owing to current uncertainty around the requirements and responsibilities for their assessment. As further information and guidance becomes available (predominantly from MD-LOT and NatureScot), these impacts will be addressed accordingly.

11.5.5 The inclusion of indirect impacts due to impacts on prey species within this category is due to the requirement of further information which will be available post-Scoping but pre-application. Notably, consideration of this impact requires an understanding of the Proposed Offshore Development impacts on relevant fish species and benthic habitats to understand whether any consequent impacts on bird prey species is expected. If no impacts on prey species are identified then the impact is expected to be Scoped In but with justification for no LSE presented in the EIAR Impacts Register, whereas if impacts are identified then further consideration will be given in the EIA. The proposed approach to Proportionate EIA is presented in **Section 6.2: Proportionate EIA approach**.

11.6 Potential Cumulative Impacts

11.6.1 There is a potential for cumulative impacts on birds due to other operational, consented and planned OWFs. As many bird species are highly mobile, there is the potential for the same bird populations to be affected by several wind farms. Of particular relevance to the cumulative assessment will be operational wind farms in the North Sea, any further ScotWind or INTOG projects which may enter the consenting process during the period of the EIA stage of the Proposed Offshore Development.

11.6.2 **Chapter 6: EIA Approach and Methodology** details how potential cumulative impacts will be assessed through a CIA, including examples of projects which are expected to be included as part of the assessment. Key projects around the Proposed Offshore Development which are expected to contribute to cumulative impacts include:

- Caledonia OWF;
- Ayre OWF;
- Broadshore OWF;
- Buchan OWF;
- Moray West OWF;
- Berwick Bank OWF;
- Pentland OWF;
- Sinclair OWF; and
- Scaraben OWF.

11.6.3 These projects represent those in closest proximity to the Proposed Offshore Development which are yet to gain consent. However, the CIA will also consider projects which have submitted consent

applications (e.g., Berwick Bank and Greenvolt), alongside operational OWFs (e.g., Moray East). This is an initial shortlist of CIA projects, and a full long list will be produced for all relevant projects.

11.6.4 For ornithological receptors, there is potential for interactions with both planned and operational OWFs across the region, as well as other activities in the study area (e.g., offshore construction activity). The CIA will consider the MDS for relevant planned projects, and as-built parameters where available for projects which are already constructed/operational.

11.6.5 In relation to ornithological receptors, the SMP[17] identified disturbance and displacement and collision risk as key impacts at the in-combination level. These impacts are also considered the key to the cumulative assessment. Both impacts are expected to be highest during the O&M phase of the Project. During the construction and decommissioning phases, impacts from disturbance and displacement will be Scoped Out as the likelihood of a cumulative impact is small. The contribution of the Proposed Offshore Development is likely to be small, and the potential for cumulative impacts is dependent on the spatial and temporal co-existence of disturbance and displacement impacts from other plans or projects in the area. Given the spread of projects within the ScotWind consenting round, significant additive effects associated with simultaneous construction phases is unlikely. In further support of this, only one red-throated diver has been recorded in surveys to date and no common scoters. These species are generally considered the highest risk displacement species in the Offshore ECC Study Area, yet there are no SPAs designated for these species near the Offshore ECC Study Area. It is therefore considered highly unlikely that any assessment of cumulative level impacts to ornithological receptors will be required for the construction and decommissioning phases.

11.6.6 In addition, discussions are currently in place and ongoing in recognition of potential cumulative effects, with ongoing collaborative studies (e.g., BTO tagging and RSPB colony counts; **Table 11.1**) to better understand key cumulative risks.

11.6.7 For the CIA, consideration will be given to the Cumulative Effects Framework, currently being developed by MD-LOT and expected to be ready for use in Spring 2024. Consideration will also be given to post-construction studies which are being undertaken for Beatrice and Moray East OWFs, monitoring ornithological impacts and confirming assumptions of ornithological assessments. Relevant findings from these studies will be considered when assessing cumulative impacts.

11.7 Potential Transboundary Impacts

11.7.1 In addition to cumulative impacts from UK OWFs, there is potential for collision and displacement impacts of IOFs at wind farms outside UK waters, and for international seabird populations to be impacted by the Proposed Offshore Development.

11.7.2 Considering the location of the Proposed Offshore Development and the likely key receptors, it is considered there will be no significant transboundary impacts on birds. Though it is acknowledged features (predominantly fulmar) of some transboundary sites are within the mean maximum foraging range (plus 1 standard deviation based on Woodward *et al*., 2019), it is considered unlikely that any measurable impacts will occur due to the low level of connectivity with these sites.

[17] https://www.gov.scot/publications/sectoral-marine-plan-appropriate-assessment/pages/16/

11.7.3 In the non-breeding season where birds may range further, it is possible that birds from non-UK seabird colonies may occur within the study area and therefore there may be impacts on birds originating from non-UK colonies. These potential impacts will be addressed in the EIAR.

11.8 Proposed Approach to EIA

Data Sources and Relevant Guidance

11.8.1 Data sources expected to form the main basis of the EIA include site-specific DAS data (**Table 11.1**). In addition, new and up to date information and evidence is regularly coming into the public domain and such new information will be reviewed as it becomes available during the relevant stages of the assessment.

11.8.2 DAS data is being collected within the Array Area plus a 4 km buffer, with flight lines spaced approximately 2 km apart with approximately 12.5% coverage. Images are captured at a ground survey distance resolution of 2 cm.

11.8.3 This DAS data will provide information on species present (or species groups where identification to species level is not possible), abundance, distribution, behaviour, location, numbers, sex, and age (where possible), flight height and flight direction. The EIA will identify the nature of the use of the site by birds recorded, i.e., seasonal differences and activities (foraging, overwintering, migrating or other) to determine the importance of the site relative to the wider area for seabirds throughout the year. Where possible, DAS data on deceased birds will also be collected to help better understand the impacts of the highly pathogenic avian influenza outbreak.

11.8.4 From this data, abundance, and density estimates (with associated confidence intervals (CIs) and levels of precision) will be calculated using a design-based modelling approach, with model-based abundances provided where possible. The species for which model-based abundance estimates will be produced will be confirmed when the full 24-months of DAS data is available.

11.8.5 Flight height estimation methods and data will be reported; however, owing to the technical difficulties in estimating flight height from aerial imagery, it is anticipated that generic flight data (Johnston *et al*., 2014a; 2014b) will be used in the collision risk model (subject to discussion with stakeholders). Collaborative work (e.g., strategic monitoring) will be undertaken with other projects within the Moray Firth as part of the NEOG, and through discussions with other east region projects. Other survey information or data from these existing OWFs in the Moray Firth will therefore be drawn upon (for example, Moray East and Moray West OWFs) to inform the EIAR. This information will be clearly defined within relevant documents, if used.

11.8.6 Impact assessments will be undertaken in line with current SNCB guidance, particularly NatureScot[18], CIEEM EIA guidance (2018; updated 2023) and expert opinion. Consideration will also be given to

[18] https://www.nature.scot/professional-advice/planning-and-development/planning-and-development-advice/renewable-energy/marine-renewables/advice-marine-renewables-development

results from past, present and ongoing research projects from ScotMer[19], the OWSMRF[20], and the ORJIP[21] where relevant.

Proposed Assessment Methodology

11.8.7 The impact assessment methodology will be based on that described in **Chapter 6: EIA Approach and Methodology**, adapted to make it applicable to ornithology IOFs. The offshore ornithology EIA will be supported by a number of technical appendices, described in greater detail below, including:

- Ornithology Baseline Technical Report;
- Collision Risk Assessment;
- Migratory Birds Report;
- Displacement Assessment; and
- Population Viability Analysis.

11.8.8 The EIA approach will use a 'source-pathway-receptor' model, which identifies likely impacts on IOFs resulting from the proposed construction, O&M and decommissioning of the Proposed Offshore Development intertidal and offshore infrastructure. The EIA will be undertaken using the most recently available guidance (notably NatureScot 2023 a, b, c, d) with further information on criteria used in each relevant section of the EIA. The parameters of this model are defined as follows:

- Source – the origin of a potential impact, noting that one source may have several pathways and receptors (e.g., an activity such as cable installation and a resultant effect such as re-suspension of sediments);
- Pathway – the means by which the effect of the activity could impact an IOF (e.g., for the example above, re-suspended sediment could settle and smother the seabed); and
- Receptor – the element of the receiving environment that is impacts (e.g., for the above example, bird prey species living on or in the seabed are unavailable to foraging birds).

11.8.9 Species identified as IOFs, subject to the completion of DAS data collection[22], will be assessed against the impact pathways presented in **Table 11.8**.

11.8.10 The following sections outline the suggested methodology based on current expectations, noting that this may evolve with subsequent input.

Ornithology Baseline Technical Report

11.8.11 The baseline report will provide a characterisation of the existing environment with respect to offshore ornithological receptors in line with NatureScot guidance (NatureScot, 2023g). This will be undertaken

[19] https://www.gov.scot/policies/marine-renewable-energy/science-and-research/

[20] https://jncc.gov.uk/our-work/owsmrf

[21] http://www.orjip.org.uk/

[22] Identified species may vary with the completion of data collection (e.g., species currently infrequently recorded may not be recorded again and therefore may not need warrant assessment, or new species may be encountered which may need consideration for assessment).

using a combination of site-specific DAS data, alongside available information from desktop study (as presented in **Table 11.1**).

Collision Risk Assessment

11.8.12 The collision risk report will provide details of the Collision Risk Modelling (CRM) assessment undertaken, and predicted impacts on relevant IOFs. It is proposed to undertake CRM using the updated 2022 version of the Marine Science Scotland Stochastic Collision Risk Model Shiny Application ('sCRM App';Caneco, 2022) in line with NatureScot guidance (NatureScot 2023h). This will be run deterministically and stochastically (i.e., incorporating standard deviations). Monthly densities of flying birds derived from DAS data will be used to populate the sCRM. Models will be run using Option 2 (Basic model) and Option 3 (Extended model) (Band 2012), utilising generic flight height distributions from Johnston *et al*. (2014a; 2014b).

11.8.13 Based on currently available data, the following species may be assessed for collision risk (noting this list may change following further collection of DAS data):

- Kittiwake;
- Gannet;
- Herring gull; and
- Great black-backed gull.

11.8.14 Based on the initial 12-months of DAS data available for the Proposed Offshore Development, a preliminary CRM exercise will be run on these species to provide an initial insight into potential impacts, with a full analysis to be completed once the full 24-months of data is available.

Migratory Birds Report

11.8.15 A migratory CRM (mCRM) assessment will also be undertaken, assessing the potential collision risk for terns and migratory non-seabird species. An updated review of migratory routes and vulnerabilities across the UK is currently being prepared on behalf of Marine Directorate and The Crown Estate. This work also includes development of a stochastic mCRM tool to enable quantitative assessment of risks to migratory SPA species, including swans, geese, divers, seaduck and raptors. This tool is expected to be used for the assessment following NatureScot guidance (NatureScot 2023bc).

Displacement

11.8.16 The displacement report will provide details of the displacement assessment undertaken, and predicted impacts on relevant IOFs. It is proposed that the joint SNCB recommended matrix approach (JNCC and SNCBs, 2022) is used, presenting a range of displacement and mortality rates for each included species, as recommended by NatureScot guidance (NatureScot 2023a). These will be based on the best available evidence and consultation with SNCBs. This guidance recommends the use of the overall mean seasonal peak numbers of birds (averaged over the years of survey) in the development footprint and appropriate buffer for the displacement assessment. This approach is therefore likely to be used.

11.8.17 The analysis will consider both sitting and flying birds. As per NatureScot guidance (NatureScot 2023a), this assessment accounts for distributional responses of birds, and therefore impacts resulting from potential barrier effects are also covered within this assessment.

11.8.18 During the breeding season, it is also expected that the SeabORD displacement assessment tool (Searle *et al*., 2018) will be used for species with available tracking data to parameterise the model. However, it is noted that a number of elements may reduce the effectiveness of this tool as highlighted for the Berwick Bank Wind Farm (SSE Renewables, 2022). Notably, the sensitivity of the model to input parameters, the incorporation of accurate uncertainty in output metrics, and the current over precautionary nature of several model assumptions.

11.8.19 Based on currently available data, the following species may be assessed for displacement risk (noting this list may change following further collection of DAS data):

- Guillemot;
- Razorbill;
- Puffin;
- Kittiwake; and
- Gannet;

Population Viability Analysis

11.8.20 In the event that any ornithological receptors require further consideration following the collision and/or displacement assessment, Population Viability Analysis (PVA) will be used. As per NatureScot guidance (NatureScot, 2023i), PVA will be undertaken when the assessed effect exceeds a change to the adult annual survival rate of 0.02% point change.

11.8.21 Modelling and assessment of potential impacts will be carried out using the Seabird PVA Tool provided by Natural England (Searle *et al*., 2019; Mobbs *et al*., 2020) following the user guide. The Seabird PVA Tool uses a Leslie matrix approach to construct a PVA model, which compares the population trend over two or more scenarios (impacted and unimpacted) based on the parameters provided by the user. All models will be run for two or three time periods (25 years and 50 years, and the intended lease period) as per NatureScot guidance (NatureScot, 2023i).

11.8.22 Density dependant models are expected to be used, with these models deemed more biologically realistic based on available evidence (e.g., Horswilll *et al*., 2017) while also providing a more precautionary approach as populations cannot recover once they have been reduced beyond a certain point. Both the counterfactual of population size and population growth rate will be provided in the results.

11.8.23 For the PVA assessment initial populations sizes will be based on the most up to date population data, likely from the SMP database, and productivity values will be based on Horswill and Robinson (2015). For gannet, kittiwake, guillemot, razorbill and puffin, survival rates will be taken from the national values presented in Horswill and Robinson (2015), which are pre-formulated within the Natural England PVA tool. For great black-backed gull, the survival rates in Horswill and Robinson (2015) are based on an old study by Glutz von Blotzheim and Bauer (1982). Due to the limited amount of data, the study recommended using the survival rates of other large gull species when conducting population modelling for great black-backed gull. Therefore, survival rates for great black-backed gull will be based on those for adult and juvenile herring gull from Horswill and Robinson (2015), if PVA is required for this species.

11.9 Scoping Questions

11.9.1 The following questions are posed to consultees to frame and focus responses to the offshore ornithology Scoping exercise, which will in turn inform the Scoping Opinion:

1. Do you agree with the data sources to be used to characterise the offshore ornithology baseline within the EIA?
2. Do you agree that all pathways, receptors and potential impacts have been identified for offshore ornithology?
3. Do you agree with the initial list of IOFs?
4. Do you agree with the impacts which have been Scoped Out of the EIA for offshore ornithology?
5. Do you agree that barrier effects can be Scoped Out as an impact alone, since they are already assessed within the displacement assessment as 'distributional responses' as per NatureScot guidance?
6. Do you agree that construction and decommissioning impacts can be Scoped Out of the CIA?
7. Do you agree that transboundary impacts during the breeding season may be Scoped Out of the Offshore EIA?
8. Do you agree with the proposed approach to assessment?
9. Do you agree on the suitability of the proposed commitments to reduce or eliminate LSE relevant to offshore ornithology?
10. What are the implications of the Beatrice post-construction monitoring report in terms of displacement rates and the inclusion of this project in the cumulative assessment?

12 Marine Mammals

12.1 Introduction

12.1.1 This chapter of the Offshore Scoping Report identifies the marine mammal receptors of relevance to the Proposed Offshore Development. It identifies the potential impacts from the construction, O&M, and decommissioning of the Proposed Offshore Development on these marine mammal receptors and sets out the proposed scope of the EIA. The proposed methods of assessment for the EIA are also presented, along with embedded commitments.

12.1.2 Based on the results of site-specific surveys and a literature review of the existing data, the key marine mammal species considered in this chapter are minke whale *Balaenoptera acutorostrata*, harbour porpoise *Phocoena phocoena*, bottlenose dolphin *Tursiops truncatus*, short-beaked common dolphin *Delphinus delphis*, white-beaked dolphin *Lagenorhynchus albirostris*, Risso's dolphin *Grampus griseus*, harbour seals *Phoca vitulina* and grey seals *Halichoerus grypus*. Recognition is also given to the following less common species in the region: humpback whale *Megaptera novaeangliae*, killer whale *Orcinus orca* and Atlantic white-sided dolphin *Lagenorhynchus acutus*.

12.1.3 Some of the key adverse effects anticipated on marine mammal receptors include noise related impacts (such as permanent auditory injury and disturbance of mammal and prey species), disturbance and collision risk associated with increased vessel traffic and offshore infrastructure, and the primary and secondary entanglement risks from floating WTG mooring lines and fishing gears.

12.1.4 This chapter should be read alongside the following other chapters:

- **Chapter 3: Proposed Offshore Development Description**;
- **Chapter 6: EIA Approach and Methodology**;
- **Chapter 7: Marine and Coastal Processes**;
- **Chapter 8: Marine Water and Sediment Quality**; and
- **Chapter 10: Fish and Shellfish Ecology**.

12.1.5 This chapter of the Offshore Scoping Report has been prepared by SMRU Consulting.

12.2 Study Area

12.2.1 The study area for marine mammals varies depending on the species, as each species requires individual consideration based on differing ecology and behaviour. The marine mammal study area has therefore been defined at two spatial scales; a regional scale study area and the local scale study area.

12.2.2 The regional scale study area encompasses a wider geographic context in terms of species presence, estimated densities and abundance. This scale defines the appropriate reference populations for the assessment. The regional study area for each of the key marine mammal species is as follows:

- Minke whale: Celtic and Greater North Seas (CGNS) Management Unit (MU);
- Harbour porpoise: North Sea (NS) MU;
- Bottlenose dolphin: Coastal East Scotland (CES) and Greater North Sea (GNS) MUs;

- Short-beaked common dolphin: CGNS MU;
- White-beaked dolphin: CGNS MU;
- Risso's dolphin: CGNS MU;
- Harbour seal: Moray Firth and Orkney and North Coast Seal Management Units (SMUs); and
- Grey seal: the East Scotland, Moray Firth and Orkney and North Coast SMUs.

12.2.3 The local scale study area is the survey area for the Project DAS. These surveys are being carried out monthly between March 2022 and February 2024 by HiDef. Data collected from the surveys undertaken between March 2022 and February 2023 have been used to inform this marine mammals chapter. The local scale study area comprises of 2 km spaced transects within the Array Area, plus a 4 km buffer, to provide an indication of the local densities of each species.

12.2.4 The extent of the Array Area and Offshore ECC Study Area relative to the marine mammal MUs (regional study area) is shown in **Figure 12.1**. The extent of the monthly digital aerial survey area is shown in **Figure 12.2**.

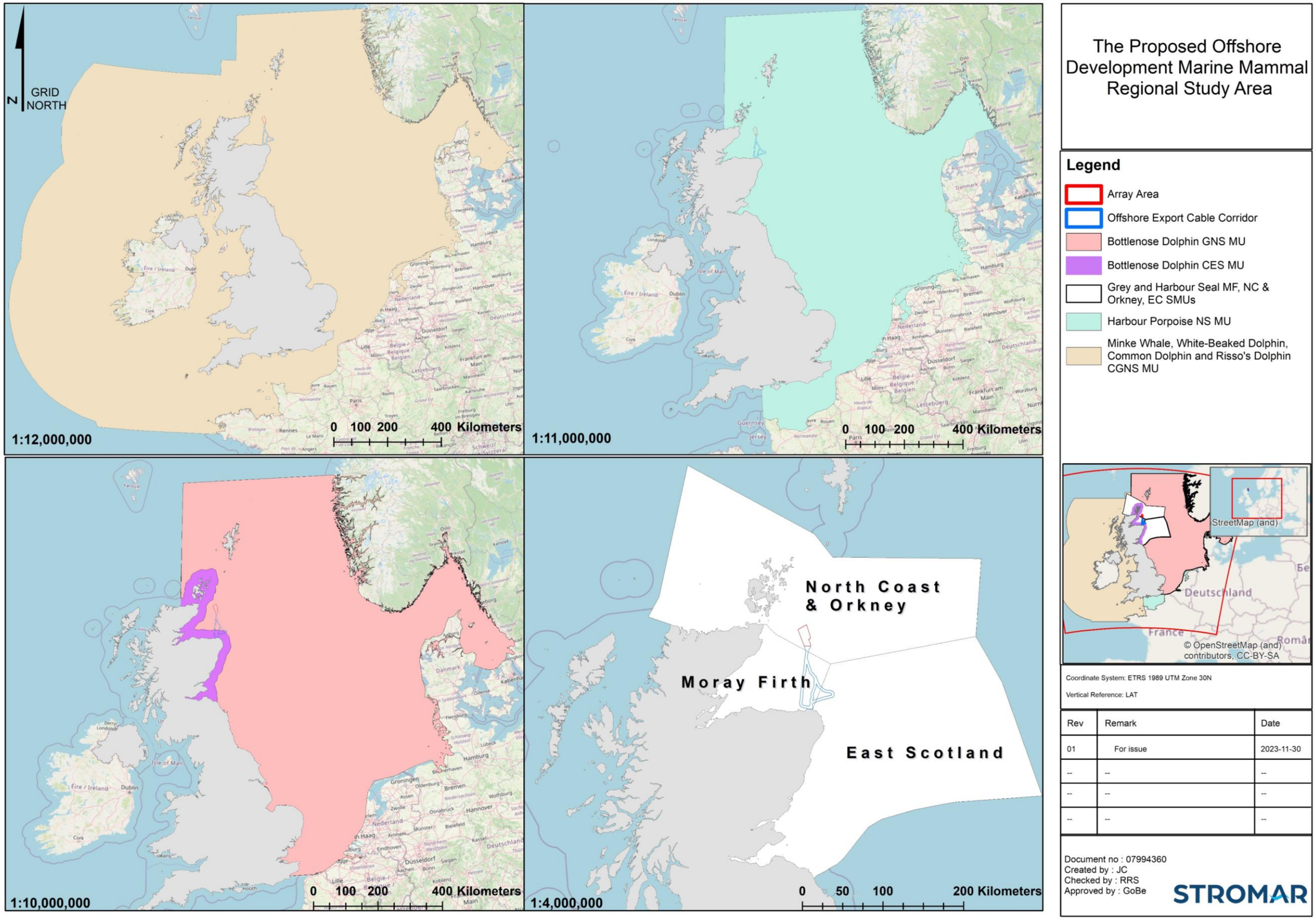


Figure 12.1: The Proposed Offshore Development Marine Mammal Regional Study Area.

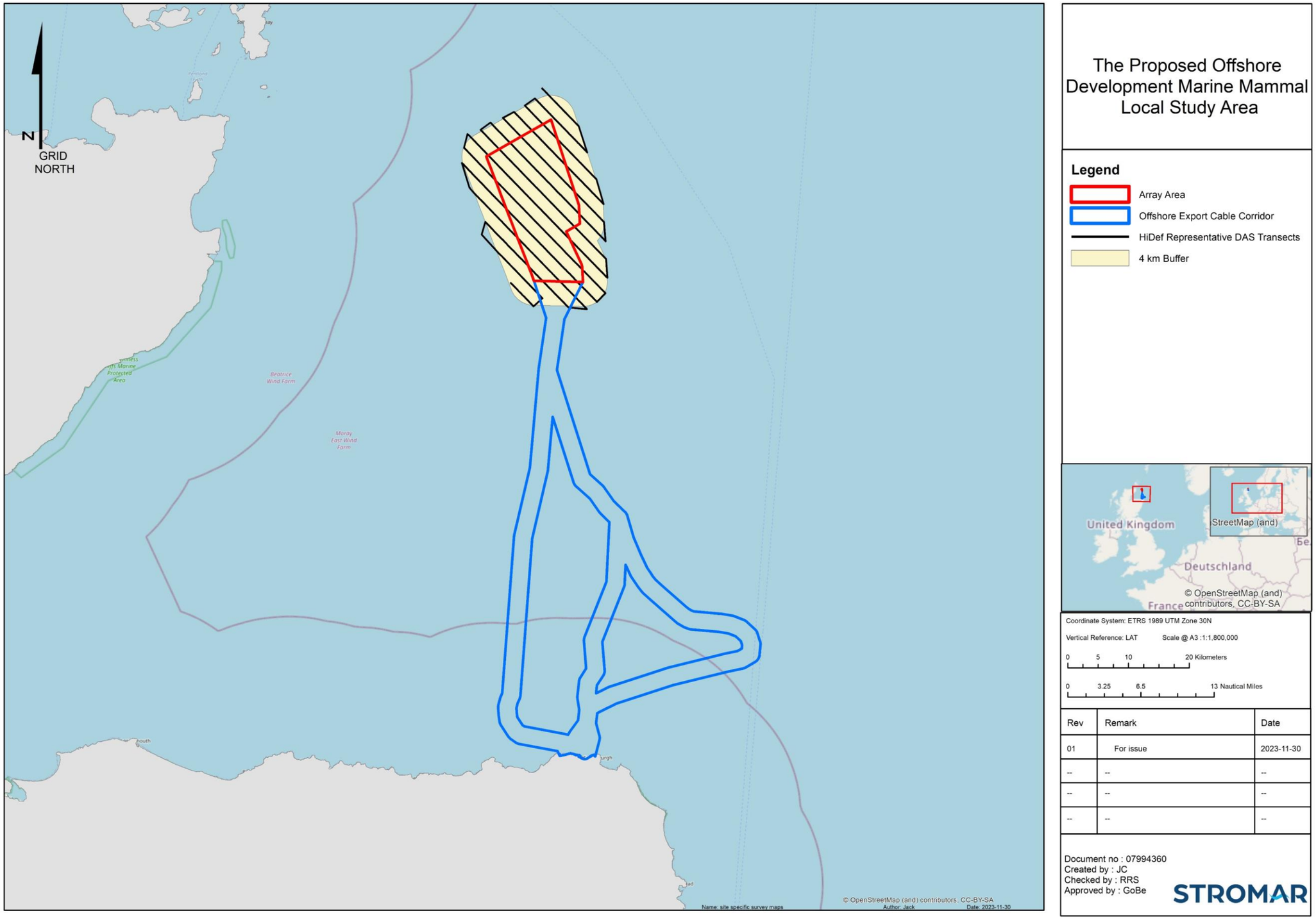


Figure 12.2: The Proposed Offshore Development Marine Mammal Local Study Area.

12.3 Baseline Environment

Data Sources

12.3.1 The data sources that have been used to inform the marine mammal chapter are presented within **Table 12.1**. These identified data sources will be taken forward and detailed fully in the marine mammal baseline characterisation report, which will identify the most appropriate reference populations and density estimates to be used in the subsequent quantitative EIA, alongside additional site-specific data that will be collected for the Proposed Offshore Development.

Table 12.1: Key sources of Marine Mammal baseline data.

Source, Author and Year	Summary	Coverage of the Array Area and Offshore ECC Study Area	Data Quality
HiDef (2022-2024), Site-specific DAS for the Proposed Offshore Development	Site-specific baseline characterisation DAS (24 surveys between March 2022 and 2024). Only a certain proportion of the data were available to inform this Scoping Report (March 2022 – February 2023) as surveys will not be completed until March 2024. In the first year of DAS, 12 surveys were undertaken (representing 12 months).	The survey area consists of the Array Area plus a 4 km buffer.	These data will represent the most up-to-date survey data and provide the best temporal coverage of marine mammal data for the site-specific Array Area (plus a 4 km buffer). Absolute abundance estimates will be provided for harbour porpoise; however, due to a lack of data on surface availability for other species (e.g., white-beaked dolphin, minke whale) and anticipated low sighting rates, other data sources (e.g., SCANS) are expected to be more robust for these species within the Array Area. Any density estimates will be valid for the survey area only. It cannot be assumed that the density estimate outside the survey area is the same.
Hague *et al.* (2020), Regional Baselines for Marine Mammal Knowledge Across the North Sea and Atlantic Areas of Scottish Waters	This report collates recent (to 2020) information on the abundance and distribution of marine mammal species in the Scottish Northern North Sea region and Scottish Atlantic waters, with a focus on draft plan option sites identified in the Draft SMP for Offshore Wind Energy for Scotland.	Report covers the entirety of Scotland, with summary information provided for specific ScotWind lease areas.	This report collates recent (to 2020) information on the abundance and distribution of marine mammal species in Scottish waters. No updates are anticipated prior to submission of the EIA.
Paxton *et al.* (2016), Revised Phase III Data Analysis of Joint Cetacean Protocol Data Resources	The Joint Cetacean Protocol (JCP) has been set up with the aim of delivering information on the distribution, abundance and population trends of cetacean species occurring in the North Sea and adjacent sea regions. Effort-linked sightings data contained within the JCP data resource have been used to estimate spatio-temporal patterns of abundance for seven species of cetacean over a 17-year period from 1994–2010 over a 1.09 million km^2 prediction region from 48° N to c. 64° N and from the continental shelf edge west of Ireland to the Kattegat in the east.	Covers the North Sea and adjacent areas, including the Proposed Offshore Development.	These data provide information on long-term patterns in distribution of several cetacean species, but data are > 12 years old and density values are not considered appropriate for informing quantitative impact assessment. A forthcoming report, Paxton *et al.* (in-preparation) 'Analyses relating to the abundance and distribution of selected marine mobile species in Scottish territorial waters', will provide more recent data; however, it is unknown when this manuscript will be published.

Source, Author and Year	Summary	Coverage of the Array Area and Offshore ECC Study Area	Data Quality
Paxton *et al.* (2014), Statistical approaches to aid the identification of MPA for minke whale, Risso's dolphin, white-beaked dolphin and basking shark	Effort-linked sightings data contained within the JCP plus additional data sourced by Scottish Natural Heritage were used to generate estimated densities per area surveyed (corrected for detection/availability) for minke whale (2000 – 2012), Risso's dolphin (1994 – 2012) and white-beaked dolphin (1994 – 2012). A further relative density per area surveyed index was obtained for basking shark (2000 – 2012). There were up to 23 distinct data sources used for each analysis (25 used in total) with data from at least 172 distinct survey platforms (ships and aircraft) representing up to 180,300 km of effort depending on the species considered.	Generated estimated densities per area surveyed which includes the North Sea and includes the Proposed Offshore Development.	These data provide information on long-term patterns in distribution of several cetacean species and basking sharks, but data are > 10 years old and cetacean density values are not considered appropriate for informing quantitative impact assessment. A forthcoming report, Paxton *et al.* (in-preparation) 'Analyses relating to the abundance and distribution of selected marine mobile species in Scottish territorial waters', will provide more recent data; however, it is unknown when this manuscript will be published.
Multiple Sources (Multiple Years), Survey data from existing OWFs	Strategic Marine Mammal Monitoring Programme (completed on behalf of Moray East OWF and Beatrice OWF) (Graham *et al.*, 2015, Graham *et al.*, 2016, Graham *et al.*, 2017b, Graham *et al.*, 2020, Graham *et al.*, 2021); Various North Sea OWF project EIAs and supplementary data (BOWL, 2012, Bailey, 2017, Moray Offshore Windfarm (West) Limited, 2018, Seagreen, 2018a, b).	Although these data sources cover specific development areas in the North Sea, they are relevant to the Proposed Offshore Development.	Data are recent at the time of publication. Any more recent, relevant and publicly available survey data supporting projects in the region will be consulted if they become available.
SCANS III and Gilles *et al.* (2023), SCANS IV	Estimates of cetacean abundance in European Atlantic waters in summer 2016 from the SCANS III aerial and shipboard surveys. Estimates of cetacean abundance in European Atlantic waters in Summer 2022 from the SCANS IV aerial and shipboard surveys.	SCANS III surveys covered the majority of European Atlantic waters (not including south, west and north Ireland). The Proposed Development is located within SCANS III Block S and SCANS IV block CS-K.	SCANS surveys are conducted periodically (1994, 2005, 2016, 2022) to provide abundance estimates and trend assessment of the regularly occurring cetacean species in European shelf waters by population-wide surveys. The SCANS IV estimates are currently the most up-to-date data from the SCANS survey and provide the most robust density estimates available at a regional scale.
Lacey *et al.* (2022), SCANS III density surfaces	Modelled density surfaces of cetaceans in European Atlantic waters in Summer 2016 using the SCANS III data.	Modelled density surfaces cover the entire SCANS III survey area.	The modelled density surfaces reported for SCANS-III are those reported for the 2016 surveys. These represent improved spatial resolution on the SCANS-III design-based estimates (described above).
SCOS (2023), SCOS Scientific Advice on Matters Related to the Management of Seal Populations	Under the Conservation of Seals Act 1970 and the Marine (Scotland) Act 2010, the Natural Environment Research Council (NERC) has a duty to provide scientific advice to government on matters related to the management of UK seal populations. NERC has appointed a SCOS to formulate this advice. This document outlines the current status of both harbour and grey seal populations in the UK. Populations of seals are characterised within MUs.	The SMUs relevant to the Proposed Offshore Development are the East Scotland, North Coast & Orkney, and Moray Firth SMUs.	Formal advice is given annually based on the latest scientific information provided to SCOS by the Sea Mammal Research Unit. The SCOS reports, which are published annually, provide scientific advice on matters related to the management of seal populations. The SCOS 2023 report is currently the most up-to-date report in which information on the current status of seals is provided, including counts up to 2021. The next full report is not anticipated until late 2024 or early 2025, but results will be incorporated where available in time to inform the assessment.

Source, Author and Year	Summary	Coverage of the Array Area and Offshore ECC Study Area	Data Quality
SMRU (2019), Seal telemetry database	Data collated by multiple authors and gathered through a consortium of funders. Used to assess connectivity and habitat associations of seal species with at-sea and on-land locations.	Data encompasses the entirety of Scotland and thus, includes the Proposed Offshore Development.	Data are the most recently available. No significant updates of relevance to the Project are anticipated.
Inter- Agency Marine Mammal Working Group (IAMMWG) (2023), Updated abundance estimates for cetacean Management Units in UK waters	The IAMMWG defined MUs for the seven most common cetacean species found in UK waters. Abundance estimates were calculated for each species within their respective MUs.	The regional study areas for the key marine mammal species are as follows – harbour porpoise: NS MU; bottlenose dolphin: CES and GNS MUs; short-beaked common dolphin: CGNS MU; white-beaked dolphin: CGNS MU; and minke whale: CGNS MU. Each MU has connectivity with the Proposed Offshore Development.	Based on the most up-to-date data available as of February 2021, and updated management units were produced in March 2023. The data used to inform the report were SCANS-III (Hammond *et al.* 2017) and the ObSERVE Programme (Rogan *et al.*, 2018). It is likely that this report shall be updated in the future now SCANS IV results are available. However, no provisional date has been announced for an updated IAMMWG abundance estimate report.
Marine Scotland (2017), Designated haul-out sites for grey and harbour seals (Protection of Seals Orders)	Seal haul-out sites are designated under Section 117 of Marine (Scotland) Act 2010. Seal haul-outs are locations on land where seals come ashore to rest, moult or breed. There are a total of 194 seal haul-out sites across Scotland which have been mapped on the National Marine Plan interactive (NMPi) system[23].	The closest seal haul-out site to the Proposed Offshore Development is the Pentland Skerries (~ 36 km away) and Duncansby Head (~ 43 km away) for grey seals, and Gills Bay (~ 48 km away) for harbour seals	Haul-out locations remain up to date. There are no revisions anticipated.
Carter *et al.* (2020), Seal habitat preference maps	Habitat modelling was used, matching seal telemetry data to habitat variables, to understand the species-environment relationships that drive seal distribution. Haul-out count data were then used to generate predictions of seal distribution at sea from all known haul-out sites. This resulted in predicted distribution maps on a 5x5 km grid. The estimated density surface gives the percentage of the British Isles at sea population (excluding hauled-out animals) estimated to be present in each grid cell at any one time during the main foraging season.	Report covers the entirety of Scotland and adjacent waters, including the Proposed Offshore Development.	Report provides the most recent information on UK seal habitat preferences. There are no immediate updates anticipated to these data.
Carter *et al.* (2022), Seal SAC densities	An extensive high-resolution GPS tracking dataset (114 grey and 239 harbour seals) was used to model habitat preference and generate at-sea distribution estimates for the entire UK and Ireland populations of both species. Regional differences in environmental drivers of distribution for both species which likely relate to regional variation in diet and population trends were reported, and SAC-specific estimates of at-	Report covers the entirety of Scotland and adjacent waters, including the Proposed Offshore Development.	Report provides the most recent information on UK seal SAC densities. There are no immediate updates anticipated to these data.

[23] https://marine.gov.scot/maps/446

Source, Author and Year	Summary	Coverage of the Array Area and Offshore ECC Study Area	Data Quality
	sea distribution for use in marine spatial planning were provided. This report demonstrates that hotspots of at-sea density in UK and Ireland-wide maps cannot always be apportioned to the nearest SAC.		
Brookes (2017), East Coast Marine Mammal Acoustic Study (ECOMMAS)	The ECOMMAS project uses acoustic recorders, known as C-PODs, at 30 locations off the east coast of Scotland, to detect echolocation clicks. At ten of these locations, a broadband acoustic recorder has also been deployed, to record ambient noise levels, as well as other animal vocalisations. The ECOMMAS locations are available for viewing on NMPi[24].	Data for porpoise and dolphin detection-positive-days can be accessed for the east coast of Scotland. This includes locations situated within the CES and GNS MUs for bottlenose dolphins and the NS MU for harbour porpoise which have connectivity with the Proposed Offshore Development. These locations are Fraserburgh, Spey Bay, Cromarty, Helmsdale and Latheron.	Data from 2013-2022 are available for use in baseline characterisations. No spatial overlap with the Array Area, but a unique resource for long-term occurrence of porpoise and dolphin in territorial waters of east Scotland.
Heinänen and Skov (2015), The Identification of Discrete and Persistent Areas of Relatively High Harbour Porpoise Density in the Wider UK Marine Area	This report provides the results of detailed analyses of 18 years of survey data in the JCP undertaken to inform the identification of discrete and persistent areas of relatively high harbour porpoise density in the UK marine area within the UK EEZ.	UK harbour porpoise MUs were used for presentation of results, thus, any data used from this report shall be representative of that for the harbour porpoise NS MU. The Proposed Offshore Development is located within this MU.	Data currency limited by year of publication (2015). No updates are anticipated in the near future.
Waggitt *et al.* (2020), Distribution Maps of Cetacean and Seabird Populations in the North-East Atlantic	This study provides the largest ever collation and standardisation of diverse survey data for cetaceans and seabirds, and the most comprehensive distribution maps of these taxa in the Northeast Atlantic. Aerial and vessel survey data were collated between 1980 and 2018. Distributional maps for 12 cetacean species were produced at 10 km resolution.	Modelled density surfaces include the entirety of Scotland and thus, includes the Proposed Offshore Development.	Informative for broad patterns of species distribution using a long-term dataset, but limitations in terms of capturing changes in distribution and abundance over time. Not recommended for quantitative impact assessment. Data are up to date as of 2018. No updates are anticipated in the near future.
Multiple data for bottlenose dolphins in Scottish waters (Cheney *et al.*, 2012, Cheney *et al.*, 2013, Cheney *et al.*,	Together, these publications provide the first comprehensive assessment of the abundance of bottlenose dolphins in the inshore waters of Scotland through a combination of dedicated photo-identification studies and opportunistic sightings, make reference to the condition of the Moray Firth SAC site, discuss the southward expansion of bottlenose dolphin population home range,	Covers the CES MU for bottlenose dolphins, and the Moray Firth SAC.	New manuscripts are continually published which report on the Moray Firth bottlenose dolphins. Where new publications are published, and are applicable to the EIA, these shall be incorporated into the EIA chapter and baseline technical report.

[24] https://marine.gov.scot/information/east-coast-marine-mammal-acoustic-study-ecommas#:~:text=The%20ECOMMAS%20project%20uses%20acoustic,Scotland%2C%20to%20detect%20echolocation%20clicks.

Source, Author and Year	Summary	Coverage of the Array Area and Offshore ECC Study Area	Data Quality
2014a, Cheney *et al.*, 2014b, Thompson *et al.*, 2015, Arso Civil *et al.*, 2018, Cheney, 2018, Cheney *et al.*, 2018, Arso Civil *et al.*, 2019, Cheney *et al.*, 2019, Arso Civil *et al.*, 2021, Arso Civil *et al.*, 2022)	and provide the most recent abundance estimate for the CES MU.		
University of Aberdeen – Lighthouse Field Station Journal Articles on harbour porpoise and seals	Journal articles on the spatiotemporal habitat use of harbour porpoise and seals in the Inner and Outer Moray Firth, and wider North Sea area (e.g., Williamson *et al.*, 2016, Iorio-Merlo *et al.*, 2022, Williamson *et al.*, 2022).	Although these data sources cover specific inner and outer Moray Firth and wider North Sea areas, they are relevant to the Proposed Offshore Development.	New manuscripts are continually published which report on the status of harbour porpoise and seals in the Inner and Outer Moray Firth, and wider North Sea area. Where new publications are published, and are applicable to the EIA, these shall be incorporated into the EIA chapter and baseline technical report.

Description of Baseline Environment

12.3.2 An understanding of the marine mammal baseline environment within the study area has been developed using the available literature and data sources presented in **Table 12.1**.

12.3.3 The marine mammal species most likely to be present in the Proposed Offshore Development are informed by site specific survey data, historical records, and a comprehensive literature review. The key species include minke whale, bottlenose dolphin, white-beaked dolphin, Risso's dolphin, harbour porpoise, grey seal and harbour seal. Further information on the occurrence of each of these species is indicated below.

12.3.4 Other marine mammals that have been sighted along the northeast and Moray coasts of Scotland, and in the wider North Sea area include humpback whale, killer whale, and Atlantic white-sided dolphins. None of these species were recorded within the DAS survey area for the period of March 2022 – February 2023. While the evidence base for their occurrence will be comprehensively assessed in the baseline characterisation report, it is not anticipated that they will be subject to quantitative assessment, as density and abundance estimates for these species are lacking. Furthermore, any commitments proposed as part of the Proposed Offshore Development will also apply to these species, irrespective as to whether they have been quantitatively or qualitatively assessed (relevant commitments are presented in **Appendix A: Offshore Commitments Register**). The final list of species for quantitative assessment will be refined in the marine mammal baseline characterisation report.

Cetaceans

Minke whale

12.3.5 Minke whale sightings are widely distributed, with sightings occurring between January and October with a peak between June and August, though minke whales are present in coastal UK waters year-round (Evans *et al.*, 2011). In the UK, minke whales have been assessed as having an 'Unknown' Overall Conservation Status (JNCC, 2019e).

12.3.6 The population estimate for the CGNS MU based on SCANS-III (Hammond *et al.*, 2017, Hammond *et al.*, 2021) and ObSERVE data (Rogan *et al.*, 2018) is 20,118 minke whales (95% CI: 14,061 – 28,786, CV: 018). The UK portion of this MU has an estimated abundance of 10,288 (95% CI: 6,210 – 17,042, CV: 0.26) (Rogan *et al.*, 2018, Hammond *et al.*, 2021, IAMMWG, 2023).

12.3.7 No minke whales were sighted in any of the survey months during the first year of site-specific DAS. However, this does not preclude their presence within the Array Area or the Offshore ECC Study Area. For example, the Array Area and Offshore ECC Study Area are in SCANS-III Block S where there was an estimated density of 0.010 minke whale/km^2 in July 2016 (Hammond *et al.*, 2021), and 0.0116 minke whale/km^2 in July 2022 in SCANS IV block CS-K (Gilles *et al.*, 2023).

12.3.8 The closest designated site for minke whales to the Array Area and Offshore ECC Study Area is the Southern Trench NCMPA. Part of the Offshore ECC Study Area crosses through the NCMPA and the Array Area is located approximately 57 km from the NCMPA. This site persistently supports higher than average densities of minke whales (**Figure 12.3**), providing feeding grounds for juveniles and adults (NatureScot, 2020). The NCMPA supports the highest densities of minke whales in the majority of the dedicated area, with the densities decreasing towards the more southern part of the NCMPA, just east of Fraserburgh and Peterhead. The same trend is shown for predicted persistence of above

mean densities during summer months. The NCMPA and the Offshore ECC Study Area overlap with one another and thus the Proposed Offshore Development will have direct interactions with the Southern Trench NCMPA.

12.3.9 **Figure 12.4** provides a visual representation of the density estimates of minke whale for the UK based on the SCANS-III data (Lacey *et al*., 2022), the Paxton *et al*. (2016) Revised Phase III Data report, and the Waggitt *et al.* (2020) paper.

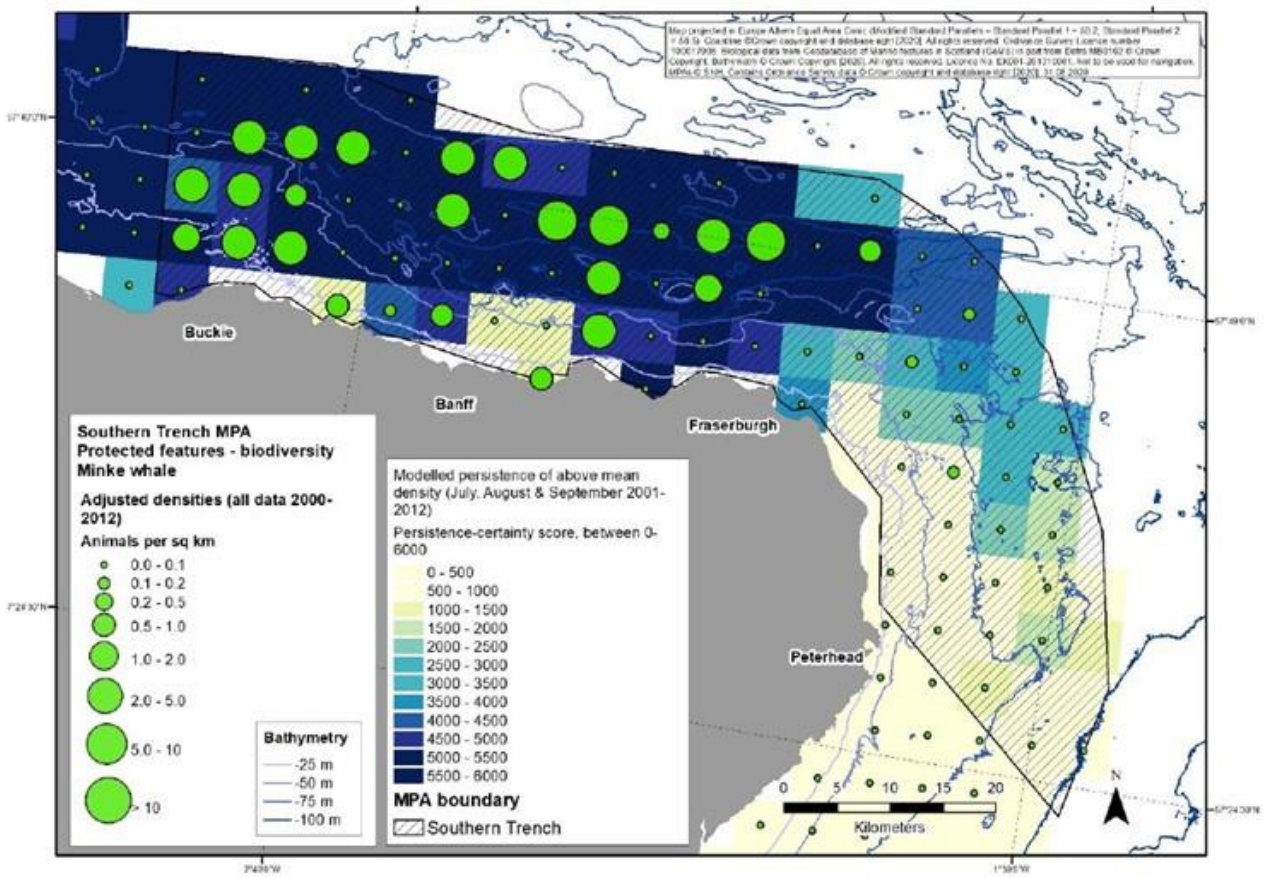


Figure 12.3: Modelled adjusted densities and the predicted persistence of above mean densities of minke whale in the Southern Trench NCMPA. Figure taken from SNH (2014).

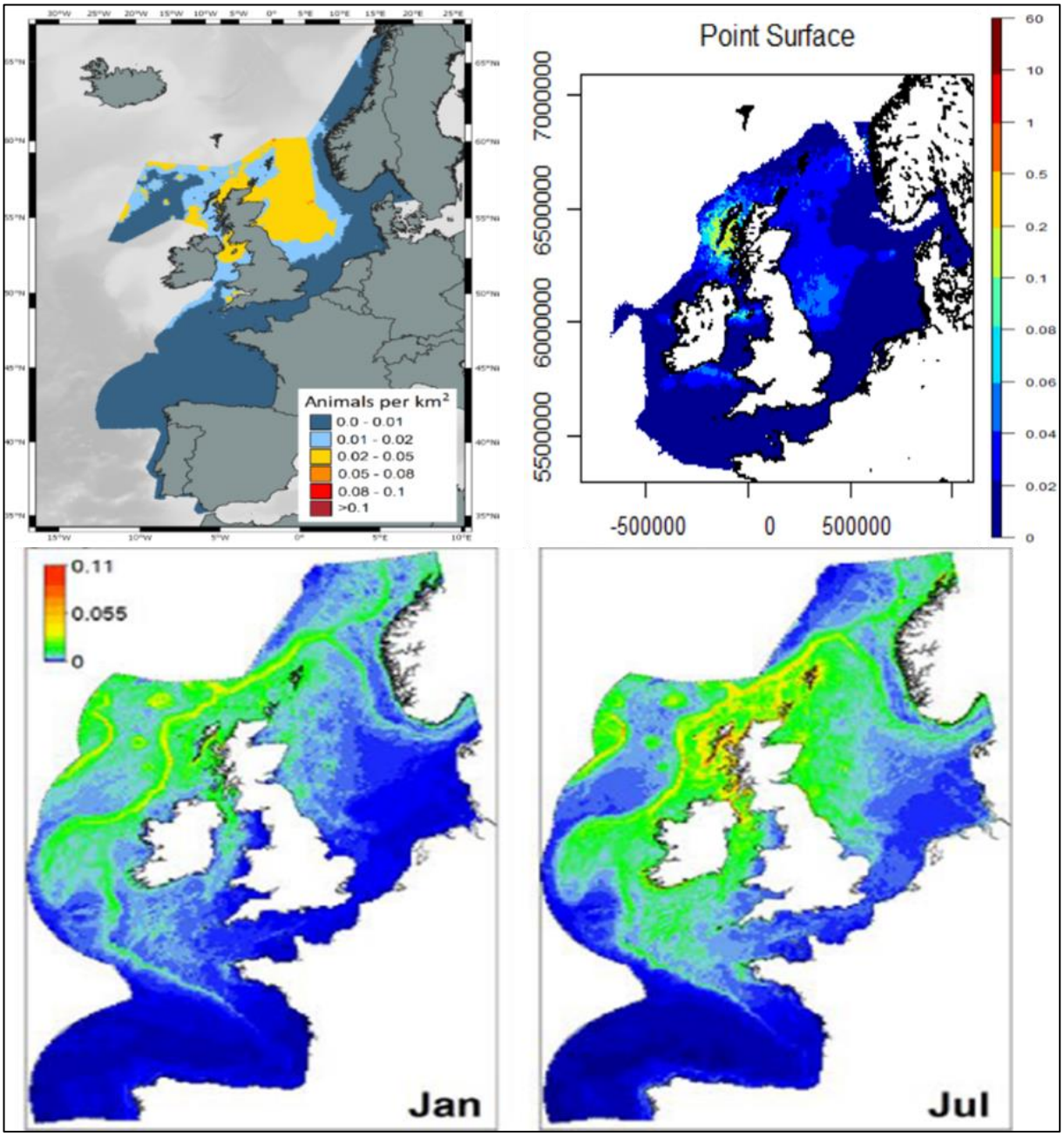


Figure 12.4: Top left: predicted surface for minke whales in SCANS-III (2016) (Lacey *et al.*, 2022), top right: predicted minke whale densities (animals/km^2) for all summers (1994 – 2010) as point estimates of cell densities (Paxton *et al.*, 2016); bottom: predicted densities of minke whales (animals per km^2) in January (left) and July (right) in the North-East Atlantic (Waggitt *et al.*, 2020).

Bottlenose dolphin

12.3.10 The Proposed Offshore Development is located within two different bottlenose dolphin MUs. The Array Area and the majority of the Offshore ECC Study Area are located in the GNS MU, while the southern portion of the Offshore ECC Study Area is located within the CES MU. Therefore, both MUs are relevant here.

12.3.11 The population estimate for the CES MU is 224 bottlenose dolphins (95% CI: 214-234) (Arso Civil *et al.*, 2021, IAMMWG, 2023). This MU is located entirely within the UK EEZ. In the UK, bottlenose dolphins have been assessed as having an 'Unknown' Overall Conservation Status (JNCC, 2019a), although the CES MU population is thought to be increasing (Arso Civil *et al.*, 2021). Individuals associated with the Moray Firth SAC are primarily observed within shallow (<20 m deep), nearshore waters of eastern Scotland (within 2 km), in particular the waters of the inner and southern coast of the Moray Firth, Aberdeenshire coast and Tay Estuary (Quick *et al.*, 2014). Recent reports have indicated an increase in sightings of bottlenose dolphins from this population in the Firth of Forth and as far south as the coast of northern England (Arso Civil *et al.*, 2022).

12.3.12 For the GNS MU, the population estimate is 2,022 bottlenose dolphins (95% CI: 548 – 7,453) (IAMMWG, 2023). For the UK portion of the MU, there is an estimated abundance of 1,885 animals (95% CI: 476 – 7,461) (Rogan *et al.*, 2018, Hammond *et al.*, 2021, IAMMWG, 2023). The bottlenose dolphins within the GNS MU are considered a different eco-type (offshore eco-type) to those within the CES MU (coastal eco-type). The offshore ecotype of bottlenose dolphins in Scotland are considered to be those encountered more than 30 km from the coastline (Breen *et al.*, 2016) and are not resident year-round (Hague *et al.*, 2020). By contrast, coastal eco-type bottlenose dolphins are resident year-round in Scottish waters, but their distribution is primarily limited to coastal waters (Hague *et al.*, 2020). Our current state of knowledge on the abundance and distribution of bottlenose dolphins is currently much more advanced for the coastal eco-type than the offshore eco-type, with dedicated, long-term studies focusing on coastal populations (Hague *et al.*, 2020).

12.3.13 No bottlenose dolphins were sighted in any of the survey months during the first year of site-specific DAS. However, this does not preclude their presence within the Array Area or the Offshore ECC Study Area. The Array Area and Offshore ECC Study Area are in SCANS-III Block S where there was an estimated density of 0.004 bottlenose dolphin/km^2 in July 2016 (Hammond *et al*., 2021). No bottlenose dolphins were identified in SCANS IV Block CS-K in July 2022 (Gilles *et al.*, 2023). It is noted that the SCANS-III and IV density estimates are not the most appropriate available for the CES bottlenose dolphin population, whose distribution is largely restricted to nearshore waters of the coast (Quick *et al.*, 2014), although this estimate may be more relevant to the offshore eco-type (GNS MU). Therefore, the quantitative assessment for bottlenose dolphins will consider potential impacts to both the offshore population and the coastal population separately.

12.3.14 **Figure 12.5** provides a summary of the locations in which bottlenose dolphins were encountered during boat surveys undertaken between 1990 and 2019 (Arso Civil *et al.*, 2021). **Figure 12.6** indicates the predicted spatial variation in the probability of detecting dolphins (of all species) across the Moray Firth (Thompson *et al.*, 2015).

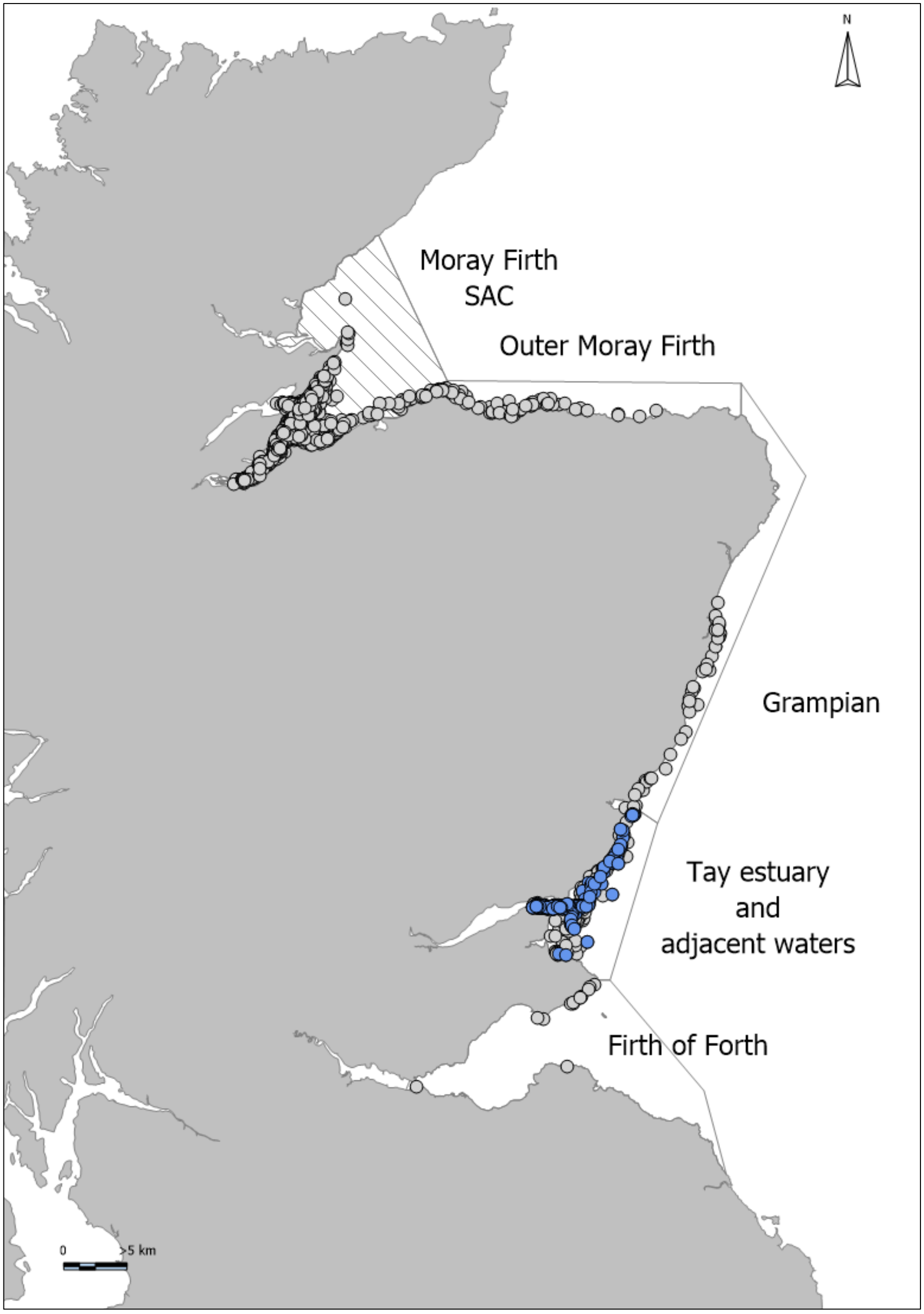


Figure 12.5: Main survey areas along the east coast of Scotland, from the Moray Firth SAC (hatched area) to the Firth of Forth. Locations of bottlenose dolphin encounters between 1990 and 2019 collected by University of Aberdeen and SMRU are shown in grey, and those collected by SMRU between 2017 and 2019 shown in blue (Arso Civil *et al.*, 2021).

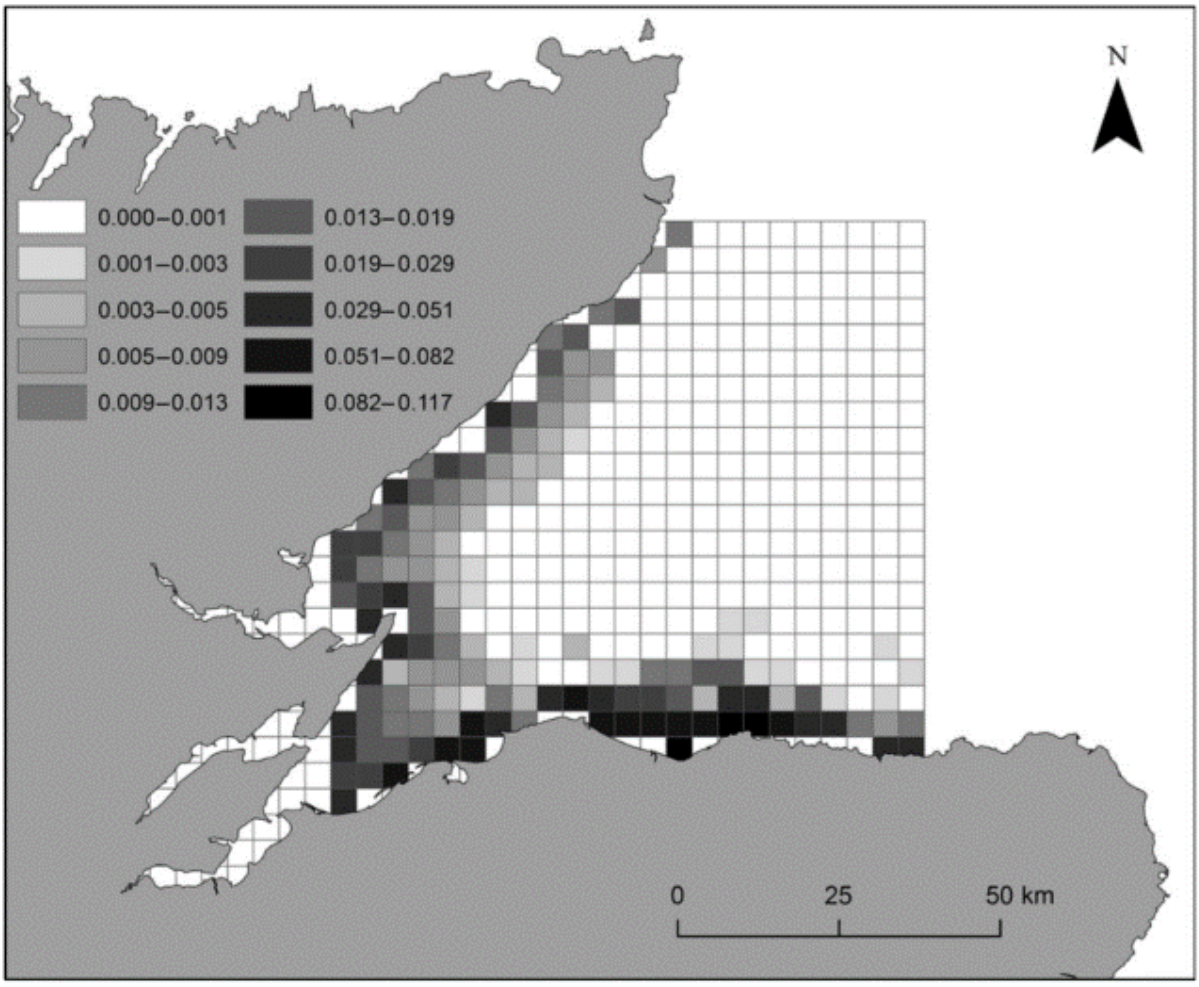


Figure 12.6: From Thompson *et al.* (2015). Predicted spatial variation in the probability of detecting dolphins (of all species) across the Moray Firth. Predictions are based on the GEE analysis of passive acoustic data and are standardized for Julian day equal to 248 and year equal to 2010.

Short-beaked common dolphin

12.3.15 Short-beaked common dolphins are one of the most common cetacean species within the waters of the UK and can be found within Scottish waters year-round, primarily along the west coast (Reid *et al.*, 2003, Hague *et al.*, 2020). Common dolphin are currently managed within the CGNS MU (IAMMWG, 2023). The population estimate for the CGNS MU based on SCANS III and Observe data is 102,565 individuals (95% CI: 58,932 – 178,822, CV: 0.29) (IAMMWG, 2023). The UK portion of this MU has an estimated abundance of 57,417 (95% CI: 30,850 – 106,863, CV: 0.32) (IAMMWG, 2023).

12.3.16 Common dolphins were sighted during one of the 12 months surveyed throughout the first year of site-specific DAS, resulting in a total of one sighting (in May 2022). If sufficient sightings data are available to generate monthly density estimates and spatial distribution patterns for common dolphin from the site-specific DAS, this will be provided within the baseline characterisation report submitted in support of an EIA. However, should this not be possible, density estimates shall be derived from pre-existing data sources such as the SCANS-III or IV data.

12.3.17 The Array Area and Offshore ECC Study Area are in SCANS-III Block S where there was no uniform density estimate provided for common dolphin in July 2016 (Hammond *et al.*, 2021). Likewise, no common dolphins were recorded in July 2022 in SCANS IV block CS-K (Gilles *et al.*, 2023).

12.3.18 **Figure 12.7** provides a visual representation of the density estimates of common dolphin for the UK based on the SCANS-III data (Lacey *et al.*, 2022), the Revised Phase III Data report (Paxton *et al.*, 2016), and the Waggitt *et al.* (2020) paper.

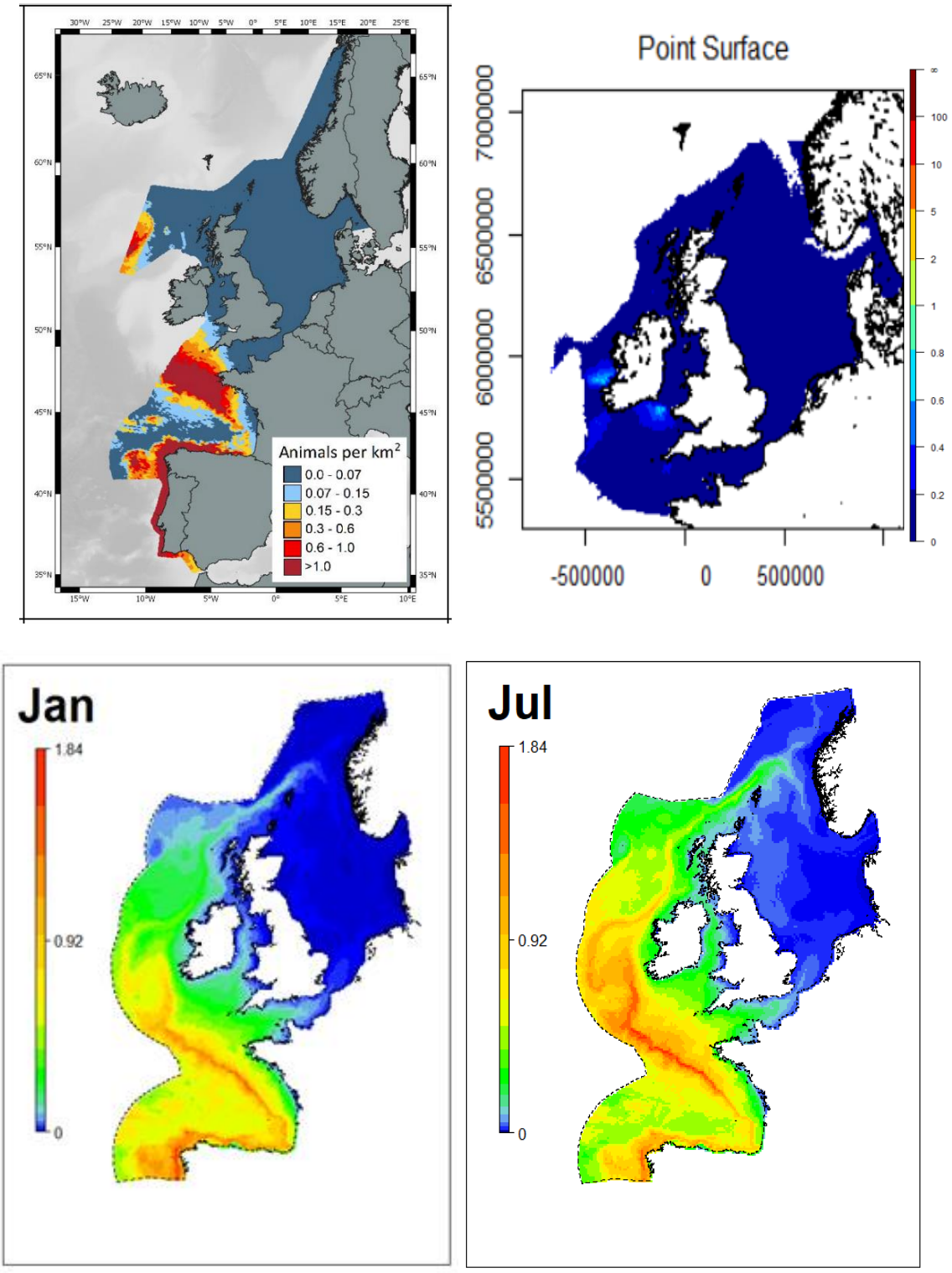


Figure 12.7: Top left: predicted surface common dolphins in SCANS-III (2016) (Lacey *et al.*, 2022); top right: predicted common dolphin densities (animals/km^2) for all summers (1994 – 2010) as point estimates of cell densities (Paxton *et al.*, 2016); bottom row: spatial variation in predicted densities of common dolphin (animals/km^2) in January (left) and July (right) in the North-East Atlantic (Waggitt *et al.*, 2020).

White-beaked dolphin

12.3.19 White-beaked dolphins are one of the most common cetacean species within the waters of the North Sea and are found within the waters off the coast of Scotland throughout the year, with the highest densities recorded in the summer months (Reid *et al.*, 2003, Hague *et al.*, 2020). In the UK, white-beaked dolphins have been assessed as having an 'Unknown' Overall Conservation Status (JNCC, 2019d). The population estimate for the CGNS MU based on SCANS III and Observe data is 43,951 individuals (95% CI: 28,439 – 67,924, CV: 0.22) (IAMMWG, 2023). The UK portion of this MU has an estimated abundance of 10,288 (95% CI: 6210 – 17,042, CV: 0.26) (IAMMWG, 2023).

12.3.20 White-beaked dolphins were sighted during four of the 12 months surveyed throughout the first year of site-specific DAS, resulting in a total of 19 sightings (all sightings between October 2022 and February 2023). If sufficient sightings data are available to generate monthly density estimates and spatial distribution patterns for white-beaked dolphin from the site-specific DAS, this will be provided within the baseline characterisation report submitted in support of an EIA. However, should this not be possible, density estimates shall be derived from pre-existing data sources such as the SCANS-III or IV data.

12.3.21 The Array Area and Offshore ECC Study Area are in SCANS-III Block S where there was an estimated density of 0.021 white-beaked dolphin/km^2 in July 2016 (Hammond *et al.*, 2021), and 0.1352 white-beaked dolphins/km^2 in July 2022 in SCANS IV block CS-K (Gilles *et al.*, 2023).

12.3.22 **Figure 12.8** provides a visual representation of the density estimates of white-beaked dolphin for the UK based on the SCANS-III data (Lacey *et al.*, 2022), the Revised Phase III Data report (Paxton *et al.*, 2016), and the Waggitt *et al.* (2020) paper.

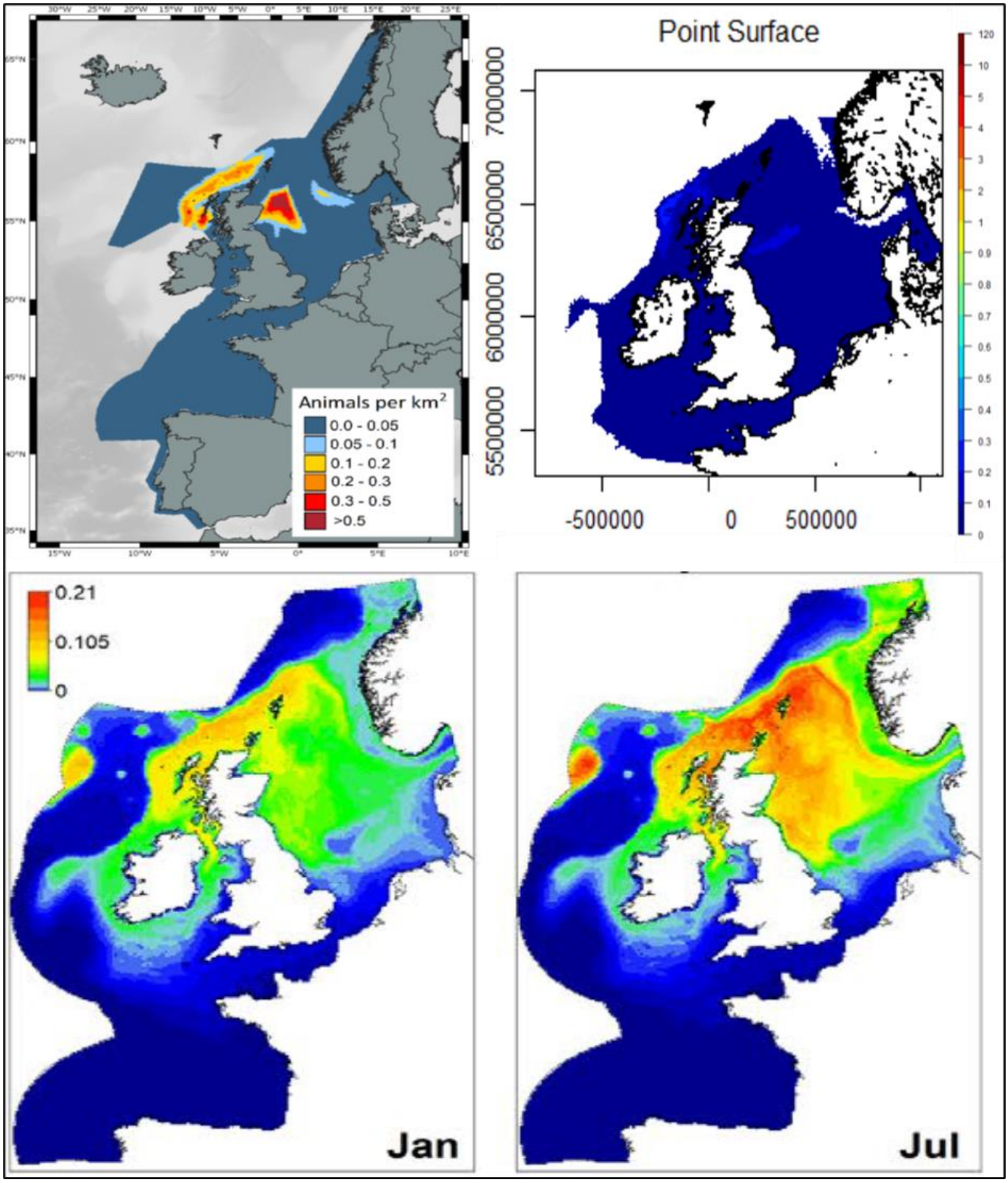


Figure 12.8: Top left: predicted surface white-beaked dolphins in SCANS-III (2016) (Lacey *et al.*, 2022); top right: predicted white-beaked dolphin densities (animals/km^2) for all summers (1994 – 2010) as point estimates of cell densities (Paxton *et al.*, 2016); bottom row: spatial variation in predicted densities of white-beaked dolphin (animals/km^2) in January (left) and July (right) in the North-East Atlantic (Waggitt *et al.*, 2020).

Risso's dolphin

12.3.23 Risso's dolphins are resident year-round in Scottish waters, but at higher densities during the summer months. Risso's dolphins have a preference for deeper waters, and so prefer shelf waters, or areas where water is deeper closer to land, such as around the Isle of Lewis (Hague *et al.*, 2020).

12.3.24 Risso's dolphin in UK waters have been assessed as 'Unknown' Overall Conservation Status (JNCC, 2019c). The population estimate for the CGNS MU based on SCANS III and Observe data is 12,262 individuals (95% CI: 5,227 – 28,764, CV: 0.46). The UK portion of this MU has an estimated abundance of 8,687 (95% CI: 2,810 – 26,852, CV: 0.63) (IAMMWG, 2023).

12.3.25 Risso's dolphins were identified twice during the first year of site-specific DAS, with both sightings occurring in June 2022. It is unlikely that sufficient sightings data will be available to generate monthly density estimates and spatial distribution patterns for Risso's dolphin from the site-specific DAS. However, density estimates shall be derived from pre-existing data sources such as SCANS IV, which provided a density estimate of 0.0376 Risso's dolphins/km^2 in SCANS IV block CS-K (Gilles *et al.*, 2023). **Figure 12.9** provides a visual representation of the density estimates of Risso's dolphin for the UK based on the Paxton *et al.* (2016) Revised Phase III Data report, and the Waggitt *et al.* (2020) paper. Risso's dolphin density estimates were not modelled from the SCANS-III data.

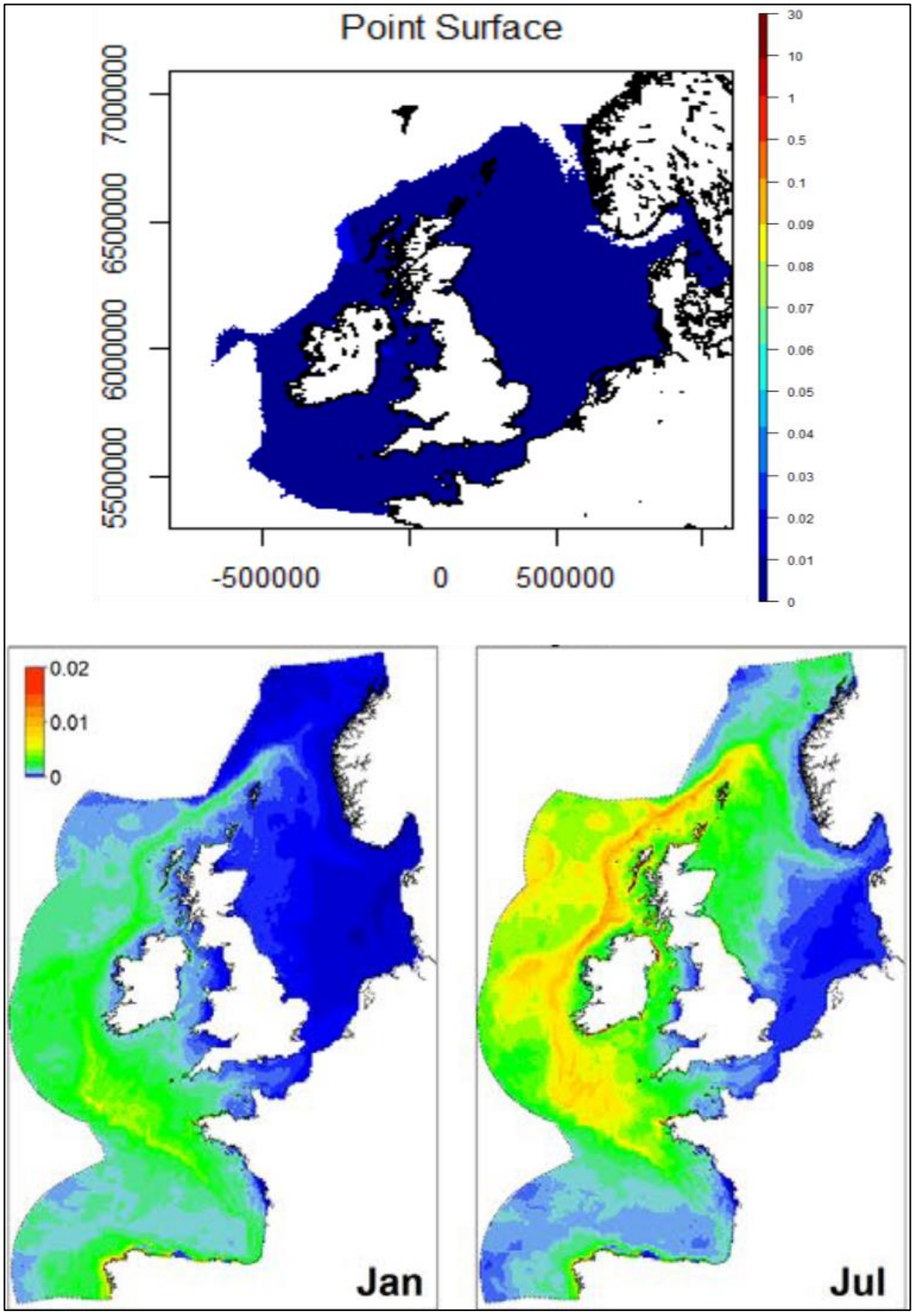


Figure 12.9: Top: predicted Risso's dolphin densities (animals/km^2) for all summers (1994 – 2010) as point estimates of cell densities (Paxton *et al.*, 2016); bottom row: spatial variation in predicted densities of Risso's dolphin (animals/km^2) in January (left) and July (right) in the North-East Atlantic (Waggitt *et al.*, 2020).

Harbour porpoise

12.3.26 Harbour porpoise are resident and abundant year-round in Scottish waters (Hague *et al.*, 2020). The population estimate for the NS MU based on SCANS III data is 346,601 harbour porpoise (95% CI: 289,498 – 419,967, CV: 0.09) (IAMMWG, 2023). The UK portion of this MU has an estimated abundance of 159,632 porpoise (95% CI: 127,442 – 199,954, CV: 0.12) (IAMMWG, 2023). The conservation status of harbour porpoise in UK waters has been updated by the JNCC (2019b) which concludes a favourable assessment of future prospects and range, but an unknown conclusion for population size and habitat. This resulted in an overall assessment of conservation status of 'Unknown' and an overall trend in Conservation status of 'Unknown'. A trend analysis indicates that the harbour porpoise abundance in the North Sea is stable and has not changed since 1994, although the associated CIs are quite wide (JNCC, 2019b, Hammond *et al.*, 2021).

12.3.27 Harbour porpoise were the most abundant marine mammal sighted in the site-specific DAS. They were sighted in seven of the 12 months surveyed throughout the first survey year, resulting in a total of 73 sightings. Monthly density estimates and spatial distribution patterns for harbour porpoise will be derived from the site-specific DAS and provided within the baseline characterisation report submitted in support of the EIA.

12.3.28 The Array Area and Offshore ECC Study Area are in SCANS-III Block S where there was an estimated density of 0.152 harbour porpoise/km^2 in July 2016 (Hammond *et al.*, 2021), and 0.2813 harbour porpoise/km^2 in July 2022 in SCANS IV block CS-K (Gilles *et al.*, 2023)..

12.3.29 **Figure 12.10** provides a visual representation of the density estimates of harbour porpoise for the UK based on the SCANS-III data (Lacey *et al.*, 2022), the Paxton *et al.* (2016) Revised Phase III Data report, and the Waggitt *et al.* (2020) paper.

12.3.30 In the Moray Firth specifically, C-POD deployments (hydrophones that passively monitor acoustics in the water) have been used to assess the spatio-temporal variation in occurrence and foraging activity in harbour porpoise (Williamson *et al.*, 2022). Results demonstrated that porpoise detections were highest (detections made across 23 hrs/day) in the outer Moray Firth (along the Smith Bank) between July and September, but detections decreased in October (10 – 12 hrs/day). In the central Moray Firth, detection rates were lower (8 - 12 hrs/day) and in the inner Moray Firth detections were lower still (1 – 5 hrs/day) (see **Figure 12.11**) (Williamson *et al.*, 2022). Harbour porpoises were detected most frequently (in 41% of surveyed hours) in offshore areas that had the lowest dolphin density (Williamson *et al.*, 2022).

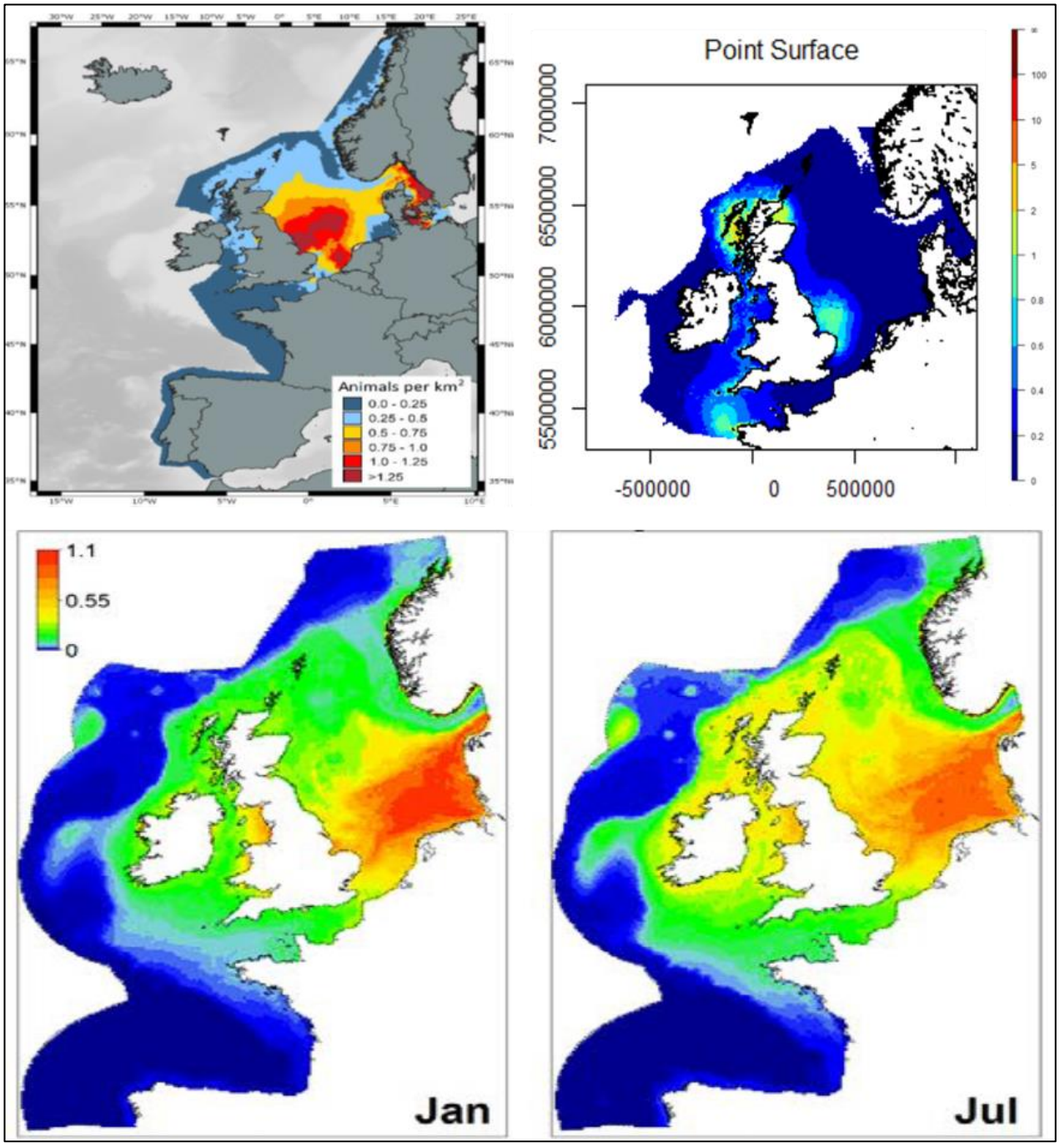


Figure 12.10: Top left: predicted surface for harbour porpoise in SCANS-III (2016) (Lacey *et al.*, 2022); top right: predicted harbour porpoise densities (animals/km^2) for summer 2008 – 2010 as point estimates of cell densities (Paxton *et al.*, 2016); bottom row: spatial variation in predicted densities of harbour porpoise (animals/km^2) in January (left) and July (right) in the North-East Atlantic (Waggitt *et al.*, 2020).

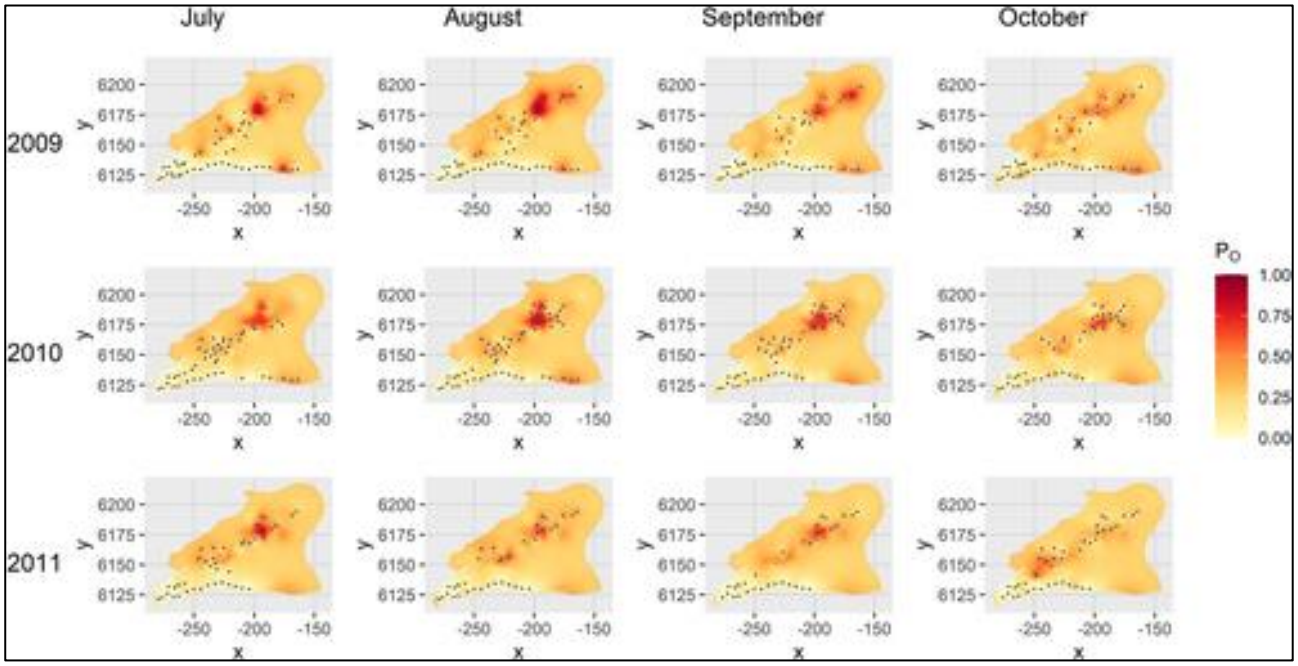


Figure 12.11: Figure taken from Williamson *et al.* (2022), demonstrating the probability of porpoise occurrence in July–October 2009–2011. All figures are scaled from 0 to 1, indicating low to high probability. Blue points represent the locations of C-PODs deployed in that month.

Pinnipeds

Harbour seal

12.3.31 The Proposed Offshore Development is located within two different seal MUs. The Array Area is located in the North Coast and Orkney SMU, while the majority of the Offshore ECC Study Area is located within the Moray Firth SMU. Therefore, both MUs are relevant here. While a small proportion of the Offshore ECC Study Area is located within the East Scotland SMU, the vast majority of harbour seals associated with this SMU are restricted to waters further south in the Tay and Forth region; it is therefore considered more precautionary to assess the Proposed Offshore Development against only the North Coast and Orkney and Moray Firth SMUs combined.

12.3.32 The overall Conservation Status of harbour seals in UK waters has been assessed as 'Unfavourable – Inadequate' with an unknown overall trend in Conservation Status (JNCC, 2013). The Moray Firth SMU August haul-out count in 2021 was 32% lower than the 2019 count (SCOS, 2023). The East Scotland MU August haul-out count in 2021 was 24% lower than the 2016 count (SCOS, 2023). For the North Coast and Orkney SMU, harbour seal counts have seen an overall decrease of approximately 8.6% pa and the latest counts are currently approximately 85% lower than in 1997 (SCOS, 2023).

12.3.33 For harbour seals, many breeding sites, which are monitored for pup production, are designated as SACs. The closest of these SACs to the Array Area and Offshore ECC Study Area and designated for harbour seals are the Sanday SAC and the Dornoch Firth and Morrich More SAC.

12.3.34 Seal tracking studies have indicated that harbour seal typically forage within 30-50 km from the coastline (Jones *et al.*, 2015), although longer travel distances do occur (e.g. Carter *et al.* (2020) gives a maximum recorded distance from a haul-out as 273 km). The closest harbour seal haul-out site to

the Array Area and Offshore ECC Study Area is Gills Bay, located ~ 48 km north-north-west of the Array Area.

12.3.35 Harbour seals were sighted once during the first year of site-specific DAS, in May 2022. As the most robust density estimates available for seals are presented in Carter *et al.* (2022), habitat-based predictions of at-sea distribution for harbour seals based on these papers shall be provided within the baseline characterisation report rather than be derived from site-specific DAS.

12.3.36 **Figure 12.12** provides a visual representation of the average density estimates of harbour seals (derived from Carter *et al.* (2020)) and SMRU harbour seal counts on land for 2019 (North Coast & Orkney) and 2021 (Moray Firth). Each source of data covers the Moray Firth and Orkney and North Coast SMUs.

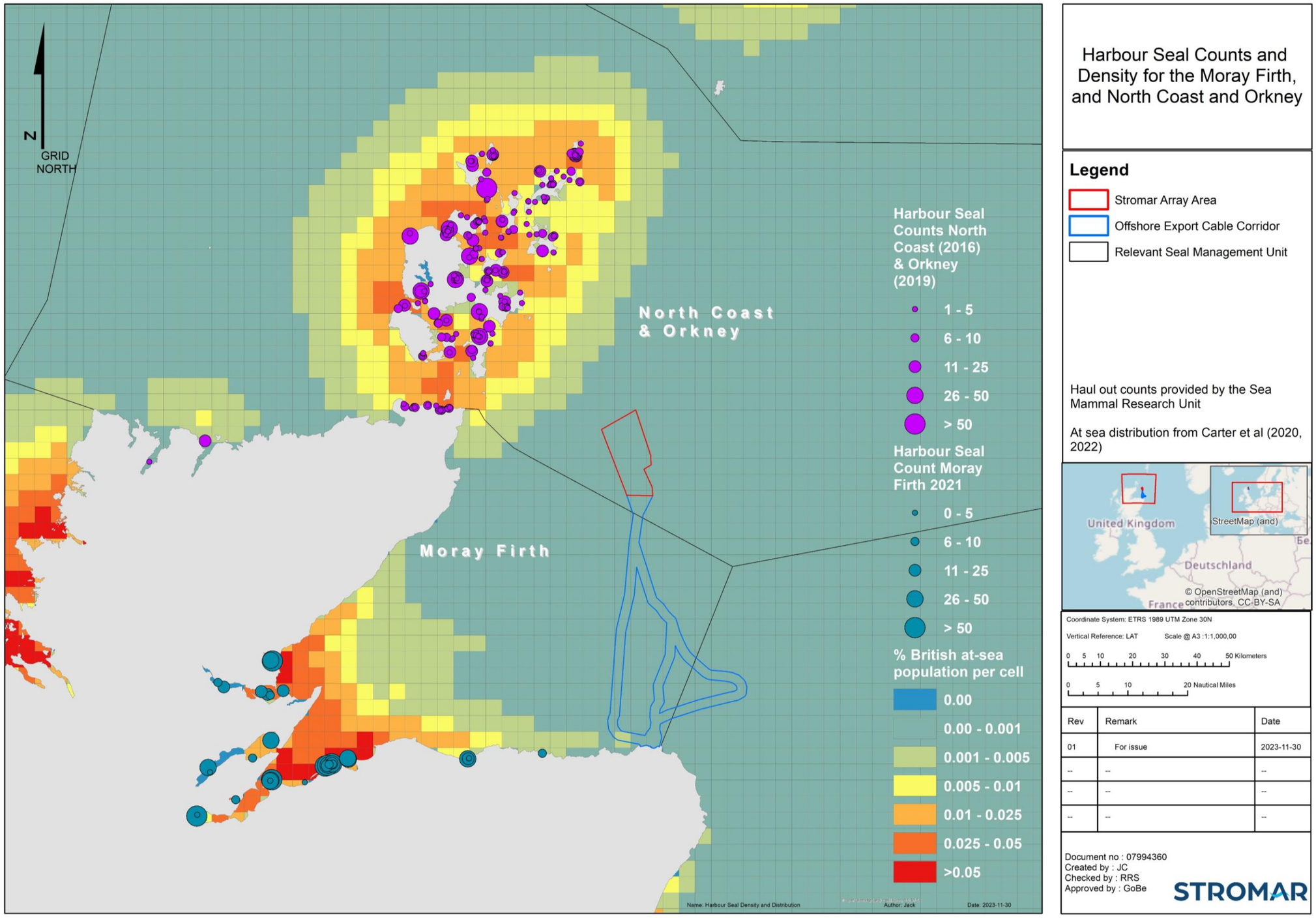


Figure 12.12: Harbour seal % of British Isles at-sea population per 25 km^2 grid cell (Carter *et al.*, 2020, Carter *et al.*, 2022) alongside harbour seal haul-out counts for the Moray Firth (2021) and North Coast (2016) and Orkney (2019) SMUs (SMRU, 2021).

Grey seal

12.3.37 The Proposed Offshore Development is located within two different seal MUs. The Array Area is located in the North Coast and Orkney SMU, while the majority Offshore ECC Study Area is located within the Moray Firth SMU. Therefore, both MUs are relevant here. However, due to the proximity of the Offshore ECC Study Area in relation to the East Scotland SMU, and the fact that tracking of individual grey seals as grey seals have wide ranging behaviours (i.e., most foraging probably occurs within 100 km of a haul-out site although they can feed up to several hundred km offshore (SCOS, 2022, 2023)), the most relevant reference population for grey seals is the combined Moray Firth, East Scotland, and North Coast and Orkney SMUs.

12.3.38 The overall assessment of conservation status of grey seals in UK waters has been assessed as 'Favourable' with an overall improving trend in conservation status and population modelling for regularly monitored grey seal breeding colonies across the UK show an increasing trend of <1.4% per annum (SCOS, 2022, 2023).

12.3.39 For grey seals in Scotland, many breeding sites which are monitored for pup production, are designated as SACs. The closest of these SACs to the Proposed Offshore Development designated for grey seals are the Faray and Holm of Faray SAC, the Berwickshire and North Northumberland Coast SAC, and the Isle of May SAC.

12.3.40 Grey seals forage in the open sea and return regularly to haul-out on land where they rest, moult and breed, they may range widely to forage. Carter *et al.* (2020) gives a maximum recorded distance from a haul-out as 448 km. Movements of grey seals between haul-out sites in the North Sea and haul-out sites in the Outer Hebrides have been recorded as well as movements from sites in Wales and northwest France, to the Inner Hebrides. The closest grey seal haul-out site to the Array Area and Offshore ECC Study Area is the Pentland Skerries, located ~ 36 km northwest of the Array Area.

12.3.41 Grey seals were sighted once during the first year of site-specific DAS, in April 2022. As the most robust density estimates available for seals are presented in Carter *et al.* (2022), habitat-based predictions of at-sea distribution for grey seals based on these papers shall be provided within the baseline characterisation report rather than be derived from site-specific DAS.

12.3.42 **Figure 12.13** provides a visual representation of the average density estimates of grey seals (derived from Carter *et al.* (2020)) and SMRU grey seal counts on land for 2019 (North Coast & Orkney) and 2021 (Moray Firth). Each source of data covers the East Scotland, Moray Firth, and Orkney and North Coast SMUs.

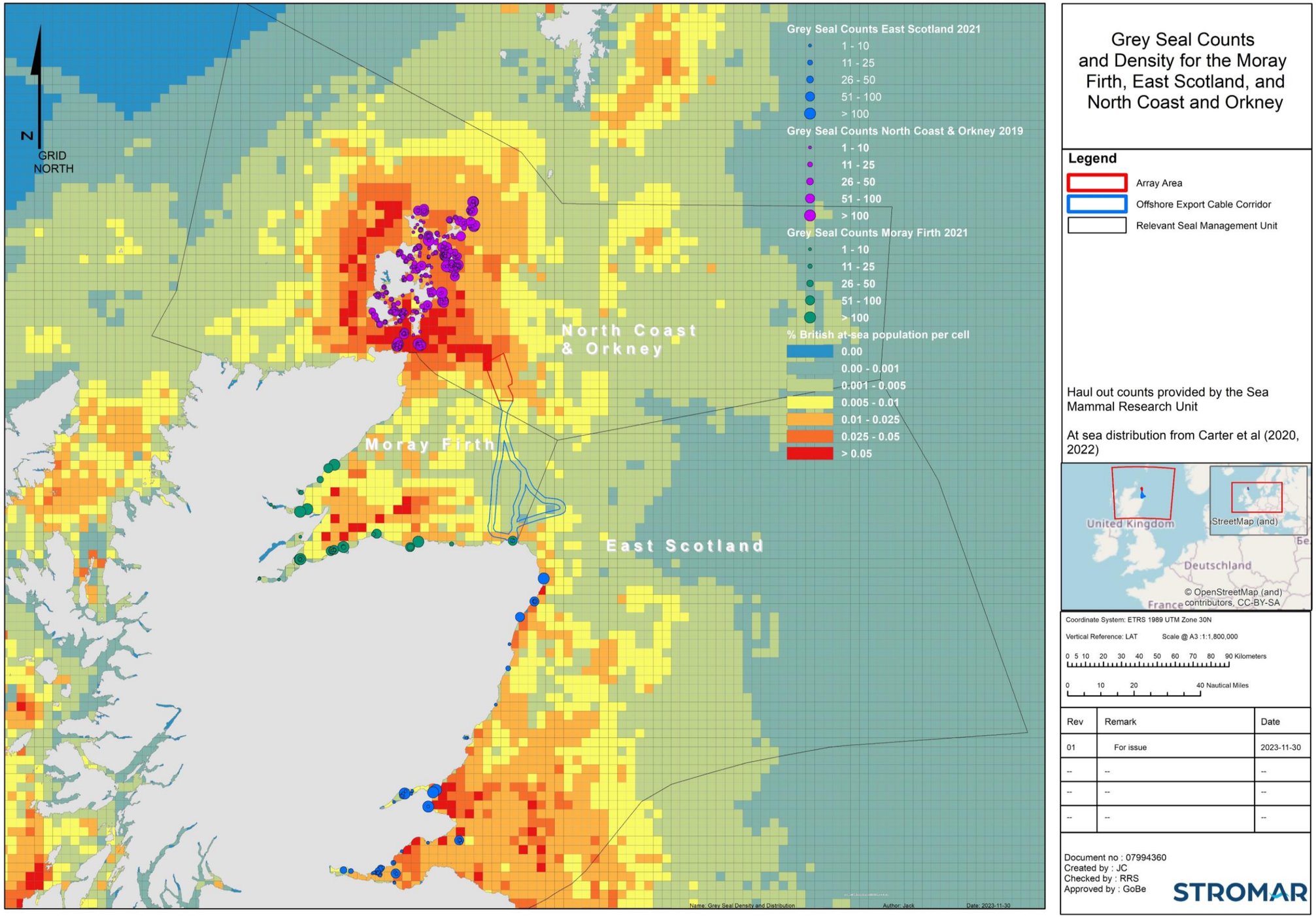


Figure 12.13: Grey seal % of British Isles at sea population per 25 km^2 grid cell (Carter *et al.*, 2020, Carter *et al.*, 2022) alongside grey seal haul-out counts for the North Coast and Orkney, Moray Firth, and East Scotland SMUs for 2019 and 2021 respectively (SMRU, 2021).

Designated Sites

12.3.43 A HRA Screening Report has been completed for the Proposed Offshore Development and includes details of the sites (specifically SACs) designated for the protection of marine mammal receptors (Ørsted, 2023b). The HRA identifies which designated sites are Screened In to the proposed HRA for marine mammal species. However, as the HRA only considers Special Protected Areas (SPAs) and SACs, other marine mammal designations such as MPAs will be considered in the EIA. As such, this section outlines all marine mammal designations within the assessment MUs for each marine mammal species. These are listed in

12.3.44 **Table** 12.2 and shown in **Figure 12.14**.

Table 12.2: List of designated sites with relevance to the marine mammal MUs included in the Scoping chapter document, and the Stromar Array Area and Offshore ECC Study Area.

Species	Designated Site	Site Description and Summary
Minke whale	Southern Trench NCMPA	The Offshore ECC Study Area will overlap with the NCMPA. The NCMPA lies approximately 57 km south of the Array Area.
Bottlenose dolphin	Moray Firth SAC	Approximately 92.7 km southwest of the Array Area and 59.4 km from the Offshore ECC Study Area (by sea). Site supports the only known resident bottlenose dolphin population in the North Sea.
Harbour porpoise	Southern North Sea SAC	Approximately 365.5 km southeast of the Array Area and 298.5 km from the Offshore ECC Study Area (by sea). The SAC lies along the east coast of England, predominantly in the offshore waters of the central and southern North Sea, from north of Dogger Bank to the Straits of Dover in the south. It covers an area of 36,951 km^2, designated for the protection of harbour porpoise
Harbour seal	Sanday SAC	Approximately 67.6 km north-northwest of the Array Area and 92.4 km from the Offshore ECC Study Area (by sea). Sanday is situated in the north-east of the Orkney archipelago and at the time of designation, supported the largest group of harbour at any discrete site in Scotland. The breeding groups, found on intertidal haul-out sites that are unevenly distributed around the Sanday coast, represent over 4% of the UK population.
	Dornoch Firth and Morrich More SAC	Approximately 120.5 km southwest of the Array Area and 98.6 km from the Offshore ECC Study Area (by sea). Site initially designated for species as numbers represented almost 2% of the UK population – counts now in decline but could be attributed to redistribution of individuals.
Grey seal	Faray and Holm of Faray SAC	Approximately 75.8 km northwest of the of the Array Area and 97.8 km from the Offshore ECC Study Area (by sea). These two uninhabited islands in the northern part of Orkney support a well-established grey seal breeding colony.
	Berwickshire and North Northumberland Coast SAC	Approximately 276 km south of the Array Area and 203 km from the Offshore ECC Study Area (by sea). It is the most south-easterly site selected for this species in Scotland and supports a well-established breeding colony.
	Isle of May SAC	Approximately 255 km south of the Array Area and 185.5 km from the Offshore ECC Study Area (by sea).

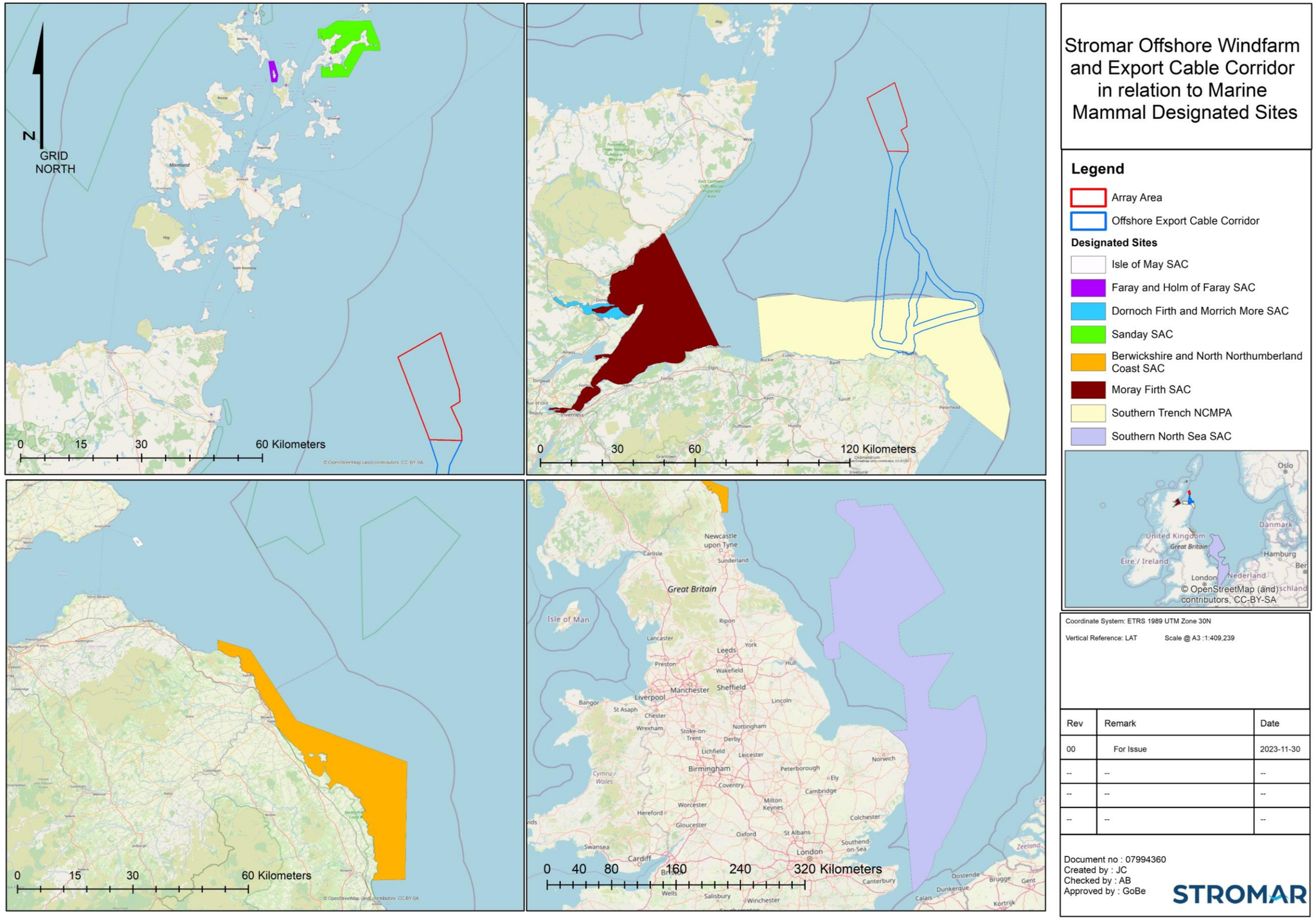


Figure 12.14: Marine mammal designated sites.

12.4 Summary of Scoped-In Receptors

12.4.1 The key marine mammal receptors within the marine mammal study area are identified as:

- Minke whale;
- Bottlenose dolphin;
- Short-beaked common dolphin;
- White-beaked dolphin;
- Risso's dolphin;
- Harbour porpoise;
- Grey seal; and
- Harbour seal.

12.5 Embedded Commitments

12.5.1 The Proposed Offshore Development has adopted various primary commitments (primary design principles intrinsically part of the Project design, installation techniques and engineering designs/modifications) as part of the pre-application phase to eliminate and/or reduce LSE arising from a number of impacts (as far as possible). These are outlined in **Appendix A: Offshore Commitments Register**. Further commitments (imposed as a result of legislative requirements and/or standard sectoral practice, regardless of EIA assessment), referred to as tertiary commitments are embedded as an inherent aspect of the EIA process. Secondary commitments (which require further activity to achieve anticipated outcome- often secured through planning conditions and/or management plans) are incorporated to reduce LSE to environmentally acceptable levels following initial assessment, i.e., so that residual effects are reduced to environmentally acceptable levels.

12.5.2 The commitments adopted by the project in relation to marine mammals are presented in **Table 12.3**. The full list of commitments can be found in **Appendix A: Offshore Commitments Register**.

Table 12.3: The Proposed Commitments Relevant to Marine Mammal Receptors.

Commitment Code	Commitment Measure
C-OFF-08	A CMS will be developed, which will detail the proposed construction methods and roles and responsibilities of parties involved.
C-OFF-09	Development of, and adherence to a CaP. The CaP will confirm planned cable routing, burial and any additional protection and will set out methods for post-installation cable monitoring as secured by Section 36 and Marine Licence consent conditions. The CaP is likely to be supported by a CBRA, which will outline how external cable protection shall be used and/or minimised, should cable burial be achieved.
C-OFF-12	Development of a PEMP, which will set out environmental monitoring in pre-, during, and post-construction phases.
C-OFF-13	A PEMP will be developed, to include a Marine Pollution Contingency Plan and INNS Management Plan. This PEMP will also include information on chemical usage, dropped objects, and waste management.

Commitment Code	Commitment Measure
C-OFF-16	A PS will be developed and followed, detailing the methods of pile installation and associated noise levels. It will include any mitigation measures to be put in place during piling to manage the effects of underwater noise on sensitive receptors.
C-OFF-17	CBRA surveys will be undertaken. Where sufficient burial is not achievable, suitable implementation and monitoring or cable protection will be developed.
C-OFF-21	A Marine Mammal Monitoring Plan (MMMP) will be developed, which will be specific to piling, geophysical surveys, UXO and decommissioning. The mitigation measures within the MMMP will be informed by the following (and updates to explosives, piling and geophysical survey guidance anticipated over the next 12 months): - JNCC (2010b): Statutory nature conservation agency protocol for minimising the risk of injury to marine mammals from piling noise; - JNCC (2010a): JNCC guidelines for minimising the risk of injury to marine mammals from using explosives; - UK Government Policy paper: Marine environment: unexploded ordnance clearance joint interim position statement (2021, updated 2022) - The design principles of the Project and secured under Section 36 and/or Marine Licence consent conditions; and - JNCC (2017): JNCC guidelines for minimising the risk of injury to marine mammals from geophysical surveys.
C-OFF-42	A VMP will be developed, which will detail the types and numbers of vessels involved in the Project work.
C-OFF-63	Development of and adherence to a DP, secured under Section 36 and/or Marine Licence consent conditions.

12.5.3 In addition to those measures stated in **Table 12.3**, it is noted that primary and secondary entanglement of marine mammals in WTG mooring lines may be a potential issue during the O&M phase. It is anticipated that primary entanglement shall largely be addressed through project design and secondary entanglement through operational measures; however, if additional commitments are assessed as necessary, this will be developed through discussions with statutory consultees and relevant stakeholders and the **Appendix A: Offshore Commitments Register** updated accordingly.

12.5.4 As a result of the commitment to implement these measures, and to align with various standard sectoral practices and procedures, the embedded (primary) commitments are considered inherently part of the design of the Proposed Offshore Development and have, therefore, been included in the assessment presented in **Section 12.6**.

12.5.5 The requirement and feasibility of any additional commitments will be dependent on the significance of the effects upon marine mammals and will be consulted upon with statutory consultees throughout the EIA process.

12.6 Scoping of Impacts

12.6.1 Potential impact pathways relevant to marine mammals which may occur during the construction, O&M, or decommissioning phases of the Proposed Offshore Development have been identified in **Table 12.4**.

Table 12.4: Scoping Assessment for Marine Mammals.

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
Construction & Decommissioning				
Noise-related impacts associated with construction and decommissioning activities resulting in permanent auditory injury (i.e., permanent threshold shifts (PTS)).	C-OFF-21	Scoped In	Underwater noise associated with anchor piling, cofferdam piling, UXO clearance, pre-construction geophysical surveys, other construction related activities (cable laying, dredging, trenching etc) and decommissioning activities all have the potential to cause permanent auditory injury. The impacts of underwater noise on marine mammals therefore require further consideration. This will also allow the embedded commitments, specifically the MMMP, to be appropriately informed and developed proportionate to the risks of underwater noise to marine mammal as a result of the construction and decommissioning of the Proposed Offshore Development. Within the Offshore ECC Study Area, specific consideration will be given to impacts on coastal species such as bottlenose dolphin, and to the Southern Trench NCMPA designated for minke whale.	LSE without secondary commitment measures
Noise-related impacts associated with construction and decommissioning activities resulting in temporary auditory injury (i.e., temporary threshold shifts (TTS)).	C-OFF-21	Scoped Out	The ranges at which TTS onset occurs do not allow assessment of the magnitude or significance of the likely consequences for individuals and ultimately populations of the predicted extent over which any TTS might occur. Therefore, TTS cannot adequately be assessed using the current TTS onset thresholds. Current TTS onset thresholds are inappropriate to determine a biologically significant level of TTS. Note: TTS will only be used as a proxy for disturbance in the UXO assessment due to the absence of disturbance thresholds for UXO clearance activities. All relevant commitment measures are presented in **Appendix A: Offshore Commitments Register**.	No LSE identified at Scoping.
Noise-related impacts associated with construction and decommissioning activities resulting in disturbance and/or displacement of individuals (including barrier effects).	C-OFF-21	Scoped In	Underwater noise associated with anchor piling, cofferdam piling, UXO clearance, pre-construction geophysical surveys, other construction related activities (cable laying, dredging, trenching etc) and decommissioning activities all have the potential to have an impact on the behaviour, habitat use and distribution of marine mammals either at individual or population level. The impacts of underwater noise on marine mammals therefore require further consideration. Within the Offshore ECC Study Area, specific consideration will be given to impacts on coastal species such as	LSE without secondary commitment measures

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
			bottlenose dolphin, and to the Southern Trench NCMPA designated for minke whale.	
Indirect impacts associated with construction and decommissioning resulting in marine mammal prey item disturbance and/or displacement.	Listed in **Chapter 10: Fish and Shellfish Ecology**.	Scoped In	Changes in prey abundance and distribution resulting from construction and decommissioning activities may impact on the ability of marine mammals to forage in the area. These impacts can arise from underwater noise emissions (i.e., during pile driving, UXO clearance, geophysical surveys etc) which cause disturbance to fish populations (as prey species of marine mammals). The scale of the impact to marine mammals will be informed by the assessment presented in **Chapter 10: Fish and Shellfish Ecology**.	LSE without secondary commitment measures
Collision risk impacts associated with increased vessel traffic in the Proposed Offshore Development during construction and decommissioning.	C-OFF-42	Scoped Out	It is not expected that increased localised vessel traffic associated with the Proposed Offshore Development will increase the risk of collision to marine mammals. Vessel movements will be managed in a way such that no significant impact is expected to marine mammals, including: • Vessel activities will fall under standard transit speeds as outlined within the VMP; • Vessels will follow prescribed routes (non-random movement) as outlined within the VMP; and • Vessels shall also act in accordance with the guidelines set out within The Scottish Marine Wildlife Watching Code (SNH, 2017), to minimise collision risks with marine mammals. All relevant commitment measures are presented in **Appendix A: Offshore Commitments Register**.	No LSE identified at Scoping.
Disturbance impacts associated with increased vessel traffic in the Array Area and ECC during construction and decommissioning.	C-OFF-42	Scoped In	Relatively high levels of vessel traffic (passenger, cargo, and other vessel activities) within the area form part of the existing baseline. Increased vessel traffic during construction and decommissioning may increase the risk of disturbance to marine mammals. Within the Offshore ECC Study Area, specific consideration will be given to impacts on coastal species such as bottlenose dolphin, the Southern Trench NCMPA designated for minke whale, and seal haul-out sites.	LSE without secondary commitment measures
Changes in water quality relating to various	C-OFF-13	Scoped Out	Activities relating to the construction and decommissioning of the Proposed Offshore Development may influence water quality as a result of sediment	No LSE identified at Scoping.

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
construction activities such as vessel movements and cable laying/trenching and any decommissioning activities.	C-OFF-13 C-OFF-09 C-OFF-17 Other embedded commitments are listed in **Chapter 8: Marine Water and Sediment Quality.**		disturbance and the accidental release of fuels, oils and/or hydraulic fluids. These impacts are expected to be localised and short-lived. With regards to the accidental release of fuels, oils and/or hydraulic fluids, the impact of pollution is associated with the construction of infrastructure and use of supply/service vessels may lead to direct mortality of marine mammals or a reduction in prey availability either of which may affect species' survival rates. However, with implementation of an appropriate PEMP and MPCP, a major incident that may impact any species at a population level is considered very unlikely. When considering sediment disturbance, marine mammals often migrate through waters where conditions are turbid for extended periods without significant impacts to species biology or behaviour. Evidence that turbidity affects cetaceans directly is not evident in the literature (Todd *et al.*, 2015) and pinnipeds often live in dark and turbid waters, where their mystacial vibrissae, or whiskers, play an important role in orientation, discriminating objects by direct touch, or to analyse water movements (Hanke *et al.*, 2010). Any impact on sediment suspension is therefore predicted to be of local spatial extent, short-term duration, intermittent frequency and reversible, within the context of regional and localised marine mammal populations and therefore not significant in terms of the EIA. All relevant commitment measures are presented in **Appendix A: Offshore Commitments Register**.	
Disturbance to designated seal haul-out sites	C-OFF-09 C-OFF-13 C-OFF-17 C-OFF-21 C-OFF-42	Scoped Out	Activities associated with cable trenching and laying, and vessel movements all have the potential to cause disturbance to seals at their haul-out sites. As the closest seal haul-out sites to the Array Area are the Pentland Skerries (~ 36 km away) and Duncansby Head (~ 43 km away) for grey seals, and the Offshore ECC Study Area is ~ 55km east of the closest seal haul-out sites Findhorn (for both grey and harbour seals) and Gills Bay (~48 km) for harbour seals, it is unlikely that these haul-out sites may experience disturbance from the activities associated with laying the cable and the landfall activities, and from the vessels involved in these activities. As such there is expected to be no significant impact to marine mammals. All relevant commitment measures are presented in **Appendix A: Offshore Commitments Register**.	No LSE identified at Scoping.

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
Operations & Maintenance				
Noise related impacts associated with the O&M of floating WTGs.	None.	Scoped In	Existing evidence suggests that operational noise associated with fixed-bottom offshore wind farms is likely to be considerably less than that of construction noise. In addition, reviews have concluded that operational, fixed-bottom wind farm noise will have negligible effects on marine mammals. However, due to the early stage of floating offshore wind technology and limited existing underwater noise monitoring data from operational floating wind farms, it is difficult to ascertain the potential impact from the operational underwater noise of a floating wind farm. As such, this impact has been Scoped In. In addition, it is noted that NatureScot's representation towards a recent Scoping Opinion for a floating OWF is that operational noise of floating OWFs should be assessed (Marine Scotland, 2023b).	LSE without secondary commitment measures
Indirect impacts associated with the O&M of floating WTGs resulting in marine mammal prey item disturbance and/or displacement.	Listed in **Chapter 10: Fish and Shellfish Ecology**.	Scoped In	Existing evidence suggests that operational noise of fixed-bottom WTGs is not likely to generate significant levels of noise that would result in disturbance of migratory or sensitive fish species (as prey species of marine mammals). However, due to the early stage of floating offshore wind technology and limited existing monitoring data of noise from operational floating wind farms, it is difficult to ascertain the potential impact of an operational floating wind farm noise. As such, this impact has been Scoped In.	LSE without secondary commitment measures
Risk of injury or death resulting from entanglement of marine mammals within mooring lines or cables of WTGs, and the secondary interactions with derelict fishing gears wrapped around WTG mooring lines.	Established within the design principles of the development.	Primary Entanglement – Scoped In Secondary Entanglement - Scoped In	The effects of marine renewable energy mooring devices on marine mammals are poorly understood. It is predicted that the introduction of dynamic lines or cables introduces a potential entanglement risk (Benjamins *et al.*, 2014) and could increase the risk of derelict fishing gear items (secondary entanglement) from being entangled within mooring systems; however, the likelihood and severity of such an impact occurring is currently unknown. It is noted that, in recent consultation feedback on other relevant OWF projects, Marine Scotland Science have requested that the potential for entanglement in debris caught up in mooring lines be included in any EIA Report (Marine Scotland, 2021a, 2023b). As such, further consideration needs to be given to the risk of injury or death resulting from entanglement	Primary Entanglement: Possible LSE without secondary commitment measures, however, it may become clear post-Scoping stage that the impact does not require detailed assessment in the EIAR. Secondary Entanglement: LSE without secondary commitment measures

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
			of marine mammals within attached derelict gear and as such, this impact has been Scoped In. With regards to primary entanglement, this relates to the possibility that marine mammals could be directly entangled within the OWF floating structure mooring lines themselves. However, this shall be dependent upon the engineering design of the floating structures (i.e., the probability that the mooring line tension is such that loops could be created within the systems which would increase the risk of marine mammal entanglement). In line with the Proportionate EIA approach, this impact pathway is provisionally Scoped In as a Possible LSE at Scoping. Prior to the EIAR, discussions will be had with the engineers to determine whether the mooring line and array cable dimensions, configurations and loads could enable loops to be created to clarify whether primary entanglement impacts can be disregarded. Should the engineers confirm that the mooring line and cable design is such that direct marine mammal entanglement cannot occur, a technical note will be drafted and shared with Consultees, with the intention of gaining agreement to Scope Out this impact from the EIAR.	
Risk of injury resulting from collision of marine mammals with WTG structures.	None.	Scoped In	Although spar, semi-submersible/barge and tension leg platform WTG structures are being proposed, the floating substructure is still to be defined. Designs with the greatest total submerged volumes (such as semi-submersible) are more likely to generate a collision risk with marine mammals. Collision risk with floating structures is poorly understood and further consideration of the potential risks is recommended. It is also noted that, in recent consultation feedback on other relevant OWF projects, NatureScot and Marine (Scotland) Directorate have expressed that that impacts related to the risk of marine mammal collisions with WTG structures be Scoped In to any EIA report (Marine Scotland, 2021b,)	LSE without secondary commitment measures
Disturbance related impacts associated with increased vessel traffic in the Array Area and ECC during O&M.	C-OFF-08	Scoped In	Relatively high levels of vessel traffic (passenger, cargo, and other vessel activities) within the area form part of the existing baseline. Increased vessel traffic during operations and maintenance may increase the risk of disturbance to marine mammals. Within the Offshore ECC Study Area, specific consideration will be given to impacts on coastal species such as bottlenose dolphin, the Southern Trench NCMPA designated for minke whale, and seal haul-out sites.	LSE without secondary commitment measures

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
Collision risk related impacts associated with increased vessel traffic in the Array Area and ECC during O&M.	C-OFF-08	Scoped Out	The small number of vessels required for O&M activities is unlikely to generate an increase in collision risk against the existing baseline of shipping activity. The development and implementation of a VMP shall help minimise risks of marine mammal-vessel collisions to negligible levels. All relevant commitment measures are presented in **Appendix A: Offshore Commitments Register**.	No LSE identified at Scoping.
Changes in water quality relating to accidental release of pollutants.	C-OFF-13	Scoped Out	The accidental release of pollutants is limited to oils and fluids contained within the WTGs and vessels. The potential for full inventory release from a turbine is considered extremely remote and would occur as a slow release, which would be almost undetectable and immediately dispersed, limiting the potential interactions between pollutants and marine mammals. For these reasons, localised, temporary changes to water quality will not have a significant impact on marine mammals. All relevant commitment measures are presented in **Appendix A: Offshore Commitments Register**.	No LSE identified at Scoping.
Impacts on marine mammals from electromagnetic fields (EMF) due to presence of subsea cabling.	None.	Scoped Out	EMFs are emitted along the lengths of subsea cables. Existing evidence suggests that the levels of EMFs emitted by offshore renewable energy export cables are at a level low enough that there is no potential for direct significant impacts on marine mammals (Copping and Hemery, 2020). Given that marine mammals are known to closely associate with offshore wind farm structures (Scheidat *et al.*, 2011, Russell *et al.*, 2014), it is predicted that the magnitude and vulnerability score for this impact would be negligible. All relevant commitment measures are presented in **Appendix A: Offshore Commitments Register**.	No LSE identified at Scoping.
Impacts on marine mammal prey items from EMF due to presence of subsea cabling.	Listed in **Chapter 10: Fish and Shellfish Ecology**.	Scoped In	Potential EMF impacts on prey species may impact foraging success for marine mammals. The scale of the indirect impact to marine mammals will be informed by the assessment presented in **Chapter 10: Fish and Shellfish Ecology**.	LSE without secondary commitment measures
Long term habitat changes, displacement and/or barrier effects due to presence of WTGs within the Array Area.	None.	Scoped In	The introduction of new infrastructure into the marine environment can potentially result in displacement or exclusion from habitats. This impact will require further consideration as this impact pathway is poorly understood for offshore floating renewable energy developments. In addition, changes	LSE without secondary commitment measures

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
This includes the potential for changes in future foraging opportunities.			in prey abundance and distribution may occur due to offshore wind farm infrastructure. Marine Scotland Science have also previously agreed with the need to assess the potential operational impacts of floating offshore wind farm barrier effects (Marine Scotland, 2021b).	

12.7 Potential Cumulative Impacts

12.7.1 The process by which potential cumulative impacts will be assessed through the CIA is described in **Chapter 6: EIA Approach and Methodology**. This also includes examples of the projects which are likely to be included in that assessment. For marine mammals, cumulative interactions may occur with other planned OWFs, as well as other offshore activities in the study area.

12.7.2 The most significant cumulative impact on marine mammal species is likely to be UWN associated with construction activities. For marine mammals the approach to CIA will be holistic and combine all potential sources of UWN including UXO clearance and pile driving at other OWFs together with disturbance from vessels, seismic surveys and any other marine construction developments that are planned within the relevant MUs for each species.

12.7.3 For each relevant project, an assessment will be made of the number of animals which may be impacted on any one day, based on reported levels of impacts in published EIAs where available and, where not, on various assumptions relating to impact footprints and animal densities. For each year, the maximum number animals impacted on any one day (assuming concurrent activity) will be presented as a proportion of the relevant MU.

12.7.4 The CIA for marine mammals will consider the MDS for each of the projects, plans and activities in line with the methodology outlined in **Chapter 6: EIA Approach and Methodology**. The impacts of fishing and shipping will not be considered in the CIA since these activities occurred throughout the baseline and are therefore already accounted for in the existing marine mammal baseline characterisation abundance and density estimates.

12.8 Potential Transboundary Impacts

12.8.1 Potential marine mammal transboundary impacts will be assessed considering the populations and species that are likely to be impacted and their potential linkage to designated sites and protected areas.

12.8.2 Direct impacts may occur due to UWN generated during construction and decommissioning, particularly piling during the installation of foundations. Indirect impacts may cause disturbance to prey (fish) species from loss of fish spawning and nursery habitat and suspended sediments and deposition. The O&M phase is considered less likely to result in significant transboundary impacts.

12.8.3 The probability of transboundary impacts to marine mammals occurring during construction, particularly due to UWN from piling is potentially high. However, with the recent rise in floating wind technologies, the extent cannot be determined at this stage and will be subject to assessment in the EIA.

12.8.4 In producing a HRA report, the risk of transboundary impacts that have the potential to affect the integrity of transboundary European designated sites will be assessed and presented.

12.9 Proposed Approach to EIA

Additional Data Sources

12.9.1 A thorough, desk-based collation and review of the relevant data will be undertaken to inform the subsequent EIA. This will build upon the data sources listed in **Table 12.1** and **Section 12.3**.

12.9.2 Project-specific survey outputs will be used to enhance the understanding of the baseline conditions.

12.9.3 Additional data sources include the following:

- The latest available results from the site-specific digital DAS will be fully processed to obtain sighting numbers, monthly and annual average relative density estimates (where sightings data allow) and absolute density estimates (where availability data allow), along with summary information on effort and environmental conditions encountered during the surveys. Where appropriate, density estimates will be apportioned to account for any species identified to only a species group level. Spatial distribution patterns within the Array Area will also be provided where sightings data allow; and
- An assessment of the most up-to-date and appropriate density estimates to be carried forward to quantitative impact assessment (i.e., SCANS-IV Report, the SCOS Annual Report (both anticipated to be published in 2023) and Paxton *et al.* (in-preparation) 'Analyses relating to the abundance and distribution of selected marine mobile species in Scottish territorial waters', (when these reports are available in the public domain).

Guidance

12.9.4 In addition to the approach and guidance (of general relevance) outlined in **Chapter 6: EIA Approach and Methodology**, the assessment of marine mammal receptors will also comply with the following guidance:

- Institute of Ecology and Environmental Management (IEEM) guidelines for marine and coastal ecological impact assessment in Britain and Ireland (IEEM, 2010, CIEEM, 2019);
- European Union Guidance on wind energy developments and Natura 2000 legislation (European Commission, 2021)
- OSPAR Guidance on Environmental Considerations for Offshore Wind Farm Development (OSPAR, 2008);
- The marine mammal PTS-onset noise exposure criteria recommended in Southall *et al.* (2019);
- Position statement from the Joint Statutory Nature Conservation Bodies in relation to the use of Acoustic Deterrent Devices (ADDs) for marine mammal mitigation during offshore wind farm construction (JNCC, 2016);
- Guidance on mitigation protocols to minimise the risk of injury to marine mammals from piling noise (JNCC, 2010b)
- Scottish Marine Wildlife Watching Code (SNH, 2017);
- JNCC guidelines for minimising the risk of injury to marine mammals from geophysical surveys (seismic survey guidelines) (JNCC, 2017);

- JNCC guidelines for minimising the risk of disturbance and injury to marine mammals whilst using explosives (JNCC, 2010a);
- UK Government Policy paper: Marine environment: unexploded ordnance clearance joint interim position statement (2021, updated 2022);
- Guidance on the Offence of Harassment at Seal Haul-Out Sites (Marine Scotland, 2014); and
- The protection of Marine European Protected Species from injury and disturbance: Guidance for Inshore Waters (July 2020 Version) (Marine Scotland, 2020)

Assessment Methodology

Underwater Noise Modelling

12.9.5 Modelling of UWN across the Proposed Offshore Development will be undertaken for all potential noise sources. This will be used to determine the potential risk of physical injury and disturbance/displacement effects caused by UWN. The assessment for underwater noise shall be quantitative.

12.9.6 For the assessment of pile-driving noise (i.e., pile driven anchors), the INSPIRE UWN model will be used. INSPIRE is a range-dependent, semi-empirical broadband noise propagation model developed by Subacoustech Environmental Limited, which has been updated and refined over ten years using empirical data from hundreds of datasets from field studies. The model considers a wide array of input parameters and has the capability to simultaneously model piling from multiple piling events to enable the assessment of events in combination. Two UWN modelling locations will be selected to be precautionary in terms of the maximum potential impacts to key sensitivities. These methods will be fully described in the UWN technical report as part of the EIA, supported by the UWN modelling and analysis.

12.9.7 The impact assessment of the risk of auditory injury (PTS-onset) to all species as a result of UXO clearance operations will include an assessment for both high-order detonations and low-order detonations, whilst aligning with recent recommendations and position statements on UXO clearance for similar OWF developments in the area[25].

12.9.8 For the assessment of non-impulsive, continuous noise sources (such as vessel noise, dredging, trenching, rock placement etc.) the SPEAR model will be used. SPEAR is a simple geometric spreading model, developed by Subacoustech Environmental Limited, that uses measured source level data to predict auditory injury impact ranges.

12.9.9 Outputs from the noise modelling will be combined with marine mammal density information to quantify the number of marine mammals that are likely to be impacted by the Proposed Offshore Development. The numbers of animals impacted will be presented as proportions of the relevant MUs (entire MU and UK portion).

25 https://www.gov.uk/government/publications/marine-environment-unexploded-ordnance-clearance-joint-interim-position-statement/marine-environment-unexploded-ordnance-clearance-joint-interim-position-statement

Assessment of auditory injury (PTS)

12.9.10 Unless any new guidance is published prior to the impact assessment, the Southall *et al.* (2019) thresholds will be used to assess the risk of auditory injury (PTS). The risk of injury will be based on dual criteria: cumulative Sound Exposure Level (SEL) (SEL_{cum}) and peak Sound Pressure Level (SPL) (SPL_{peak}). To assess the SEL_{cum} criterion, the predictions of received sound level over 24 hours are frequency weighted, to reflect the hearing sensitivity of each functional hearing group. The SEL_{cum} from multiple pulses will be assessed using a fleeing animal model using indicative swim speeds. The SPL_{peak} criterion is for unweighted received sound level. The assessment for auditory injury shall be quantitative.

Assessment of Disturbance – UXO

12.9.11 If required, UXO clearance will be undertaken as part of a separate Marine Licence (and EPS licence) application. At both the Scoping and EIA stage, the number and size of any UXO that may require clearance is unknown. The EIA will present an indicative worst-case scenario for UXO charge size, based on knowledge gained from previous UXO surveys for other developments in the North Sea region. The assessment for disturbance from UXO detonation shall be quantitative.

12.9.12 The current JNCC guidance (JNCC, 2020) is to assume a 26 km Effective Deterrence Range (EDR) from high-order UXO clearance for harbour porpoise when assessing potential disturbance in harbour porpoise SACs. However, this EDR is not based on any empirical evidence of disturbance responses to UXO clearance (instead, extrapolated from evidence for pie-driving) and no EDRs have been proposed for other species of marine mammal (and other megafauna). As such, the modelled extent of TTS-onset threshold noise levels outlined by Southall *et al.* (2019) will be used as a proxy for disturbance. Low-order UXO clearance will also be assessed using TTS-onset thresholds as a proxy for disturbance alongside an EDR of 5 km (as recommended in JNCC (2023)).

Assessment of Disturbance – Piling

12.9.13 The assessment of piling disturbance for pile-driven anchors will be based on the best practice methodology at the time of assessment, making use of the best available scientific evidence. It is likely, based on current practice, that the methodology will incorporate the application of a species-specific dose response approach rather than a fixed behavioural threshold approach, which is a quantitative assessment. The current piling dose-response functions available are for harbour porpoise at the Beatrice OWF (Graham *et al.*, 2017a, Graham *et al.*, 2019), and for harbour seals at the Lincs OWF (Whyte *et al.*, 2020). Where species-specific dose-response functions are not available, the harbour porpoise and harbour seal ones will be used as a proxy for all other cetaceans and seals, respectively. These functions provide estimates of the proportion of individuals disturbed when exposed to different levels of noise (unweighted SEL for single strikes, in 5 dB increments). Noise contours at appropriate intervals will be generated by noise modelling and overlain on species density surfaces to predict the number of animals potentially disturbed. This will allow the quantification of the number of animals that potentially respond. If required, population-level modelling will be conducted using the Interim Population Consequences of Disturbance Model (Interim Population Consequences of Disturbance Model) (Harwood *et al.*, 2014, King *et al.*, 2015, Harwood *et al.*, 2016) to determine if the impact is sufficient to result in changes at the population level.

Assessment of Disturbance from Vessels

12.9.14 Assessments made on the impacts of vessel disturbance will be based on the most up-to-date scientific evidence on the effect of construction, O&M and decommissioning vessels on marine mammals, and shall be a quantitative assessment. For example, an assessment of vessel disturbance on marine mammals will be made drawing on the results of studies of harbour porpoise responses to construction vessel traffic by Benhemma-Le Gall *et al.* (2021) and Benhemma-Le Gall *et al.* (2023).

Assessment of Disturbance from Other Construction Activities and Operations

12.9.15 For other construction and pre-construction activities, an assessment of the risk of disturbance will be based on the best available information on noise levels for each activity, alongside any available evidence of disturbance impacts provided in the literature.

12.9.16 For operational noise, an assessment of the risk of disturbance will be based on the best available information on noise levels from floating WTGs (e.g., Hywind Scotland (Martin *et al.*, 2011, Burns *et al.*, 2022), Kincardine). Consideration will also be given to assessing the acoustic footprint of multiple WTGs within the Array Area.

12.9.17 In the assessment of disturbance from other construction activities and operations, detailed consideration shall be given to areas of uncertainty, the degrees of conservatism in the assessment of noise impacts to marine mammals, and their implications for the assessment.

Other Impacts

12.9.18 The assessment of potential impacts other than UWN (e.g., entanglement, long-term habitats change) will be qualitative and based on the best available evidence of these impact pathways considered alongside the Proposed Offshore Development's design envelope, location and species Scoped In. Assessments will be made based on the most recent literature available at the time, such as Benjamins *et al.* (2014) for entanglement risk.

12.9.19 European sites designated for the conservation of marine mammal features (SACs) will be considered within the HRA or 'Report to Inform Appropriate Assessment (RIAA)' which will be completed alongside the EIAR. As the HRA/RIAA will only include SACs and SPAs, the EIA chapter will provide an assessment of the potential impacts of the development on the minke whale feature of the Southern Trench NCMPA.

12.10 Scoping Questions

12.10.1 The following questions refer to the marine mammal chapter and are designed to inform the Scoping Opinion and focus the Scoping exercise:

1. Do you agree with the study area(s) defined in **Section 12.2** for the analysis of predicted impacts on marine mammals?
2. Do you agree with the use of those data listed in **Table 12.1**, and any additional anticipated data listed in **Section 12.9** being used to inform the Offshore EIA?
3. Are there any additional data sources or guidance documents that should be considered?
4. Do you agree that all receptors related to marine mammals have been identified?

5. Do you agree with the suggested embedded commitments considered and the approach to mitigation identified in relation to marine mammals?
6. Do you agree with the Scoping In and Out of impact pathways in relation to marine mammals?
7. Do you agree on the suitability of the proposed commitments to reduce or eliminate LSE, in particular, the UWN impact assessment, for marine mammals?

13 Commercial Fisheries

13.1 Introduction

13.1.1 This chapter of the Offshore Scoping Report identifies the commercial fisheries receptors of relevance to the Proposed Offshore Development and considers the potential impacts from the construction, O&M and decommissioning of the Proposed Offshore Development on commercial fisheries.

13.1.2 The Proposed Offshore Development has the potential to cause adverse effects on the commercial fisheries receptors. Activity associated with the Proposed Offshore Development and the presence of Proposed Offshore Development infrastructure may lead to reduction in access to established fishing grounds (with potential for subsequent displacement leading to gear conflict and increased pressure on adjacent areas), disturbance to commercially important species, and the physical presence of offshore infrastructure has the potential to result in gear snagging.

13.1.3 Relevant commercial fisheries stakeholders include the SFF, the SWFPA, the NERIFG, and other local fishermen's associations and individual fishermen as identified by the Developer appointed FLO.

13.1.4 For this chapter, 'commercial fishing' is defined as any form of fishing activity legally undertaken where the catch is sold for taxable profit.

13.1.5 This chapter should be read alongside the following other chapters:

- **Chapter 10: Fish and Shellfish Ecology**, which includes consideration of potential impacts on fish species of commercial importance;
- **Chapter 14: Shipping and Navigation**, which includes consideration of potential impacts on vessel routing and navigational safety; and
- **Chapter 18: Socio-economics, Tourism and Recreation**, which includes consideration of potential impacts on recreational sea angling.

13.1.6 This chapter of the Offshore Scoping Report has been prepared by Nima Consultants Ltd.

13.2 Study Area

13.2.1 The Proposed Offshore Development is located within the southern portion of the ICES Division 4a (northern North Sea) and northern portion of ICES Division 4b (central North Sea) statistical areas; within UK EEZ waters. For the purpose of recording commercial fisheries landings, ICES Divisions 4a is divided into statistical rectangles, of which the Project overlaps with 44E7, 44E8, 45E7, 45E8 and 46E7. For the purposes of this Offshore Scoping Report, the local commercial fisheries study area comprises these five ICES rectangles.

13.2.2 While the local study area illustrated in **Figure 13.1** focuses on the Proposed Offshore Development overlap with ICES rectangles, a wider regional area will be considered for potential fisheries displacement impacts within the EIAR. It is proposed that the regional study area will also include those 13 ICES rectangles immediately adjacent to the local study area as shown in **Figure 13.1**.

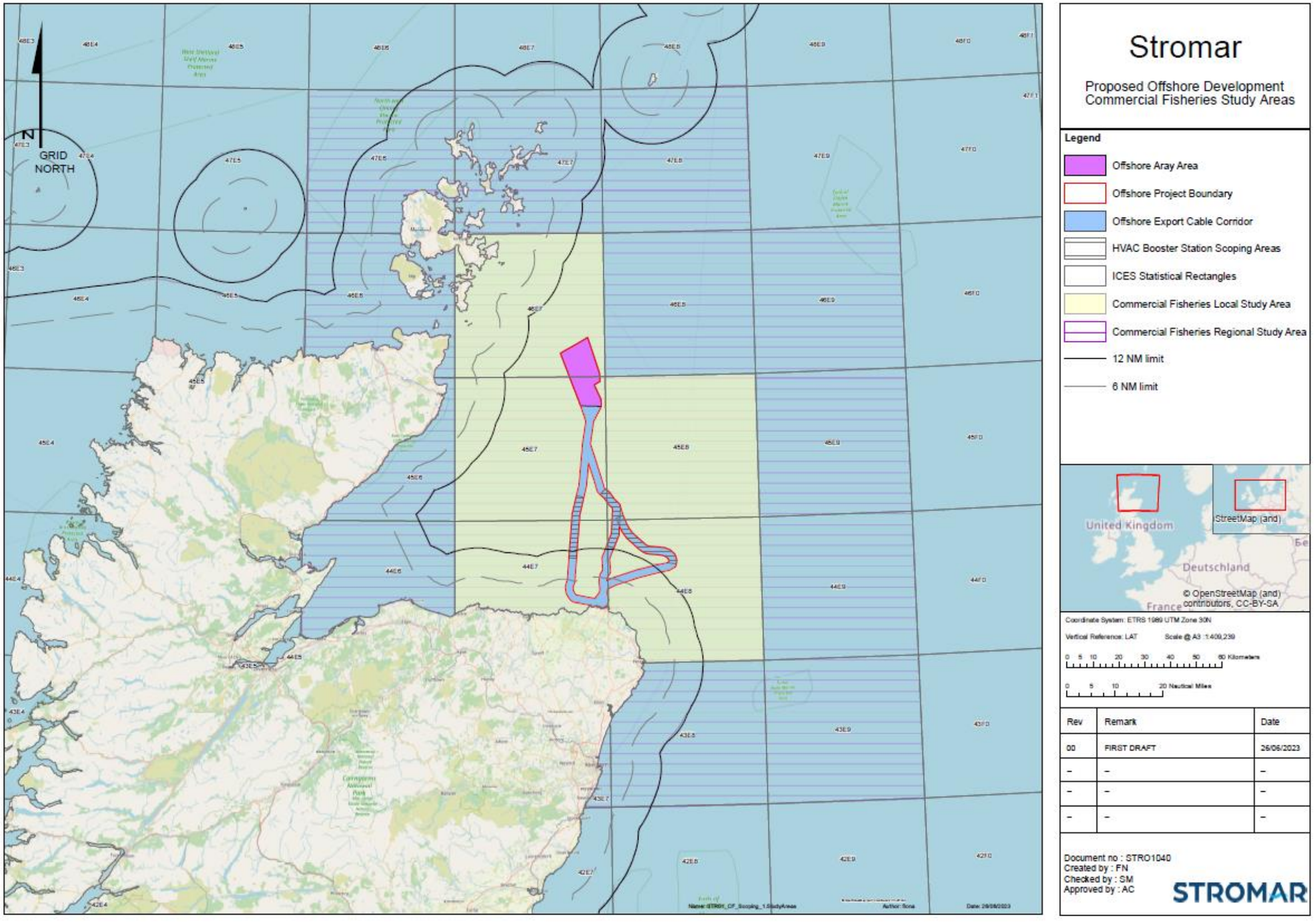


Figure 13.1: **The Proposed Offshore Development Commercial Fisheries Local and Regional Study Areas.**

13.3 Baseline Environment

Data Sources

13.3.1 The data sources that have been used to inform this chapter are presented within **Table 13.1**. These data sources will be taken forward and used to inform the subsequent EIA, alongside additional site-specific data that will be collected for the Project, such as marine traffic survey data and any regionally specific data made available to the Project from commercial fisheries stakeholders. No site-specific commercial fisheries surveys will be undertaken. The data sources listed in the table below are all considered relevant and up-to-date; where new data becomes available, this will be used to inform EIA.

Table 13.1: Key Sources of Commercial Fisheries Data.

Source, Author and Year	Summary	Coverage of the Array Area and Offshore ECC Study Area	Data Quality
MMO (2023a), UK annual fisheries landings statistics: MMO, 2017 to 2021	Annual fisheries landings data for registered fishing vessels landing to their home nation ports.	UK national dataset providing full coverage of the commercial fisheries study areas.	The data are recorded from sales notes and landing declarations for all vessel lengths. Due to the UK legislation of Registration of Buyers and Sellers, data are considered accurate and verifiable. Data assessed with low uncertainty and high confidence.
MMO (2023b), UK Vessel Monitoring System (VMS) data: MMO, 2020	VMS data for UK fishing vessels greater than 15 m in length, including vessels registered in Scotland, England, Northern Ireland, Wales and Isle of Man. Note that UK vessels ≥12 m in length have VMS on board, however, to date, the MMO provide amalgamated VMS datasets for ≥15 m vessels only. VMS data sourced from MMO displays the first sales value (£) of catches. Note that the most recent 2020 data has been presented in this Offshore Scoping Report, but that longer term datasets will be analysed within the EIAR.	UK national dataset providing full coverage of the commercial fisheries study areas.	The data are only available for 15 m and over vessels, so are not representative of <15 m vessels. Data assessed with medium uncertainty and medium confidence.
EU Data Collection Framework (DCF) (2020), EU annual fisheries landings statistics	Annual fisheries landings data for registered fishing vessels landing to their home nation ports.	European-wide dataset providing full coverage of the commercial fisheries study areas.	The data are submitted by individual member states and therefore limitations vary per country. Vessels

Source, Author and Year	Summary	Coverage of the Array Area and Offshore ECC Study Area	Data Quality
Scientific, Technical and Economic Committee for Fisheries (STECF), 2004 to 2016 EU DCF			under 10 m may be omitted or mis-represented by the data. Accuracy is likely to be greater for landings from larger vessels. For UK vessels under 10 m length, data are assessed with: high uncertainty and low confidence. For all other EU vessels data are assessed with low uncertainty and high confidence.
ICES (2022), EU VMS data: ICES, 2016 to 2020	VMS data for fishing vessels greater than 12 m in length. VMS data sourced from ICES displays the surface Swept Area Ratio (SAR) of catches by different gear types and covers EU (including UK) registered vessels 12 m and over in length. Surface SAR indicates the number of times in an annual period that a demersal fishing gear makes contact with (or sweeps) the seabed surface. Surface SAR provides a proxy for fishing intensity.	European-wide dataset providing full coverage of the commercial fisheries study areas.	The data are only available for 12 m and over vessels, so are not representative of <12 m vessels. Data assessed with medium uncertainty and medium confidence.
Marine Scotland National Marine Plan Interactive (NMPi) (various publication dates) Marine Scotland MAPS NMPi (2023), Fisheries datasets	Fisheries datasets available from the Marine Scotland MAPS NMPi, including ScotMap data.	Varying spatial coverage, in most cases providing full coverage of the commercial fisheries study areas.	Datasets involve use of/compilation of several of the other datasets listed in this table. Data assessed precautionarily with medium uncertainty and medium confidence.
European Maritime Safety Agency (EMSA) (2023), Fishing vessel route density data	Fishing vessel route density, based on vessel Automatic Information System (AIS) positional data. AIS is required to be fitted on fishing vessels ≥15 m length. Note that the most recent data has been presented in this Scoping Report, but that longer term datasets	European-wide dataset providing full coverage of the commercial fisheries study areas.	The data are only available for 15 m and over vessels, so are not representative of <15 m vessels. Data assessed with medium uncertainty and medium confidence.

Source, Author and Year	Summary	Coverage of the Array Area and Offshore ECC Study Area	Data Quality
	will be analysed within the EIAR.		
ICES and Marine Scotland (various publication dates), Key species stock assessments	Assessments of the status of commercially targeted fish and shellfish stocks.	Varying spatial coverage, in most cases providing full coverage of the commercial fisheries study areas.	Data assessed with low uncertainty and high confidence.
Scottish Government (2020), Sectoral Marine Plan	Description of regional commercial fisheries activity.	Covering the NE3 PO and therefore providing full coverage of the Array Area.	Description relies on use of/compilation of several of the other datasets listed in this table. Data assessed precautionarily with medium uncertainty and medium confidence.
North Atlantic Fisheries College (NAFC) Marine Centre University of Highlands and Islands (UHI) (2021), Fisheries activity mapping in the NERIFG area	Mapping of fishing activity and critical habitats of key species within 12 nm of the coast in the NERIFG area.	Covers the NERIFG area, inclusive of the commercial fisheries local study area.	Datasets involve use of/compilation of several of the other datasets listed in this table. Data assessed precautionarily with medium uncertainty and medium confidence.
Brown and May Marine Ltd (2022), Stromar: Commercial Fisheries Baseline Study	Description of commercial fisheries activity in and around Stromar.	Covering the Array Area.	Description relies on use of/compilation of several of the other datasets listed in this table. Data assessed precautionarily with medium uncertainty and medium confidence.

13.3.2 It should be noted that the quantitative datasets identified in **Table 13.1** may not capture all commercial fisheries activity in the commercial fisheries study areas. For instance, the VMS datasets only include vessels ≥12 m (ICES data) or ≥15 m (MMO data) in length.

13.3.3 However, in addition to VMS data, other published data does provide a useful insight into commercial fisheries activity undertaken in inshore areas (e.g., ScotMap inshore fisheries mapping[26]) and consultation with fisheries stakeholders and industry is expected to further inform the EIA.

13.3.4 Consultation with representatives of fishermen's associations and organisations has been and will continue to be undertaken to seek to corroborate the findings of desk-based baseline data analysis and to provide insight into specific fishing grounds and activity of any vessels active in the area. Consultation will also be important to inform gear specifications for vessels active in the area, which

[26] https://marine.gov.scot/information/scotmap-inshore-fisheries-mapping-project-scotland

will allow a full understanding of how different vessels and different gear configurations may be affected.

13.3.5 Variations and trends in commercial fisheries activity are an important aspect of the baseline assessment and is the principal reason for considering up to five years of baseline data. Given the time periods considered in this Scoping exercise (i.e., 2017 to 2021), existing baseline data may to some extent capture potential changes in commercial fisheries activity resulting from the COVID-19 pandemic, which is understood to have temporarily affected market demand and supply chains. Additionally, changes in fishing patterns resulting from the withdrawal of the UK from the EU would be expected in future data sets, which include data for 2021 onwards. Long term environmental and climatic changes may be expected to be detectable within the five-year time series but may benefit from longer-term analysis dependant on the target species (for example, where king scallop *Pecten maximus* are a relevant target species, analysis of landings across a seven to ten-year period is proposed to capture the cyclical nature of their productivity and associated fishery). Inclusion of such longer-term analysis will be further informed by stakeholder consultation.

Description of Baseline Environment

13.3.6 An understanding of the commercial fisheries baseline environment within the study areas has been developed from utilisation of the available literature and data sources presented in **Table 13.1**.

13.3.7 Landings by UK-registered vessels from the commercial fisheries local study area had an annual average landings value of approximately £20.9 million across the years 2017 to 2021 (MMO, 2023a), with landings values peaking in 2019 at £28.8 million and being at their lowest in 2020 at £17 million (likely due to a combination of COVID-19 restrictions and the UK EU-exit). Landings from ICES rectangles 44E7 and 44E8, which overlap the Offshore ECC Study Area, accounted for approximately 29% and 24% of the total value of landings from the local study area respectively. Over the same time period, the annual average weight of landings from the study area was just under 10,000 tonnes, peaking at approximately 14,500 tonnes in 2019.

13.3.8 Landings of shellfish dominated, accounting for 59% of the total landings value (based on data from MMO, 2023a). Landings of demersal fish species accounted for 29% of the total landings value, and pelagic fish species for 13%. Scottish vessels were responsible for the majority (87%) of landings, with landings also being made by vessels registered in England and to a much lesser extent vessels registered in Northern Ireland. The main landing ports local to the Proposed Offshore Development include (but are not limited to) Fraserburgh, Peterhead and Buckie.

13.3.9 **Figure 13.2** and **Figure 13.3** show the top 12 species landed in the local study area by value and weight respectively, from 2017 to 2021 (MMO, 2023a). **Figure 13.4** shows the landed value over the same period from the local study area by ICES rectangle and gear type. The key species landed are Nephrops *Nephrops norvegicus*, haddock *Melanogrammus aeglefinus*, mackerel *Scomber scombrus*, brown crabs *Cancer pagurus*, squid *Loligo* spp. and king scallop *Pecten maximus* (also referred to as scallop).

13.3.10 First sales value and weight of Nephrops landings have fluctuated over the 2017 to 2021 period, with an annual landed value of £2 million in 2020 and of £3.9 million in 2019. Landed values and weights of mackerel and scallops have also been variable across the time period, with five-year averages of £2.4 million for mackerel and £1.8 million for scallop landed annually from the local study area. The significant annual variation in landings of mackerel represent patterns typical for pelagic species that

swim in fast moving shoals and may not be specifically linked to areas or habitats when caught in the water column. Landings of haddock from the local study area have also fluctuated over the time series, peaking in annual landed value in 2020 at £3.9 million. Landings of brown crab from the local study area have shown some variation across the time series, with an annual landed value of £2.7 million. Landings of squid from the local study area have an annual average value of £2.3 million, being at their lowest value in 2021 at £1 million.

13.3.11 Landing statistics indicate that landings by under 10 m length vessels and over 10 m vessels are made across the local study area, with the majority of landings by value being made by vessels between 18 m and 24 m length. Notably, the majority (85% by value) of the landings by potting vessels are made by vessels ≤12 m in length, indicating the importance of the inshore fleet across the inshore portion of the commercial fisheries local study area. Almost all of the landings by demersal and pelagic trawl, dredge and demersal seine are by vessels >10 m in length.

13.3.12 Landings of the species detailed above vary seasonally. Landings of haddock targeted by demersal trawlers show peaks in January and then in late summer/early autumn with less landings through the intermediate spring, whilst landings of Nephrops exhibit a summer peak during June and July. Landings of mackerel taken in demersal and pelagic trawls are principally in late summer, in the month of August. Landings of scallops by dredgers peak in late spring and early summer. Inshore vessels are often equipped to move from species to species throughout the seasons. Landing trends per month will be analysed within the EIAR for individual species at both an ICES rectangle level, and by port of landing to identify which fleet and fishery operate at specific times of the year.

13.3.13 **Figure 13.5** and **Figure 13.6** show the top 12 species landed from the commercial fisheries regional study area by value and weight respectively, from 2017 to 2021 (MMO, 2023a). **Figure 13.7** shows the landed value over the same period from the regional study area by ICES rectangle and gear type. Key target species and active gear types are broadly aligned with those in the local study area, with pots and traps used to target shellfish including brown crab and lobster *Homarus gammarus*, demersal trawls used to target Nephrops, haddock and mixed demersal fish species, and dredges used to target scallop. Within the regional study area, landings data additionally indicates the presence of vessels deploying pelagic seine gear to target herring *Clupea harengus.*

13.3.14 EU landings data indicates the potential for fishing activity by Belgian, German and Irish vessels. The majority of non-UK fleet activity is understood to occur to the northeast and east of the Proposed Offshore Development (Brown and May Marine Ltd, 2022).

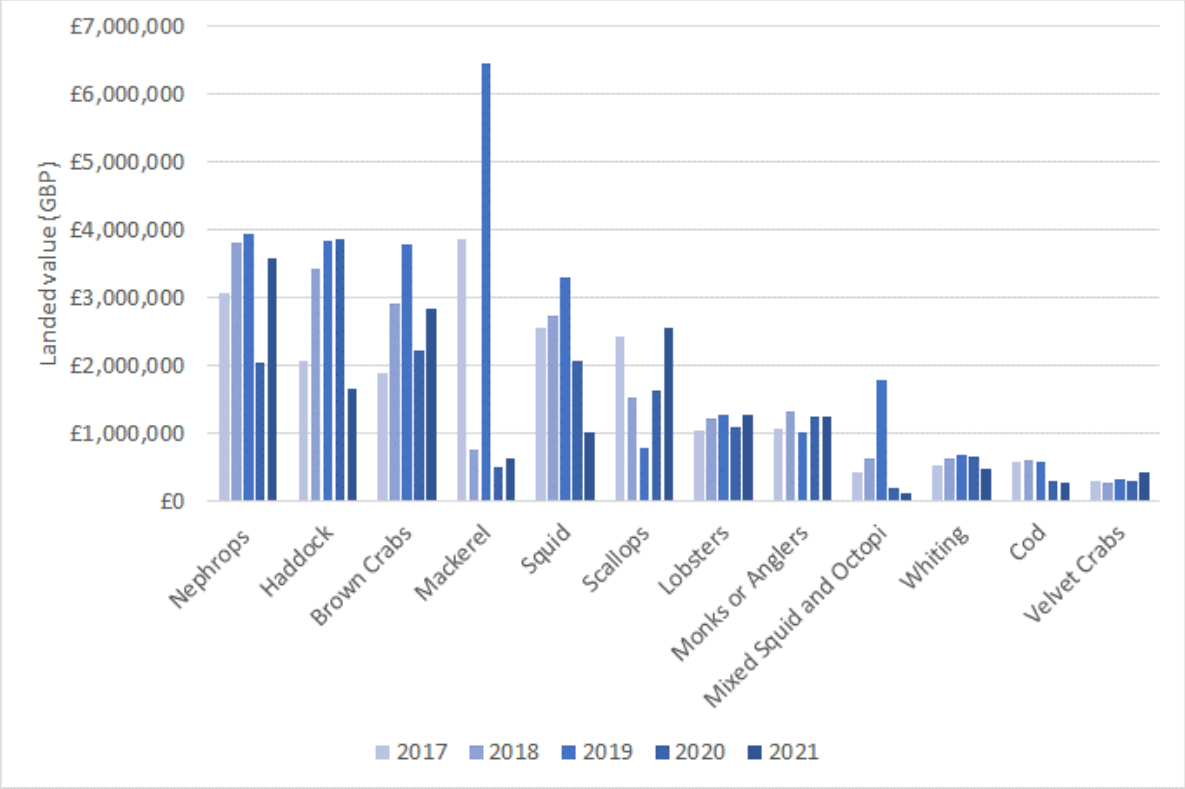


Figure 13.2: Top 12 species by value Great British Pound (GBP) from 2017 to 2021 landed from the commercial fisheries local study area (data source: MMO, 2021; MMO, 2023a).

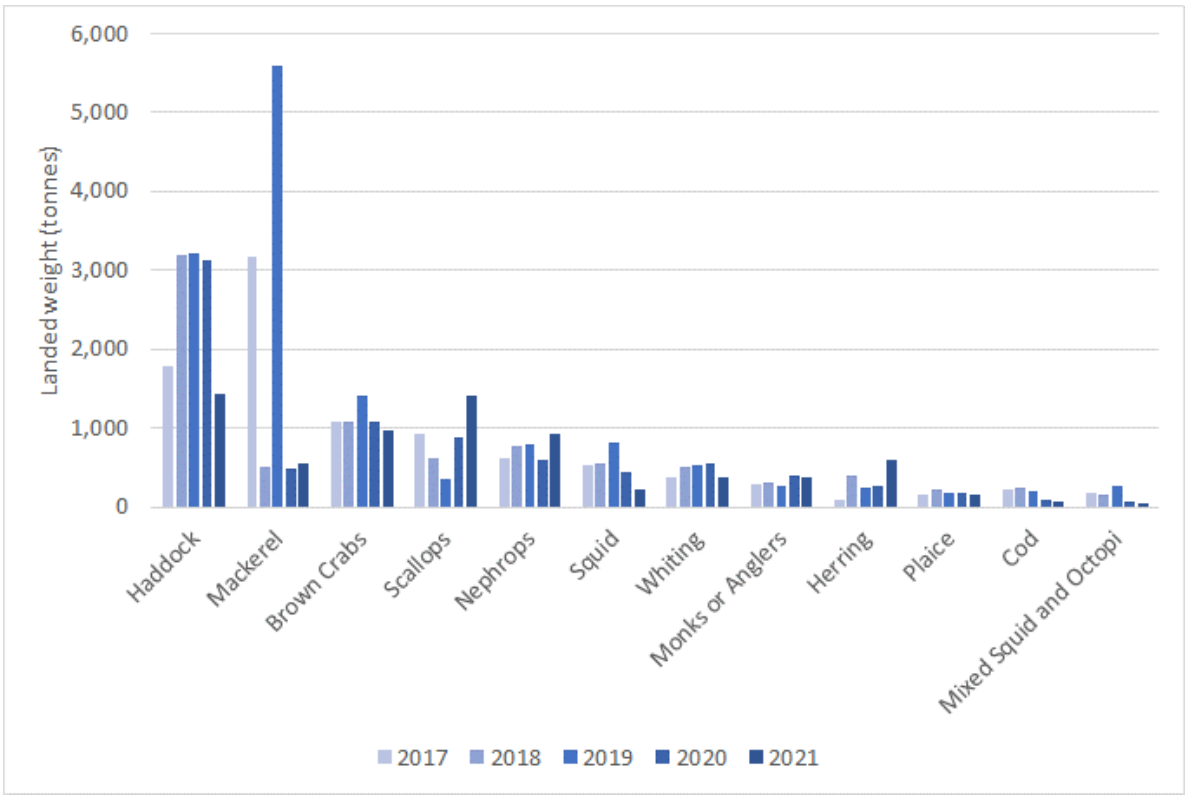


Figure 13.3: Top 12 species by weight (tonnes) from 2017 to 2021 landed from the commercial fisheries local study area (Source: MMO, 2021; MMO, 2023a).

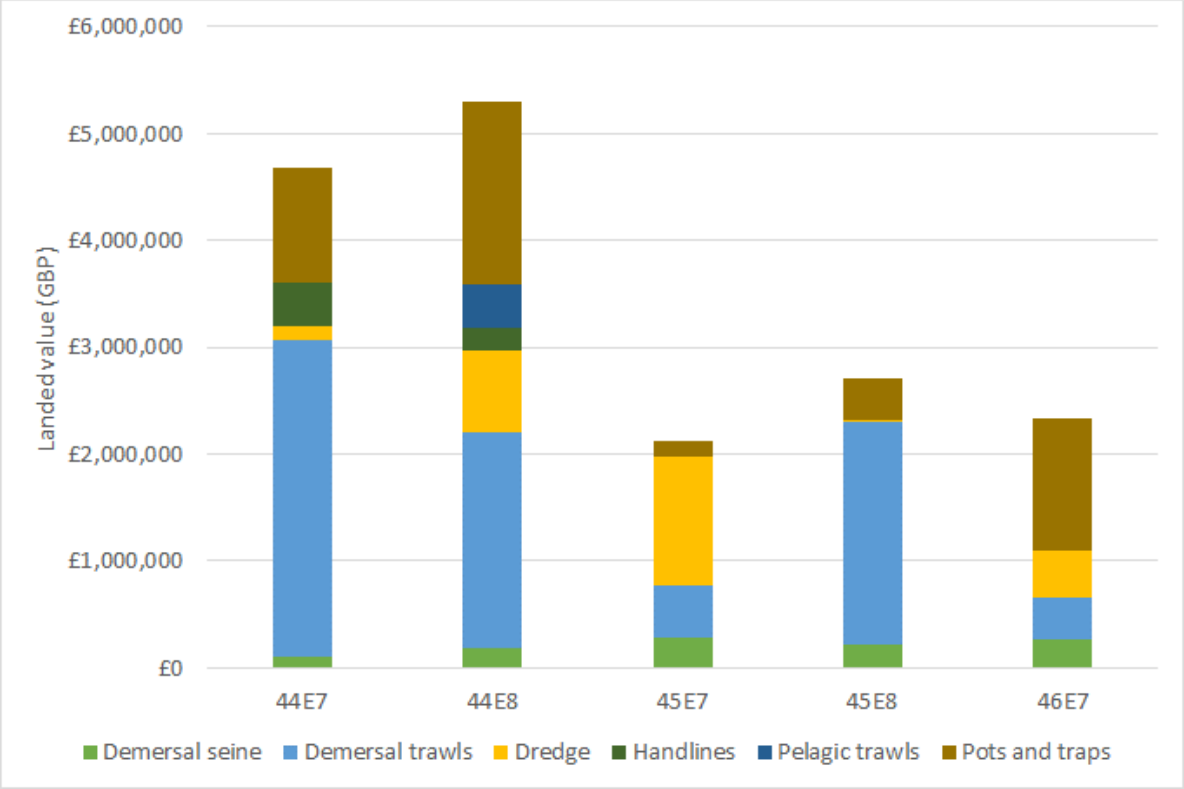


Figure 13.4: Landed value in 2021 from the commercial fisheries local study area by ICES rectangle and gear type (Source: MMO, 2023a).

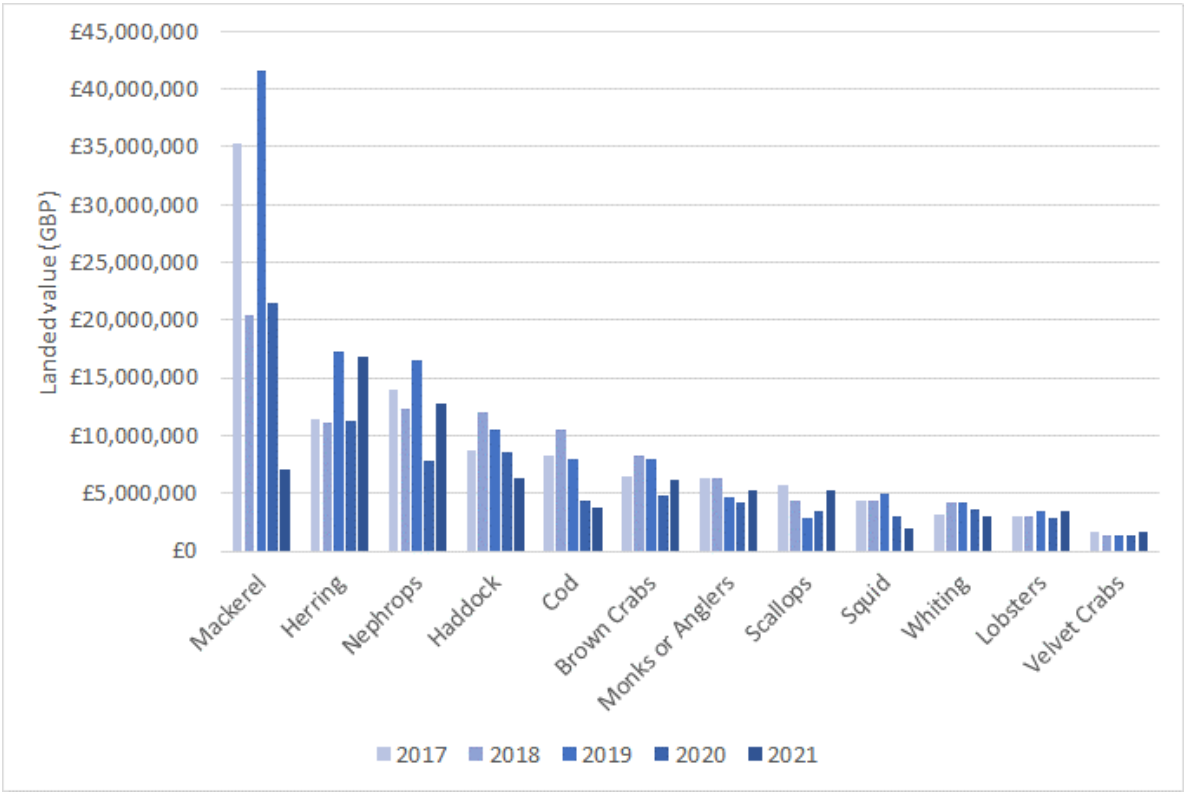


Figure 13.5: Top 12 species by value (GBP) from 2017 to 2021 landed from the commercial fisheries regional study area (data source: MMO, 2021; MMO, 2023a).

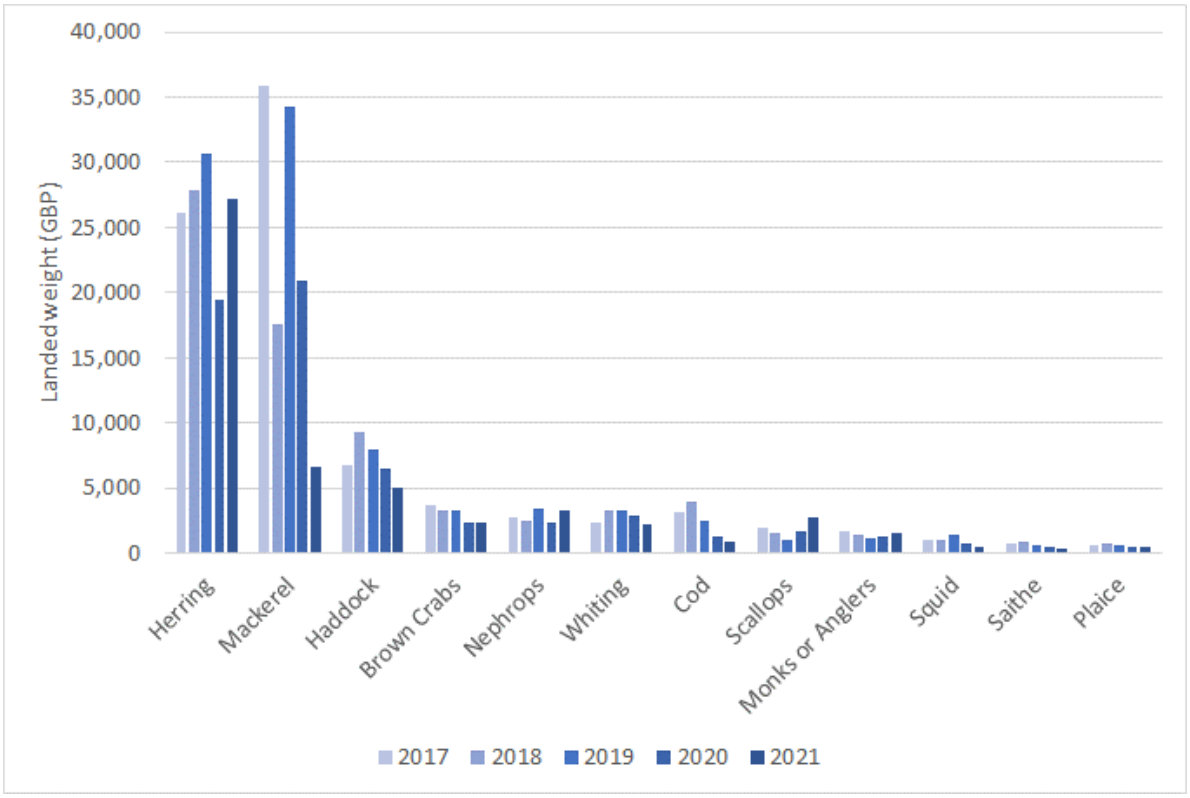


Figure 13.6: Top 12 species by weight (tonnes) from 2017 to 2021 landed from the commercial fisheries regional study area (Source: MMO, 2021; MMO, 2023a).

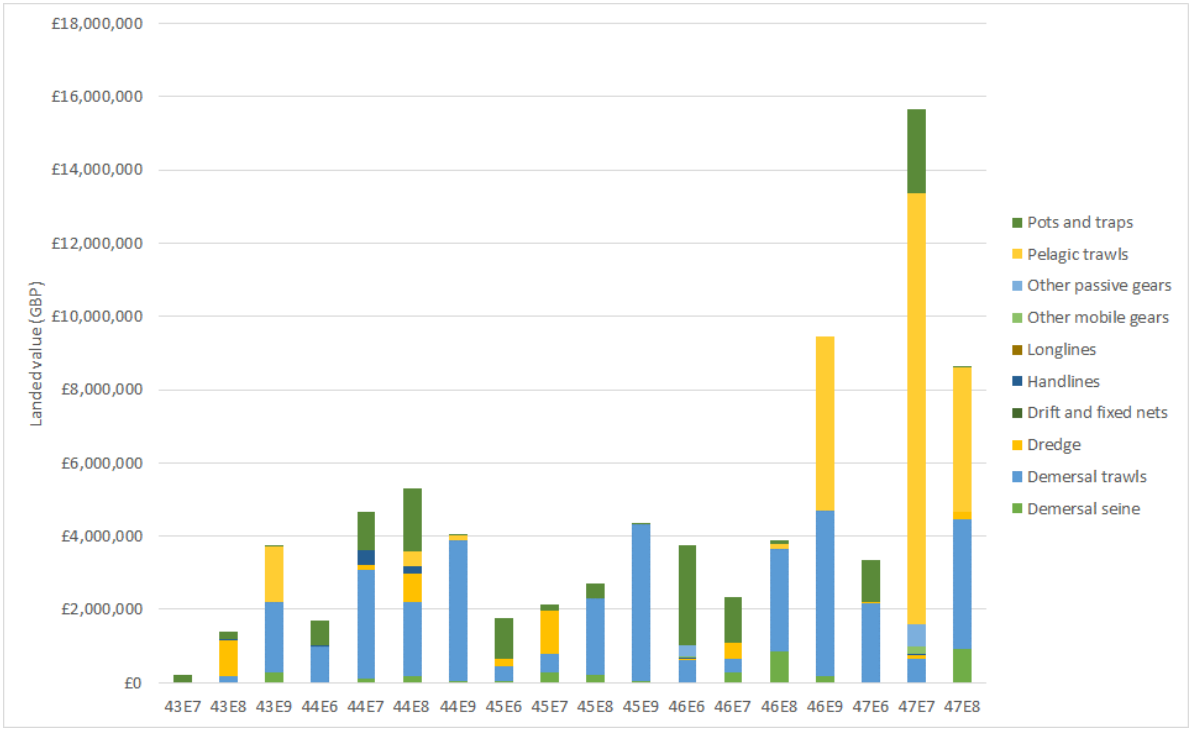


Figure 13.7: Landed value in 2021 from the commercial fisheries regional study area by ICES rectangle and gear type (Source: MMO, 2021; MMO, 2023a).

13.3.15 In addition to landings data, spatial data describing fishing activity is available, including AIS fishing vessel route density data. AIS is required to be fitted on fishing vessels ≥15 m length. The data presented in **Figure 13.8** is specific to fishing vessels and indicates the route density per square km per year. This data does not distinguish between transiting vessels and active fishing but does provide a useful source to corroborate fishing grounds. Data indicates fishing vessel presence within the Proposed Offshore Development, with sustained fishing vessel presence across the nearshore sections of the Offshore ECC Study Area and along the northern boundary of the Array Area, but with significant fishing grounds present throughout the region.

13.3.16 VMS and spatial data to map fishing activity is available for UK and EU fleets. VMS data sourced from ICES displays the surface SAR of catches by different gear types and covers EU (including UK) registered vessels 12 m and over in length. Surface SAR indicates the number of times in an annual period that a demersal fishing gear makes contact with (or sweeps) the seabed surface. Surface SAR provides a proxy for fishing intensity and has been analysed to determine an average annual SAR based on data from 2016 to 2020. VMS data sourced from MMO displays the first sales value (GBP) of catches and covers UK registered vessels 15 m and over in length from 2016 to 2019. ScotMap inshore fisheries mapping data relating to the period 2007 to 2011 are also available and have been mapped.

13.3.17 Mapped data is provided for the following gear types:

- **Figure 13.9** and **Figure 13.10**: Demersal otter trawl, indicating some activity within the Offshore ECC Study Area and particularly in the nearshore portion of the Offshore ECC Study Area;
- **Figure 13.11** and **Figure 13.12**: Dredge, indicating activity along the northern boundary of the Array Area and across discrete sections of the Offshore ECC Study Area;
- **Figure 13.13** and **Figure 13.14**: Demersal seine, indicating low levels of activity within the Offshore ECC Study Area and slightly higher levels across the Array Area;
- **Figure 13.15**: Pelagic trawl, indicating low levels of pelagic trawl activity by UK vessels across much of the Proposed Offshore Development but with some activity in the northern extent of the Offshore ECC Study Area and southern portion of the Array Area; and
- **Figure 13.16** and **Figure 13.17**: Pots and traps, indicating potting activity by UK vessels over 15 m length in the Array Area and notable levels of potting activity by UK inshore vessels in the nearshore portion of the Offshore ECC Study Area.

13.3.18 The mapped spatial data presented below is aligned with that presented in the UHI study, which mapped fisheries and habitats in the NERIFG area (Shelmerdine and Mouat, 2021).

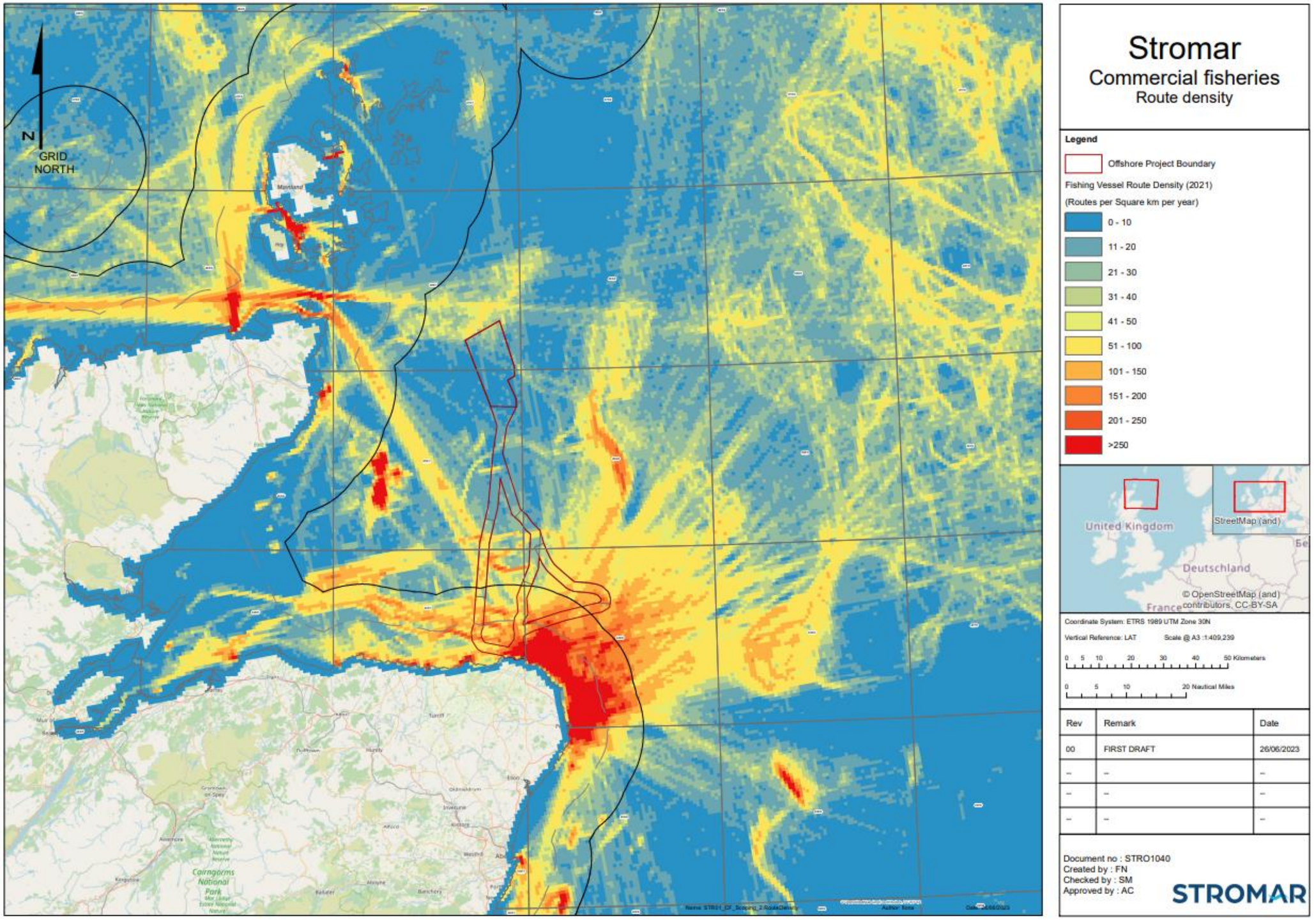


Figure 13.8: Fishing vessel route density data (Source: EMSA, 2022).

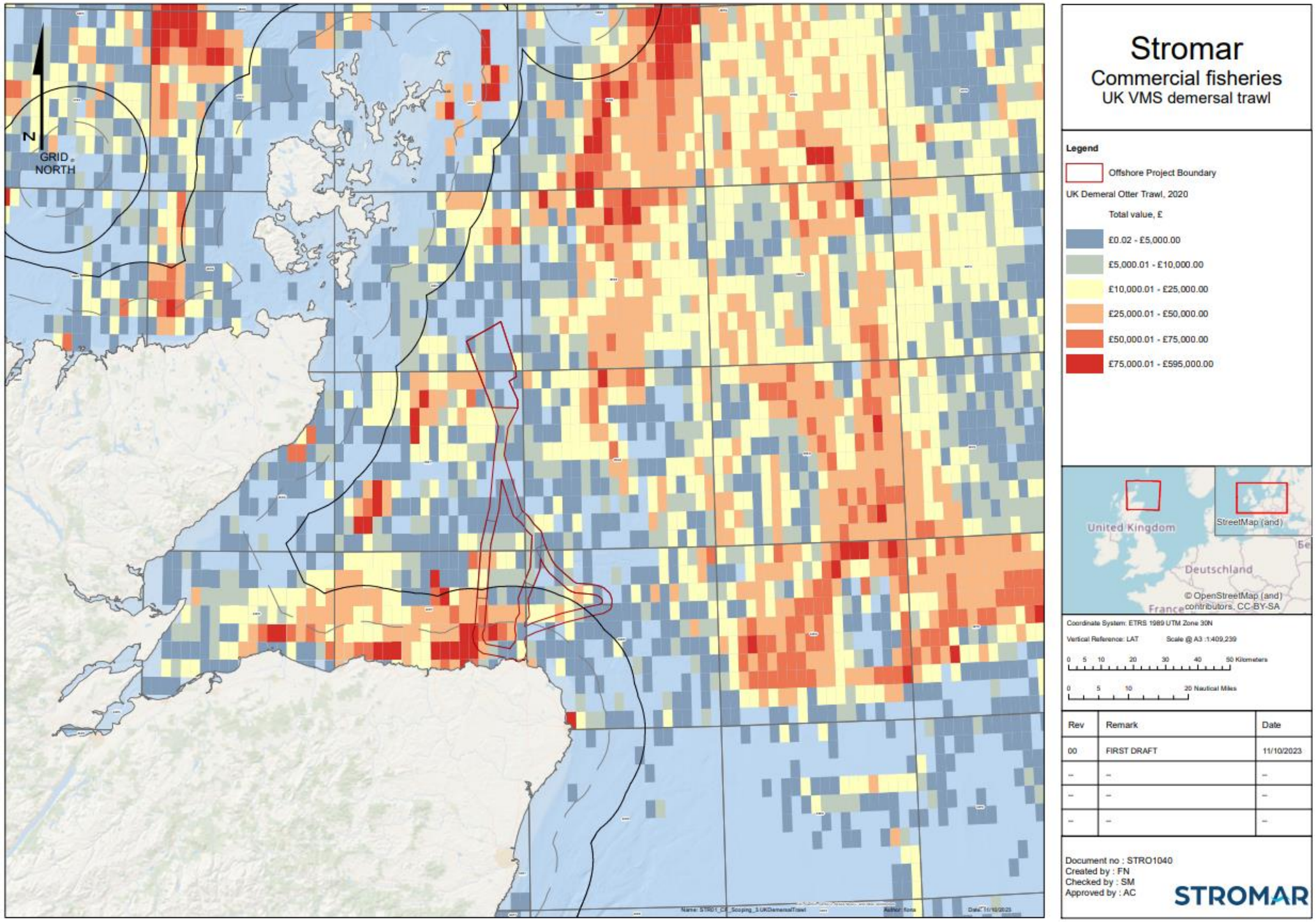


Figure 13.9: UK vessels ≥ 15 m length actively fishing using demersal otter trawl (Data source: MMO, 2023c, annual data set for 2020).

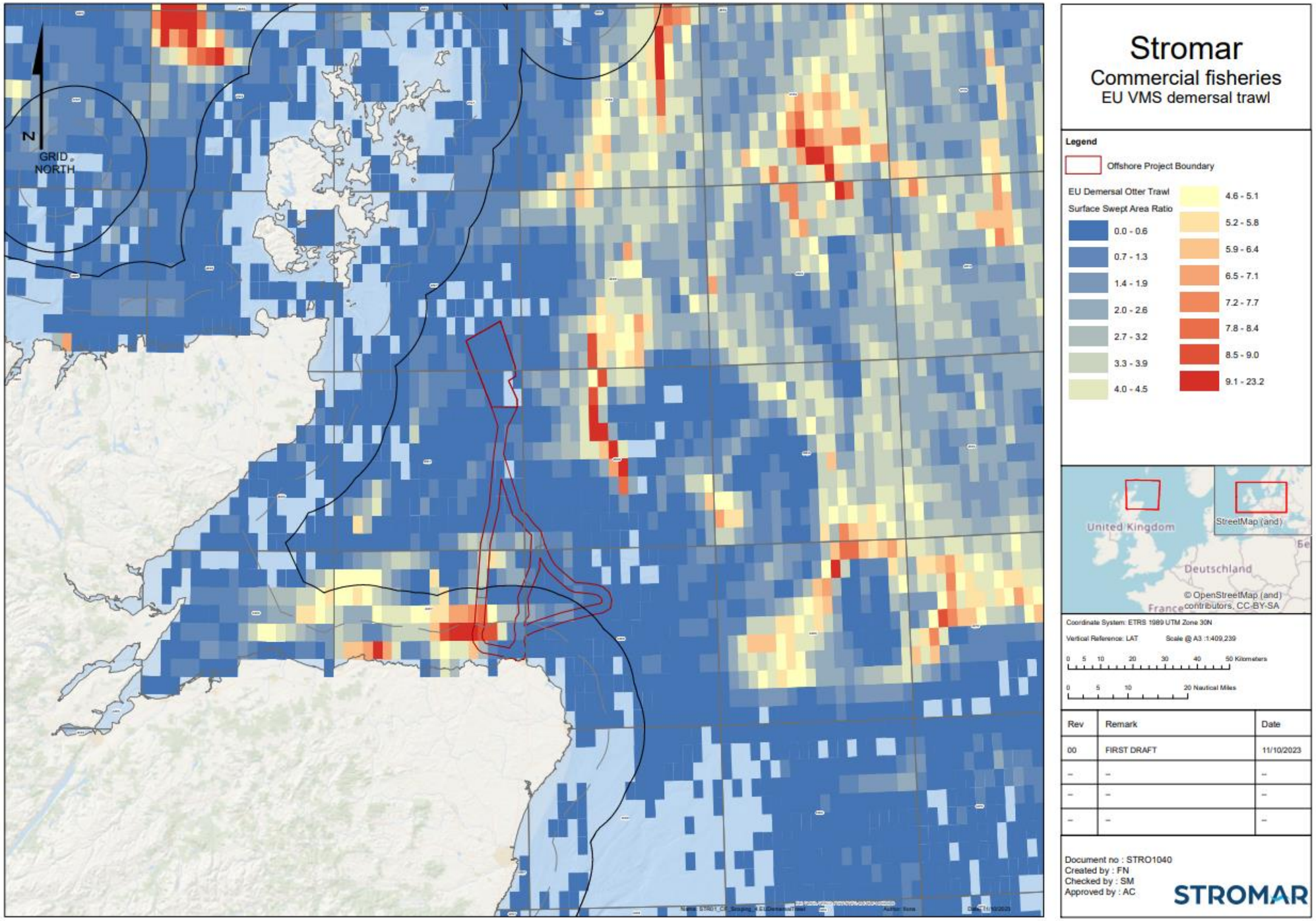


Figure 13.10: EU (including UK) vessels ≥ 12 m length actively fishing using demersal otter trawl (Data source: ICES, 2021, based on a five-year annual average data set from 2016-2020).

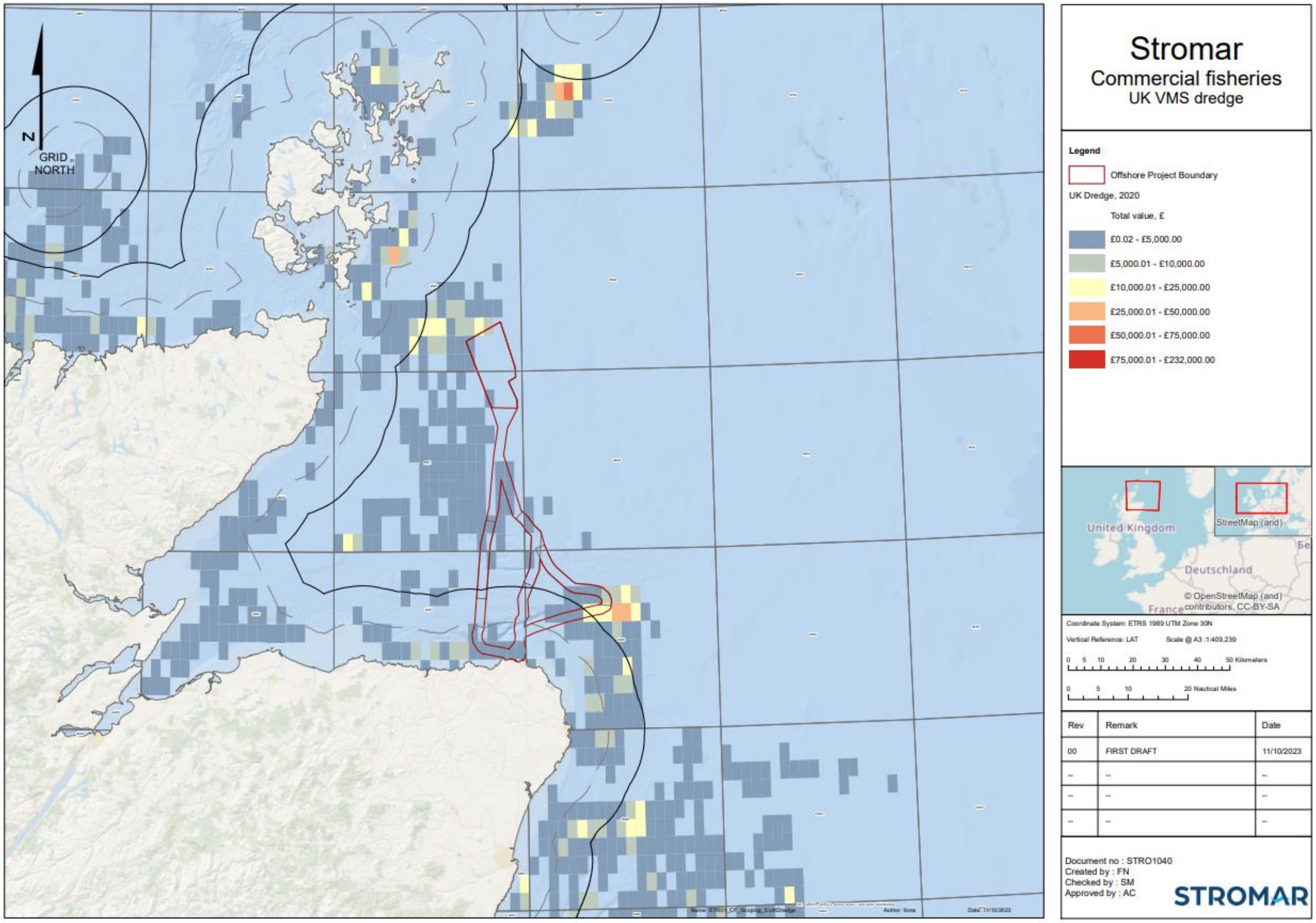


Figure 13.11: UK vessels ≥ 15 m length actively fishing using dredge (Data source: MMO, 2023c, annual data set for 2020).

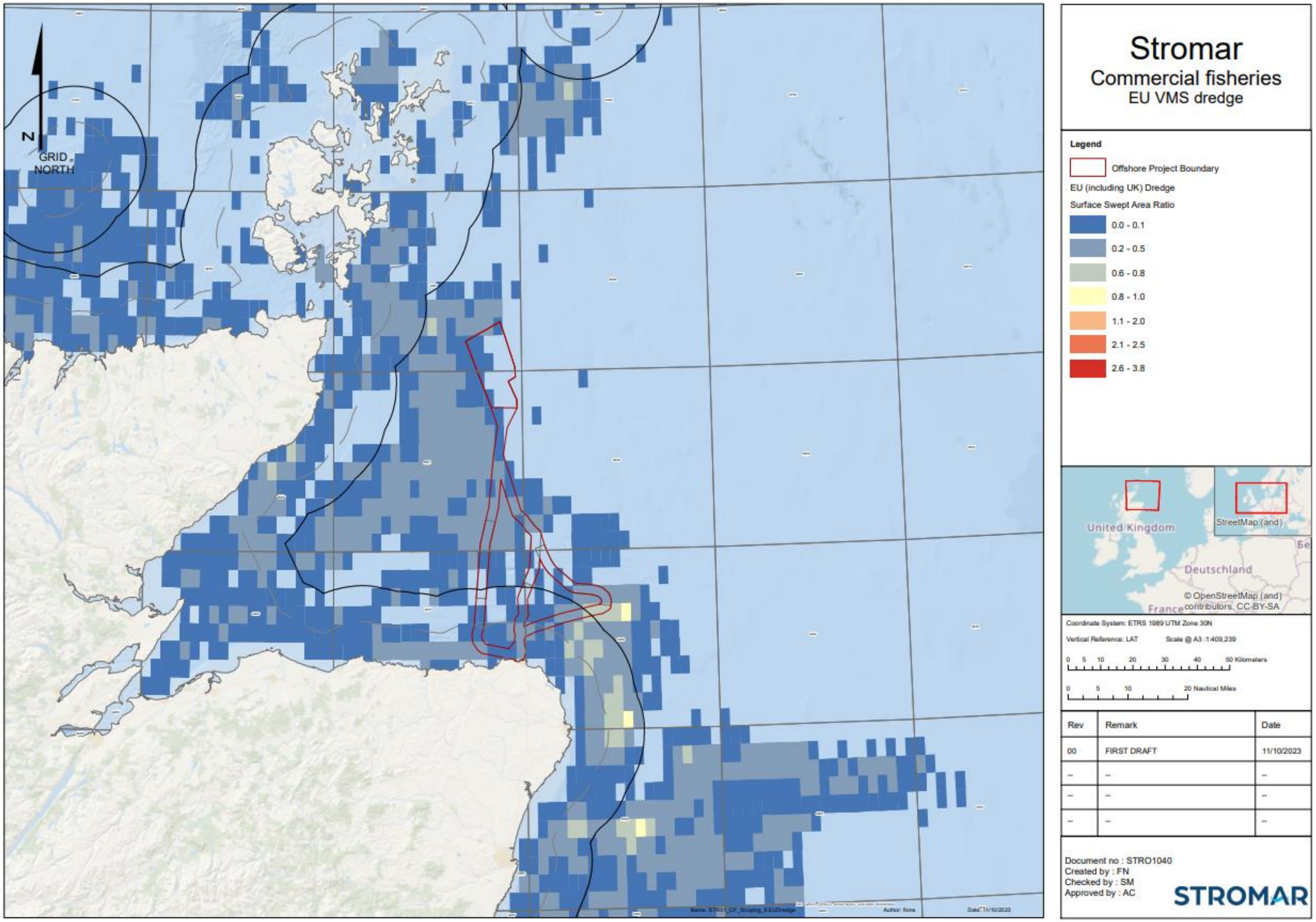


Figure 13.12: EU (including UK) vessels ≥ 12 m length actively fishing using dredge (Data source: ICES, 2021, based on a five-year annual average data set from 2016-2020).

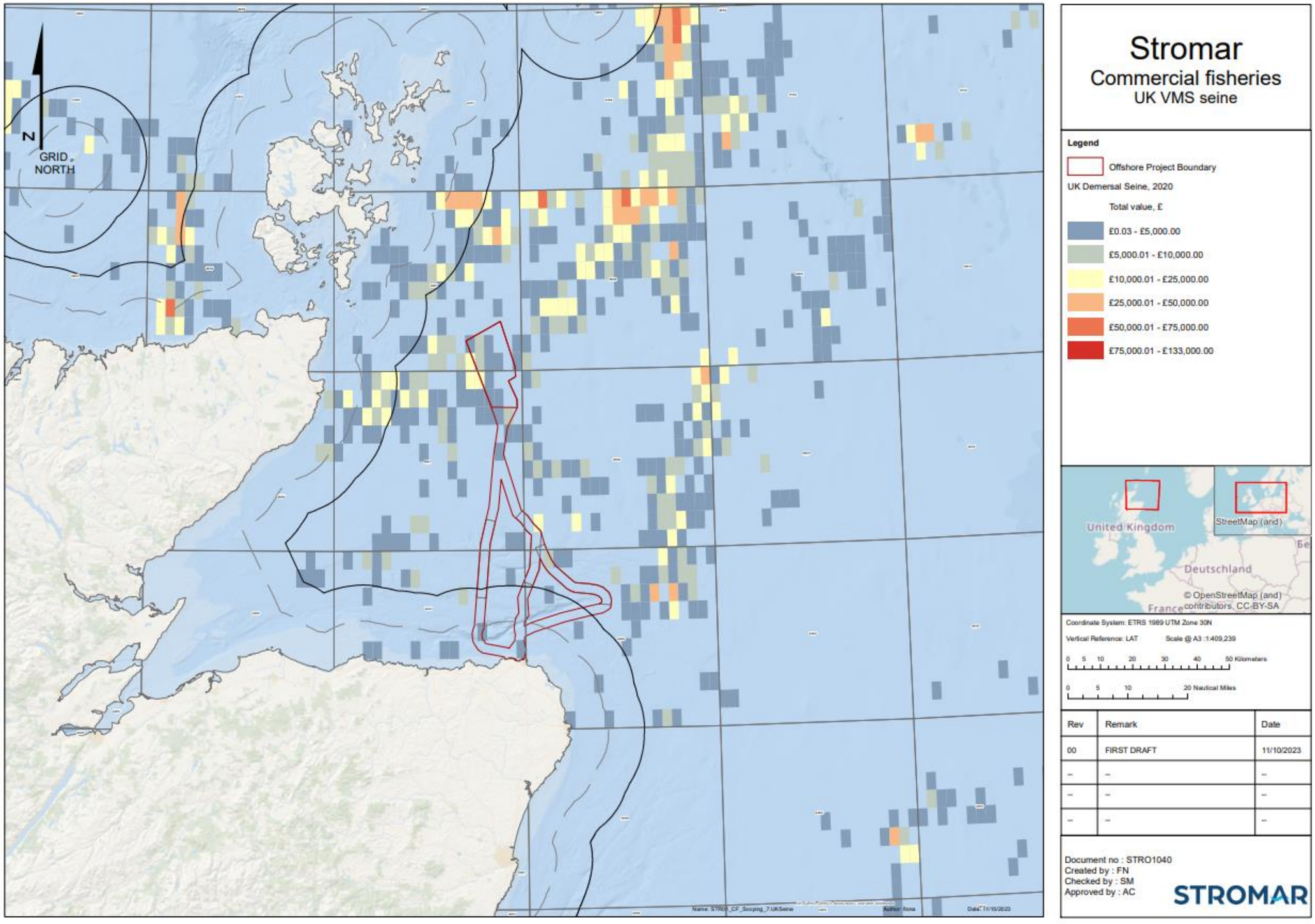


Figure 13.13: UK vessels ≥ 15 m length actively fishing using demersal seine (Data source: MMO, 2023c, annual data set for 2020).

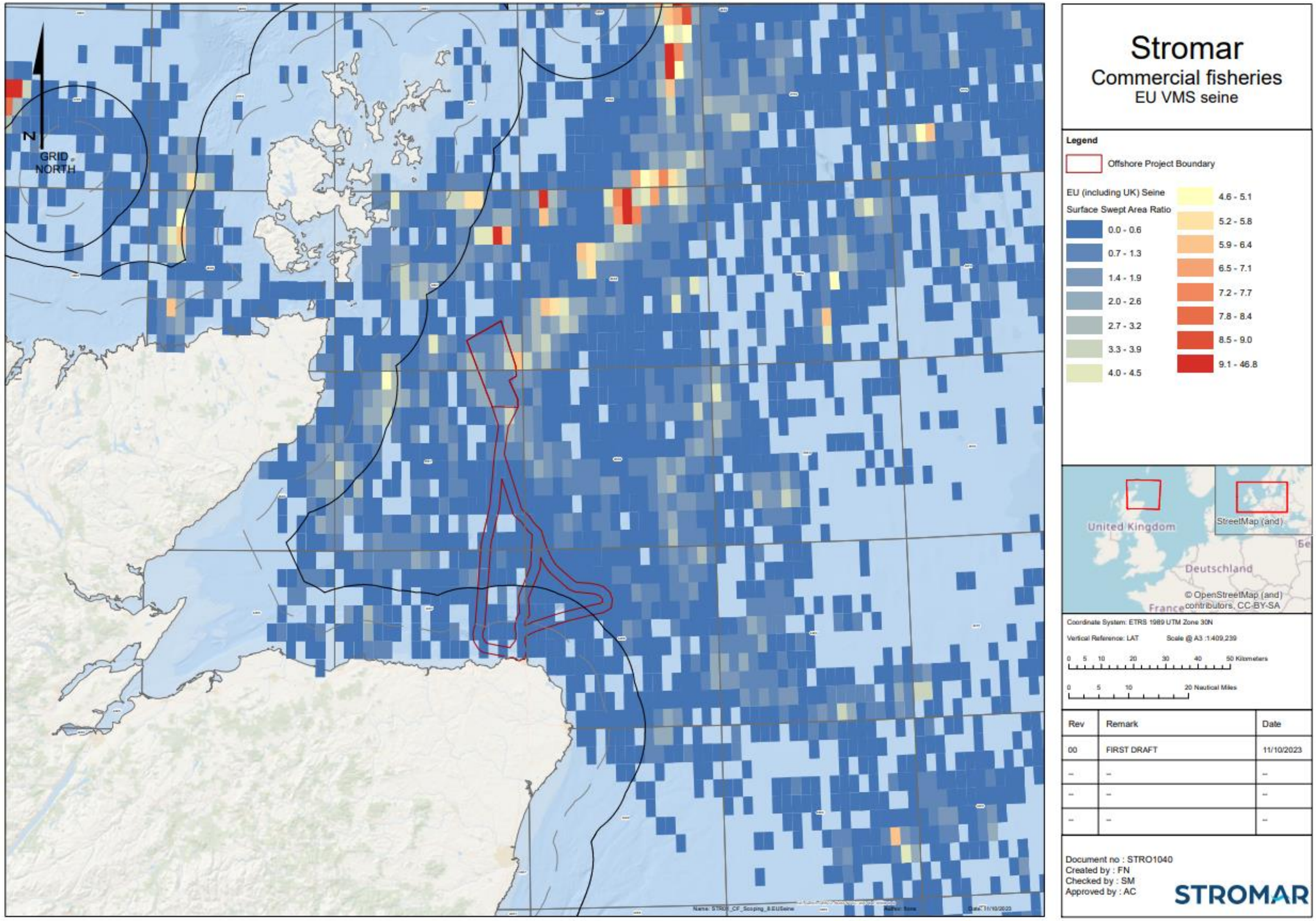


Figure 13.14: EU (including UK) vessels ≥ 12 m length actively fishing using demersal seine (Data source: ICES, 2021, based on a five-year annual average data set from 2016-2020).

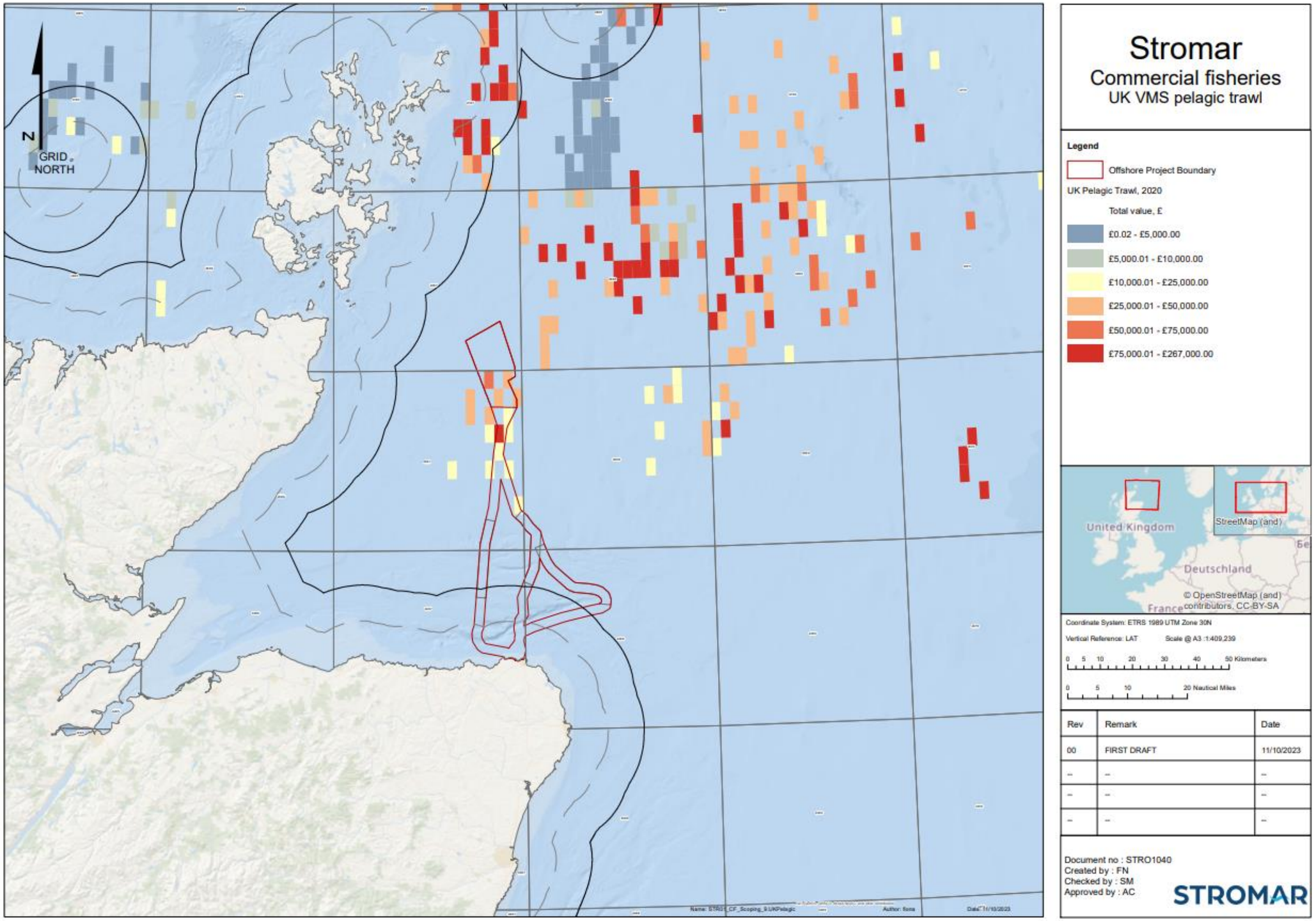


Figure 13.15: UK vessels ≥ 15 m length actively fishing using pelagic trawl (Data source: MMO, 2023c, annual data set for 2020).

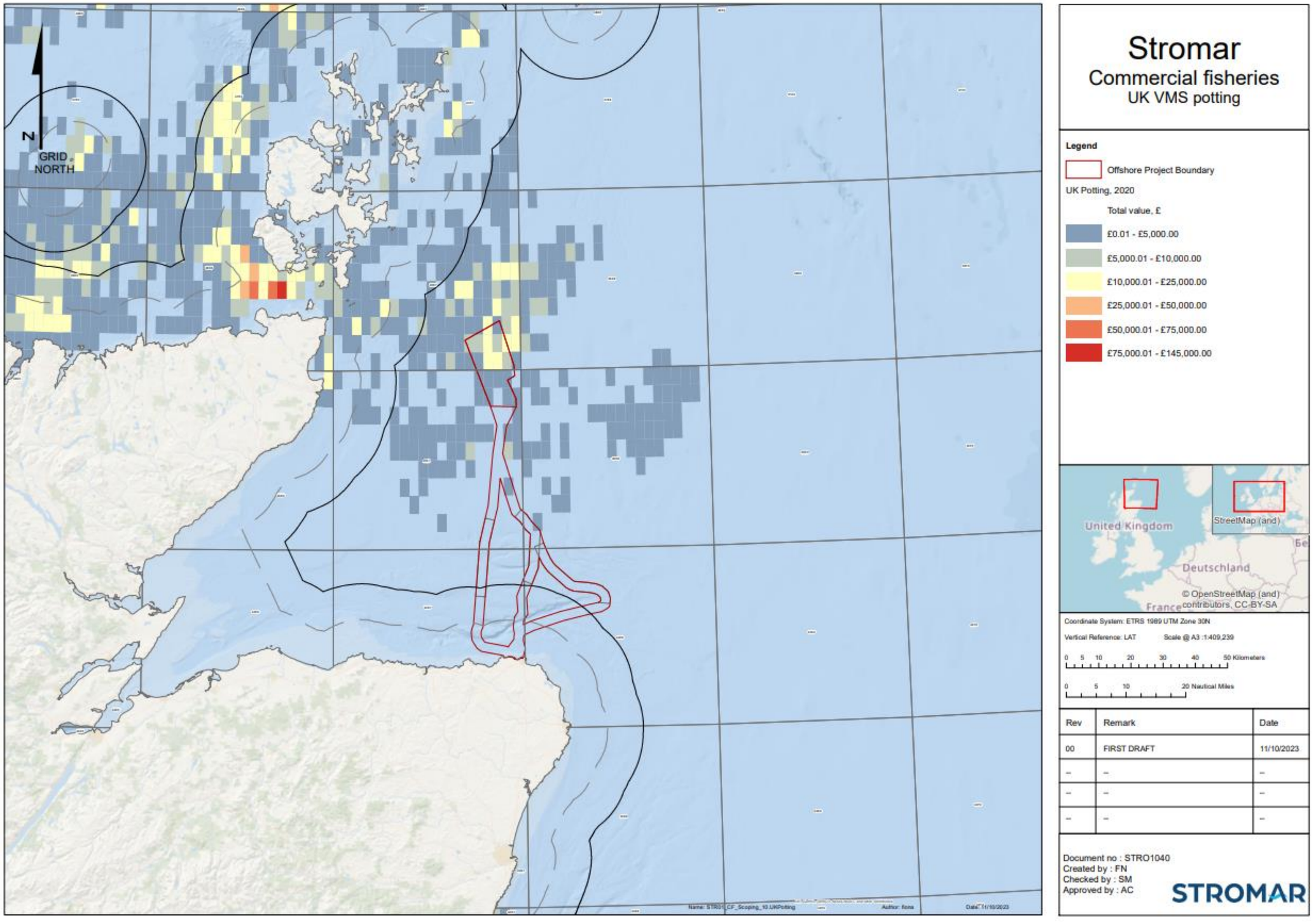


Figure 13.16: UK vessels ≥ 15 m length actively fishing using pots or traps (Data source: MMO, 2023c, annual data set for 2020).

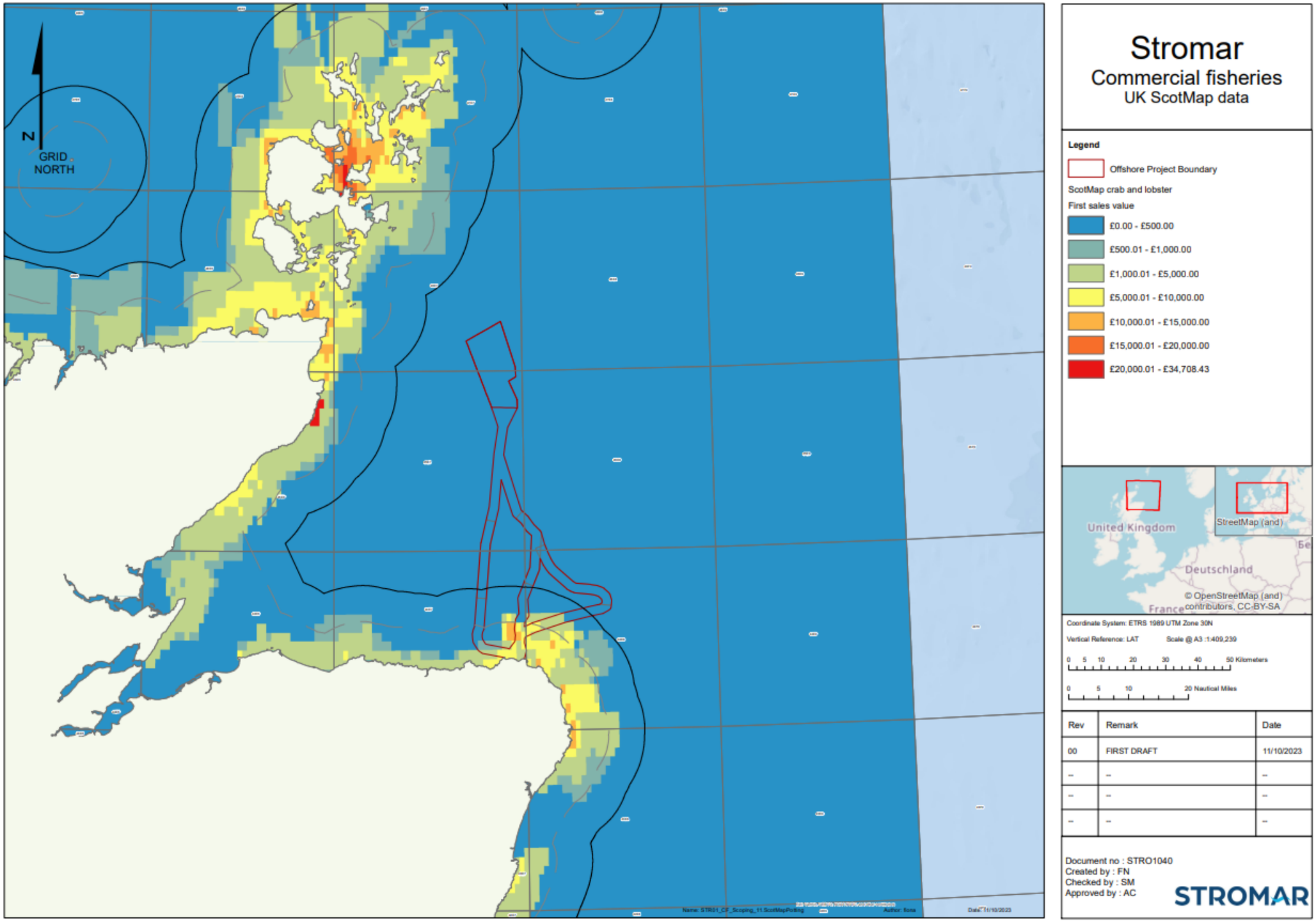


Figure 13.17: UK inshore vessels actively fishing using pots or traps (Data source: Marine Scotland ScotMap)

Summary

13.3.19 The key commercial fisheries receptors within the commercial fisheries study areas are identified as follows:

- Local creel fleet targeting brown crab and lobster (vessels typically 15 m and under in length) across the Offshore ECC Study Area;
- Local jigging fleet targeting mackerel across the Offshore ECC Study Area;
- Potting fleet targeting brown crab, lobster and velvet crab (vessels typically 10 m and over in length) across the Array Area;
- Demersal trawl fleet targeting Nephrops, squid, haddock and other whitefish across both Offshore ECC Study Area and Array Area;
- Scallop dredging fleet targeting scallops, predominately across the Offshore ECC Study Area;
- Scottish seine fleet targeting haddock and other whitefish predominantly across the Array Area; and
- Pelagic trawlers from the UK, Ireland, Germany and the Netherlands predominantly across the Array Area.

13.3.20 Salmon fishing and sea trout fishing rights in Scotland include coastal fixed engine and net and coble fisheries. It is understood that there are a number of fixed engine sites for wild salmon and sea trout, and a number of net and coble sites around Fraserburgh (Scottish Government, 2021). These sites have been reported to be active between 2011 to 2018. The EIA will explore if these sites remain active.

13.3.21 There are no aquaculture facilities within the study area, and it is considered unlikely that there would be any aquaculture development offshore in the vicinity of the Proposed Offshore Development.

13.4 Embedded Commitments

13.4.1 The Proposed Offshore Development has adopted various primary commitments (primary design principles intrinsically part of the Project design, installation techniques and engineering designs/modifications) as part of the pre-application phase to eliminate and/or reduce LSE arising from a number of impacts (as far as possible). These are outlined in **Appendix A: Offshore Commitments Register**. Further commitments (imposed as a result of legislative requirements and/or standard sectoral practice, regardless of EIA assessment), referred to as tertiary commitments are embedded as an inherent aspect of the EIA process. Secondary commitments (which require further activity to achieve anticipated outcome- often secured through planning conditions and/or management plans) are incorporated to reduce LSE to environmentally acceptable levels following initial assessment, i.e., so that residual effects are reduced to environmentally acceptable levels.

13.4.2 The commitments adopted by the project in relation to commercial fisheries are presented in **Table 13.2**. The full list of commitments can be found in **Appendix A: Offshore Commitments Register**.

Table 13.2: The Proposed Commitments Relevant to Commercial Fisheries.

Commitment Code	Commitment Measure
C-OFF-09	Development of, and adherence to a CaP. The CaP will confirm planned cable routing, burial and any additional protection and will set out methods for post-installation cable monitoring as secured by Section 36 and Marine Licence consent conditions. The CaP is likely to be supported by a CBRA, which will outline how external cable protection shall be used and/or minimised, should cable burial be achieved.
C-OFF-12	Development of a PEMP, which will set out environmental monitoring in pre-, during, and post-construction phases.
C-OFF-13	A PEMP will be developed, to include a Marine Pollution Contingency Plan and INNS Management Plan. This PEMP will also include information on chemical usage, dropped objects, and waste management.
C-OFF-17	CBRA surveys will be undertaken. Where sufficient burial is not achievable, suitable implementation and monitoring or cable protection will be developed.
C-OFF-26	Consultation (via appointed FLO) will ensure that potential impacts on commercial fisheries will be understood and reduced where reasonably practicable during the route optioneering and offshore export cable design development.
C-OFF-27	Fisheries Liaison and procedures will adhere to the latest relevant available best practice guidance in the event of interactions between fishing activities and the Project.
C-OFF-28	A FLO has been appointed to maintain continued consultation with the fishing industry.
C-OFF-29	A Fisheries Management and Mitigation Strategy (FMMS) will be implemented, detailing the strategy for fisheries consultation throughout the Project timeline.
C-OFF-31	All dropped objects will be reported, and where recovery is possible/the dropped object may cause a hazard, the object will be retrieved
C-OFF-32	In accordance with marine licensing requirements a DSLP will be submitted and approved prior to construction. Confirming layout and relevant design parameters, including the maximum height of WTGs and lighting details. The works will be constructed in accordance with the approved DSLP.
C-OFF-33	Development of and adherence to a LMP, which will confirm compliance with legal requirements with regards to shipping, navigation, and aviation.
C-OFF-42	A VMP will be developed, which will detail the types and numbers of vessels involved in the Project work.
C-OFF-43	Development of a Navigational Safety Plan (NSP), detailing the measures in place for the Project related to navigational safety. This will include Notice to Mariners (via Kingfisher Bulletins or other appropriate methods) of activity in an appropriate timeframe. These notifications will provide details on the positions and nature of the works.
C-OFF-44	Advance warning and accurate location details of construction, maintenance and decommissioning operations, associated Safety Zones and advisory passing distances will be given via Notices to Mariners and Kingfisher Bulletins.
C-OFF-45	Appropriate Safety Zones (e.g., 500m) around offshore substation platforms and WTGs during major works (or up to 200 m during pre-commissioning works) will be applied for and implemented as appropriate.

Commitment Code	Commitment Measure
C-OFF-51	Utilisation of guard vessels (when necessary) to ensure adherence with Safety Zones, advised passing distances, mitigate potential impacts posing risk to surface navigation.

13.4.3 As a result of the commitment to implement these measures, and to align with various standard sectoral practices and procedures, the embedded (primary) commitments are considered inherently part of the design of the Proposed Offshore Development and have, therefore, been included in the assessment presented in **Section 13.5**.

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

13.5 Scoping of Impacts

13.5.1 Potential impact pathways relevant to commercial fisheries which may occur during the construction, O&M, or decommissioning phases of the Proposed Offshore Development have been identified in **Table 13.3**.

Table 13.3: Scoping Assessment for Commercial Fisheries.

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
Construction (and Decommissioning)				
Reduction in access to, or exclusion from established fishing grounds	C-OFF-09 C-OFF-26 C-OFF-27 C-OFF-28 C-OFF-31 C-OFF-44 C-OFF-45 C-OFF-51	Scoped In	Construction and decommissioning activities have potential to create loss of fishing opportunities. This effect is expected to be localised and short term; furthermore, the operational range of relevant fleets will not typically be limited to the Proposed Offshore Development. This effect will be subject to detailed assessment in the EIAR. To confirm the LSE of the effect, further and more detailed analysis of baseline data sources will be undertaken alongside engagement with stakeholders to understand fishing activity in the Proposed Offshore Development.	Possible LSE without secondary commitment measures, however, it may become clear post-Scoping stage that the impact does not require detailed assessment in the EIAR.
Displacement leading to gear conflict and increased fishing pressure on adjacent grounds	C-OFF-29 C-OFF-13	Scoped In	Any reduced access to fishing grounds creates the potential for displacement of fishing activity. This effect is expected to be short-term and localised, and the operational range of relevant fleets will not typically be limited to the Proposed Offshore Development. This effect will be subject to detailed assessment in the EIAR. To confirm the LSE of the effect, further and more detailed analysis of baseline data sources will be undertaken alongside engagement with stakeholders to understand fishing activity in and around the Proposed Offshore Development.	LSE without secondary commitment measures
Disturbance of commercially important fish and shellfish resources leading to	C-OFF-13	Scoped In	Construction and decommissioning activities may lead to disturbance of commercially important fish and shellfish	Possible LSE without secondary commitment measures, however, it may become clear post-Scoping stage that the

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
displacement or disruption of fishing activity			resources and therefore displace or disrupt a range of fishing activity. To confirm the LSE of this effect, further assessment is required; assessment will be informed by the outcomes of the impact assessment in **Chapter 10: Fish and Shellfish Ecology** and it will be assumed that commercial fisheries will be affected as a result of any loss of resources.	impact does not require detailed assessment in the EIAR.
Increased vessel traffic associated with the Proposed Offshore Development within fishing grounds leading to interference with fishing activity	C-OFF-17 C-OFF-42	Scoped In	Movement of vessels associated with the Proposed Offshore Development adding to the existing volume of marine traffic in the area, may lead to interference of fishing activity. To confirm the LSE of this effect, further assessment is required. Assessment will be informed by the outcomes of the shipping and navigation impact assessment (**Chapter 14: Shipping and Navigation**) and Navigational Risk Assessment (NRA).	Possible LSE without secondary commitment measures, however, it may become clear post-Scoping stage that the impact does not require detailed assessment in the EIAR.
Additional steaming to alternative fishing grounds for vessels that would otherwise fish within the Proposed Offshore Development	C-OFF-17 C-OFF-42	Scoped In	This effect will be localised to Safety Zones and therefore limited deviations to steaming routes are expected. Given adequate notification, it is expected that vessels, which typically have an operational range beyond that of the Proposed Offshore Development (as indicated by VMS data presented above), will be in a position to avoid temporary construction/decommissioning areas with no or minimal impact on their steaming times. With embedded commitments in place (**Section 13.4**), no LSE is expected but reflecting feedback received from the Scottish Fishermen's Federation during	Possible LSE without secondary commitment measures, however, it may become clear post-Scoping stage that the impact does not require detailed assessment in the EIAR.

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
			scoping workshop engagement, the impact is Scoped In. All relevant commitments are presented in **Appendix A: Offshore Commitments Register**.	
Operation and Maintenance				
Reduction in access to, or exclusion from established fishing grounds	C-OFF-09 C-OFF-17 C-OFF-26 C-OFF-27 C-OFF-28 C-OFF-29 C-OFF-31 C-OFF-32 C-OFF-33 C-OFF-44 C-OFF-45	Scoped In	Accessibility within the Array Area will be dependent on turbine spacing, turbine layout and foundation type. In particular, mooring systems of floating foundations may affect the ability of commercial fishing fleets in deploying certain gears. This effect will be subject to detailed assessment in the EIAR. To confirm the LSE of the effect, further and more detailed analysis of baseline data sources will be undertaken alongside engagement with stakeholders to understand fishing activity in the Proposed Offshore Development.	LSE without secondary commitment measures
Displacement leading to gear conflict and increased fishing pressure on adjacent grounds	C-OFF-29 C-OFF-13	Scoped In	Any reduced access to fishing grounds creates the potential for displacement of fishing activity. This effect is expected to be localised and the operational range of relevant fleets will not typically be limited to the Proposed Offshore Development. This effect will be subject to detailed assessment in the EIAR. To confirm the LSE of the effect, further and more detailed analysis of baseline data sources will be undertaken alongside engagement with stakeholders to understand fishing activity in and around the Proposed Offshore Development.	LSE without secondary commitment measures

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
Disturbance of commercially important fish and shellfish resources leading to displacement or disruption of fishing activity	C-OFF-13	Scoped In	O&M of the Proposed Offshore Development may lead to disturbance of commercially important fish and shellfish resources, including electromagnetic fields from subsea cables, and changes to habitat, and therefore displace or disrupt a range of fishing activity. To confirm the LSE of this effect, further assessment is required;; assessment will be informed by the outcomes of the fish and shellfish ecology impact assessment (**Chapter 10: Fish and Shellfish Ecology)** and it will be assumed that commercial fisheries will be affected as a result of any loss of resources.	Possible LSE without secondary commitment measures, however, it may become clear post-Scoping stage that the impact does not require detailed assessment in the EIAR.
Increased vessel traffic associated with the Proposed Offshore Development within fishing grounds leading to interference with fishing activity	C-OFF-42 C-OFF-17	Scoped In	Movement of vessels associated with O&M of the Proposed Offshore Development adding to the existing volume of marine traffic in the area, may lead to interference of fishing activity. To confirm the LSE of this effect, further assessment is required; assessment will be informed by the outcomes of the shipping and navigation impact assessment (**Chapter 14: Shipping and Navigation**) and NRA.	Possible LSE without secondary commitment measures, however, it may become clear post-Scoping stage that the impact does not require detailed assessment in the EIAR.
Additional steaming to alternative fishing grounds for vessels that would otherwise fish within the Proposed Offshore Development	C-OFF-42 C-OFF-17	Scoped In	This effect will be localised to safety zones associated with temporary maintenance works on installed structures and therefore limited deviations to steaming routes are expected. Given adequate notification, it is expected that vessels, which typically have an operational range beyond that of the Proposed Offshore Development (as indicated by VMS and ScotMap data presented above), will be in a position to avoid temporary maintenance areas	Possible LSE without secondary commitment measures, however, it may become clear post-Scoping stage that the impact does not require detailed assessment in the EIAR.

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
			around installed infrastructure with no or minimal impact on their steaming times. With embedded commitments in place (**Section 13.4**), no LSE is expected but reflecting feedback received from the Scottish Fishermen's Federation during scoping workshop engagement, the impact is Scoped In. All relevant commitments are presented in **Appendix A: Offshore Commitments Register**.	
Physical presence of infrastructure and potential exposure of that infrastructure leading to gear snagging	C-OFF-44 C-OFF-17 C-OFF-31	Scoped In	Standard industry practice and protocol (e.g., seabed infrastructure will be buried and/or marked on nautical charts) will minimise the risk of gear snagging, but it remains likely to be an area of industry concern. To confirm the LSE of this effect, further assessment is required, which will be informed by engagement with stakeholders. Safety aspects associated with this impact, including damage to property and vessel stability, will be considered within the shipping and navigation impact assessment (**Chapter 14: Shipping and Navigation**) and NRA.	Possible LSE without secondary commitment measures, however, it may become clear post-Scoping stage that the impact does not require detailed assessment in the EIAR.

13.6 Potential Cumulative Impacts

13.6.1 **Chapter 6: EIA Approach and Methodology** details how potential cumulative impacts will be assessed through a CIA and gives examples of the projects which are likely to be included in that assessment.

13.6.2 Offshore wind projects and other activities, such as subsea cables and pipelines, relevant to the assessment of cumulative impacts on commercial fisheries will be identified through a screening exercise. The potential impacts considered in the cumulative assessment as part of EIA will be in line with those described for the project-alone assessment, though it is possible that some will be screened out on the basis that the impacts are highly localised (i.e., they occur only within Proposed Offshore Development boundaries) or where management measures in place for the Proposed Offshore Development and other projects will reduce the risk of impacts occurring. Key potential cumulative impacts are expected to result from a loss or restricted access to established fishing grounds and displacement of fishing activity.

13.6.3 It is recognised that a relatively large number of ScotWind sites have been identified in the North-East region, coupled with existing OWFs in the Moray Firth area that continue to pose ongoing impact to the commercial fisheries sector; notably for the scallop sector. The commercial fisheries CIA will scope in the following impacts which are considered to have regional significance:

- Reduction in access to, or exclusion from established fishing grounds;
- Displacement leading to gear conflict and increased fishing pressure on adjacent grounds; and
- Disturbance of commercially important fish and shellfish resources leading to displacement or disruption of fishing activity.

13.6.4 The CIA for commercial fisheries will consider the MDS for each of the projects, plans and activities in line with the methodology outlined in **Chapter 6: EIA Approach and Methodology**. A study area of the North Sea (ICES divisions 4a,b,c) is proposed for the commercial fisheries CIA. The EIA will further consider the geographic scope of the CIA for certain fleets that may have a wider operational range, such as the scallop dredge and the pelagic trawl fisheries.

13.7 Potential Transboundary Impacts

13.7.1 Transboundary impacts will be considered based on any potential displacement of fishing activity into the nearest EEZ, which is expected to be unlikely based on data presented in this Offshore Scoping Report.

13.8 Proposed Approach to EIA

Additional Data Sources

13.8.1 Detailed analysis of baseline datasets will be undertaken within the EIA to characterise long-term (i.e., over several years) patterns in commercial fisheries activity across the study area and predict potential impacts upon future commercial fishing activities. Data sources include those set out within **Table 13.1** and will additionally be expected to include site specific marine traffic (AIS and radar) data gathered for the Proposed Offshore Development, the results of any fisheries scouting surveys (fishing gear and vessel observations), and data held by the Developer appointed FLO.

13.8.2 Consultation with the commercial fishing industry has been and will continue to be undertaken in order to ground-truth available baseline data and gain further understanding of commercial fisheries activity by smaller vessels across the inshore portion of the study area. Consultation will be undertaken with a number of relevant stakeholders, including the following:

- SFF;
- SWFPA;
- NERIFG;
- Other local fishermen's associations and existing commercial fisheries working groups;
- Individual fishermen as identified by the Company FLO/other means; and
- Any Norwegian and EU Member State representative organisations as identified during baseline data analysis.

13.8.3 Pre-application consultation has been undertaken with SFF, SWFPA and NERIFG representatives, two meetings were held with SFF and SWFPA in 2022: one on 21 September and the other on 17 October, and two further meetings with all three fisheries organisations were held on 24 January and 09 February 2023. These conversations provided an opportunity for knowledge sharing and constructive feedback on RPSS databases, while identifying further opportunities for consultation with commercial fishers. Discussions are ongoing, and the SFF, SWFPA and NERIFG attended the commercial fisheries Scoping Workshop session in November 2023. Feedback was provided at the workshop on the impacts proposed to be Scoped In to and Out of EIA and on the approach to assessing those impacts. In general there was agreement that the approach was appropriate though SFF advised that 'additional steaming' impacts be Scoped In to EIA and this request is reflected in **Table 13.3**. A detailed summary of the consultation undertaken to date, as well as planned future consultation, related to commercial fisheries is presented in **Chapter 4: Consultation**.

13.8.4 Analysis of data and the results of consultation will provide an extended baseline characterisation of the study area, which will underpin and inform the impact assessment.

13.8.5 No site-specific surveys are proposed to inform the commercial fisheries EIAR chapter.

Guidance

13.8.6 In addition to the approach and guidance (of general relevance) outlined in **Chapter 6: EIA Approach and Methodology**, the assessment of potential impacts on commercial fisheries receptors will also comply with the following guidance documents where they are specific to this topic, which are recognised as being current and accepted:

- Good Practice Guidance for assessing fisheries displacement by other licensed marine activities (Xodus, 2022);
- Best Practice Guidance for Fishing Industry Financial and Economic Impact Assessments (United Kingdom Fisheries Economic Network and Seafish, 2012);
- Fisheries Liaison with Offshore Wind and Wet Renewables group (FLOWW) Recommendations for Fisheries Liaison: Best Practice guidance for offshore renewable developers (FLOWW, 2014 and noted to be currently in the process of being updated; BERR, 2008b);

- FLOWW Best Practice Guidance for Offshore Renewables Developments: Recommendations for Fisheries Disruption Settlements and Community Funds (FLOWW, 2015);
- Options and opportunities for marine fisheries mitigation associated with wind farms (Blyth-Skyrme, 2010a);
- Developing guidance on fisheries CIA for wind farm developers (Blyth-Skyrme, 2010b);
- CIA guidelines, guiding principles for cumulative impacts assessments in offshore wind farms (RenewableUK, 2013);
- Guidelines for data acquisition to support marine environmental assessments of offshore renewable energy projects. Contract report: ME5403 (Cefas, 2012);
- Fisheries Liaison Guidelines - Issue 6 (UK Oil and Gas, 2015);
- Fishing and Submarine Cables - Working Together (International Cable Protection Committee, 2009); and
- Offshore Wind Farms - Guidance note for EIA in respect of FEPA and CPA requirements (Cefas, Marine Consents and Environment Unit (MCEU), DEFRA and Department of Trade and Industry, 2004).

Assessment Methodology

13.8.7 The EIA will follow the general Proportionate EIA approach outlined in **Chapter 6: EIA Approach and Methodology** of this Offshore Scoping Report (also presented in **Appendix C: Proportionate EIA Position Paper**). Definitions specific to commercial fisheries in relation to assessing the sensitivity of the receptor and magnitude of an impact will be provided to frame the assessment.

13.8.8 To explore trends in fishing patterns, the EIA will typically analyse five years of baseline data based on the most up to date data available for each particular data source at the time of analysis. Where appropriate, a longer timeline of data will be assessed; specifically, it is proposed to assess ten years of data for the king scallop fishery to take account of the cyclical nature of scallop grounds that typically produce higher yields every five to seven years.

13.8.9 Where relevant, impact assessment will be informed by the outcomes of the fish and shellfish ecology and shipping and navigation assessments.

13.8.10 Impacts will be assessed for each relevant fleet/fishery Scoped In to EIA, and where relevant, impacts associated with the Array Area and the Offshore ECC Study Area will be separately assessed.

13.9 Scoping Questions

13.9.1 The following questions refer to the commercial fisheries chapter and are designed to inform the Scoping Opinion and focus the Scoping exercise:

1. Do you agree with the study areas defined for commercial fisheries?
2. Do you agree with the use of data listed in **Table 13.1** being used to inform the Offshore EIAR?
3. Are there any further data sources or guidance documents that should be considered?

4. Do you agree that all receptors, pathways, and potential impacts related to commercial fisheries have been identified?
5. Do you agree with the Scoping In and Scoping Out of impact pathways in relation to commercial fisheries?
6. Do you agree with the assessment of transboundary effects in relation to commercial fisheries?
7. Do you agree with the assessment of cumulative effects in relation to commercial fisheries?
8. Do you agree with the proposed assessment methodology for commercial fisheries?
9. Do you agree on the suitability of the proposed commitments to reduce or eliminate LSE relevant to commercial fisheries?

14 Shipping and Navigation

14.1 Introduction

14.1.1 This chapter considers the potential impacts from the construction, O&M, and decommissioning of the Proposed Offshore Development on shipping and navigation receptors (users).

14.1.2 There is potential for the Proposed Offshore Development to result in various adverse effects on the shipping and navigation receptors. The associated activities may lead to increased collision and allision risk (possibly as a result of displacement), reduced access to established ports and harbours, risk of interaction (of anchor and fishing gear) with subsea cables and mooring lines, interference with navigation and communications equipment, and reduction in Search and Rescue (SaR) capability.

14.1.3 The key stakeholders concerned with shipping and navigation include the MCA, NLB, and the UK Chamber of Shipping as presented in **Chapter 4: Consultation**.

14.1.4 This chapter should be read alongside the following chapters:

- **Chapter 13: Commercial Fisheries**, which considers the impacts associated with active fishing;
- **Chapter 16: Military and Civil Aviation**, which considers the impacts associated with aviation navigation; and
- **Chapter 20: Other Human Activities**, which considers the impacts of the activity or access displacement of other marine users receptors.

14.1.5 This chapter of the Offshore Scoping Report has been prepared by Anatec Ltd.

14.2 Study Area

14.2.1 The assessment within this chapter has been undertaken within a study area defined as a 10 nm buffer of the Array Area as presented in **Figure 14.1** (hereafter referred to as the shipping and navigation study area). This is an industry accepted buffer (i.e., typically used in publicly available NRAs)) used for shipping and navigation assessments as it captures relevant routeing in the area that may be affected, whilst remaining site-specific to the Proposed Offshore Development. The Offshore ECC Study Area will be 5 nm around the proposed Offshore ECC excluding the area about Mean High Water Springs and the study area for the HVAC booster station search area study area will be 10 nm (location to be defined post Scoping).

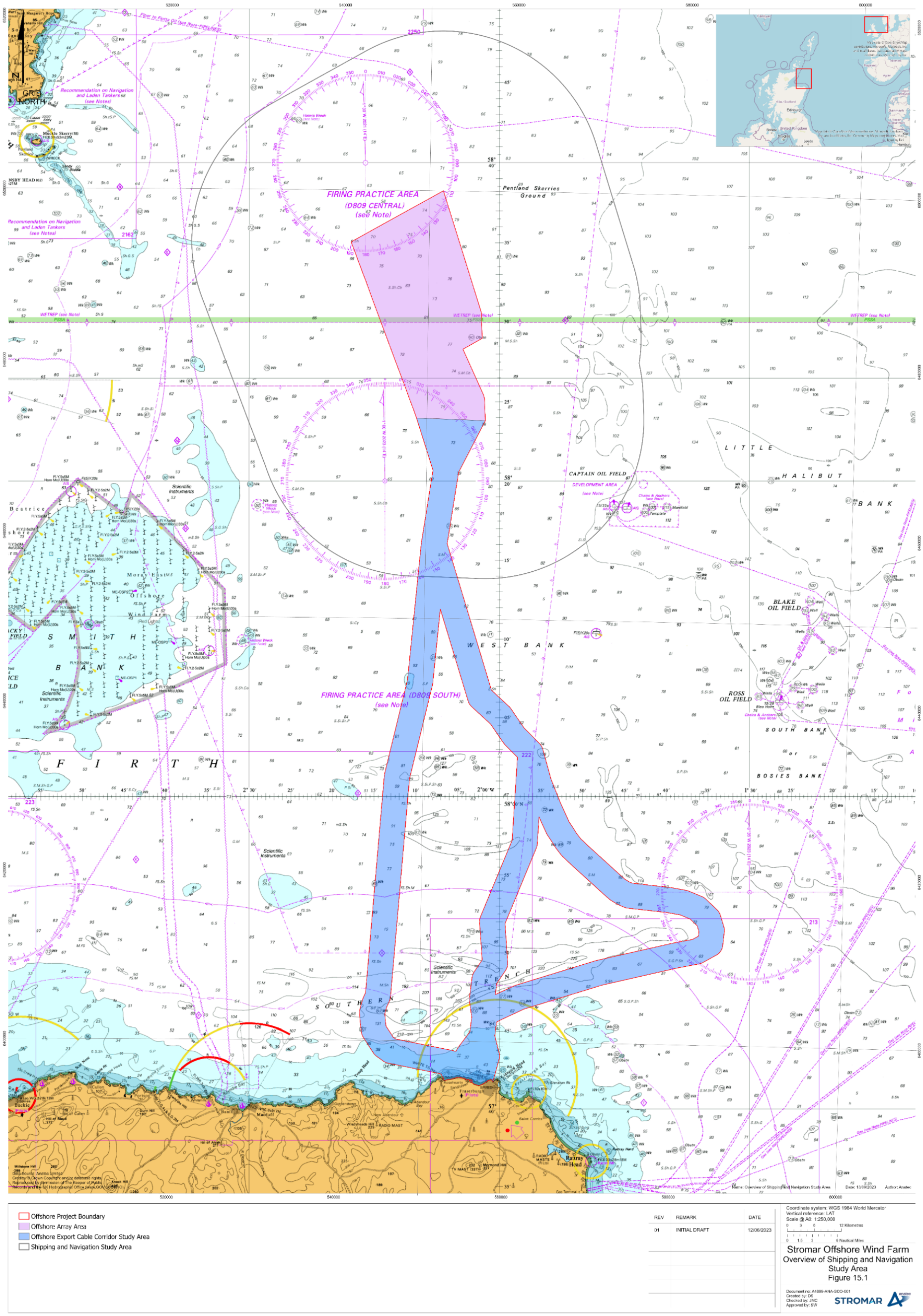


Figure 14.1: The Proposed Offshore Development Shipping and Navigation Study Area.

14.3 Baseline Environment

Data Sources

14.3.1 The data sources that have been used to inform the shipping and navigation chapter are presented within **Table 14.1**. These identified data sources will be taken forward and used to inform the subsequent EIA and NRA, alongside additional desktop (see **Table 14.4**) and site-specific survey data that will be collected for the Proposed Offshore Development.

Table 14.1: Key Sources of Shipping and Navigation Data.

Source, Author and Year	Summary	Coverage of the Array Area and Offshore ECC Study Area	Data Quality
Anatec Limited (2022), Automatic Identification System data	28 Days of AIS data (16 - 29 July 2022 and 03 – 16 December 2022) collected from coastal and offshore receivers.	Full coverage of the shipping and navigation study area. Additional vessel traffic survey data for the Offshore ECC Study Area will be considered in the NRA (see **Section 14.8**).	Medium - data will be updated for the assessment with Marine Guidance Note (MGN) 654 compliant surveys to ensure non-AIS vessels are captured.
United Kingdom Hydrographic Office (UKHO) (2022/2023), Admiralty charts	UKHO Admiralty Charts 222-0, 213-0, 115-0, 1942-0.	Full coverage of the Array Area and full coverage of the Offshore ECC Study Area.	High
UKHO (2022), Admiralty Sailing Directions	NP52 Admiralty Sailing Directions North Coast of Scotland Pilot (UKHO, 2022).	Full coverage of the Array Area and full coverage of the Offshore ECC Study Area.	High
Stromar site-specific shipping and navigation surveys	Site-specific shipping and navigation data collected from the Array Area, with the first survey commencing in Winter 2023 (and the second planned for Summer 2024).	Full coverage of the Array Area and partial coverage of Offshore ECC Study Area.	High data quality anticipated.
Additional 12 months of AIS data	As requested in previous Scoping Opinions, an additional 12 months of AIS data will be acquired and analysed for inclusion in the EIAR.	Full coverage of the Array Area and Offshore ECC Study Area.	High data quality anticipated.

Description of Baseline Environment

14.3.2 An understanding of the baseline environment within the shipping and navigation study area has been developed from utilisation of the available literature and data sources presented in **Table 14.1**.

Navigational Features

14.3.3 **Figure 14.2** presents the charted navigational features in the vicinity of the Proposed Offshore Development. Focus has primarily been given to those within the shipping and navigation study area; however, other navigational features that are outside of the shipping and navigation study area have also been considered and, if deemed to be of particular relevance, are presented and discussed.

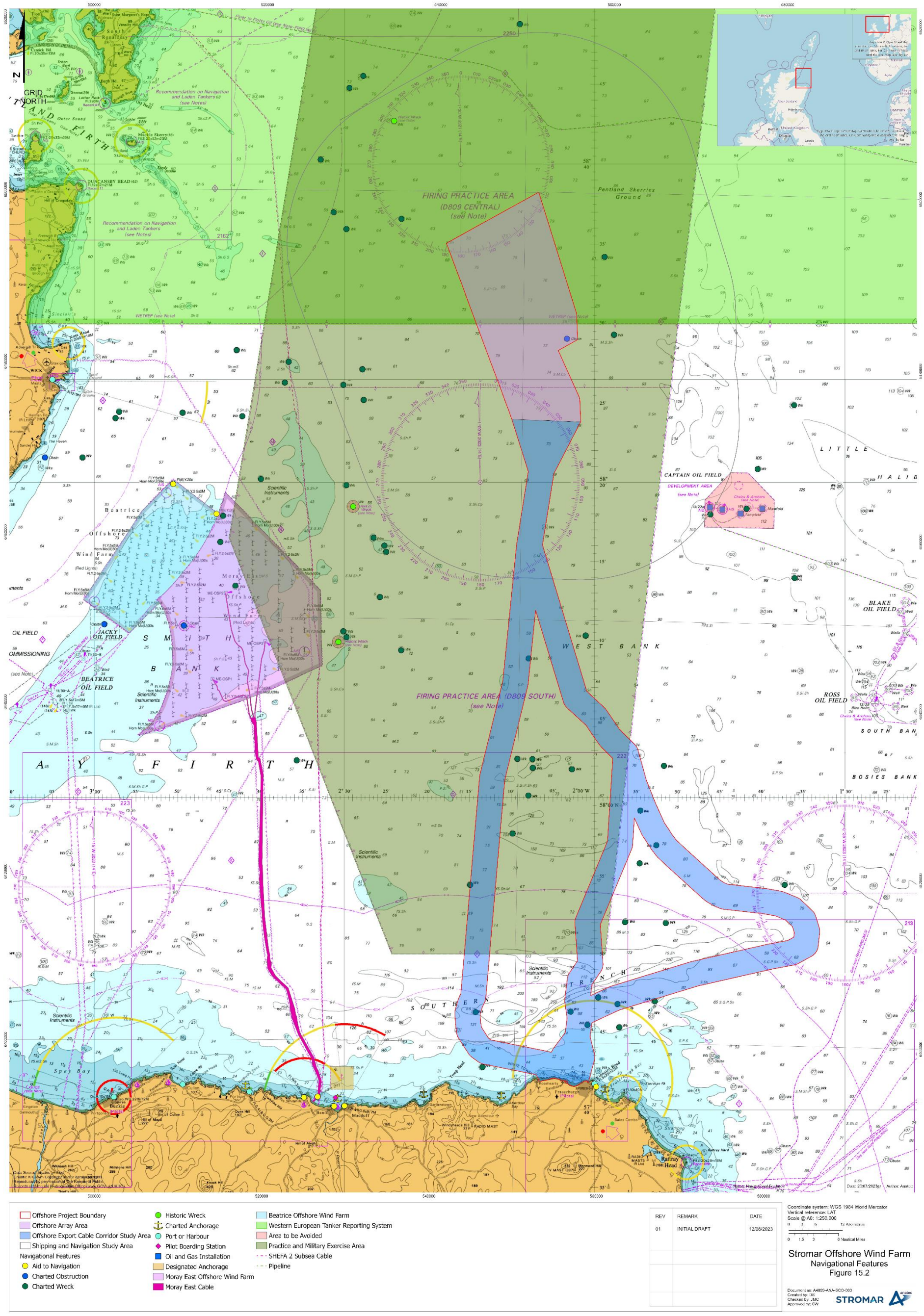


Figure 14.2: Navigational Features.

14.3.4 There is a single charted navigational feature within the Array Area; an obstruction at a depth of 90 m below CD, located at the Array Area's eastern extent and within 700 m of its boundary. Within the broader shipping and navigation study area, there are nine charted wrecks with seven of these located to the west of the Array Area and the other two to the east.

14.3.5 In addition, there is a charted historic wreck located 8.3 nm to the northwest of the Array Area and a pipeline connecting the Piper Oil Field (to the east) and Orkney (to the northwest) that passes approximately 4.1 nm to the north of the Array Area (shown in **Figure 14.2**).

14.3.6 The Western European Tanker Reporting System (WETREP) area overlaps the northern half of the shipping and navigation study area. This applies to all oil tankers of greater than 600 tonnes deadweight carrying:

- Heavy crude oil;
- Heavy fuel oils; and
- Bitumen and tar and their emulsions.

14.3.7 It is noted that given only tankers are required to report, it is not expected that the WETREP will have any impact on any construction operations within the Array Area. However further consultation would be required with the MCA to determine any specific requirements.

14.3.8 Two Military Practice and Exercise Areas overlap the shipping and navigation study area, and are shown in more detail in **Chapter 16: Military and Civil Aviation** (**Figure 16.6** shows the restricted airspace/danger areas). No restrictions are placed on the right to transit through these areas at any time, and they are operated using a clear range procedure (exercises and firing only takes place when the areas are considered to be clear of all shipping).

14.3.9 Note that there are navigational features beyond the shipping and navigation study area but in sufficiently close proximity to warrant consideration, and these are also presented in **Figure 14.2**. The Captain Oil Field, which is contained within an Area to be Avoided and includes Oil and Gas (O&G) installations, is located at a minimum distance of approximately 9.3 nm to the southwest of the Array Area. Fishing vessels are strongly advised to keep outside of the area, although they have been recorded entering/exiting the area as seen in **Figure 14.3.**

14.3.10 The SHEFA-2 subsea cable runs from Orkney to Banff, passing within approximately 10.4 nm to the west of the Array Area. The Moray East OWF and Beatrice OWF are located at minimum distances of approximately 16.2 nm and 19.5 nm, respectively. There are nine charted wrecks within the Offshore ECC Study Area. Fraserburgh Harbour is the closest harbour/port to its landfall, located 0.4 nm to its east.

Vessel Traffic

14.3.11 **Figure 14.3** presents the vessels recorded within the shipping and navigation study area during the 28-day period, colour-coded by vessel type.

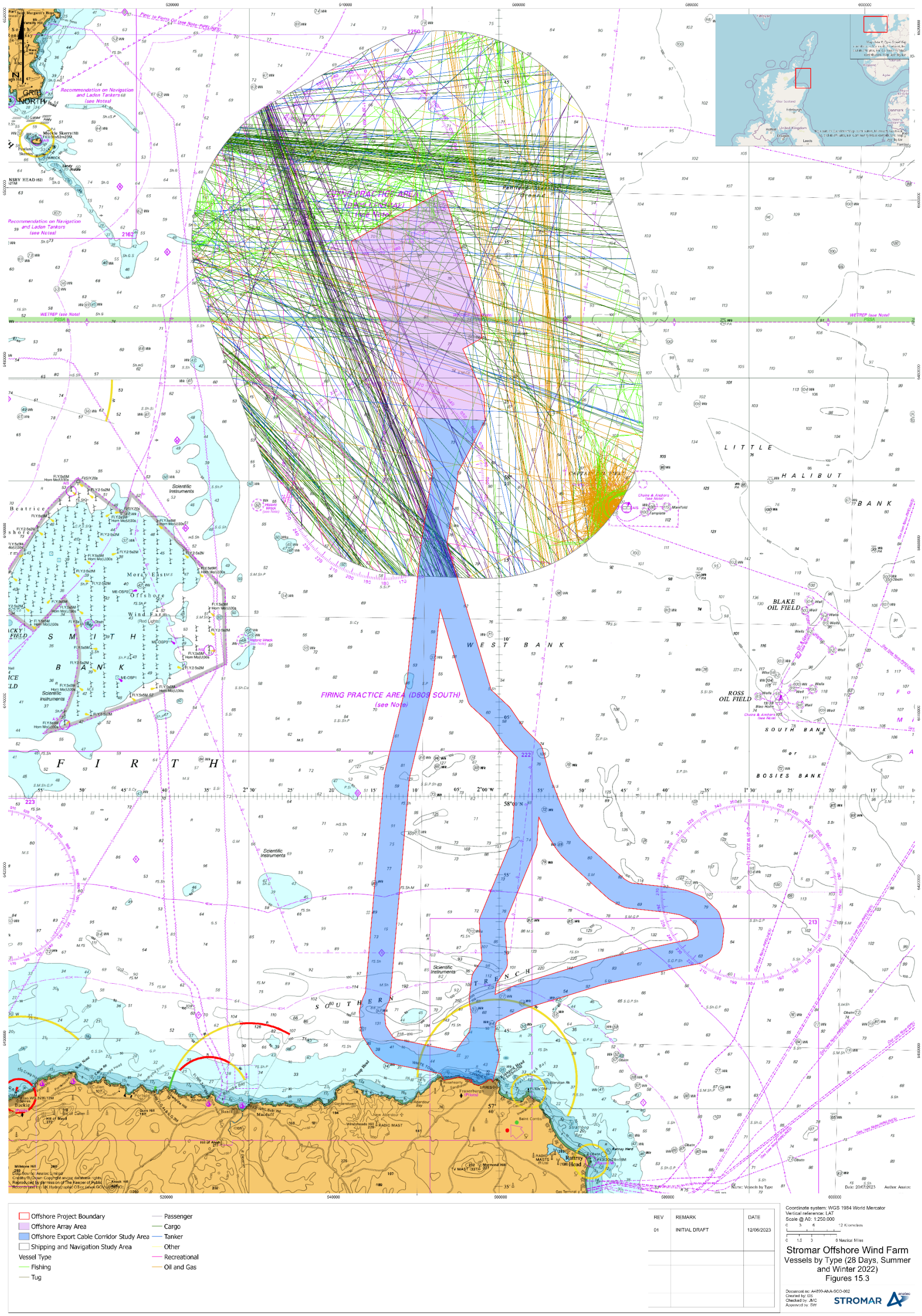


Figure 14.3: Vessels by Type (28 Days, Summer and Winter 2022).

14.3.12 During the summer, there was an average of 20 unique vessels per day recorded within the shipping and navigation study area and four to five per day within the Array Area itself. During the winter, this was 17 to 18 per day within the shipping and navigation study area and two to three within the Array Area itself.

14.3.13 The most common vessel type recorded during the 28-day period was cargo vessels. Cargo vessels were mainly seen undertaking an east/west route to the north of the Array Area as well as northwest/southeast routes to the west and southwest of the Array Area.

14.3.14 This was followed by fishing vessels, which were seen exhibiting active fishing behaviour within the northern extent of the Array Area as well as to its northeast, northwest and southeast. Also common were O&G vessels, which were primarily associated with the Catcher Oil Field to the southeast of the Array Area.

14.3.15 Passenger vessels were primarily seen undertaking a northwest/southeast route to the west of the Array Area. Recreational vessels were entirely recorded during the summer period, and primarily inshore of the Array Area. Tankers were seen throughout the shipping and navigation study area, primarily in east/west transit.

14.4 Embedded Commitments

14.4.1 The Proposed Offshore Development has adopted various primary commitments (primary design principles intrinsically part of the Project design, installation techniques and engineering designs/modifications) as part of the pre-application phase to eliminate and/or reduce LSE arising from a number of impacts (as far as possible). These are outlined in **Appendix A: Offshore Commitments Register**. Further commitments (imposed as a result of legislative requirements and/or standard sectoral practice, regardless of EIA assessment), referred to as tertiary commitments are embedded as an inherent aspect of the EIA process. Secondary commitments (which require further activity to achieve anticipated outcome- often secured through planning conditions and/or management plans) are incorporated to reduce LSE to environmentally acceptable levels following initial assessment, i.e., so that residual effects are reduced to environmentally acceptable levels.

14.4.2 The commitments adopted by the project in relation to shipping and navigation are presented in **Table 14.2**. The full list of commitments can be found in **Appendix A: Offshore Commitments Register**.

Table 14.2: The Proposed Commitments Relevant to Shipping and Navigation Receptors.

Commitment Code	Commitment Measure
C-OFF-02	Minimum blade clearance of 30 m above HAT. HAT used due to floating nature of turbine technology.
C-OFF-13	A PEMP will be developed, to include a Marine Pollution Contingency Plan and INNS Management Plan. This PEMP will also include information on chemical usage, dropped objects, and waste management.
C-OFF-17	CBRA surveys will be undertaken. Where sufficient burial is not achievable, suitable implementation and monitoring or cable protection will be developed.

Commitment Code	Commitment Measure
C-OFF-33	Development of and adherence to a LMP, which will confirm compliance with legal requirements with regards to shipping, navigation, and aviation.
C-OFF-39	Buoys will be deployed at construction sites in accordance with NLB guidance and advice.
C-OFF-40	The Project will be appropriately marked on aeronautical and admiralty charts, including provisions of the position and height of structures to the UKHO, CAA, MOD, and Defence Geographic Centre (DGC).
C-OFF-41	Compliance with regulatory expectations on moorings for floating wind and marine devices e.g., MCA and Health and Safety Executive (HSE), 2017
C-OFF-43	Development of a NSP, detailing the measures in place for the Project related to navigational safety. This will include Notice to Mariners (via Kingfisher Bulletins or other appropriate methods) of activity in an appropriate timeframe. These notifications will provide details on the positions and nature of the works.
C-OFF-45	Appropriate Safety Zones (e.g., 500m) around offshore substation platforms and WTGs during major works (or up to 200 m during pre-commissioning works) will be applied for and implemented as appropriate.
C-OFF-51	Utilisation of guard vessels (when necessary) to ensure adherence with Safety Zones, advised passing distances, mitigate potential impacts posing risk to surface navigation.
C-OFF-47	All Project vessels will comply with international marine regulations (as adopted by the Flag State), notably the International Regulations for Preventing Collisions at Sea (IMO, 1974) and the International Convention for the Safety of Life at Sea (SOLAS) (IMO, 1974).
C-OFF-48	Compliance with Marine Guidance Note (MGN) 654 (MCA, 2021) and its annexes where applicable
C-OFF-49	Effective marine coordination and communication will be implemented to manage Project vessel movements.

14.4.3 As a result of the commitment to implement these measures, and to align with various standard sectoral practices and procedures, the embedded (primary) commitments are considered inherently part of the design of the Proposed Offshore Development and have, therefore, been included in the assessment presented in **Section 14.5**.

14.5 Scoping of Impacts

14.5.1 Potential impacts (hazards) relevant to shipping and navigation which may occur during the construction, O&M or decommissioning phases of the Proposed Offshore Development have been identified in **Table 14.3**. It is noted that no impacts (hazards) have been Scoped Out at this stage as the MCA require assessment to be undertaken at NRA stage. There were no 'Possible LSE' impacts identified for shipping and navigation.

Table 14.3: Scoping Assessment for Shipping and Navigation.

Impact (Hazard)	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
All Phases				
Increased vessel to vessel collision risk resulting from displacement (third party to third party). Displacement will also consider increased journey times and distances.	C-OFF-02 C-OFF-13 C-OFF-17 C-OFF-45 C-OFF-47 C-OFF-48 C-OFF-51	Scoped In	Baseline vessel traffic data indicates that certain vessels are likely to deviate to pass around the Array Area or buoyed construction/decommissioning area, and as such collision risk in the area may increase. Non-AIS traffic will need to be considered and quantitative modelling undertaken to assess the risk.	LSE without secondary commitment measures.
Increased vessel to vessel collision risk resulting from displacement (third party to Project vessel).	C-OFF-02 C-OFF-13 C-OFF-17 C-OFF-45 C-OFF-47 C-OFF-48 C-OFF-49 C-OFF-51	Scoped In	The increased levels of vessel traffic in the area associated with the construction, O&M and decommissioning of the Array Area may lead to increased collision risk (third party vessel to Project vessel).	LSE without secondary commitment measures.
Vessel to structure Allision risk.	C-OFF-02 C-OFF-13 C-OFF-33 C-OFF-40 C-OFF-48 C-OFF-51	Scoped In	The presence of surface structures will create new Allision risk to vessels under power or Not Under Command. Non-AIS traffic will need to be considered and quantitative modelling undertaken to assess the risk.	LSE without secondary commitment measures.

Impact (Hazard)	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
Reduced access to local ports and harbours.	C-OFF-02 C-OFF-17 C-OFF-47 C-OFF-48	Scoped In	Project vessel transits and activities may impact access to local ports and harbours.	LSE without secondary commitment measures.
Operations and Maintenance Phase				
Reduction of under keel clearance as a result of subsea infrastructure.	C-OFF-17 C-OFF-33 C-OFF-48 C-OFF-51	Scoped In	The presence of subsea infrastructure (e.g., cable protection) may lead to an increase in under keel interaction risk. Non-AIS traffic will need to be considered.	LSE without secondary commitment measures.
Anchor and fishing gear interaction (navigation safety) with subsea cables.	C-OFF-13 C-OFF-17 C-OFF-40 C-OFF-48 C-OFF-51	Scoped In	The presence of subsea cables may lead to an increase in anchor and fishing gear interaction risk. Non-AIS traffic will need to be considered.	LSE without secondary commitment measures.
Anchor and fishing gear interaction (navigation safety only) with mooring lines.	C-OFF-13 C-OFF-17 C-OFF-40 C-OFF-41 C-OFF-48 C-OFF-51	Scoped In	The presence of mooring lines may lead to an increase in anchor and fishing gear interaction risk. Non-AIS traffic will need to be considered.	LSE without secondary commitment measures.
Loss of station.	C-OFF-17 C-OFF-40 C-OFF-41 C-OFF-48	Scoped In	In the event of mooring line failure, the floating structures would create a collision risk to passing traffic.	LSE without secondary commitment measures.

Impact (Hazard)	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
	C-OFF-51			
Interference with navigation, communications, and position-fixing equipment.	C-OFF-48 C-OFF-17	Scoped In	The Array Area infrastructure (e.g., WTGs, subsea cables) may impact on equipment onboard vessels, including potential effects of electromagnetic interference from cables.	LSE without secondary commitment measures.
Reduction of SaR capability.	C-OFF-48 C-OFF-17 C-OFF-47	Scoped In	There may be an increase in incident rates associated with the Array Area which may lead to a reduction in SaR capability. The layout of the structures may also impact access for SaR responders in the area.	LSE without secondary commitment measures.

14.6 Potential Cumulative Impacts

14.6.1 All impacts (hazards) identified on an in-isolation basis will be considered within the NRA for the potential for cumulative effects.

14.6.2 In terms of cumulative projects to be included, other developments within 50 nm of the Array Area will be Screened In or Out of the cumulative assessment based on a number of factors, including:

- Status of development;
- Data confidence level;
- Proximity to the Array Area; and
- Location relative to routeing passing the Array Area.

14.6.3 Projects likely to be included in the cumulative assessment are Caledonia OWF, Broadshore OWF, Buchan OWF and Ayre OWF.

14.6.4 Beatrice OWF, Moray East OWF and Moray West OWF will be considered within the baseline data assessment given that they are in construction or operational and already influence traffic movements within the area.

14.7 Potential Transboundary Impacts

14.7.1 It is considered that there is the potential for transboundary impacts (hazards) upon shipping and navigation due to construction, O&M, and decommissioning impacts of the Array Area. These will be considered within the in-isolation assessment given the international nature of vessel routeing (i.e., routeing to/from international ports or internationally owned/operated vessels), and cumulatively with the presence of other offshore developments and activities within the cumulative assessment. Further consideration will be undertaken within the NRA.

14.8 Proposed Approach to EIA

Additional Data Sources

14.8.1 In addition to the data sources listed in **Section 14.3**, the data sources listed in **Table 14.4** below will be required.

Table 14.4: Additional Data Sources.

Data	Source(s)	Purpose
Vessel traffic	28 days' seasonal vessel traffic survey data of the Array Area study area collected on site and consisting of AIS, radar and visual observations for the shipping and navigation study area.	To characterise vessel traffic within and in proximity to the Array Area study area in accordance with MGN 654 (MGN, 2021) requirements and as agreed with the MCA.
	28 days' seasonal AIS for the Offshore ECC study area shipping and navigation study area.	To characterise vessel traffic within and in proximity to the ECC study area in accordance with MGN 654 (MGN, 2021) requirements and as agreed with the MCA.

Data	Source(s)	Purpose
	3 months of winter AIS for the HVAC booster station shipping and navigation study area.	To characterise vessel traffic within and in proximity to the HVAC booster station search area and allow refinement to a smaller study area as agreed with the MCA.
	14 days of summer vessel traffic survey data of the HVAC booster station shipping and navigation study area collected on site and consisting of AIS, radar and visual observations for the shipping and navigation study area.	To characterise vessel traffic within and in proximity to the HVAC booster station shipping and navigation study area in accordance with MGN 654 (MGN, 2021) requirements and as agreed with the MCA.
	12 months' AIS data for the shipping and navigation study area.	Validation of vessel traffic surveys and characterisation of long-term effects.
	Anatec's *ShipRoutes database.*	Secondary source for characterising vessel traffic, including cumulatively within and in proximity to the Array Area.
Maritime Incidents	Maritime Accident Investigation Branch marine accidents database.	Review of maritime incidents within and in proximity to the Proposed Offshore Development.
	Royal National Lifeboat Institution incident data.	
	Department for Transport United Kingdom (UK) civilian SaR helicopter taskings.	
Marine aggregate dredging	Marine aggregate dredging areas (licenced and active).	Given the Proposed Offshore Development sits within Scottish Waters it is not likely that there are any relevant marine aggregate dredging sites however the data will be checked to confirm.
Recreational traffic density and features	UK Coastal Atlas of Recreational Boating 2.1 (Royal Yachting Association (RYA), 2019a).	Characterising recreational activity within and in proximity to the Proposed Offshore Development.
Meteorological Data	Client-provided weather data.	Characterising weather conditions in proximity to the Array Area for use as input in the collision and Allision risk modelling.
	Case studies of past weather events.	Identifying periods of adverse weather in proximity to the Proposed Offshore Development.

Guidance

14.8.2 The shipping and navigation offshore EIA Report will follow the methodology set out in the following guidance documents:

- MGN 654 OREIs – Guidance on UK Navigational Practice, Safety and Emergency Responses and its Annexes (MCA, 2021a);
- IMO guidelines for Formal Safety Assessment (FSA) (IMO, 2018);

- International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) Guidance G1162 on the Marking of Man-Made Offshore Structures (IALA, 2021);
- MGN 372 Amendment 1 OREIs – Guidance to Mariners Operating in the Vicinity of UK OREIs (MCA, 2022);
- The RYA's Position on Offshore Energy Developments: Paper 1 – Wind Energy (RYA, 2019b); and
- MCA and HSE Regulatory Expectations on Moorings for Floating Wind and Marine Devices (MCA and HSE, 2017).

Assessment Methodology

14.8.3 As per the methodology stated in the MCA methodology (Annex 1 to MGN 654) (MCA, 2021a), an NRA should be undertaken where impacts (hazards) will be assessed on a preliminary basis to identify the impacts (hazards) that should be included within the EIA. Given that the NRA includes a set of criteria under MGN 654 (MCA, 2021a) which must be considered, no impact (hazard) will be Scoped Out at this Scoping stage i.e., all impacts will be considered within the NRA process.

14.8.4 The IMO FSA Methodology (IMO, 2018) is the internationally recognised approach for assessing impacts (hazards) to shipping and navigation receptors (users), and is the approach required under MGN 654 (MCA, 2021a). It is noted that this methodology differs to that used in the other EIA chapters, however it is the methodology required by the relevant regulatory bodies; the methodology is well defined and current. This methodology is centred on risk control and assesses each impact (hazards) in terms of its frequency and consequence in order that its significance can be determined as 'broadly acceptable', 'tolerable', or 'unacceptable'. Any impact (hazards) assessed as 'unacceptable' will require additional environmental commitment measures implemented beyond those considered embedded to reduce the impact (hazards) to within 'tolerable' or 'broadly acceptable' parameters.

14.8.5 The frequency and consequence of each impact (hazards) will be assessed, with significance then determined via a risk matrix approach (**Table 14.5**). 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 environmental measures in place;
- Lessons learnt from other OWF projects;
- Level of stakeholder concern; and
- Outputs of consultation.

14.8.6 The following scenarios will be considered as pre the requirements of MGN 654:

- Base case without Proposed Offshore Development;
- Base case with Proposed Offshore Development;
- Future case without Proposed Offshore Development; and
- Future case with Proposed Offshore Development.

Table 14.5: Risk Matrix.

Frequency	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				

14.9 Scoping Questions

14.9.1 The following questions refer to the shipping and navigation chapter and are designed to inform the Scoping Opinion and focus the Scoping exercise.

1. Do you agree with the study area defined for shipping and navigation?
2. Do you agree with the use of data listed in **Section 14.3**, and any additional data listed in **Section 14.8**, being used to inform the Offshore EIAR?
3. Are there any further data sources or guidance documents that should be considered?
4. Do you agree that all receptors (users) and potential impacts (hazards) related to shipping and navigation have been identified?
5. Do you agree with the Scoping In of impact (hazards) in relation to shipping and navigation?
6. Do you agree with the assessment of transboundary effects in relation to shipping and navigation?
7. Do you agree with the assessment of cumulative effects in relation to shipping and navigation?
8. Do you agree with the proposed assessment methodology for shipping and navigation?
9. Do you agree on the suitability of the proposed commitments to reduce or eliminate LSE relevant to shipping and navigation?
10. Do you have any additional comments relating to the use of floating WTG technology specifically and potential associated additional commitment options (e.g., operational safety zones) in relation to navigational safety impacts?

15 Marine Archaeology and Cultural Heritage

15.1 Introduction

15.1.1 This chapter of the Offshore Scoping Report identifies the known and potential marine archaeology and cultural heritage assets of relevance to the Proposed Offshore Development and will consider the potential for significant effects on these assets that may arise from the construction, O&M, and decommissioning phases of the Proposed Offshore Development.

15.1.2 There is potential for activities associated with the Proposed Offshore Development to result in adverse effects on marine archaeology and cultural heritage receptors. The key impacts of relevance include direct damage to submerged prehistoric landscapes and other marine heritage receptors including maritime and aviation assets, and also indirect impacts to these assets caused by changes to seabed sediment (reduction or accretion) due to physical disturbance activities. Direct and indirect impacts may also affect the setting of marine heritage assets impacting their archaeological significance.

15.1.3 This chapter should be read alongside **Chapter 7: Marine and Coastal Processes**. This chapter assesses sediment transport and scouring that may cause bathymetric changes; the results of which are important for understanding the potential indirect impact that the development infrastructure may have on marine archaeology and cultural heritage assets.

15.1.4 The onshore elements of archaeology and cultural heritage are reported within the separate Onshore Scoping Report (Ørsted, 2023a) and covers the onshore infrastructure down to MLWS. Marine archaeology and cultural heritage in the intertidal zone, between MLWS and MHWS, will therefore be discussed both within this chapter and within the Onshore Scoping Report.

15.1.5 This chapter of the Offshore Scoping Report has been prepared by Wessex Archaeology.

15.2 Study Area

15.2.1 The marine archaeology and cultural heritage study area is defined by a 500 m buffer around the extent of the Offshore Project Boundary. At the landfall, the study area extends to the MHWS mark. The study area is shown on **Figure 15.1**.

15.2.2 The 500 m buffer enables marine archaeological seabed assets that are located close to the boundary of the study area to be included in the assessment, as the features themselves or their potential mitigation measures may extend into the Offshore Project Boundary and could potentially be impacted.

15.2.3 The study area will be subject to review and may be amended during subsequent phases of the Project in response to a refinement in the positioning of development infrastructure and the identification of additional constraints, which may be environmental and/or engineering related.

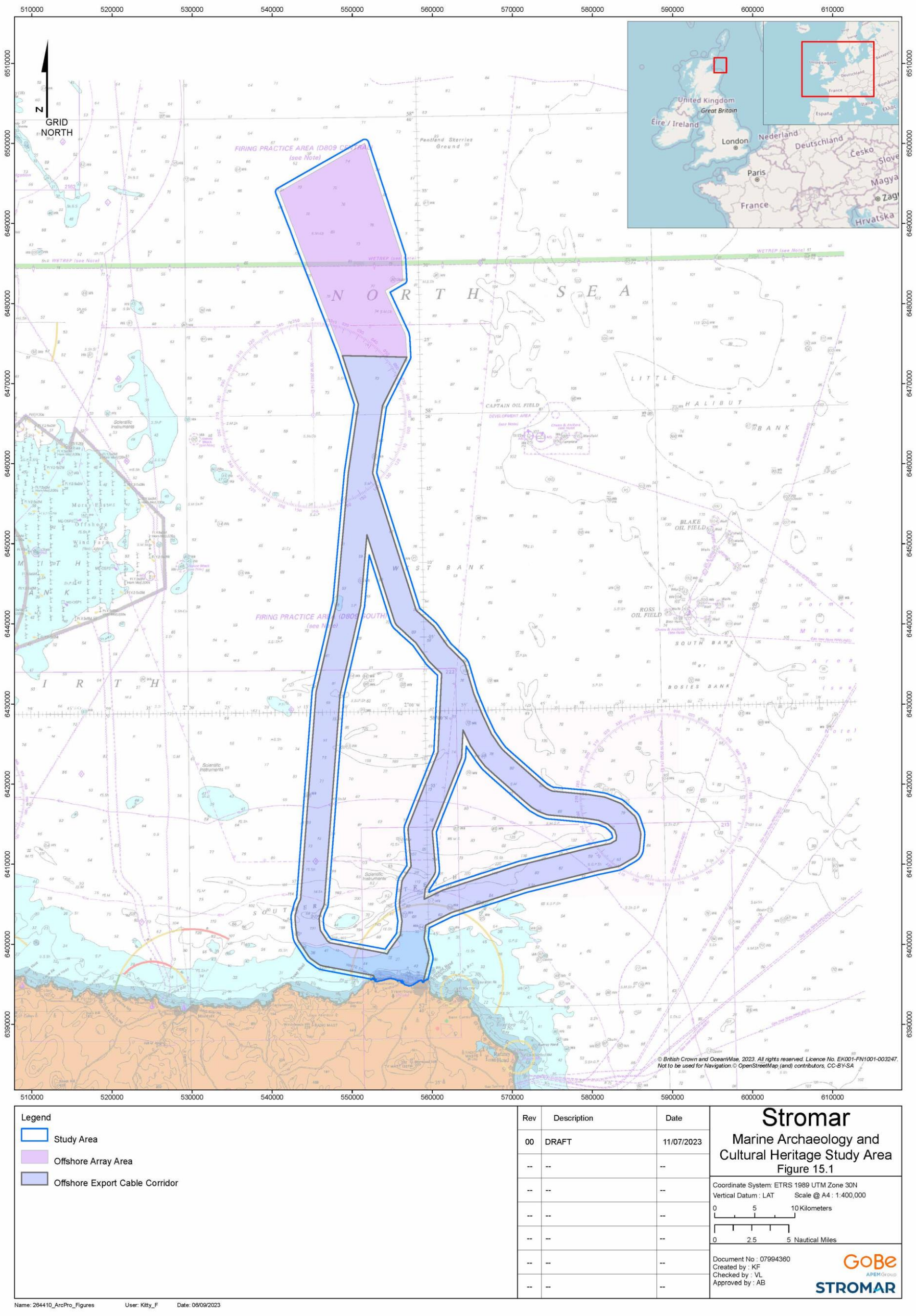


Figure 15.1: The Proposed Offshore Development Marine Archaeology and Cultural Heritage Study Area.

15.3 Baseline Environment

Data Sources

15.3.1 For the purposes of this Offshore Scoping Report a desk-based review of the known and potential resource was undertaken using relevant spatial and scientific data sources.

15.3.2 The data sources that have been used to inform the marine archaeology and cultural heritage chapter are presented within

15.3.3 **Table** 15.1. These identified data sources will be taken forward and used to inform the subsequent EIA.

15.3.4 The data sources used in this assessment have been presented in Universal Transverse Mercator (UTM) Zone 30 North projected from a European Terrestrial Reference System 1989 (ETRS89) datum.

Table 15.1: Key Sources of Marine Archaeology and Cultural Heritage Data.

Source, Author and Year	Summary	Coverage of the Array Area and Offshore ECC Study Area	Data Quality
UKHO (2023), Wrecks and obstructions. Records were requested directly from the UKHO https://www.admiralty.co.uk/access-data/marine-data	Dataset comprising wrecks and obstructions collected and maintained for navigational purposes.	Records exist within the Array and the Offshore ECC Study Area.	Records were supplied by the UKHO on 19 May 2023 and the dataset has not been updated since. Positions were provided in WGS84 latitude/longitude and were converted using ArcGIS Pro to ETRS89 UTM 30N.
National Record of the Historic Environment (Canmore) (2023). https://canmore.org.uk/	Compiled and managed by Historic Environment Scotland (HES), this dataset comprises terrestrial and marine archaeological sites, find spots and archaeological/survey events.	Records exist within the Array and the Offshore ECC Study Area.	Records were downloaded from the HES data portal (https://portal.historicenvironment.scot/downloads/canmore) on 15 June 2023 and the dataset has not been updated since. Positions were downloaded in WGS84 latitude/longitude and were converted using ArcGIS Pro to ETRS89 UTM 30N.
Aberdeenshire Historic Environment Record (HER) (2023), Archaeology Service HER. Records were requested directly from Aberdeenshire HER https://online.aberdeenshire.gov.uk/smrpub/	Maintained by Aberdeenshire Council Archaeology Service, this dataset comprises records relating to archaeological and historical information including archaeological sites, find spots and events.	Records exist within the Offshore ECC Study Area only.	Records were supplied by Aberdeenshire HER on 03 July 2023 and the dataset has not been updated since. Positions were provided in British National Grid E/N and were converted using ArcGIS Pro to ETRS89 UTM 30N.
HES' Scheduled Monuments (including protected wrecks)	Nationally important monuments and sites including those in the	The dataset covers Scotland – no records are within the study area.	Records were downloaded in June 2023 and the dataset has not been

Source, Author and Year	Summary	Coverage of the Array Area and Offshore ECC Study Area	Data Quality
Records were downloaded from the National Marine Plan interactive (NMPi) website https://marine.gov.scot/maps/1472	marine area, legally protected by the Ancient Monuments and Archaeological Areas Act 1979.		updated since. No records are located within the study area.
Scottish Government (Marine Directorate)'s protected wrecks Records were downloaded from the National Marine Plan interactive (NMPi) website https://marine.gov.scot/maps/628	Aircraft and ships designated under the Protection of Military Remains Act 1986	The dataset covers Scotland – no records are within the study area.	Records were downloaded in June 2023 and the dataset has not been updated since. No records are located within the study area.
Marine geophysical survey data ARGEO 2023-2024	Multibeam echosounder including backscatter, sidescan sonar, magnetometer, and sub-bottom profiler data. Data will be assessed by Wessex Archaeology geophysicists.	Partial coverage of the Array Area and Offshore ECC achieved in 2023 survey campaign.	Full coverage not achieved in 2023 campaign, to be updated in the 2024 survey campaign.
GeoIndex (offshore) maintained by the BGS. https://www.bgs.ac.uk/map-viewers/geoindex-offshore/	Geological information and survey data for the offshore environment.	Geological baseline information for the study area.	Geological data is unlikely to change.
Admiralty chart 0115	Marine chart issued by the UKHO that provides details regarding depths (chart datum), navigational seabed hazards including wreck sites and coastlines.	The chart covers the entire Proposed Offshore Development.	The most up to date chart has been used for this assessment.
Existing archaeological reports and published sources	Background information relevant to the study area to enhance the baseline description, including paleogeography and geological assessments and aircraft crash site assessment.	Sources relevant to the study area have been utilised.	Sources relevant to the study area have been utilised.

Description of Baseline Environment

15.3.5 An understanding of the marine archaeology and cultural heritage baseline environment within the study area has been developed from utilisation of the available literature and data sources presented in

15.3.6 **Table** 15.1.

15.3.7 The desk-based review has been completed in accordance with the relevant sections of the Chartered Institute for Archaeologists' (CIfA) Standard and Guidance for Historic Environment Desk-based Assessment (2020).

15.3.8 'Marine historic assets' are defined in the Marine (Scotland) Act 2010, Section 73 (5) as "*vessels, vehicles, aircraft, parts of such, contents of such, buildings and other structures, caves, deposits, artefacts or any other thing or groups of things that evidence previous human activity*".

15.3.9 Based on expert judgement and experience, marine archaeological and cultural heritage assets located within the study area and that are relevant to the Proposed Offshore Development can be characterised as comprising three fundamental themes:

- Palaeogeography (for example, seabed and sub-seabed palaeochannels and other geomorphological features that may contain prehistoric deposits, ecofacts, and prehistoric artefacts such as stone tools) including their setting;
- Seabed assets, including maritime sites (such as shipwrecks and/or associated material including cargo, obstructions and fishermen's fasteners) and aviation sites (aircraft crash sites and/or associated debris) including their setting; and
- Intertidal heritage receptors relating to marine and maritime activity for example fish traps, piers, sea defences located within the intertidal zone, between the MHWS and MLWS.

15.3.10 The known marine archaeological and cultural heritage assets located within the study area are listed in **Table 15.2** and shown on **Figure 15.2**.

Designated Sites

15.3.11 Maritime or aviation wrecks can be protected under various legislation, including the Marine (Scotland) Act 2010, the Protection of Military Remains Act 1986 or the Ancient Monuments and Archaeological Areas Act 1979 and interference or damage to these sites is considered a criminal offence.

15.3.12 There are currently no known maritime or aviation sites within the study area that are subject to statutory protection from these acts, which can be used to protect marine archaeological assets of historical, archaeological or artistic value, as well as allowing military wrecks and aircraft remains to be protected.

Palaeogeography

15.3.13 Submerged landscapes are areas where human beings and early hominids previously lived; on terrain that was at that time dry land, or where they exploited marine resources on the coast, which is now submerged by Holocene sea-level change and geomorphological development.

15.3.14 Hominids and humans have occupied the British Isles at various times, with the earliest occupation extending back to around one million years (Parfitt *et al.*, 2010), with coastal areas clearly attracting human populations, including landscapes that are now submerged (Bailey *et al.*, 2020). Regionally, archaeological evidence for early prehistory in north and northeast Scotland currently exists from the Late Upper Palaeolithic, following the end of the last Ice Age, from *c.* 15,000 years ago (Ballin, 2017).

15.3.15 There are currently no known submerged prehistoric assets within the study area, in large part due to significant data gaps in shallow coastal waters, potentially constrained by increased water depths in the northern North Sea (Bicket and Tizzard, 2015; Dawson *et al*., 2017).

15.3.16 Nearshore and coastal areas around Scotland's coasts retain higher potential for encountering Late Pleistocene and Early Holocene submerged palaeolandscapes. There is potential for the presence of as yet undiscovered *in situ* palaeolandscape deposits (for example peats, estuarine and low-energy coastal sediments of archaeological interest) palaeochannels of river systems, prehistoric sites and finds located within the inundated palaeogeography. Any early prehistoric discoveries will be regarded of national importance, above or below the sea level.

Maritime and Aviation Archaeology

Maritime Archaeology

15.3.17 Maritime archaeological sites comprise two broad categories; the remains of vessels that have been lost as a result of stranding, foundering, collision, enemy action and other causes (for instance shipwrecks), and sites that consist of vessel-related material (for instance material that would be considered 'wreck' in terms of Merchant Shipping Act 1995).

15.3.18 Shipwrecks on the seabed provide insight on the types of vessels used in the past, the nature of shipping activity in the wider area and the changing usage of the marine environment through different periods. Such remains are considered more likely in sediments that promote the preservation of wreck sites (especially those constructed of wood), for instance finer grained sediments that are not subject to high levels of mobility, particularly where such sediments have seen limited recent disturbance.

15.3.19 Wreck-related debris includes, but is not limited to, equipment lost overboard or deliberately jettisoned such as fishing gear, ammunition and anchors or the surviving remains of a vessel such as its cargo or a ballast mound.

15.3.20 There is potential for discoveries of maritime craft from the Mesolithic to the modern period. Post-medieval and modern wrecks, as they were generally made of more substantial material, are more likely to have been discovered through surveys undertaken by the UKHO and others, and thus recorded in the archaeological record. However, there is still potential for the discovery of previously unrecorded wreck sites, particularly of wooden wrecks, broken up wrecks or partially buried wrecks that are more difficult to detect through geophysical survey.

15.3.21 Shipwreck inventories and documentary sources are usually biased towards the 18th century and later when more systematic reporting began. Therefore, there are few known historical records of wrecks from the medieval or earlier periods. There is still high potential for both unknown, unrecorded vessels and reported but unlocated losses to have sunk in the Array Area and the Offshore ECC Study Area.

Aviation Archaeology

15.3.22 Marine aviation archaeology receptors comprise the remains or associated remains of military and civilian aircraft that have been lost at sea (Wessex Archaeology, 2008). Evidence is divided into three primary time periods based on major technological advances in aircraft design: pre-1939; 1939-1945; and post-1945.

15.3.23 One UKHO record (2041, see below) describes a wreck of an aircraft that was classified in a survey undertaken in 1987 as 'a boulder with little height'. The record has subsequently been amended to 'dead'. There are also records for aviation losses in the study area and, although their locations are unknown, there is particularly high potential for the discovery of aircraft from 1939-1945.

15.3.24 There is high potential for 20th century aircraft, particularly in relation to the Second World War (Wessex Archaeology, 2008). There were several airfields in the vicinity of the Proposed Offshore Development during the Second World War, with Royal Air Force (RAF) Banff particularly proximate, along with wider activity from Axis forces based in Norway undertaking missions to mainland Scotland, and maritime patrol activities from both sides throughout the period.

15.3.25 Marine aircraft crash sites can retain a significant amount of material, whilst being an ephemeral target to identify, with the potential for *in situ* human remains. Aircraft crash sites are often difficult to identify through archaeological assessments of geophysical survey, although experience indicates material from the site, such as engines or other material may be recorded as small obstructions or anomalies.

15.3.26 The remains of crashed military aircraft are protected under the Protection of Military Remains Act 1986 and cannot be disturbed without a licence obtained from the Joint Casualty and Compassionate Centre, part of the MOD.

Known Seabed Assets

15.3.27 There are 49 records within the study area for known seabed assets that could relate to maritime or aviation sites and/or associated material or find spots; four within the Array Area, 28 within the Offshore ECC and 17 within the Offshore ECC 500 m buffer.

15.3.28 The records have been compiled from UKHO, National Record of the Historic Environment (Canmore) and Aberdeenshire HER databases and are presented in **Table 15.2** and on **Figure 15.2** and comprise:

- 33 wrecks, including:
  - 15 'live' wrecks with existing identified wreckage on/under the seabed;
  - Nine 'dead' wrecks considered by the UKHO not to exist as material has not been detected during the most recent surveys including one potential aircraft site (2041);
  - One 'lifted' wreck that has been salvaged (2049); and
  - Eight unknown wrecks recorded in the National Record of the Historic Environment (Canmore) and/or Aberdeenshire HER databases with no associated UKHO record.
- 15 obstructions, including:
  - Four 'live' obstructions with existing material on/under the seabed; and
  - 11 'dead' obstructions considered by the UKHO not to exist as material has not been detected during the most recent surveys.

- One find spot for a crucible recovered in fishing nets (2044).

15.3.29 Sixteen of the recorded wrecks relate to named vessels, potentially allowing further research to be undertaken into their background, use and circumstances of loss (2006, 2008, 2009, 2010, 2013, 2016- 2019, 2025, 2028, 2037, 2039, 2045, 2048 and 2049).

15.3.30 Fifteen of the known records relate to modern ships all of which were lost during the First and Second World Wars (2007-2010, 2013, 2017-2020, 2027, 2028, 2031, 2032, 2037 and 2045). Shipwreck inventories and documentary sources are usually biased towards the 18th century and later when more systematic reporting began.

15.3.31 Nine of the known and named records refer to modern wrecks that have been lost between 1967 and 1998 (2006, 2016, 2025, 2035, 2039, 2041, 2047, 2048 and 2049) and are all located inside the Offshore ECC Study Area. Although these wreck sites do not have archaeological value, they still have social and cultural value, and equally they would be considered navigational hazards for the Proposed Offshore Development. Despite their lack of archaeological value, these records will be retained in the gazetteer of seabed assets.

15.3.32 One record was originally described as an aircraft (2041); although the UKHO have since updated their description to that of a boulder and amended the record to ‘dead’, it would be prudent to be aware that aircraft material may exist in the area still.

15.3.33 It should also be noted that any of the unidentified sites or obstructions could relate to either shipwreck of aircraft sites and that material could still exist on or under the seabed of the sites described as ‘dead’ or ‘lifted’.

Table 15.2: Known Seabed Assets Recorded in the Study Area.

WA ID	Associated IDs	Type	UKHO status	Name	Description	Easting	Northing	Location in Study Area
						ETRS89 UTM30N		
2001	UKHO_1301	Obstruction - foul ground	Dead	-	Fisherman's fastener originally found in 1981 and not located in subsequent surveys and amended to dead by the UKHO.	554970.32	6485187.85	Array
2002	UKHO_1303	Obstruction - foul ground	Dead	-	Fisherman's fastener originally found in 1981 and not located in subsequent surveys and amended to dead by the UKHO.	552603.02	6484320.17	Array
2003	UKHO_1331, Canmore_321592	Obstruction	Dead	-	Unidentified obstruction originally surveyed as standing 2.9 m high with other anomalies in proximity. It was not located in a later survey and has been amended to dead by the UKHO.	545612.51	6483986.69	Array
2004	UKHO_79587	Obstruction	Live	-	Possible boulder identified as a single contact in a scour hole with no associated magnetic anomaly.	555083.32	6483024.55	Array
2005	UKHO_1304	Obstruction - foul ground	Dead	-	Fisherman's fastener originally found in 1981 and not located in subsequent surveys and amended to dead by the UKHO.	553029.71	6482657.44	Array
2006	UKHO_1189, Canmore_321559	Wreck - non-dangerous	Live	*Mizpah*	Wreck of a fishing vessel lost in November 1978 after taking on water in the engine room. During its most recent survey, the wreck is described as degraded, almost not resembling a wreck.	552821	6460931.37	ECC
2007	UKHO_1185, Canmore_321555	Wreck - non-dangerous	Dead	*Unknown*	Wreck of a British destroyer lost in January 1940 following a torpedo attack by a German submarine U-22. Amended to dead after its most recent survey in 2001.	552726.75	6456858.36	ECC
2008	UKHO_1183, Canmore_321553	Wreck - non-dangerous	Dead	*Miranda*	Wreck of a steamship lost in January 1940 having been mined/torpedoed whilst carrying a cargo of coal. The wreck was not located during the most recent survey in 2012 and the record has been amended to dead.	553730.18	6455016.01	ECC
2009	UKHO_1175, Canmore_321547	Wreck - non-dangerous	Live	*Osmed*	Wreck of a Swedish steamship lost in February 1940 following a torpedo attack whilst carrying a cargo of coal. Built in 1903 in Middlesbrough, the ship had two boilers, a triple expansion engine and a gross tonnage of 1545. The most recent survey in 2012 detailed the wreck as being in two parts with no scour. The northern section measures 14.5 m long, 7.6 m wide and the southern section measures 47.8 m long, 16.2 m wide with a maximum height of 7.1 m. It is described as having a strong magnetic anomaly.	551106.03	6445425.62	ECC
2010	UKHO_1168, Canmore_321543	Wreck - non-dangerous	Dead	*Glenravel*	Wreck of a British steamship lost in August 1915 following capture by submarine U-17 and sunk by scuttling charges. Built in 1906 in Troon, the ship had two boilers and a triple expansion engine with a gross tonnage of 1092. The wreck	558338.55	6441164.02	ECC

WA ID	Associated IDs	Type	UKHO status	Name	Description	Easting	Northing	Location in Study Area
						ETRS89 UTM30N		
					was not located during the most recent UKHO survey in 2012 and has been amended to dead.			
2011	UKHO_1647	Obstruction - foul ground	Dead	-	Fisherman's fastener originally found in 1981 and not located in subsequent surveys and amended to dead by the UKHO.	559524.47	6439572.56	ECC
2012	UKHO_1649	Obstruction - foul ground	Dead	-	Fisherman's fastener originally found in 1981 and not located in subsequent surveys and amended to dead by the UKHO.	561236.67	6438980.53	ECC buffer
2013	UKHO_1340, Canmore_321600	Wreck - non-dangerous	Dead	*Wignore*	Wreck of a British trawler lost in November 1939 following a torpedo attack by submarine U-18 whilst part of the Icelandic fishing convoy. Built in 1928 in Beverley, the ship had one boiler and a triple expansion engine with a gross tonnage of 345. The wreck was not located during the most recent UKHO survey in 2012 and the record has been amended to dead.	561436.36	6431376.39	ECC
2014	UKHO_2357, Canmore_321955	Wreck - non-dangerous	Live	Unknown	Unidentified wreck discovered in 1945. The most recent UKHO survey describes the wreck as being intact, possibly inverted, and a poor magnetic anomaly. Scour is present close to the wreck.	564482.91	6427679.28	ECC
2015	UKHO_2181, Canmore_321893	Obstruction	Dead	-	Originally identified as a wreck in 1986, a later survey in 1987 classified it as a rock extrusion and the UKHO record has been amended to dead.	544959.95	6425713.9	ECC buffer
2016	UKHO_2356, Canmore_321954	Wreck - non-dangerous	Live	*Jenny Jensen* (possibly)	Wreck of a Danish fishing vessel lost in February 1975 having taken on water and sinking whilst under tow. The most recent survey in 2010 described the site as being upright with debris close to the northwest end. The site is considered a moderate magnetic anomaly.	566444.3	6423596.89	ECC
2017	Canmore_273985, AHER_NK09SW0001	Wreck		*Scotia (possibly)*	Possible remains of a steel Danish steamship lost in December 1939 having been torpedoed by U-23. Built in 1924 in Copenhagen, this vessel had a gross tonnage of 2400. The Canmore record states that the position of the location may be derived from chart annotation and is accepted as indicating material remains. A UKHO record for this vessel is not located within the study area. Another Canmore record for Scotia also exists (Canmore_325919) and is considered a Recorded Location.	561955.55	6420227.03	ECC
2018	UKHO_2353, Canmore_321951	Wreck - non-dangerous	Dead	*HMS Astronomer*	Wreck of a British steamship lost in June 1940 having been torpedoed by submarine U-58. The ship drifted and sank the following day. Built in 1917 in Glasgow, the ship had four boilers, a quadruple expansion engine and a gross tonnage of 8401. The ship was lost whilst on passage from Rosyth for	569017.65	6419995.43	ECC buffer

WA ID	Associated IDs	Type	UKHO status	Name	Description	Easting	Northing	Location in Study Area
						ETRS89 UTM30N		
					Scapa Flow with a general and mixed goods cargo. The wreck was not located during the most recent survey in 2010 and the record has been amended to dead by the UKHO.			
2019	UKHO_2164, Canmore_321885, Canmore_207862, AHER_NJ99SE0001	Wreck - non-dangerous	Dead	*Princess Caroline*	Wreck of a British steamship lost in August 1915 after being mined. Built in 1910, the ship had one boiler, a triple expansion engine and a gross tonnage of 888. The ship was lost whilst carrying a general cargo from Liverpool to Aberdeen. The wreck was not located during the most recent survey in 2010 and the record has been amended to dead by the UKHO. Two Canmore records also relate to this site, one of which is located 600 m to the southeast.	558659	6419366.41	ECC buffer
2020	UKHO_2163, Canmore_101794, AHER_NJ89SE0001	Wreck - non-dangerous	Live	Unknown	Unidentified wreck discovered in 1944. The most recent UKHO survey in 1987 has little detail regarding the condition of the site.	544479.55	6418627.03	ECC buffer
2021	UKHO_59458, Canmore_323845	Obstruction - foul ground	Live	-	Obstruction identified by a UKHO survey in 2001 as suspected wire hawser that was snagged and lost.	543793.06	6415186.65	ECC buffer
2022	UKHO_2374, Canmore_101870, AHER_NK08NW0001	Obstruction - foul ground	Dead	-	Obstruction identified as a sidescan sonar contact in 1986 and later amended to dead as it could not be located.	559740.16	6414217.67	ECC
2023	Canmore_310743	Wreck			Recorded by Canmore as a dispersed unidentified wreck considered to be no longer a danger to surface navigation. No further details are provided and there is no associated UKHO record.	559823.21	6414218.91	ECC
2024	Canmore_328900	Wreck			Recorded by Canmore as a dispersed unidentified wreck. No further details are provided and there is no associated UKHO record. Position is given to the nearest 10m.	560030	6413509.33	ECC
2025	UKHO_2344, Canmore_321946	Wreck - non-dangerous	Dead	*Challenger*	Wreck of a British fishing vessel lost in September 1967 following a collision with MFV Eilean Shona. The wreck was not located during the most recent survey in 2010 and the record was amended to dead.	571132.79	6409362.75	ECC
2026	UKHO_2345	Obstruction	Dead	-	A possible obstruction that was not located in 1986 and the record was amended to dead.	560300.3	6408719.9	ECC buffer
2027	UKHO_2376, Canmore_101872, AHER_NK07NW0002	Wreck - non-dangerous	Live	Unknown	Unidentified wreck discovered in 1945 and described in a later survey in 1986 as lying north-south with no scour.	559903.5	6405436.66	ECC

WA ID	Associated IDs	Type	UKHO status	Name	Description	Easting	Northing	Location in Study Area
						ETRS89 UTM30N		
2028	UKHO_2341, Canmore_101864	Wreck - non-dangerous	Live	*Remuera*	Wreck of a British steamship lost in August 1940 having been sunk by German torpedo bombers. The most recent survey of the wreck undertaken in 1986 describes the site as having two separate small pieces of debris lying about 50 north of the main wreck.	566598.92	6405077.89	ECC buffer
2029	Canmore_196103, AHER_NK07NE0003	Wreck		Unknown	Recorded by Aberdeenshire HER as a supposed wreck site. Position is given to the nearest 1 km.	567366	6405066.55	ECC buffer
2030	Canmore_196105, AHER_NK07NE0004	Wreck		Unknown	Recorded by Aberdeenshire HER as a supposed wreck site. Position is given to the nearest 100 m.	566766	6405057.69	ECC buffer
2031	UKHO_2338, Canmore_196106, AHER_NK07NE0005	Wreck - non-dangerous	Dead	Unknown	Unidentified wreck discovered in 1945 and was not located in 1986 so the record was amended the dead. The position lies between two prominent rock features.	565416.19	6404718.88	ECC buffer
2032	UKHO_2333, Canmore_101863, AHER_NK07NW0001	Wreck - non-dangerous	Live	Unknown	Unidentified wreck discovered in 1945 and described in a later survey in 1986 as being intact with two high points and has a build-up of sand to the south of the wreck. The bow is facing northeast. The site is known locally as the 'Knock Wreck'.	562162.34	6404667.34	ECC
2033	UKHO_2336	Obstruction	Dead	-	Originally identified as an obstruction in 1945, a later survey in 1986 closely examined the location following local fishermen reporting that an aircraft wreck was present in the locality. The survey did not find anything, and the record was amended to dead.	563737.16	6404320.8	ECC buffer
2034	UKHO_2334	Obstruction	Dead	-	No details are provided other than the anomaly being a non-submarine contact.	561856.7	6404105.9	ECC
2035	UKHO_2178, Canmore_101800, AHER_NJ97NE0001	Wreck - non-dangerous	Live	Unknown	A small wreck identified in a 1986 UKHO survey with little scour on the site.	556624.63	6403687.49	ECC
2036	Canmore_196108, AHER_NK07NW0003	Wreck		Unknown	Recorded by Aberdeenshire HER as a supposed wreck site. Position is given to the nearest 100 m.	561588	6403481.31	ECC buffer
2037	UKHO_2156, Canmore_101792, AHER_NJ87NE0001	Wreck - non-dangerous	Live	*U-77*	Wreck of a German submarine, U-77, thought to have been lost in July 1916 following an accident when one of its own mines exploded in, or near, to the stern minelaying chute. Built in 1915 this ocean mine laying boat was sent to the Moray coast to lay mines between Kinnaird Head and Knock	545325.7	6403483.29	ECC

WA ID	Associated IDs	Type	UKHO status	Name	Description	Easting	Northing	Location in Study Area
						ETRS89 UTM30N		
					Head, an area where naval vessels were believed to pass on their way to the deep-water base at Invergordon. The most recent UKHO survey identified the wreck as U-77 using an underwater camera and describes the submarine as lying on a muddy floor orientated east/west and covered in fishing nets. The west end of the wreck is intact, and the east end is broken up with a debris field.			
2038	Canmore_196111, ACAS_NJ87NE0002	Wreck		Unknown	Recorded by Aberdeenshire HER as a supposed wreck site. Position is given to the nearest 100 m.	546294.05	6402955.3	ECC buffer
2039	UKHO_2179, Canmore_101801, AHER_NJ97SE0003	Wreck - non-dangerous	Live	*Lloyd George*	Wreck of a British wooden hulled fishing vessel identified in a UKHO survey undertaken in 1986.	558647.11	6402140.89	ECC
2040	Canmore_328893	Wreck		Unknown	Recorded by Canmore as having a chart symbol for a wreck. No further details are provided and there is no associated UKHO record. Position is given to the nearest 10m.	559062.48	6401803.78	ECC
2041	UKHO_2182, Canmore_101721, AHER_NJ87SE0001	Wreck - non-dangerous	Dead	Unknown	Wreck of an aircraft that was classified in a survey undertaken in 1987 as a boulder with little height. The record was subsequently amended to dead.	546245.62	6401081.4	ECC
2042	UKHO_2180, Canmore_321892, Canmore_101722, AHER_NJ97SE0002	Obstruction - foul ground	Live	-	Described by the UKHO as two definite hull shapes, flush with the ground.	554731.45	6398374.39	ECC
2043	UKHO_2206, Canmore_101816, AHER_NJ97SE0004	Wreck - non-dangerous	Live	*Unknown*	Described by the UKHO as a possible wreck.	557014.47	6398342.9	ECC
2044	AHER_NJ38SW0001	Find spot			Find spot for the location of the recovery of a crucible brought up in nets by a fishing boat. It measures 209mm high/131 mm rim diameter/90 mm base diameter and its date is unknown. No further details are provided on the HER record.	559773.69	6398247.64	ECC buffer
2045	UKHO_2153, Canmore_101790, AHER_NJ86NE0001	Wreck - non-dangerous	Live	*Fram (stern section)*	Wreck of a Swedish steamship lost whilst at anchor in February 1040 following a torpedo attack by U-13. The ship broke in two and the bow sank immediately whilst the stern section drifted for 25 minutes before sinking. Built in 1897 in	546210.71	6396937.35	ECC buffer

WA ID	Associated IDs	Type	UKHO status	Name	Description	Easting	Northing	Location in Study Area
						ETRS89 UTM30N		
					Middlesbrough the ship had three boilers, a triple expansion engine and a gross tonnage of 2760. The most recent UKHO survey in 1987 described the site as having a high point at either end and an open hold with the hatch covers missing.			
2046	UKHO_58914, Canmore_323805	Obstruction - foul ground	Live	-	Described by the UKHO as cables/chains/mooring/nets/tackle/wires.	549854.49	6396702.34	ECC
2047	UKHO_2213, Canmore_321903	Wreck - non-dangerous	Live	Unknown	Wreck of a boat that sank in August 1998 and the crew of one was able to swim ashore. No further details are provided regarding the wreck site.	555427.37	6395847.13	ECC
2048	UKHO_2210, Canmore_321900	Wreck	Live	*Fleetwood Mac*	Wreck of a British fishing vessel lost in September 1993 having ran aground, presumably when attempting to enter the harbour. The UKHO survey describes the site as being almost completely submerged at high water.	552830.15	6395719.55	ECC
2049	UKHO_2147, Canmore_321879, AHER_NJ96NE0083	Wreck	Lifted	*Antonio*	Wreck of a Panamanian cargo ship lost in June 1979 having ran aground in fog conditions and later blown up with explosives. The most recent UKHO survey states that nothing is visible at low water. Local fishermen state that the vessel was scrapped and entirely removed.	558511.92	6395519.49	ECC

Recorded Losses

15.3.34 Within the National Record of the Historic Environment (Canmore) and Aberdeenshire HER, there are 109 records located across the study area that relate to Recorded Losses; 103 maritime losses and six aviation losses.

15.3.35 These are records for ships or aircraft that are known to have wrecked or crashed offshore, but for which the exact locations are not known. The positional data of these records is unreliable and serves only to provide an indication of the types of vessels or aircraft that passed through the area and the wrecking incidents that are known to have occurred in the general region. Whilst the remains of these vessels or aircraft may exist somewhere on the seafloor, their location is presently unknown. As such, they signify the potential maritime and aviation resource and are not presented on a figure or in a table.

15.3.36 The maritime Recorded Losses date from between the 16th and 20th centuries, with most losses occurring during the 19th century. The variety of vessel types is broad including brigs, sloops and schooners and their nationalities range from such countries as Britain, Norway, Germany and the Netherlands indicating trading routes. The causes of loss are diverse and can indicate navigational hazards or military action.

15.3.37 The aviation Recorded Losses are particularly important as any aircraft lost while in military service is automatically protected under the Protection of Military Remains Act 1986, and therefore the discovery of remains from any of these aircraft would be protected. The aviation Recorded Losses relate to British aircraft, four of which were lost whilst in military service during the Second World War. Of the other two losses, one was an unknown British aircraft lost in 1933 and the other a recent helicopter that ditched in 1986.

15.3.38 The archaeological potential of these records will be more fully assessed in the desk-based assessment undertaken to inform the subsequent EIA process.

Intertidal Archaeology

15.3.39 Intertidal heritage assets comprise sites and material located in the area between the MHWS and MLWS. There is one intertidal heritage asset recorded in the Aberdeenshire HER dataset, detailed in **Table 15.3** and shown on **Figure 15.2**, relating to a Second World War observation post. Despite it being in a destroyed condition, associated material may still exist in the area. The position for this feature is the centre-point of a polygon, which is why it appears outside the study area.

Table 15.3: Intertidal Assets Recorded in the Study Area.

WA ID	Associated IDs	Period	Description	Easting	Northing
				ETRS89 UTM30N	
1001	AHER_NJ96NE0038	Modern - Second World War	Site of a Second World War watch hut, used to observe the coastline, manned by four elderly men from Sandhaven and Pitullie. The Aberdeenshire HER record describes its condition as being destroyed.	555797.29	6395489.75

15.3.40 Although there is only one record that relates to an archaeological feature, on the boundary of the study area are three settlements that all have maritime associations and could increase the potential for marine and cultural heritage assets to be discovered during the Project. These settlements are as follows:

- Rosehearty Harbour (Canmore_120169, AHER_NJ96NW0017) Listed Building (LB40433): a sheltered port for ships built in the 18th century with 19th century additions, comprising two piers with one ending with a concrete beacon (AHER_ NJ96NW0159), a breakwater, a slipway and a lighthouse. A 20th century slipway is also recorded in the harbour (Canmore_282053);
- Sandhaven Harbour (Canmore_120168, AHER_NJ96NE0020): originally built in 1840 and extended around thirty years later, comprising an L-plan pier, short straight pier, a sub-dividing straight pier and a boatbuilding yard; and
- Fraserburgh Harbour (AHER_NK06NW0008): originally built in around 1576 as a fishing harbour and greatly extended since then. During the Second World War the harbour was defended by three pillboxes, a Type 27 on the breakwater, a Type 24 on the central pier and another of unknown type somewhere on the north breakwater. One record relating to an undated sewer ventilator (Canmore_161736) is incorrectly located within the marine area of the study area, however it is actually located terrestrially within the town of Fraserburgh.

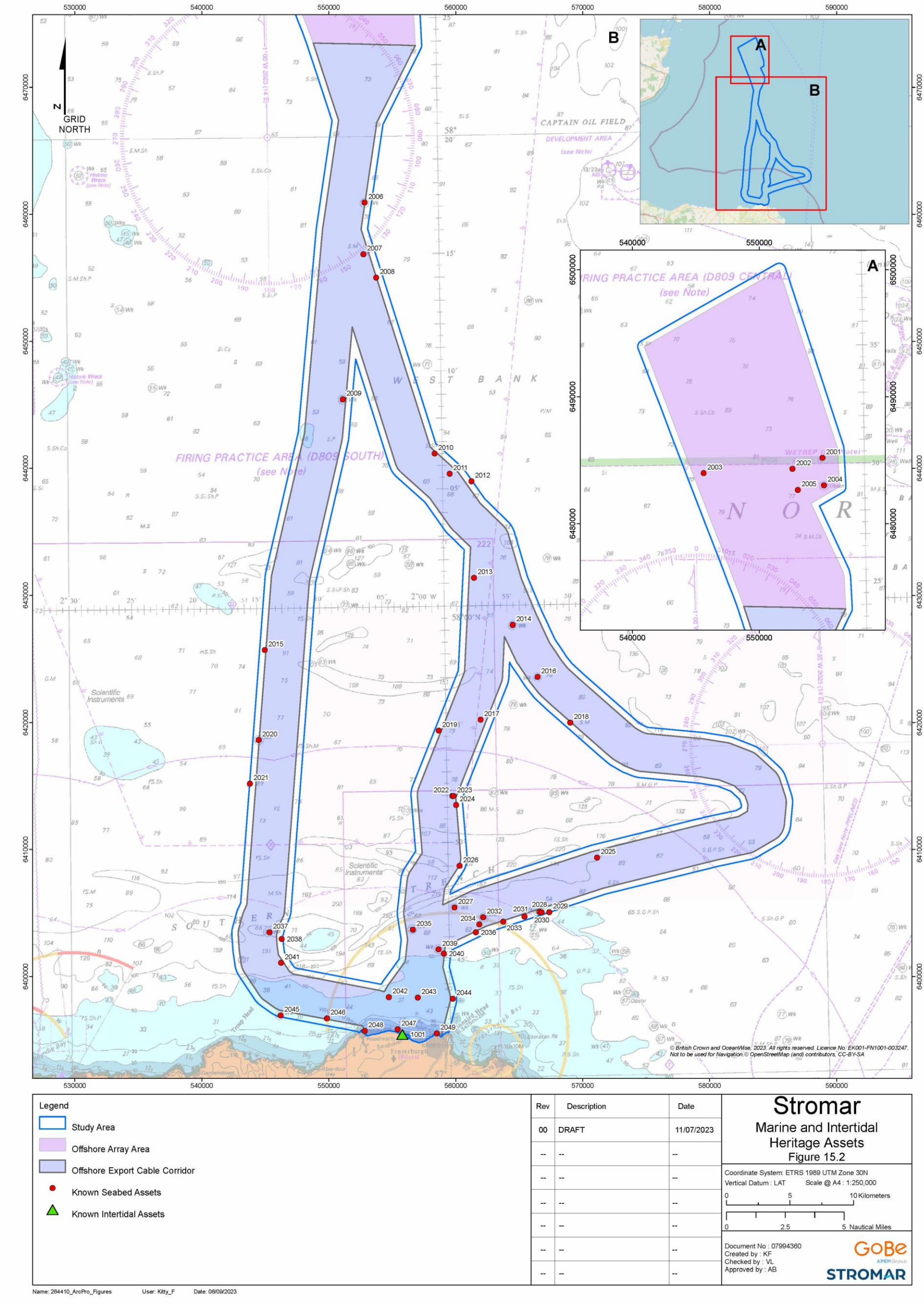


Figure 15.2: Marine and Intertidal Heritage Assets

15.4 Embedded Commitments

15.4.1 The Proposed Offshore Development has adopted various primary commitments (primary design principles intrinsically part of the Project design, installation techniques and engineering designs/modifications) as part of the pre-application phase to eliminate and/or reduce LSE arising from a number of impacts (as far as possible). These are outlined in **Appendix A: Offshore Commitments Register**. Further commitments (imposed as a result of legislative requirements and/or standard sectoral practice, regardless of EIA assessment), referred to as tertiary commitments are embedded as an inherent aspect of the EIA process. Secondary commitments (which require further activity to achieve anticipated outcome- often secured through planning conditions and/or management plans) are incorporated to reduce LSE to environmentally acceptable levels following initial assessment, i.e., so that residual effects are reduced to environmentally acceptable levels.

15.4.2 The commitments adopted by the project in relation to marine archaeology and cultural heritage are presented in **Table 15.4**. The full list of commitments can be found in **Appendix A: Offshore Commitments Register.**

Table 15.4: The Proposed Commitments Relevant to Marine Archaeology and Cultural Heritage Receptors.

Commitment Code	Commitment Measure
C-OFF-09	Development of, and adherence to a CaP. The CaP will confirm planned cable routing, burial and any additional protection and will set out methods for post-installation cable monitoring as secured by Section 36 and Marine Licence consent conditions. The CaP is likely to be supported by a CBRA, which will outline how external cable protection shall be used and/or minimised, should cable burial be achieved.
C-OFF-18	Scour protection to be implemented around foundations and offshore structures. Ideally this will reduce the change to hydrodynamic and sedimentary regimes that may expose archaeological receptors leading to increased rates of deterioration through biological, chemical and physical processes.
C-OFF-08	A CMS will be developed, which will detail the proposed construction methods and roles and responsibilities of parties involved.
C-OFF-32	In accordance with marine licensing requirements a DSLP will be submitted and approved prior to construction. Confirming layout and relevant design parameters, including the maximum height of WTGs and lighting details. The works will be constructed in accordance with the approved DSLP.
C-OFF-55	Additional marine surveys: Geophysical and geotechnical survey data acquisition for pre-consent planning purposes will be assessed for indications of archaeology, and the results will be used to supplement the desk-based research gathered to inform the EIA process. Any further geophysical or geotechnical surveys undertaken, for instance post-consent or post-construction, will also be considered for archaeological assessment and the results will be integrated with previous interpretations and reported on accordingly. This includes further investigation to confirm the nature of seabed anomaly receptors where micro-siting is not possible; methods of ground truthing assessment could include ROV or diver survey and could be undertaken in conjunction with other surveys associated with the Proposed Offshore Development, for example UXO or obstruction surveys. Further geotechnical surveys may also be implemented to offset impacts to palaeogeographic features such as palaeochannels and thus enhancing the archaeological record.

Commitment Code	Commitment Measure
C-OFF-56	A walkover survey of the intertidal element of the study area will be undertaken to inform the understanding of the existing marine heritage assets and also the potential for unknown material to be uncovered.
C-OFF-57	Reporting produced as part of this Proposed Offshore Development that contains details of marine archaeological and cultural heritage will be submitted to OASIS for publishing through the Archaeology Data Service ArchSearch catalogue, following confirmation from the Developer.
C-OFF-58	Watching briefs may also be employed in the intertidal or marine areas where any intrusive works are planned. These could include pre-lay grapnel runs or intertidal cable-laying in an excavated trench. The proposed methodology will be presented in a Method Statement and agreed through consultation with the Archaeological Curator, HES, and MD-LOT.
C-OFF-59	Offshore Project infrastructure will avoid identified seabed heritage assets (such as protected wrecks) and anthropogenic geophysical anomalies (identified using Archaeological Exclusion Zones (AEZs)), as described in the Written Scheme of Investigation (WSI). AEZs will not be proposed for archaeological receptors of lower archaeological value, however such features will be avoided, where practicable, using micro-siting of the Proposed Offshore Development.
C-OFF-61	An Archaeological WSI will be developed and implemented that includes the details of agreed mitigation measures, including a Protocol for Archaeological Discoveries (Protocol) based on The Crown Estate's 'Protocol for Archaeological Discoveries: Offshore Renewables Projects' published in 2014. Although the WSI is not considered a mitigation measure in itself, the measures that are detailed within it are often secured through planning conditions requiring the implementation of a WSI (The Crown Estate, 2021: 7). The WSI contains the details of the archaeological mitigation measures that will be adhered to for the lifetime of the Proposed Offshore Development, from planning through to decommissioning. WSIs are also umbrella documents for survey, investigation and assessment required for the Proposed Offshore Development, supported, as required, by Method Statements.
C-OFF-63	Development of and adherence to a DP, secured under Section 36 and/or Marine Licence consent conditions.

15.4.3 As a result of the commitment to implement these measures, and to align with various standard sectoral practices and procedures, the embedded (primary) commitments are considered inherently part of the design of the Proposed Offshore Development and have, therefore, been included in the assessment presented in **Section 15.5**.

15.5 Scoping of Impacts

15.5.1 The potential impacts categories of relevance to marine archaeology and cultural heritage assessments are presented below in **Table 15.5.**

Table 15.5: Potential Impact Categories Associated with Marine Archaeology and Cultural Heritage.

Impact Category (for seabed, sub-seabed and intertidal marine heritage assets)	Definitions Associated with Impact Categories
Indirect	The indirect interactions upon the known and potential marine archaeological receptors occur as a result of changes to hydrodynamic patterns and sediment transport regimes, where these changes have occurred as a consequence of activities and structures associated with the project activities. Scour has a negative or adverse impact on marine archaeological receptors whereby it can expose material which leads to increased rates of deterioration through biological, chemical and physical processes. Alternatively, the redeposition of sediments following settling of sediment plumes can be beneficial to the preservation of marine archaeological receptors as greater sediment cover increases the potential for anaerobic environment, which inhibits a range of biological, chemical and physical degradation processes.
Direct	Direct impacts can include direct damage to structures, features, deposits and artefacts, and the disturbance of relationships between these elements and the wider surroundings. The setting of known and named wreck sites may also be impacted and in turn this could potentially affect the significance of such receptors.

15.5.2 The potential activities associated with the various development phases of the Proposed Offshore Development which could directly and indirectly impacts marine and intertidal archaeological receptors are presented in **Table 15.6**.

Table 15.6: Activities and Impacts Relevant to Marine Archaeology and Cultural Heritage Receptors.

Impact Category	Potential Development Activities and Associated Impacts to Archaeological Receptors
Construction	
Indirect	Scour associated with changes to hydrodynamic regimes and seabed sediment distributions from construction activities and structures; Sediment deposition or the placement of non-burial cable protection on the seabed; and Seabed sediment movement caused by propellers of construction vessels.
Direct	Pre-installation intrusive seabed and intertidal surveys (such as geotechnical coring) and seabed preparation (such as seabed levelling or ground reinforcement) and clearance (such as removing surface and subsurface debris and sandwaves, pre-lay grapnel run and UXO clearance); Installation of: WTG foundation substructures, using various methodologies such as spar, TLP and semi-submersible and barge; Associated mooring and anchoring systems; Offshore cables, including inter-array cables, interlink cables and export cables using various methods including ploughing, trenching, jetting, rock-cutting and/or dredging; Intertidal cables using either trenched (by means of ploughs, rock cutters or jetting tools) or trenchless methodologies (by means of Horizontal Directional Drilling, potentially requiring cofferdam installations for the intertidal zone);

Impact Category	Potential Development Activities and Associated Impacts to Archaeological Receptors
	Offshore Substations, Accommodation Platform and Reactive Compensation Station (if required); Other infrastructure if tethered to the seabed, such as Offshore Innovation Platform, offshore wave buoys and wind measurement devices. External cable and scour protection; and Use of vessels throughout the Project such as jack-up barges, workboats or specialist cable-laying vessels.
Operations and Maintenance	
Indirect	Indirect damage may occur as a result of sediment deposition or the placement of non-burial cable protection on the seabed, seabed sediment movement caused by propellers of operations vessels and/or cable or infrastructure foundation maintenance and repair that could lead to an alteration of sediment transport regimes.
Direct	Direct damage may occur where operational and maintenance activities contact with the seabed beyond the area already impacted during the construction phase.
Decommissioning	
Indirect	Direct damage may occur where decommissioning activities contact with the seabed beyond the area already impacted during the construction phase.
Direct	Indirect damage may occur as a result of the removal of cable or infrastructure foundations leading to an alteration of sediment transport regimes and seabed sediment movement caused by propellers of decommissioning vessels.

15.5.3 Potential impact pathways relevant to marine archaeology and cultural heritage which may occur during the construction, O&M, or decommissioning phases of the Proposed Offshore Development have been identified in **Table 15.7**.

Table 15.7: Scoping Assessment for Marine Archaeology and Cultural Heritage.

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
Construction and Decommissioning				
Physical disturbance activities causing direct damage and/or loss to known and/or potential prehistoric landscapes, deposits, features or finds on or under the seabed.	C-OFF-08 C-OFF-09 C-OFF-18 C-OFF-32 C-OFF-56 C-OFF-57 C-OFF-59 C-OFF-61 C-OFF-63	Scoped In	Any of the pre-installation clearance activities, installation of proposed infrastructure, decommissioning activities and cables or vessel usage that impact the seabed, sub-seabed or intertidal zone in any manner have the potential to result in the damage/loss of submerged prehistoric landscape deposits, features or finds, if present. Effects are considered to be permanent. To confirm the LSE of this impact, a full suite of high quality marine geophysical and geotechnical surveys must be undertaken and archaeologically assessed to understand the known resource on the seabed (nature, extent and archaeological value). This must be followed with appropriate commitment measures in place including those stipulated in a WSI as agreed with the Archaeological Curator, including a Protocol for Archaeological Discoveries.	Possible LSE without secondary commitment measures, however, it may become clear post-Scoping stage that the impact does not require detailed assessment in the EIAR.
Physical disturbance activities causing direct damage and/or loss to known and recorded marine (including maritime and aviation receptors) and intertidal heritage receptors and/or anomalies of likely/possible anthropogenic origin on or under the seabed	C-OFF-08 C-OFF-09 C-OFF-18 C-OFF-32 C-OFF-56 C-OFF-57 C-OFF-59 C-OFF-61	Scoped In	Any of the pre-installation clearance activities, installation of proposed infrastructure, decommissioning activities, and cables or vessel usage that impact the seabed, sub-seabed or intertidal zone in any manner have the potential to result in the damage/loss of known or potential marine and intertidal sites, features or finds, if present. Effects are considered to be permanent. To confirm the LSE of this impact, a full suite of high quality marine geophysical and	Possible LSE without secondary commitment measures, however, it may become clear post-Scoping stage that the impact does not require detailed assessment in the EIAR.

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
	C-OFF-63		geotechnical surveys must be undertaken and archaeologically assessed to understand the known resource on the seabed (nature, extent and archaeological value). This must be followed with appropriate commitment measures in place including those stipulated in a WSI as agreed with the Archaeological Curator, including Archaeological Exclusion Zones and micro-siting.	
Physical disturbance activities causing direct damage and/or loss to potential, currently unrecorded marine (including maritime and aviation receptors) and intertidal heritage receptors on or under the seabed.	C-OFF-08 C-OFF-09 C-OFF-18 C-OFF-32 C-OFF-56 C-OFF-57 C-OFF-59 C-OFF-61 C-OFF-63	Scoped In	Any of the pre-installation clearance activities, installation of proposed infrastructure, decommissioning activities, and cables or vessel usage that impact the seabed, sub-seabed or intertidal zone in any manner have the potential to result in the damage/loss of known or potential marine and intertidal sites, features or finds, if present. Effects are considered to be permanent. To confirm the LSE of this impact, a full suite of high quality marine geophysical and geotechnical surveys must be undertaken and archaeologically assessed to understand the known resource on the seabed (nature, extent and archaeological value). This must be followed with appropriate commitment measures in place including those stipulated in a WSI as agreed with the Archaeological Curator, including a Protocol for Archaeological Discoveries.	Possible LSE without secondary commitment measures, however, it may become clear post-Scoping stage that the impact does not require detailed assessment in the EIAR.
Physical disturbance activities causing indirect changes to hydrodynamic and sedimentary regimes leading to sediment reduction on the seabed	C-OFF-32 C-OFF-18 C-OFF-61	Scoped In	Any of the pre-installation clearance activities, installation of proposed infrastructure, decommissioning activities, and cables or vessel usage may cause indirect changes to hydrodynamic and sedimentary regimes leading to sediment reduction on the seabed and scour, potentially exposing receptors	LSE without secondary commitment measures

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
			leading to increased rates of deterioration through biological, chemical and physical processes. The LSE of this impact is to be confirmed following review of the Physical Processes assessment.	
Physical disturbance activities causing indirect changes to hydrodynamic and sedimentary regimes leading to sediment accretion on the seabed	C-OFF-32 C-OFF-18 C-OFF-61	Scoped In	Any of the pre-installation clearance activities, installation of proposed infrastructure, decommissioning activities, and cables or vessel usage may cause indirect changes to hydrodynamic and sedimentary regimes may cause sediment to cover receptors inhibiting a range of biological, chemical and physical degradation processes (beneficial effect). The LSE of this impact is to be confirmed following review of the Physical Processes assessment.	LSE without secondary commitment measures (beneficial)
Temporary or permanent change to the setting of known heritage assets (sites with identified and named vessels or aircraft)	C-OFF-08 C-OFF-09 C-OFF-32 C-OFF-57 C-OFF-59 C-OFF-61 C-OFF-63	Scoped In	The setting of known and named wreck (and aviation) sites may be impacted by activities associated with the device designs, the offshore export cable and other infrastructure, and in turn this could potentially affect the significance of such seabed features. Effects could be temporary or permanent. To confirm the LSE of this impact, a full suite of high quality marine geophysical and geotechnical surveys must be undertaken and archaeologically assessed to understand the known resource on the seabed (nature, extent and archaeological value). The impact to setting will be confirmed once the location and size of project infrastructure is known and its proximity to known archaeological receptors.	Possible LSE without secondary commitment measures, however, it may become clear post-Scoping stage that the impact does not require detailed assessment in the EIAR.

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
Operations and Maintenance				
Physical disturbance activities causing direct damage and/or loss to known and/or potential prehistoric landscapes, deposits, features or finds on or under the seabed.	C-OFF-08 C-OFF-09 C-OFF-18 C-OFF-32 C-OFF-56 C-OFF-57 C-OFF-59 C-OFF-61 C-OFF-63	Scoped In	Any of the pre-installation clearance activities, installation of proposed infrastructure, decommissioning activities and cables or vessel usage that impact the seabed, sub-seabed or intertidal zone in any manner have the potential to result in the damage/loss of submerged prehistoric landscape deposits, features or finds, if present. Effects are considered to be permanent. To confirm the LSE of this impact, a full suite of high quality marine geophysical and geotechnical surveys must be undertaken and archaeologically assessed to understand the known resource on the seabed (nature, extent and archaeological value). This must be followed with appropriate commitment measures in place including those stipulated in a WSI as agreed with the Archaeological Curator, including a Protocol for Archaeological Discoveries.	Possible LSE without secondary commitment measures, however, it may become clear post-Scoping stage that the impact does not require detailed assessment in the EIAR.
Physical disturbance activities causing direct damage and/or loss to known and recorded marine (including maritime and aviation receptors) and intertidal heritage receptors and/or anomalies of likely/possible anthropogenic origin on or under the seabed	C-OFF-08 C-OFF-09 C-OFF-18 C-OFF-32 C-OFF-56 C-OFF-57 C-OFF-59 C-OFF-61 C-OFF-63	Scoped In	Any of the pre-installation clearance activities, installation of proposed infrastructure, decommissioning activities, and cables or vessel usage that impact the seabed, sub-seabed or intertidal zone in any manner have the potential to result in the damage/loss of known or potential marine and intertidal sites, features or finds, if present. Effects are considered to be permanent. To confirm the LSE of this impact, a full suite of high quality marine geophysical and geotechnical surveys must be undertaken and archaeologically assessed to understand the	Possible LSE without secondary commitment measures, however, it may become clear post-Scoping stage that the impact does not require detailed assessment in the EIAR.

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
			known resource on the seabed (nature, extent and archaeological value). This must be followed with appropriate commitment measures in place including those stipulated in a WSI as agreed with the Archaeological Curator, including Archaeological Exclusion Zones and micro-siting.	
Physical disturbance activities causing direct damage and/or loss to potential, currently unrecorded marine (including maritime and aviation receptors) and intertidal heritage receptors on or under the seabed.	C-OFF-08 C-OFF-09 C-OFF-18 C-OFF-32 C-OFF-56 C-OFF-57 C-OFF-59 C-OFF-61 C-OFF-63	Scoped In	Any of the pre-installation clearance activities, installation of proposed infrastructure, decommissioning activities, and cables or vessel usage that impact the seabed, sub-seabed or intertidal zone in any manner have the potential to result in the damage/loss of known or potential marine and intertidal sites, features or finds, if present. Effects are considered to be permanent. To confirm the LSE of this impact, a full suite of high quality marine geophysical and geotechnical surveys must be undertaken and archaeologically assessed to understand the known resource on the seabed (nature, extent and archaeological value). This must be followed with appropriate commitment measures in place including those stipulated in a WSI as agreed with the Archaeological Curator, including a Protocol for Archaeological Discoveries.	Possible LSE without secondary commitment measures, however, it may become clear post-Scoping stage that the impact does not require detailed assessment in the EIAR.
Physical disturbance activities causing indirect changes to hydrodynamic and sedimentary regimes leading to sediment reduction on the seabed	C-OFF-18 C-OFF-32 C-OFF-61	Scoped In	Any of the O&M activities or vessel usage may cause indirect changes to hydrodynamic and sedimentary regimes leading to sediment reduction on the seabed and scour, potentially exposing receptors leading to increased rates of deterioration through biological, chemical and physical processes.	LSE without secondary commitment measures

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
			The LSE of this impact is to be confirmed following review of the Physical Processes assessment.	
Physical disturbance activities causing indirect changes to hydrodynamic and sedimentary regimes leading to sediment accretion on the seabed	C-OFF-18 C-OFF-32 C-OFF-61	Scoped In	Any of the O&M activities or vessel usage may cause indirect changes to hydrodynamic and sedimentary regimes may cause sediment to cover receptors inhibiting a range of biological, chemical and physical degradation processes (beneficial effect). The LSE of this impact is to be confirmed following review of the Physical Processes assessment.	LSE without secondary commitment measures (beneficial)
Temporary or permanent change to the setting of known heritage assets (sites with identified and named vessels or aircraft)	C-OFF-08 C-OFF-09 C-OFF-18 C-OFF-32 C-OFF-57 C-OFF-59 C-OFF-61 C-OFF-62	Scoped In	The setting of known and named wreck (and aviation) sites may be impacted by activities associated with the device designs, the offshore export cable and other infrastructure, and in turn this could potentially affect the significance of such seabed features. Effects could be temporary or permanent. To confirm the LSE of this impact, a full suite of high quality marine geophysical and geotechnical surveys must be undertaken and archaeologically assessed to understand the known resource on the seabed (nature, extent and archaeological value). The impact to setting will be confirmed once the location and size of project infrastructure is known and its proximity to known archaeological receptors.	Possible LSE without secondary commitment measures, however, it may become clear post-Scoping stage that the impact does not require detailed assessment in the EIAR.

15.6 Potential Cumulative Impacts

15.6.1 The EIA will include consideration of the potential cumulative impact (direct or indirect) of the Proposed Offshore Development and other developments on the marine historic environment. The process by which potential cumulative impacts will be assessed through the CIA is described in **Chapter 6: EIA Approach and Methodology**. The approach and methodology will be confirmed following submission of this chapter and in line with the other disciplines being assessed. Where relevant, reference will also be made to relevant regional guidance, including those presented in **Table 15.8**.

15.6.2 Other marine developments considered along the Proposed Offshore Development for the CIA have not yet been confirmed, but may include pre-consent projects (for instance, Buchan OWF, Broadshore OWF and Marram OWF), consented projects (for instance, Moray East OWF) and those in operation (for instance, Moray OWF (East) and Beatrice OWF).

15.6.3 Each development will undergo their own EIA with suitable mitigation measures recommended and therefore any direct cumulative impacts will be unlikely. With regards to indirect effects, effects to local hydrodynamic and sediment transport regime will need to be assessed within the EIA to assess the significance of these impacts upon the known and unknown marine historic environment within the study area.

15.7 Potential Transboundary Impacts

15.7.1 With regards to effects on the marine historic environment, the potential impacts of the Proposed Offshore Development are unlikely to lead to any significant transboundary effects during the construction, O&M or decommissioning phases.

15.7.2 Direct impacts resulting from the Proposed Offshore Development are expected to be confined to the study area, and therefore are not predicted to result in transboundary effects. Similarly with indirect impacts, due to the Proposed Offshore Development's proximity to such boundaries, the potential for indirect impacts is not expected. It is therefore recommended that transboundary effects be Scoped Out for the purposes of EIA. This will require confirmation from the curators and can be discussed further at future stakeholder consultations.

15.8 Proposed Approach to EIA

Additional Data Sources

15.8.1 A thorough, desk-based collation and review of the relevant data will be undertaken to inform the subsequent EIA. Along with the datasets presented in

15.8.2 **Table** 15.1, the following additional data sources will be consulted to compile the desk-based element of the assessment, where available:

- Marine geophysical datasets comprising SBP, high-density magnetometer and Multi-beam Bathymetry Echo Sounder;
- Marine geotechnical data obtained from the assessment of boreholes, vibrocores and CPTs;
- ROV data;

- Existing geotechnical, geophysical and geoarchaeological data;
- Available LiDAR and aerial photography;
- Online resources including BGS Geology of Britain Viewer;
- Relevant background mapping from the area including Admiralty Charts from the UKHO, historic maps and Ordnance Survey; and
- Published and unpublished literature (including a detailed review of reports for previous fieldwork carried out within the proximity to the Proposed Offshore Development boundary).

15.8.3 Geophysical and geotechnical surveys undertaken across the Offshore Project Boundary by XOCEAN in 2023 and 2024 will obtain multibeam echosounder including backscatter, sub-bottom profiler, sidescan sonar and magnetometer data. These datasets will cover the entirety of the Array Area and Offshore ECC Study Area and will be archaeologically assessed to provide a full assessment of the known marine heritage receptors and to identify anthropogenic geophysical anomalies and the presence of submerged palaeolandscape deposits, with previously unknown or unconfirmed locations. The marine geophysical surveys will be conducted to appropriate professional standards for archaeological review (as outlined in Plets *et al.*, 2013) and support post-consent mitigation strategies (The Crown Estate, 2021).

15.8.4 Geotechnical surveys conducted for the Proposed Offshore Development will primarily provide seabed information for engineering design solutions. These will be informed by relevant guidance (Gribble and Leather, 2011) to ensure the logs are suitable for archaeological review and core material is kept for potential analysis if sediments of archaeological interest are identified. This will inform whether submerged palaeolandscape deposits and prehistoric archaeological remains are present in the Array Area or the Offshore ECC Study Area. Geotechnical data is not anticipated to be available pre-application.

15.8.5 If required, an intertidal walkover survey will be undertaken at the proposed landfall to ground truth previously recorded heritage assets and to identify any new assets that may be of relevance to the assessment.

Guidance

15.8.6 In addition to the approach and guidance (of general relevance) outlined in **Chapter 6: EIA Approach and Methodology**, the assessment of marine archaeology and cultural heritage receptors will also comply with the relevant regional (Scottish and UK) and standard industry guidance. This guidance proposed for consideration within the EIA is presented in **Table 15.8**.

Table 15.8: Guidance Documents Relevant to Marine Archaeology and Cultural Heritage Receptors for Consideration in EIA.

Guidance Category	Guidance Documentation (presented in chronological order)
Regional	Scotland's National Marine Plan (NMP): A Single Framework for Managing Our Seas (Marine Scotland, 2015) covers both Scottish inshore waters (out to 12 nm) and offshore waters (12 to 200 nm). It contains policies and advice concerning the marine historic environment, including that development and use of the marine environment should protect and, where appropriate, enhance heritage assets in a manner proportionate to their significance and that as well as designated marine

	heritage assets there are likely to be a number of undesignated sites of demonstrably equivalent significance, which are yet to be fully recorded or await discovery.
	Scotland's National Marine Plan (*ibid.*, 2015) also recommends that Historic Marine Planning Partnerships and licensing authorities should seek to identify significant historic environment resources at the earliest stages of planning or development process and preserve them *in situ* wherever feasible. Adverse impacts should be avoided, or, if not possible, minimised and mitigated. Where this is not possible licensing authorities should require developers to record and advance understanding of the significance of the heritage asset before it is lost, in a manner proportionate to that significance.
	The Historic Environment Policy for Scotland (HES, 2019b) includes policies that decisions affecting any part of the historic environment require understanding of its significance and consideration of avoiding or minimising detrimental impacts.
	The Designation Policy and Selection Guidance (HES, 2020) stands alongside the Historic Environment Policy for Scotland and outlines the principles and criteria that underpin the designation of historic MPAs.
	The Aberdeenshire Local Development Plan (Aberdeenshire Council, 2023) is part of a series of documents comprising the statutory development plan for the area, and details the policies for determining applications. Although the document does not specifically include offshore assets, the polices referring to offshore cultural heritage can be utilised.
Standard Guidance	Managing Lithic Scatters: Archaeological Guidance for Planning Authorities and Developers (English Heritage (now Historic England), 2000).
	Military Aircraft Crash Sites: Guidance on their significance and future management (English Heritage (now Historic England), 2002).
	The Code of Practice for Seabed Development (Joint Nautical Archaeology Policy Committee, 2006).
	Historic Environment Guidance for the Offshore Renewable Energy Sector (Wessex Archaeology, 2007).
	Conservation Principles, Policies and Guidance for the Sustainable Management of the Historic Environment (English Heritage (now Historic England), 2008).
	Guidance for Assessment of Cumulative Impacts on the Historic Environment from Offshore Renewable Energy (Oxford Archaeology and George Lambrick Archaeology and Heritage, 2008).
	Our Seas – A shared resource: High level marine objectives (Department for Environment, Food and Rural Affairs, 2009).
	Offshore Geotechnical Investigations and Historic Environment Analysis: Guidance for the Renewable Energy Sector (Gribble and Leather, 2011).
	Marine Geophysics Data Acquisition, Processing and Interpretation Guidance Notes (Plets *et al*., 2013).
	Protocol for Archaeological Discoveries: Offshore Renewables Projects (The Crown Estate, 2014).
	Protection and Management of Historic Military Wrecks Outside UK Territorial Waters (Department of Culture, Media and Sport and the MOD, 2014).
	Geoarchaeology: Using Earth Sciences to Understand the Archaeological Record (Historic England, 2015).
	Managing Change in the Historic Environment - Setting (HES, 2016).

	Marine Scotland Consenting and Licensing Guidance (Marine Scotland, 2018).
	Environmental Impact Assessment Handbook: Guidance for competent authorities, consultation bodies, and others involved in the EIA process in Scotland (HES and SNH, 2018).
	MPAs in the Seas around Scotland – Guidelines on the selection, designation and management of historic MPAs (HES, 2019a).
	SEA of Sectoral Marine Plan for Offshore Wind Energy – Strategic Environmental Assessment Environmental Report (Scottish Government, 2019a).
	Designation Policy and Selection Guidance (HES, 2020).
	Standard and Guidance for Historic Environment Desk-based Assessment (Chartered Institute for Archaeologists, 2020).
	Offshore Wind Energy in Scottish Waters: Regional Locational Guidance (ABPmer, 2020).
	Archaeological Written Schemes of Investigation for Offshore Wind Farm Projects (The Crown Estate, 2021).
	Sectorial Marine Plan for Offshore Wind Energy (updated) – Strategic Environmental Assessment Screening and Scoping Report (ABPmer, 2023).
	Curating the Palaeolithic (Historic England, 2023).

Assessment Methodology

15.8.7 The EIA will follow the general Proportionate EIA approach outlined in **Chapter 6: EIA Approach and Methodology** and will be based on the MDS approach with reference to relevant legislation and policy in order that the licensing authorities have sufficient and adequate information on which to base a decision. Methodology relating specifically to marine archaeology receptors, and beyond the scope of that presented in **Chapter 6: EIA Approach and Methodology** will be presented below.

15.8.8 Following submission of the Offshore Scoping Report, the baseline for marine archaeology and cultural heritage will be further enhanced with a desk-based baseline assessment conducted to identify the known and potential marine cultural heritage resource within the study area enhanced by the archaeological review of project-specific marine geophysical and geotechnical datasets as available. It would aim to characterise marine historic assets that have the potential to be present due to an unknown location of loss, since there could be assets of moderate and high heritage value present. The desk-based baseline assessment would be conducted to appropriate professional standards (CIfA, 2020). The importance (or value) of marine historic environment assets along with the significance of their setting will also be evaluated to inform the assessment. The level of importance assigned depends on a number of factors, including intrinsic, contextual and associative characteristics. This will be based on the following guidance documents:

- Designation Policy and Selection Guidance, including Annexes (HES, 2020);
- Ships and Boats: Prehistory to Present. Designation Selection Guide (English Heritage, (2012); and

- Assessing Boats and Ships 1860-1913, 1914-1938 and 1939-1950. Archaeological Desk-Based Assessments in 3 volumes (Wessex Archaeology, 2011).

15.8.9 The assessment will address the identification of any marine heritage assets on the seabed, so that avoidance of impact can be embedded in the project design, and if avoidance is not practicable, then an evidence-based approach will be used to design suitable mitigation strategies in consultation with MD-LOT and HES, via an agreed Written Scheme of Investigation (all commitments are presented in **Appendix A: Offshore Commitments Register**). All impacts on marine heritage assets identified within this chapter and confirmed in the EIAR will be Scoped In to the EIA process (see **Table 15.7**). Only the transboundary effects are recommended at this stage to be Scoped Out of EIA.

15.8.10 The assessment will be based on analysis of desk-based sources (including an ArcGIS Pro based gazetteer) and geophysical and geotechnical data collected specifically for the Proposed Offshore Development. The assessment of the magnitude of impact and the significance of effect on marine historic environment assets will be based on HES and SNH's Environmental Impact Assessment Handbook (2018) and is detailed below, to be agreed in consultation with statutory stakeholders and curators.

15.8.11 In addition to the commitments presented in **Section 15.4** and **Appendix A: Offshore Commitments Register**, additional commitments are proposed to ensure that where impact is unavoidable, further information is obtained for posterity or material is recovered and preserved, thus further informing the archaeological record. Additional measures include:

- Furthermore, mitigating and offsetting impacts to palaeogeographic features such as palaeochannels may occur through further investigation of existing geotechnical samples or undertaking further samples, which can enhance the palaeogeographic record for an area;
- AEZs will not be proposed for archaeological features of lower archaeological value, however such features will be avoided where practicable. Micro-siting of the Proposed Offshore Development, where practicable, will help to avoid seabed features, such as geophysical anomalies of archaeological potential;
- Where micro-siting is not possible, further assessment will be undertaken to confirm the nature of the seabed anomaly. Methods of ground truthing assessment could include ROV or diver survey and could be undertaken in conjunction with other surveys associated with the Proposed Offshore Development, for UXO or obstruction surveys;
- Watching briefs may also be employed in the intertidal or marine areas where any intrusive works are planned. These could include pre-lay grapnel runs or intertidal cable-laying in an excavated trench. The proposed methodology will be presented in a Method Statement and agreed through consultation with the Archaeological Curator, HES, and MD-LOT; and
- Once the design of the Offshore Scheme has been confirmed, it may be possible to ascertain measures to protect heritage assets that could be indirectly impacted, for instance by scouring, exposure or erosion, caused by direct impacts to the seabed. For instance, 'buffers' may be placed around a heritage asset to protect it from scour. This will be confirmed following review of **Chapter 7: Marine and Coastal Processes**.

Criteria for Assessing Significance

15.8.12 The Historic Environment Policy for Scotland (HES, 2019b: 4-5) describes a heritage asset as a physical element of the historic environment – a building, monument, site, place, area or landscape identified as having cultural significance. Cultural significance is defined as comprising aesthetic, historic, scientific or social value for past, present or future generations and can be embodied in a place itself, its fabric, setting, use, associations, meanings, records, related places and related objects.

15.8.13 The significance of impacts will be determined with reference to the following factors (HES and SNH, 2018):

- The asset's value (sensitivity);
- The degree of change in its cultural significance resulting from the Proposed Offshore Development (magnitude of impact);
- The duration or frequency of the impact; and
- The likelihood of the impact occurring.

15.8.14 For the significance of any given impact to be fully understood, the sensitivity of any receptors that may be impacted need to be considered along with the magnitude of the effect. The criteria used to assess the significance of an impact is presented below.

Sensitivity

15.8.15 The sensitivity of a historic environment receptor is a function of its capacity to accommodate change and reflects its ability to recover if it is affected. Based on HES and SNH's Environmental Impact Assessment Handbook (HES and SNH, 2018), the sensitivity of the receptor will be assessed with regard to the following factors:

- Value – a measure of the receptor's importance, rarity and worth;
- Adaptability – the degree to which a receptor can avoid or adapt to an effect;
- Tolerance – the ability of a receptor to accommodate temporary or permanent change without significant negative impact; and
- Recoverability – the temporal scale over and extent to which a receptor will recover following an effect.

15.8.16 Archaeological receptors cannot typically adapt, tolerate or recover from physical impacts resulting in material damage or loss caused by development. Consequently, the sensitivity of each receptor is predominantly quantified only by their value. Where receptors are considered to be capable of adapting to, tolerating or recovering from indirect impacts, these factors will also be incorporated into an assessment of their sensitivity.

15.8.17 According to the Environmental Impact Assessment Handbook (HES and SNH, 2018: 175), value of a heritage assets reflects the relative importance of the asset as an element of the historic environment and is most commonly categorised as international, national, regional and local.

15.8.18 It should be noted that, while designation indicates that a receptor has been identified as being of high value, non-designated archaeological assets are not necessarily of lesser value. Consequently, non-designated receptors that can be demonstrated to be of equivalent value to designated sites are considered to be of equivalent significance.

15.8.19 The nature of the marine archaeological resource is such that there is a high level of uncertainty concerning remains on the seabed. Often data regarding the nature and extent of sites are limited or out of date and, as such, the precautionary principle has been applied to all aspects of archaeological impact assessment.

15.8.20 The sensitivity (assessed as value for marine archaeology) of known archaeological assets will be assessed using professional judgement informed by criteria provided in **Table 15.9** (based on HES and SNH, 2018: 185) below.

Table 15.9: Criteria to Assess Archaeological Sensitivity.

Sensitivity	Criteria
High	Assets valued at an international or national level, for example, scheduled monuments, historic MPAs and non-designated assets that meet the relevant criteria for designation in the opinion of the assessor. Assets have the high potential to contribute to knowledge and understanding and/or public engagement. All other wrecked ships and aircraft with statutory protection under the Protection of Wrecks Act 1973, Ancient Monuments and Archaeological Areas Act 1979 or Protection of Military Remains Act 1986, plus as-yet undesignated sites that are demonstrably of equivalent archaeological value. Palaeogeographic features with demonstrable potential to include artefactual and/or palaeoenvironmental material, possibly as part of a prehistoric site or landscape.
Medium	Assets valued at a regional level, for example, non-designated assets of similar value in the opinion of the assessor. Assets have the moderate potential to contribute to knowledge and understanding and/or public engagement. Includes wrecks of ships and aircraft that do not have statutory protection or equivalent significance, but have moderate potential based on a formal assessment of their importance in terms of build, use, loss, survival and investigation. Prehistoric deposits with moderate potential to contribute to an understanding of the palaeoenvironment.
Low	Assets valued at a local level, for example, non-designated assets of similar value in the opinion of the assessor. Assets have the low potential to contribute to knowledge and understanding and/or public engagement. Includes wrecks of ships and aircraft that do not have statutory protection or equivalent significance, but have low potential based on a formal assessment of their importance in terms of build, use, loss, survival and investigation. Prehistoric deposits with low potential to contribute to an understanding of the palaeoenvironment.
Unknown	There is not presently enough information available about the site to assess its value.

Magnitude

15.8.21 In accordance with HES and SNH (2018: 184), the assessment of magnitude will be led by professional judgement since cultural heritage impacts are rarely quantifiable. In lieu of the Proposed Offshore Development's own criteria for magnitude, **Table 15.10** will be utilised for the assessment of marine archaeological heritage assets:

Table 15.10: Criteria to Assess Magnitude.

Magnitude	Adverse	Beneficial
Substantial	Changes to the fabric or setting of a heritage asset resulting in the complete or near complete loss of its cultural significance, such that it may no longer be considered a heritage asset.	Preservation of the asset *in situ* where it would be completely or almost completely lost in the do-nothing scenario.
Moderate	Changes to the elements of the fabric or setting of the heritage asset that contribute to its cultural significance such that this is substantially altered.	Changes to key elements of the asset's fabric or setting that result in its cultural significance being preserved, where they would otherwise be lost, or restored.
Slight	Changes to the elements of the fabric or setting of the heritage asset that contribute to its cultural significance such that this is slightly altered.	Changes that result in elements of the asset's fabric or setting that detract from its cultural significance being removed.
Negligible	Changes to fabric or setting that leave significance unchanged.	

Significance of Impact

15.8.22 The significance of impact (adverse or beneficial) on an archaeological receptor, whether direct or indirect, is determined as a combination of the sensitivity (value) of the receptor and the measures of the magnitude of the effect. The significance of impact matrix is presented in **Chapter 6: EIA Approach and Methodology**, however it is not a substitute for professional judgement and interpretation, particularly where the sensitivity or effect magnitude levels are not clear or are borderline between categories.

15.9 Scoping Questions

15.9.1 The following questions refer to the marine archaeology and cultural heritage chapter and are designed to inform the Scoping Opinion and focus the Scoping exercise.

1. Do you agree with the study area defined for marine archaeology and cultural heritage chapter?
2. Do you agree with the use of data listed in **Section 15.3**, and any additional data listed in **Paragraph 15.8.1**, being used to inform the Offshore EIAR?
3. Are there any further data sources or guidance documents that should be considered?
4. Do you agree that all receptors, pathways, and potential impacts related to marine archaeology and cultural heritage chapter have been identified?
5. Do you agree with the Scoping In and Scoping Out of impact pathways in relation to marine archaeology and cultural heritage chapter?
6. Do you agree with the assessment of transboundary effects in relation to marine archaeology and cultural heritage chapter?
7. Do you agree with the assessment of cumulative effects in relation to marine archaeology and cultural heritage chapter?
8. Do you agree with the proposed assessment methodology for marine archaeology and cultural heritage chapter?

9. Do you agree on the suitability of the proposed commitments to reduce or eliminate LSE relevant to marine archaeology and cultural heritage?

16 Military and Civil Aviation

16.1 Introduction

16.1.1 This chapter of the Offshore Scoping Report identifies military and civil aviation receptors of relevance to the Proposed Offshore Development and considers the potential impacts from the construction, O&M and decommissioning of the Proposed Offshore Development on military and civil aviation.

16.1.2 WTGs have the potential to cause a variety of adverse effects on military and civil aviation receptors. WTGs can impact radars used by civilian and military air traffic controllers because the characteristics of moving WTG blades are similar to those of aircraft, leading to spurious return, or clutter, on radar displays. This can affect the safe provision of Air Traffic Services (ATS) or interfere with tracking of aircraft by the military. WTGs can also have the potential to present a physical obstruction for aviation activities, such as military low flying or helicopter SaR operations.

16.1.3 Aviation stakeholders potentially affected include the UK CAA, the MOD, National Air Traffic Services (NATS), Highlands and Islands Airports Limited (HIAL) and offshore helicopter operators such as Bristow Group, who currently deliver the UK SaR contract on behalf of His Majesty's Coastguard.

16.1.4 This chapter should be read alongside the following chapters:

- **Chapter 14: Shipping and Navigation**;
- **Chapter 17: Seascape, Landscape and Visual Impact**; and
- **Chapter 20: Other Human Activities**.

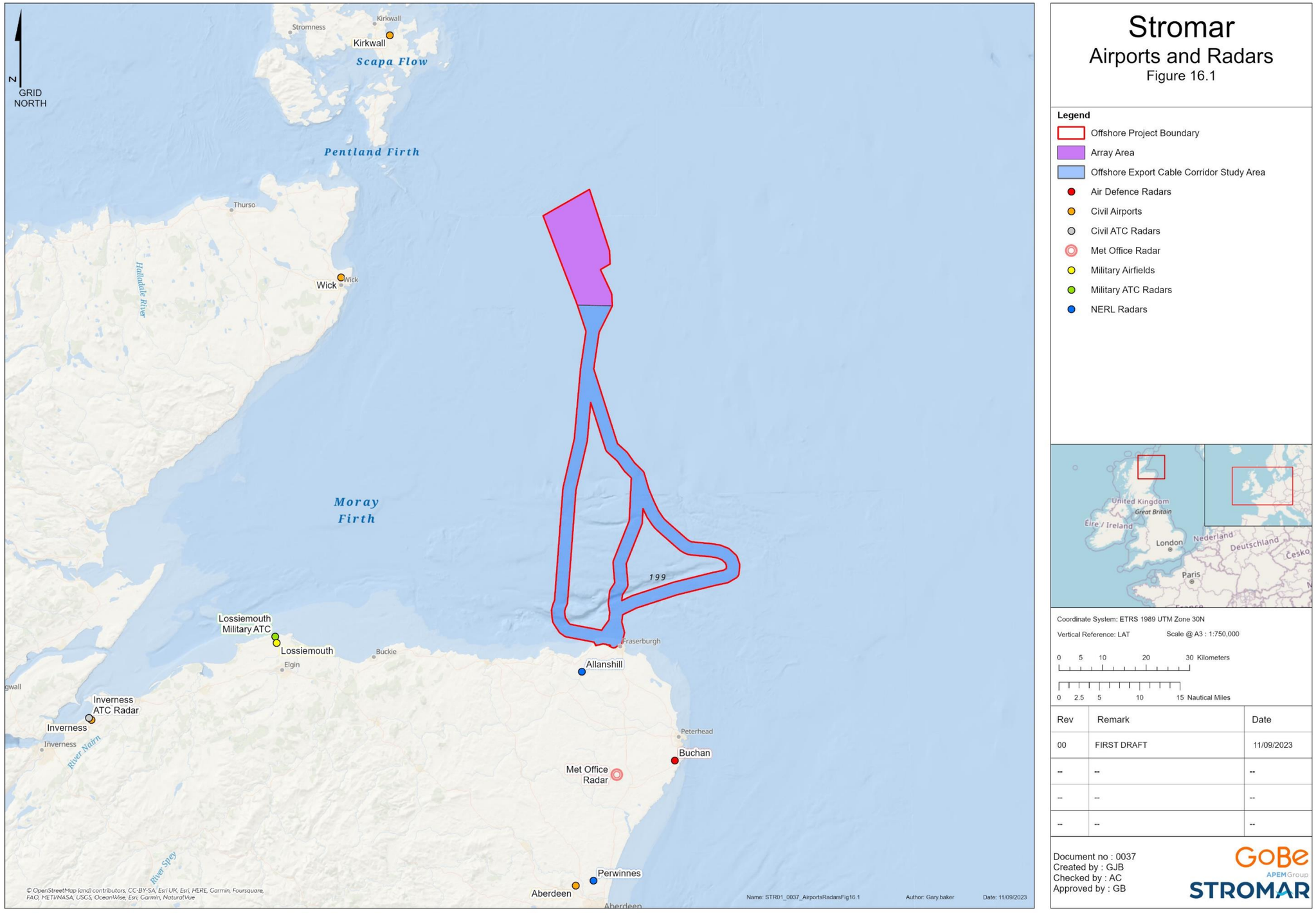
16.1.5 This chapter of the Offshore Scoping Report has been prepared by Cyrrus Limited.

16.2 Study Area

Overview

16.2.1 In considering the spatial coverage of the military and civil aviation study area, the overriding factor is the potential for WTGs within the Array Area to have an impact on civil and military radars when taking into account the required radar's operational ranges. In general, Primary Surveillance Radars (PSRs) installed on civil and military aerodromes have an operational range between 40 and 60 nm. All radar-equipped airfields within a 60 nm radius of the Array Area are therefore included in this study area. En-route radars operated by NATS (En-Route) plc (NERL), and military Air Defence (AD) radars are required to provide coverage at ranges in excess of 60 nm and so all such radars with potential Radar Line of Sight (RLoS) of WTGs in the Array Area are also included in the study area.

16.2.2 The military and civil aviation study area is defined by the Proposed Offshore Development footprint, plus an appropriate buffer. This includes the airspace between the Array Area and the UK mainland, extending from Kirkwall Airport to the northwest, to Aberdeen Airport in the south. Aerodromes and radars within the study area that are under consideration as part of this Offshore Scoping Report are shown in **Figure 16.1**.



Stromar
Airports and Radars
Figure 16.1

Legend

- Offshore Project Boundary
- Array Area
- Offshore Export Cable Corridor Study Area
- Air Defence Radars
- Civil Airports
- Civil ATC Radars
- Met Office Radar
- Military Airfields
- Military ATC Radars
- NERL Radars

Coordinate System: ETRS 1989 UTM Zone 30N
Vertical Reference: LAT
Scale @ A3 : 1:750,000

0 5 10 20 30 Kilometers
0 2.5 5 10 15 Nautical Miles

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Approved by : GB

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Figure 16.1: Airports and Radars.

16.2.3 The following criteria have been used to identify receptors within the study area (and are discussed further below):

- Civil aerodromes;
- MOD facilities;
- NERL facilities;
- Meteorological radio facilities; and
- Other aviation activities.

Civil Aerodromes

16.2.4 The Civil Aviation Publication (CAP) 764 Policy and Guidelines on Wind Turbines (CAA, 2016) states the distances from various aerodromes where consultation is necessary. These distances include:

- Aerodromes with a surveillance radar – 30 km;
- Non-radar equipped licensed aerodromes with a runway of more than 1,100 m – 17 km;
- Licensed aerodromes where the WTGs will lie within airspace coincidental with any published Instrument Flight Procedure (IFP);
- Unlicensed aerodromes with runways of more than 800 m – 4 km;
- Unlicensed aerodromes with runways of less than 800 m – 3 km;
- Gliding sites – 10 km; and
- Other aviation activities such as parachute sites and microlight sites – 3 km.

16.2.5 CAP 764 states that these distances are for guideline purposes only and do not represent ranges beyond which all WTG developments will be approved or within which they will always be objected to. For example, aerodromes may utilise their radars at ranges in excess of 30 km. These ranges are intended as a prompt for discussion between aviation stakeholders and developers.

16.2.6 As well as examining the technical impact of WTGs on Air Traffic Control (ATC) facilities, it is necessary to consider the physical safeguarding of ATC operations using the criteria laid down in CAP 168 Licensing of Aerodromes (CAA, 2019) to determine whether the Proposed Offshore Development will breach obstacle clearance criteria.

Ministry of Defence

16.2.7 Aviation, AD and other activities of the MOD must also be considered, and this includes:

- MOD airfields, both radar and non-radar equipped;
- MOD AD radars; and
- MOD Practice and Exercise Areas (PEXAs) for both aviation and non-aviation activities.

NERL Facilities

16.2.8 The possible effects of WTGs on NERL radar systems, a network of primary and secondary radar facilities around the country, must also be considered.

Meteorological Radio Facilities

16.2.9 WTGs have the potential to adversely impact meteorological facilities, such as weather radars. The Meteorological (MET) Office must be consulted by developers for WTG proposals within a 20 km radius zone of any of their UK weather radar sites.

Other Aviation Activities

16.2.10 Other aviation activities of relevance could include:

- General military low flying operations;
- Military and civilian 'off-route' fixed-wing and helicopter operations, including SaR missions and offshore helicopter operations in support of the O&G industry; and
- Other aviation activity.

16.3 Baseline Environment

Data Sources

16.3.1 For the purposes of this Offshore Scoping Report, a desk-based review of existing and known activities was undertaken using relevant spatial and scientific data sources.

16.3.2 The data sources that have been used to inform the military and civil aviation chapter are presented within **Table 16.1**. These identified data sources will be taken forward and used to inform the subsequent EIA.

Table 16.1: Key sources of Military and Civil Aviation Data.

Source, Author and Year	Summary	Coverage of the Array Area and Offshore ECC Study Area	Data Quality
CAA (2023), CAP 032 UK Aeronautical Information Publication (AIP)	Contains information on facilities, services, rules, regulations, and restrictions in UK airspace.	Full coverage.	AIP charts updated every 28 days.
MOD (2023), UK Military AIP	The main resource for information on flight procedures at all military aerodromes.	Full coverage.	Military AIP charts are updated every 28 days.
NATS (2012), Wind farm self-assessment maps	Maps provided by NATS to ascertain potential impact of WTGs on their en-route electronic infrastructure.	Full coverage.	Although last updated in 2012, can indicate the depth of radars on the
North Sea Transition Authority (NSTA) (2023a), Offshore infrastructure data	Regularly updated NSTA offshore shapefiles.	Full coverage.	Shapefile is updated every month.
Helideck Certification Authority (HCA) (2023), Helideck Certificates	Regularly updated offshore helideck certifications.	Full coverage.	HCA contains current helideck certificates with the expiry/renewal dates included.

Source, Author and Year	Summary	Coverage of the Array Area and Offshore ECC Study Area	Data Quality
Operational Programme for the Exchange of Weather Radar Information (OPERA) Database (2023), EUMET	Contains information for weather station radars throughout the UK.	Full coverage.	Data contains the current radar stations being operated by the MET Office in the UK.
NATS (2023), Technical and Operational Assessment (TOPA) for Stromar OWF Development	A project-specific report commissioned to gain NATS insight into the impacts of the Proposed Offshore Development.	Full coverage.	Dated January 2023, TOPA used the MDS for the Proposed Offshore Development.

Description of Baseline Environment

16.3.3 An understanding of the military and civil aviation baseline environment within the study area has been developed from utilisation of the available literature and data sources presented in **Table 16.1**.

16.3.4 An overview of the existing military and civil airspace environment is presented in **Figure 16.2**. The following sections provide further details.

Civil Aviation

16.3.5 The airspace above and adjacent to the Array Area is used by both civil and military aircraft and lies within the Scottish Flight Information Region (FIR) for air traffic control. This airspace is regulated by the UK CAA. The Scottish FIR is adjacent to the Polaris FIR whose boundary is, approximately, 194 km to the northeast of the Array Area at the closest point. Polaris FIR is regulated by CAA Norway.

16.3.6 Airspace is classified as either controlled or uncontrolled and is divided into classes depending on the type of ATS provided and under what conditions. In the UK, there are five classes of airspace, specifically A, C, D, E and G. Classes A to E are controlled airspace whereas Class G is uncontrolled. Within controlled airspace, aircraft are monitored and instructed by ATC, conversely in uncontrolled airspace aircraft are not subject to ATC instruction but operate according to a simple set of regulations. ATC may still provide information, if requested, to ensure flight safety.

16.3.7 Aircraft operate under one of two flight rules: Visual Flight Rules (VFR) or Instrument Flight Rules (IFR). VFR flight is conducted with visual reference to the natural horizon, whereas IFR requires reference solely to aircraft instrumentation.

16.3.8 From sea level to Flight Level (FL) 195, approximately 19,500 ft or 5,950 m above MSL, the airspace in the vicinity of the Array Area is Class G uncontrolled airspace. This airspace is used predominantly by low level flight operations and generally by aircraft flying under VFR. Under VFR flight, the pilot is responsible for maintaining a safe distance from the terrain, obstacles, and other aircraft.

16.3.9 Approximately 27.5 km southeast of the nearest extent of the Array Area is the Moray Firth Transponder Mandatory Zone (TMZ), shown within **Figure 16.2**. This zone is active from sea level to FL 100, approximately 10,000 ft, or 3,050 m AMSL. Within a TMZ, it is mandatory for aircraft to carry and operate transponder equipment. This enables aircraft to be detected and tracked by Secondary

Surveillance Radar (SSR) systems. The Moray Firth TMZ surrounds the Beatrice OWF and Moray East OWF and is used to mitigate the impact WTGs have on PSRs.

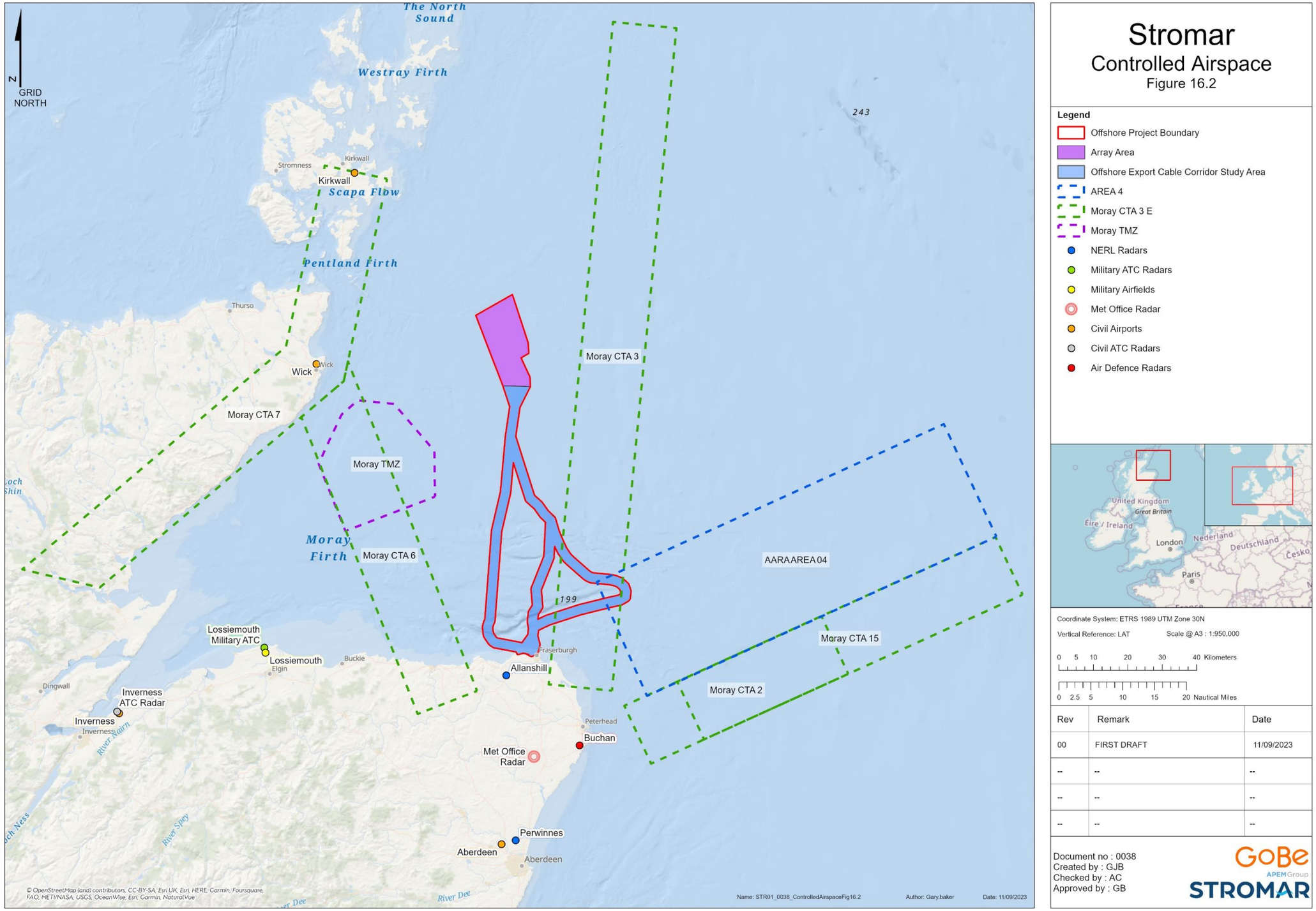


Figure 16.2: Controlled Airspace.

16.3.10 Above FL 195 over the Array Area is Class C controlled airspace in the form of a Temporary Reserved Area (TRA). This airspace, TRA 008B, has an upper limit of FL 245, approximately 24,500 ft AMSL. This airspace is available for use by both military and civil aircraft, though it is primarily used to accommodate VFR military flying activity. Laterally the nearest controlled airspace to the Array Area is the Moray Control Area (CTA), which is divided into CTAs 1 to 17. The closest of these CTAs to the Array Area is CTA 3, approximately 13.8 km to the east of the Array Area at its nearest point. This airspace is Class E controlled airspace with a lower limit of FL 105, approximately 10,500 ft AMSL, and an upper limit of FL 195, approximately 19,500 ft AMSL. These zones are depicted within **Figure 16.2.**

16.3.11 The nearest UK civil airport to the Array Area is Wick Airport, situated approximately 48.5 km west of the Array Area at its nearest point (**Figure 16.3)**. Wick Airport provides daily scheduled flights to Aberdeen Airport and is regularly used by helicopters operating offshore. Aberdeen International Airport is located approximately 133.3 km south of the Array Area and Inverness Airport is 146.7 km southwest.

16.3.12 Airports with published IFPs have associated Minimum Sector Altitudes (MSAs). These areas define the minimum safe altitude an aircraft can descend to within a sector defined by a 25 nm (approximately 46 km) radius, with the addition of a 5 nm (approximately 9.3 km) buffer zone. MSAs provide obstacle clearance protection of at least 1,000 ft to aircraft within that area. This provides pilots flying under IFR the reassurance of properly designated obstacle and terrain clearance protection whilst making an approach and landing at an airport in poor visibility. The nearest airports with published IFPs to the Array Area are Wick and Kirkwall Airport. The MSA for Wick Airport is centred on 'WCK' Non-Directional Beacon and the MSA for Kirkwall is centred on the 'KWL' Very High Frequency Omnidirectional Range. As shown within **Figure 16.3**, the buffer zone of the Wick Airport MSA overlaps the majority of the Array Area, and the buffer zone of the MSA for Kirkwall Airport infringes the north-west corner of the Array Area. The MSAs for Wick and Kirkwall Airport are 1,800 and 1,900 ft respectively.

16.3.13 In addition to the MSAs at Wick and Kirkwall Airport, there are Terminal Arrival Altitudes (TAAs) established at Wick and Kirkwall Airport. A TAA functions similarly to the MSA but specifically for pilots approaching the Airport. The TAAs for Wick and Kirkwall Airport are centred on the Intermediate Approach Fixes (IFs), PC31I and RUDKU respectively. As shown within **Figure 16.4** the majority of the Stromar Array Area lies within the Wick TAA and infringes the Kirkwall TAA along the northern edge of the Array Area. The altitudes of these sections are 1,800 ft for Wick, and 1,500 ft for Kirkwall. In addition to the TAA sections are 5 nm (approximately 9.3 km) buffer zones, the east of the Array Area is covered by the Wick TAA buffer zone and the northern section overlapped by the Kirkwall TAA buffer zone. To provide 1,000 ft clearance over WTGs with a maximum tip height of 385 m (1,263 ft) AMSL, both the MSAs and TAAs overlapping the Array Area will need to be increased. Further impact on Wick and Kirkwall IFPs will be determined by specialist analysis and consultation with HIAL.

16.3.14 Inverness Airport is equipped with a PSR and SSR combined facility. The preliminary RLoS analysis (**Figure 16.5**) indicates that Inverness PSR will not have visibility of WTGs with a maximum tip height of 385 m AMSL within the Array Area (as presented in **Chapter 3: Proposed Offshore Development Description**) as shown in **Figure 16.5**.

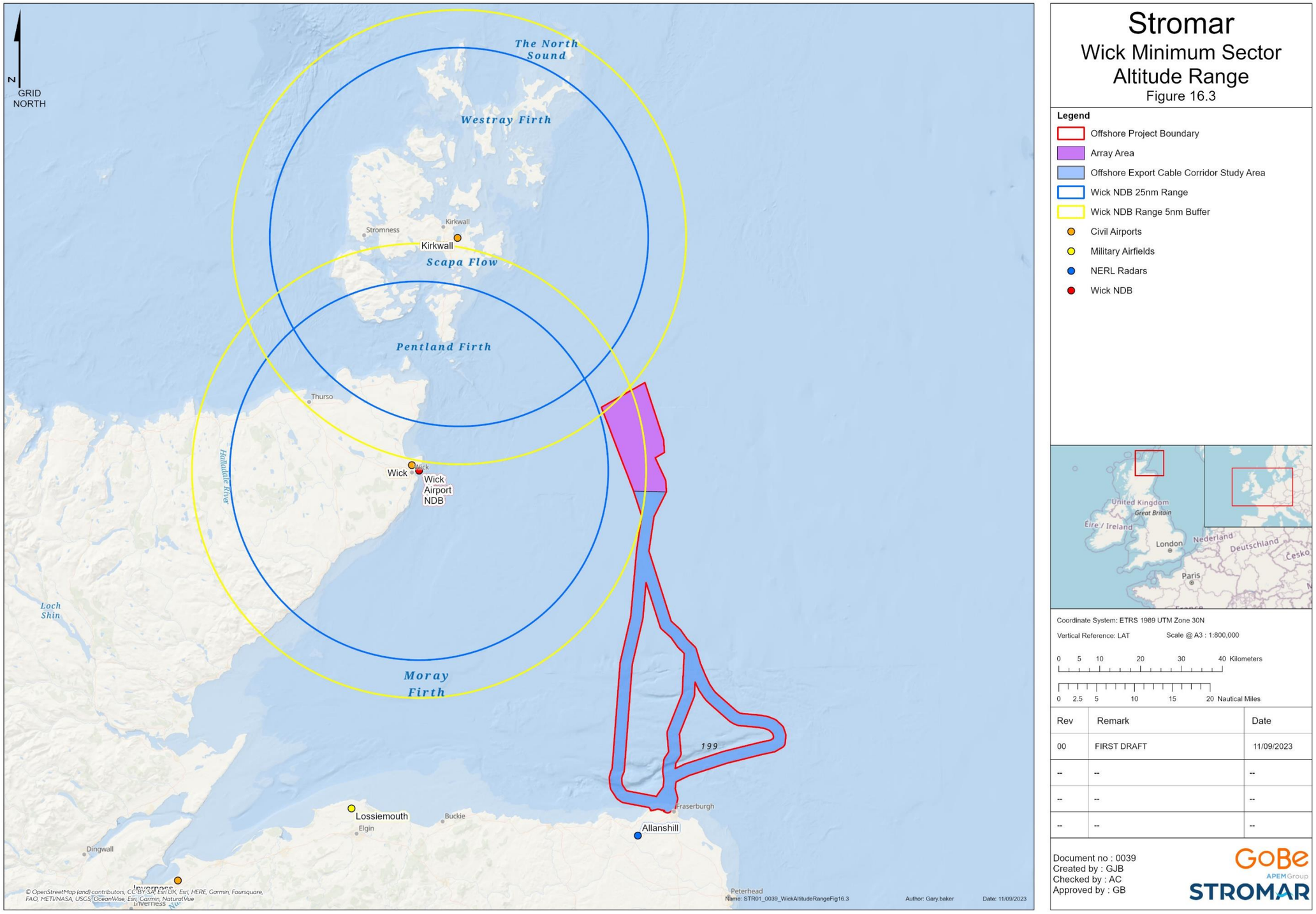
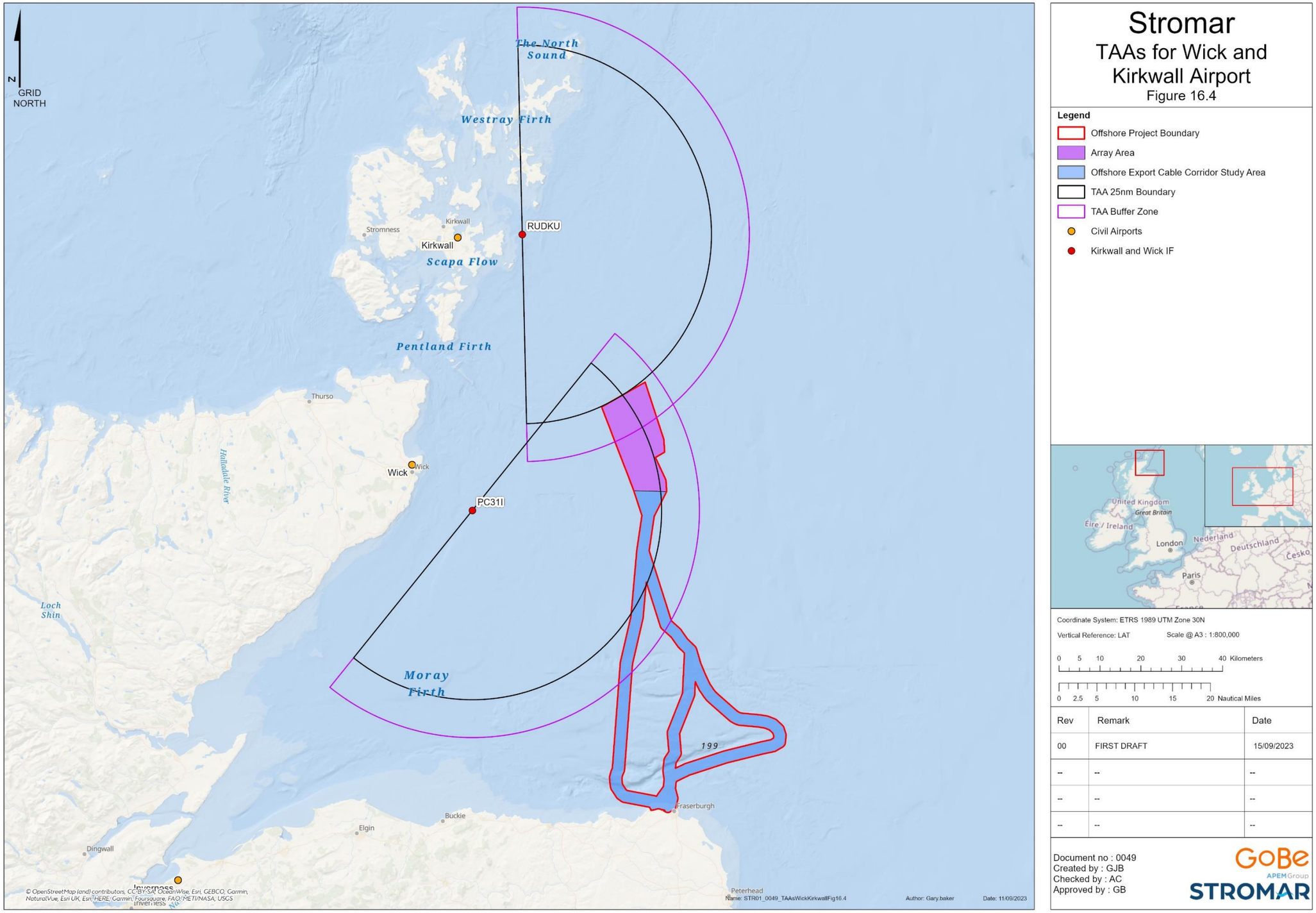


Figure 16.3: Wick MSA Range.



Stromar

TAAs for Wick and Kirkwall Airport

Figure 16.4

Legend

- Offshore Project Boundary
- Array Area
- Offshore Export Cable Corridor Study Area
- TAA 25nm Boundary
- TAA Buffer Zone
- Civil Airports
- Kirkwall and Wick IF

Coordinate System: ETRS 1989 UTM Zone 30N
Vertical Reference: LAT
Scale @ A3 : 1:800,000

0 5 10 20 30 40 Kilometers
0 2.5 5 10 15 20 Nautical Miles

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Figure 16.4: TAAs for Wick and Kirkwall Airport.

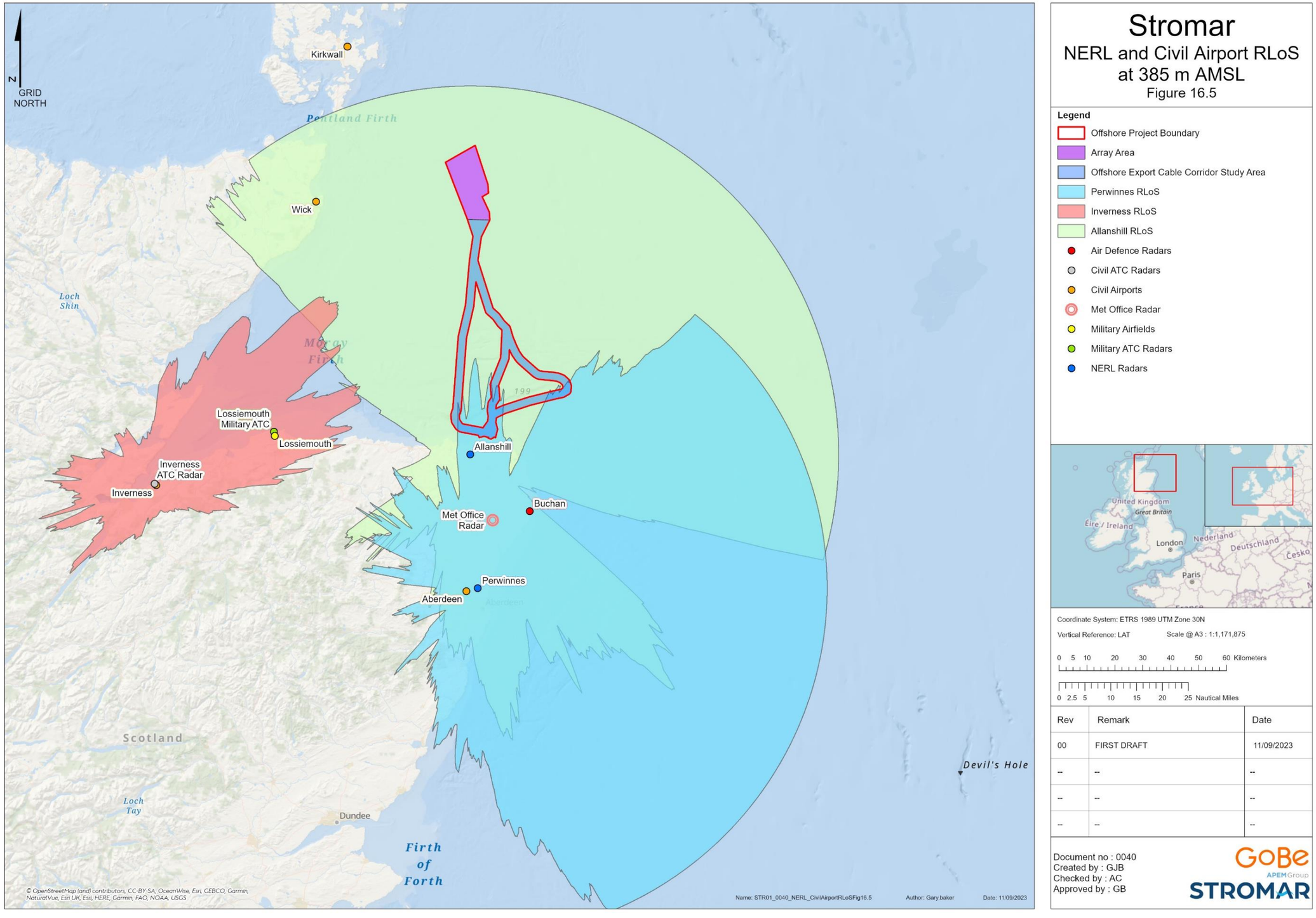


Figure 16.5: **NERL and Civil Airport RLoS at 385 m AMSL.**

16.3.15 NERL provides en-route civil ATS within the Scottish FIR and operates a network of radar facilities to provide en-route information for both civil and military aircraft. The closest NERL radar to the Array Area is based at Allanshill, 84.2 km to the south.

16.3.16 Preliminary RLoS analysis for WTGs with a maximum tip height of 385 m AMSL shows that all WTGs within the Array Area will be visible to Allanshill PSR as presented in **Figure 16.5**. The TOPA produced by NATS states that the development is likely to cause 'false primary plots' and reduce the probability of detection of real aircraft. Furthermore, these impacts apply to airport operations as Allanshill radar is used as an approach aid. The TOPA continues to highlight that Allanshill En-Route ATC, military ATC, and Prestwick Centre ATC have deemed the Proposed Offshore Development as unacceptable (NATS, 2023). NERL facilities are combined with SSR systems. WTGs have less of an impact on SSR than PSR systems when they are located more than 10 km away from the SSR facility (CAP 764, 2016). The SSR facility at Allanshill is 84.2 km away from the Array Area.

16.3.17 In summary, there is potential for WTGs in the Array Area to impact Wick and Kirkwall Airport's IFPs and the NERL PSR facility at Allanshill.

Military Aviation

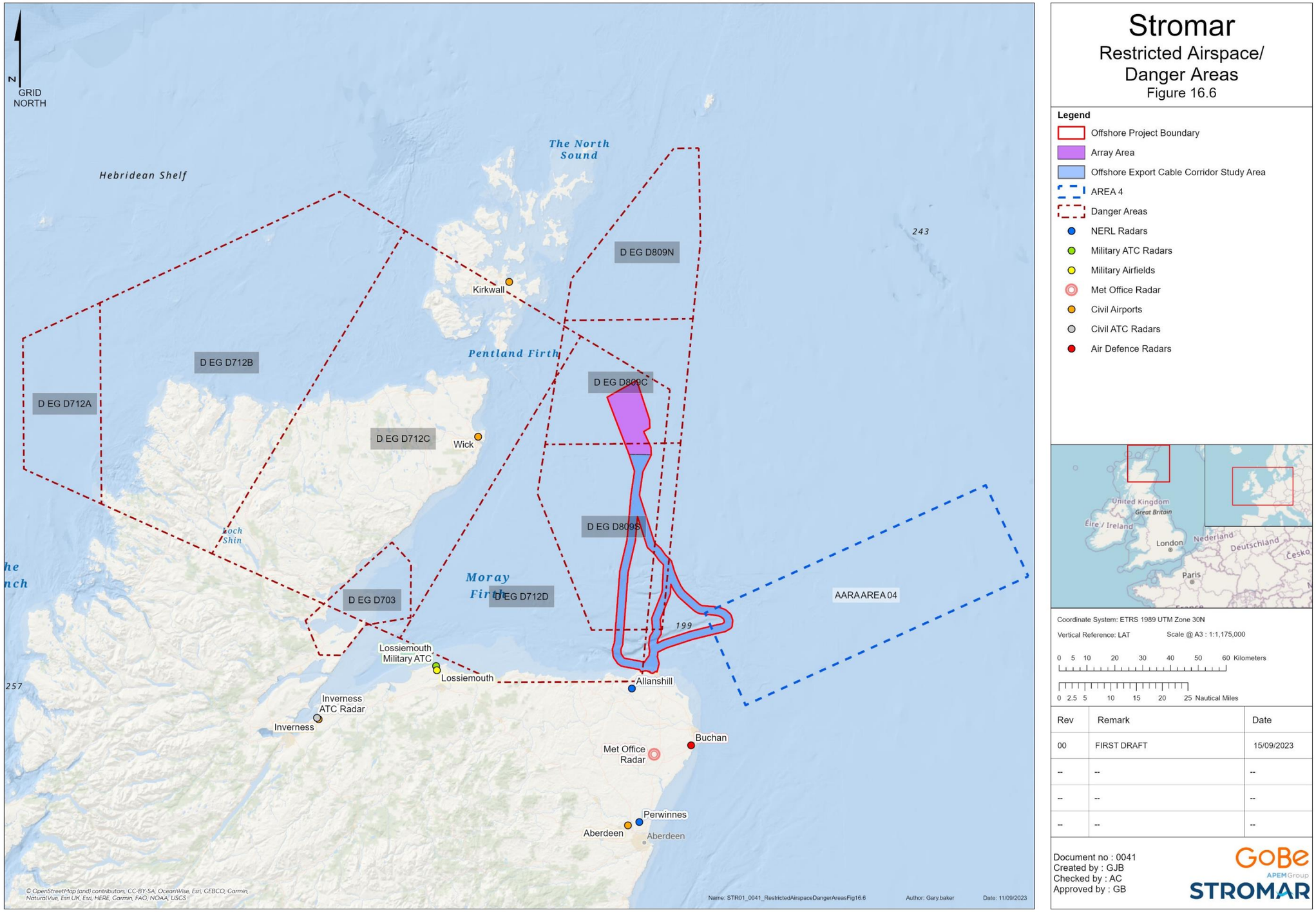
16.3.18 The Array Area lies within the Moray Firth Danger Areas EGD809C (Central) and EGD809S (South) which are active from sea level to the upper limit of 55,000 ft AMSL. Activity within these areas includes ordnance, munitions, explosives/unmanned aircraft system, and high energy manoeuvres. The MOD will need to know of any obstacles within the area that could affect these operations.

16.3.19 The Array Area lies entirely within the Northern Managed Danger Area, EGD712D. When active, from FL 245 to FL 660 (approximately 24,500 feet to 66,000 feet AMSL respectively), this area is a segregated airspace which accommodates military flight training with activity including high energy manoeuvres.

16.3.20 Located, approximately, 87.7 km to the southwest of the Array Area is the Tain Danger Area, EGD703. This zone is active from sea level to 15,000 ft AMSL. Activity within this area includes ordnance, munitions and explosives/unmanned aircraft system, high energy manoeuvres, para dropping and electronic optical hazards.

16.3.21 Situated, approximately, 59.8 km southeast of the Array Area is an Air to Air Refuelling Area, Area 04. This zone has an upper limit of FL 240 and a lower limit of FL 70 (approximately 24,000 ft to 7,000 ft AMSL respectively) and is permanently available to military air traffic.

16.3.22 There are no known further PEXAs, including non-aviation activities within the study area. All airspace mentioned above are depicted within **Figure 16.6**.



Stromar

Restricted Airspace/ Danger Areas

Figure 16.6

Legend

- Offshore Project Boundary
- Array Area
- Offshore Export Cable Corridor Study Area
- AREA 4
- Danger Areas
- NERL Radars
- Military ATC Radars
- Military Airfields
- Met Office Radar
- Civil Airports
- Civil ATC Radars
- Air Defence Radars

Coordinate System: ETRS 1989 UTM Zone 30N
Vertical Reference: LAT
Scale @ A3 : 1:1,175,000

0 5 10 20 30 40 50 60 Kilometers

0 2.5 5 10 15 20 25 Nautical Miles

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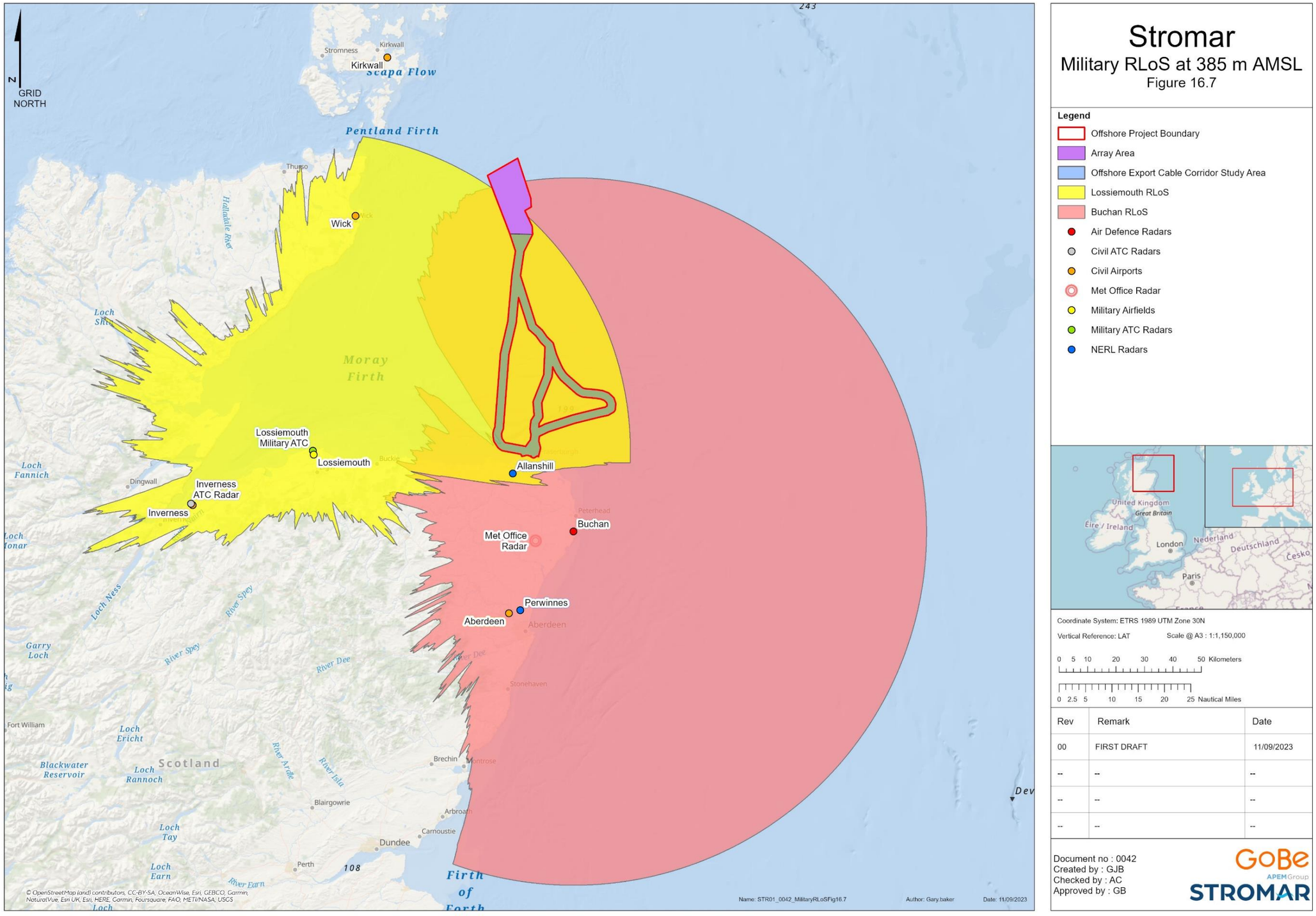
Figure 16.6: Restricted Airspace/Danger Areas.

16.3.23 The nearest military airfield with a PSR is RAF Lossiemouth, approximately 103 km southwest of the Array Area. The preliminary RLoS analysis indicates that all WTGs within the southern half of Array Area will be visible with a maximum tip height of 385 m AMSL to Lossiemouth ATC PSR, as shown within **Figure 16.7**.

16.3.24 The TOPA produced by NATS states that the Military ATC users of their radar at Allanshill deem the anticipated impact of the Proposed Development to their operations as unacceptable.

16.3.25 The closest MOD AD radar to the Array Area is situated approximately 105.4 km to the south at Remote Radar Head Buchan. Preliminary RLoS modelling indicates that most WTGs with a maximum tip height of 385 m AMSL within the Array Area will be visible to Buchan AD PSR. Buchan AD PSR will have a RLoS covering most of the site at this height. This is presented within **Figure 16.7**.

16.3.26 In summary, the WTGs within the Array Area have the potential to impact military airspace. Furthermore, WTGs may also have an impact on military radars such as Lossiemouth ATC PSR and Buchan AD PSR.



Stromar

Military RLoS at 385 m AMSL

Figure 16.7

Legend

- Offshore Project Boundary
- Array Area
- Offshore Export Cable Corridor Study Area
- Lossiemouth RLoS
- Buchan RLoS
- Air Defence Radars
- Civil ATC Radars
- Civil Airports
- Met Office Radar
- Military Airfields
- Military ATC Radars
- NERL Radars

Coordinate System: ETRS 1989 UTM Zone 30N
Vertical Reference: LAT
Scale @ A3 : 1:1,150,000

0 5 10 20 30 40 50 Kilometers

0 2.5 5 10 15 20 25 Nautical Miles

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Figure 16.7: Military RLoS at 385 m AMSL.

Meteorological Radio Facilities

16.3.27 The closest MET Office radar to the Array Area is the Hill of Dudwick, approximately 107.3 km south of the Array Area. Preliminary RLoS modelling indicates that the WTGs within the Array Area will not be visible to the Hill of Dudwick with a maximum tip height of 385 m AMSL. The Array Area is beyond the 20 km safeguarded zone established around weather radars and therefore unlikely to have a significant impact.

Helicopter Main Routing Indicators

16.3.28 Helicopter Main Routing Indicators (HMRIs) are a network of offshore routes used by civilian helicopters to navigate over the North Sea in support of O&G facilities. Whilst these routes have no lateral dimensions, there must be no obstacles within a 2 nm buffer of the route centreline. The closest HMRI to the Array Area outside of the Northern Offshore Safety Area, is HMRI X-Ray, depicted in **Figure 16.8**, which passes between Aberdeen and Wick Airport. This centreline is a safe distance from the Array Area by approximately 48.7 km (26.3 nm).

16.3.29 As shown in **Figure 16.8**, one of the proposed Offshore ECCs is within the 2 nm radius of the HMRI routes; Whisky, Echo, 029, 032, 035, 038, and 041. If the introduction of an obstacle is planned within the 2 nm range of the centreline, then consultation is required between the helicopter operators and the Air Navigation Service Provider.

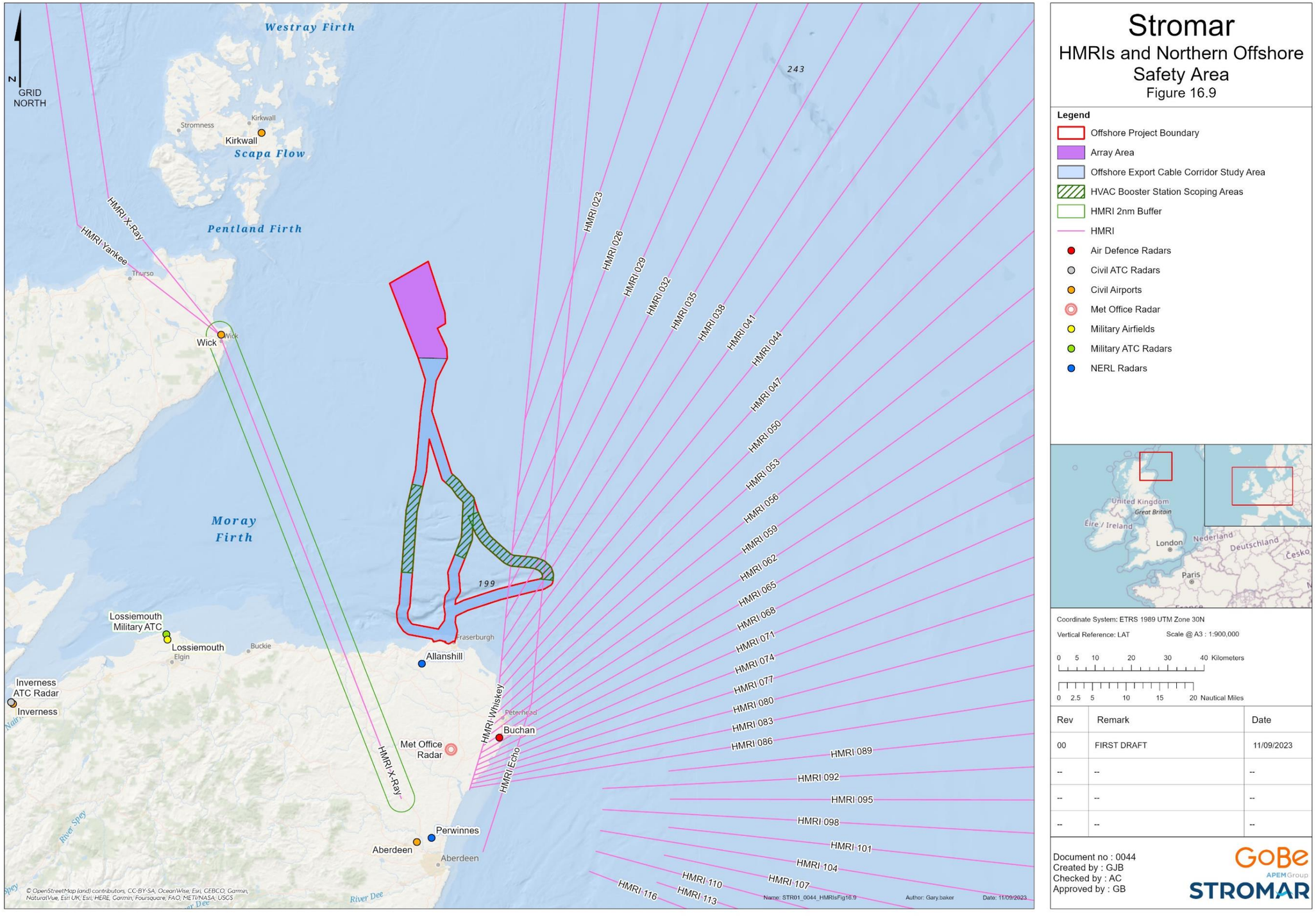

Figure 16.8: HMRIs and Northern Offshore Safety Area.

Helidecks

16.3.30 There are many O&G helidecks surrounding the Array Area. To achieve a safe operating environment under low visibility, a consultation zone with a 9 nm radius is present around each offshore helideck. This means obstacles such as WTGs within this radius must be consulted on with the helideck operators to maintain safe offshore helicopter operations alongside the Proposed Offshore Development. The nearest helidecks to the Array Area are the Captain Bridge-Linked Platform A, Captain Wellhead Protection Platform A and Captain Floating Production, Storage and Offloading. The closest of these are located just outside of the 9 nm consultation range of the Array Area, with the closest situated approximately 9.7 nm (18 km), as indicated within **Figure 16.9**.

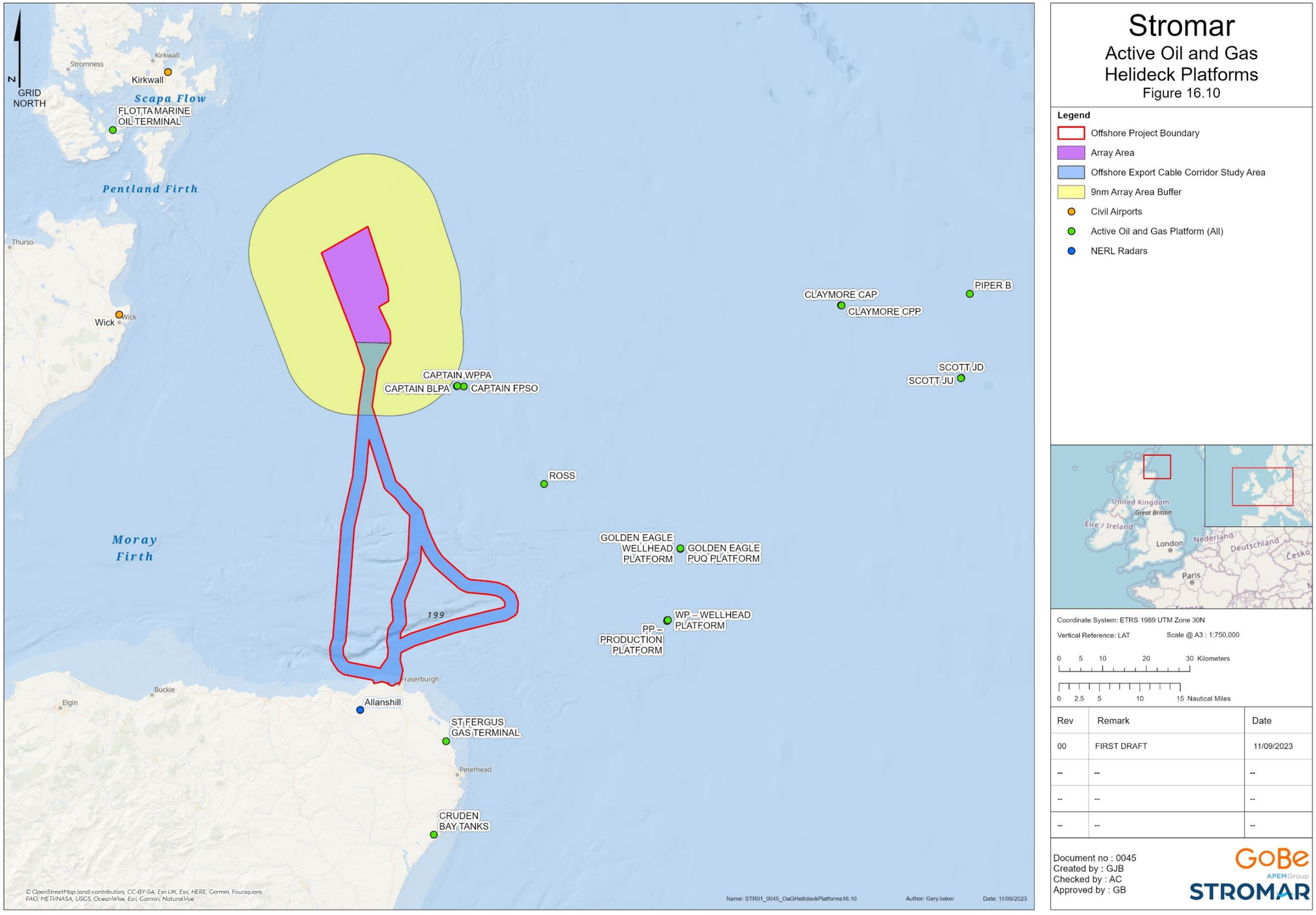

Figure 16.9: Active O&G Helideck Platforms.

Search and Rescue

16.3.31 Bristow currently supply the helicopters used in SaR operations in the vicinity of the Array Area. For SaR operations to be carried out safely and efficiently, they require developers to fulfil WTGs spacing, marking and lighting requirements as set out by the MCA. The nearest SaR base to the Array Area is Inverness Airport, approximately 142.2 km to the southwest.

16.4 Embedded Commitments

16.4.1 The Proposed Offshore Development has adopted various primary commitments (primary design principles intrinsically part of the Project design, installation techniques and engineering designs/modifications) as part of the pre-application phase to eliminate and/or reduce LSE arising from a number of impacts (as far as possible). These are outlined in **Appendix A: Offshore Commitments Register**. Further commitments (imposed as a result of legislative requirements and/or standard sectoral practice, regardless of EIA assessment), referred to as tertiary commitments are embedded as an inherent aspect of the EIA process. Secondary commitments (which require further activity to achieve anticipated outcome- often secured through planning conditions and/or management plans) are incorporated to reduce LSE to environmentally acceptable levels following initial assessment, i.e., so that residual effects are reduced to environmentally acceptable levels.

16.4.2 The commitments adopted by the project in relation to military and civil aviation are presented in **Table 16.2.** The full list of commitments can be found in **Appendix A: Offshore Commitments Register**.

Table 16.2: The Proposed Commitments Relevant to Military and Civil Aviation Receptors.

Commitment Code	Commitment Measure
C-OFF-08	A CMS will be developed, which will detail the proposed construction methods and roles and responsibilities of parties involved.
C-OFF-32	In accordance with marine licensing requirements a DSLP will be submitted and approved prior to construction. Confirming layout and relevant design parameters, including the maximum height of WTGs and lighting details. The works will be constructed in accordance with the approved DSLP.
C-OFF-33	Development of and adherence to a LMP, which will confirm compliance with legal requirements with regards to shipping, navigation, and aviation.
C-OFF-34	The UKHO will be notified of Project works.
C-OFF-35	A SaR checklist will be carried out in line with MCA MGN 654 (MCA, 2021) and its annexes. Consideration will also be given to MGN 543 SAR Annex 5 (MCA, 2018).
C-OFF-36	An Emergency Response Cooperation Plan (ERCoP) will be developed, prepared in line with MCA guidance. This plan will detail the measures the Project has in place to support any emergency response.
C-OFF-37	Marine navigation markings and lighting of the Project will be defined in agreement with the NLB, and in accordance with the latest relevant available standard industry guidance for shipping, navigation and aviation marking and lighting.
C-OFF-38	Aviation lighting and markings will be installed in line with Article 223 of CAP 393, the UK Air Navigation Order (ANO) 2016, which sets out mandatory requirements for lighting of offshore WTGs.

Commitment Code	Commitment Measure
C-OFF-39	Buoys will be deployed at construction sites in accordance with NLB guidance and advice.
C-OFF-40	The Project will be appropriately marked on aeronautical and admiralty charts, including provisions of the position and height of structures to the UKHO, CAA, MOD, and DGC.
C-OFF-63	Development of and adherence to a DP, secured under Section 36 and/or Marine Licence consent conditions.

16.4.3 As a result of the commitment to implement these measures, and to align with various standard sectoral practices and procedures, the embedded (primary) commitments are considered inherently part of the design of the Proposed Offshore Development and have, therefore, been included in the assessment presented in **Section 16.5**.

16.5 Scoping of Impacts

16.5.1 Potential impact pathways relevant to military and civil aviation which may occur during the construction, O&M or decommissioning phases of the Proposed Offshore Development have been identified in **Table 16.3**.

16.5.2 WTGs within the Array Area have the potential to impact military and civil aviation (fixed-wing and helicopters), either through their physical size limiting access and affecting safe passage, or through their effects on PSR systems which can impact the safe provision of an ATS.

16.5.3 PSR impacts are caused by the characteristics of rotating WTG blades being similar to an aircraft, leading to spurious clutter on ATC radar displays.

16.5.4 The creation of a new obstacle environment increases the risk of collision for military low flying aircraft and helicopters conducting SaR operations.

16.5.5 Helicopter traffic as a result of planned activities in support of the Proposed Offshore Development may raise the overall level of air traffic in the area and increase the chance of aircraft-to-aircraft collision.

Table 16.3: Scoping Assessment for Military and Civil Aviation.

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
Construction				
Creation of an aviation obstacle environment as a result of offshore structures.	C-OFF-28 C-OFF-33 C-OFF-35 C-OFF-36 C-OFF-38 C-OFF-40	Scoped In	Construction of the wind farm will involve tall crane vessels which could pose a physical obstruction to low flying aircraft, increasing the risk of collision or requiring aircraft to fly extended routes to avoid obstacles. Specifically, tall crane vessels and above sea level infrastructure will have a potential impact on military activities within the Moray Firth Danger Area, helicopters flying to and from offshore oil and gas platforms, and SaR operations, and WTGs may impact the Wick and Kirkwall Airport IFPs. The transportation of pre-assembled WTGs will cause the same impacts along the route taken to the Array Area.	LSE without secondary commitment measures
Increased air traffic in the area related to wind farm activities	C-OFF-28 C-OFF-33 C-OFF-35 C-OFF-36 C-OFF-38 C-OFF-40	Scoped In	Helicopter traffic associated with the construction phase could impact existing traffic in the area, increasing the risk of aircraft collision. Existing traffic may include military aircraft engaged in activities within the Moray Firth Danger Area, helicopter traffic in support of oil and gas, and aircraft associated with SaR operations. LSE will be ascertained by communication and coordination with the MOD and other aviation operators.	Possible LSE without secondary commitment measures, however, it may become clear post-Scoping stage that the impact does not require detailed assessment in the EIAR.
Impact on civil and military PSR systems from WTGs	n/a	Scoped Out	To discriminate aircraft targets from unwanted clutter, PSRs ignore static objects and only display moving targets. PSRs that can see the rotating blades of WTGs can mistake them for aircraft and so present them on the radar display as clutter. Until WTG blades in RLoS are allowed to rotate at operational speeds, they will not generate PSR clutter. Similarly, tall construction vessels and cranes that are in RLoS will not be moving fast enough to generate PSR clutter. All relevant commitments are presented in **Appendix A: Offshore Commitments Register**.	No LSE identified at Scoping.
Impact on civil and military SSR systems from WTGs	n/a	Scoped Out	NATS do not consider the impact of WTGs on SSR to be material or relevant for turbines that are beyond approximately 28 km from their SSR facilities. Furthermore, CAP 764 states that WTG effects on SSR "…*are typically only a consideration when the turbines are*	No LSE identified at Scoping.

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
			located very close to the SSR i.e., less than 10 km". The nearest SSR facility, at Allanshill, is approximately 84.2 km south of the Array Area. All relevant commitments are presented in **Appendix A: Offshore Commitments Register**.	
Impact on Hill of Dudwick weather radar from WTGs	n/a	Scoped Out	The closest MET Office radar is at Hill of Dudwick, located 107.3 km to the south of the Array Area. WTGs will be significantly beyond the 20 km safeguarded zone and preliminary RLoS also shows that WTGs within the Array Area will not be visible to the radar. All relevant commitments are presented in **Appendix A: Offshore Commitments Register**.	No LSE identified at Scoping.
Impacts from the Offshore ECC	C-OFF-33 C-OFF-35 C-OFF-38 C-OFF-40	Scoped In	Surface vessels will not generate any PSR clutter. The offshore ECCs and surface vessels will be operating within the Moray Firth Danger Area which when active from SFC, includes ordnance, munitions and explosives activities.	LSE without secondary commitment measures
Operation and Maintenance				
Creation of an aviation obstacle environment as a result of offshore structures	C-OFF-28 C-OFF-33 C-OFF-35 C-OFF-36 C-OFF-38 C-OFF-40	Scoped In	The presence of completed WTGs could pose a physical obstruction to low flying aircraft, increasing the risk of collision or requiring aircraft to fly extended routes to avoid obstructions. Specifically, WTGs and booster stations will have a potential impact on military activities within the Moray Firth Danger Area, helicopters flying to and from offshore oil and gas platforms, and SaR operations, and WTGs may impact Wick and Kirkwall Airport IFPs.	LSE without secondary commitment measures

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
Increased air traffic in the area related to wind farm activities	C-OFF-28 C-OFF-33 C-OFF-35 C-OFF-36 C-OFF-38 C-OFF-40	Scoped In	Helicopter traffic associated with maintenance activities could impact on existing traffic in the area, increasing the risk of aircraft collision. Existing traffic may include military aircraft engaged in activities within the Moray Firth Danger Area, helicopter traffic in support of oil and gas, and aircraft associated with SaR operations. LSE will be ascertained by communication and coordination with the MOD and other aviation operators.	Possible LSE without secondary commitment measures, however, it may become clear post-Scoping stage that the impact does not require detailed assessment in the EIAR.
Impact on NERL Allanshill and Buchan AD PSR systems from WTGs	n/a	Scoped In	To discriminate desired aircraft targets from unwanted clutter, PSRs ignore static objects and only display moving targets. PSRs that can see rotating blades of WTGs can mistake them for aircraft and so present them on ATC radar displays as clutter. Controllers may not be able to distinguish aircraft from the clutter. The TOPA produced by NATS for Stromar has stated the Proposed Offshore Development is likely to cause false primary plots to be generated and reduce the radar's probability of detection. This effect on Allanshill radar will impact military ATC, Prestwick Centre ATC, and Aberdeen En-route (Offshore) ATC.	LSE without secondary commitment measures
Impact on Lossiemouth ATC from WTGs	n/a	Scoped In	To discriminate desired aircraft targets from unwanted clutter, PSRs ignore static objects and only display moving targets. PSRs that can see rotating blades of WTGs can mistake them for aircraft and so present them on ATC radar displays as clutter. Controllers may not be able to distinguish aircraft from the clutter. The TOPA produced by NATS for Stromar has stated the Proposed Offshore Development is likely to cause false primary plots to be generated and reduce the radar's probability of detection. LSE will be ascertained by consultation with the MOD to determine the extent WTGs will impact on aviation operations. Further RLoS analysis will be necessary as the project develops and designs are finalised.	Possible LSE without secondary commitment measures, however, it may become clear post-Scoping stage that the impact does not require detailed assessment in the EIAR.
Impact on Hill of Dudwick weather radar from WTGs	n/a	Scoped Out	The closest MET Office radar is at Hill of Dudwick, located 107.3 km to the south of the Array Area. WTGs will be significantly beyond the 20 km safeguarded zone and preliminary RLoS also shows that WTGs within the Array Area will not be visible to the radar. All relevant commitments are presented in **Appendix A: Offshore Commitments Register**.	No LSE identified at Scoping.

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
Impacts from the Offshore ECC	C-OFF-33 C-OFF-35 C-OFF-38 C-OFF-40	Scoped In	Surface vessels will not generate any PSR clutter. The offshore ECCs and surface vessels will be operating within the Moray Firth Danger Area which when active from SFC, includes ordnance, munitions and explosives activities.	LSE without secondary commitment measures
Impacts on civil and military SSR systems from WTGs	n/a	Scoped Out	NATS do not consider the impact of WTGs on SSR to be material or relevant for turbines that are beyond approximately 28 km from their SSR facilities. Furthermore, CAP 764 states that WTG effects on SSR "…*are typically only a consideration when the turbines are located very close to the SSR i.e., less than 10 km*". The nearest SSR facility at Allanshill is approximately 84.2 km south of the Array Area. All relevant commitments are presented in **Appendix A: Offshore Commitments Register**.	No LSE identified at Scoping.
Impact on Inverness Airport PSR from WTGs	n/a	Scoped Out	RLoS modelling indicates that the WTGs will not be visible to Inverness PSR. All relevant commitments are presented in **Appendix A: Offshore Commitments Register**.	No LSE identified at Scoping.
Impact on NERL Perwinnes PSR from WTGs	n/a	Scoped Out	RLoS modelling indicates that the WTGs will not be visible to Perwinnes PSR. All relevant commitments are presented in **Appendix A: Offshore Commitments Register**.	No LSE identified at Scoping.
Decommissioning				
Increased air traffic in the area related to wind farm activities	C-OFF-28 C-OFF-33 C-OFF-35 C-OFF-36 C-OFF-38 C-OFF-40	Scoped In	Increased helicopter traffic associated with the decommissioning phase could impact on existing traffic in the area, increasing the risk of aircraft collision. Existing traffic may include military aircraft engaged in activities associated with the Moray Firth Danger Area, helicopter traffic in support of oil and gas, and aircraft associated with SaR operations. LSE will be ascertained by communication and coordination with the MOD and other aviation operators.	Possible LSE without secondary commitment measures, however, it may become clear post-Scoping stage that the impact does not require detailed assessment in the EIAR.

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
Impact from the offshore ECC	C-OFF-33 C-OFF-35 C-OFF-38 C-OFF-40	Scoped In	Surface vessels will not generate any PSR clutter. The offshore ECCs and surface vessels will be operating within the Moray Firth Danger Area which when active from SFC, includes ordnance, munitions and explosives activities.	LSE without secondary commitment measures
Creation of an aviation obstacle environment as a result of offshore structures	C-OFF-28 C-OFF-33 C-OFF-35 C-OFF-36 C-OFF-38 C-OFF-40	Scoped Out	During the decommissioning phase the existing WTGs will be gradually dismantled and therefore the aviation obstacle environment will be removed. No specific decommissioning impacts are foreseen above those present in the construction and O&M phases. All relevant commitments are presented in **Appendix A: Offshore Commitments Register**.	No LSE identified at Scoping.
Impact on NERL Allanshill, MOD Lossiemouth ATC and Buchan AD PSR systems from WTGs	n/a	Scoped Out	During the decommissioning phase the blades of the WTGs will cease rotating, therefore the impact on PSRs will gradually reduce until the last WTG ceases operation. Any commitments will remain in place until the last WTG ceases rotation. There will be no specific impacts on PSRs during decommissioning. All relevant commitments are presented in **Appendix A: Offshore Commitments Register**.	No LSE identified at Scoping.

16.6 Potential Cumulative Impacts

16.6.1 The process by which potential cumulative impacts will be assessed through the CIA is described in **Chapter 6: EIA Approach and Methodology**. Military and civil aviation cumulative impacts may occur when there are other planned/proposed OWF developments in close proximity to the Proposed Offshore Development along with associated aviation activities. There are numerous OWFs in close proximity to the Array Area, in varying development stages. These nearby OWFs (all located within a 50 nm of the Array Area) include:

- In development:
  - Caledonia;
  - Ayre;
  - Buchan;
  - Broadshore;
  - Marram Wind,
  - Sinclair; and
  - Scaraben.
- Consented, under construction:
  - Moray West.
- Consented, operational:
  - Beatrice; and
  - Moray East

16.6.2 Potential cumulative impacts include an increased air-to-air collision risk and cumulative clutter on radar systems.

16.6.3 The CIA for military and civil aviation will consider the MDS to assess the maximum impact the Proposed Offshore Development would cause in line with the methodology in **Chapter 6: EIA Approach and Methodology**.

16.7 Potential Transboundary Effects

16.7.1 The potential impacts of WTGs on military and civil aviation are localised and the Array Area is completely within UK airspace, with the nearest Norwegian operated airspace (Polaris FIR) located 194 km to the northeast of the Array Area. In addition, the Array Area is significantly beyond the expected radar coverage of the nearest non-UK airport.

16.7.2 Due to the localised nature of any potential impacts, transboundary impacts are unlikely to occur and, therefore it is proposed that this impact will be Scoped Out from further consideration within the EIA.

16.8 Proposed Approach to EIA

Additional Data Sources

16.8.1 A thorough, desk-based collation and review of the relevant data will be undertaken to inform the subsequent EIA.

Guidance

16.8.2 In addition to the approach and guidance (of general relevance) outlined in **Chapter 6: EIA Approach and Methodology**, the assessment of military and civil aviation receptors will also comply with the following guidance documents where they are specific to this topic:

- ANO 2016 (CAA, 2023a);
- CAO 032 UK AIP (CAA, 2023b);
- CAP 1616 airspace Change (CAA, 2021a);
- CAP 168 Licensing of Aerodromes (CAA, 2022a);
- CAP 437 Standards for offshore Helicopter Landing Areas (CAA, 2023c);
- CAP 670 Air Traffic Services Safety Requirements (CAA, 2019);
- CAP 764 Policy and Guidelines on Wind Turbines (CAA, 2016);
- International Civil Aviation Organisation (ICAO) Annex 14 Aerodrome Design and Operations (ICAO, 2022);
- MCA Document Offshore Renewable Energy Installations: Requirements, Guidance and Operational Considerations for SaR and Emergency Response (MCA, 2021b);
- MCA MGN 654 Safety of Navigation: OREIs – Guidance on UK Navigational Practice, Safety and Emergency Response (MCA, 2021c);
- MOD Obstruction Lighting Guidance (Low Flying Operations Flight, 2020); and
- UK Military AIP (MOD, 2023).

Assessment Methodology

16.8.3 The EIA will follow the general Proportionate EIA approach outlined in **Chapter 6: EIA Approach and Methodology**.

16.8.4 The EIA process will be informed by further desk-based studies, including RLoS modelling, which will identify and examine in greater detail sensitive aviation and radar receptors. RLoS is determined using radar propagation modelling software and 3D terrain data. Studies will be undertaken in parallel with consultation with relevant stakeholders to provide a detailed understanding of potential impacts. It is expected that the consultation stage will be an iterative process, allowing for any concerns to be addressed during the pre-application phase and in finalising the consent application. The military and civil aviation assessment will comply to the guidance laid out in documents listed in **Section 16.8.2**.

16.8.5 In respect of impacts to Buchan AD PSR, an AD and Offshore Wind (AD&OW) Windfarm Mitigation Task Force (the Task Force) has been established as a collaborative initiative between MOD, the Department for Energy Security and Net Zero, the Offshore Wind Industry Council and the Crown

Estate. The aim of the Task Force is to enable the co-existence of UK AD&OWs to contribute towards meeting the UK Government's Net Zero target without degrading the nation's AD surveillance capability. The Developer is engaging with this initiative.

16.8.6 The corresponding AD&OW Strategy and Implementation Plan sets the direction for this collaboration through identifying, assessing and deploying solutions that will enable the co-existence of AD&OW operations such that neither is unduly nor excessively compromised. This plan may lead to significant changes to current AS PSR characteristics and capabilities that in turn may affect the potential impact that the Proposed Offshore Development may have.

16.9 Scoping Questions

16.9.1 The following questions refer to the military and civil aviation chapter and are designed to inform the Scoping Opinion and focus the Scoping exercise:

1. Do you agree with the study area defined for military and civil aviation?
2. Do you agree with the use of data listed in **Section 16.3**, **Table 16.1**, and any other additional data listed in **Section 16.3**: **Data Sources**, being used to inform the Offshore EIAR?
3. Are there any further data sources or guidance documents that should be considered?
4. Do you agree that all receptors, pathways and potential impacts related to military and civil aviation have been identified?
5. Do you agree with the Scoping In and Scoping Out of impact pathways in relation to military and civil aviation?
6. Do you agree with the assessment of transboundary effects in relation to military and civil aviation?
7. Do you agree with the assessment of cumulative effects in relation to military and civil aviation?
8. Do you agree with the proposed assessment methodology for military and civil aviation?
9. Do you agree on the suitability of the proposed commitments to reduce or eliminate LSE relevant to military and civil aviation?

17 Seascape, Landscape and Visual Impact

17.1 Introduction

17.1.1 This chapter identifies the Seascape, Landscape and Visual receptors of relevance to the Proposed Offshore Development. It considers the potential impacts on relevant seascape, landscape and visual receptors which may arise as a result of the construction, O&M and decommissioning of the Proposed Offshore Development. This chapter of the Scoping Report identifies the potential seascape, landscape and visual impacts of the Proposed Offshore Development, confirms the study area for the Seascape, Landscape and Visual Impact Assessment (SLVIA), relevant data sources, guidance and assessment methodology, as well as identifying the key receptors, with a Scoping exercise undertaken to determine the potential impacts that can be Scoped In or Scoped Out.

17.1.2 The likely key impacts on Seascape, Landscape and Visual receptors are the impacts of the operation of the Array Area on coastal character and views from the north-east coastline of Caithness and the eastern coast of the Orkney Islands; and the potential operation of the HVAC RCS on views from the north Aberdeenshire Coast.

17.1.3 This chapter should be read alongside the following other chapters:

- **Chapter 2: Legislation and Policy Context**;
- **Chapter 3: Proposed Offshore Development Description**; and
- **Chapter 15: Marine Archaeology and Cultural Heritage**.

17.1.4 The landscape and visual elements associated with the onshore infrastructure are reported upon within the separate Onshore Scoping Report.

17.1.5 This chapter of the Offshore Scoping Report has been prepared by Optimised Environments.

17.2 Study Area

17.2.1 The Array Area, within which the offshore wind generating infrastructure will be situated (up to 71 WTGs of up to 385 m blade tip height, floating foundation and mooring system, three OSSs and an Accommodation Platform) is located approximately 50 km from the mainland east of Wick and approximately 36 km from Clettack Skerry, within the Pentland Skerries, a group of small, uninhabited islands which are part of the Orkney Islands (**Figure 17.1**). The Array Area is located approximately 40 km from the nearest inhabited coastline, at the southern extent of South Ronaldsay (Old Head) within the Orkney Islands, and approximately 43 km from the coastline of mainland Scotland at Duncansby Head, Caithness.

17.2.2 An Offshore ECC Study Area comprises up to three 3 km wide corridors up to 126 km long connecting to a number of landfall options along the north Aberdeenshire coast. If HVAC technology is selected, one RCS (surface structure) will be located offshore within one of the RCS search areas, at a point between the OWF and the landfall. The SLVIA assumes that the RCS would be located at the closest point of the RCS search areas, approximately 20 km from the Aberdeenshire coast, which represents the MDS (**Figure 17.2**). The RCS in the Offshore ECC is assumed to be similar in design but smaller than the OSSs in the Array Area. The RCS search area and number of Offshore ECCs will be further refined and reduced at EIAR.

17.2.3 The spatial extent of the study area for the SLVIA of the Array Area is defined as a 60 km radius from the Array Area, as shown in **Figure 17.1**. This distance represents the outer limit beyond which significant seascape, landscape and visual effects are unlikely to arise as a result of the Array Area, based on professional judgement, guidance, benchmarking other OWF projects, review of Met Office visibility data and review of potential impact pathways using the Zone of Theoretical Visibility (ZTV) for the Array Area (**Figure 17.3** and shown in **Appendix E: SLVIA Visualisations** at A1 scale).

17.2.4 The study area for the assessment of seascape, landscape and visual effects arising from the offshore RCS is defined as a 30 km radius from the closest edge of the RCS search areas to the Aberdeenshire coastline. This represents the MDS for the location of the RCS in terms of its effects on seascape, landscape and visual resources. The RCS study area is shown in **Figure 17.2**. Beyond the 30 km radius study area, significant seascape, landscape and visual effects are unlikely to arise as a result of the RCS, based on professional judgement, guidance and experience of other OWF projects.

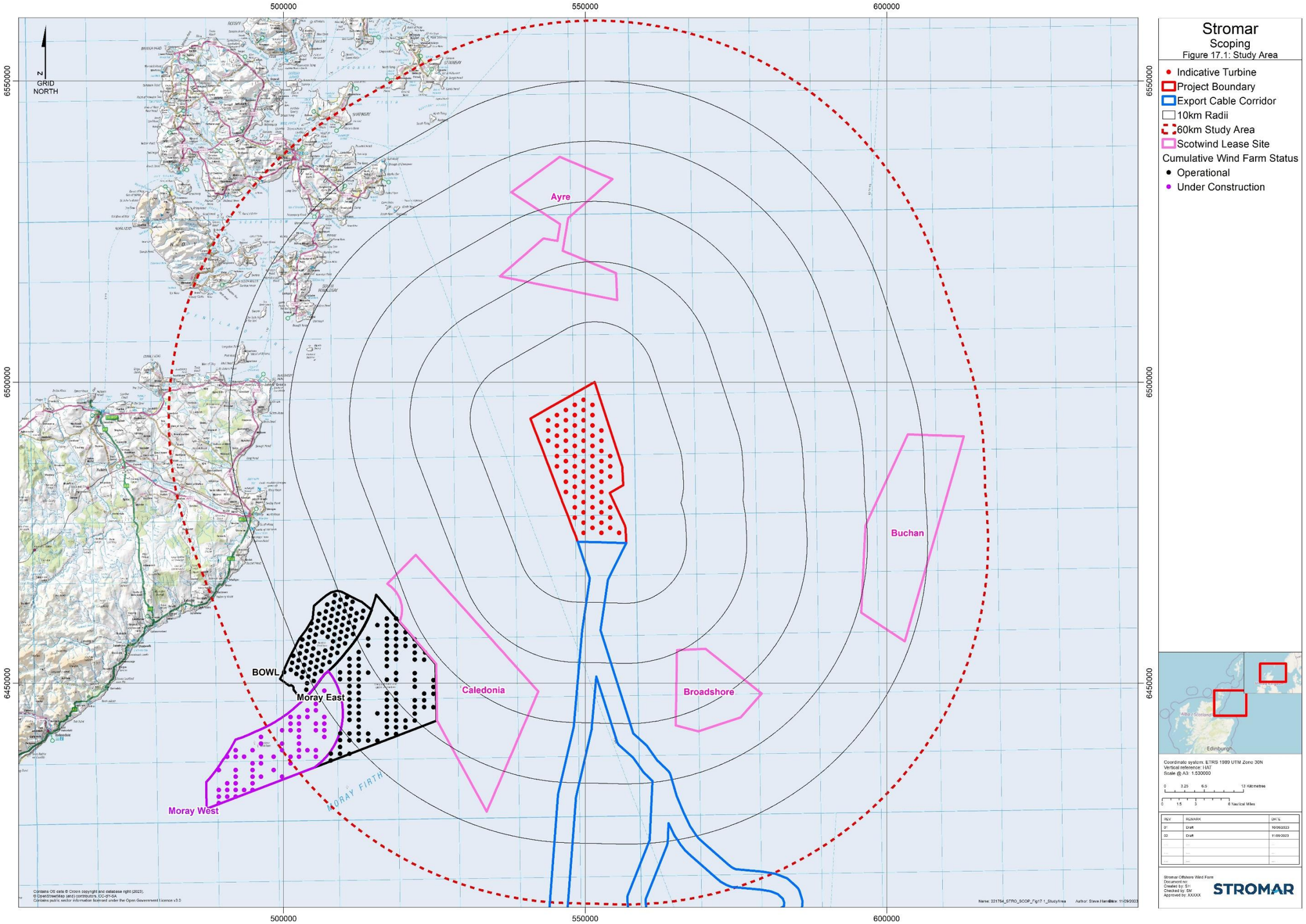

Figure 17.1: The Proposed Offshore Development SLVIA Study Area.

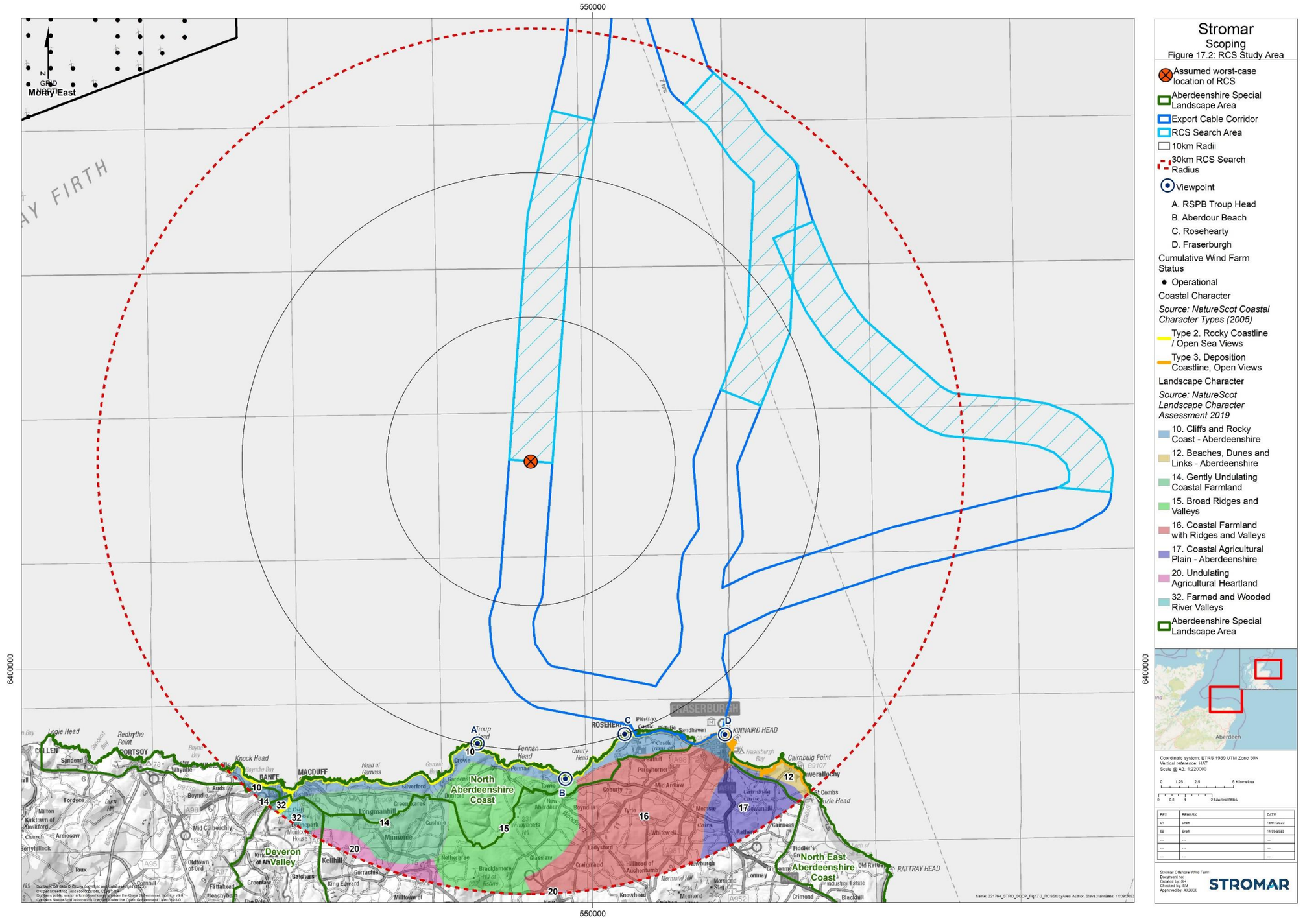

Figure 17.2: RCS Study Area.

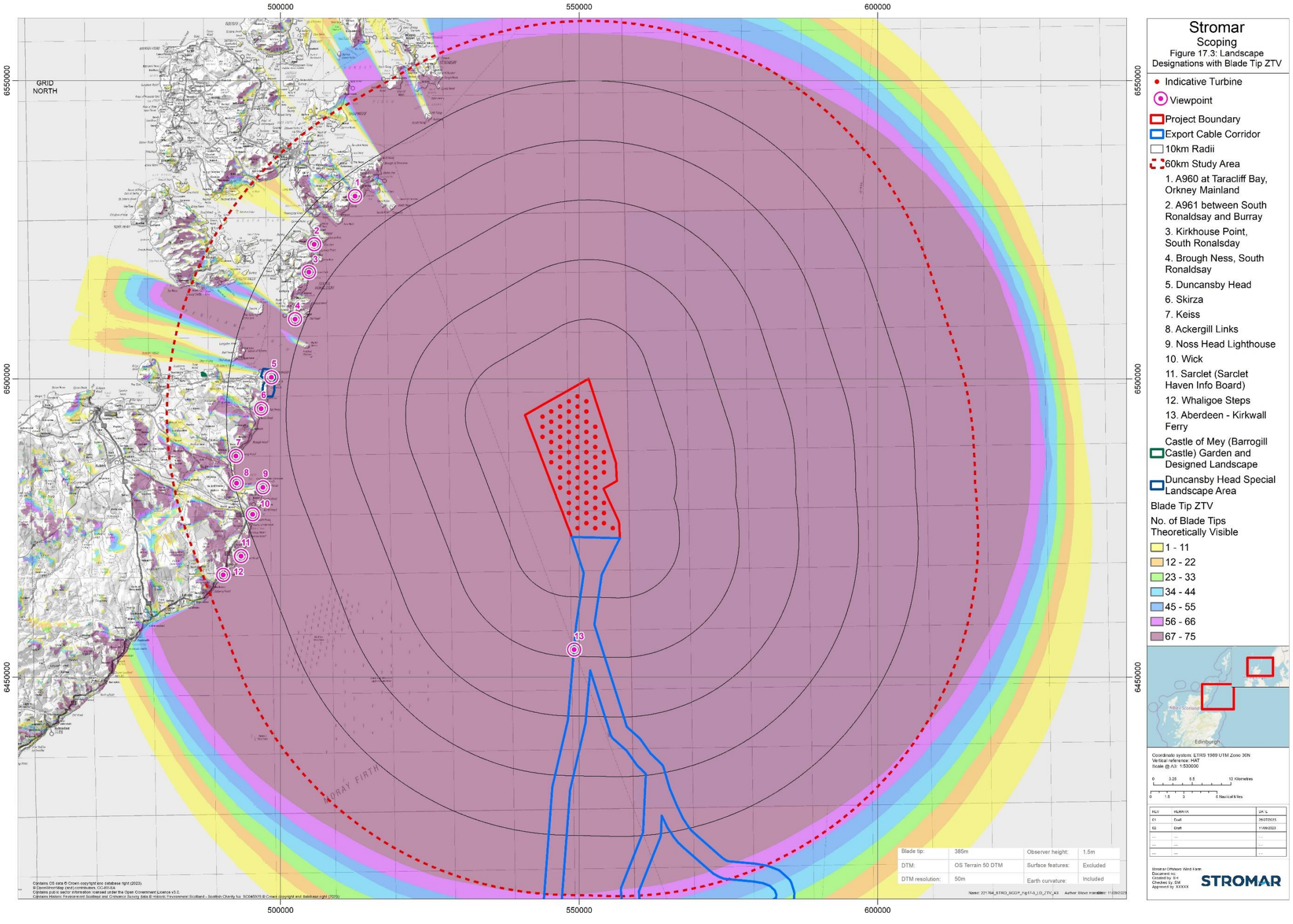

Figure 17.3: Zone of Theoretical Visibility (ZTV) – Array Area.

17.2.5 The Array Area study area predominantly comprises seascape within the North Sea, as well as sections of coastline and land within Caithness and the Orkney Islands. Across mainland Scotland, the study area covers an area at the northeastern tip of Caithness, between Mid Clyth to the south and Ham in the north. Across the Orkney Islands, the study area covers land within Stronsay, Shapinsay, Mainland, Burray, South Ronaldsay, Flotta and Hoy, as well as several smaller islands. The RCS study area includes land within Aberdeenshire, to the south of the 60 km SLVIA study area.

17.2.6 The study area for the SLVIA of the Array Area is informed by the blade tip Zone of Theoretical Visibility (ZTV) (**Figure 17.3**) and the extent of LSE. The ZTV models the likely extent of visibility of the Array Area, and the study area therefore focuses on locations from which the Array Area may be visible. The blade tip ZTV indicates that visibility of the Array Area may be widespread throughout the surrounding seascape within a radius of approximately 60 km. On land, theoretical visibility will predominantly be experienced from coastal areas within approximately 40 – 50 km due to screen by intervening landform, although there will be some areas of visibility beyond this. Beyond this distance, fewer WTGs will be visible and the geographic area that may experience visibility will be reduced. At this distance, it is considered likely that the horizontal extent of the Array Area will occupy a small proportion of the overall view, with the WTGs also appearing small in apparent vertical height. At distances beyond 60 km the height and visual influence of the WTGs will be limited by the curvature of the earth and prevailing visibility conditions. The lower parts of the WTGs will be screened below the horizon, meaning that only the upper parts of the WTGs may theoretically be seen above the skyline, however any WTGs beyond 60 km are not anticipated to be visible (based on Met Office data) and those between 50-60 km are unlikely to be visible most of the time.

17.2.7 The study area for the SLVIA of the Array Area is also informed by the likely variation in weather conditions which will influence its visibility from the Caithness and Orkney coastlines. This will be informed by METAR visibility data published by the Met Office. The Met Office defines visibility as "*the greatest distance at which an object can be seen and recognised in daylight, or at night could be seen if the general illumination were raised to a daylight level*" (Met Office, 2020) and provides definitions of visibility from 'very poor' at less than 1 km to 'excellent' at more than 40 km. Excellent visibility conditions will be required to view the Array Area at distances beyond 40 km from the coast, which occur infrequently. METAR visibility data will be collected at the nearest Met Office weather station at Wick Airport to support the assessment of the likely frequency of visibility of the Array Area at a range of distances.

17.2.8 These factors have been considered in the determination of a suitable SLVIA study area. It is proposed that assessment of seascape, landscape and visual effects resulting from the Proposed Offshore Development are Scoped Out beyond a radius of 60 km from the boundary of the Array Area.

17.2.9 The RCS study area is also informed by the likely extent of significant effects. Based on professional judgement and experience on similar projects, this is defined as 30 km from the assumed location of the RCS. As shown on **Figure 17.2**, this is approximately 20 km from the closest part of Aberdeenshire coast, near Rosehearty and Troup Head. It is considered unlikely that significant effects will be experienced beyond this distance, due to the scale of the infrastructure associated with the RCS. Further information regarding the MDS for the RCS can be found in **Chapter 3: Proposed Offshore Development Description**.

17.2.10 Feedback from consultees on this matter, as well as potential design changes to the Proposed Offshore Development and the identification of further potential impacts, may influence further refinement of the study area.

17.3 Baseline Environment

Data Sources

17.3.1 For the purposes of this Offshore Scoping Report a desk-based review of existing and known activities was undertaken using relevant spatial and scientific data sources.

17.3.2 The data sources that will be used to inform the SLVIA chapter are presented within

17.3.3 **Table** 17.1. These identified data sources will be taken forward and used to inform the subsequent EIA, alongside additional site-specific data that will be collected for the Project.

Table 17.1: Key Sources of SLVIA Data

Source, Author and Year	Summary	Coverage of the Array Area and Offshore ECC Study Area	Data Quality
Met Office (2013-2022), Visibility Data	Identifies frequency of visibility at a range of visibility bands.	Weather station at Wick.	Most recently available version of data, until 2023 data published.
NatureScot (2019), National Landscape Character Assessment	Identifies, describes and maps variation in landscape character within Scotland.	Full coverage of land within the Array Area study area.	Most recent version of data, not likely to be updated.
Scott *et al*., (2005), SNH Commissioned Report No. 103: An assessment of the sensitivity and capacity of the Scottish seascape in relation to wind farms	Identifies, describes and maps variation in the character of Scotland's coasts at the national level.	Full coverage of coastline within the Array Area study area.	Most recent version of data, not likely to be updated.
NatureScot (2016), Orkney and North Caithness Coastal Character Assessment	Identifies, describes and maps variation in the character of Scotland's coasts at a more detailed level.	Coverage of coastline within the Array Area study area throughout Orkney Islands and within parts of Caithness to the north of Freswick Bay.	Most recent version of data, not likely to be updated.
Highland Council (2011), Assessment of Highland Special Landscape Areas (SLAs)	Identifies, describes and maps areas of the landscape that exhibit particular qualities and characteristics that are valued locally.	Coverage of land within the Array Area study area which falls within mainland Scotland. There is no equivalent data for the remaining land within the study area which falls within the Orkney Islands.	Most recent version of data, not likely to be updated.
Aberdeenshire Council (2023), Aberdeenshire Local Development Plan,	Identifies, describes and maps areas of the landscape that exhibit particular qualities and	Coverage of land within the RCS study area.	Most recent version of data, not likely to be updated before 2031.

Source, Author and Year	Summary	Coverage of the Array Area and Offshore ECC Study Area	Data Quality
Appendix 13: Aberdeenshire SLAs	characteristics that are valued locally.		
Highland Council (2019), Core paths in Caithness, Highland Council, 2011 and Modified Core Paths Plan (Caithness and Sutherland) Amended	Identifies and maps core paths within Caithness.	Coverage of land within the Array Area study area which falls within mainland Scotland.	Most recent version of data, not likely to be updated.
Highland Council (2017)	Landscape Sensitivity Appraisal: Black Isle, Surrounding Hills and Moray Firth Coast, Caithness. For Inclusion in the Onshore Wind Energy Supplementary Guidance Addendum Supplementary Guidance: "Part 2B", December 2017.	Coverage of the land within the Array Area study area which falls within Highland Council.	Most recent version of data, not likely to be updated.
Orkney Islands Council (2018), Orkney Core Paths Plan	Identifies and maps core paths within the Orkney Islands.	Coverage of land within the Array Area study area which falls within the Orkney Islands.	Most recent version of data, not likely to be updated.
Aberdeenshire Council (2015), Aberdeenshire North Core Paths and Long-Distance Routes	Identifies and maps core paths within northern Aberdeenshire.	Coverage of land within the RCS study area.	Most recent version of data, not likely to be updated.
Ordnance Survey/Sustrans (Various), Visual receptor mapping	Mapping of settlements, long distance recreational routes.	Full coverage of land within the Array Area study area.	Most recent version of data, updated 2023.
Ordnance Survey (2022), Digital Terrain Model	Digital terrain model datasets.	Full coverage of land within the Array Area study area.	Most recent version of data, not likely to be updated.
Ordnance Survey (2022), Ordnance Survey mapping at a range of scales	Topographical maps.	Full coverage of land within the Array Area study area.	Most recent version of data, updated 2022.
Google/Bing (2022), Aerial and street-level photography	Aerial and street-level photography available online.	Full coverage of land within the Array Area study area.	Most recent version of data, updated 2022.
OPEN internal dataset	Mapping of onshore and OWFs within the SLVIA study area.	Full coverage of the Array Area study area.	Most recent version of data, updated 2023.
MacColl, Telford and Stevenson Offshore Wind Farms, Moray East Offshore Wind Farms, MORL (2019b)	Coastal character assessment	Caithness and Sutherland coastline, outwith area covered by Orkney and North Caithness Coastal Character Assessment, NatureScot, 2016.	Most recent version of data, not likely to be updated.

Description of Baseline Environment

Introduction

17.3.4 The description of the baseline environment is contained in two sections, covering the baseline environment within the Array Area study area, and the RCS study area, as shown in **Figure 17.1** and **Figure 17.2** respectively. The seascape, landscape and visual baseline of each is described below.

Array Area - Visual Baseline

Introduction

17.3.5 Coastlines within the study area vary from low lying agricultural land to prominent high cliffs, though all tend to have generally open views over the surrounding expansive seascape. Within Caithness, settlement and transport routes are generally focused along the coast, whereas the Orkney Islands have a more varied pattern of visual receptors due to the complex coastlines and small scale of many of the islands. Within the study area, a number of settlements on the Orkney Islands are located along the coastline, including Burray Village on Burray, St Margaret's Hope on South Ronaldsay, and Kirkwall on Mainland, while other settlement is located further inland, generally dispersed throughout agricultural landscapes which feature a strong rectilinear field pattern.

17.3.6 East Caithness and Sutherland are notable as having predominantly low rocky coastlines with few significant indentations or headlands, with low cliffs in some areas and views directed over sea and along strongly linear edge by inland hills beyond a narrow coastal shelf. There are occasional sandy bays further north in Caithness backed by low lying and more extensive farmland and settlement is focussed on tight knit villages and some crofting on coastal edge or located at base of cliffs.

17.3.7 North Caithness and the Pentland Firth are notable as an area of high cliffs particularly on headlands, interspersed with short sections of low rocky coastal edge with occasional beaches. There are views towards the Orkney Islands with Hoy especially visible in places.

17.3.8 East Orkney is noted as an area of generally low-lying coasts backed by open flat pastures and the bays, inlets and interplay of land and water give a diverse form and changing views as the viewer moves through the landscape.

Zone of Theoretical Visibility

17.3.9 The ZTV illustrated in **Figure 17.3** has informed the identification of the visual baseline. The ZTV shows the parts of the study area which have theoretical visibility of the WTGs within the Array Area. This aids in the identification of groups of people who may experience visibility of Array Area and the selection of representative viewpoints. The focus of the SLVIA will be on areas within the SLVIA study area which experience theoretical visibility of the Array Area.

17.3.10 WTGs of 385 m to blade tip (above HAT) have been used in the modelling of the ZTV. The ZTV indicates areas within the study area which will experience theoretical visibility of higher and lower numbers of WTGs, as well as areas in which there will be no theoretical visibility of WTGs.

17.3.11 The ZTV is based on an Ordnance Survey terrain model and illustrates a 'bare ground' scenario. This means that the screening effect of buildings, vegetation and other local features which may reduce actual visibility are not taken into account. In this respect, the ZTV illustrates an over-representation

of maximum visibility. Many areas which show theoretical visibility in **Figure 17.3** are unlikely to experience actual visibility of the Array Area due to screening by surface features.

17.3.12 Limitations of the ZTV also include the method of displaying higher and lower levels of visibility. This is modelled based on the numbers of WTGs which are theoretically visible and does not factor in the proportion of these WTGs which will be seen. Therefore, this means that areas shown as experiencing high levels of theoretical visibility may in reality experience visibility of very small proportions of a larger number of WTGs at long distances.

17.3.13 The ZTV indicates that visibility of the Array Area will predominantly be experienced across offshore areas of the North Sea, due to the distance of approximately 40 km between the WTGs and the Caithness and Orkney coastlines. At distances of more than 40 km, fewer WTGs would be visible, smaller proportions of each WTG would be visible, and each WTG would appear to be smaller in height. Additionally, visibility of WTGs will only be experienced in excellent visibility conditions and will therefore only be available at certain times.

17.3.14 The ZTV includes land within both mainland Scotland and the Orkney islands. Within the study area, land within Caithness includes much of the coastline between Duncansby Head and Mid Clyth. The ZTV also indicates visibility across higher ground further inland including areas around Brabster; Myrelandhorn, North Watten and Mireland; and Bilbster, Tannach and Thrumster.

17.3.15 Within the Orkney islands, ZTV coverage comprises mainly land along the coastlines of Stronsay, Mainland, South Ronaldsay, Hoy and Stroma. Several smaller uninhabited islands also experience theoretical visibility along southeastern coastlines, and there is lower-level visibility indicated across parts of Shapinsay. There is also ZTV coverage across more distant higher ground within Mainland and Hoy.

17.3.16 Higher levels of visibility of the WTGs are generally indicated along coastlines facing southeast to east, with lower levels indicated inland, where screening by surrounding landform reduces visibility of the number of WTGs within the Array Area.

17.3.17 Actual visibility will be further reduced compared to the theoretical visibility shown on the ZTV. Vegetation and built development, particularly within settlements, will contribute to increased screening of the Array Area. Within settlement, including streets, open spaces and low buildings within Wick and other smaller settlements, visibility will be limited by surrounding built form. Actual visibility of the Array Area is likely to be highest along the coastal edge, where built form is less likely to screen views.

Visual Receptors

17.3.18 People who may experience visibility of the Array Area, including from settlements, places of work and recreational areas, are considered to be visual receptors. Visual receptors at locations within the ZTV have been identified within the 60 km SLVIA study area and include:

- Residential receptors within coastal settlements including Wick and Keiss;
- Recreational visitors to tourist attractions including Duncansby Head and Whaligoe Steps;
- Recreational visitors to beaches, including those engaging in water activities, including at Sinclair's Bay (Ackergill Links/Keiss Links) and Freswick Bay;

- Users of the Public Right of Way (PRoW) network, including on the John o' Groats Trail long-distance walking route;
- Road users on the A99, A960 and A961, including those travelling on the North Coast 500 long-distance route, and cyclists on national cycle routes between Inverness and John o' Groats, and Burwick and Stromness;
- Travellers on ferries from John o' Groats to Burwick; Gills Bay to St Margarets Hope; Aberdeen to Kirkwall; and Kirkwall to Lerwick;
- Users of recreational boats along the Caithness coast; and
- People involved in offshore commercial activity off the Caithness coast, including in the fisheries and O&G industries.

Viewpoints

17.3.19 **Table 17.2** below identifies representative viewpoints which are considered in the Scoping Report and proposed for inclusion in the SLVIA for the EIAR. Viewpoint locations are shown in the ZTV in **Figure 17.3** and have been selected with reference to the relevant landscape and visual receptors and the ZTV coverage. They are also informed by benchmarks set by viewpoints used in the assessment of other nearby OWFs including Moray East OWF.

17.3.20 The detailed location of viewpoints should be informed by site surveys, mapping and predicted Zones of Theoretical Visibility (ZTVs) and the purpose of the selected and agreed viewpoints will be clearly identified and stated in the EIA Report.

17.3.21 **Figure 17.6** to **Figure 17.18b** in **Appendix E: SLVIA Visualisations** present wireline visualisations showing the Array Area from each of these representative viewpoints. These wirelines are intended to aid in the understanding of the likely visual effects of the Array Area. These effects are considered in **Section 17.5**, which provides justification for Scoping In or Scoping Out the related impacts on SLVIA within the EIA.

17.3.22 Visibility experienced at each of these representative viewpoints will be influenced by atmospheric visibility. This varies according to the weather conditions, and viewpoints located at greater distances from the Array Area are likely to experience less frequent visibility of the WTGs due to factors such as fog and rain.

Table 17.2: Viewpoint proposed for SLVIA – Array Area

No.	Viewpoint	Easting	Northing	Reason for Selection
1	A960 at Taracliff Bay, Orkney Mainland	354970	1003399	Represents views experienced by road users on the A960, and recreational receptors visiting Taracliff Bay.
2	A961 between South Ronaldsay and Burray	348022	995436	Represents views experienced by road users on the A961.
3	Kirkhouse Point, South Ronalsday	347069	990773	Represents views experienced by recreational receptors along the coast, and residential receptors within South Ronaldsay.

No.	Viewpoint	Easting	Northing	Reason for Selection
4	Brough Ness, South Ronaldsay	344638	982914	Represents views experienced by recreational receptors along the coast. Similar views will be experienced by transport receptors on the John o' Groats to Burwick ferry.
5	Duncansby Head	340525	973250	Represents views experienced by recreational receptors visiting the Duncansby Head Lighthouse, and Duncansby Head SLA. Proposed as nighttime viewpoint.
6	Skirza	338737	968025	Represents views experienced by residential receptors within the settlement of Skirza.
7	Keiss	334382	960142	Represents views experienced by residential receptors within Keiss, visitors to Keiss Links and Harbour, and road users on the A99. Proposed as nighttime viewpoint.
8	Ackergill Links	334428	955594	Represents views experienced by recreational receptors on the golf course at Ackergill Links.
9	Noss Head Lighthouse	338827	955010	Represents views experienced by recreational receptors visiting the Noss Head lighthouse.
10	Wick	337032	950321	Represents views experienced by residential receptors within the settlement, and visitors to the settlement. Proposed as nighttime viewpoint.
11	Sarclet	334992	943334	Represents views experienced by recreational receptors along the coast.
12	Whaligoe Steps	331944	940235	Representative of views experienced by visitors to this popular visitor location at Whaligoe Steps descending the cliff face of this rocky inlet off the NC500 route.
13	Aberdeen – Kirkwall Ferry	390448	926800	Represents views experienced by travellers on the ferry between Aberdeen and Kirkwall. Views will be experienced towards both the Array Area and the assumed RCS location at similar distances.

Night-time visual impacts

17.3.23 Visual receptors, including residents and visitors, may experience views of aviation lighting associated with the Array Area. Although these receptors will predominantly experience such views at distances of more than 40 to 45 km, there is the potential for significant effects to arise as a result of the aviation lighting. The SLVIA will therefore include an assessment of the night-time effects of the Array Area.

Artificial lighting is found within the settlements of Wick, John o' Groats, Kirkwall and other smaller settlements, on passing vessels in the sea, and on WTGs at Beatrice and Moray East Wind Farms, and will form part of the baseline against which the effects of aviation lighting within the Array Area will be assessed. **Table 17.2** above indicates the representative viewpoints which are proposed for inclusion in the nighttime assessment of effects.

Array Area - Seascape and Landscape Character

17.3.24 The majority of the SLVIA study area for the Array Area consists of the open seascape of the North Sea, the Outer Moray Firth, Pentland Firth and Scapa Flow. The Outer Moray Firth includes the operational Beatrice Wind Farm and Moray East Wind Farm to the southeast of the Array Area.

17.3.25 Within the SLVIA study area for the Array Area, terrestrial landscape is restricted to the northeast coastline and hinterland of Caithness between Halberry Head and Duncansby Head; the Pentland Firth between Dunnet Head and Stroma; and the Orkney Islands of South Ronaldsay, Burray, parts of Hoy, eastern mainland Orkney and the southern edges of Stronsay.

17.3.26 An overview of the baseline seascape context of the SLVIA study area for the Array Area is provided in 'An assessment of the sensitivity and capacity of the Scottish seascape in relation to windfarms' (Scott *et al*., 2005). This report classifies the mainland coastline within the study area as part of the East Caithness and Sutherland Seascape Character Area (SCA) and the North Caithness/Pentland First SCA. These SCAs comprise mainly Seascape Character Type (SCT) 2: Mainland Rocky Coastline with Open Sea Views. The coastline of the Orkney Islands is classified as part of the East Orkney SCA, which predominantly comprises SCT 12: Deposition Coasts of Islands.

Coastal Character

17.3.27 NatureScot promotes an approach to characterising the marine landscape through classifying the character along the coastline (NatureScot, 2018). Thirteen SCTs have been identified (Scott *et al*., 2005) at a broad scale. Four of these occur within the SLVIA study area, as shown on **Figure 17.4**:

- SCT 1: Remote High Cliffs – at Duncansby Head and St John's Point;
- SCT 2: Rocky Coastline/Open Sea Views – majority of Caithness coast, with the exception of the remote high cliffs and deposition coast at Sinclair's Bay;
- SCT 3: Deposition Coastline, Open Views – Sinclair's Bay; and
- SCT 12: Deposition Coasts of Islands – Orkney Islands.

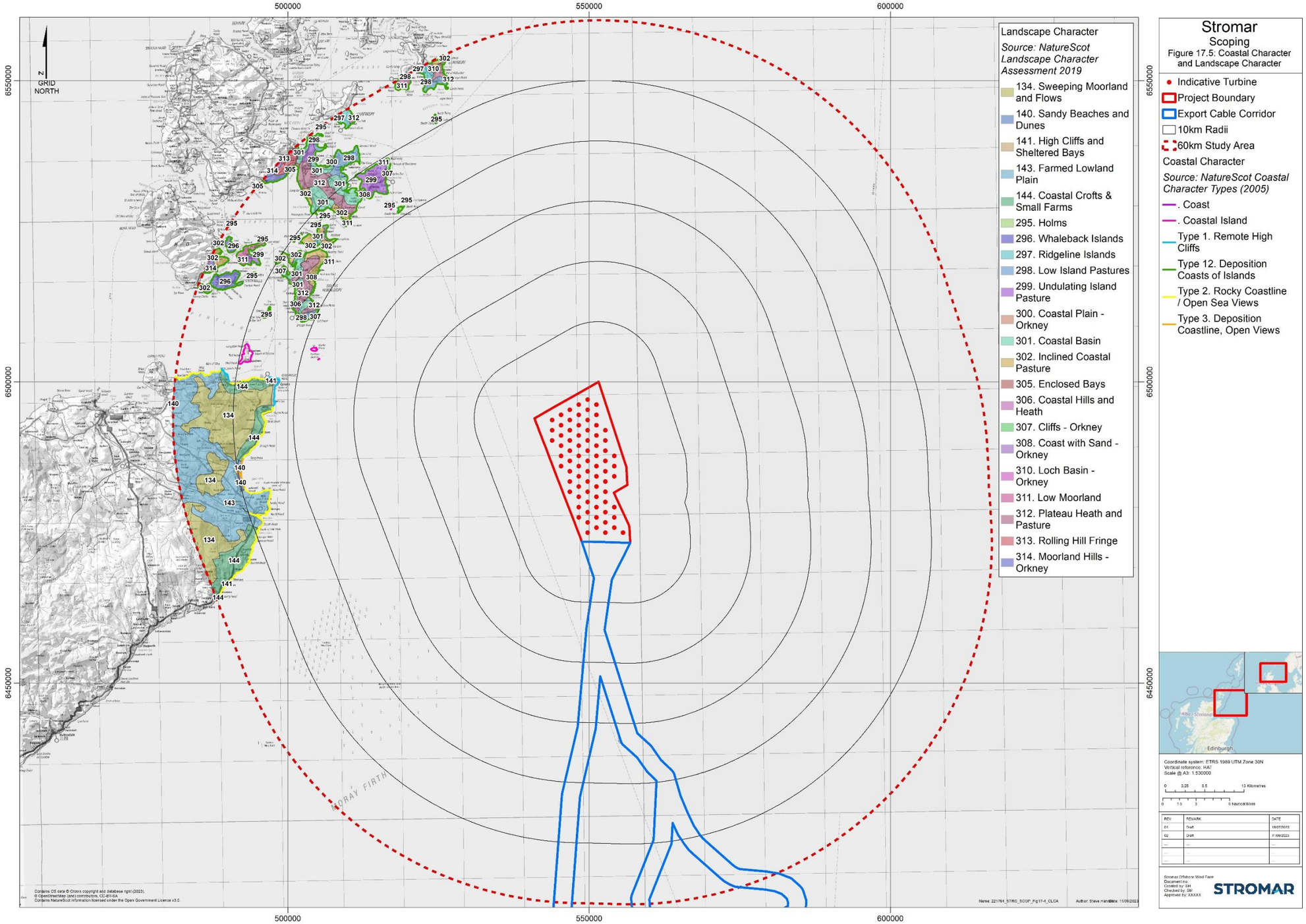

Figure 17.4: Landscape and Coastal Character (Overview).

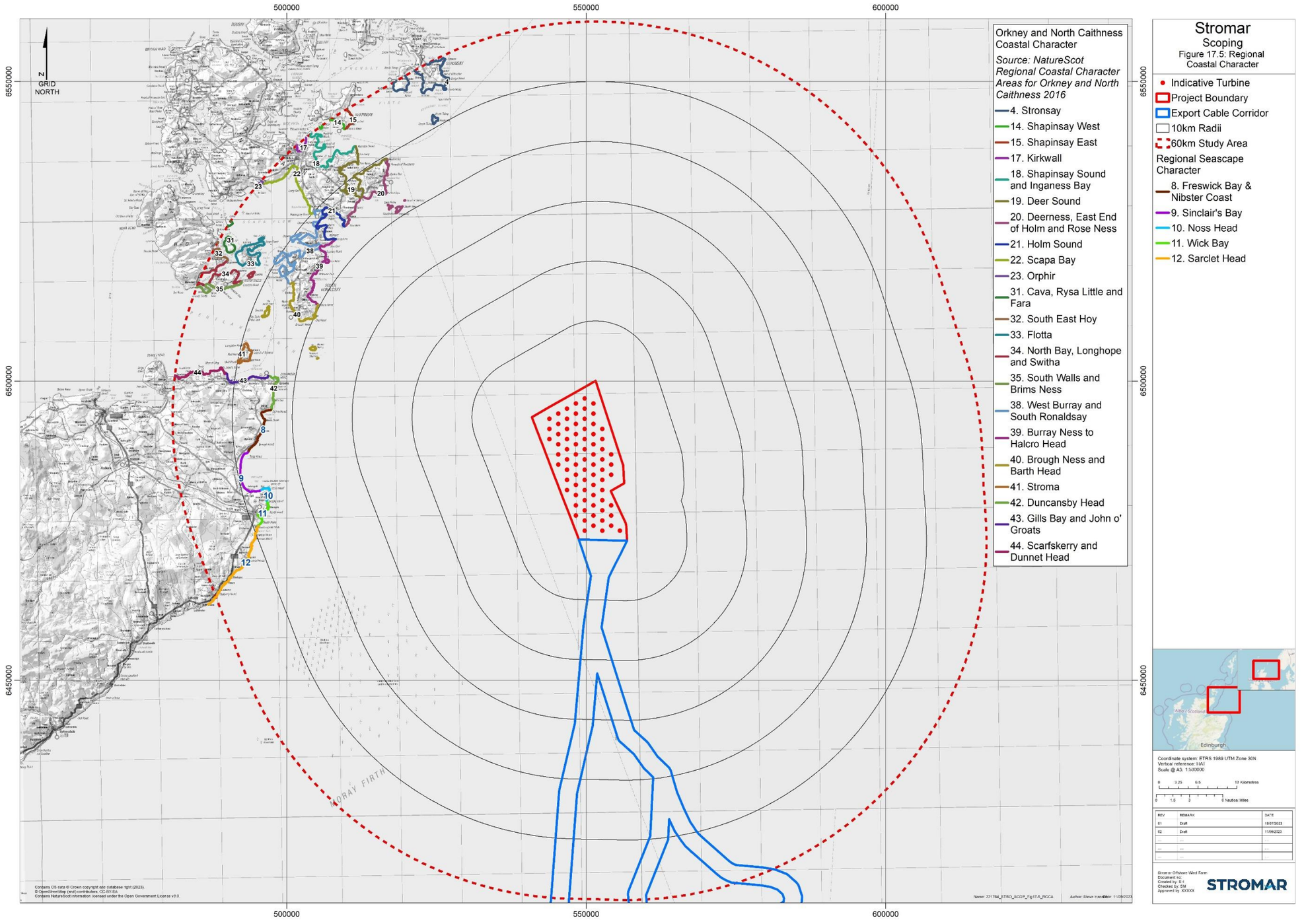

Figure 17.5: Regional Coastal Character.

17.3.28 Coastlines within Orkney and North Caithness have been characterised at a more detailed level (NatureScot, 2016). This characterisation covers the coastline of Orkney and North Caithness within the SLVIA study area and defines Regional Coastal Character Areas (RCCA) and Local Coastal Character Areas (LCCAs). Within South Caithness, which is not covered by the NatureScot (2016) characterisation, Coastal Character Areas (CCAs) were defined as part of the SLVIA for the Moray East Wind Farm (MORL, 2019b). These are defined at a similar scale as the RCCAs. RCCAs and CCAs within the SLVIA study area are shown in **Figure 17.5**.

17.3.29 NatureScot (2018) guidance on Coastal Character Assessment within Scotland states that "*Regional Coastal Character Areas would be more appropriate for the assessment of offshore wind farm development located beyond approximately 12nm [approx. 22 km] from shore where visibility from the coast may be more extensive"*. The SLVIA will therefore focus on effects on coastal character at the scale of RCCAs, rather than the national-scale Seascape Character Types, or more detailed LCCAs.

17.3.30 Coastal character within the study area varies from steep, intricate cliffs with associated stacks, to wide sandy bays, to broad headlands. The character within the Orkney Islands generally varies from mainland Caithness, particularly across the smaller islands, which are more exposed and open to the surrounding seascape. There are also a number of small settlements along the coast, the character of which varies from more remote, uninhabited areas. Landcover across coastal areas varies from sandy and rocky beaches to rough grassland on higher clifftops and headlands, to agricultural land across flatter elevated areas.

17.3.31 Significant effects have previously been identified on coastal character at distances of up to 30 km from OWFs (Marine Scotland, 2021d). The coastal character of the Caithness and Orkney coastlines within 60 km of the Array Area has been considered in this Scoping assessment (**Table 17.5**), due to the large scale of the WTGs proposed (up to 385 m to blade tip above HAT), in order to cover areas where effects may arise as a result of the Array Area.

Landscape character

17.3.32 The National Landscape Character Assessment of Scotland (NatureScot, 2019b) defines landscape character at a national level. Several different Landscape Character Types (LCTs) identified within this assessment occur within the onshore areas of the SLVIA study area. These are shown and listed in **Figure 17.4**. As part of the Scoping assessment, ZTV mapping (**Figure 17.2**) has been used to consider the likely effects of the Array Area on these LCTs.

Designated Landscapes

17.3.33 The SLVIA study area does not contain any nationally protected landscapes (e.g., National Scenic Areas (NSAs) or Wild Land Areas (WLAs). Highland Council has identified regional level landscape designations (Highland Council, 2011), of which one – Duncansby Head SLA – is located within the SLVIA study area. There are no regional level landscape designations within Orkney. Designated landscapes within the SLVIA study area are shown alongside the ZTV on **Figure 17.3**.

Duncansby Head SLA

17.3.34 The Duncansby Head SLA is located approximately 42 km from the Array Area at its closest point. It is located at the most northeasterly point of the Scottish mainland, to the east of the settlement of John o' Groats and includes the land around Duncansby Head as well as the Stacks of Duncansby (Highland Council, 2011). It extends approximately from the Ness of Duncansby to caves at Head of Fastgeo.

The area is designated due to its "*spectacular cliff scenery and its commanding views*" (Highland Council, 2011).

17.3.35 The aspects and features for which this landscape is designated, and which are susceptible to potential effects as a result of the Array Area include:

- "The approach to the coastline is across gentle open grassland adding to the visual drama when the cliffs are suddenly encountered and the expansive views of the surrounding sea revealed. A distinctive and diverse sequence of views is available as the paths parallel to the coastline are followed.
- In clear conditions, the seaward views are very impressive, varying as you move along the coast.
- In clear conditions, impressive seaward views extend to Dunnet Head and the Orkney Islands while closer to shore, the island of Stroma and the Pentland Skerries form focal features." (Highland Council, 2011).

17.3.36 The introduction of tall structures to the landscape is described in the SLA citation as a sensitivity to change within this designated landscape, although the citation generally refers to tall structures introduced on land as opposed to offshore.

17.3.37 As shown in **Figure 17.3**, theoretical visibility of the Array Area would be experienced at distances of approximately 43 km from parts of the Duncansby Head SLA.

Wind Energy Baseline Conditions

17.3.38 In accordance with Guidelines for Landscape and Visual Impact Assessment, 3rd Edition (GLVIA3) (Landscape Institute, 2013) (para 7.13), existing offshore and onshore wind farms and those which are under construction will be included in the baseline for both coastal character and visual effects assessments. These projects are shown in **Figure 17.1**. The Beatrice OWF is operational as of June 2019; the Moray East OWF is operational as of April 2022; and the Moray West OWF is under-construction as of May 2023. In accordance with GLVIA3, Beatrice, Moray East and Moray West will be assumed to be part of the baseline conditions in the SLVIA and are based on the following key parameters:

- Beatrice Wind Farm - 84 WTGs at 182.5m blade tip height, located approximately 13 km from the Caithess coast;
- Moray East Wind Farm - 100 WTGs at 204 m blade tip height, located to the east of Beatrice Wind Farm, approximately 22 km from the Caithess coast; and
- Moray West Wind Farm - 60 WTGs of up to 262 m blade tip height, located approximately 22.5 km from the Caithness coast to the west of Moray East Wind Farm and south of Beatrice Wind Farm.

17.3.39 Due to their relative proximity to the coastline of Caithness, these OWFs exert an influence on the baseline visual context and coastal character of the study area. In particular, Beatrice Wind Farm will be seen at a distance of approximately 13 km from parts of the study area, with Moray East and Moray West generally being seen beyond and extending Beatrice Wind Farm. Due to their position within the southwest of the study area, they are most likely to exert an influence on the coastline to the south of Noss Head. North of this, the distance and orientation of the coastline around Freswick Bay will limit

the influence of these OWFs on visual receptors and coastal character, although they may still be visible from northern parts of the Caithness coastline within the study area.

17.3.40 The terrestrial areas of the SLVIA study area include a number of operational onshore wind farms, including Stroupster Wind Farm (13 WTGs at 113m blade tip height), approximately 3 km west of Freswick Bay; Lochend Wind Farm (four WTGs at 99.5m blade tip height), approximately 8 km southwest of John o' Groats; and Burn of Whilk Wind Farm (nine WTGs at 116 m blade tip height), approximately 11 km southwest of Wick. There is also a cluster of wind farm developments, located over 5 km to the west of Wick, comprising Bilbster Wind Farm (three WTGs at 90m blade tip height), Wathegar Wind Farm (five WTGs at 101m blade tip height), Wathegar 2 Wind Farm (nine WTGs at 110m blade tip height), and Achairn Wind Farm (three WTGs at 100 m blade tip height). Camster Wind Farm (25 WTGs at 120 m blade tip height) is located partially within the study area at its southwestern extent. These operational onshore wind farms establish development of this type as an existing influence within the terrestrial environment.

RCS – Baseline

Landscape and coastal character

17.3.41 The SLVIA study area for the RCS is shown on **Figure 17.2**, and comprises land across the northern Aberdeenshire coast, stretching broadly from Banff in the west to Inveralochy in the east.

17.3.42 Coastlines within the RCS study area generally feature steep cliffs with associated caves and stacks, although there are several beaches within small bays. Landcover predominantly comprises farmland which extends to the edges of cliffs. Across the study area, settlement is generally focussed along the coast, with a number of small fishing villages and larger settlements including Banff and Fraserburgh located on high ground above the cliffs which form the coastline. Further inland, the landscape generally features gently undulating coastal farmland, although there is a more pronounced pattern of topography where the Tore Burn flows towards the coast at Pennan.

17.3.43 There are a number of LCTs within the RCS study area, as defined within the National Landscape Character Assessment of Scotland (NatureScot, 2019b). These comprise LCT 10: Cliffs and Rocky Coast; LCT 14: Gently Undulating Coastal Farmland; LCT 16: Coastal Farmland with Ridges and Valleys; LCT17: Coastal Agricultural Plain; and LCT 32: Farmed and Wooded River Valleys.

17.3.44 Two national-level SCTs have been identified within the RCS study area, as described by Scott *et al*. (2005). These are shown on **Figure 17.2** and comprise:

- SCT 2: Rocky Coastline/Open Sea Views; and
- SCT 3: Deposition Coastline, Open Views.

17.3.45 There is one landscape designation within the RCS study area, as shown on **Figure 17.2**. The North Aberdeenshire Coast SLA extends along most of the coastline within the study area, with the exception of the coastline to the north of Fraserburgh. It also extends further inland through the Tore of Troup, to the south of Pennan. The area is designated primarily as a result of the high scenic value of the landscape itself as well as the outward views available towards the North Sea. In particular, the area is valued for the contrast of the rugged, exposed cliffs with the small villages and settlements located within more sheltered areas, as well as the expansive nature of views out to sea from elevated areas such as clifftops and headlands.

Visual Baseline

17.3.46 From the coastline, there are views north and north-east towards the Moray Firth and out to sea. Under clear conditions, there are also views north-west towards hills within Sutherland. The generally flat, low-lying nature of the landscape creates a sense of exposure and openness, although there are some areas of more sheltered character, particularly in the small bays which often feature sandy beaches.

17.3.47 People who may experience visibility of the RCS, including from settlements, places of work and recreational areas, are considered to be visual receptors. Visual receptors have been identified within the 30 km RCS study area and include:

- Residential receptors within coastal settlements including Banff, Macduff, Rosehearty and Fraserburgh;
- Recreational visitors to tourist attractions including the Museum of Scottish Lighthouses, Dundarg Castle, Pitsligo Castle, and Castle of Pittulie;
- Recreational visitors to beaches, including those engaging in water activities, including at Aberdour Beach and Pennan Bay;
- Users of the PRoW network, including on the Aberdeenshire Coastal Trail long-distance walking route;
- Road users on the A90 and A98, and cyclists on national cycle routes between Aberdeen and Inverness;
- Travellers on ferries between Aberdeen and Kirkwall;
- Users of recreational boats along the north Aberdeenshire coast; and
- People involved in offshore commercial activity off the north Aberdeenshire coast, including in the fisheries and O&G industries.

17.3.48 In addition to the representative viewpoints listed above for the assessment of effects within the Array Area study area, four further viewpoints are considered in the Scoping Report and proposed for inclusion within the SLVIA to assess the likely visual effects of the RCS. **Table 17.3** below identifies these viewpoints. Viewpoint locations are shown on **Figure 17.2** and have been selected with reference to the relevant landscape and visual receptors.

17.3.49 Visibility experienced at each of these representative viewpoints will be influenced by atmospheric visibility. This varies according to the weather conditions, and viewpoints located at greater distances from the RCS are likely to experience less frequent visibility of it due to factors such as fog and rain.

Table 17.3: Viewpoints proposed for SLVIA - RCS

No.	Viewpoint	Easting	Northing	Reason for Selection
A	Troup Head (RSPB Nature Reserve)	382510	867155	Represents views experienced by recreational receptors along the coast.
B	Aberdour Beach	388569	864615	Represents views experienced by recreational receptors along the coast.
C	Rosehearty	392718	867651	Represents views experienced by residential receptors within northern parts of Rosehearty, as well as visitors to the settlement.
D	Kinnaird Head, Fraserburgh	399667	867523	Represents views experienced by recreational receptors visiting the Museum of Scottish Lighthouses, and residents within Fraserburgh.

17.4 Embedded Commitments

17.4.1 The Proposed Offshore Development has adopted various primary commitments (primary design principles intrinsically part of the Project design, installation techniques and engineering designs/modifications) as part of the pre-application phase to eliminate and/or reduce LSE arising from a number of impacts (as far as possible). These are outlined in **Appendix A: Offshore Commitments Register**. Further commitments (imposed as a result of legislative requirements and/or standard sectoral practice, regardless of EIA assessment), referred to as tertiary commitments are embedded as an inherent aspect of the EIA process. Secondary commitments (which require further activity to achieve anticipated outcome- often secured through planning conditions and/or management plans) are incorporated to reduce LSE to environmentally acceptable levels following initial assessment, i.e., so that residual effects are reduced to environmentally acceptable levels.

17.4.2 The commitments adopted by the project in relation to SLVIA are presented in **Table 17.4**. The full list of commitments can be found in **Appendix A: Offshore Commitments Register**.

Table 17.4: The Proposed Commitments Relevant to Seascape, Landscape and Visual Impact Receptors.

Commitment Code	Commitment Measure
C-OFF-01	The number of WTGs installed will not exceed 71 WTGs.
C-OFF-03	WTGs will have a maximum blade tip height of 385 m above HAT and the rotor diameter will not exceed 320 m.
C-OFF-32	In accordance with marine licensing requirements a DSLP will be submitted and approved prior to construction. Confirming layout and relevant design parameters, including the maximum height of WTGs and lighting details. The works will be constructed in accordance with the approved DSLP.
C-OFF-52	A lighting scheme for the aviation lighting of structures (turbines and offshore support platforms) above 60m in height will be agreed with the relevant authorities and will accord with the Air

Commitment Code	Commitment Measure
	Navigation Order 2016. Aviation warning lights will have reduced intensity at and below the horizontal and allow a further reduction in lighting intensity when the visibility in all directions from every wind turbine is more than 5 km.

17.4.3 As a result of the commitment to implement these measures, and to align with various standard sectoral practices and procedures, the embedded (primary) commitments are considered inherently part of the design of the Proposed Offshore Development and have, therefore, been included in the assessment presented in **Section 17.5**.

17.4.4 The requirement and feasibility of any additional commitments will be consulted upon with statutory consultees throughout the EIA process.

17.5 Scoping of Impacts

17.5.1 The SLVIA will utilise a design envelope assessment approach, in accordance with Scottish Government (2022) 'Guidance for applicants on using the design envelope for applications under Section 36 of the Electricity Act 1989'. This approach is proposed to be used for the assessment of potential seascape, landscape and visual impacts due to the uncertainty of the specific design of the Proposed Offshore Development.

17.5.2 The design envelope approach proposes that the Proposed Offshore Development will be assessed on the basis of a set of design parameters relating included in the application documents. The SLVIA will determine the parameters of the Proposed Offshore Development which are likely to result in the maximum adverse effect, and the assessment will be undertaken on this basis to determine the significance of the effect.

17.5.3 Potential impact pathways relevant to seascape, landscape and visual receptors that may occur during the construction, O&M, or decommissioning phases of the Proposed Offshore Development have been identified in **Table 17.5**.

Table 17.5: Scoping Assessment for Seascape, Landscape and Visual

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
Construction, operational and decommissioning phase seascape, landscape and visual impacts of the Array Area outside the 60 km radius SLVIA study area (**Figure 17.1**).	n/a	Scoped Out	The 60km radius SLVIA study area is defined to an outer limit within which significant effects could occur. Significant effects will not occur beyond 60 km due to the limited changes to views arising from the Array Area at distances of over 60 km. Based on METAR visibility data at the nearest Met Office weather station at Wick Airport, visibility beyond 60 km occurs infrequently and it is predicted that the Array Area will rarely, if ever, be visible and recognisable at distances beyond 60 km. In the Caledonia Offshore Wind Farm Scoping Opinion (Marine Scotland 2023a), Scottish Ministers advised that the study area for the SLVIA should be a radius of 60km, which was in line with the Highland Council representation. All relevant commitments are presented in **Appendix A: Offshore Commitments Register**.	No LSE identified at Scoping.
The seascape, landscape and visual impacts of the HVAC Reactive Compensation Station (RCS)	n/a	Scoped In	If HVAC technology is selected, one Reactive Compensation Station (RCS) will be located offshore at a point between the offshore wind farm and the landfall. The closest point to the coast at which it may currently be located is approximately 20 km from the Aberdeenshire coast, but this distance is likely to increase at EIAR. At this distance from the coast, a single RCS of similar but smaller design than the main offshore wind farm substations may give rise to significant effects on seascape, landscape and visual receptors. As design and RPSS development continues, the number of Offshore ECCs, the corridor width and the HVAC search area are likely to reduce. Receptors to be Scoped In and Out of the assessment of the RCS will be identified as part of the preliminary assessment in the SLVIA.	Possible LSE without secondary commitment measures, however, it may become clear post-Scoping stage that the impact does not require detailed assessment in the EIAR.

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
The seascape, landscape and visual impacts of the construction and decommissioning of the offshore ECC beyond (outside) the inter-tidal area.	n/a	Scoped Out	Effects on seascape, landscape and visual receptors are unlikely to be significant (outside the inter-tidal area), due to the nature of the offshore ECC; and the distant visibility of related activity offshore within an expansive seascape context. The sporadic nature of related above-sea construction activity means its effects will be short-term and temporary. Related above-sea construction activity is mainly related to the movement of sea vessels, which are an established component of the baseline seascape and views of it. Long-range visibility of this activity further reduces its impact. The number of offshore ECCs is also likely to reduce as design and RPSS development continues. All relevant commitments are presented in **Appendix A: Offshore Commitments Register**.	No LSE identified at Scoping.
The seascape, landscape and visual impacts of the construction and decommissioning of the offshore ECC within the inter-tidal area.	n/a	Scoped In	Possible significant effects on seascape, landscape and visual receptors arising from the construction of the offshore ECC within the inter-tidal area, including potential use of cofferdam in the intertidal zone to assist in cable installation activities by excluding water from the working area. Effects anticipated to be localised to the receptors located in close proximity to the construction works taking place in the inter-tidal area. The number of offshore ECCs is also likely to reduce as design and RPSS development continues.	Possible LSE without secondary commitment measures, however, it may become clear post-Scoping stage that the impact does not require detailed assessment in the EIAR.
The seascape, landscape, and visual effects of the operation of the offshore ECC.	n/a	Scoped Out	No potential for significant effects on SLVR arising from the offshore ECC, due to its location below the sea surface and its lack of visibility. All relevant commitments are presented in **Appendix A: Offshore Commitments Register**.	No LSE identified at Scoping.
Impacts of the construction, operation	n/a	Scoped Out	No potential for physical effects on landscape receptors. Due to the offshore location of the Array	No LSE identified at Scoping.

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
and decommissioning of the Proposed Offshore Development on physical aspects of landscape character.			Area, it will only affect the perceived character and qualities of the landscape, which is considered as an indirect effect. No physical attributes that define landscape character or special qualities of designated landscapes will be changed. All relevant commitments are presented in **Appendix A: Offshore Commitments Register**.	
Impact (daytime) of the construction, operation and decommissioning of the Array Area on seascape (coastal) character.	C-OFF-01 C-OFF-03 C-OFF-32	Scoped In and Scoped Out	Those coastal character receptors proposed to be Scoped Out either experience no visibility or limited theoretical visibility of the Array Area, often at very long range, as shown on **Figure 17.5**. There will therefore be no potential for significant effects on these receptors. Coastal character receptors proposed to be Scoped In to the assessment may experience views of the Array Area at ranges typically between 40-50km. Typically, those predicted to experience LSE are located in closer proximity to the Array Area, and/or experience relatively high-level theoretical visibility of the Proposed Offshore Development. Those predicted to experience Possible LSE are generally located at greater distances from the Array Area, and/or experience lower levels of theoretical visibility. However, both groups of receptors may or may not experience significant effects as a result of the Proposed Offshore Development. An initial assessment of the potential effects of the Array Area on these RCCAs and CCAs will be undertaken initially using desk-based information and ZTV analysis, with a detailed assessment focusing on those that are identified as requiring further assessment. Detailed assessment to include desk-based seascape character assessment publications and primary baseline data collection (for example through site surveys), quantitative and qualitative assessment methodologies to determine likely	LSE without secondary commitment measures for the following receptors: RCCA 20: Deerness, East End of Holm and Rose Nest; RCCA 39: Burray Ness to Halcro Head; RCCA 40: Brough Ness and Barth Head; RCCA 42: Duncansby Head; CCA8: Freswick Bay and Nibster Coast; CCA 10: Noss Head; CCA 11: Wick Bay Possible LSE without secondary commitment measures, however, it may become clear post-Scoping stage that the impact does not require detailed assessment in the EIAR for the following receptors: RCCA 4: Stronsay; RCCA 21: Holm Sound; RCCA 41: Stroma; CCA 9: Sinclair's Bay; and CCA 12: Sarclet Head. No LSE identified at Scoping. No LSE identified at Scoping for the following receptors: RCCA 14: Shapinsay West; RCCA 15: Shapinsay East; RCCA 18: Shapinsay Sound and Inganess Bay; RCCA 19: Deer Sound; RCCA 22: Scapa Bay; RCCA 23: Orphir; RCCA 31: Cava, Rysa Little and Fara; RCCA 32: South East Hoy; RCCA

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
			significance, and modelling such as ZTV analysis and wireline/photomontage visualisations. All relevant commitments are presented in **Appendix A: Offshore Commitments Register**.	33: Flotta; RCCA 34: North Bay, Longhope and Switha; RCCA 35: South Walls and Brims Ness; RCCA 38: West Burray and South Ronaldsay; RCCA 43: Gills Bay and John o' Groats; and RCCA 44: Scarfskerry and Dunnet Head.
Impact (daytime) of the construction, operation and decommissioning of the Array Area on perceived landscape character.	C-OFF-01 C-OFF-03 C-OFF-32	Scoped In and Scoped Out	Those landscape receptors proposed to be Scoped Out here either experience no visibility or limited theoretical visibility of the Array Area, often at very long range, as shown in **Figure 17.4**, or are located inland and do not feature a relationship to the sea as a key characteristic. There will therefore be no potential for significant effects on these receptors. Landscape character receptors proposed to be Scoped In to the assessment may experience views of the Array Area at ranges typically between 40-50km. Typically, those predicted to experience LSE are located in closer proximity to the Array Area, and/or experience relatively high-level theoretical visibility of the Proposed Offshore Development. Those predicted to experience Possible LSE are generally located at greater distances from the Array Area, and/or experience lower levels of theoretical visibility. However, both groups of receptors may or may not experience significant effects as a result of the Proposed Offshore Development. An initial assessment of the potential effects of the Array Area on landscape receptors will be undertaken initially using desk-based information and ZTV analysis, with a detailed assessment focusing on those that are identified as requiring further assessment. Detailed assessment to include desk-based seascape character assessment publications and primary baseline data collection (for example through site surveys), quantitative and qualitative assessment methodologies to determine likely	LSE without secondary commitment measures for the following receptors: LCT 141: High Cliffs and Sheltered Bays; LCT 143: Farmed Lowland Plain; LCT 144: Coastal Crofts & Small Farms; LCT 295: Holms; LCT 298: Low Island Pastures; LCT 299: Undulating Island Pastures; LCT 307: Cliffs – Orkney. Possible LSE without secondary commitment measures, however, it may become clear post-Scoping stage that the impact does not require detailed assessment in the EIAR for the following receptors: LCT 140: Sandy Beaches and Dunes; LCT 301: Coastal Basin; LCT 302: Inclined Coastal Pasture; LCT 308: Coast with Sand – Orkney No LSE identified at Scoping. No LSE identified at Scoping for the following receptors: LCT134: Sweeping Moorland and Flows; LCT 296: Whaleback Islands; LCT 297: Ridgeline Islands; LCT 300: Coastal Plain – Orkney; LCT 305: LCT 306: Coastal Hills and Heath; LCT 310: Loch Basin – Orkney; Enclosed Bays; LCT 311: Low Moorland; LCT 312: Plateau Heath and Pasture; LCT 313: Rolling Hill Fringe; and LCT 314: Moorland Hills – Orkney

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
			significance, and modelling such as ZTV analysis and wireline/photomontage visualisations. All relevant commitments are presented in **Appendix A: Offshore Commitments Register**.	
Impact (daytime) of the construction, operation and decommissioning of the Array Area on perceived landscape character/special qualities of designated landscapes.	C-OFF-01 C-OFF-03 C-OFF-32	Scoped In and Scoped Out	Those designated landscapes proposed to be Scoped Out experience no theoretical visibility of the Array Area, as shown in **Figure 17.3**. There will therefore be no potential for significant effects on these receptors. An initial assessment of the potential effects of the Array Area on the perceived character and special qualities of the remaining designated landscapes will be undertaken initially using desk-based information and ZTV analysis, with a detailed assessment focusing on those that are identified as requiring further assessment. Detailed assessment to include desk-based assessment to define special qualities that may be affected by the Array Area, using published documents and primary baseline data collection (for example through site surveys), quantitative and qualitative assessment methodologies to determine likely significance, and modelling such as ZTV analysis and wireline/photomontage visualisations. Relevant special qualities for detailed assessment will be agreed with stakeholders as part of the evidence plan process. All relevant commitments are presented in **Appendix A: Offshore Commitments Register**.	LSE without secondary commitment measures for the following receptors: Duncansby Head SLA (LSE) No LSE identified at Scoping. No LSE identified at Scoping for the following receptors: Castle of Mey (Barrogill Castle) Garden and Designed Landscape (No LSE)
Impact (daytime) of the construction, operation and decommissioning of the Array Area on visual receptors/views.	C-OFF-01 C-OFF-03 C-OFF-32	Scoped In and Scoped Out	Those visual receptors proposed to be Scoped Out here either experience no visibility or limited theoretical visibility of the Array Area, often at very long range, as shown in **Figure 17.4**, or are considered to be of lower sensitivity to changes in the surrounding seascape environment. There will	LSE without secondary commitment measures for the following receptors: Effects experienced by visual receptors at identified viewpoints, comprising Viewpoint 3: Kirkhouse Point, South Ronaldsay; Viewpoint 4: Brough Ness, South Ronaldsay; Viewpoint 5:

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
			therefore be no potential for significant effects on these receptors. Visual receptors proposed to be Scoped In to the assessment may experience views of the Array Area at ranges typically between 40-50km. Typically, those predicted to experience LSE are located in closer proximity to the Array Area, and /or represent views experienced by receptors of higher sensitivity to changes associated with the Proposed Offshore Development. Those predicted to experience Possible LSE are generally located at greater distances from the Array Area, and/or represent views experienced by receptors of lower sensitivity to changes associated with the Proposed Offshore Development. However, both groups of receptors may or may not experience significant effects as a result of the Proposed Offshore Development. An initial assessment of the potential effects of the Stromar Array Area on views and visual receptors will be undertaken initially using desk-based information and ZTV analysis, with a detailed assessment focusing on those that are identified as requiring further assessment. Detailed assessment to include desk-based publications and primary baseline data collection (for example through site surveys), quantitative and qualitative assessment methodologies to determine likely significance, and modelling such as ZTV analysis and wireline/photomontage visualisations. All relevant commitments are presented in **Appendix A: Offshore Commitments Register**.	Duncansby Head; Viewpoint 6: Skirza; and Viewpoint 9: Noss Head Lighthouse. Effects experienced by visual receptors on transport and recreational routes, comprising John o' Groats long-distance walking trail; and ferry routes between Aberdeen and Kirkwall. Effects experienced by visual receptors at the visitor attraction at Duncansby Head. Effects experienced by recreational visitors, including those engaging in water activities, at Freswick Bay. Possible LSE without secondary commitment measures, however, it may become clear post-Scoping stage that the impact does not require detailed assessment in the EIAR for the following receptors: Effects experienced by visual receptors at identified viewpoints comprising Viewpoint 1: A960 at Taracliffe Bay, Orkney Mainland; Viewpoint 2: A961 between South Ronaldsay and Burray; Viewpoint 7: Keiss; Viewpoint 8: Ackergill Links; Viewpoint 10: Wick; Viewpoint 11: Sarclet (Sarclet Haven Info Board); Viewpoint 12: Whaligoe Steps; Viewpoint 13: Aberdeen – Kirkwall Ferry. Effects experienced by residential receptors within coastal settlements including Wick and Keiss. Effects experienced by visual receptors on transport and recreational routes, comprising the A99, A960, and A961 roads (including those following the promoted North Coast 500 tourist route); national cycle routes between Burwick to Kirkwall and Stromness; and ferry routes from

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
				John o' Groats to Burwick, Gills Bay to St Margarets Hope, and Kirkwall to Lerwick. Effects experienced by recreational visitors to beaches, including those engaging in water activities, at Sinclairs Bay. Effects experienced by visual receptors at the visitor attraction at Whaligoe Steps. Visual effects experienced by users of recreational boats along the Caithness coast. No LSE identified at Scoping. No LSE identified at Scoping for the following receptors: Visual effects beyond the 60 km study area. Visual effects outwith the ZTV, or within the ZTV where surface features including built development and vegetation will limit actual visibility (No LSE). Visual effects on receptors involved in offshore commercial activity off the Caithness coast, including in the fisheries and oil and gas industries, due to a lower susceptibility to changes in the surrounding seascape. Effects experienced by visual receptors on a national cycle network route between Inverness and John o' Groats, due to limited visibility.
Impact (night-time) of the operation and maintenance of the Stromar Array Area lighting on visual receptors/views and the visual aspects of coastal character.	C-OFF-01 C-OFF-03 C-OFF-52	Scoped In and Scoped Out	A ZTV showing the geographic extent of visible aviation and marine navigation lighting will be used to inform the assessment of effects resulting from WTG lighting. Night-time photographs and visualisations will be prepared from proposed night-time viewpoints (**Table 17.2**) to illustrate the effects of the lighting from key viewpoints, to be agreed with stakeholders. In the Caledonia Offshore Wind	Possible LSE without secondary commitment measures, however, it may become clear post-Scoping stage that the impact does not require detailed assessment in the EIAR for the following receptors: Effects experienced by visual receptors within the ZTV, including at identified viewpoints, public rights of way, long distance recreational routes,

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
			Farm Scoping Opinion (Marine Scotland, 2023a), Scottish Ministers advised that the Developer should consider the night-time component of the character and visual amenity, in line with the NatureScot representation. All relevant commitments are presented in **Appendix A: Offshore Commitments Register**.	transport routes, national cycle network routes, visitor attractions and settlements. No LSE identified at Scoping. No LSE identified at Scoping for the following receptors: Visual effects beyond the 60 km study area (No LSE).

17.6 Potential Cumulative Impacts

17.6.1 The process by which potential cumulative impacts will be assessed through the Cumulative Effects Assessment (CEA) is described in **Chapter 6: EIA Approach and Methodology** of the Scoping Report.

17.6.2 The CEA will take into account the impact associated with the Proposed Offshore Development together with other relevant plans, projects and activities. Cumulative effects are therefore the additional or combined effect of the Proposed Offshore Development in combination with the effects from a number of different projects, on the same receptor or resource.

17.6.3 In accordance with NatureScot guidance and GLVIA3 (para 7.13), existing projects and those which are under construction will be included in the SLVIA baseline and described as part of the baseline conditions, including the extent to which these have altered character and views, and affected sensitivity to wind farm development. Operational and under construction projects considered as part of the baseline for the SLVIA are: Beatrice Wind Farm, Moray East Wind Farm and Moray West Wind Farm (**Figure 17.1**). A further assessment of the additional cumulative seascape, landscape and visual effects of the Proposed Offshore Development with other potential future projects will be undertaken in the CEA.

17.6.4 For seascape, landscape and visual receptors, cumulative interactions may occur with other planned projects and developments in the study area. Potential cumulative impacts with other projects and activities will be considered for each of the impacts Scoped In (**Figure 17.5**).

17.6.5 A tiered approach will be adopted for the CEA. This provides a framework for placing relative weight upon the potential for each project to be included in the CEA to ultimately be realised, based upon the project's current status and certainty in the projects' parameters.

17.6.6 Cumulative interactions may occur with OWFs that are consented, subject to a live application, subject to a Scoping request or where an OLA has been granted.

17.6.7 The projects selected as relevant to the CEA presented within this SLVIA will be based upon the results of a screening exercise. Each project will be considered on a case-by-case basis for screening in or out of this chapter's assessment based upon data confidence, effect-receptor pathways and the spatial/temporal scales involved.

17.6.8 The focus of the cumulative seascape, landscape and visual assessment will be on the additional effect of the Proposed Offshore Development in conjunction with other developments of the same type i.e., other OWFs. Other OWF projects are shown in **Figure 17.1.**

17.6.9 Projects that are likely to come forward where an OLA has been granted will also be considered further in the CEA, in order to assess the potential for likely significant cumulative effects. Several ScotWind sites that were allocated in February 2022 fall within the SLVIA study area (**Figure 17.1**) - Ayre, Broadshore, Buchan and Caledonia.

17.6.10 Due to the very long distance of the Broadshore and Buchan ScotWind projects from all coastlines within the SLVIA study area, it is considered that there is no likelihood of these projects resulting in significant cumulative effects with the Proposed Offshore Development on seascape, landscape and

visual receptors; and therefore, the Broadshore and Buchan ScotWind sites will be Scoped Out of the SLVIA.

17.6.11 Due to their closer position to the coast, the Caledonia and Ayre ScotWind sites have potential for cumulative effect interactions with the Proposed Offshore Development. It is understood that the Ayre OWF will start consultations among local communities in Orkney as part of this consenting process from 2024. Caledonia OWF is currently at Scoping stage (Scoping Report September 2022 and Scoping Opinion January 2023). Indicative offshore design envelope information for Caledonia is included in the Caledonia OWF Scoping Report (Caledonia Offshore Wind Ltd, September 2022). Development within these ScotWind sites is, however, less certain, over a long timeframe and with lower data confidence at present. The likely significant cumulative effects of the Proposed Offshore Development with the Caledonia and Ayre ScotWind sites will be assessed in the SLVIA if these projects are subsequently well-defined to the point that they can be assessed, and their effects are reasonably foreseeable.

Table 17.6: Cumulative impacts proposed to be Scoped In to the SLVIA.

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
Construction, operational and decommissioning phase seascape, landscape and visual impacts of the Array Area outside the 60 km radius SLVIA study area (**Figure 17.1**).	n/a	Scoped Out	The 60km radius SLVIA study area is defined to an outer limit within which significant effects could occur. Significant effects will not occur beyond 60 km due to the limited changes to views arising from the Array Area at distances of over 60 km. Based on METAR visibility data at the nearest Met Office weather station at Wick Airport, visibility beyond 60 km occurs infrequently and it is predicted that the Array Area will rarely, if ever, be visible and recognisable at distances beyond 60 km. In the Caledonia Offshore Wind Farm Scoping Opinion (Marine Scotland, 2023a), Scottish Ministers advised that the study area for the SLVIA should be a radius of 60km, which was in line with the Highland Council representation.	No LSE identified at Scoping.
The seascape, landscape and visual impacts of the HVAC Reactive Compensation Station (RCS)	n/a	Scoped In	If HVAC technology is selected, one Reactive Compensation Station (RCS) will be located offshore at a point between the offshore wind farm and the landfall. The closest point to the coast at which it may be located is approximately 20 km from the Aberdeenshire coast. At this distance from the coast, a single RCS of similar but smaller design than the main offshore wind farm substations may give rise to significant effects on seascape, landscape and visual receptors. Receptors to be Scoped In and Out of the assessment of the RCS will be identified as part of the preliminary assessment in the SLVIA.	Possible LSE without secondary commitment measures, however, it may become clear post-Scoping stage that the impact does not require detailed assessment in the EIAR.
The seascape, landscape and visual impacts of the construction and decommissioning of the offshore ECC	n/a	Scoped Out	Effects on seascape, landscape and visual receptors are unlikely to be significant (outside the inter-tidal area), due to the nature of the offshore ECC; and the distant visibility of related activity offshore within an expansive seascape context. The sporadic nature of related above-sea construction activity means its effects will be short-term and temporary.	No LSE identified at Scoping.

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
beyond (outside) the inter-tidal area.			Related above-sea construction activity is mainly related to the movement of sea vessels, which are an established component of the baseline seascape and views of it. Long-range visibility of this activity further reduces its impact.	
The seascape, landscape and visual impacts of the construction and decommissioning of the offshore ECC within the inter-tidal area.	n/a	Scoped In	Possible significant effects on seascape, landscape and visual receptors arising from the construction of the offshore ECC within the inter-tidal area, including potential use of cofferdam in the intertidal zone to assist in cable installation activities by excluding water from the working area. Effects anticipated to be localised to the receptors located in close proximity to the construction works taking place in the inter-tidal area.	Possible LSE without secondary commitment measures, however, it may become clear post-Scoping stage that the impact does not require detailed assessment in the EIAR.
The seascape, landscape, and visual effects of the operation of the offshore ECC.	n/a	Scoped Out	No potential for significant effects on SLVR arising from the offshore ECC, due to its location below the sea surface and its lack of visibility.	No LSE identified at Scoping.
Impacts of the construction, operation and decommissioning of the Proposed Offshore Development on physical aspects of landscape character.	n/a	Scoped Out	No potential for physical effects on landscape receptors. Due to the offshore location of the Array Area, it will only affect the perceived character and qualities of the landscape, which is considered as an indirect effect. No physical attributes that define landscape character or special qualities of designated landscapes will be changed.	No LSE identified at Scoping.
Impact (daytime) of the construction, operation and decommissioning of the Array Area on	C-OFF-01 C-OFF-38 C-OFF-39	Scoped In and Scoped Out	Those coastal character receptors proposed to be Scoped Out either experience no visibility or limited theoretical visibility of the Array Area, often at very long range, as shown on **Figure 17.5**. There will therefore be no potential for significant effects on these receptors.	LSE without secondary commitment measures for the following receptors: RCCA 20: Deerness, East End of Holm and Rose Nest; RCCA 39: Burray Ness to Halcro Head; RCCA 40: Brough Ness and Barth

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
seascape (coastal) character.			Coastal character receptors proposed to be Scoped In to the assessment may experience views of the Array Area at ranges typically between 40-50km. Typically, those predicted to experience LSE are located in closer proximity to the Array Area, and/or experience relatively high-level theoretical visibility of the Proposed Offshore Development. Those predicted to experience Possible LSE are generally located at greater distances from the Array Area, and/or experience lower levels of theoretical visibility. However, both groups of receptors may or may not experience significant effects as a result of the Proposed Offshore Development. An initial assessment of the potential effects of the Array Area on these RCCAs and CCAs will be undertaken initially using desk-based information and ZTV analysis, with a detailed assessment focusing on those that are identified as requiring further assessment. Detailed assessment to include desk-based seascape character assessment publications and primary baseline data collection (for example through site surveys), quantitative and qualitative assessment methodologies to determine likely significance, and modelling such as ZTV analysis and wireline/photomontage visualisations.	Head; RCCA 42: Duncansby Head; CCA8: Freswick Bay and Nibster Coast; CCA 10: Noss Head; CCA 11: Wick Bay Possible LSE without secondary commitment measures, however, it may become clear post-Scoping stage that the impact does not require detailed assessment in the EIAR for the following receptors: RCCA 4: Stronsay; RCCA 21: Holm Sound; RCCA 41: Stroma; CCA 9: Sinclair's Bay; and CCA 12: Sarclet Head No LSE identified at Scoping for the following receptors: RCCA 14: Shapinsay West; RCCA 15: Shapinsay East; RCCA 18: Shapinsay Sound and Inganess Bay; RCCA 19: Deer Sound; RCCA 22: Scapa Bay; RCCA 23: Orphir; RCCA 31: Cava, Rysa Little and Fara; RCCA 32: South East Hoy; RCCA 33: Flotta; RCCA 34: North Bay, Longhope and Switha; RCCA 35: South Walls and Brims Ness; RCCA 38: West Burray and South Ronaldsay; RCCA 43: Gills Bay and John o' Groats; and RCCA 44: Scarfskerry and Dunnet Head

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
Impact (daytime) of the construction, operation and decommissioning of the Array Area on perceived landscape character.	C-OFF-01 C-OFF-38 C-OFF-39	Scoped In and Scoped Out	Those landscape receptors proposed to be Scoped Out here either experience no visibility or limited theoretical visibility of the Array Area, often at very long range, as shown in **Figure 17.4**, or are located inland and do not feature a relationship to the sea as a key characteristic. There will therefore be no potential for significant effects on these receptors. Landscape character receptors proposed to be Scoped In to the assessment may experience views of the Array Area at ranges typically between 40-50km. Typically, those predicted to experience LSE are located in closer proximity to the Array Area, and/or experience relatively high-level theoretical visibility of the Proposed Offshore Development. Those predicted to experience Possible LSE are generally located at greater distances from the Array Area, and/or experience lower levels of theoretical visibility. However, both groups of receptors may or may not experience significant effects as a result of the Proposed Offshore Development. An initial assessment of the potential effects of the Array Area on landscape receptors will be undertaken initially using desk-based information and ZTV analysis, with a detailed assessment focusing on those that are identified as requiring further assessment. Detailed assessment to include desk-based seascape character assessment publications and primary baseline data collection (for example through site surveys), quantitative and qualitative assessment methodologies to determine likely significance, and modelling such as ZTV analysis and wireline/photomontage visualisations.	LSE without secondary commitment measures for the following receptors: LCT 141: High Cliffs and Sheltered Bays; LCT 143: Farmed Lowland Plain; LCT 144: Coastal Crofts & Small Farms; LCT 295: Holms; LCT 298: Low Island Pastures; LCT 299: Undulating Island Pastures; LCT 307: Cliffs – Orkney. Possible LSE without secondary commitment measures, however, it may become clear post-Scoping stage that the impact does not require detailed assessment in the EIAR for the following receptors: LCT 140: Sandy Beaches and Dunes; LCT 301: Coastal Basin; LCT 302: Inclined Coastal Pasture; LCT 308: Coast with Sand – Orkney. No LSE identified at Scoping for the following receptors: LCT134: Sweeping Moorland and Flows; LCT 296: Whaleback Islands; LCT 297: Ridgeline Islands; LCT 300: Coastal Plain – Orkney; LCT 305: LCT 306: Coastal Hills and Heath; LCT 310: Loch Basin – Orkney; Enclosed Bays; LCT 311: Low Moorland; LCT 312: Plateau Heath and Pasture; LCT 313: Rolling Hill Fringe; and LCT 314: Moorland Hills – Orkney (No LSE).

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
Impact (daytime) of the construction, operation and decommissioning of the Array Area on perceived landscape character/special qualities of designated landscapes.	C-OFF-01 C-OFF-38 C-OFF-39	Scoped In and Scoped Out	Those designated landscapes proposed to be Scoped Out experience no theoretical visibility of the Array Area, as shown in **Figure 17.3**. There will therefore be no potential for significant effects on these receptors. An initial assessment of the potential effects of the Array Area on the perceived character and special qualities of the remaining designated landscapes will be undertaken initially using desk-based information and ZTV analysis, with a detailed assessment focusing on those that are identified as requiring further assessment. Detailed assessment to include desk-based assessment to define special qualities that may be affected by the Array Area, using published documents and primary baseline data collection (for example through site surveys), quantitative and qualitative assessment methodologies to determine likely significance, and modelling such as ZTV analysis and wireline/photomontage visualisations. Relevant special qualities for detailed assessment will be agreed with stakeholders as part of the evidence plan process.	LSE without secondary commitment measures for the following receptors: Head SLA (LSE) No LSE identified at Scoping for the following receptors: Castle of Mey (Barrogill Castle) Garden and Designed Landscape (No LSE)
Impact (daytime) of the construction, operation and decommissioning of the Array Area on visual receptors/views.	C-OFF-01 C-OFF-38 C-OFF-39	Scoped In and Scoped Out	Those visual receptors proposed to be Scoped Out here either experience no visibility or limited theoretical visibility of the Array Area, often at very long range, as shown in **Figure 17.4**, or are considered to be of lower sensitivity to changes in the surrounding seascape environment. There will therefore be no potential for significant effects on these receptors. Visual receptors proposed to be Scoped In to the assessment may experience views of the Array Area at ranges typically between 40-50km. Typically, those predicted to experience LSE are located in closer proximity to the Array Area, and/or represent views	LSE without secondary commitment measures for the following receptors: Effects experienced by visual receptors at identified viewpoints, comprising Viewpoint 3: Kirkhouse Point, South Ronaldsay; Viewpoint 4: Brough Ness, South Ronaldsay; Viewpoint 5: Duncansby Head; Viewpoint 6: Skirza; and Viewpoint 9: Noss Head Lighthouse. Effects experienced by visual receptors on transport and recreational routes, comprising

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
			experienced by receptors of higher sensitivity to changes associated with the Proposed Offshore Development. Those predicted to experience Possible LSE are generally located at greater distances from the Array Area, and/or represent views experienced by receptors of lower sensitivity to changes associated with the Proposed Offshore Development. However, both groups of receptors may or may not experience significant effects as a result of the Proposed Offshore Development. An initial assessment of the potential effects of the Stromar Array Area on views and visual receptors will be undertaken initially using desk-based information and ZTV analysis, with a detailed assessment focusing on those that are identified as requiring further assessment. Detailed assessment to include desk-based publications and primary baseline data collection (for example through site surveys), quantitative and qualitative assessment methodologies to determine likely significance, and modelling such as ZTV analysis and wireline/photomontage visualisations.	John o' Groats long-distance walking trail; and ferry routes between Aberdeen and Kirkwall. Effects experienced by recreational visitors, including those engaging in water activities, at Freswick Bay. Effects experienced by visual receptors at the visitor attraction at Duncansby Head. Possible LSE without secondary commitment measures, however, it may become clear post-Scoping stage that the impact does not require detailed assessment in the EIAR for the following receptors: Effects experienced by visual receptors at identified viewpoints comprising Viewpoint 1: A960 at Taracliffe Bay, Orkney Mainland; Viewpoint 2: A961 between South Ronaldsay and Burray; Viewpoint 7: Keiss; Viewpoint 8: Ackergill Links; Viewpoint 10: Wick; Viewpoint 11: Sarclet (Sarclet Haven Info Board); Viewpoint 12: Whaligoe Steps; Viewpoint 13: Aberdeen – Kirkwall Ferry. Effects experienced by residential receptors within coastal settlements including Wick and Keiss. Effects experienced by visual receptors on transport and recreational routes, comprising the A99, A960, and A961 roads (including those following the promoted North Coast 500 tourist route); national cycle routes between Burwick to Kirkwall and Stromness; and ferry routes from John o' Groats to Burwick, Gills

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
				Bay to St Margarets Hope, and Kirkwall to Lerwick. Effects experienced by recreational visitors to beaches, including those engaging in water activities, at Sinclairs Bay. Effects experienced by visual receptors at the visitor attraction at Whaligoe Steps. Visual effects experienced by users of recreational boats along the Caithness coast. No LSE identified at Scoping for the following receptors: Visual effects outwith the ZTV, or within the ZTV where surface features including built development and vegetation will limit actual visibility (No LSE). Visual effects on receptors involved in offshore commercial activity off the Caithness coast, including in the fisheries and oil and gas industries, due to a lower susceptibility to changes in the surrounding seascape. Effects experienced by visual receptors on a national cycle network route between Inverness and John o' Groats, due to limited visibility.
Impact (night-time) of the operation and maintenance of the Stromar Array Area lighting on visual receptors/views and	C-OFF-01 C-OFF-38 C-OFF-39	Scoped In and Scoped Out	A ZTV showing the geographic extent of visible aviation and marine navigation lighting will be used to inform the assessment of effects resulting from WTG lighting. Night-time photographs and visualisations will be prepared from proposed night-time viewpoints (**Table 17.2**) to illustrate the effects of the lighting from key	Possible LSE without secondary commitment measures, however, it may become clear post-Scoping stage that the impact does not require detailed assessment in the EIAR for the following receptors:

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
the visual aspects of coastal character.			viewpoints, to be agreed with stakeholders. In the Caledonia Offshore Wind Farm Scoping Opinion (Marine Scotland, 2023a), Scottish Ministers advised that the Developer should consider the night-time component of the character and visual amenity, in line with the NatureScot representation.	Effects experienced by visual receptors within the ZTV, including at identified viewpoints, public rights of way, long distance recreational routes, transport routes, national cycle network routes, visitor attractions and settlements. No LSE identified at Scoping for the following receptors: Visual effects beyond the 60 km study area

17.7 Potential Transboundary Impacts

17.7.1 The SLVIA study area lies within UK waters. The nearest EU coastline lies approximately 450 km to the southwest, located near Inishtrahull Island off the northern coast of Ireland. The nearest coastline outside the UK, within the Faroe Islands, lies approximately 397 km to the northwest.

17.7.2 No transboundary impacts on seascape, landscape and visual receptors are anticipated to occur as a result of the Proposed Offshore Development activities during construction, O&M or decommissioning. Any predicted impacts on seascape, landscape and visual receptors will largely be contained within the SLVIA study area and will not give rise to effects on seascape, landscape and visual receptors beyond UK waters. Therefore, it is proposed to Scope Out transboundary impacts with regards to seascape, landscape and visual receptors.

17.8 Proposed Approach to EIA

Additional Data Sources

17.8.1 A thorough, desk-based collation and review of the relevant data will be undertaken to inform the subsequent SLVIA. In particular, landscape and seascape character assessments will be analysed along with the ZTV to inform the identification of seascape, landscape and visual receptors which require assessment. A preliminary assessment will be carried out to determine which receptors have the potential to experience significant effects as a result of the Proposed Offshore Development. These receptors will then be subject to detailed assessment.

17.8.2 Following desk-based review, those receptors which have the potential to undergo significant effects will then be subject to a series of surveys. This will include visits to RCCAs, CCAs and LCTs to verify the ZTV on site, visits to viewpoints and baseline panoramic photography.

17.8.3 Sea-based offshore surveys are not proposed to be undertaken as part of the SLVIA. Illustrative wirelines (without baseline photography) will be prepared for offshore viewpoints if required.

17.8.4 Detailed assessment methods will be based on quantifying impacts through modelling to enable prediction of seascape, landscape and visual effects. Assessment of the sensitivity of seascape, landscape and visual receptors will be undertaken, together with an assessment of the magnitude of change arising as a result of the Proposed Offshore Development. Judgements on sensitivity and magnitude will be combined to arrive at an overall assessment as to whether the Project will have an effect that is significant or not significant on each seascape, landscape and visual receptor.

Guidance

17.8.5 In addition to the approach and guidance (of general relevance) outlined in **Chapter 6: EIA Approach and Methodology**, the assessment of seascape, landscape and visual impact receptors will also comply with the following guidance:

- Landscape Institute with the Institute of Environmental Management and Assessment (2013). Guidelines for Landscape and Visual Impact Assessment. Third Edition;
- Landscape Institute (2019). Visual Representation of Development Proposals Technical Guidance Note 06/19;

- Landscape Institute (2021). Assessing landscape value outside national designations;
- NatureScot (2021). Assessing the Cumulative Impact of Onshore Wind Energy Developments;
- NatureScot (2017a). Visual Representation of Windfarms: Version 2.2;
- NatureScot (2017b). Siting and Designing Windfarms in the Landscape, Guidance (Version 3a);
- NatureScot (2018). Guidance note: Coastal Character Assessment.
- NatureScot (2012). Offshore Renewables – guidance on assessing the impact on coastal landscape and seascape. Guidance for Scoping an ES.
- The Highland Council (2016). Visualisation Standards for Wind Energy Developments; and
- Scottish Government (2022). Guidance for applicants on using the design envelope for applications under Section 36 of the Electricity Act 1989.

Assessment Methodology

17.8.6 The EIA will follow the most current methods of assessment (including guidance) for surveys, modelling and impact assessment, in line with the general Proportionate EIA methodology described in **Chapter 6: EIA Approach and Methodology**. The approach to the assessment of seascape, landscape and visual receptors in the EIA Report will be based on the outcome of the Scoping assessment undertaken in **Table 17.5**.

17.8.7 The methodology used in the SLVIA will reflect the 'Guidelines for Landscape and Visual Impact Assessment: Third Edition (Landscape Institute, 2013), which constitutes best practice guidance for SLVIA. In accordance with this and with the EIA Regulations, the effects arising from the Proposed Offshore Development on the seascape, landscape and visual resource will be assessed as either significant or not significant. Further guidance that is reflected in the SLVIA methodology is described in **Section 17.8.5** above.

17.8.8 The SLVIA will be based on the following methodology:

- Those features of the Proposed Offshore Development that may result in seascape, landscape and visual effects will be described;
- The overall scope of the SLVIA will be defined, including the study area and range of possible seascape, landscape and visual effects;
- The seascape and landscape baseline will be established, using seascape/landscape character assessment and the ZTV of the Proposed Offshore Development to identify seascape and landscape receptors that may be affected and their key characteristics and value;
- The visual baseline will be established by defining the ZTV, identifying the people who may be affected and identifying visual receptors and selecting representative viewpoints;
- A preliminary assessment will be undertaken with reference to ZTVs and wirelines, in order to identify seascape, landscape and visual receptors with the potential to be significantly affected by the Proposed Offshore Development, which will then be subject to detailed

assessment. Those receptors which are considered unlikely to experience significant effects will be Scoped Out of the assessment (in consultation with relevant stakeholders);

- Assessments of the sensitivity of each receptor, and the magnitude of change experienced, will be carried out. Judgements of the susceptibility of each receptor to change of the type proposed will be combined with judgements of the value of the receptor to determine the sensitivity of receptors to the Proposed Offshore Development.
- An assessment of the size/scale of seascape/landscape impact, the degree to which seascape/landscape elements are altered and the extent to which the impacts change the key characteristics of the landscape will be undertaken, combining these judgements to assess the magnitude of change on each seascape/landscape receptor.
- An assessment of the size/scale of visual impact, the extent to which the change would affect views, whether this is unique or representative of a wider area, and the position of the Proposed Offshore Development in relation to the principal orientation of the view and activity of the receptor will be undertaken. These judgements are combined to assess the magnitude of change on the visual receptor.
- The judgements relating to sensitivity and magnitude of change will then be combined to determine the significance of each seascape, landscape or visual effect. In accordance with GLVIA3 (Landscape Institute, 2013), professional judgement will be applied in the determination of significant effects, but in general, the higher the sensitivity and higher the magnitude of change, the more likely that a significant effect will arise as a result of the Proposed Offshore Development; and
- A CEA will be undertaken to assess the likely additional significant effects arising from the Proposed Offshore Development when considered together with other existing, consented or application stage developments and identify related significant effects arising. The CEA will focus on the LSE, and those which may influence the outcome of the consenting process in particular.

17.9 Summary and Key Issues

17.9.1 The likely key impacts on Seascape, Landscape and Visual receptors are the impacts of the operation of the Array Area on coastal character and views from the north-east coastline of Caithness and the eastern coast of the Orkney Islands; and the operation of the HVAC RCS on views from the north Aberdeenshire Coast.

17.9.2 Drawing upon the seascape and landscape character and visual baselines described above, the key seascape, landscape and visual receptors within the study area are identified below:

- Coastal character receptors as outlined in **Table 17.5** above;
- Landscape character receptors as outlined in **Table 17.5** above;
- Duncansby Head SLA; and
- Visual receptors at identified viewpoints, public rights of way, long distance recreational routes (such as the NC500), transport routes, ferry routes (such as the Aberdeen to Orkney Ferry), national cycle network routes, visitor attractions and settlements.

17.10 Scoping Questions

17.10.1 The following questions refer to the seascape, landscape and visual impact chapter and are designed to inform the Scoping Opinion and focus the Scoping exercise:

1. Do you agree with the study area defined for the SLVIA of the Array Area?
2. Do you agree with the use of data listed in **Table 17.1** and any additional data listed in **Section 17.8.1**, being used to inform the Offshore EIA Report?
3. Are there any further data sources or guidance documents that should be considered?
4. Do you agree that all receptors, pathways, and potential impacts related to seascape, landscape and visual impacts have been identified?
5. Do you agree with the Scoping In and Scoping Out of impact pathways in relation to seascape, landscape and visual impact?
6. Do you agree with the assessment of transboundary effects in relation to seascape, landscape and visual impact?
7. Do you agree with the assessment of cumulative effects in relation to seascape, landscape and visual impact?
8. Do you agree with the proposed assessment methodology for seascape, landscape and visual impact?
9. Do you agree on the suitability of the proposed embedded commitments of relevance to seascape, landscape and visual impact that have been identified for the Proposed Offshore Development?

18 Socio-economics, Tourism and Recreation

18.1 Introduction

18.1.1 The chapter identifies the elements of socio-economics, tourism and recreation relevant to the Project (as a whole), and considers the potential impacts arising from its construction, O&M, and decommissioning phases. This includes both onshore and offshore activity, supporting the Offshore Scoping Report and separate Onshore Scoping Report.

18.1.2 The key impacts that will be covered in this chapter include:

- Increase in employment and Gross Value Added (GVA);
- Economic activity associated with onshore elements in Aberdeenshire;
- Demographic changes;
- Changes to housing demand;
- Changes to other local public and private services;
- Socio-cultural impacts;
- Changes to visitor behaviour;
- Changes to onshore recreation;
- Changes to commercial fisheries; and
- Changes to shipping and marine recreation.

18.1.3 This chapter should be read alongside the following offshore chapters:

- **Chapter 13: Commercial Fisheries**;
- **Chapter 14: Shipping and Navigation**;
- **Chapter 17: Seascape, Landscape and Visual Impact**; and
- **Chapter 20: Other Human Activities**.

18.1.4 This chapter should also be read alongside the following onshore chapters:

- **Chapter 9: Landscape and Visual Impact Assessment**;
- **Chapter 11: Land Use and Agriculture**; and
- **Chapter 12: Traffic and Transport**.

18.1.5 This chapter of the Offshore Scoping Report has been prepared by BiGGAR Economics.

18.2 Study Area

18.2.1 While the majority of the Project is located offshore, for most of the socio-economic effects the relevant study areas will be onshore, since the organisations, individuals and communities that might be affected by the offshore activities are based in onshore communities, including coastal communities.

18.2.2 The socio-economic study areas for the assessment of effects on employment and economy will be defined in line with the guidance on identification of 'local areas' for offshore developments published by the Scottish Government (Scottish Government, 2022e). This guidance identified six principles for identifying local study areas for offshore development:

- Principle 1 (Dual Geographies): The local area for the supply chain and investment impacts should be separate from the local area(s) for wider socio-economic impacts, including tourism and recreation;
- Principle 2 (Appropriate Impacts): The appropriate impacts for assessments should be identified before 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 pre-existing economic or political geographies (community councils, local authorities, development agencies) to enhance accountability;
- Principle 5 (Understandable): The local areas should be defined so that they are understandable to the communities they describe; and
- 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.

18.2.3 This assessment will cover the combined impacts associated with the onshore and offshore elements of the Project.

18.2.4 The epicentres of impact for the onshore elements, such as landfall, cable route and onshore substation will be in Aberdeenshire with landfall near Fraserburgh. Therefore, it is possible to apply the ‘local areas’ guidance to the onshore elements of the Project. The socio-economic assessment of the onshore elements of the Project will focus on the local authority of Aberdeenshire.

18.2.5 The epicentres of impact associated with the offshore elements of the Project will include the locations of the key construction and O&M ports, the location of any supply chain hubs or any locations on land with visibility of the offshore infrastructure. However, the Array Area will be located approximately 50 km east of Wick and this is beyond the range of normal visibility (White Consultants, 2020). Therefore, the visibility of the offshore infrastructure is not anticipated to be considered an epicentre of impacts. At this stage the port locations or supply chain hubs have not been defined and therefore a ‘local area’ for the combined elements of the Project, including offshore, has not been defined in this Scoping Report. A ‘local area’ for the socio-economic impact assessment will be defined within the EIAR if more details on the potential port locations are known.

18.2.6 The socio-economic effects for the combined onshore and offshore elements of the Project will be assessed at the level of Scottish and UK economies.

18.2.7 For tourism and recreation, the main focus will be sensitive receptors onshore that may be impacted by the development, construction, operation and decommissioning of the onshore and offshore elements of the Project. Given the distance from shore, it is anticipated that there will be limited effects associated with visibility from the Array and therefore any potential changes to behaviour would be

expected to arise due to increased activity at ports and harbours or due to the construction and/or operation of onshore assets such as the landfall.

18.2.8 A Tourism and Recreation Study Area (TRSA) has been identified based on the following electoral wards where onshore infrastructure is proposed:

- Fraserburgh and District;
- Troup;
- Central Buchan; and
- Turriff and District.

18.2.9 The TRSA is presented in **Figure 18.1**.

18.2.10 There is the potential for marine tourism and recreation to be impacted by the construction and decommissioning of the offshore cable route, near the proposed landfall location in Aberdeenshire. These could occur if the vessels used during construction impede on the ability of marine recreation users to pursue these activities, including recreational sailing or sea angling.

18.2.11 More local study areas, which are expected to include the electoral wards around the chosen port(s) will be defined when more information is known about the proposed construction and O&M bases associated with the Project.

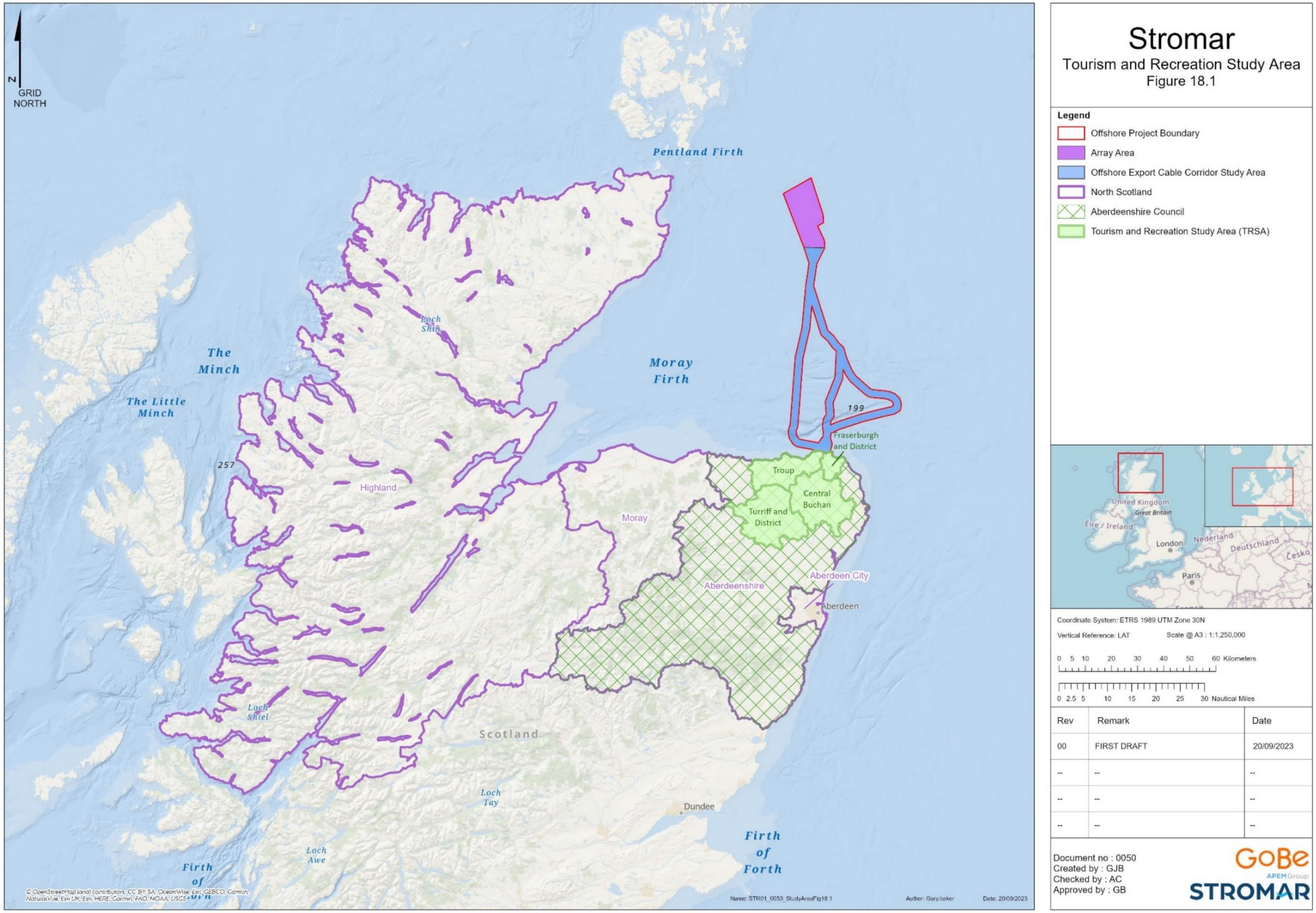

Figure 18.1: The Proposed Offshore Development Tourism and Recreation Study Area.

18.3 Baseline Environment

18.3.1 For the purposes of this chapter (and to inform the subsequent EIA), a desk-based review of existing and known activities was undertaken using data sources presented within **Table 18.1**, to understand the socio-economic, tourism and recreation baseline environment.

18.3.2 For most cases the data sources apply at the UK, Scotland and local authority level, including Aberdeenshire where the onshore assets will be located. In some cases, data sources also apply to electoral wards, which have been used to determine the TRSA.

Table 18.1: Key Sources of Socio-economics, Tourism and Recreation Data.

Source, Author and Year	Summary	Coverage of the Array Area and Offshore/Onshore ECC Study Areas	Data Quality
Socio-economics			
National Records of Scotland (2022), Mid-2021 Population Estimates Scotland	Population estimates, broken down by age.	Covers Scotland and each of its local authorities.	Annual publication. Will be updated prior to assessment.
National Records of Scotland (2022), 2012-based Principal Population Projections	Population projections for Scotland	Covers Scotland.	Biannual publication. Will likely be updated prior to assessment and include local authority data
National Records of Scotland (2020), 2018-based Principal Population Projections	Population projections for Scotland and each of its 32 local authorities, broken down by age.	Covers Scotland and each of its local authorities.	Biannual publication. Current latest estimates of local authority projections in Scotland.
Office for National Statistics (ONS) (2020), Principal Populations 2018-Based	Population projections for the UK as a whole, broken down by age.	Covers the UK as a whole.	Latest data from ONS. Will likely be updated prior to assessment to be 2020 based projections.
ONS (2023a) Annual Survey of Hours and Earnings 2022	Provides average and median residential and workplace earning.	Covers the UK, Scotland and local authorities.	Annual publication. Will be updated prior to assessment.
ONS (2022), Business Register and Employment Survey 2021	Provides a breakdown of employment by sector.	Covers the UK, Scotland, local authorities and electoral wards.	Annual publication. Will be updated prior to assessment.
ONS (2023b), Annual Population Survey 2022	Provides statistics on characteristics of populations, including economic activity rate and unemployment rate	Covers the UK, Scotland and local authorities.	Annual publication. Will be updated prior to assessment.
Offshore Wind Industry Council (OWIC) (2023), Offshore Wind Skills Intelligence Report	Provides information on the existing offshore wind labour force across the UK as well as the skills that are	Covers the UK and individual regions across Scotland.	Annual publication. Will be updated prior to assessment.

Source, Author and Year	Summary	Coverage of the Array Area and Offshore/Onshore ECC Study Areas	Data Quality
	expected to be needed up to 2030.		
Offshore Renewable Energy Catapult (2020), The Offshore Wind O&M Opportunity	Discusses the potential opportunities in offshore wind by 2030, with a detailed breakdown of annual spending and associated opportunities in the UK.	Considers opportunities in the UK.	Single publication. Unlikely to be updated prior to assessment but may be supplemented by other studies.
UK Government (2020), The Offshore Wind Sector Deal	Sets out the economic opportunities associated with offshore wind, including UK Government targets on the share of UK content.	Applies to the UK.	Single publication. Unlikely to be updated prior to assessment but may be supplemented by other studies.
Scottish Government (2018), National Performance Framework	Sets out a framework for what a successful country would look like, providing a range of measures to assess a proposed project against.	Applies to Scotland.	Single publication. May be updated prior to assessment to reflect ongoing work to update the National Planning Framework (NPF).
Scottish Government (2022a), National Strategy for Economic Transformation	Sets out the priorities for the Scottish economy, as well as how to achieve a wellbeing economy.	Applies to Scotland.	Single publication. Unlikely to be updated prior to assessment but may be superceded by another strategy.
Scottish Government (2023), National Planning Framework 4	Establishes a framework for spatial priorities in Scotland.	Applies to Scotland.	Single publication. Unlikely to be updated prior to assessment as there is typically 5 – 10 years between revisions.
Scottish Government (2020), Offshore Wind Policy Statement	Sets out the Scottish Government's ambitions for the future of offshore wind in Scotland.	Applies to Scotland.	Single publication. Unlikely to be updated prior to assessment but may be superceded by another strategy.
Tourism and Recreation			
Kantar TNS (2020a), Great Britain Day Visitor 2019	Annual publication of domestic day visits by number and value, with 2019 as the latest year not affected by Covid-19. May be updated prior to drafting the EIA.	Covers UK, Scotland and local authorities.	Annual publication. May be updated prior to the assessment. However, tourism data for 2020 – 2021 will need to be treated with caution due to the impact of Covid-19 on the tourism sector.
Kantar TNS (2020b), Great Britain Tourism Survey 2019	Annual publication of domestic overnight tourism visits and nights by	Covers UK, Scotland and local authorities.	Annual publication. May be updated prior to the assessment. However,

Source, Author and Year	Summary	Coverage of the Array Area and Offshore/Onshore ECC Study Areas	Data Quality
	number, value and purpose, with 2019 as the latest year not affected by Covid-19. May be updated prior to drafting the EIA.		tourism data for 2020 – 2021 will need to be treated with caution due to the impact of Covid-19 on the tourism sector.
ONS (2020b), International Passenger Survey	Annual publication of international overnight tourism visits and nights by number, value and purpose, with 2019 as the latest year not affected by Covid-19. May be updated prior to drafting the EIA.	Covers UK, Scotland and selected regions, such as Grampian.	Annual publication. May be updated prior to the assessment. However, tourism data for 2020 – 2021 will need to be treated with caution due to the impact of Covid-19 on the tourism sector.
Scottish Government (2022b), Annual Growth Sector Statistics	Provides economic statistics, such as employment and GVA, on growth sectors identified by the Scottish Government, including sustainable tourism	Covers Scotland and its local authorities.	Annual publication. May be updated prior to the assessment. However, tourism data for 2020 – 2021 will need to be treated with caution due to the impact of Covid-19 on the tourism sector.
VisitScotland (2020), Grampian Factsheet 2019	Provides an overview of tourism in the northeast of Scotland, including the top visitor attractions.	Covers Aberdeenshire, Aberdeen City and Moray.	Single publication. May be updated prior to the assessment but there is no publication schedule for the regional factsheets.

18.3.3 The socio-economic baseline is presented for the three geographic areas that socio-economic impacts will be assessed:

- Aberdeenshire;
- Scotland; and
- the UK (or Great Britain if data for Northern Ireland is not available).

18.3.4 The tourism and recreation baseline is presented for the TRSA and compared with the wider Aberdeenshire and Scottish tourism performance.

Socio-economic baseline

Population

18.3.5 The population of Aberdeenshire in 2021 was estimated to be 262,700 (National Records of Scotland, 2022a). This is equivalent to 5% of the total population of Scotland. The population of Aberdeenshire is relatively younger than the rest of Scotland with a greater share (19%) of the population that are aged under 16. The data for populations of Aberdeenshire, Scotland and the UK are presented in **Table 18.2**.

Table 18.2: Population, 2021 (National Records of Scotland, 2022a).

Population demographic	Aberdeenshire	Scotland	Great Britain
Total	262,700	5,479,900	65,121,700
Under 16	19%	17%	18%
16 – 64	61%	64%	63%
65 and over	20%	20%	19%

18.3.6 Between 2001 and 2021, the population of Aberdeenshire grew by 16%, compared to an 8% growth across Scotland as a whole. This was the sixth greatest level of population growth out of the 32 local authorities in Scotland.

Population Projections

18.3.7 The population of Aberdeenshire is projected to grow by 2% between 2021 and 2043 (National Records of Scotland, 2022b). This aligns with the projected population growth of Scotland as a whole, which is also projected to increase by 2% in this period. All of this population growth is projected to come from those aged 65 and over. It is projected that this demographic will increase by 17,500 in Aberdeenshire in this time period and by over 315,000 in Scotland. The working age population of Aberdeenshire is expected to decrease by 7,200 in the same period, while in Scotland it is projected to decrease by over 130,000. The predicted populations are presented below in **Table 18.3**.

Table 18.3: Population Projections, 2021 – 2043.

Population demographic	Aberdeenshire		Scotland		Great Britain	
	2021	2043	2021	2043	2021	2043
Total	262,700	267,796	5,479,900	5,574,819	65,121,700	70,628,081
Under 16	19%	16%	17%	15%	18%	17%
16 – 64	61%	57%	64%	60%	63%	59%
65 and over	20%	27%	20%	25%	19%	24%

Economic Activity

18.3.8 **Table 18.4** shows the economic activity indicators of Aberdeenshire, Scotland and Great Britain in 2022 (ONS, 2023c). The economic activity rate in Aberdeenshire is 82%, this is higher than both Scotland (77%) and Great Britain (78%). The unemployment rate is higher in Aberdeenshire at 5%, compared to 3% in Scotland and 4% across Great Britain.

18.3.9 In Aberdeenshire, the median annual gross income for full time workers was £34,825, which is 5% more than the average for Scotland and 7% more than the average for Great Britain (ONS, 2023a).

Table 18.4: Economic Activity, 2022.

Economic Performance Metric	Aberdeenshire	Scotland	Great Britain
Economic Activity Rate	82%	77%	78%
Unemployment Rate	5%	3%	4%
Median Annual Full Time Income (resident)	£34,825	£33,311	£32,447

Industrial Structure

18.3.10 There were 112,500 people employed within Aberdeenshire in 2022, this accounts for 4% of the total employment within Scotland. The labour market in Aberdeenshire is closely linked to the economy of Aberdeen City. In 2011, it was estimated that 41,000 residents of Aberdeenshire worked within Aberdeen City, this was equivalent to approximately one third of the employed residents of Aberdeenshire.

18.3.11 As shown in **Table 18.5**, the sector that employs most people in Aberdeenshire are the wholesale and retail trades (ONS, 2023b). This sector accounts for 14% of employment, similar to Scotland and Great Britain.

18.3.12 The sectors that are most relevant when assessing the potential activities related to the development and construction of the Project are:

- Manufacturing;
- Construction; and
- Professional, scientific and technical activities.

18.3.13 Manufacturing makes up a greater proportion of employment in Aberdeenshire (12%) compared with the wider Scottish economy (ONS, 2023b). However, the largest component of the manufacturing sector in Aberdeenshire is the manufacture of food products, which employs 4,750 people and accounts for 5% of all jobs in the area. Across Great Britain and Scotland, this sector employs an average of 1%.

18.3.14 The construction sector in Aberdeenshire is relatively larger than in the wider Scottish or Great British economies (ONS, 2023b). It accounts for 8% of employment in Aberdeenshire, compared to 6% in Scotland and 5% across Great Britain. This is equivalent to approximately 8,900 people and includes civil engineering, construction of buildings and specialised construction activities, such as plumbers and electricians.

18.3.15 The professional, scientific and technical activities sector is also relatively stronger in Aberdeenshire than the wider economy and accounts for 9% of employment, compared to 6% across the UK. Within this, Aberdeenshire is particularly strong in architectural and engineering services, which accounts for 6% of all jobs in the area. This expertise is linked with the O&G cluster in the northeast of Scotland.

Table 18.5: Industrial Structure, 2022 (ONS, 2023b).

Sector	Aberdeenshire	Scotland	Great Britain
Wholesale and retail trade; repair of motor vehicles and motorcycles	14%	14%	14%
Manufacturing	12%	7%	7%
Agriculture, forestry and fishing	11%	3%	2%
Professional, scientific and technical activities	9%	6%	9%
Human health and social work activities	9%	15%	13%
Construction	8%	6%	5%
Education	8%	8%	8%
Accommodation and food service activities	6%	7%	7%
Administrative and support service activities	5%	8%	9%
Transportation and storage	4%	4%	5%
Mining and quarrying	3%	1%	0%
Public administration and defence; compulsory social security	3%	6%	4%
Arts, entertainment and recreation	2%	2%	2%
Other service activities	1%	2%	2%
Information and communication	1%	3%	4%
Real estate activities	1%	2%	2%
Water supply; sewerage, waste management and remediation activities	1%	1%	1%
Electricity, gas, steam and air conditioning supply	1%	1%	0%
Financial and insurance activities	1%	3%	3%
Activities of households as employers; undifferentiated goods-and services-producing activities of households for own use	0%	0%	0%
Activities of extraterritorial organisations and bodies	0%	0%	0%
Total	112,500	2,617,000	31,360,000

Socio-economic Summary

18.3.16 The economy of Aberdeenshire has performed better than the wider Scottish economy in recent years. This is reflected by the higher levels of population growth that the area has seen and the higher levels of pay. The economy is closely integrated with that of Aberdeen City and forms part of the O&G cluster that serves the North Sea. As a result of this expertise, the area is well placed to benefit from supply chain opportunities associated with the offshore wind sector. It is also well placed to benefit from opportunities associated with the onshore elements of the project, particularly around construction and professional services.

18.3.17 The long-term trends that will change the socio-economic baseline of Aberdeenshire are similar to those across the rest of Scotland. The population is not projected to grow at the same level as it has in previous decades and all of this growth is projected to come from those aged 65 or over. The working age population is projected to decline. New opportunities and drivers of economic growth will be required to mitigate against this projection.

Tourism and Recreation Baseline

18.3.18 The tourism and recreation baseline outlines the scale of the tourism economy in Aberdeenshire, compared with Scotland and the UK, and identifies key attractions in the area. This includes an overview of visitor numbers and their spend and key attractions within the TRSA. If known, the tourism baseline will be augmented with local visitor attractions and other data related to the construction and operational port(s).

Visits and Spend of Tourists

18.3.19 A range of statistics are available on tourism visitor numbers and visitor spend in Aberdeenshire and Scotland, including the Great Britain Day Visitor Survey (Kantar TNS, 2020a), the Great Britain Tourism Survey (Kantar TNS, 2020b) and the International Passenger Survey (ONS, 2020b), which are averages over a 3-year period (2017-2019). These are not available at the level of electoral wards and therefore no visitor data is available for the TRSA, though data for Aberdeenshire has been included. However, data on employment and business activity is available for the TRSA and provides an alternative baseline source for estimating the scale of tourism activity in the area.

18.3.20 In 2019, there were 10 million visitors to Aberdeenshire, which accounted for 6.2% of all visits in Scotland, with visitor spending equal to £276 million, or 2.5% of all Scottish visitor spending. Spend per visitor is significantly higher across Scotland compared to Aberdeenshire due to the relatively low number of overnight visitors, which typically have higher levels of average spending. Overnight domestic visitors accounted for 19% of total tourism spend in Aberdeenshire, compared to 28% across Scotland.

18.3.21 The data for tourist and visitor spend in Aberdeenshire, Scotland and the UK is presented in **Table 18.6**.

Table 18.6: Visits and Visitor Spending, 2019.

Visits/Spend	Aberdeenshire	Scotland	UK
Visits (Million)			
Day Visitors	9	145	1,795
Domestic Overnight	<1	12	1,212
International Overnight	<1	4	40
Total	10	161	1,957
Spend (£ million)			
Day Visitors	193	5,186	58,623
Domestic Overnight	52	2,989	24,099
International Overnight	32	1,538	27,413
Total	276	10,714	110,135

Tourism Employment

18.3.22 Sustainable tourism is a growth sector defined by the Scottish Government which includes tourism related industries such as accommodation, food and beverage services and the operation of museums and similar attractions. There are around 1,250 people employed in sustainable tourism in the TRSA, which is equivalent to 6.2% of total employment in the area (ONS, 2023b). This is a lower proportion than for Aberdeenshire (7.1%), Scotland (8.0%) and Great Britain (7.8%). Sustainable tourism employment data is presented in **Table 18.7**.

Table 18.7: Sustainable Tourism Employment, 2021.

Attraction	TRSA	Aberdeenshire	Scotland	Great Britain
Tourism Employment	1,250	8,000	209,000	2,445,000
Total Employment	19,950	112,750	2,616,000	31,360,000
Share of total employment	6.2%	7.1%	8.0%	7.8%

Note. Employment for Northern Ireland is not reported, so figures are reported for Great Britain.

Local Tourism and Recreation Attractions

18.3.23 VisitScotland provides a database of visitor attractions in Scotland (VisitScotland, 2023), which was supplemented by a search of Google Maps and VisitAberdeenshire (VisitAberdeenshire, 2023). On this basis, 14 attractions were identified within around 5 km of the Onshore Export Cable Corridor Study Area, beyond which it is unlikely that there would be any significant effects (**Table 18.4**). Only one of the attractions identified (Fyvie Castle) was listed among the top ten visitor attractions in Grampian (VisitScotland, 2019). These local tourism and recreation attractions are presented in **Table 18.8**.

18.3.24 As the Onshore Export Cable Corridor Study Area is refined during the EIA process, it is anticipated that the area within 5 km will be smaller and some visitor attractions that have been identified may be excluded.

Table 18.8: Tourism and Recreation Study Area Attractions.

Attraction	Description	Distance from Onshore Export Cable Corridor Study Area
Brucklay Park Alpacas	A farm north of Maud that offers alpaca-related activities.	Within
Rosehearty Beach	A sandy beach that is used for walking, swimming and wind-surfing.	Within
Rosehearty Community Boat Club	A community boating club.	Within
Rosehearty Golf Club	A local golf club to the southeast of Rosehearty.	Within
Waulkmill Menagerie	A menagerie of animals near New Deer.	Within
Dalgatie Castle	Castle originally constructed in 1030.	1 km
George Watt Surf School	Water sports centre offering surfing classes from Fraserburgh.	1 km
Museum of Scottish Lighthouses	A museum in Fraserburgh that is set in Kinnaird Head Lighthouse, Scotland's first.	1 km
Fraserburgh Golf Club	A local golf club to the southeast of Fraserburgh.	2 km
Aden Country Park	A country park in Old Deer that includes the Aberdeenshire Museum of Farming.	3 km
Deer Abbey	A ruined Cistercian Monastery near Old Deer.	3 km
Rhuallan Raptors	Falconry centre near Mintlaw featuring educational talks, flying displays and hunting trips.	4 km
Fyvie Castle	A 13th century castle with extensive grounds, managed by the National Trust for Scotland.	5 km
Turriff Golf Club	Eighteen-hole golf course which hosts events and competitions.	5 km

18.3.25 In addition to tourism attractions there are also a number of recreational trails that are within the Onshore Export Cable Corridor Study Area. These include the Formartine and Buchan Way, a 53-mile-long distance route that begins in Dyce, passes through Maud and then branches off to either Fraserburgh (where it passes though the Onshore Scoping Boundary) or Peterhead. In addition, National Cycle Route 1d passes through the Onshore Export Cable Corridor Study Area near Maud.

18.3.26 There are a number of core paths within the boundary area, which are likely to be used by local walkers, including:

- 7LD.01.10, 7LD.01.09 and 117.01 along the beach between Fraserburgh and Rosehearty;
- 115.01 near Rosehearty;
- 106.04 on the outskirts of Fraserburgh;
- 109.01 in Memsie;
- 218.01-04 near Strichen;
- 205.04 near Adziel; and
- 211.01 near New Deer.

18.3.27 No sea cliff climbing was identified within the Onshore ECC Study Area at the landfall.

Tourism and Recreation Baseline Summary

18.3.28 Tourism plays a role in the economy of the TRSA, though it employs relatively fewer people than elsewhere in Aberdeenshire and Scotland. A small number of attractions have been identified within Onshore Export Cable Corridor Study Area, though this number is likely to reduce as a more detailed route is defined.

Strategic overview

National Performance Framework

18.3.29 Scotland's NPF (Scottish Government, 2018c), first published in 2018, sets out the ambitions of the Scottish Government across a range of economic, social and environmental factors. The framework includes 'increased wellbeing' as part of its purpose and combined measurement of how well Scotland is doing in economic terms with a broader range of wellbeing measures. The NPF is designed to give a more rounded view of economic performance and progress towards achieving sustainable and inclusive economic growth and wellbeing across Scotland.

18.3.30 The aims for Scotland set out in the NPF are:

- "Create a more successful country;
- Give opportunities to all people living in Scotland;
- Increase the wellbeing of people living in Scotland;
- Create sustainable and inclusive growth; and
- Reduce inequalities and give equal importance to economic, environmental and social progress."

National Planning Framework

18.3.31 In 2023, the Scottish Government published the NPF4 (Scottish Government, 2023), which set out Scotland's spatial strategy to 2045. It affirms the importance of Scotland's transition to a net zero economy through green investment and green jobs, with wind energy highlighted as playing a significant role in the coming years. It states that renewable energy developments will only be supported where they maximise net economic impact, including local and community socio-economic benefits, such as employment, associated business and supply chain opportunities. The NPF4 also specifically highlights the role of the north east, including Aberdeenshire, in achieving a Just Transition to net zero.

National Strategy for Economic Transformation

18.3.32 In March 2022, the Scottish Government released the National Strategy for Economic Transformation (Scottish Government, 2022b), which set out its ambition for Scotland's economy over the next 10 years. The Scottish Government's vision is to create a wellbeing economy where society thrives across economic, social and environment dimensions, which delivers prosperity for all Scotland's people and places. Of particular importance is the ambition to be greener, with a just transition to net zero, a nature-positive economy and a rebuilding of natural capital.

18.3.33 A key longer-term challenge identified in the strategy is to address deep-seated regional inequality, which includes rural and island areas that face problems such as a declining labour supply, poorer access to infrastructure and housing. The transition to net zero presents a further challenge of delivering positive employment, revenue, and community benefits.

18.3.34 To deliver its vision and address the economy's challenges, five programmes of action have been identified (with a sixth priority of creating a culture of delivery), including:

- Establishing Scotland as a world-class entrepreneurial nation;
- Strengthening Scotland's position in new markets and industries, generating new, well-paid jobs from a just transition to net zero;
- Making Scotland's businesses, industries, regions, communities and public services more productive and innovative;
- Ensuring that people have the skills they need to meet the demands of the economy, and that employers invest in their skilled employees; and
- Reorienting the economy towards wellbeing and fair work.

18.3.35 The strategy notes that Scotland has substantial energy potential and that it has developed a growing green industrial base. This provides a strong foundation for securing new market opportunities arising from the transition to net zero, for example in the hydrogen economy and in the decarbonisation of heating systems, where Scotland may be able to secure first-mover advantage and will need continuing investment and support. Renewable energy also has a role to play in supporting productive businesses and regions across Scotland.

Offshore Wind Policy Statement

18.3.36 The Scottish Government's 2020 Offshore Wind Policy Statement (Scottish Government, 2020) highlights the substantial potential of Scotland's waters for offshore wind and the importance of the sector in the transition to net zero.

18.3.37 When the policy statement was published in October 2020 the ScotWind leasing round was expected to lead to an additional 11 GW of offshore wind capacity by 2030, generating substantial economic impacts in Scotland's offshore wind supply chain. In contrast, the ScotWind leasing round is now expected to lead to an additional 25 GW of offshore wind capacity (CES, 2022), with economic opportunities related to floating offshore.

UK Government Offshore Wind Sector Deal

18.3.38 The UK Government's Offshore Wind Sector Deal (UK Government, 2020) aims to ensure that UK companies can benefit from the opportunities presented by the expansion of the offshore wind sector, enhancing the competitiveness of UK firms internationally and sustaining the UK's role as a global leader in offshore wind generation, as outlined in the offshore wind sector deal. Offshore wind is also expected to play a significant role in the transition to net zero, creating green jobs as part of the net zero, build back greener agenda.

Regional Economic Strategy: Securing the future of the northeast economy

18.3.39 In 2015, Opportunity North-East, in collaboration with Aberdeen City Council and Aberdeenshire Council, published a regional economic strategy for the northeast, which aimed to present a 20-year vision for the wellbeing of the region and its people (Opportunity North East, 2015).

18.3.40 Building on the then Scottish Government's economic strategy (Scottish Government, 2015b) and the decline in the price of oil, the strategy envisions a stronger, more diverse economy and centres the four principles of investment in infrastructure, innovation, inclusive economic growth and internationalisation. Key sectors that were identified include the energy sector (including renewables and hydrogen), tourism, food and drink and fisheries and agriculture.

18.3.41 Offshore wind has gained increasing prominence more recently, including in the Aberdeen City Region Deal (Aberdeen City Region, 2022). Investments of over £300 million have been made in the Net Zero Technology Centre, which focuses on reducing emissions (including in the O&G sector), the deployment of offshore wind and integration of the new energy system. A further £350 million has been invested in the Aberdeen South Harbour, which is intended to play a significant role in offshore wind and maximising the benefits of ScotWind.

Aberdeenshire Local Development Plan

18.3.42 In January 2023, Aberdeenshire Council adopted the Local Development Plan (Aberdeenshire Council, 2023), which sets out the policies that will be used for determining planning applications up to 2031. These policies include those which are relevant to socio-economics, tourism and recreation and those specific to the development of renewable energy projects. In particular, the Local Development Plan aims to:

- Take on the challenges of sustainable development and climate change; and
- Increase and diversify the economy.

18.3.43 Policy C2 within the Local Development Plan specifically outlines the approach to renewable energy projects. It states that the assessment of the acceptability of such developments will consider any effects on socio-economic aspects of the project and effects on tourism and recreation assets.

18.4 Embedded Commitments

18.4.1 The Proposed Offshore Development has adopted various primary commitments (primary design principles intrinsically part of the Project design, installation techniques and engineering designs/modifications) as part of the pre-application phase to eliminate and/or reduce LSE arising from a number of impacts (as far as possible). These are outlined in **Appendix A: Offshore Commitments Register**. Further commitments (imposed as a result of legislative requirements and/or standard sectoral practice, regardless of EIA assessment), referred to as tertiary commitments are embedded as an inherent aspect of the EIA process. Secondary commitments (which require further activity to achieve anticipated outcome- often secured through planning conditions and/or management plans) are incorporated to reduce LSE to environmentally acceptable levels following initial assessment, i.e., so that residual effects are reduced to environmentally acceptable levels.

18.4.2 The commitments adopted by the project in relation to socioeconomics, tourism and recreation are presented in **Table 18.9**. The full list of commitments can be found in **Appendix A: Offshore Commitments Register**.

18.4.3 As part of the ScotWind bidding process, the Developer provided a Supply Chain Development Statement (SCDS), which outlines a commitment scenario and an ambition scenario for the share of supply chain content that will be sourced from Scotland in the development and construction phase, as well as in the first six years of operation. This will be refined over time as the Project is progressed and local content options are explored.

18.4.4 The Developer has engaged proactively with and participates in a scheme to encourage the supply chain in Scotland, including securing Memoranda of Understanding with several ports and engaging with enterprise organisations, including Scottish Enterprise and Highlands and Islands Enterprise, to develop a sustainable Scottish supply chain. This supply chain engagement includes proactive membership of:

- Deepwind Cluster;
- The Strategic Investment Model Group;
- Aberdeen Renewable Energy Group;
- Scottish Offshore Wind Energy Council (SOWEC);
- The Coalition for Wind Industry Circularity; and
- Scottish Renewables.

18.4.5 The Developer has also supported efforts to upskill and re-skill Scotland's existing workforce. This includes engaging with PowerHouse floating wind research centre and the SOWEC skills workstream. The Developer will also explore community benefit and community ownership.

18.4.6 The requirement and feasibility of any additional commitments will be dependent on the significance of the effects upon socio-economics, recreation and tourism receptors and will be consulted upon with statutory consultees throughout the EIA process.

Table 18.9: The Proposed Commitments Relevant to Socio-economics, Tourism and Recreation Receptors.

Commitment Code	Commitment Measure
Offshore	
C-OFF-17	CBRA surveys will be undertaken. Where sufficient burial is not achievable, suitable implementation and monitoring or cable protection will be developed.
C-OFF-27	Fisheries Liaison and procedures will adhere to the latest relevant available best practice guidance in the event of interactions between fishing activities and the Project.
C-OFF-29	A FMMS will be implemented, detailing the strategy for fisheries consultation throughout the Project timeline.
C-OFF-42	A VMP will be developed, which will detail the types and numbers of vessels involved in the Project work.
C-OFF-62	Utilisation of local contractors for onshore and offshore construction work where possible, to support the Scottish Supply Chain.
Onshore	
C-ONS-011	An Access Management Plan will be developed in conjunction with Aberdeenshire Council and through consultation with local stakeholders. Where public access will be temporarily disrupted during construction, a suitable diversion which minimises the length of path affected will be put in place along with the display of signage at each end of the route where the route is diverted
C-ONS-022	Production and compliance with a Construction Traffic Management Plan (CTMP) outlining the mechanisms for managing the movement of construction related traffic. The CTMP will be developed post-consent and submitted for the approval of Aberdeenshire Council in consultation with relevant parties

18.4.7 As a result of the commitment to implement these measures, and to align with various standard sectoral practices and procedures, the embedded (primary) commitments are considered inherently part of the design of the Project and have, therefore, been included in the assessment presented in **Section 18.5**.

18.5 Scoping of Impacts

18.5.1 Potential impact pathways relevant to socio-economics, tourism and recreation which may occur during the construction, O&M, or decommissioning phases of the Project have been identified in **Table 18.10**. There were no 'Possible LSE' impacts identified for socio-economics, tourism and recreation.

Table 18.10: Scoping Assessment for Socio-economics, Tourism and Recreation.

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
Construction				
Increase in employment and GVA.	C-OFF-62	Scoped In	The construction of Project will require expenditure with companies in each of the study areas. This will support employment and generate GVA, including impacts associated with spending in the wider supply chain (indirect effects) and spending by staff (induced effects).	LSE without secondary commitment measures.
Economic activity associated with onshore elements in Aberdeenshire	C-OFF-62	Scoped In	The construction of the onshore elements of the Project will require spending in Aberdeenshire. This will support employment and generate GVA, including impacts associated with spending in the wider supply chain (indirect effects) and spending by staff (induced effects).	LSE without secondary commitment measures.
Demographic changes.	n/a	Scoped In	The impacts of demographic changes will be assessed as far as possible, including the scale of any impact and its potential to be significant. If ports have been determined by the time of the assessment, it will be possible to be more definitive on the likely significance of these impacts.	LSE without secondary commitment measures.
Changes to housing demand.	n/a	Scoped In	The impacts of demographic changes and the implications for housing demand will be assessed as far as possible, including the scale of any impact and its potential to be significant. This will include the potential demand for temporary accommodation from transient workers. If ports have been determined by the time of the assessment, it will be possible to be more definitive on the likely significance of these impacts.	LSE without secondary commitment measures.
Changes to other local public and private services.	n/a	Scoped In	The impacts of demographic changes and the implications for demand on local public and private services will be assessed as far as possible, including the scale of any impact and its potential to be significant. If ports have been determined by the time of the assessment, it will be	LSE without secondary commitment measures.

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
			possible to be more definitive on the likely significance of these impacts.	
Socio-cultural impacts.	n/a	Scoped Out	The potential socio-cultural impacts, including changes to community character or image and quality of life, will require primary stakeholder engagement in the communities around the key epicentres of impact. To avoid survey fatigue and ensure meaningful interactions, this engagement will occur post consent as decisions are made regarding the location of key activities, such as ports. These impacts have therefore been Scoped Out of the assessment. All relevant commitments are presented in **Appendix A: Offshore Commitments Register**.	No LSE identified at Scoping.
Changes to visitor behaviour.	n/a	Scoped In	Potential changes to visitor behaviour may arise from changes to onshore activity associated with the construction of the Project, including onshore grid connection and increased activity at ports and harbours.	LSE without secondary commitment measures.
Changes to onshore recreation.	C-ONS-011 C-ONS-022	Scoped In	Potential disruption to onshore recreational assets, such as walking and cycling trails, golf courses, beaches and surfing, may reduce recreational opportunities.	LSE without secondary commitment measures.
Changes to commercial fisheries.	C-OFF-29 C-OFF-17	Scoped In	Potential disruption to the commercial fishing sector leading to changes in economic activity in the sector.	LSE without secondary commitment measures.
Changes to shipping and marine recreation.	C-OFF-42	Scoped In	Changes to economic activity as a result of the construction of the Project may impact activity in the shipping and marine recreation sectors.	LSE without secondary commitment measures.
Operation and Maintenance				
Increase in employment and GVA.	C-OFF-62	Scoped In	O&M will require expenditure with companies and organisations in each of the study areas, supporting employment and generating GVA.	LSE without secondary commitment measures.

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
Economic activity associated with onshore elements in Aberdeenshire	C-OFF-62	Scoped In	The O&M of the onshore elements of the Project will require spending in Aberdeenshire supporting employment and generating GVA.	LSE without secondary commitment measures.
Demographic changes.	n/a	Scoped In	The impacts of demographic changes will be assessed as far as possible, including the scale of any impact and its potential to be significant. If ports have been determined by the time of the assessment, it will be possible to be more definitive on the likely significance of these impacts.	LSE without secondary commitment measures.
Changes to housing demand.	n/a	Scoped In	The impacts of demographic changes and the implications for housing demand will be assessed as far as possible, including the scale of any impact and its potential to be significant. If ports have been determined by the time of the assessment, it will be possible to be more definitive on the likely significance of these impacts.	LSE without secondary commitment measures.
Changes to other local public and private services.	n/a	Scoped In	The impacts of demographic changes and the implications for demand on local public and private services will be assessed as far as possible, including the scale of any impact and its potential to be significant. If ports have been determined by the time of the assessment, it will be possible to be more definitive on the likely significance of these impacts.	LSE without secondary commitment measures.
Socio-cultural impacts	n/a	Scoped Out	The potential socio-cultural impacts, including changes to community character or image and quality of life, will require primary stakeholder engagement in the communities around the key epicentres of impact. To avoid survey fatigue and ensure meaningful interactions, this engagement will occur post consent as decisions are made regarding the location of key activities, such as ports. These impacts have therefore been Scoped Out of the assessment. All relevant commitments are presented in **Appendix A: Offshore Commitments Register**.	No LSE identified at Scoping.

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
Changes to visitor behaviour.	n/a	Scoped In	Potential changes to visitor behaviour may arise from changes to onshore activity associated with the O&M of the Project, such as increased activity at ports and harbours, or changes to seascape and visual impact.	LSE without secondary commitment measures.
Changes to onshore recreation.	n/a	Scoped In	Potential disruption to onshore recreational activities, such as walking and cycling trails, golf courses, beaches and surfing, may reduce recreational opportunities.	LSE without secondary commitment measures.
Changes to commercial fisheries.	C-OFF-27 C-OFF-29 C-OFF-17	Scoped In	Potential disruption to the commercial fishing sector leading to changes in economic activity in the sector.	LSE without secondary commitment measures.
Changes to shipping and marine recreation.	C-OFF-42	Scoped In	Changes to economic activity as a result of the operation of the Project may impact activity in the shipping and marine recreation sectors.	LSE without secondary commitment measures.
Decommissioning				
Increase in employment and GVA.	n/a	Scoped In	Decommissioning will require expenditure with companies and organisations in each of the study areas, supporting employment and generating GVA.	LSE without secondary commitment measures.
Economic activity associated with onshore elements in Aberdeenshire	n/a	Scoped In	The decommissioning of the onshore elements of the Project will require spending in Aberdeenshire supporting employment and generating GVA.	LSE without secondary commitment measures.
Changes to visitor behaviour.	n/a	Scoped Out	Potential changes to visitor behaviour may arise from changes to onshore activity associated with decommissioning of the Project, such as increased activity at ports, harbours and the onshore infrastructure, or changes to seascape and visual impact. However, the locations, methods and approach to decommissioning is unlikely to be known at this stage and the tourism sector baseline has the potential to change significantly between	No LSE identified at Scoping.

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
			now and the time of decommissioning. The significance of any effect will also be determined by the location of ports used in the decommissioning. This has been Scoped Out as a meaningful assessment will not be possible until the port location(s) are known. All relevant commitments are presented in **Appendix A: Offshore Commitments Register**.	
Demographic changes.	n/a	Scoped In	The impacts of demographic changes will be assessed as far as possible, including the scale of any impact and its potential to be significant. If ports have been determined by the time of the assessment, it will be possible to be more definitive on the likely significance of these impacts.	LSE without secondary commitment measures.
Changes to housing demand.	n/a	Scoped In	The impacts of demographic changes and the implications for housing demand will be assessed as far as possible, including the scale of any impact and its potential to be significant. If ports have been determined by the time of the assessment, it will be possible to be more definitive on the likely significance of these impacts.	LSE without secondary commitment measures.
Changes to other local public and private services.	n/a	Scoped In	The impacts of demographic changes and the implications for demand on local public and private services will be assessed as far as possible, including the scale of any impact and its potential to be significant. If ports have been determined by the time of the assessment, it will be possible to be more definitive on the likely significance of these impacts.	LSE without secondary commitment measures.
Changes to onshore recreation.	n/a	Scoped In	Potential disruption to onshore recreational assets, such as walking and cycling trails, golf courses, beaches and surfing, and sea cliff climbing, may reduce recreational opportunities.	LSE without secondary commitment measures.
Socio-cultural impacts	n/a	Scoped Out	The potential socio-cultural impacts, including changes to community character or image and quality of life, will require primary stakeholder engagement in the communities around the key epicentres of impact. To avoid	No LSE identified at Scoping.

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
			survey fatigue and ensure meaningful interactions, this engagement will occur post consent as decisions are made regarding the location of key activities, such as ports. These impacts have therefore been Scoped Out of the assessment. All relevant commitments are presented in **Appendix A: Offshore Commitments Register**.	
Changes to commercial fisheries.	n/a	Scoped In	Potential disruption to the commercial fishing sector leading to changes in economic activity in the sector.	LSE without secondary commitment measures.
Changes to shipping and marine recreation.	n/a	Scoped In	Changes to economic activity as a result of decommissioning the Project may impact activity in the shipping and marine recreation sectors.	LSE without secondary commitment measures.

18.6 Potential Cumulative Impacts

18.6.1 The process by which potential cumulative impacts will be assessed through the CIA is described in **Chapter 6: EIA Approach and Methodology**. For socio-economics, tourism and recreation, cumulative interactions may occur with other ScotWind projects and other large capital projects.

18.6.2 There is the potential for the potential impacts identified in **Table 18.10** to interact with other projects particularly other OWFs being developed as part of the ScotWind and INTOG leasing rounds, and other significant capital projects in the area. Cumulatively, the development of the ScotWind projects is expected to represent a substantial increase in demand at the Scottish level for the industries that will be involved in the construction of these projects.

18.6.3 As one of potentially many offshore wind projects, the Project will contribute to the cumulative case for potential local or inward investment by making it more financially attractive to set up new manufacturing and fabrication facilities in Scotland, as opposed to relying on overseas facilities that may have higher transportation costs. Consideration will also be given to the cumulative effects on port facilities during both construction and O&M phases.

18.6.4 The decommissioning timetable of other capital projects, particularly offshore wind projects, is not known at this stage, and the main constraint on this activity will be the port infrastructure. The baseline assessment of port capabilities and constraints is likely to change over time as port invest in new facilities to need the decommissioning demand. Therefore, the CIA will not consider decommissioning impacts.

18.6.5 The CIA for socio-economics, tourism and recreation will consider the most recent publicly available parameters for each of the projects, plans and activities in line with the methodology outlined in **Chapter 6: EIA Approach and Methodology**.

18.7 Potential Transboundary Impacts

18.7.1 The following transboundary impacts have been identified as potential occurrences resulting from activities associated with the Project construction, O&M, and decommissioning:

- Socio-economic impacts taking place outside of the UK, relating to non-UK supply chain during the construction, operation and decommissioning phases. These will be imports from outside of the UK, and are expected to be positive in nature; and
- Impacts on commercial fisheries and other marine users based outside of the UK during construction, operation and decommissioning.

18.8 Proposed Approach to EIA

Additional Data Sources

18.8.1 A more detailed literature review will be developed for the EIA, building upon the high-level outline provided within this Scoping Report. This may include more recent information published by the ONS, National Records of Scotland and Scotland's Census, and any other post-Scoping reports which are expected to be published before the drafting of the EIAR.

Guidance

18.8.2 In addition to the approach and guidance outlined in **Chapter 6: EIA Approach and Methodology**, the assessment of socio-economic, tourism and recreation receptors will also comply with the following guidance documents where they are specific to this topic:

- Marine Scotland (2022b) General Advice for Socio-Economic Impact Assessment, Marine Analytical Unit;
- Marine Scotland (2022c) Defining 'Local Areas' for assessing impacts of offshore renewables and other marine developments: Guidance Principles; and
- HM Treasury (2022), Green Book: Appraisal and Evaluation in Central Government.

18.8.3 In addition, the Scottish Government is in the process of developing guidance on the assessment of the socio-economic impacts of offshore wind energy projects. It is expected that this shall be published prior to the submission of the EIA. This guidance will be considered, and it is assumed that it shall build on current best practice.

Consultation

18.8.4 In order to fully understand the baseline and the potential impacts associated with the Project, key stakeholders such as Aberdeenshire Council, Scottish Enterprise and Opportunity North East will be consulted. Additional consultees may be identified as the project progresses and based on comments in the Scoping Opinion. The Developer will also engage with relevant communities through public consultation events.

Assessment Methodology

18.8.5 The EIA will follow the general Proportionate EIA approach outlined in **Chapter 6: EIA Approach and Methodology** of this Scoping Report.

Economic Impact Methodology

18.8.6 To assess the socio-economic effects of the Project the focus will be on the direct and indirect (supply chain) effects, in line with the UK Offshore Wind Sector Deal (UK Government, 2020). In addition to this, the assessment shall also consider the induced effects, which are the effects of staff spending and the economic impact that this subsequent increase in demand stimulates).

18.8.7 The economic impacts will be considered for each study area and will be reported in terms of:

- GVA: this is a measure of economic value added by an organisation, industry or region and is typically estimated by subtracting the non-staff operational costs from the turnover of an organisation;
- Years of Employment: this is a measure of employment which is equivalent to one person being employed for a year and is typically used when considering short to medium term employment impacts, such as those associated with the construction phase of the Project; and
- Jobs: this is a measure of employment which considers the headcount employment in an organisation or industry. This measure is used when considering long term impacts such as the jobs supported during the O&M phase of the Project.

18.8.8 The socio-economic assessment will consider the lowest, realistic levels of expenditure associated with the Project, since that would represent the 'worst case' scenario in terms of the expected positive socio-economic effects. This will take account of the 'Commitment' scenario in the SCDS submitted as part of the ScotWind leasing process, though may be revised to reflect subsequent revisions of the SCDS which will take account of any changes or development in the local supply chain.

18.8.9 The impact assessment will take account of deadweight, leakage, displacement and substitution. Sensitivity analysis will also be undertaken to account for risk, uncertainty and optimism bias, where they could have implications for the economic impacts.

18.8.10 The offshore elements will include the construction and installation of Proposed Offshore Development infrastructure. The onshore elements will include construction and installation of the landfall, onshore cable route and onshore substation. The analysis for the Project will cover three phases:

- Development and construction;
- O&M; and
- Decommissioning.

18.8.11 The impacts during the construction phase will be based on the actual expenditure that has occurred to date as well as the planned expenditure associated with this phase. In addition to the total impact over the period, the assessment will also consider the timings of impacts during this phase to understand the peaks and troughs of this activity.

18.8.12 The impacts during the O&M phase for the Project will be based on projected operational (including maintenance) expenditure.

18.8.13 In instances where impacts are expected to occur over several years, such as the O&M phase or the decommissioning phase, a discount rate will be applied. This allows impacts that occur sooner to be valued more highly than impacts that occur in the future, a concept known as time preference. In this instance a discount rate of 3.5% will be chosen, which is in line with the UK Government's Green Book (UK Government, 2022). On this basis it is expected that the decommissioning phase impacts will be substantially lower than for the construction phase.

18.9 Scoping Questions

18.9.1 The following questions refer to the socio-economics, tourism and recreation chapter and are designed to inform the Scoping Opinion and focus the Scoping exercise:

1. Do you agree with the study areas defined for socio-economics, tourism and recreation?
2. Do you agree with the use of data listed in **Section 18.3**, and the additional data listed in **Section 18.8**, being used to inform the Offshore EIA Report?
3. Are there any further data sources or guidance documents that should be considered?
4. Do you agree that all receptors, pathways, and potential impacts related to socio-economics, tourism and recreation have been identified?
5. Do you agree with the Scoping In and Scoping Out of impact pathways in relation to socio-economics, tourism and recreation (as presented in **Table 18.10**)?

6. Do you agree with the assessment of transboundary effects in relation to socio-economics, tourism and recreation?
7. Do you agree with the assessment of cumulative effects in relation to socio-economics, tourism and recreation?
8. Do you agree with the proposed assessment methodology for socio-economics, tourism and recreation?
9. Do you agree on the suitability of the proposed commitments to reduce or eliminate LSE relevant to socio-economics, tourism and recreation?

19 Greenhouse Gas and Climate Change

19.1 Introduction

19.1.1 This chapter of the Offshore Scoping Report identifies those climate receptors of relevance to the Proposed Offshore Development and considers the potential impacts from the construction, O&M and decommissioning phases (up to MHWS).

19.1.2 A climate change assessment comprises the following three aspects:

- GHG emissions assessment27 (i.e., the carbon assessment - the term 'carbon' is used interchangeably to refer to GHG emissions) which identifies the estimated GHG emissions associated with all the development phases of the Proposed Offshore Development, providing comparison against current and projected future baseline conditions. The development phases include the planning phase, the procurement and manufacturing of components process, the transportation of materials, the construction phase of the project, O&M, and decommissioning. These will all require a GHG emissions assessment. This assessment also identifies the relevant commitments required to reduce the GHG emissions through the life cycle of the Proposed Offshore Development. To embed commitments in the development phases several plans and procedures are to be given effect to. These include a Commitments Register, that is to be continually updated during the current project planning phase (items include measures such as the 'utilisation of local contractors for both offshore and onshore construction work'), a Sustainable Supply Chain Statement (SSCS) that will be in accordance with Ørsted's sustainability reporting[28] that will be embedded in the construction contract, and a PEMP that will be used during construction and for future O&M(both to be embedded in operations manuals). The PEMP will cover topics such as waste management including the potential recycling of materials during decommissioning. The SSCS and PEMP are required to be continually updated;
- Climate Change Resilience (CCR) assessment which identifies the anticipated future climatic changes, relating the vulnerability of the Proposed Offshore Development to these changes; and
- In-combination Climate Change Impact (ICCI) assessment which identifies where potential changes to climate will combine with environmental impacts associated with the Proposed Offshore Development. This combination has the potential to result in significant effects on environmental receptors within the EIA scope, which are not present under current climate conditions.

19.1.3 This chapter should be read alongside the following other chapters:

- **Chapter 6: EIA Approach and Methodology**;

[27] Those GHGs defined under the Kyoto Protocol (which will form the basis of this assessment) comprises carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), perfluorocarbons (PFCs), hydrofluorocarbons (HFCs), sulphur hexafluoride (SF_6) and nitrogen trifluoride (NF_3).

[28] orsted-sustainability-report-2022.pdf (azureedge.net) – p.16 "Increasing transparency of our supply chain emissions from offshore wind farms" and p.17 explains how Ørsted partner with "local stakeholders to understand their specific needs and use their expertise to ensure that the projects deliver benefits for both climate, nature and local communities."

- **Chapter 14: Shipping and Navigation**; and
- **Chapter 20: Other Human Activities**.

19.1.4 This chapter of the Offshore Scoping Report has been prepared by GoBe.

19.2 Study Area

19.2.1 The study area applicable to each of the previously mentioned assessments is presented below.

Greenhouse Gas Assessment

19.2.2 The spatial study area of the GHG emissions assessment includes various sources and removals of GHG emissions related to the development phases (construction, O&M, decommissioning) of the Proposed Offshore Development.

19.2.3 The GHG emissions assessment relevant to the construction phase has a study area defined by the emissions sources associated with the construction works. These emissions sources include extraction/manufacture/transportation of materials to the construction site, as well as emissions generated through activities within the construction site (e.g., fuel usage, construction waste management).

19.2.4 The O&M GHG emissions assessment will consider emissions arising from those maintenance and replacement activities associated with the Proposed Offshore Development in addition to the operational energy consumption of the Proposed Offshore Development itself. The likely energy generation output of the Proposed Offshore Development will also be included in the assessment, based on a common operational profile used across the EIA. This energy generation assessment will be contextualised against the forecast marginal carbon intensity of grid connected electricity for the UK in forthcoming years[29].

19.2.5 In order to align with the available guidance and best practice regarding study area extent, the following will be applied as relevant:

- The Publicly Available Specification (PAS) 2080: Carbon Management in Infrastructure (British Standards Institute, 2023); and
- Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance (Institute of Environmental Management and Assessment (IEMA), 2022).

19.2.6 A summary of the GHG emission sources included within the PAS 2080 life cycle assessment (used to inform this GHG emissions assessment) is presented in **Table 19.1**.

[29] Benefits from generation and export of low carbon electricity in the GHG assessment will need clear attribution to distinct project assessments to avoid double-counting across associated/linked projects.

Table 19.1: Summary of GHG Study Area Components to be included within the Climate Assessment (British Standards Institute, 2022).

Project Stage	PAS 2080 Life Cycle Stage	Description	Inclusion/Exclusion and Associated Justification
Pre-construction	A0	Preliminary studies Consultation	Excluded – work will be predominantly desk-based and assumed to be negligible.
Construction	A1-A3	Raw material supply	Included - GHG emissions associated with the required raw materials.
	A4	Transport to works site	Included – transportation may be via the road network or across the sea by vessel(s).
	A5	Construction/installation process	Included – emissions associated with plant use and fuel for vehicles/vessels during the construction process.
	D	Land use change	Excluded – offshore components are assumed to be negligible.
Operation	B1	Use	Excluded – GHG emissions associated with fabric of products and materials once they have been installed is assumed to be negligible.
	B2-B4	Maintenance/Repair/ Replacement	Included – energy consumption associated with activities.
	B5	Refurbishment	Excluded – the Proposed Offshore Development is not expected to undergo refurbishment during its operational lifetime[30].
	B6	Operational energy use	Excluded – GHG emissions associated with energy consumption are likely to be negligible offshore. Any assessment of low carbon electricity generation benefits will be included at this life cycle stage.
	B7	Operational water use	Excluded – GHG emissions associated with water use on site are likely to be negligible offshore.
	B8	Other operational processes	Excluded – other GHG emissions associated with the Proposed Offshore Development (e.g., management of operational waste) are likely to be negligible offshore.
	B9	Other utilisation of infrastructure	Excluded – not applicable to the Proposed Offshore Development.
	D	Ongoing land use emissions and sequestered	Excluded – the components associated with the offshore and likely to be negligible.
End of Life	C1	Deconstruction	Included – associated energy consumption.

[30] At the end of the Proposed Offshore Development's lifetime, there will be an assessment of the viability for re-powering versus decommissioning. If re-powering is deemed feasible, an assessment process would be completed at a later stage (not included as part of the current EIA/application process).

Project Stage	PAS 2080 Life Cycle Stage	Description	Inclusion/Exclusion and Associated Justification
	C2	Transport	Included – vessels and road traffic.
	C3	Waste processing for recovery	Included – associated energy consumption.
	C4	Disposal	Included – energy consumption associated with waste disposal/recycling.

19.2.7 The temporal boundary for GHG emissions assessment constitutes the construction phase, O&M and decommissioning phases. The GHG assessment study area cannot be described at the Scoping stage due to the uncertainty regarding construction/O&M ports.

Climate Chance Resilience Assessment

19.2.8 The CCR assessment study area is defined with the inclusion of permanent and temporary construction footprints within the Offshore Project Boundary. This assessment considers all potential climate hazards for the Proposed Offshore Development infrastructure and assets and quantifies the potential climate effects over the assumed appraisal period for the Proposed Offshore Development.

19.2.9 The spatial boundary for the Proposed Offshore Development extends to MHWS, inherently including both offshore and coastal elements. The key source of information for identifying projected changes in climate for this assessment will be the Met Office (2023) UK 18 climate projections. Whilst these projections reflect the anticipated climate change for both land and coastal areas, rather than offshore, for the purpose of this proportionate climate risk assessment the UKCP18 projections for the local area are assumed to broadly reflect the corresponding offshore conditions. Some of the impacts identified in the UKCP18 will not be relevant for the offshore region, such as flooding.

In-combination Climate Chance Impact Assessment

19.2.10 The ICCI study area corresponds to that identified for each environmental technical discipline, as presented within the relevant chapters of this Offshore Scoping Report.

19.3 Baseline Environment

19.3.1 Under current conditions, the UK is not on target to achieve the overall reduction target set for carbon under 'COP27: Key outcomes and next steps for the UK. December 2022' (CCC, 2022). The COP27 meeting held in Egypt in November 2022 determined that "*wind targets are a key part in helping Scotland reach it's climate targets".* In order to not negatively impact the carbon generation in the UK, the Proposed Offshore Development should be as carbon neutral as possible and minimise GHG production as much as feasible whilst producing cleaner green energy.

Data Sources

19.3.2 The data sources that have been used to inform this GHG and Climate Change chapter are presented below in **Table 19.2**.In addition to the Met Office data described in the table, comparative assessments and data from similar sized OWFs will be utilised to assess the project.

Table 19.2: Key Sources of GHG and Climate Change Data.

Source, Author and Year	Summary	Coverage of the Array Area and Offshore ECC Study Area	Data Quality
Met Office (2023), UK climate averages. UK climate averages - Met Office	An interactive map produced by the Met Office presenting climate averages and monitoring points around the UK.	The nearest monitoring point for the Proposed Offshore Development is located at Wick John O'Groats Airport (approximately 50 km in distance) and conditions are assumed to be similar to this monitoring point and consistent across the Array Area and Offshore ECC Study Area. Full coverage of the Array Area and ECC Study Area.	The Met Office hold comprehensive and extensive and up to date data on weather patterns in the area

Description of the Baseline Environment

Greenhouse Gas Assessment

19.3.3 In accordance with the IEMA guidance mentioned in **Section 19.2** (IEMA, 2022), the baseline scenario is established based on a do-minimum assumption. This baseline is established in order to compare and assess the potential impacts of the Proposed Offshore Development on the current climate situation (e.g., the situation where no infrastructure is present within the Offshore Project Boundary). Assumptions are made on the projected cumulative GHG emissions within the study area without implementation of the Proposed Offshore Development.

19.3.4 There is currently no offshore infrastructure permanently located within the Offshore Proposed Offshore Development (as shown in **Chapter 20: Other Human Activities**). There are various other planned developments in the vicinity of the Proposed Offshore Development, including:

- OWFs:
  - Caledonia;
  - Broadshore;
  - Ayre;
  - Moray East; and
  - Moray West.
- INTOG projects:
  - Sinclair; and
  - Scaraben.
- O&G:
  - Captain Oil Field.

19.3.5 As shown in **Chapter 14: Shipping and Navigation**, shipping may transit through the Array Area, but it is expected the GHG emissions from this activity would not be significant, because few vessels transit through the Array Area. **Paragraph 14.3.12** of **Chapter 14: Shipping and Navigation** states an average of 4 to 5 ships transited through the site during the summer months and 2 to 3 during the winter. It is therefore considered that the baseline GHG emissions associated with the GHG emissions assessment study area are negligible.

Climate Change Resilience Assessment

19.3.6 The Met Office generates high level climatology observations, to assist in tracking climate change and projecting future changes. The Proposed Offshore Development is located, approximately, 50 km off the coast of Wick, in the Outer Moray Firth region. Historical climatic observations recorded at Wick John O'Groats Airport over a three-decade period are presented in **Table 19.3**.

Table 19.3: Average Climatic Conditions and Observations Between 1991 and 2020 (Met Office, 2023).

Climatic Conditions	Climate Observations (1991-2020)
Temperature	The average annual maximum temperature was 11.03 °C in the area surrounding Wick John O'Groats Airport.[31] The highest maximum temperatures were recorded in summer months (July and August) and lows recorded in winter months (January and February). The average annual minimum temperature was 5.39 °C in the area surrounding Wick John O'Groats Airport. The highest minimum temperatures were recorded in summer months (July and August), with the lowest minimum temperature recorded in winter months (January and February).
Sunshine	The annual average hours of sunshine is reported to be 1303.52 hours.
Rainfall	The annual average amount of rainfall was 792.70 mm. The number of days where rainfall was more than 1 mm was 165.60 days.
Wind	The annual average speed of the wind at 10 m was 11.25 knots.
Air Frost	The annual average numbers of days of air frost was 39.34 days annually.

In-combination Climate Chance Impact Assessment

19.3.7 The baseline for the ICCI assessment will correspond to that described in each of the relevant technical chapters of this Offshore Scoping Report.

19.4 Embedded Commitments

19.4.1 The Proposed Offshore Development has adopted various primary commitments (primary design principles intrinsically part of the Project design, installation techniques and engineering designs/modifications) as part of the pre-application phase to eliminate and/or reduce LSE arising from a number of impacts (as far as possible). These are outlined in **Appendix A: Offshore Commitments Register**. Further commitments (imposed as a result of legislative requirements and/or standard sectoral practice, regardless of EIA assessment), referred to as tertiary commitments are embedded

[31] Met Office data is collected at Wick John O'Groats Airport and is applicable across the Caithness region, temperatures in the area do not vary significantly.

as an inherent aspect of the EIA process. Secondary commitments (which require further activity to achieve anticipated outcome- often secured through planning conditions and/or management plans) are incorporated to reduce LSE to environmentally acceptable levels following initial assessment, i.e., so that residual effects are reduced to environmentally acceptable levels.

19.4.2 The commitments adopted by the project in relation to greenhouse gas and climate change are presented in **Table 19.4**. The full list of commitments can be found in **Appendix A: Offshore Commitments Register**.

Table 19.4: The Proposed Commitments Relevant to Greenhouse Gas and Climate Change Receptors.

Commitment Code	Commitment Measure
C-OFF-08	A CMS will be developed, which will detail the proposed construction methods and roles and responsibilities of parties involved.
C-OFF-12	Development of a PEMP, which will set out environmental monitoring in pre-, during, and post-construction phases.
C-OFF-13	A PEMP will be developed, to include a Marine Pollution Contingency Plan and INNS Management Plan. This PEMP will also include information on chemical usage, dropped objects, and waste management.
C-OFF-63	Development of and adherence to a DP, secured under Section 36 and/or Marine Licence consent conditions.

19.4.3 As a result of the commitment to implement these measures, and to align with various standard sectoral practices and procedures, the embedded (primary) commitments are considered inherently part of the design of the Proposed Offshore Development and have, therefore, been included in the assessment presented in **Section 19.5**.

19.4.4 The requirement and feasibility of any additional commitments will be dependent on the significance of the effects upon on climate and will be consulted upon with statutory consultees throughout the EIA process.

19.5 Scoping of Impacts

- An initial assessment of the likelihood of effects on climate receptors processes due to the Proposed Offshore Development activities for Scoping are presented in **Table 19.7**. This assessment considers the combination of the following:
- The definition of the Proposed Offshore Development at the Scoping stage (as shown in **Chapter 3: Proposed Offshore Development Description**);
- The embedded commitments (as presented in **Section 19.4** and **Appendix A: Offshore Commitments Register**);
- The level of understanding of the baseline conditions (at the Scoping stage);
- The existing evidence base for climate effects caused by project activities;

- Relevant policy and guidance (as shown in **Section 19.8: Guidance**); and
- The professional judgement of qualified climate specialists.

Greenhouse Gas Assessment

19.5.1 The construction phase for the Proposed Offshore Development will lead to the generation of GHG emissions. The Proposed Offshore Development supports the generation of low carbon electricity during the operational phase, which will provide a net benefit against a future baseline in the absence of the Proposed Offshore Development (assuming it contributes to reduced reliance on fossil fuels).

19.5.2 The potential sources of GHG emissions during the life cycle of the Proposed Offshore Development are presented below in **Table 19.5**.

Table 19.5: Potential Sources of GHG Emissions During the Project Life Cycle.

Life Cycle/Sub-stage identified within PAS 2080[32]	Potential Source of GHG Emissions
Pre-construction	
A0 Pre-construction	Site preparation works.
Construction	
A1-A3 Product stage; including raw material supply, transport and manufacture	Embodied GHG emissions associated with the required raw materials; Vehicle emissions for transportation prior to factory gate; Energy use for fabrication of offshore project elements (e.g., WTGs); and Industrial and energy emissions in the manufacture of materials.
A4-A5 Construction process stage; including transport to and from work site as well as construction and installation processes	Vehicle and shipping emissions for transportation of materials to site; and Energy and fuel use in construction process.
Operation and Maintenance	
B2-B5 O&M; including repair and replacement	Energy consumption for infrastructure operation and activities of organisations conducting routine maintenance including extraction, manufacture, transportation and installation energy use; and Embodied carbon associated with raw materials used for repair and replacement activities.
End-of-Life	
C1-C4	Energy consumption in deconstruction process;

[32] Publicly Available Specification (PAS) 2080: Carbon Management in Infrastructure is a standard framework implemented to manage carbon in development and infrastructure. It looks at the whole value chain and aims to reduce carbon through intelligent design, construction and use.

Life Cycle/Sub-stage identified within PAS 2080[32]	Potential Source of GHG Emissions
Decommissioning	Vehicle shipping emissions for transportation of materials away from site; Potential re-purposing of energy infrastructure; and Waste management of decommissioning materials.

Climate Change Resilience Assessment

19.5.3 During the construction phase of the Proposed Offshore Development, there is potential for projected changes to climate (e.g., extreme weather events) to negatively impact the Proposed Offshore Development.

19.5.4 Through the operational phase of the Proposed Offshore Development there is potential for the projected changes to climate to impact the Proposed Offshore Development. This may be through excessive increase in wind speeds, leading to detrimental impacts on the productivity of the WTGs (Susini *et al*., 2022).

19.5.5 The potential weather events which may be observed during the life cycle of the Proposed Offshore Development are presented below in **Table 19.6**.

Table 19.6: The Summary of Primary Weather Events and the Potential Impacts on the Proposed Offshore Development Across the Full Project Life Cycle.

Sub-stage of PAS 2080 Life Cycle	Potential Source of GHG Emissions
Heavy Rain	Delay to construction programme; and Damage to WTG blades in use, such as leading-edge erosion.
High Winds and Gales	Damage to WTG/rotor blades from wind/wind borne debris in use; Uneven loading of WTGs; and Delay to construction programme.
Increased Temperatures and Prolonged Periods of Hot Weather	Health impacts of workers from breathing problems and sunstroke; Heat stress on electronic equipment; and Increased frequency and maintenance and repair/replacement.
Increased Frequency of Extreme Weather Events	Damage to WTGs/rotor blades from wind; Uneven loading of WTGs; Increased requirement/frequency of maintenance and repair; and Increased costs associated with increased frequency of repair.
Lightning	Structural damage to infrastructure; Power surges and tripping electricity breakers; Fires; Health impacts from direct strikes; and Danger to workers/shipping due to reduced visibility.

Sub-stage of PAS 2080 Life Cycle	Potential Source of GHG Emissions
Snow and Ice	Damage to WTGs/rotor blades; and Health impacts from slipping on ice and chest illnesses.
Fog	Danger to workers/shipping reduced visibility.

19.5.6 The potential impact pathways relevant to GHG and climate change which may occur during the construction, O&M, or decommissioning phases of the Proposed Offshore Development has been identified and are presented in **Table 19.7**. These impacts are based on a consideration of the baseline environmental conditions. There were no 'Possible LSE' impacts identified for GHG and climate change.

Table 19.7: Scoping Assessment for Greenhouse Gas and Climate Change.

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
Construction and Decommissioning				
GHG emissions associated with construction materials (raw material supply, transportation, and manufacture)	C-OFF-08 C-OFF-12 C-OFF-13	Scoped In	The Proposed Offshore Development will result in generation of GHG emissions during construction due to the construction materials.	LSE without secondary commitment measures.
GHG emissions associated with construction processes (including transportation to site and installation processes)	C-OFF-08 C-OFF-12 C-OFF-13	Scoped In	The construction and installations activities associated with the Proposed Offshore Development will lead to generation of GHG emissions.	LSE without secondary commitment measures.
CCR of construction and decommissioning period	C-OFF-08 C-OFF-12 C-OFF-13	Scoped In	The Proposed Offshore Development has potential to be adversely impacted by changes in climate during construction and decommissioning.	LSE without secondary commitment measures.
ICCI of construction and decommissioning period	C-OFF-08 C-OFF-12 C-OFF-13 C-OFF-63	Scoped In	The Proposed Offshore Development has the potential to be adversely impacted by significant effects on environmental receptors within the scope of the EIA, which are not present under the current climate conditions.	LSE without secondary commitment measures.
GHG emissions associated with decommissioning processes and waste materials	C-OFF-12 C-OFF-13 C-OFF-63	Scoped In	The decommissioning of the Proposed Offshore Development will result in the generation of GHG emissions.	LSE without secondary commitment measures.
Operation and Maintenance				

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
GHG emissions associated with operation (including energy use)	C-OFF-12 C-OFF-13	Scoped In	The Proposed Offshore Development will support the generation of low carbon energy during the O&M phase, although the net benefits against the future baseline will be assessed.	LSE without secondary commitment measures.
GHG emissions that are associated with maintenance (including materials used for repair and replacement activities)	C-OFF-12 C-OFF-13	Scoped In	There will be GHG emissions generated during the maintenance cycles associated with material replacement and repair activities for the Proposed Offshore Development.	LSE without secondary commitment measures.
CCR of operational period	C-OFF-12 C-OFF-13	Scoped In	The anticipated changes in climate during the O&M phase may negatively impact the Proposed Offshore Development.	LSE without secondary commitment measures.
ICCI of operational period	C-OFF-12 C-OFF-13	Scoped In	The Proposed Offshore Development may be adversely impacted by significant effects on environmental receptors within the scope of the EIA, which are not present under the current climate conditions.	LSE without secondary commitment measures.

19.6 Potential Cumulative Impacts

19.6.1 The process by which potential cumulative impacts will be assessed through a CIA is presented in **Chapter 6: EIA Approach and Methodology**. For this GHG and Climate Change chapter, cumulative interactions may be expected to occur with other OWFs or other industries with operations and developments in the vicinity of the Proposed Offshore Development, such as:

- Caledonia OWF;
- Broadshore OWF;
- Ayre OWF;
- Sinclair INTOG project
- Scaraben INTOG project; and
- Captain Oil Field.

19.6.2 The CIA for greenhouse gas and climate change will consider the most recent publicly available parameters for each of the plans, projects or activities, in accordance with the methodology presented in **Chapter 6: EIA Approach and Methodology**.

19.6.3 In accordance with the current IEMA GHG guidance (IEMA, 2022) cumulative impacts will be Scoped Out for the GHG Assessment. As GHG emission impacts occur at a global level rather than a localised one, cumulative impacts differ from other technical topics with a geographic bounded area. This IEMA guidance states "*Effects of GHG emissions from specific cumulative projects therefore in general should not be individually assessed, as there is no basis for selecting any particular (or more than one) cumulative project that has GHG emissions for assessment over any year*".

19.6.4 For cumulative impacts to be considered under the CCR Assessment, the impacts would be needed where other developments have potential to increase climate risks to the Proposed Offshore Development. Due to the discrete nature of the Proposed Offshore Development infrastructure, it is considered unlikely that other developments would increase these climate risks. Therefore, it is proposed that cumulative impacts will be Scoped Out of the CCR Assessment.

19.6.5 For cumulative impacts to be considered under the ICCI Assessment, these impacts would occur where climate change impacts upon environmental receptors are inherently at risk of cumulative impacts. Whilst it is expected that these occurrences will be minimal, cumulative impacts for ICCI will be Scoped In to this assessment.

19.7 Potential Transboundary Impacts

19.7.1 GHG emissions are transboundary by nature and will be continually assessed against national carbon targets. These targets serve to represent the international consensus that a reduction in global GHG concentrations is necessary, as stated in the COP27 agreement. The Proposed Offshore Development is located wholly within Scottish territorial waters and is a significant distance from the nearest EEZ of another country (approximately 410 km from Denmark).

19.7.2 The Proposed Offshore Development is located a significant distance from the nearest adjacent foreign EEZ, as such it is considered that transboundary impacts will not occur. However, there is a possibility some of the construction will be undertaken at ports abroad, whilst this location is still

unknown it is not possible to define a GHG and Climate Change study area at this stage. Therefore, it is proposed that transboundary effects to be Scoped In to the subsequent EIA.

19.7.3 For both the CCR and ICCI assessments it is considered unlikely that there would be significant transboundary impacts. Therefore, this assessment is proposed to be Scoped Out.

19.8 Proposed Approach to EIA

19.8.1 The inclusion of GHG and climate assessments within the EIA process is a relatively new requirement for offshore wind projects in Scotland. As such, assessment approaches are still being established and developed based upon existing published guidance for onshore assessments. This is alongside the consideration and development of specific methods that may be better suited to assess offshore renewable energy projects where the purpose is to reduce GHG emissions within the power sector. Therefore, there may be adaptation of guidance and ongoing development of the assessment approaches as the Proposed Offshore Development (and other ScotWind projects) progress through design and consent processes. Consultation on approaches will be key to informing a relevant and robust GHG and climate assessment.

Additional Data Sources

19.8.2 One of the first steps will be to undertake a detailed literature review to fully inform the impact assessment and production of the EIAR. The information that will inform this carbon assessment will be taken from a combination of:

- Project-specific information available at the design stage;
- Project-specific survey outputs, from the metocean survey campaign;
- Project-specific construction/O&M proposals;
- Publicly available industry benchmarks that will be used to inform a preliminary estimate of the embodied carbon emissions and operational energy;
- Manufacturer handbooks on equipment/machinery emission outputs (specific to the proposed WTG technology); and
- ISO 14040 Series for Standard for Life Cycle Assessment.

19.8.3 The data presented in **Table 19.2** will be utilised in this further EIA GHG and Climate Change chapter assessment.

Guidance

19.8.4 In addition to the approach and guidance (of general relevance) outlined in **Chapter 6: EIA Approach and Methodology**, the assessment of greenhouse gas and climate change receptors will also comply with the following guidance documents:

- UKCP18 (UK Climate Projection bata base, 2018)-Climate resilience assessment;
- Inventory of Carbon and Energy Database (Jones and Hammond, 2019)-Obtain emission factors for the GHG assessment;
- Climate Change Act (2008)-Help to reach the six carbon budgets;
- BEIS-Data for GHG emissions;

- IEMA (2022b)-IEMA Climate Change Adaptation Practitioner Guidance;
- IEMA (2022a)-EIA Guide to Assessing GHG Emissions and Evaluating their Significance; and
- IEMA (2020)-EIA Guide to Climate Change Resilience and Adaptation.

Assessment Methodology

19.8.5 While aligning with the general Proportionate EIA approach outlined in **Chapter 6: EIA Approach and Methodology** of this Offshore Scoping Report, the GHG and climate assessments will follow the specific approach and methodology outlined below. The assessment methodology will be reflective of current and emerging industry standards (including those recommended by IEMA) and refined through consultation with key stakeholders (principally MD-LOT); as well as through the monitoring of the content of other ScotWind and INTOG EIAs to understand what constitutes best practice.

19.8.6 A review of all current guidance will be undertaken to determine the relevance to offshore wind, and the proposed approach will be aligned with stakeholder expectations and best offshore practice (at the time of undertaking the impact assessment). Forthcoming consultations will constitute a key role in the development of assessment methods.

Greenhouse Gas Assessment

19.8.7 The GHG assessment will quantify and report on the GHG emissions predicted to be generated or avoided due to the Proposed Offshore Development. The metric used for reporting will be tonnes of carbon dioxide equivalent (tCO_2e), a single metric of the global warming potential of the main GHGs.

19.8.8 The assessment methodology will focus on determining the impact of the Proposed Offshore Development on carbon emissions by quantifying the net carbon emissions arising from each life cycle stage (pre-construction, construction, O&M, and decommissioning). Emissions associated with the Proposed Offshore Development will be compared to the baseline (Do-Minimum) scenario to quantify the net impact. Emissions will be calculated with the Atkin's Carbon Knowledgebase tool, containing a detailed library of calculation formulae and emissions factors from authoritative sources. This assessment process will also identify opportunities to reduce the whole-life carbon of the Proposed Offshore Development, across the pre-construction, construction and operational development phases.

19.8.9 The Proposed Offshore Development is predicted to result in temporary, localised increased GHG emissions during the construction phase (although associated benefits will be long-term). Renewable energy will be generated and exported through the operational phase. These assumptions will be confirmed within the Offshore EIAR, to be presented in the context of wider sectoral and geographic GHG emissions.

19.8.10 The carbon emissions for the Proposed Offshore Development will be calculated by converting 'activity' data to carbon emissions, which will be done through the application of referenced typical emissions conversions factors used widely. These emissions may include the following across the Proposed Offshore Development:

- Greenhouse Gas Reporting: Conversion Factors (published annually);
- Inventory of Carbon and Energy database V3 (Jones and Hammond, 2019); and

- Valuation of energy use and greenhouse gas emissions for appraisal: supplementary guidance to the HM treasury Green Book.

19.8.11 The main reference periods for assessing emissions will be in accordance with the UK Carbon Budget Periods, covering 2025 to 2037 (Fourth, Fifth and Sixth Budget), summarised below in **Table 19.8**.

Table 19.8: UK Carbon Budget Periods.

Carbon Budget and Period	Carbon Budget limit	Reduction Below 1990 Levels
Fourth (2023-2027)	1,950 $MtCO_2e$	50% by 2025
Fifth (2028-2032)	1,725 $MtCO_2e$	68% by 2030*
Sixth (2033-2037)	969 $MtCO_2e$	78% by 2035

* This was originally 57% when the Fifth Carbon Budget was enshrined in law but was increased to 68% as the UK's National Determined Contribution ahead of the Conference of Parties (COP) 26 (COP26) in November 2021 (BEIS, 2020).

Climate Change Resilience Assessment

19.8.12 Future projected climate conditions and extreme weather events for the area encompassing the Proposed Offshore Development will be provided up until the 2060's. These time periods will cover the assumed operational lifespan of the Project.

19.8.13 The future climate baseline will be established from historical baseline data and average climate conditions obtained from the UKCP18 probabilistic projections of climate change.

19.8.14 The Offshore EIAR will consider climate change projections for a range of meteorological parameters, presented for different probability levels within the RCP8.5 high emission scenario for both the near- and long-term (future time periods for the 2060's).

19.8.15 The CCR assessment relates to the resilience of the Proposed Offshore Development to the impacts of climate change. The CCR assessment will consider potential hazards resulting from the various life cycle stages on the Proposed Offshore Development.

19.8.16 The CCR assessment will be qualitative and identify potential future climate hazards and consider the impacts and risks of these on the Proposed Offshore Development. A qualitative appraisal of the significance of the impacts will be conducted based on the likelihood and consequence of each impact in line with the approach detailed in the IEMA guidance on Climate Change and Resilience and Adaptation.

19.8.17 In accordance with best practise, risks associated with CCR will be scored using five classifications:

- Very high;
- High;
- Medium;
- Low; and
- Very low.

19.8.18 The risk assessment identifies the need for any additional resilience measures to protect against the impacts of climate change, based on risks marked as 'High' or 'Very high'. These high-level resilience measures will be designed in a workshop with key engineering and design professionals.

19.8.19 Adequate commitment measures will be included within the wider environmental and engineering design approaches. This should lead to it being unlikely that climate resilience effects will be identified, or where the potential for climate resilience to be inadequate. The subsequent EIAR will seek to confirm this.

In-combination Climate Change Impact Assessment

19.8.20 After the consideration of potential impacts due to changes to climate, professional judgement will be employed by environmental discipline experts to produce high level, qualitative statements about potential topic-specific impacts resulting from the projected climate change for receptors and resources in the vicinity of the Proposed Offshore Development. These will include recommendations for any required commitment measures, as well as allowances for future monitoring which will ensure the identification of unexpected impacts on environmental receptors and resources are carried out.

19.8.21 The potential significance of in-combination climate change impacts will be assessed qualitatively (if required) based on the professional judgement of relevant environmental and climate change experts.

19.8.22 Climatic conditions may impact all the environmental topics within the Offshore EIAR. The Proposed Offshore Development will be designed to be resilient to forecast changes in climate and the in-combination impacts will be assessed for al topics.

19.9 Scoping Questions

19.9.1 The following questions refer to the greenhouse gas and climate change chapter and are designed to inform the Scoping Opinion and focus the Scoping exercise:

1. Do you agree with the study area definitions proposed for greenhouse gas and climate change assessment?
2. Do you agree with the use of data listed in **Table 19.2** and **Section 19.8**, being used to inform the Offshore EIA Report?
3. Are there any other specific offshore data sources or guidance documents that should be considered?
4. Do you agree that all receptors, pathways, and potential impacts related to greenhouse gas and climate change have been identified?
5. Do you agree with the Scoping In and Scoping Out of impact pathways in relation to greenhouse gas and climate change?
6. Do you agree with the assessment of transboundary effects in relation to greenhouse gas and climate change?
7. Do you agree with the assessment of cumulative effects in relation to greenhouse gas and climate change?
8. Do you have any comment on the proposed assessment approach and outline methodology for greenhouse gas and climate change?

9. Do you agree on the suitability of the proposed commitments to reduce or eliminate LSE relevant to greenhouse gas and climate change?

20 Other Human Activities

20.1 Introduction

20.1.1 This section presents the other human activities that have been identified, through a desk-based study, as present within and in the vicinity of the Proposed Offshore Development. The potential impacts, which relate to safety and navigational issues upon these receptors from the three phases (construction, O&M, and decommissioning) of the Proposed Offshore Development have been determined and appraised within this chapter. The receptors include:

- Offshore Renewables Infrastructure and Operations;
- Subsea Cables and Utilities;
- O&G Infrastructure and Operations;
- Carbon Capture and Storage (CCS);
- Offshore Wind INTOG sites;
- Marine Dredging and Disposal; and
- Other Marine Infrastructure.

20.1.2 This chapter of the Offshore Scoping Report has been prepared by GoBe.

20.2 Study Area

20.2.1 The other human activities study area is defined by the Offshore Project Boundary (Array Area, Offshore ECC Study Area and any associated infrastructure) as well as a 10 nm buffer. This buffer aligns with the Shipping and Navigation buffer designated in the Offshore Scoping Report (see **Chapter 14: Shipping and Navigation**) and considers the movement of other marine stakeholders and activities. This study area is presented in **Figure 20.1**.

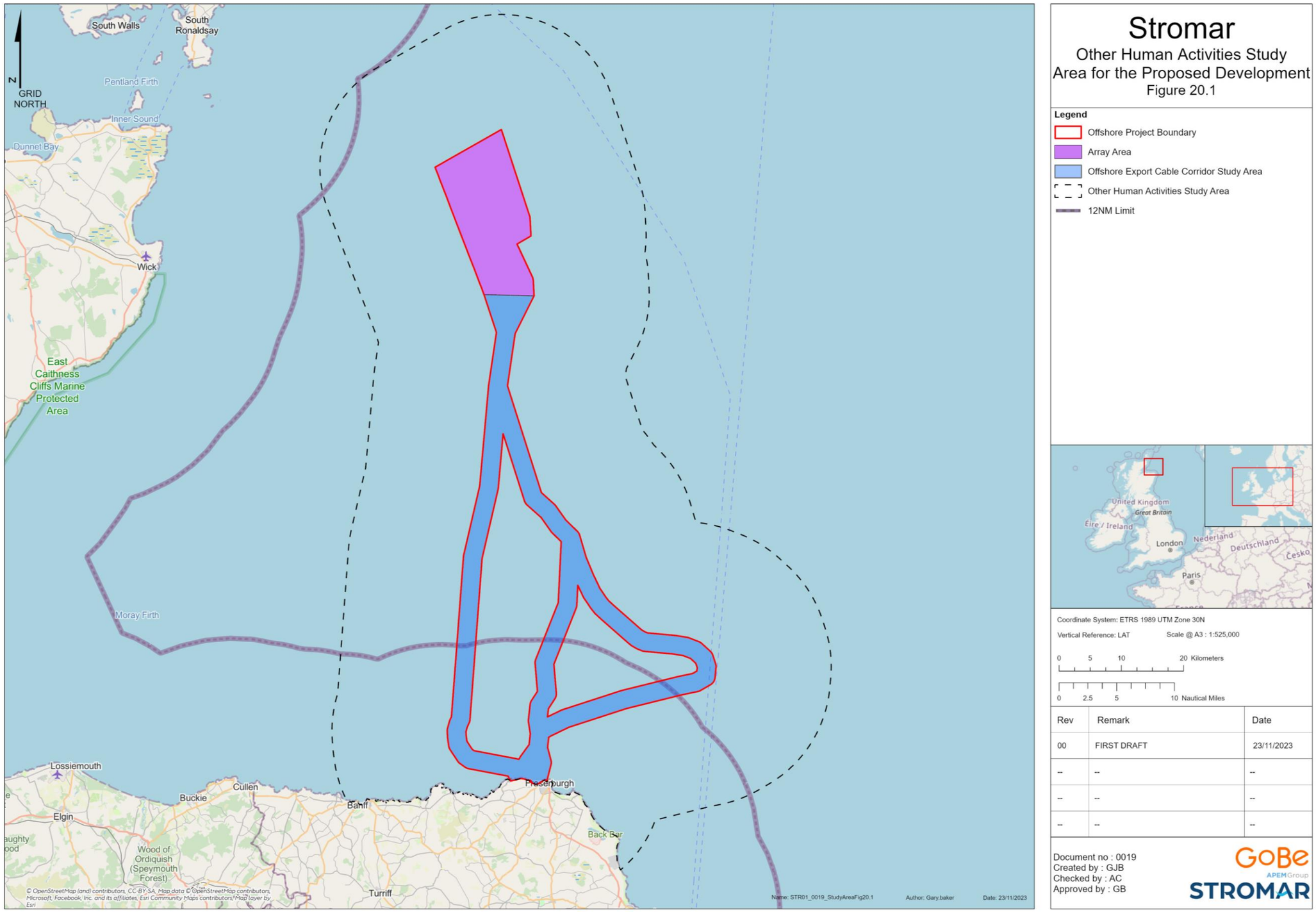

Figure 20.1: The Proposed Offshore Development Other Human Activities Study Area.

20.3 Baseline Environment

Data Sources

20.3.1 For the purposes of this Offshore Scoping Report a desk-based review of existing and known/recorded activities was undertaken using relevant spatial and scientific data sources. No specific consultation in relation to these activities/receptors has been undertaken to date.

20.3.2 The data sources that have been used to inform the other human activities chapter are presented within **Table 20.1**. These identified data sources will be taken forward and used to inform the subsequent EIA, alongside any additional specific data that is collected during consultation or other stakeholder engagement activities.

Table 20.1: Key Sources of Other Human Activities Data.

Source, Author and Year	Summary	Coverage of the Array Area and Offshore ECC Study Area	Data Quality
Scottish Government (2020), https://www.gov.scot/publications/sectoral-marine-plan-regional-locational-guidance/pages/5/	Sets out the baseline data for offshore wind energy in Scotland's Northeast sector	Provides information on current, planned, and potential future energy generation structures (not including OWFs). Provides information on Telecom Cables, Power Interconnectors, Carbon capture and Storage, O&G infrastructure and licensed blocks, defence infrastructure and exercise areas, and aquaculture. The data source provides full coverage of the Offshore Project Boundary.	Marine Scotland dataset – ancillary to the National Marine Planning Interactive (NMPi) 3 years since study undertaken.
Scottish Government and Marine Scotland (2017), https://marinescotland.atkinsgeospatial.com/nmpi/default.aspx?layers=765	Online Interactive Geographic Information Systems (GIS) based map that provides different types of information for Scotland's marine areas.	Provides information on wind and wave and tidal energy planned and proposed projects. The data source provides full coverage of the Offshore Project Boundary.	National Marine Plan interactive (NMPi) Data sets were prepared as part of the original National Marine Plan (2015) process. Data being updated as part of the preparation of National Marine Plan 2, due 2025
NSTA (2023), https://www.arcgis.com/apps/webappviewer/index.html?id=f4b1ea5802944a55aa4a9df0184205a5	Online Interactive GIS based map that provides data for offshore O&G activity	Provides information on O&G infrastructure and projects. The data source provides partial coverage of the Offshore Project Boundary.	NSTA hold up to date data as part of their regulatory role in the O&G industry

Source, Author and Year	Summary	Coverage of the Array Area and Offshore ECC Study Area	Data Quality
CES (2023), https://crown-estate-scotland-spatial-hub-coregis.hub.arcgis.com/	CES datasets	Provides information on OWF, Innovation and Targeted Oil and Gas (INTOG) application areas, and aquaculture. The data source provides partial coverage of the Offshore Project Boundary.	CES provide annual information on OWF and INTOG

Description of Baseline Environment

20.3.3 An understanding of the other human activities baseline environment within the study area has been developed from the use of available literature and data sources presented in **Table 20.1**. This initial desk-based review has been used inform the Scoping process and provides the baseline understanding of other marine users within the study area.

20.3.4 As illustrated in **Figure 20.2**, the key other human activities present within the proposed study area are:

- Broadshore, Caledonia and Ayre (formally Cluaran Ear-Thuath) OWFs;
- Captain Oil Field and adjoining pipeline to the Frigg UK Gas Transportation System and then on to St. Fergus gas terminal; and
- The Shetland HVDC Link.

Offshore Renewables

Offshore Wind

20.3.5 The existing offshore wind infrastructure (**Figure 20.2**) include those OWF projects currently in the early planning/concept stages in addition to proposed OWF developments.

20.3.6 There are three proposed OWF projects following the CES Offshore Leasing Round in 2022 within the study area. These are summarised in **Table 20.2** and their comparative locations to the Proposed Offshore Development are displayed in **Figure 20.2**.

Offshore Wind Innovation and Targeted Oil and Gas

20.3.7 INTOG projects decarbonise North Sea O&G operations in line with the targets of the North Sea Transition Sector Deal. The nearest INTOG development is known as ‘Sinclair’ and is being developed by Blue Float Energy/Renantis Partnership. This will also be located approximately 16.6 km from the Array Area, and 14.8 km from the Offshore ECC Study Area. INTOG lease areas of relevance to the Proposed Offshore Development are shown in **Figure 20.2**.

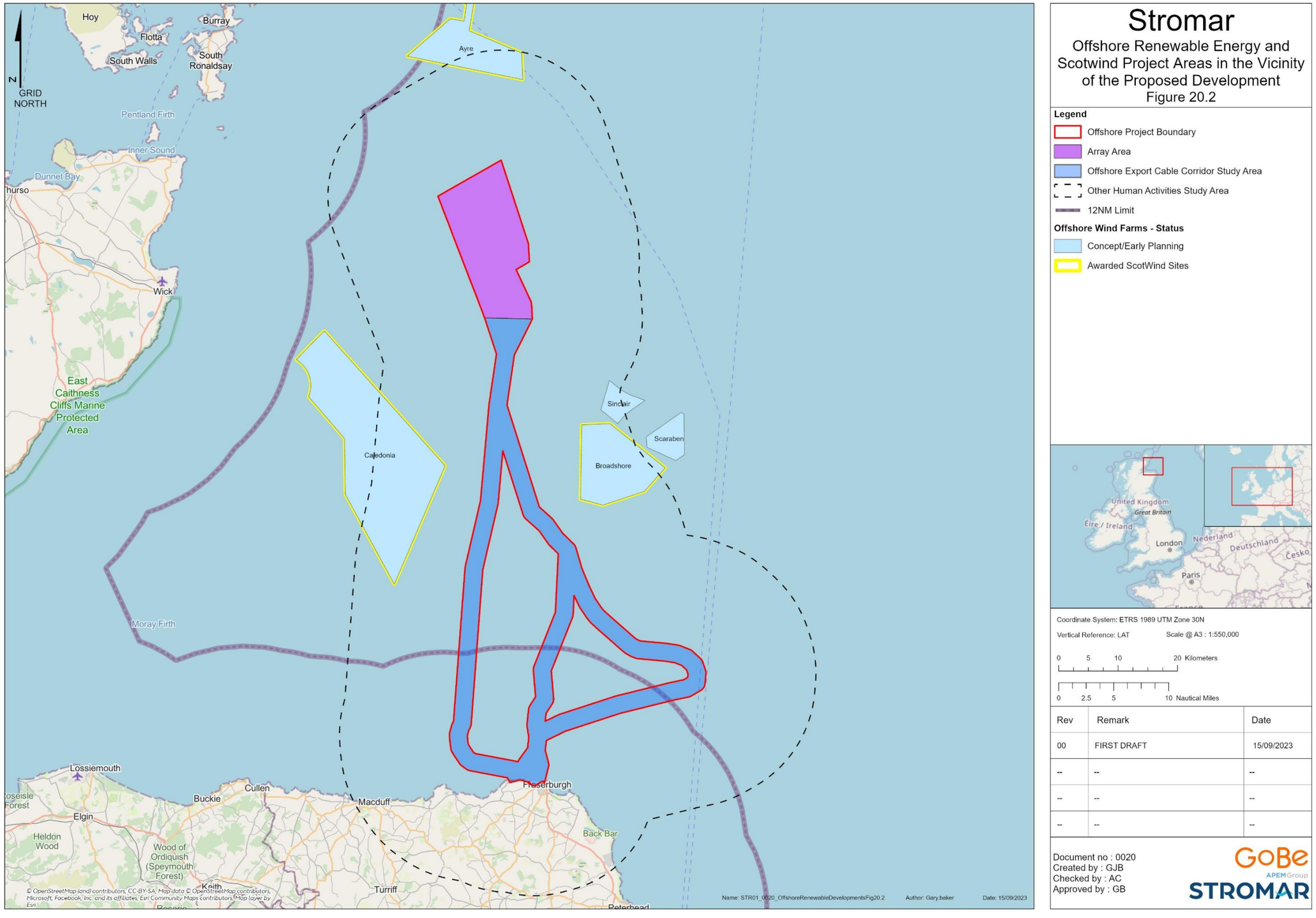

Figure 20.2: Offshore Renewable Energy and ScotWind Project Areas in the Vicinity of the Proposed Offshore Development.

Table 20.2: Summary of ScotWind Projects within the Array Area and ECC Study Area.

Project	Developer	Plan Option	Status	Distance from Stromar OWF
Broadshore	BlueFloat Energy and Renantis	NE6	Pre-Planning (permitting)	19.7km to Array Area 5.8 km to Offshore ECC Study Area
Caledonia	Ocean Winds	NE4	Pre-Planning (announced)	21.6 km to Array Area 6.5 km to Offshore ECC Study Area
Ayre/Cluaran Ear-Thuath	Thistle Wind Partners	NE2	Pre-Planning	14.0 km to Array Area 40.2 km to Offshore ECC Study Area

Broadshore Offshore Wind Farm

20.3.8 Broadshore OWF is a floating OWF development with a projected total capacity of 900 MWs. The project is located North of Fraserburgh, spread over an area of 134 km². The site is situated 5.8 km southeast of the Proposed Offshore Development Offshore ECC Study Area (**Figure 20.2**). The project is owned and being developed by BlueFloat Energy and Renantis. The Project is currently in the pre-application phase.

Caledonia Offshore Wind Farm

20.3.9 Caledonia OWF is a proposed floating and fixed OWF development with an original OA for 1 GW but a projected capacity of 2 GW. The project is located within Moray Firth and 22 km south of Wick, spread over an area of 429 km². The site is situated 6.5 km southwest of the Proposed Offshore Development Offshore ECC Study Area (**Figure 20.2**). The project is being developed by Ocean Winds and is co-owned by EDP Renewables (EDP Renováveis) and Engie. Project construction is expected in 2026 and commercial operation should begin in 2030 (Caledonia OWF, 2023). It is important to note, that Caledonia OWF do not have a final location for their landfall point(s), but they will be located between Banff and Whitehills, with the export cables predicted to cross the intertidal area and land between MHWS and a TJB (forming the interface between the onshore and offshore export cables). Caledonia is approaching the pre-application consultation stage of the project, following receipt of its Scoping Opinion in January 2023. Consultation events are to be held early in 2024.

Ayre Offshore Wind Farm

20.3.10 Ayre OWF project is a proposed floating OWF development with a projected capacity of 1GW. The project is located 36 km east of (Kirkwall) Orkney and is spread over an area of 201 km². The site is situated 14.0 km north of the Array Area (**Figure 20.2**). The project is being developed and is co-owned by a joint venture (JV) between DEME Concessions, Qair and Aspiravi (Thistle Wind Partners). The project is anticipated to be developed in two phases. The project is in the early planning stages, with the first phase expected to start construction in 2029, the second phase expected to start construction in 2031 and both fully commissioned by 2033 (Thistle Wind Partners, 2023).

Wave and Tidal

20.3.11 There are currently no wave or tidal energy developments planned within the Proposed Offshore Development or study area. The closest wave and tidal energy lease site is 40.4 km away from the Array Area (and 57.5 km from the Offshore ECC Study Area) (Marine Scotland, 2021e).

Subsea Cables and Utilities

Power Cables

20.3.12 The subsea power and telecommunication cables within the other human activities study area are presented below in **Figure 20.3**.

20.3.13 The Shetland HVDC Link is a 253 km subsea cable between Noss Head in Caithness and Weisdale Voe in Shetland and is currently under construction (**Figure 20.3**). The circuit is comprised of three cables laid as a single bundle, the minimum burial depth of the cable is expected to be, approximately, 60 cm and maximum of up to 1 m. Where burial is not possible other alternatives will be used to protect the cables. The cable is in the vicinity of the Proposed Offshore Development crossing the west and the north boundaries of the 10 nm buffer. At its closest point, the cable is at 2.6 km from the Proposed Offshore Development Offshore ECC Study Area (Xodus 2019).

Telecommunication Cables

20.3.14 The closest telecommunications cable is the SHEFA-2 fibre-optic cable operated by Shefa LTD, connecting the Faroe isles to the Scottish Mainland via the Shetlands and Orkney respectively (**Figure 20.3**). The SHEFA-2 is, at its closest point, 15.7 km from the Offshore Project Boundary (Shefa, 2023).

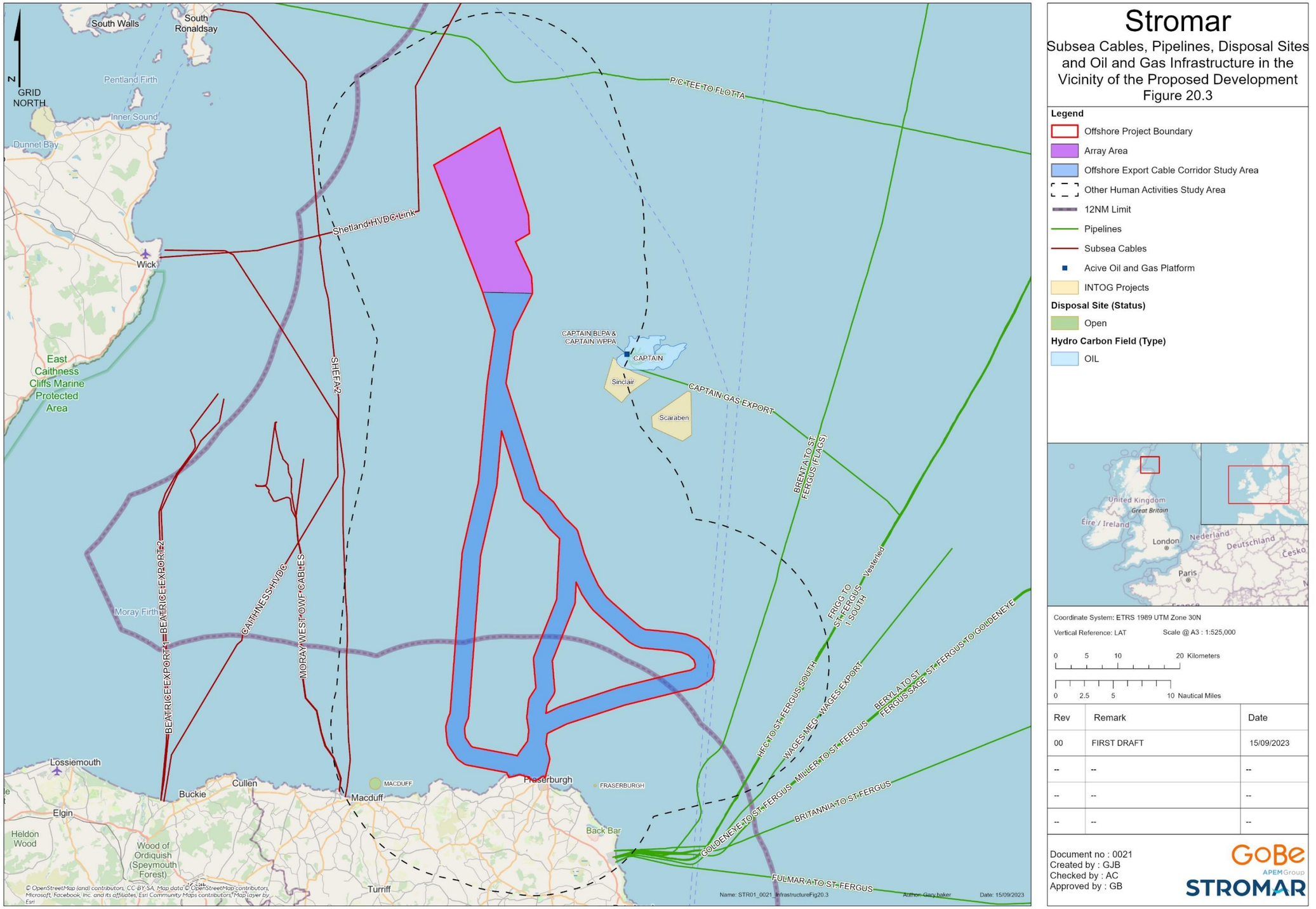

Figure 20.3: Subsea Cables, Pipelines, Disposal Sites and O&G Infrastructure in the Vicinity of the Proposed Offshore Development.

Oil and Gas

20.3.15 The Proposed Offshore Development is within a region where O&G activity occurs throughout most of the offshore waters (Scottish Government 2020). These structures include wells, surface and subsurface structures. As the majority of O&G fields on the UK Continental Shelf (UKCS) are in a mature stage of development, decommissioning processes over the next 20 to 30 years are expected to increase (DECC 2016). Thus, there is potential for decommissioning of O&G structures to overlap with the Proposed Offshore Development operations. The O&G infrastructure within the other human activities study area are presented in **Figure 20.3**.

20.3.16 The Array Area overlaps with four of the provisional 31st Round awarded License blocks (12/14, 12/15, 12/19 and 12/20) and the Offshore ECC Study Area with selected provisional license blocks to the south of the Array Area (provisional 31st Round awarded Blocks; 12/19; 12/14; 12/15; 12/20; 13/11; 13/16c; 12/25a; 12/24; 12/25; 18/4; 18/5).

20.3.17 The Captain Oil Field is located 145 km northeast of Aberdeen in Block 13/22a. The field is operated by Ithaca Energy and in the process of developing enhanced oil recovery, with no current indicative decommissioning date (Ithaca Energy, 2023). The oil field is located 17 km southeast of the Array Area (and 16.8 km from the Offshore ECC Study Area) (**Figure 20.3**).

20.3.18 The other human activities study area is not currently crossed by any O&G pipelines. The nearest active oil pipeline is located approximately 7.6 km North from the Array Area (and 33.9 km from the Offshore ECC Study Area) transporting oil from the Piper and Claymore oilfields to the Flotta terminal on the Orkney Isles. The nearest active gas pipeline is located approximately 50.7 km from the Array Area (and 5 km from the Offshore ECC Study Area) and connects the Brent Alpha Oil field in the Northern North Sea to the St. Fergus Gas Terminal. There are no current plans for new pipeline construction within the vicinity (NSTA 2023b).

Carbon Capture and Storage

20.3.19 CCS is one of the methods used by the Scottish Government to aid the policy of decarbonising electricity generation by 2030. The development of the industry is currently focused around the north and northeast regions. It is likely that in future the development of the CCS industry will be attained within these regions.

20.3.20 There is a saline aquifer (Captain) that currently overlaps with the other human activities study area. However, the area of the ACT Acorn project site (Captain X storage site) shows no current overlap with the Offshore Project Boundary (Scottish Government 2020).

Marine Dredging and Disposal

20.3.21 The marine dredging and disposal sites of relevance to the other human activities study area are presented in **Figure 20.3**.

20.3.22 Within the Offshore Project Boundary, there is one ‘open’ dredge soil deposit site (Fraserburgh) located on the coast of Fraserburgh (**Figure 20.3**). This open dredging disposal site is located approximately 79.8 km from the Array Area, and 7.9 km from the Offshore ECC Study Area. No wastewater treatment plants are found within the vicinity of the Offshore study area (Marine Scotland, 2021e). No marine aggregate extraction is licensed within the study area (Marine Scotland, 2021e).

Other Marine Infrastructure

Aquaculture

20.3.23 The other human activities study area comprises no active shellfish or finfish aquaculture sites (Marine Scotland, 2021e). Moreover, a continuous ban against further marine finfish farm developments on the north and east coasts has been put in place to safeguard migratory fish species (Scottish Government, 2015c).

Nuclear

20.3.24 There are no current or future plans for nuclear facilities in the study area, in line with the Scottish Government's continued opposition for new nuclear stions in the country (Scottish Government, 2017).

20.4 Embedded Commitments

20.4.1 The Proposed Offshore Development has adopted various primary commitments (primary design principles intrinsically part of the Project design, installation techniques and engineering designs/modifications) as part of the pre-application phase to eliminate and/or reduce LSE arising from a number of impacts (as far as possible). These are outlined in **Appendix A: Offshore Commitments Register**. Further commitments (imposed as a result of legislative requirements and/or standard sectoral practice, regardless of EIA assessment), referred to as tertiary commitments are embedded as an inherent aspect of the EIA process. Secondary commitments (which require further activity to achieve anticipated outcome- often secured through planning conditions and/or management plans) are incorporated to reduce LSE to environmentally acceptable levels following initial assessment, i.e., so that residual effects are reduced to environmentally acceptable levels.

20.4.2 The commitments adopted by the project in relation to other human activities are presented in **Table 20.3**. The full list of commitments can be found in **Appendix A: Offshore Commitments Register**.

Table 20.3: The Proposed Commitments Relevant to Other Human Activities Receptors.

Commitment Code	Commitment Measure
C-OFF-02	Minimum blade clearance of 30 m above HAT. HAT used due to floating nature of turbine technology.
C-OFF-09	Development of, and adherence to a CaP. The CaP will confirm planned cable routing, burial and any additional protection and will set out methods for post-installation cable monitoring as secured by Section 36 and Marine Licence consent conditions. The CaP is likely to be supported by a CBRA, which will outline how external cable protection shall be used and/or minimised, should cable burial be achieved.
C-OFF-10	Where a Project cable crosses or runs parallel to an existing/planned cable/pipeline a crossing agreement will be implemented.
C-OFF-16	A PS will be developed and followed, detailing the methods of pile installation and associated noise levels. It will include any mitigation measures to be put in place during piling to manage the effects of underwater noise on sensitive receptors.
C-OFF-08	A CMS will be developed, which will detail the proposed construction methods and roles and responsibilities of parties involved.

Commitment Code	Commitment Measure
C-OFF-33	Development of and adherence to a LMP, which will confirm compliance with legal requirements with regards to shipping, navigation, and aviation.
C-OFF-34	The UKHO will be notified of Project works.
C-OFF-35	A SaR checklist will be carried out in line with MCA MGN 654 (MCA, 2021) and its annexes. Consideration will also be given to MGN 543 SAR Annex 5 (MCA, 2018).
C-OFF-36	An ERCoP will be developed, prepared in line with MCA guidance. This plan will detail the measures the Project has in place to support any emergency response.
C-OFF-39	Buoys will be deployed at construction sites in accordance with NLB guidance and advice.
C-OFF-40	The Project will be appropriately marked on aeronautical and admiralty charts, including provisions of the position and height of structures to the UKHO, CAA, MOD, and DGC.
C-OFF-43	Development of a NSP, detailing the measures in place for the Project related to navigational safety. This will include Notice to Mariners (via Kingfisher Bulletins or other appropriate methods) of activity in an appropriate timeframe. These notifications will provide details on the positions and nature of the works.
C-OFF-45	Appropriate Safety Zones (e.g., 500m) around offshore substation platforms and WTGs during major works (or up to 200 m during pre-commissioning works) will be applied for and implemented as appropriate.
C-OFF-46	Marine navigation markings and lighting of the Project will be defined in agreement with the NLB, and in accordance with the latest relevant available standard industry guidance for shipping, navigation and aviation marking and lighting.
C-OFF-47	All Project vessels will comply with international marine regulations (as adopted by the Flag State), notably the International Regulations for Preventing Collisions at Sea (IMO, 1974) and the SOLAS (IMO, 1974).
C-OFF-51	Utilisation of guard vessels (when necessary) to ensure adherence with Safety Zones, advised passing distances, mitigate potential impacts posing risk to surface navigation.

20.4.3 As a result of the commitment to implement these measures, and to align with various standard sectoral practices and procedures, the embedded (primary) commitments are considered inherently part of the design of the Proposed Offshore Development and have, therefore, been included in the assessment presented in **Section 20.5**.

20.5 Scoping of Impacts

20.5.1 Potential impact pathways relevant to other human activities which may occur during the construction, O&M, or decommissioning phases of the Proposed Offshore Development have been identified in **Table 20.4.** There were no impacts identified as 'Possible LSE' for other human activities.

Table 20.4: Scoping Assessment for Other Human Activities.

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
Construction (and Decommissioning)				
Temporary obstruction to other OWFs	C-OFF-02 C-OFF-09 C-OFF-17 C-OFF-33 C-OFF-36 C-OFF-44 C-OFF-45 C-OFF-51	Scoped In	The study area overlaps with the Array Area or the ECC of the Broadshore and Ayre OWF. Thus, there is potential during construction to obstruct activities necessary to their development. The Project aspect Scoped In for further assessment is the Offshore ECC.	LSE without secondary commitment measures.
Temporary obstruction to wave and tidal renewable energy activities and developments	C-OFF-09 C-OFF-33	Scoped Out	There are no wave or tidal renewable projects in the study area. All relevant commitments are presented in **Appendix A: Offshore Commitments Register**.	No LSE identified at Scoping.
Temporary obstruction to O&G activities and developments	C-OFF-02 C-OFF-09 C-OFF-17 C-OFF-33 C-OFF-36 C-OFF-51 C-OFF-44 C-OFF-45	Scoped In	Due to the proximity of the Captain Oil Field development of enhanced oil recovery this will be included in the future assessment as part of the EIA. The Project aspect Scoped In for further assessment is the Offshore ECC.	LSE without secondary commitment measures.
Temporary obstruction to CCS activities and developments	C-OFF-02 C-OFF-09	Scoped Out	There are no CCS activities within the study area.	No LSE identified at Scoping.

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
	C-OFF-33 C-OFF-44 C-OFF-45 C-OFF-51		All relevant commitments are presented in **Appendix A: Offshore Commitments Register**.	
Temporary obstructions to INTOG activities	C-OFF-02 C-OFF-09 C-OFF-17 C-OFF-33 C-OFF-44 C-OFF-51	Scoped In	There is one proposed INTOG activity within the study area. The Project aspect Scoped In for further assessment is the Offshore ECC.	LSE without secondary commitment measures.
Temporary obstruction to subsea cables and utilities activities and developments	C-OFF-02 C-OFF-09 C-OFF-17 C-OFF-36 C-OFF-44 C-OFF-45 C-OFF-51	Scoped In	The study area overlaps the Shetland HVDC Link and due to the proximity with the cables this will be included in the future assessment as part of the EIA. The Project aspect Scoped In for further assessment is the Array Area.	LSE without secondary commitment measures.
Temporary obstructions to aquaculture activities	n/a	Scoped Out	There are no aquaculture sites or proposed projects in the study area. All relevant commitments are presented in **Appendix A: Offshore Commitments Register**.	No LSE identified at Scoping.
Temporary obstruction to marine dredging and disposal activities	C-OFF-02 C-OFF-09 C-OFF-17 C-OFF-33	Scoped In	There is one open disposal site within the study area. The effect on this site will be considered further within the EIA assessment.	LSE without secondary commitment measures.

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
	C-OFF-36 C-OFF-44 C-OFF-51		The Project aspects Scoped In for further assessment are the Offshore ECC and landfall.	
Temporary obstruction to marine aggregate activities	C-OFF-09 C-OFF-17 C-OFF-33	Scoped Out	There are no marine aggregate dredging activities in the vicinity of the study area. All relevant commitments are presented in **Appendix A: Offshore Commitments Register**.	No LSE identified at Scoping.
Temporary obstruction to nuclear activities	C-OFF-09 C-OFF-17 C-OFF-33	Scoped Out	There are no nuclear energy sites in the vicinity of the study area. All relevant commitments are presented in **Appendix A: Offshore Commitments Register**.	No LSE identified at Scoping.
Operation and Maintenance				
Temporary obstruction to other OWFs	C-OFF-08 C-OFF-10 C-OFF-40	Scoped In	The study area overlaps with the Array Area or the ECC of the Broadshore and Cluaran Ear-Thuath/Ayre OWF. Thus, there is potential during O&M to obstruct activities necessary to their development. The Project aspects Scoped In for further assessment are the Array Area and Offshore ECC.	LSE without secondary commitment measures.
Temporary obstruction to wave and tidal renewable energy activities and developments	C-OFF-08 C-OFF-40	Scoped Out	There are no wave or tidal renewable projects in the study area. All relevant commitments are presented in **Appendix A: Offshore Commitments Register**.	No LSE identified at Scoping.
Temporary obstruction to O&G activities and developments	C-OFF-08 C-OFF-10 C-OFF-40	Scoped In	Due to the Proximity of the Captain Oil Field development of enhanced oil recovery this will be included in the future assessment as part of the EIA.	LSE without secondary commitment measures.

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
			The Project aspect Scoped In for further assessment is the offshore export cables.	
Temporary obstruction to CCS activities and developments	C-OFF-08 C-OFF-40	Scoped Out	There are no plans to develop CCS projects within the study area. All relevant commitments are presented in **Appendix A: Offshore Commitments Register**.	No LSE identified at Scoping.
Temporary obstructions to INTOG activities	C-OFF-08 C-OFF-10 C-OFF-40	Scoped In	There is one proposed INTOG activity within the study area. The Project aspect Scoped In for further assessment is the Offshore ECC.	LSE without secondary commitment measures.
Temporary obstruction to subsea cables and utilities activities and developments	C-OFF-08 C-OFF-10 C-OFF-40	Scoped In	The study area overlaps the Shetland HVDC Link and due to the proximity with the cables this will be included in the future assessment as part of the EIA. The Project aspect Scoped In for further assessment is the Array Area.	LSE without secondary commitment measures.
Temporary obstructions to aquaculture activities	n/a	Scoped Out	There are no aquaculture sites or proposed projects in the study area. All relevant commitments are presented in **Appendix A: Offshore Commitments Register**.	No LSE identified at Scoping.
Temporary obstruction to marine dredging and disposal activities	C-OFF-08 C-OFF-40	Scoped In	There is one open disposal site within the study area. The effect on this site will be considered further within the EIA assessment. The Project aspects Scoped In for further assessment are the Offshore ECC and landfall.	LSE without secondary commitment measures.
Temporary obstruction to marine aggregate activities	C-OFF-08 C-OFF-40	Scoped Out	There are no marine aggregate dredging activities in the vicinity of the study area.	No LSE identified at Scoping.

Impact Pathway	Commitment Code	Scoped In/Scoped Out	Justification	Proportionate EIA
			All relevant commitments are presented in **Appendix A: Offshore Commitments Register**.	
Temporary obstruction to nuclear activities	C-OFF-08 C-OFF-40	Scoped Out	There are no nuclear energy sites in the vicinity of the study area. All relevant commitments are presented in **Appendix A: Offshore Commitments Register**.	No LSE identified at Scoping.

20.6 Potential Cumulative Impacts

20.6.1 The process by which potential cumulative impacts will be assessed through the CIA is described in **Chapter 6: EIA Approach and Methodology**.

20.6.2 Although predicted impacts are anticipated to be minimal, there is the possibility that impacts from the Proposed Offshore Development which could result in cumulative impacts on other human activities. There is potential that these cumulative impacts occur during all stages of the Proposed Offshore Development. For other human activities related to the Proposed Offshore Development cumulative interactions may occur with the neighbouring O&G development, the HVDC Link and adjacent wind farm projects.

20.6.3 Given the overlap of the Array Area and the proximity of the Proposed Offshore Development to the Shetland HVDC link project currently under construction, there is potential for cumulative impacts to arise. Additionally, the proposed development for enhanced oil recovery within the Captain Oil Field set out by Ithaca energy, could show potential for cumulative impacts to arise during this development as well as future decommissioning programs for the site.

20.6.4 **Chapter 6: EIA Approach and Methodology** details how these potential cumulative impacts will be assessed through the CIA. The CIA for other human activities will consider the MDS for each of the nearby projects, developments, and associated activities consistent with the methodology presented within **Chapter 6: EIA Approach and Methodology**.

20.7 Potential Transboundary Impacts

20.7.1 There is no potential for transboundary impacts upon other human activities receptors during construction, O&M, and decommissioning of the Proposed Offshore Development. No other human activities' receptors associated with other EEZs have been identified. Therefore, transboundary impacts will not be assessed further within EIA process and have been Scoped Out from Offshore Scoping Report.

20.8 Proposed Approach to Environmental Impact Assessment

20.8.1 The EIA will be prepared in accordance with the UK Government's 2020 EIA Regulations and guidance from the Offshore Wind Industry Council. The most current methods of assessment will be used when undertaking survey work and carrying out associated modelling.

Additional Data Sources

20.8.2 A more detailed literature review will be developed for the EIAR, building upon the outline provided within this Offshore Scoping Report. The existing data sources and assessment of impacts of the Proposed Offshore Development on other human activities will be built upon and adapted through stakeholder engagement and consultation as a primary source of information and data, to identify all current or known/planned activities in the vicinity of the Proposed Offshore Development. Consultees are likely to include:

- Subsea cables operators;
- Marine Renewable Energy lease owners;

- O&G Operators;
- Carbon Capture and Storage developers; and
- Disposal site users.

20.8.3 Any potential impacts that are Scoped In, either cumulative or alone, will be identified and assessed on a desk-based format, while considering the MDS of the Proposed Offshore Development for both the project-specific and cumulative impacts. Information will align with other sections of the EIA where relevant such as shipping and navigation or military and civil aviation (**Chapters 14: Shipping and Navigation** and **Chapter 16: Military and Civil Aviation)** and both direct and indirect impacts will be taken into consideration. The sensitivity of a receptor will take into account the capacity to accommodate any change and the value/importance of each receptor, while the magnitude of an impact will be derived from the MDS of the Proposed Offshore Development.

Guidance

20.8.4 In addition to the approach and guidance (of general relevance) outlined in **Chapter 6: EIA Approach and Methodology**, the assessment of other human activities receptors will also comply with the following guidance:

- Assessment of Impact of Offshore Wind Energy Structures on the Marine Environment (Marine Institute, 2000);
- European Subsea Cables Association (ESCA) Guideline No 6, The Proximity of Offshore Renewable Energy Installations and Submarine Cable Infrastructure in UK Waters (ESCA, 2016);
- International Cable Protection Committee (ICPC) recommendations (ICPC, 2021);
- Oil and Gas UK, Pipeline Crossing Agreement and Proximity Agreement Pack (Oil and Gas UK, 2015);
- The Crown Estate Guidance: Export transmission cables for offshore renewable installations - Principles of cable rerouting and spacing (The Crown Estate, 2012a); and
- The Crown Estate Guidance: Submarine cables and offshore renewable energy installation - Proximity study (The Crown Estate, 2012b).

20.8.5 In addition, any upcoming guidance in development will be used when appropriate.

20.9 Scoping Questions

20.9.1 The following questions refer to the other human activities chapter and are designed to inform the Scoping Opinion and focus the Scoping exercise:

1. Do you agree with the use of those data listed in **Section 20.3**, and any additional anticipated data listed in **Section 20.8**, being used to inform the Offshore EIA?
2. Do you agree that all receptors related to other human activities have been identified?
3. Do you agree with the Scoping In and Out of impacts related to other human activities?
4. Do you agree with the assessment of transboundary effects related to other human activities?
5. Do you agree with the assessment of cumulative effects related to other human activities?

6. Do you agree on the suitability of the proposed commitments to reduce or eliminate LSE relevant to other human activities?

21 Summary of Offshore EIA Scoping

21.1 Summary of Impacts and Commitments

21.1.1 A summary of the environmental impacts that will potentially occur during construction, O&M and decommissioning of the Proposed Offshore Development is presented within **Appendix B: Offshore Impacts Register**. This Impacts Register captures all of the potential impacts that have been identified within this Offshore Scoping Report and will be treated as a 'live document' and updated as the EIA progresses. Additional potential impacts that are identified in the forthcoming Scoping Opinion or during consultation will be included in this Impacts Register and tracked through the EIA process.

21.1.2 Each technical chapter within this Offshore Scoping Report has made reference to commitments that have been made as part of the project design process. These commitments are all contained within **Appendix A: Offshore Commitments Register**, with relevance to each technical topic indicated. This Commitments Register will be treated as a 'live' document, which will be updated and developed further as the EIA progress (incorporating feedback from stakeholder consultation).

21.1.3 In order to align with numerous standard sectoral practices and procedures it is considered that embedded commitments are inherently part of the design and are considered in the assessment of each technical topic.

21.2 Topics Scoped In to the Offshore EIA

21.2.1 The follow environmental technical topics are 'Scoped In' to further assessment in the EIAR:

- Marine and Coastal Processes;
- Marine Water and Sediment Quality;
- Benthic and Intertidal Ecology;
- Fish and Shellfish Ecology;
- Offshore Ornithology;
- Marine Mammals;
- Commercial Fisheries;
- Shipping and Navigation;
- Marine Archaeology and Cultural Heritage;
- Military and Civil Aviation;
- Seascape, Landscape and Visual Impact;
- Socio-economics, Tourism and Recreation;
- Greenhouse Gas and Climate Change; and
- Other Human Activities.

21.2.2 The following technical topics have been Scoped Out of further assessment within the EIAR:

- Offshore Airborne Noise and Vibration; and
- Offshore Air Quality.

21.2.3 Justifications for the Scoping Out of the above technical topics is presented in **Chapter 6: EIA Approach and Methodology**.

22 Proposed Structure of the EIA Report

22.1 Introduction

22.1.1 The following chapter sets out the proposed approach, and presentation of, the subsequent EIAR. This EIAR will be produced with Scottish legislative requirements in mind, namely the EIA Regulations (and other relevant best practice guidance). Individual technical topics will be subject to their own specific guidance and standards and will be applied alongside the generic EIA standards.

22.2 EIAR Structure

22.2.1 It is proposed that the EIAR will be presented similar to the proposed contents outlined in **Table 22.1** and **Table 22.2**. It is proposed that the EIAR will be presented separately for offshore and onshore, with the proposed contents for the Onshore EIAR presented in the Onshore Scoping Report.

22.2.2 This EIAR will be prepared by competent experts, making use of the most recent and relevant assessment and methodology procedures, and data collection and interpretation. Information on the competent experts for respective topics will be provided within the EIAR.

22.2.3 The technical chapters will include the following:

- Introduction;
- Policy and guidance;
- Consultation;
- Design basis for assessment;
- Impact assessment for methodology;
- Baseline environment;
- Potential effects;
- Commitment measures and monitoring;
- Transboundary and inter-related effects;
- Cumulative effects; and
- Residual effects.

22.2.4 It is envisaged that there will be a range of technical appendices supporting the EIAR, with the relevant offshore appendices presented in **Table 22.2**.

Table 22.1: Proposed Structure of the EIAR (Offshore Elements of Proposed Offshore Development).

Volume	Contents	Chapters		Outline
Volume 1	Overview	Background		The introductory chapters of the EIAR will introduce the Proposed Offshore Development and provide further context on the relevant topics. This will provide a summary of the EIAR findings in a clear and accessible format, using supporting figures and non-technical language.
		Planning and Policy Context		
		Proposed Offshore Development Description		
		Consultation		
		Site Selection and Consideration of Options		
		EIA Methodology		
Volume 2	Offshore EIAR	Physical	Marine and Coastal Processes	Assessment chapters for each environmental aspect will be undertaken/presented in accordance with Article IV of the EIA Directive for the offshore infrastructure seaward of MHWS. These chapters will present a description of the relevant receptors, baseline environment characterisation, relevant commitment measures, potential impact, and significant effects. The commitments measures and associated residual effects will be included. A CIA will be included within each technical chapter rather than as a standalone chapter.
			Marine Water and Sediment Quality	
			UWN	
		Biological	Benthic and Intertidal Ecology	
			Fish and Shellfish Ecology	
			Offshore Ornithology	
			Marine Mammals	
		Human	Commercial Fisheries	
			Shipping and Navigation	
			Marine Archaeology and Cultural Heritage	
			Military and Civil Aviation	
			Seascape, Landscape and Visual Impact	

Volume	Contents	Chapters		Outline
			Socio-economics, Tourism and Recreation	
			Greenhouse Gas and Climate Change	
			Other Human Activities	
Volume 3	Summary	Commitment Register		Summary chapters to provide a concise presentation of the key findings of the EIA and relevant commitments.
		Summary and Conclusions		
Volume 4	Technical Appendices	See **Table 22.2**.		Technical appendices for the offshore assessment chapters that will support those in Volume 2. These appendices will be cross-referenced in the relevant chapters, and may include modelling outputs, background reports and/or supporting documents.
Volume 5	Figures	N/A		A presentation of visualisations and photomontages.

Table 22.2: Proposed Structure of the EIAR Technical Appendices.

Technical Appendices
Draft Environmental Management Plan
Draft Decommissioning Plan
Onshore and Offshore Scoping Opinions
Scoping and Consultation Gap Analysis
Cumulative Impact Assessment Screening List
Commitments Register
Impacts Register
Proportionate EIA Position Paper
Marine and Coastal Processes Technical Report
Benthic and Intertidal Ecology Technical Report
Marine Mammal Technical Report
Underwater Noise Modelling Report
Draft European Protected Species Risk Assessment and Licence Application(s)
Ornithology Baseline Technical Report
Ornithology Collision Risk Modelling Technical Report
Ornithology Displacement Technical Report
Ornithology Migratory Birds Report
Ornithology Population Viability Analysis Report
Commercial Fisheries Technical Report
Draft Fisheries Management and Mitigation Strategy
Navigational Risk Assessment
Initial Aviation Assessment (including TOPA)
Radar Propagation Modelling
Socio-economic Technical Report
Marine Archaeology and Cultural Heritage Technical Report
Unexploded Ordnance Risk Assessment
Water Framework Directive Compliance Assessment

23 Next Steps

23.1 Introduction

23.1.1 Each technical topic assessment within this Offshore Scoping Report has identified the potential impacts that may arise because of the construction, O&M and decommissioning of the Proposed Offshore Development, and therefore the potential impacts that are proposed to be Scoped In to the Offshore EIAR for the Proposed Offshore Development. For the relevant impacts and receptors that have been Scoped In to the Offshore EIAR, the proposed approach for the analysis and assessment has been described and questions have been posed to consultees to comment on. The Developer invites Scottish Ministers to respond to this Offshore EIA Scoping Report by providing a response to the topic specific questions by providing a formal Scoping Opinion on the key areas identified, the data sources, and the methodology proposed.

23.1.2 This chapter should be read alongside the following other chapters, and the questions contained within them:

- **Chapter 1: Introduction**;
- **Chapter 2: Legislation and Policy Context**;
- **Chapter 3: Proposed Offshore Development Description**;
- **Chapter 4: Consultation**;
- **Chapter 5: Site Selection and Consideration of Options**;
- **Chapter 6: EIA Approach and Methodology**;
- **Chapter 7: Marine and Coastal Processes**;
- **Chapter 8: Marine Water and Sediment Quality**;
- **Chapter 9: Benthic and Intertidal Ecology**;
- **Chapter 10: Fish and Shellfish Ecology**;
- **Chapter 11: Offshore Ornithology**;
- **Chapter 12: Marine Mammals**;
- **Chapter 13: Commercial Fisheries**;
- **Chapter 14: Shipping and Navigation**;
- **Chapter 15: Marine Archaeology and Cultural Heritage**;
- **Chapter 16: Military and Civil Aviation**;
- **Chapter 17: Seascape, Landscape and Visual Impact**;
- **Chapter 18:Socio-economics, Tourism and Recreation**;
- **Chapter 19: Greenhouse Gas and Climate Change**; and
- **Chapter 20: Other Human Activities**.

23.2 Actions following Scoping Opinion

23.2.1 Feedback received as part of the Scoping Opinion will be utilised to input into PAC, and further survey and design work. This will inform the continued RPSS process of the Offshore ECC and landfall. Additional impacts identified following receipt of the Scoping Opinion, or because of stakeholder engagement or public consultation, will be documented within the Offshore EIAR that will be prepared to support the Section 36 Consent and the Marine Licence applications.

23.2.2 The impacts identified as 'Possible LSE' will be carried forward from the Scoping Report and will follow one of the three routes of assessment (as presented in **Appendix C: Proportionate EIA Position Paper**). The route taken by each impact will be dependent on the additional subsequent information and feedback contained within the Scoping Opinion (as well as additional consultation held prior to the EIAR submission).

23.3 Next stages and Indicative Timeframes

23.3.1 The next steps are summarised in **Table 23.1** below and include programmed timeframes.

Table 23.1: Next Stages and Indicative Timeframes.

Next Stage	Indicative Timeframe
Scoping Opinion	April 2024
PAC	June 2024 or September 2024
Submission of EIAR	Q3 2025

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