



Morven Hawthorn Pit Grid Connection Project

Preliminary Environmental Information Report

Volume 2, Chapter 5: Marine Mammals

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GoBe	Morven Offshore Wind Limited

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Annexes

Annex number	Annex title
5.1	Underwater Sound Modelling Report

Glossary

Term	Meaning
Amplitude (as it relates to sound)	Amplitude is defined as the maximum height of a sound wave, representing the extent of particle displacement as the wave travels through a medium. In simpler terms, it can be thought of as the "height" of the wave. Greater amplitude means that particles are displaced further from their equilibrium position, resulting in a louder sound.
Anthropogenic	An activity caused or produced by humans
the Applicant	The legal entity making the applications for consent; Morven Offshore Wind Limited (MvOWL).
Baseline	Existing conditions as represented by the latest available data, whether from literature or survey and used as a benchmark for making comparisons to assess the impact of a development or project.
Cable protection	Measures used to protect subsea cables where burial is not possible, due to seabed conditions or at cable crossings, to ensure cable stability and reduce risks from anchors, fishing gear and environmental forces.
Cetacean	A marine mammal of the infraorder cetacea; a whale, dolphin, or porpoise.
Commitments	Measures (embedded mitigation and secondary) to be adopted during the construction, operation and maintenance, and decommissioning phases of the MHPGC Project.
Construction	Used to refer to the whole construction phase of a project.
Cumulative effect	The combined effect of the MHPGC Project in combined with the effects from other proposed developments, on the same receptor or resource.
Cumulative effects assessment	Assessment of likely significant effects resulting from the MHPGC Project alongside the likely effects arising from other proposed developments on the same receptor or resource.
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in sound pressure level between two sounds is given by $20 \log_{10}$. The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is $20 \mu\text{Pa}$.
Deflagration	Deflagration in the context of Unexploded Ordnance (UXO) refers to a method of clearance that involves igniting and burning the explosive contents of UXOs without causing a detonation.
Development Consent Order (DCO)	An order made under the Planning Act 2008, as amended, granting development consent.
Direct impact	This is associated with the direct activities of the MHPGC Project as well as the activities of primary suppliers.
Effect	Term used to express the consequence 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.
EIA Regulations	A term commonly used to refer to the Infrastructure Planning (EIA) Regulations 2017 and Marine Works (EIA) Regulation 2007 which required major development projects (in Scottish and English waters) to undertake a EIA assessment and underpins the EIA process.
Embedded mitigation	Measures included as part of the project design. Includes both primary and tertiary mitigation.
Environmental Impact Assessment (EIA)	The process of identifying and assessing the significant effects likely to arise from a project. This requires consideration of the likely changes to the environment, where these arise as a consequence of a project, through comparison with the existing and projected future baseline conditions.
European Protected Species (EPS)	Species (e.g. bats, great crested newts, otters, dormice and cetaceans) which receive full protection under the Conservation of Habitats and Species Regulations 2017 and Conservation of Offshore Marine Habitats and Species Regulations 2017.
Expert Working Groups (EWGs)	A topic-specific group of specialists formed under the Evidence Plan Process (EPP) to resolve technical issues and agree approaches for environmental assessments.
Future baseline	Refers to the predicted situation in future years without the MHPGC Project.
Habitat	The environment that a plant or animal lives in.
Habitats Directive	Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora (the Habitats Directive) is the European Union Directive from which the requirement for the consideration of potential impacts of the MHPGC Project upon sites designated within the National Site Network is derived.
Habitats Regulations	A term commonly used to refer to the collective legislation that translates the Habitats Directive (Directive 92/43/ECC) and the Wild Birds Directive (Directive 2009/147/EC) into specific legal obligations in Scotland and England. Namely: the Conservation (Natural Habitats, &c.) (as amended) Regulations 1994 (applies in Scotland out to 12nm); the Conservation of Habitats and Species Regulations (as amended) 2017 (applies in England out to 12nm and in Scotland for reserved activities); and the Conservation of Offshore Marine Habitats and Species Regulations (as amended) 2017 (applies in English and Scottish waters beyond 12nm). These Regulations provide the legal framework for the protection of European sites, including Special Areas of Conservation (SACs) and Special Protection Areas (SPAs), and underpin the Habitats Regulations Assessment/Appraisal (HRA) process.
Hertz (Hz)	Hz is a unit of frequency that measures how often a sound wave cycles per second. Specifically, 1Hz means one cycle per second, and in audio, indicates how fast sound waves vibrate. Faster vibrations correspond to higher pitches, while slower vibrations produce lower pitches.
High order Unexploded Ordnance (UXO) clearance	The clearance of unexploded ordnance using high-order detonation.

High Voltage Alternating Current (HVAC)	A HVAC electric power transmission system uses alternating current for electric power transmission that periodically reverses direction at regular intervals.
High Voltage Direct Current (HVDC)	A HVDC electric power transmission system uses direct current for electric power transmission, in contrast to the more common alternating current systems. Most HVDC links use voltages between 100 kilovolts (kV) and 800kV.
Impact	A change caused by an action that occurs during a project's lifetime.
Impulsive sound	Sound that is broadband, extremely short in duration, with a rapid rise time and a peak level higher than its energy-averaged level.
Inter-related effects	Effects that may arise from the interactions between different EIA topic effects considered within the project-alone assessment, potentially leading to more significant effects than if they were to be considered in isolation.
Landfall	The area in which the offshore export cables make landfall (come ashore) and the transitional area between the trenchless technique exit pits and the transition joint bay inclusive of all construction works.
Low order UXO clearance	Applying techniques like deflagration to neutralize UXOs without causing a high order explosion, thereby reducing sound levels.
Magnitude	A combination of the spatial extent, duration, frequency and reversibility of an impact.
Marine Directorate Licensing Operations Team (MD-LOT)	The part of the Scottish Government's Marine Directorate responsible for assessing and administering applications for marine licences and Section 36 consent (offshore) in Scotland.
Marine Management Organisation (MMO)	The MMO, as a UK government body, is responsible for licensing, regulating and overseeing activities in the marine environment for English waters. For a DCO and deemed marine licence, the MMO acts as a statutory consultee, advising on marine planning, environmental impacts, habitats and compliance with marine licensing regulations
Maximum Design Scenario (MDS)	The realistic worst case scenario, selected on a topic-specific and impact specific basis, from a range of potential parameters for the MHPGC Project.
Mean High Water Springs (MHWS)	The most inshore level location reached by the sea at high tide during mean high water spring tide. This is defined as the average tidal height throughout the year, of two successive high waters, during a 24-hour period in each month when the range of the tide is at its greatest.
Mean Low Water Springs (MLWS)	The average height of the low water levels of each pair of successive low waters during the periods of about 24 hours when the tidal range is at its greatest.
Morven Branxton Area Grid Connection Project (hereafter 'MBAGC Project')	The Morven Branxton Area Grid Connection Project will be comprised of the offshore export cable in Scottish waters from the Morven North or the Morven South Offshore Substation Platforms, the onshore export cable and the onshore land substation in the vicinity of Branxton in East Lothian, Scotland.
Morven Hawthorn Pit Grid Connection Project	The MHPGC Project is comprised of the offshore export cables in Scottish and English waters from the Morven North or the Morven South offshore substation platform(s) (OSPs), landfall, onshore

	export cables, the onshore land substation (LSS) and AC connection cables. Also referred to in this report as the MHPGC Project, for ease of reading.
MHPGC Project Environmental Statement (ES)	The document presenting the results of the Environmental Impact Assessment process.
MHPGC Project Evidence Plan Process (EPP)	A voluntary consultation process with specialist stakeholders to agree the approach to, and information to support, the EIA and Habitats Regulations Assessment processes for certain topics.
MHPGC Project Habitats Regulations Appraisal/ Habitats Regulations Assessment (HRA) Screening Report	A HRA Screening Report is Stage 1 of the HRA process and screens in sites within the National Site Network, and qualifying features, for consideration within Stage 2 of the HRA process. The HRA Screening Report for the MHPGC Project will be submitted to PINS and MD-LOT to obtain an opinion on which sites within the National Site Network, and qualifying features, should be screened in for consideration within the MHPGC Project Report to Inform the Appropriate Assessment (RIAA).
MHPGC Project PEIR Red Line Boundary	The area within which all components of the MHPGC Project will be located, including areas required on a temporary basis during construction and/or decommissioning (such as construction compounds).
MHPGC Project Marine Protected Area (MPA) and Marine Conservation Zone (MCZ) Assessment	The MPA and MCZ Assessment is a process used to evaluate whether a proposed activity could have a significant impact on designated nature conservation MPAs (in Scotland) or MCZs and HPMAAs (in England). It ensures that the development does not hinder the conservation objectives of the protected features of these sites, as required under the Marine (Scotland) Act 2010 (Scotland) and the Marine and Coastal Access Act 2009. The MPA/MCZ Assessment for the MHPGC Project will consider whether the activities subject to the relevant application (i.e. activities subject to a marine licence application and DCO consent) can hinder the conservation objectives of a protected feature in a nature conservation MPA, MCZ or HPMA.
MHPGC Project Preliminary Environmental Information Report (PEIR)	A report that provides a preliminary environmental information in accordance with the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017. This is information that enables consultees to understand the likely significant environmental effects of a project and which helps to inform consultee responses.
MHPGC Project Report to Inform Appropriate Assessment (RIAA)	A report prepared by the Applicant containing information that the Competent Authority needs to inform an Appropriate Assessment at Stage 2 of the HRA process. The MHPGC Project will consider whether the MHPGC Project could have adverse effects, either alone or in-combination with other plans or projects, on the integrity of the National Site Network for which the likely significant effects has been previously established.
MHPGC Project Scoping Boundary	The spatial extent of the area used to define the environmental baseline to inform impact assessments at the time the Scoping Report was submitted.
MHPGC Project Scoping Report	A Scoping Report for the MHPGC Project. scoping the likely significant effects of the project on the environment, was submitted and accepted by Planning Inspectorate (PINS) and submitted to the

	Scottish Ministers, via the Marine Directorate - Licencing Operations Team (MD-LOT) in February 2025.
MHPGC Project Scoping Opinions	Separate scoping opinions received from PINS (on behalf of the Secretary of State) and MD-LOT (on behalf of the Scottish Ministers) in response to the MHPGC Scoping Report. The MHPGC Scoping Opinions contain the range of issues that PINS, and MD-LOT in consultation with statutory stakeholders, have identified should be considered within the EIA process.
Morven North Offshore Wind Array Project (hereafter 'Morven North')	The Morven North Offshore Wind Array Project which includes the wind turbines and foundations, Offshore Substation Platforms (OSP(s)) and foundations, inter-array and inter-connector cables and associated infrastructure located within the Morven North Boundary.
Morven North Offshore Wind Array Project and Morven South Offshore Wind Array Project (hereafter 'Morven North and Morven South')	Morven North and Morven South comprises the Morven North Offshore Wind Array Project and the Morven South Offshore Wind Array Projects collectively.
Morven South Offshore Wind Array Project (hereafter 'Morven South')	The Morven South Offshore Wind Array Project, which includes the wind turbines and foundations, OSP(s) and foundations, inter-array and inter-connector cables and associated infrastructure located within the Morven South Boundary.
Morven Programme	The Morven Programme comprises the MHPGC Project, Morven North, Morven South and MBAGC Project collectively.
National Grid Hawthorn Pit Substation	The National Grid substation at Hawthorn Pit, County Durham, which the Alternating Current (AC) connection cables will connect into from the Onshore Land Substation.
National Policy Statement (NPS)	Policy statements published by the Department for Energy Security and Net Zero and designated under the Planning Act 2008, setting out national policy for Nationally Significant Infrastructure Projects (NSIPs).
NatureScot (NS)	NS is the Scottish Government's nature agency responsible for protecting and promoting Scotland's natural heritage. For a marine licence in Scottish waters, NS advises on impacts to Scottish habitats, species, and designated sites.
Natural England (NE)	NE is the UK Government's statutory adviser on the natural environment, focusing on conserving biodiversity, landscapes, and access to nature. For a DCO and marine licence, NE provides statutory and technical advice to competent authorities on potential effects on designated sites, habitats, and protected species, supporting environmental assessment and decision-making.
Noise	The terms noise and sound are often used interchangeably. Noise usually refers to unwanted or disturbing sounds that interfere with normal hearing and can be unpleasant or harmful. It is often characterised by irregularities in the sound waves and is considered a form of sound pollution.
Non-impulsive sound	Sound that is continuous or occurs intermittently but does not exhibit the distinctive features associated with impulsive sound.
Offshore export cables	High voltage direct current (HVDC) cables which bring electricity from either the Morven North OSP or the Morven South OSP to the transition joint bay (TJB) at landfall.

Offshore export cable corridor	The proposed offshore area in which the offshore export cables will be laid, from either the Morven North Offshore Substation Platform (OSP) or Morven South OSP to the Transition Joint Bay (TJB) at landfall.
Offshore substation platforms (OSP(s))	OSP(s) comprise the support structure, topside and electrical components used for collecting the electricity generated by the wind turbine generators, in Scottish waters, for the passage or transmission to landfall. These OSP(s) can be divided into two types: • HVAC (High Voltage Alternating Current) collector substations; • HVDC converter substations.
Operations and maintenance phase (O&M)	The operational and maintenance phase of the MHPGC Project.
Ordnance	Refers to military supplies, especially weapons and bombs.
Outline Cable Specification and Installation Plan (CSIP)	An outline plan describing cable installation, burial, protection and monitoring, including a Cable Burial Risk Assessment. The CSIP is intended to manage interactions with the seabed and other marine receptors, including navigation, the environment, and other legitimate sea users such as commercial fisheries.
Outline Marine Mammal Mitigation Protocol (MMMP)	Outline protocol to specify measures for minimising disturbance and injury to marine mammals during offshore construction and survey activities, which could include monitoring, Marine Mammal Observers (MMObs), Passive Acoustic Monitoring (PAM), and Acoustic Deterrent Devices (ADDs).
Outline Vessel Traffic Management Plan (VTMP)	Outline plan to detail how vessels will be managed during offshore works, including routeing, scheduling, safety procedures and coordination to minimise environmental and navigational risks.
Particle motion	Transport of particles through water or sediment.
Pascal (Pa)	In the context of sound, Pa is the unit of measurement for sound pressure. It represents the force per unit area, equivalent to Newtons (N) per square metre.
Peak sound pressure level	20 times the logarithm to the base 10 of the ratio of the maximum sound pressure magnitude within a specified time interval to the specified reference value in decibels. The reference value in underwater acoustics is 1µPa.
Permanent Threshold Shift (PTS)	A permanent, irreversible increase in the threshold of audibility at a specified frequency or portion of an individual's hearing range above a previously established reference level.
Philopatric	The tendency of an organism to stay in or habitually return to a particular area.
Phocid	One of the three groups of pinnipeds, encompassing earless seals or 'true' seals.
Pinnipeds	Infraorder of marine mammals including true and eared seals (Phocidae), sea lions (Otaridae), and walruses (Odobenidae).
Planning Inspectorate (PINS)	The PINS is an executive agency of the UK Government responsible for administering and examining DCO applications for Nationally Significant Infrastructure Projects (NSIPs) in England. PINS manages the application process, oversees consultation and

	examination, and makes a recommendation to the relevant Secretary of State on whether consent should be granted.
Primary mitigation	Measures included as part of the location or design of the MHPGC Project made during the pre-application phase that are an inherent part of the MHPGC Project and do not require additional action to be taken. This includes modifications arising through the iterative design process. These measures will be secured through the consent itself through the description of the MHPGC Project, the parameters and associated commitments secured by the DCO and marine licence, or both.
Receptor	A specific environmental feature, resource, population or asset that may be affected by the MHPGC Project, either directly or indirectly, and which falls within the environmental topics considered under the EIA Regulations.
Residual effects	Effects that continue to exist after mitigation has been applied.
Root-mean-square (rms) Sound Pressure Level (SPLrms)	The Sound Pressure Level calculated using the square root of the integral of the squared sound pressure over a specified time interval, divided by the duration of the time interval, for a specified frequency range. It provides a measure of the average sound pressure level by smoothing short-term fluctuations in the acoustic signal.
Secondary mitigation	Actions that will require further activity to achieve the anticipated outcome and may be imposed as part of the planning consent, or through inclusion in the ES. These include measures required to reduce the significance of environmental effects and may be secured through an environmental management plan. For secondary mitigation measures, both pre-mitigation and residual effects are presented.
Significance	Effect factor that is determined by the magnitude of impact along with the sensitivity of the receptor.
Sound	The terms noise and sound are often used interchangeably. Sound is a broad term that refers to any auditory experience created by vibrations that travel through a medium such as air, water, or solids to the ear.
Sound Exposure Level (SEL)	A metric used to measure the cumulative noise energy to which a receiver is exposed over a specified time period. It is defined as ten times the logarithm to the base 10 of the ratio of sound exposure to the reference sound exposure. In underwater acoustics, the reference sound exposure is $1\mu\text{Pa}^2\text{s}$ and SEL is expressed in decibels (dB re $1\mu\text{Pa}^2\text{s}$).
Sound pressure	Measurement of the resulting change in pressure due to particle vibration in fluid or gas.
Sound Pressure Level (SPL)	A metric used to measure the magnitude of pressure variation caused by a sound wave relative to a specified reference pressure. It is defined as 20 times the logarithm to the base 10 of the ratio of the measured sound pressure to the reference sound pressure. In underwater acoustics, the reference pressure is $1\mu\text{Pa}$, and SPL is expressed in decibels (dB re $1\mu\text{Pa}$).
Sound speed profile	The variation of sound speed with depth in water, determined by temperature, salinity, and pressure.

Special Area of Conservation (SAC)	A site designation specified in the Habitats Directive (Council Directive 92/43/EEC) and protected in the UK under the Conservation (Natural Habitats, &c.) Regulations 1994 (in Scotland), the Conservation of Habitats and Species Regulations 2017 (in England) and Conservation of Offshore Marine Habitats and Species Regulations 2017 (in Scotland and England). Each site is designated for one or more of the habitats and species listed in the Directive. The Habitats Directive requires the necessary conservation measures to be established involving, if need be, appropriate management plans for each SAC to ensure the favourable conservation status of the habitats or species for which it was designated.
Statutory consultee	Organisations that are required to be consulted by an applicant pursuant to section 42 of the Planning Act 2008 in relation to an application for development consent. Not all consultees will be statutory consultees.
the Study Area	For each environmental topic, the baseline environment will be characterised, and the likely significant effect will be described within a topic-specific Study Area. Specific Study Areas are defined for each topic based on the characteristics of the receiving environment and the nature and extent of the likely significant effects associated with the MHPGC Project.
Temporary Threshold Shift (TTS)	A recoverable reversible increase in the threshold of audibility.
Tertiary mitigation	Actions that would occur with or without input from the EIA process feeding into the design. These include actions that will be undertaken to meet other existing legislative requirements, or actions that are considered to be standard practices used to manage commonly occurring environmental effects.
Transboundary effects	Assessment of likely significant effects resulting from MHPGC Project on the interests of another European Economic Area (EEA) state(s).
Transboundary impact	Potential impacts resulting from MHPGC Project and affecting another European Economic Area (EEA) state.
Underwater sound	Sound that travels through water, made by natural sources like animals or by human activities like vessels and construction activities.
Unexploded Ordnance (UXO)	Unexploded ordnance are explosive weapons (e.g. bombs, shells, grenades, land mines, naval mines, etc.) that did not explode when they were employed and still pose a risk of detonation, potentially many decades after they were used or discarded.
Zone of Influence (Zoi)	The area within which impacts arising from the MHPGC Project could occur upon receptors.

Acronyms

Acronym	Meaning
ADD	Acoustic Deterrent Device
ASCOBANS	Agreement on the Conservation of Small Cetaceans of the Baltic, Northeast Atlantic, Irish and North Seas

AUD INJ	Auditory injury
BEIS	Department for Business, Energy and Industrial Strategy
BNG	Biodiversity Net Gain
CBRA	Cable Burial Risk Assessment
CEA	Cumulative Effect Assessment
CES	Coastal East Scotland
CFE	Controlled Flow Excavation
CGNS	Celtic and Greater North Sea
CIEEM	Chartered Institute for Ecology and Environmental Management
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CLV	Cable Lay Vessel
COLREG	International Regulations for Preventing Collisions at Sea
C-POD	Cetacean Porpoise Detector
CPS	Cable Protection Plan
CPT	Core Penetration Testing
CPT	Cone Penetration Tests
CSIP	Cable Specification and Installation Plan
CSV	Construction Support Vessel
CTV	Crew Transfer Vessel
CTV	Crew Transport Vessel
DAS	Digital Aerial Surveys
DCO	Development Consent Order
Defra	Department for Environment, Food and Rural Affairs
DESNZ	Department for Energy Security and Net Zero
DML	Deemed Marine Licence
DSV	Dive Support Vessel
ECC	Export Cable Corridor
eDNA	Environmental Deoxyribonucleic Acid
EDR	Effective Deterrent Range
EEA	European Economic Area
EIA	Environmental Impact Assessment
EMF	Electromagnetic Field
EPP	Evidence Plan Process
EPS	European Protected Species
ES	Environmental Statement
EU	European Union

EWG	Expert Working Group
GES	Good Environmental Status
GNS	Greater North Sea
GV	Guard Vessel
FCS	Favourable Conservation Status
HDD	Horizontal Directional Drilling
HF	High Frequency
HPMA	Highly Protected Marine Area
HRA	Habitat Regulations Appraisal/Assessment
IAMMWG	Inter-Agency Marine Mammal Working Group
ICES	International Council for the Exploration of the Sea
IEF	Important Ecological Features
IEMA	Institute of Environmental Management and Assessment
IMO	International Maritime Organisation
INCA	Industry Nature Conservation Association
IROPI	Imperative Reasons of Overriding Public Interest
ISEP	Institute of Sustainability and Environmental Professionals
ISV	Installation Support Vessel
JCDP	Joint Cetacean Data Programme
JNCC	Joint Nature Conservation Committee
KP	Kilometre Point
LF	Low Frequency
LSE	Likely Significant Effects
MAG	Magnetometer
MBAGC	Morven Branxton Area Grid Connection
MBES	Multi Beam Echo Sounder
MCZ	Marine Conservation Zone
MD-LOT	Marine Directorate – Licensing Operations Team
MDS	Maximum Design Scenario
MHPGC	Morven Hawthorn Pit Grid Connection
MHWS	Mean High Water Springs
MLWS	Mean Low Water Springs
MMMP	Marine Mammal Mitigation Plan
MMO	Marine Management Organisation
MMOb	Marine Mammal Observer
MPA	Marine Protected Area
MPCP	Marine Pollution Contingency Plan

MPS	Marine Policy Statement
MSFD	Marine Strategy Framework Directive
MU	Management Unit
ncMPA	Nature Conservation Marine Protected Area
NEQ	Net Explosive Quantity
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Association
NPPF	National Planning Policy Framework
NPS	National Policy Statements
NRW	Natural Resources Wales
NSIP	Nationally Significant Infrastructure Project
O&M	Operations and Maintenance
OEMP	Offshore Environmental Management Plan
OIPMP	Offshore In-Principal Monitoring Plan
OSP	Offshore Substation Platform
OSPAR	Oslo-Paris Convention for the Protection of the Marine Environment of the Northeast Atlantic
OWF	Offshore Wind Farm
PEIR	Preliminary Environmental Information Report
PINS	Planning Inspectorate
PLGR	Pre-Lay Grapnel Run
PTS	Permanent Threshold Shift
PW	Phocid pinnipeds in Water
RIAA	Report to Inform the Appropriate Assessment
ROV	Remotely Operated Vehicle
SAC	Special Area of Conservation
SBES	Single Beam Echo-Sounding
SBP	Sub-Bottom Profiling/Profiler
SCANS	Small Cetacean Abundance in the North Sea
SCOS	Special Committee on Seals
SEL	Sound Exposure Level
SEL _{cum}	Cumulative Sound Exposure Level
SEL _{ss}	Sound Exposure Level Single Strike
SMU	Seal Monitoring Unit
SNCB	Statutory Nature Conservation Body
SoS	Secretary of State
SOV	Service Operation Vessel

SPA	Special Protection Area
SPL	Sound Pressure Level
SPL _{pk}	Peak Sound Pressure Level
SPL _{rms}	root mean square Sound Pressure Level
SSC	Suspended Sediment Concentration
SSS	Side Scan Sonar
TSV	Trenching Support Vessel
TTS	Temporary Threshold shift
UHRs	Ultra-High Resolution Seismic
UK	United Kingdom
USBL	Ultra-Short Baseline
USV	Uncrewed Surface Vessel
UXO	Unexploded Ordnance
VC	Vibrocoring
VHF	Very High-Frequency
VTMP	Vessel Traffic Management Plan
ZoI	Zone of Influence

Units

Unit	Meaning
dB	Decibel
°C	Degrees Celsius
Hz	Hertz
kg	Kilogram
kHz	Kilohertz
km	Kilometre
m	Metre
nm	Nautical Mile

5 Marine Mammals

5.1 Introduction

- 5.1.1.1 This chapter of the Preliminary Environmental Information Report (PEIR) presents the preliminary findings of the Environmental Impact Assessment (EIA) work undertaken to date for the Morven Hawthorn Pit Grid Connection Project (hereafter 'MHPGC Project'), as described in **Volume 1, Chapter 2: Project Description, of the PEIR**.
- 5.1.1.2 This chapter considers the potential impacts and effects on marine mammals that could result from the construction, operation and maintenance (O&M) and decommissioning phases of the MHPGC Project. Specifically, it relates to the offshore elements of the MHPGC Project from the offshore substation platform(s) (OSPs) within Morven North Offshore Wind Array Project or Morven South Offshore Wind Array Project (hereafter 'Morven North and Morven South') located within Scottish offshore waters, transiting through English offshore and inshore waters, to Mean High Water Springs (MHWS) at landfall.
- 5.1.1.3 This chapter describes the methodology, datasets that have informed the assessment, baseline conditions, including future baseline, mitigation measures and the preliminary residual effects on marine mammals that could result from the MHPGC Project.
- 5.1.1.4 The marine mammal chapter is informed by the following chapters of the PEIR:
- **Volume 1, Chapter 2: Project Description, of the PEIR;**
 - **Volume 1, Chapter 3: Site Selection & Consideration of Alternatives, of the PEIR;**
 - **Volume 1, Chapter 4: Approach to Environmental Impact Assessment, of the PEIR;**
 - **Volume 1, Chapter 5: Policy and Legislation, of the PEIR;**
 - **Volume 2, Chapter 3: Benthic Subtidal and Intertidal Ecology, of the PEIR;**
 - **Volume 2, Chapter 4: Fish and Shellfish Ecology, of the PEIR;**
 - **Volume 2, Chapter 8: Shipping and Navigation, of the PEIR;**
 - **Volume 4, Chapter 5: Inter-related Effects, of the PEIR.**
- 5.1.1.5 The chapter also draws on information contained within the following annexes of the PEIR:
- **Volume 1, Annex 4.1: Draft Commitments Register, of the PEIR;**
 - **Volume 1, Annex 4.2: Transboundary Screening, of the PEIR;**
 - **Volume 1, Annex 4.3: Cumulative Screening and Location Plan, of the PEIR;**
 - **Volume 2, Annex 4.1: Herring and Sandeel Assessment, of the PEIR;**
 - **Volume 2, Annex 5.1: Underwater Sound Modelling Report, of the PEIR.**
- 5.1.1.6 The chapter also draws on information contained within the following reports:
- **MHPGC Project Habitat Regulations Appraisal/Habitats Regulations Assessment (HRA) Screening Report, prepared to accompany the PEIR;**
 - **MHPGC Project Report to Inform Appropriate Assessment (RIAA), prepared to accompany the PEIR;**
 - **MHPGC Project Marine Protected Area, Marine Conservation Zone and Highly Protected Marine Area Screening and Assessment Approach Technical Note, prepared to accompany the PEIR.**
- 5.1.1.7 This PEIR will offer a comprehensive overview of the MHPGC Project's preliminary assessment of likely significant environmental effects and the mitigation measures proposed. The PEIR presents relevant information to stakeholders to support review and consultation and will also be informed by the ongoing pre-application consultation process outlined in **Section 5.2.6**.
- 5.1.1.8 Following statutory consultation, consultation responses will be reviewed and considered in preparation of the Environmental Statement (ES) that will accompany the application to the Planning Inspectorate (PINS) for development consent and the marine licence application(s) to Marine Directorate Licensing Operations Team (MD-LOT).

5.2 Legislative and policy context

5.2.1 Overview

- 5.2.1.1 The full relevant legislation and policy context for the MHPGC Project has been detailed in **Volume 1, Chapter 5: Policy and Legislation, of the PEIR**. This section sets out the legislation and planning policy that is relevant to the marine mammal assessment.

5.2.2 Legislation

International

Marine Strategy Framework Directive (2008/56/EC)

- 5.2.2.1 The overarching aim of the Marine Strategy Framework Directive (MSFD; 2008/56/EC) is to protect Europe's marine waters through an ecosystem-based approach to the management of human activities and to achieve or maintain Good Environmental Status (GES) of the marine environment. The MSFD establishes a framework for the development of marine strategies, including the assessment of pressures and impacts on marine ecosystems. The UK retained aspects of the MSFD framework following EU Exit through the Marine Strategy Regulations 2010 and related legislation, as described in more detail below,

Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) 1973

- 5.2.2.2 CITES regulates the international trade in certain species of wild fauna and flora, including marine mammal species and products derived from them, to ensure that international trade does not threaten their survival.

Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention) 1979

- 5.2.2.3 The Bonn Convention provides a global platform for the conservation and sustainable use of migratory species including whales and dolphins, through international cooperation.

Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) 1979

- 5.2.2.4 The Bern Convention promotes the conservation of wild flora and fauna and their natural habitats. Its provisions are implemented through United Kingdom (UK) legislation through the Wildlife and Countryside Act 1981 (as amended) and the Nature Conservation (Scotland) Act 2004 (as amended).

Agreement on the Conservation of Small Cetaceans of the Baltic, Northeast Atlantic, Irish and North Seas (ASCOBANS) 1992

- 5.2.2.5 ASCOBANS aims to achieve and maintain a favourable conservation status for populations of small cetaceans through international cooperation and the implementation of conservation measures throughout the Agreement Area.

Convention on Biological Diversity 1993

- 5.2.2.6 The Convention on Biological Diversity establishes a global framework for the conservation and sustainable use of biological diversity, including marine species, habitats and ecosystem functioning.

Oslo-Paris Convention for the Protection of the Marine Environment of the Northeast Atlantic (OSPAR Convention) 1998

- 5.2.2.7 The OSPAR Convention provides the framework for cooperation between Contracting Parties to protect the marine environment of the Northeast Atlantic, including the conservation of threatened and/or declining marine species and habitats.

National legislation

- 5.2.2.8 As the MHPGC Project extends from Scottish offshore waters to an English landfall, legislation applicable within both English and Scottish jurisdictions has been considered where relevant to marine mammal receptors.

United Kingdom

Marine and Coastal Access Act 2009

- 5.2.2.9 The Marine and Coastal Access Act 2009 establishes the legal framework for marine planning, licensing and marine conservation in UK waters to help ensure clean, healthy, safe, productive and biologically diverse oceans and seas.

The Marine Strategy Regulations 2010

- 5.2.2.10 The Marine Strategy Regulations 2010 transpose the European Union (EU) MSFD (2008/56/EC) into UK legislation and require the UK to take the necessary measures to achieve or maintain GES through the development of a UK Marine Strategy.

The Conservation of Offshore Marine Habitats and Species Regulations 2017 (as amended)

- 5.2.2.11 The Conservation of Offshore Marine Habitats and Species Regulations 2017 (as amended¹) provide protection for internationally important marine habitats and species within the UK Offshore Marine Area (beyond the 12 nautical mile (nm) limit) and establish the legislative framework for the protection and management of offshore European sites (UK Government, 2017).
- 5.2.2.12 Under these Regulations, plans or projects that are likely to have a significant effect on a European site or European offshore marine site, either alone or in combination with other plans or projects, must be subject to a Habitats Regulations Assessment (HRA) (referred to in Scotland as Habitats Regulations Appraisal), including an Appropriate Assessment where required, in view of the site's conservation objectives. Where adverse effects on site integrity cannot be ruled out, consent may only be granted where the relevant legal tests, including imperative reasons of overriding public interest (IROPI) and appropriate compensatory measures, are satisfied.
- 5.2.2.13 The Regulations also provide protection for European Protected Species (EPS). All cetacean species occurring within UK waters are designated as EPS, making it an offence to deliberately capture, kill, injure or disturb these species except where permitted under the relevant licensing provisions.

The Wildlife and Countryside Act 1981 (as amended)

- 5.2.2.14 The Wildlife and Countryside Act 1981 (as amended) provide protection for listed wild animals and natural habitats. All cetaceans are protected under Schedule 5 of the Act, making it an offence to intentionally or recklessly kill, injure or disturb protected species in certain circumstances (UK Government, 2026).

Scottish waters

Marine (Scotland) Act 2010

- 5.2.2.15 The Marine (Scotland) Act 2010 establishes the legislative framework for marine planning and licensing in Scottish waters and places duties on Scottish Ministers and public authorities to further the achievement of sustainable development, including the protection and, where appropriate, enhancement of the health of that area.
- 5.2.2.16 Part 6 (Section 117) of the Marine (Scotland) Act 2010 provides enhanced protection for seals, including the designation of seal haul-out sites, where it is an offence to intentionally or recklessly harass seals in areas regularly used by seals for resting, moulting and/or breeding. The Act also regulates activities that may result in the killing, taking or injury of seals through a licensing system.

The Conservation (Natural Habitats, &c.) Regulations 1994 (as amended)

- 5.2.2.17 The Conservation (Natural Habitats, &c.) Regulations 1994 (as amended¹) transpose the requirements of the Habitats Directive (92/43/EEC) (EU, 1992) and relevant provisions of the Birds Directive (2009/147/EC) (EU, 2009) into Scottish law and provide protection for European sites and EPS in Scottish inshore territorial waters (out to the 12nm limit) (UK Government, 1994; 2019b).

¹ Following the UK's departure from the European Union (EU), the Conservation of Offshore Marine Habitats and Species Regulations 2017 (as amended) (UK Government, 2017) and the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 (UK Government, 2019a; 2019b) decoupled the previous regulations from EU Habitats Directive (92/43/EC) into UK legislation while maintaining stringent protections for designated sites.

Nature Conservation (Scotland) Act 2004

- 5.2.2.18 The Nature Conservation (Scotland) Act 2004 places duties on public bodies to further the conservation of biodiversity and strengthens wildlife enforcement legislation by extending offences relating to disturbance and harassment of cetaceans to include reckless, as well as intentional, acts.

The Protection of Seals (Designation of Haul-Out Sites) (Scotland) Order 2014

- 5.2.2.19 This Order designates protected seal haul-out sites throughout Scotland, providing additional legal protections against intentional or reckless harassment of seals at designated haul-out sites: locations on land where seals come ashore to rest, moult or breed.

English waters

The Conservation of Habitats and Species Regulations 2017 (as amended 2019)

- 5.2.2.20 The Conservation of Habitats and Species Regulations (2017) (amended 2019¹) transpose the requirements of the Habitats Directive (92/43/EEC) (EU, 1992) and relevant provisions of the Birds Directive (2009/147/EC) (EU, 2009) into UK legislation in English waters (UK Government, 2019a). These Regulations provide protection for European sites and EPS within English territorial waters (out to the 12nm limit).

Conservation of Seals Act 1970

- 5.2.2.21 The Conservation of Seals Act 1970 provides protection for seals in England, Wales and adjacent territorial waters through restrictions on the killing and taking of seals and establishing licensing provisions in specified circumstances.

Natural Environment and Rural Communities Act 2006 (Section 41)

- 5.2.2.22 Section 41 of the Natural Environment and Rural Communities Act 2006 identifies species of principal importance for the purposes of conserving biodiversity in England, including a number of marine mammal species (UK Government, 2023).

5.2.3 National policy context

English national planning policy

National Policy Statements

- 5.2.3.1 The Planning Act 2008 establishes the consenting framework for Nationally Significant Infrastructure Projects (NSIPs), including the Development Consent Order (DCO) process. National Policy Statements (NPS) set out the primary policy framework against which NSIPs are assessed and provide the guidelines, requirements and criteria that the MHPGC Project must meet to obtain consent and proceed with development. Table 5.1
- 5.2.3.2 **Table 5.1** provides details of the NPS provisions relevant to marine mammals and how and where they are covered in the PEIR:
- NPS for energy (EN-1) (Department for Energy Security and Net Zero (DESNZ), 2025a);
 - NPS for renewable energy infrastructure (EN-3) (DESNZ, 2025b);
 - NPS for electricity networks infrastructure (EN-5) (DESNZ, 2025c).

Table 5.1: Summary of the NPS provisions relevant to marine mammals

Summary of relevant NPS provisions	How and where considered in the PEIR
NPS EN-1	
Paragraph 5.4.18 "...Where the development is subject to EIA, the applicant should ensure that the Environmental Statement (ES) clearly sets out any effects on internationally, nationally, and locally designated sites of ecological or geological conservation importance (including those outside England), on protected species and on habitats and other species identified as	Internationally and nationally designated sites relevant to marine mammals are considered in Section 5.4.4 , with potential effects on relevant designated sites considered within the MHPGC Project HRA Screening Report, prepared to accompany the PEIR , and the MHPGC Project RIAA, prepared to accompany the PEIR .

Summary of relevant NPS provisions	How and where considered in the PEIR
being of principal importance for the conservation of biodiversity, including irreplaceable habitats. "	A detailed Marine Protected Area (MPA)/Marine Conservation Zone (MCZ) Assessment and Highly Protected Marine Area (HPMA) Ecosystem Level Assessment will be undertaken and submitted with the DCO application and Marine Licence application(s) to the Scottish Ministers [see further detail in Approach to Marine Protected Area/Marine Conservation Zone and Highly Protected Marine Area Assessments, prepared to accompany the PEIR].
Paragraph 5.4.20 to 5.4.22 "...The applicant should show how the project has taken advantage of opportunities to conserve and enhance biodiversity and geological conservation interests."	Measures have been incorporated as part of the MHPGC Project design and mitigation measures relevant to marine mammals are presented in Section 5.7 , with the full list of commitments provided in Volume 1, Annex 4.1: Draft Commitments Register, of the PEIR .
Paragraph 5.4.23 "...The design of energy NSIP proposals will need to consider the movement of mobile/migratory species such as birds, fish and marine and terrestrial mammals and their potential to interact with infrastructure. As energy infrastructure could occur anywhere within England and Wales, both inland and onshore and offshore, the potential to affect mobile and migratory species across the UK and more widely across Europe (transboundary effects) requires consideration, depending on the location of development."	The distribution and movement of marine mammals are considered within the baseline presented in Section 5.4 , and in the assessment of potential impacts in Section 5.8 . The wider regional and cumulative considerations, including the effects on transboundary species, are considered in Sections 5.9 and 5.10 , respectively.
Paragraph 5.4.34 to 5.4.35 "Applicants should consider any reasonable opportunities to maximise the restoration, creation, and enhancement of wider biodiversity..." and "Consideration should be given to improvements to, and impacts on, habitats and species in, around and beyond developments, for wider ecosystem services and natural capital benefits..."	The marine mammal baseline, including consideration of relevant species, populations and their ecological importance, is presented in Section 5.4 . Potential impacts on marine mammals, including indirect effects associated with impacts on prey species and habitats, are assessed in Section 5.8 , with mitigation measures presented in Section 5.7 .
Paragraph 5.4.36 "...Applicants should include appropriate avoidance, mitigation, compensation, and enhancement measures as an integral part of the proposed development. In particular, the applicant should demonstrate that: • During construction, they will seek to ensure that activities will be confined to the minimum areas required for the works; • The timing of construction has been planned to avoid or limit disturbance; • During construction and operation best practice will be followed to ensure that risk of disturbance or damage to species or habitats is minimised, including as a consequence of transport access arrangements; • Habitats will, where practicable, be restored after construction works have finished; • Opportunities will be taken to enhance existing habitats rather than replace them, and where practicable, create new habitats of value within the site landscaping proposals. Where habitat creation is required as mitigation, compensation, or enhancement, the location and quality will be of key importance. In this regard habitat creation should be focused on areas where the most ecological and ecosystems benefits can be realised;	Potential impacts on marine mammals associated with construction and operation of the MHPGC Project are assessed in Section 5.8 , with mitigation measures relevant to marine mammals presented in Section 5.7 . The full list of commitments provided in Volume 1, Annex 4.1: Draft Commitments Register, of the PEIR .

Summary of relevant NPS provisions	How and where considered in the PEIR
Mitigations required as a result of legal protection of habitats or species will be complied with."	
NPS EN-3	
Paragraphs 2.8.45 and 2.8.46 "...Given the scale of offshore wind deployment required to meet 2030 and 2050 ambitions, applicants will need to give close consideration to impacts on MPAs, either alone or in combination, and employ the mitigation hierarchy and if necessary, provide compensation (both individually and in combination with other plans or projects) which may be needed to approve their projects. It is likely that mitigation may include proactive measures to reduce the impact of deployment (e.g. micro-siting of offshore transmission routes to avoid vulnerable habitats, alternatives piling or trenching techniques, noise abatement technology, collision avoidance methods or, if necessary, compensation for habitat loss)."	Consideration has been given to MPAs in Section 5.4.4, including the identification of relevant sites [see Approach to Marine Protected Area/Marine Conservation Zone and Highly Protected Marine Area Assessments, prepared to accompany the PEIR]. A detailed MPA/MCZ Assessment and HPMA Ecosystem Level Assessment will be undertaken and submitted with the DCO application and Marine Licence application(s) to the Scottish Ministers
Paragraph 2.8.91 "In addition, Applicants should have regard to the specific ecological and biodiversity considerations that relate to proposed offshore renewable energy infrastructure developments, namely: - Fish - Intertidal and subtidal seabed habitats and species; - Marine mammals; - Birds; - Wider ecosystem impacts and interaction, and other relevant protected migratory species."	A detailed assessment of marine mammal ecology, baseline conditions and potential impacts associated with all phases of the MHPGC Project is provided within this chapter. The marine mammal baseline, including consideration of relevant species, population and their ecological importance, is presented in Section 5.4. Potential impacts on marine mammals associated with all phases of the MHPGC Project are assessed in Section 5.8, including underwater noise, vessel-related collision risk and indirect effects associated with impacts on prey species.
Paragraphs 2.8.94 and 2.8.87 "...Applicants must undertake a detailed assessment of the offshore ecological, biodiversity and physical impacts of their proposed development, for all phases of the lifespan of that development, in accordance with the appropriate policy for offshore wind farm (OWF) EIAs, HRAs and MCZ (Marine Conservation Zone); assessments."	A baseline for marine mammals is provided in Section 5.4, with an assessment of potential impacts associated with all phases of the MHPGC Project presented in Section 5.8. Potential effects on designated sites are considered within the MHPGC Project HRA Screening Report, prepared to accompany the PEIR, and the MHPGC Project RIAA, prepared to accompany the PEIR. A detailed MPA/MCZ Assessment and HPMA Ecosystem Level Assessment will be undertaken and submitted with the DCO application and Marine Licence application(s) to the Scottish Ministers [see further detail in Approach to Marine Protected Area/Marine Conservation Zone and Highly Protected Marine Area Assessments, prepared to accompany the PEIR].
Paragraphs 2.8.95 to 2.8.96 "...Applicants need to consider environmental and biodiversity net gain as set out in Section 4.6 of EN-1 and the Environment Act 2021. Applicants should assess the potential of their proposed development to have net positive effects on marine ecology and biodiversity, as well as negative effects."	Potential positive and negative effects on marine mammals associated with the MHPGC Project are assessed in Section 5.8, with mitigation measures relevant to marine mammals presented in Section 5.7.
Paragraphs 2.8.97 to 2.8.99 "...Applicants should consult at an early stage of pre-application with relevant statutory consultees and energy not-for profit organisations/non-governmental organisations as appropriate, on the assessment	A summary of consultation undertaken for the MHPGC Project relevant to marine mammals is presented in Section 5.2.6, including consultation with the relevant SNCBs on the assessment methodology, baseline data and potential mitigation measures.

Summary of relevant NPS provisions	How and where considered in the PEIR
methodologies, baseline data collection, and potential avoidance, mitigation and compensation options which should be undertaken. In developing proposals applicants must refer to the most recent best practice advice originally provided by Natural England under the Offshore Wind Enabling Action Programme and/or their relevant Statutory Nature Conservation Body (SNCB). Any relevant data that has been collected as part of post-construction ecological monitoring from existing operational offshore windfarms should be referred to where appropriate."	
Paragraphs 2.8.120 to 2.8.121 "...Where necessary, assessment of the effects on marine mammals should include details of: • Likely feeding areas impacts on prey species and prey habitat; • Known birthing areas/haul-out sites for breeding and pupping; • Migration routes; • Protected sites; • Baseline noise levels; • Predicted construction and soft start noise levels in relation to mortality, permanent threshold shift (PTS), temporary threshold shift (TTS) and disturbance; • Operational noise; • Duration and spatial extent of the impacting activities including cumulative/in combination effects with other plans or projects; • Collision risk; • Entanglement risk; • Barrier risk. The scope, effort and methods required for marine mammal surveys and impact assessments should be discussed with the relevant SNCB."	The scope, methodology and data sources used to inform the marine mammal assessment have been discussed with the relevant SNCBs through the pre-application consultation process, as summarised in Section 5.2.6. Section 5.4 considers relevant marine mammal species and populations, including distribution, migration routes, known birthing areas and/or haul-out sites, and likely feeding areas. Section 5.8 considers the potential impacts on marine mammals, including underwater noise during all phases of the MHPGC Project, collision risk associated with vessel activity, and indirect effects associated with impacts on prey species. Potential effects on relevant protected sites are considered within the MHPGC Project HRA Screening Report, prepared to accompany the PEIR and MHPGC Project RIAA, prepared to accompany the PEIR. A detailed MPA/MCZ Assessment and HPMA Ecosystem Level Assessment will be undertaken and submitted with the DCO application and Marine Licence application(s) to the Scottish Ministers [see further detail in Approach to Marine Protected Area/Marine Conservation Zone and Highly Protected Marine Area Assessments, prepared to accompany the PEIR]. Cumulative effects from other plans and projects are considered in Section 5.9.
Paragraphs 2.8.122 to 2.8.124 "...The applicant should discuss any proposed noisy activities with the relevant statutory body and must reference the joint Joint Nature Conservation Committee (JNCC) and SNCB underwater noise guidance, and any successor of this guidance, in relation to noisy activities (alone and in combination with other plans or projects) within Special Areas of Conservation (SAC), Special Protection Areas (SPA) and Ramsar sites, in addition to the JNCC mitigation guidelines for piling, explosive use, and geophysical surveys. Natural Resources Wales (NRW) has a position statement on assessing noisy activities which should also be referenced where relevant. Where the assessment identifies that noise from construction and Unexploded Ordnance (UXO) clearance may reach noise levels likely to lead to noise thresholds being exceeded (as detailed in the JNCC guidance) or an offence as described in paragraph 2.8.127 to 2.8.129 above is committed, the applicant must look at possible alternatives or appropriate mitigation. The applicant should develop a Site Integrity Plan or alternative assessments for projects in English and Welsh waters to allow the cumulative impacts of underwater noise	The MHPGC Project has undertaken underwater sound propagation modelling for activities that generate sound, as detailed in Volume 2, Annex 5.1: Underwater Sound Modelling Report, of the PEIR, with results used to inform the assessments of potential impact on marine mammals associated with underwater sound generating activities in Section 5.8. The assessment has been informed by relevant JNCC and SNCB underwater noise guidance, and JNCC marine mammal mitigation guidance. The marine mammal assessment methodology, including scope of assessment and review of preliminary underwater sound modelling outputs, has been discussed with the relevant SNCB through the Evidence Plan Process (EPP), as summarised in Section 5.2.6. The Applicant is developing an Outline Marine Mammal Mitigation Plan (MMMP; CoT36) to be submitted with the DCO and Marine Licence application(s), as described in Section 5.7, which will set out measures to reduce the potential for injury and

Summary of relevant NPS provisions	How and where considered in the PEIR
to be reviewed closer to the construction date, when there is more certainty in other plans and projects.”	disturbance to marine mammals arising from underwater sound-generating activities. No underwater sound generating activities are located within nationally designated sites; potential effects on protected sites are considered through the MHPGC Project HRA Screening Report, prepared to accompany the PEIR and the MHPGC Project RIAA, prepared to accompany the PEIR. A detailed MPA/MCZ Assessment and HPMA Ecosystem Level Assessment will be undertaken and submitted with the DCO application and Marine Licence application(s) to the Scottish Ministers [see further detail in Approach to Marine Protected Area/Marine Conservation Zone and Highly Protected Marine Area Assessments, prepared to accompany the PEIR]. Potential cumulative effects associated with underwater noise from other plans and projects are considered in Section 5.9.
NPS EN-5	
Paragraph 2.2.10 “...As well as having duties under Section 9 of the Electricity Act 1989, (in relation to developing and maintaining an economical and efficient network), applicants must take into account Schedule 9 to the Electricity Act 1989, which places a duty on all transmission and distribution licence holders, in formulating proposals for new electricity networks infrastructure, to “have regard to the desirability of preserving natural beauty, of conserving flora, fauna and geological or physiographical features of special interest and of protecting sites, buildings and objects of architectural, historic or archaeological interest; and ...do what [they] reasonably can to mitigate any effect which the proposals would have on the natural beauty of the countryside or on any such flora, fauna, features, sites, buildings or objects.”	The MHPGC Project undertook a detailed routing and siting exercise, as detailed in Volume 1 Chapter 3: Site Selection & Consideration of Alternatives, of the PEIR, which considered a wide range of environmental factors including biodiversity. Potential impacts on marine mammals are assessed in Section 5.8, with measures relevant to marine mammals are presented in Section 5.7. The full list of MHPGC Project commitments provided in Volume 1, Annex 4.1: Draft Commitments Register, of the PEIR.
Paragraph 2.13.21 “...The sensitivities of many coastal locations and of the marine environment as well as the potential environmental, community and other impacts in neighbouring onshore areas must be considered in the identification onshore connection points.”	The landfall design is summarised in Volume 1 Chapter 2: Project Description of the PEIR. Mitigation relevant to marine mammals is provided in Section 5.7, with the full list of commitments provided in Volume 1, Annex 4.1: Draft Commitments Register of the PEIR.
Paragraph 2.14.2 “...The applicant should demonstrate: • how environmental, community and other impacts have been considered and how adverse impacts have followed the mitigation hierarchy i.e. avoidance, reduction and mitigation of adverse impacts through good design; • how enhancements to the environment post construction will be achieved including demonstrating consideration of how proposals can contribute towards biodiversity net gain (as set out in Section 4.5 of EN-1 and the Environment Act 2021), as well as wider environmental improvements in line with the Environmental Improvement Plan and environmental targets (paragraph 4.2.29 of EN-1). In addition, all applicants are encouraged to demonstrate how the construction planning for the proposals has been	The MHPGC Project undertook a detailed routing and siting study, as detailed in Volume 1 Chapter 3: Site Selection & Consideration of Alternatives, of the PEIR, which considered a wide range of environmental factors including biodiversity. Potential impacts on marine mammals are assessed in Section 5.8, with mitigation measures relevant to marine mammals presented in Section 5.7 and follow the mitigation hierarchy. The full list of commitments provided in Volume 1, Annex 4.1: Draft Commitments Register, of the PEIR. Biodiversity net gain and wider environmental enhancements associated with the MHPGC Project are considered separately within the Biodiversity Net Gain Assessment, which will be submitted with the ES at DCO submission [see Volume 3, Annex: 3.14: Initial

Summary of relevant NPS provisions	How and where considered in the PEIR
coordinated with that for other similar projects in the area on a similar timeline.”	Biodiversity Net Gain Assessment, of the PEIR for further detail]. Potential cumulative effects, including consideration of other projects and plans, are assessed in Section 5.9 .

National Planning Policy Framework

- 5.2.3.3 The National Planning Policy Framework (NPPF) sets out national planning policies for England that are relevant to the determination of the MHPGC Project DCO application (UK Ministry of Housing, Communities & Local Government, 2024).
- 5.2.3.4 **Table 5.2** provides details of the NPPF provisions relevant to marine mammals and how and where these have been considered within the PEIR or will be covered within the ES.
- 5.2.3.5 The NPPF was updated in August 2026 and will be fully considered in the MHPGC Environmental Statement.

Table 5.2: Summary of NPPF requirements relevant to marine mammals

NPPF section	How and where this is considered in the PEIR
Section 15: Conserving and enhancing the natural environment Paragraph 187: “Planning policies and decisions should contribute to and enhance the natural and local environment by: a) protecting and enhancing valued landscapes, sites of biodiversity or geological value and soils (in a manner commensurate with their statutory status or identified quality in the development plan); b) recognising the intrinsic character and beauty of the countryside, and the wider benefits from natural capital and ecosystem services... d) minimising impacts on and providing net gains for biodiversity... e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability...”.	Potential impacts on marine mammals, including potential impacts associated with underwater noise, are assessed in Section 5.8. Relevant designated sites and their marine mammal features are considered in Section 5.4.4, with potential impacts on designated sites assessed within the MHPGC Project HRA Screening Report, prepared to accompany the PEIR, and MHPGC Project RIAA, prepared to accompany the PEIR. A detailed MPA/MCZ Assessment and HPMA Ecosystem Level Assessment will be undertaken and submitted with the DCO application and Marine Licence application(s) to the Scottish Ministers [see further detail in Approach to Marine Protected Area/Marine Conservation Zone and Highly Protected Marine Area Assessments, prepared to accompany the PEIR]. Any requirements for Biodiversity Net Gain (BNG) associated with the MHPGC Project will be considered separately within the BNG Assessment, results of which will be presented within the ES at DCO submission [see Volume 3, Annex: 3.14: Initial Biodiversity Net Gain Assessment, of the PEIR for further detail].
Paragraph 188 “Plans should: distinguish between the hierarchy of international, national and locally designated sites; allocate land with the least environmental or amenity value, where consistent with other policies in this Framework; take a strategic approach to maintaining and enhancing networks of habitats and green infrastructure; and plan for the enhancement of natural capital at a catchment or landscape scale across local authority boundaries”.	The MHPGC Project has considered the hierarchy of international, national and locally designated sites where relevant populations of marine mammals or features are identified. Details of relevant designated sites are provided in Section 5.4.4, with potential impacts assessed within the MHPGC Project HRA Screening Report, prepared to accompany the PEIR, and the MHPGC Project RIAA, prepared to accompany the PEIR. A detailed MPA/MCZ Assessment and HPMA Ecosystem Level Assessment will be undertaken and submitted with the DCO application and Marine Licence application(s) to the Scottish Ministers [see further detail in Approach to Marine Protected Area/Marine Conservation Zone and Highly Protected Marine Area Assessments, prepared to accompany the PEIR].

NPPF section	How and where this is considered in the PEIR
Habitats and biodiversity Paragraph 192 “To protect and enhance biodiversity and geodiversity, plans should: - Identify, map and safeguard components of local wildlife-rich habitats and wider ecological networks, including the hierarchy of international, national and locally designated sites of importance for biodiversity, wildlife corridors and stepping stones that connect them; and areas identified by national and local partnerships for habitat management, enhancement, restoration or creation; and - promote the conservation, restoration and enhancement of priority habitats, ecological networks and the protection and recovery of priority species; and identify and pursue opportunities for securing measurable net gains for biodiversity.”	Marine mammals, including protected species where relevant, are considered within the assessment in Section 5.8. Baseline information on marine mammal populations, distribution and ecological importance is provided in Section 5.4, with potential impacts and mitigation measures considered in Sections 5.8 and 5.7, respectively. Details of relevant designated sites and areas of marine conservation importance are provided in Section 5.4.4, with potential impacts assessed within the MHPGC Project HRA Screening Report, prepared to accompany the PEIR, and the MHPGC Project RIAA, prepared to accompany the PEIR. A detailed MPA/MCZ Assessment and HPMA Ecosystem Level Assessment will be undertaken and submitted with the DCO application and Marine Licence application(s) to the Scottish Ministers [see further detail in Approach to Marine Protected Area/Marine Conservation Zone and Highly Protected Marine Area Assessments, prepared to accompany the PEIR].
Paragraph 194 “The following should be given the same protection as habitats sites: - Potential Special Protection Areas and possible Special Areas of Conservation; - listed or proposed Ramsar sites; and - sites identified, or required, as compensatory measures for adverse effects on habitats sites, potential Special Protection Areas, possible Special Areas of Conservation, and listed or proposed Ramsar sites.”	Potential impacts on internationally designated sites, including potential SACs and Ramsar sites where relevant, are provided in Section 5.4.4, with potential impacts considered within the MHPGC Project HRA Screening Report, prepared to accompany the PEIR, and the MHPGC Project RIAA, prepared to accompany the PEIR.

Scottish national planning policy

National Planning Framework 4

5.2.3.6 National Planning Framework 4 (NPF4) (Scottish Government, 2023) presents the national spatial strategy for Scotland, including the spatial principles, regional priorities, national developments and national planning policy. NPF4 applies to the Scottish consenting elements of the MHPGC Project and replaces the previous NPF3 and Scottish Planning Policy. The NPF4 policies relevant to the marine mammal assessment are Policy 3 (Biodiversity) and 11 (Energy).

5.2.4 Marine planning policy context

5.2.4.1 The following marine plans are relevant to marine mammals and have informed the assessment of potential impacts presented within this chapter. Their relevance to the MHPGC Project is outlined in **Table 5.3**:

- The UK Marine Policy Statement (MPS) (UK Government, 2011);
- Scotland’s National Marine Plan (Scottish Government, 2015);
- Northeast Inshore and Northeast Offshore Marine Plan (Marine Management Organisation (MMO), 2021).

Table 5.3: Marine planning policy relevant to marine mammals

Marine plan description	How and where considered in the PEIR
UK MPS	
The UK MPS provides the overarching policy framework for marine planning in the UK and promotes the sustainable use of marine resources, including the protection of marine biodiversity through the application of the precautionary principle and an evidence-based approach.	The MHPGC Projects has considered the principles of the MPS through assessment of potential impacts on marine mammals in Section 5.8, and the identification of mitigation measures to avoid, reduce and mitigate potential impacts in Section 5.7. The full list of commitments provided in Volume 1, Annex 4.1: Draft Commitments Register, of the PEIR. Potential impacts on designated sites are considered within the MHPGC Project HRA Screening Report, prepared to accompany the PEIR, and the MHPGC Project RIAA, prepared to accompany the PEIR. A detailed MPA/MCZ Assessment and HPMA Ecosystem Level Assessment will be undertaken and submitted with the DCO application and Marine Licence application(s) to the Scottish Ministers [see further detail in Approach to Marine Protected Area/Marine Conservation Zone and Highly Protected Marine Area Assessments, prepared to accompany the PEIR].
Paragraphs 2.6.1.1 to 2.6.1.6 – Marine ecology and biodiversity The MPS states that development should aim to avoid harm to marine ecology, biodiversity and geological conservation interests, including through location, mitigation and consideration of reasonable alternatives. Where significant harm cannot be avoided, appropriate compensatory measures should be sought. The MPS also highlights the importance of applying the precautionary principle and giving appropriate weight to designated sites, protected species, habitats and species of principal importance for biodiversity conservation. “Many individual wildlife species receive statutory protection under a range of legislative provisions. Other species and habitats have been identified as being of principal importance for the conservation of biodiversity in the UK and thereby requiring conservation action or are subject to recommended conservation actions by an appropriate international organisation. Priority marine features are being defined in the seas around Scotland. The marine plan authority should ensure that development does not result in a significant adverse effect on the conservation of habitats or the populations of species of conservation concern and that wildlife species and habitats enjoying statutory protection are protected from the adverse effects of development in accordance with applicable legislation.”	Where possible, consideration has been given to environmental constraints through MHPGC Project design, mitigation measures and the assessment of reasonable alternatives, as described in Volume 1, Chapter 2: Project Description, of the PEIR, and Volume 1, Chapter 3: Site Selection & Consideration of Alternatives, of the PEIR. Relevant protected sites and species designations are considered in Section 5.4.4, with potential impacts on marine mammals are assessed within Section 5.8. Mitigation measures relevant to marine mammals are provided in Section 5.7, with the full list of commitments provided in Volume 1, Annex 4.1: Draft Commitments Register of the PEIR. Potential impacts on designated sites are considered within the MHPGC Project HRA Screening Report, prepared to accompany the PEIR, and the MHPGC Project RIAA, prepared to accompany the PEIR. A detailed MPA/MCZ Assessment and HPMA Ecosystem Level Assessment will be undertaken and submitted in support of the DCO application and Marine Licence application(s) to the Scottish Ministers [see further detail in Approach to Marine Protected Area/Marine Conservation Zone and Highly Protected Marine Area Assessments, prepared to accompany the PEIR].
Paragraphs 2.6.3.1 to 2.6.3.4 – Noise The MPS recognises that noise arising from a proposed activity or development in the marine area or in coastal or estuarine waters can have adverse effects on biodiversity, including through behavioural responses, effects on hearing and, at sufficiently high levels, injury or mortality. Sources of particular concern include explosions, shipping, seismic surveys, offshore construction and offshore industrial activities, for example dredging, drilling and piling, sonar of various types and acoustic deterrent devices.	Potential impacts on marine mammals associated with underwater sound-generating activities are assessed in Section 5.8, informed by the underwater sound modelling presented in Volume 2, Annex 5.1: Underwater Sound Modelling Report, of the PEIR. Potential cumulative effects, including consideration of other projects and plans, are assessed in Section 5.9. Mitigation measures relevant to potential impacts from underwater sound on marine mammals are provided in Section 5.7, including the Outline MMMP (CoT36). The full

Marine plan description	How and where considered in the PEIR
For certain species, deliberate disturbance is prohibited unless undertaken in accordance with the terms of a licence. The descriptors for achieving GES under the MPS include keeping underwater noise at levels that do not adversely affect the marine environment. It states that the effects of noise and vibration on wildlife should be mitigated and minimised, taking account of known sensitivities to particular frequencies and sound levels, and that cumulative effects should be considered across sensitive receptors in the marine area.	list of commitments provided in Volume 1, Annex 4.1: Draft Commitments Register of the PEIR.
Paragraph 3.3.24 – Renewable Energy “Renewable energy developments can potentially have adverse impacts on marine fish and mammals, primarily through construction noise, and may displace fishing activity and have direct or indirect impacts on other users of the sea, including mariners. ... Their foundation designs are likely to have an effect on hydrodynamics and consequent sediment movement. This includes potential scouring of sediments around the bases of turbines. These and other potential adverse impacts, together with potential mitigation measures, are considered in NPS EN-3.”	Potential impacts on marine mammals associated with the MHPGC Project, including potential impacts associated with underwater sound-generating activities during construction, are assessed in Section 5.8 and informed by the underwater sound modelling presented in Volume 2, Annex 5.1: Underwater Sound Modelling Report, of the PEIR. Mitigation measures relevant to potential impacts on marine mammals are presented in Section 5.7, including measures relevant to underwater sound-generating activities. The full list of commitments provided in Volume 1, Annex 4.1: Draft Commitments Register of the PEIR.
Paragraph 3.3.30 – Offshore electricity networks “An increase in underwater cables in the UK marine area will cause environmental impacts. Impacts from cable installations on the sea bed are low and mainly occur due to the physical disturbance involved with their placement. They tend to be of short duration with a relatively small area being affected. The main impact will be where cable protection, for example, rock armour or concrete mattresses, is required where cable burial is not feasible. This is particularly the case where cables either run through, or have landfall within, any site designated as being of national or international nature conservation importance or other sensitive areas such as designated shell fisheries, spawning or nursery grounds for economically important fish species or marine archaeological sites.”	Potential impacts associated with offshore export cable installation, including indirect effects on marine mammals arising from potential impacts on prey species and habitats, are considered in Section 5.8. The assessment of potential impacts on prey species and habitats is informed by the relevant assessments presented in Volume 2, Chapter 4: Fish and Shellfish Ecology, of the PEIR. Mitigation measures relevant to potential impacts on marine mammals are presented in Section 5.7, with the full list of commitments provided in Volume 1, Annex 4.1: Draft Commitments Register of the PEIR.
Scottish National Marine Plan	
GEN 9 – Natural Heritage “Development and use of the marine environment must: - Comply with legal requirements for protected areas and protected species. - Not result in significant impact on the national status of Priority Marine Features. - Protect and, where appropriate, enhance the health of the marine area.”	The MHPGC Project design and routeing process has considered environmental constraints, including relevant marine conservation interests, as described in Volume 1, Chapter 2: Project Description, of the PEIR, and Volume 1, Chapter 3: Site Selection & Consideration of Alternatives, of the PEIR. Relevant protected sites and species designations are considered in Section 5.4.4, with potential impacts on marine mammals assessed within Section 5.8. Mitigation measures relevant to marine mammals are provided in Section 5.7, with the full list of commitments provided in Volume 1, Annex 4.1: Draft Commitments Register of the PEIR. Potential effects on designated sites are considered within the MHPGC Project HRA Screening Report, prepared to accompany the PEIR, and the MHPGC Project RIAA, prepared to accompany the PEIR. A detailed MPA/MCZ Assessment and HPMA Ecosystem Level Assessment will be undertaken and submitted in support of the DCO application and Marine Licence application(s).

Marine plan description	How and where considered in the PEIR
	to the Scottish Ministers [see further detail in Approach to Marine Protected Area/Marine Conservation Zone and Highly Protected Marine Area Assessments, prepared to accompany the PEIR].
Paragraph 4.51 “...The presence (or potential presence) of a legally protected species is an important consideration. If there is evidence to suggest that a protected species is present or may be affected by a proposed development, steps must be taken to establish their presence. The level of protection afforded by legislation must be factored into the planning and design of the development and any impacts must be fully considered prior to the determination of the application.”	All cetaceans are EPS and occur throughout UK waters. Seals are also afforded strict legal protection under relevant legislation. The presence and distribution of marine mammal species, including protected species, are considered in Section 5.4.4, with potential impacts on marine mammals assessed in Section 5.8. Mitigation measures relevant to potential impacts on marine mammals are presented in Section 5.7, with the full list of commitments provided in Volume 1, Annex 4.1: Draft Commitments Register of the PEIR.
Paragraph 4.52 “...Certain activities in territorial waters (e.g. those involving European Protected Species as specified in the Conservation (Natural Habitats etc.) Regulations 1994, and wild birds, protected animals and plants under the Wildlife and Countryside Act 1981) may only be undertaken under licence. Equivalent provisions for birds and European Protected Species under the offshore regulations need to be followed in the Scottish offshore zone in accordance with the Offshore Marine Conservation (Natural habitats, &c.) Regulations 2007.”	The requirement for an EPS licence has been considered for relevant MHPGC Project activities. Based on the assessment presented in Section 5.8, an EPS licence may be required for activities where there is a potential for an EPS disturbance offence or injury, subject to confirmation of the final activity parameters and the outcome of the relevant EPS risk assessment and licensing process. The activities for which an EPS licence may be required are identified in Section 5.6, with mitigation measures to avoid or reduce potential impacts on marine mammals are described in Section 5.7. Where an EPS licence is required, the Applicant will obtain the necessary licence prior to undertaking the relevant activity and comply with any licence conditions..
Paragraph 4.53 “...For certain species, deliberate or reckless disturbance or harassment is prohibited and can only be carried out in accordance with the terms of a licence. Marine Scotland's Guidance on Protection of Marine European Protected Species from Injury and Disturbance must be followed.”	Potential disturbance and injury to EPS from relevant MHPGC Project activities have been assessed in Section 5.8. Mitigation measures to avoid or reduce potential impacts on marine mammals, including those relevant to underwater sound-generating activities, are described in Section 5.7.
Paragraph 4.54 “...Guidance on harassment at designated seal haul-out sites should be taken into account. Seal conservation areas should also be taken into account, as should recommended techniques for assessing acceptable levels of man-made pressures.”	A detailed baseline of seal presence, distribution and designated haul-out sites is provided in Section 5.4.4. The closest designated haul-out site to the MHPGC Project PEIR Red Line Boundary is the Ythan Estuary designated haul-out, located approximately 70km away. Potential impacts on seals, including designated seal haul-out sites where relevant, are assessed in Section 5.8.
GEN 13 - Noise “...Development and use in the marine environment should avoid significant adverse effects of man-made noise and vibration, especially on species sensitive to such effects... Mitigating and minimising the effects of noise and vibration on wildlife should be considered, taking account of known sensitivities to particular frequencies and source levels of sound. Significant adverse effects on health should be avoided... Developers should monitor loud, low to mid frequency (10Hz to 10kHz) impulsive noise. This includes use of seismic airguns, other geophysical surveys (<10kHz), pile driving, explosives and certain acoustic deterrent devices (ADD).”	The assessment has been informed by relevant JNCC and SNCCB underwater noise guidance and relevant JNCC marine mammal mitigation guidance. The approach to the marine mammal assessment has been discussed with the relevant consultation bodies through the EPP, as summarised in Section 5.2.6. Underwater sound modelling for the MHPGC Project sound-generating activities is presented in Volume 2, Annex 5.1: Underwater Sound Modelling Report, with the potential impacts on marine mammals assessed in Section 5.8. Mitigation measures to avoid or reduce relevant potential impacts on marine mammals, including the development of an Outline MMMP (CoT36), are presented in Section 5.7, with the full list of commitments provided in Volume 1, Annex 4.1: Draft Commitments Register of the PEIR.
Northeast Inshore and Northeast Offshore Marine Plan	

Marine plan description	How and where considered in the PEIR
Northeast Inshore and Northeast Offshore Marine Plan ensures biodiversity is protected and conserved from the Scottish border to Flamborough Head. These marine plans will contribute to the achievement and integration of sectoral activity through specific policies within a framework of economic, social and environmental considerations. The marine plan will reflect the MPS at the sub-national level, considering the social, economic and environmental factors that affect the northeast marine plan areas and the communities that are dependent on, or have an interest in, the northeast marine plan areas.	The MHPGC Project design and routeing process has considered environmental constraints, including the avoidance of sensitive areas and habitats where practicable, as described in Volume 1, Chapter 2: Project Description, of the PEIR and Volume 3: Site Selection & Consideration of Alternatives, of the PEIR. Relevant protected sites and species designations are considered in Section 5.4.4, with potential impacts on marine mammals assessed in Section 5.8. Mitigation measures relevant to marine mammals are provided in Section 5.7, with the full list of commitments provided in Volume 1, Annex 4.1: Draft Commitments Register, of the PEIR.

5.2.5 Local policy context

- 5.2.5.1 The majority of the MHPGC lies outside the jurisdiction of any Local Planning Authority and is therefore not subject to local planning policy instruments. However, the nearshore elements of the MHPGC Project lies within the jurisdiction of Durham County Council, with the intertidal area falling within the Wider Coastal Zone, which extends from Mean Low Water Springs (MLWS) to the coastal railway line. The County Durham Development Plan (Durham County Council, 2020) applies to the intertidal area.
- 5.2.5.2 The County Durham Plan is currently under review, with the Council progressing the preparation of a new development plan (Durham County Council, 2026). The current adopted County Durham Plan remains the applicable local planning policy, and neither the adopted Plan nor the emerging review documents contain policies considered relevant to marine mammals or habitats of importance to marine mammal species. Therefore, local planning policy has not been considered further within this assessment.

5.2.6 Guidance

- 5.2.6.1 The marine mammal impact assessment has been informed by the following guidance and technical documents:
- Guidelines for Ecological Impact Assessment in the UK and Ireland – Terrestrial, Freshwater, Coastal and Marine (Chartered Institute for Ecology and Environmental Management (CIEEM), 2024);
 - Joint Nature Conservation Committee (JNCC) guidelines for minimising the risk of injury to marine mammals from geophysical surveys (JNCC, 2017);
 - JNCC guidance for the use of Passive Acoustic Monitoring in UK waters for minimising the risk of injury to marine mammals from offshore activities (JNCC, 2023);
 - JNCC guidelines for minimising the risk of injury to marine mammals from unexploded ordnance (UXO) clearance in the marine environment (JNCC 2025a);
 - Marine environment: unexploded ordnance clearance Joint Position Statement (UK Government, 2025);
 - Guidance for assessing the significance of noise disturbance against Conservation Objectives of harbour porpoise SACs (England, Wales & Northern Ireland) (JNCC, 2020);
 - Updated Effective Deterrent Ranges (EDRs) for assessing the significance of noise disturbance against Conservation Objectives of harbour porpoise Special Areas of Conservation (England, Wales & Northern Ireland) (JNCC, 2025b);
 - 2024 Update to: Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 3.0) (National Marine Fisheries Service (NMFS), 2024);
 - Marine Mammal Noise Exposure Criteria: Updated Scientific Recommendations for Residual Hearing Effects (Southall *et al.*, 2019);
 - Marine Mammal Noise Exposure Criteria: Assessing the Severity of Marine Mammal Behavioural Responses to Human Noise (Southall *et al.*, 2021);

- Acoustic threshold criteria for behavioural disturbance (Level B Harassment) from underwater sound for marine mammals (National Oceanic and Atmospheric Administration (NOAA), 2005).

5.3 Consultation and engagement

5.3.1 Scoping

- 5.3.1.1 A Scoping Report for the MHPGC Project was issued to the PINS and MD-LOT in February 2025 (RPS, 2025). Following consultation with the appropriate statutory bodies, PINS (on behalf of the Secretary of State (SoS)) and MD-LOT both provided Scoping Opinions in March 2025 (PINS, 2025a; MD-LOT, 2025, respectively).
- 5.3.1.2 **Table 5.4** summarises the key marine mammal comments raised during the scoping process and how these comments have been addressed within the PEIR.

Table 5.4: Summary of scoping responses relevant to marine mammals

Comment	How and where considered in the PEIR
PINS	
Transboundary ID 221 (Scoping Report reference: Paragraph 4.1.1.4): It is noted that the Scoping Report states that the following aspects have been screened in for further consideration in the ES: • fish and shellfish ecology; • offshore and intertidal ornithology; • marine mammals; • shipping and navigation; • commercial fisheries; • climate change. The Inspectorate recommends that the ES should identify whether the proposed development has the potential for significant transboundary effects, and if so, what these are, and which EEA States would be affected. The Inspectorate will undertake a transboundary screening on behalf of the SoS in due course.	The potential for transboundary effects on marine mammals has been assessed in Section 5.10, with the screening process documented in Volume 1, Annex 4.2: Transboundary Screening, of the PEIR.
Marine Mammals <u>Species scoped out of the assessment</u> <u>ID 3.6.1 (Paragraph 7.6.5.64)</u> Paragraph 7.6.5.64 proposes to scope the following species out of the impact assessment as they are considered to be rare or occasional visitors and/ or occur in very low numbers in the Marine Mammal Study Area: • harbour seal (depending on the results of the telemetry study); • short-beaked common dolphin; • Atlantic white-sided dolphin; • Risso's dolphin; • killer whale; • long-finned pilot whale; • pygmy sperm whale; • sei whale. The MHPGC Project Scoping Report acknowledges that these species are protected by legislation, including some that are protected under Annex II of the Habitats Regulations, regardless as to whether they are important ecological features. The ES should include details of the mitigation	All marine mammal species identified during scoping have been considered within the baseline [see Section 5.4]. The assessment of potential impacts is presented in Section 5.8, with the scope of the assessment informed through consultation with the relevant consultation bodies, including Natural England through the EPP, as described in Section 5.3.2. Further detail is provided in the response to Natural England comment from Appendix 2 of the Scoping Opinion (ID 26) is provided later in this Table. Mitigation measures relevant to marine mammals are provided in Section 5.7, with the full list of commitments provided in Volume 1, Annex 4.1: Draft Commitments Register, of the PEIR.

Comment	How and where considered in the PEIR
measures proposed to ensure compliance with legislation and explain how its delivery is assured with reference to relevant documents. The applicant's attention is directed to the comments of Natural England in appendix 2 to this Opinion regarding the scoping out of the above species. In the absence of agreement with consultation bodies, the Inspectorate does not agree to scope out the above species from further assessment at this stage. The ES should include an assessment of potential impacts on these species, where Likely Significant Effect (LSE) could occur or the ES should otherwise explain, with evidence of agreement from relevant consultation bodies, why significant effects are not likely to occur.	
ID 3.6.10 (Sections 7.6.4 and 7.6.5) The Inspectorate notes the comment from Natural England in relation to baseline data (see appendix 2 of this Opinion). The applicant should seek to agree the approach to baseline characterisation with relevant consultation bodies, including Natural England.	The approach to the marine mammal baseline [see Section 5.4] has been discussed and agreed through consultation with relevant consultation bodies, including NatureScot and Natural England, via the EPP, as summarised in Section 5.3.2.
ID 3.6.11 (Table 7.34) The applicant's attention is directed to the comments of Natural England regarding policy and guidance available in respect of noise activities in the marine environment, including UXO. The applicant should seek to agree the approach to the assessment of noise impacts to marine mammals with relevant consultation bodies, including Natural England and the MMO.	The assessment has been informed by relevant JNCC and SNCC underwater noise guidance and relevant JNCC marine mammal mitigation guidance [see Section 5.2.6]. The approach to the marine mammal assessment, including underwater sound, has been discussed through the EPP with the relevant consultation bodies, including the MMO, Natural England and NatureScot as summarised in Section 5.3.2. Potential impacts to marine mammals from underwater sound are assessed are assessed in Section 5.8.
<u>Injury and disturbance from underwater sound generation from UXO clearance (O&M and decommissioning)</u> ID 3.6.2 (Table 7.34) On the basis that UXO clearance would take place during the construction phase and would not be required during O&M or decommissioning phases, the Inspectorate is content to scope this matter from further assessment.	Injury and disturbance from underwater sound generated from UXO clearance during the O&M and decommissioning phases have been scoped out of the assessment, as no UXO clearance activities are proposed during these phases.
<u>Injury to marine mammals due to collision with vessels (O&M)</u> <u>ID 3.6.3 (Table 7.34 and Table 7.35)</u> The Scoping Report states at table 7.35 that O&M vessels will transit slowly through the proposed development and will adhere to the Scottish Marine Wildlife Watching Code. The Inspectorate notes the proposed mitigation measure MM-78, which describes that a Vessel Management Plan will be developed to reduce disturbance to marine mammal receptors from transiting vessels, and that vessels will transit slowly through the proposed development, with all vessel operators to adhere to the Scottish Marine Wildlife Watching Code and Defra Marine and Coastal Wildlife Code. The justification does not expand on why construction and decommissioning phase collision is scoped in and O&M scoped out. However, the Inspectorate considers that due to the likely reduced numbers of vessels involved in O&M activities and with the mitigation measures to be secured, this matter can be scoped out of the assessment for the operational phase. The ES should explain how the VMP will be secured. The Inspectorate also advises that the applicant should provide an outline VMP to demonstrate how effects on marine mammals would be minimised.	Potential injury to marine mammals from vessel collision during the O&M phase has been retained within the assessment on a precautionary basis and is assessed in Section 5.8.3. The Outline Vessel Traffic Management Plan (VTMP; CoT30) will form part of the Outline Offshore Environmental Management Plan (OEMP; CoT06), which will be submitted with the application for development consent and as part of the Marine Licence application(s) to the Scottish Ministers, as described in Section 5.7. Under CoT30, a detailed VTMP will be developed pre-construction in accordance with the Outline VTMP and will detail measures to reduce disturbance to marine mammal

Comment	How and where considered in the PEIR
	receptors from transiting vessels, including slow transit through the MHPGC Project and other measures as detailed in the Outline MMMP (CoT36). The full list of commitments is provided in Volume 1, Annex 4.1: Draft Commitments Register, of the PEIR.
<u>Disturbance to marine mammals from pre-construction site investigation surveys (O&M and decommissioning)</u> ID 3.6.4 (Table 7.34) On the basis that pre-construction site investigation surveys are not required for the operation and decommissioning phases, this matter can be scoped out of the assessment for those phases.	Potential disturbance to marine mammals from site investigation surveys during the O&M and decommissioning phases of the MHPGC Project have been scoped out, as these activities are not proposed during these phases of the MHPGC Project.
<u>Injury and disturbance from underwater sound generated by piling (all phases)</u> ID 3.6.5 (Table 7.35) The MHPGC Project Scoping Report confirms that no underwater piling is proposed. On this basis the Inspectorate is content to scope this matter out of further assessment.	No piling activities are proposed as part of the MHPGC Project; therefore, potential impacts associated with piling have been scoped out of the assessment across all phases [see Volume 1, Chapter 2: Project Description, of the PEIR].
<u>Accidental pollution (all phases)</u> ID 3.6.6 (Table 7.35) The Inspectorate agrees that this matter can be scoped out on the basis that the mitigation measures proposed within the outline management plans, including MPCP, should be sufficient to address the likely impacts and avoid a likely significant effect. The ES should include details of the mitigation and explain how its delivery is assured with reference to relevant documents.	Potential impacts associated with accidental pollution have been scoped out of the marine mammal assessment. Commitments to prevent and manage accidental pollution, including an Outline Marine Pollution Contingency Plan (MPCP; CoT37), are described in Section 5.7, with the full list of commitments provided in Volume 1, Annex 4.1: Draft Commitments Register, of the PEIR.
<u>Increased SSC and associated sediment deposition (all phases)</u> ID 3.6.7 (Table 7.35) Regarding increased suspended sediments, the Inspectorate is content that impacts on marine mammals (apart from impacts to prey resource, which is scoped in) are not likely to result in significant effects and can be scoped out of further assessment.	Potential impacts associated with increased Suspended Sediment Concentrations (SSC) and sediment deposition on marine mammals have been scoped out across all phases, with the exception of any indirect effects on prey resources, which is assessed in Section 5.8.
<u>Impact of EMF (from surface laid or buried cables) (O&M)</u> <u>ID 3.6.8 (Table 7.35)</u> The Inspectorate notes the references to studies and literature in the Scoping Report and based on the information provided, agrees that this matter can be scoped out. The Inspectorate acknowledges that this is an evolving matter and as such, agreement should be sought from the relevant conservation bodies.	Potential impacts associated with Electromagnetic Fields (EMF) during the O&M phases have been scoped out for the marine mammal assessment. The approach to impacts has been agreed in consultation with relevant consultation bodies, including NatureScot and Natural England, through the EPP, see Section 5.3.2.
<u>Effects of the particle motion element of underwater sound on marine mammals (all phases)</u> <u>ID 3.6.9 (Table 7.35)</u> This matter is proposed to be scoped out on the basis that there is no evidence that particle motion has any effect on marine mammals. The	Potential impacts associated with the particle motion element of underwater sound on marine mammals has been scoped out of the assessment across all phases, with the exception of any indirect effects on prey resources, which is assessed in Section 5.8.

Comment	How and where considered in the PEIR
Inspectorate is content to scope this matter from the assessment on this basis.	
MD-LOT	
5.3 Underwater Sound 5.3.1 The underwater sound study area is defined by the fish and shellfish ecology, marine mammals, and commercial fisheries receptors and the Scottish Ministers are content with this approach. Section 7.2.4 of the Scoping Report states that data collected during site-specific surveys will be used to inform the environmental input for underwater sound modelling along with the publicly available data sources outlined in Table 7.6 of the Scoping Report. The Scottish Ministers are content with this approach. With regard to underwater noise sources at Section 7.2.5.4 of the Scoping Report, the Scottish Ministers direct the Applicant further to the NatureScot representation and advise that this must be considered within the EIA Report.	The Marine Mammal Regional Study Area and underwater sound ZOI have been defined using marine mammal Management Units (MU) and project-specific underwater sound modelling, which defines the ZOI for the MHPGC Project. The approach has been discussed with the relevant consultation bodies through the EPP, as summarised Section 5.3.2. Further details are provided in Section 5.4 and Volume 2, Annex 5.1: Underwater Sound Modelling Report, of the PEIR.
5.3.2 Table 7.7 of the Scoping Report presents the potential impacts the Applicant intends to scope in for assessment for different phases of the Proposed Works for underwater sound while Table 7.8 presents the impacts proposed to be scoped out. The Scottish Ministers highlight the NatureScot representation with regard to “increased underwater sound from non-impulsive sound sources” and advise that the EIA Report must ensure that the assessment is based on a realistic worst-case scenario, noting that a wide range of cable burial techniques are being considered which will all have different levels of non-impulsive underwater noise associated.	Potential impacts associated with non-impulsive underwater sound from all relevant MHPGC Project activities, including the range of offshore export cable installation and burial techniques within the Maximum Design Scenario (MDS) [see Section 5.6.2], are assessed in relation marine mammals in Section 5.8. Further details of the modelling assumptions are provided in Volume 2, Annex 5.1: Underwater Sound Modelling Report, of the PEIR.
5.3.4 Section 7.2.7 presents the designed in measures and mitigation. The Scottish Ministers highlight the NatureScot representation on the preference that low order (deflagration) detonation be the implemented method of UXO disposal. The Scottish Ministers also highlight NatureScot’s representation in that, should significant effects be identified during the EIA, the embedded mitigation measure in Table 7.9 would not be sufficient to mitigate impacts, and this must be considered further within the EIA Report.	The MHPGC Projects includes a commitment to seek to minimise impacts from UXO clearance through the hierarchy set out in CoT58, which identified low order techniques, such as deflagration, as the preferred method where practicable and appropriate. Associated marine mammal mitigation is set out in Section 5.7, including the development of an Outline MMMP (CoT36), which will be submitted as part of the DCO application and Marine Licence application(s) to the Scottish Ministers. The full list of commitments provided in Volume 1, Annex 4.1: Draft Commitments Register, of the PEIR. Potential impacts to marine mammals from UXO clearance is assessed in Section 5.8.2.
5.3.5 In Section 7.2.9, the Applicant proposes to conduct the Cumulative Effects Assessment (CEA) in line with Chapter 4 of the Scoping Report. The Scottish Ministers are content with this approach and highlight the NatureScot representation with regard to agreement on the list of projects and/or plans to be included in the assessment.	The CEA has been developed through the EPP, including consultation on the CEA screening and the list of relevant plans and projects [see Section 5.3.2]. The methodology approach and marine mammal assessment for the CEA is presented in Section 5.9 and Volume 1,

Comment	How and where considered in the PEIR
	Annex 4.3 Cumulative Screening and Location Plan.
5.3.6 The potential for transboundary impacts has been considered in Section 7.2.11 of the Scoping Report and the Scottish Ministers are content with this approach.	The potential for transboundary effects on marine mammals has been considered in Section 5.10. While the Scottish Ministers advised that no potential for transboundary impacts was identified, transboundary screening has been retained in response to consultation advice from the Danish Agency for Green Transition and Aquatic Environment regarding potential effects on Danish marine mammal populations, and PINS request that the EIA Report identify and consider the potential for significant transboundary effects. The screening process documented in Volume 1, Annex 4.2: Transboundary Screening, of the PEIR.
5.7 Marine Mammals 5.7.1 The Scottish Ministers are content with the two study areas presented in Section 7.6.3 of the Scoping Report. This view is supported by the Nature representation.	The Marine Mammal Study Areas presented at scoping have been retained for the PEIR, as described in Section 5.4.2.
5.7.2 The Applicant presents a list of data sources considered in Section 7.6.4 of the MHPGC Project Scoping Report. The Scottish Ministers are largely content with this however, direct the Applicant to the representation from NatureScot regarding additional data sources and request that these are utilised by the Applicant when preparing the EIA Report.	Additional data sources identified through consultation with NatureScot have been incorporated into the baseline characterisation, as described in Section 5.4.3.
5.7.3 Regarding baseline characterisation, the Scottish Ministers are generally content with the approach proposed by the Applicant in Section 7.6.5 of the Scoping Report. With regard to reference population, the Scottish Ministers advise that the total MU population is useful for context and this should be presented in the EIA Report, however the impacts must be assessed against the UK portion of the MU. This view is in line with the NatureScot representation.	Marine mammal reference populations and their associated MUs have been used to define the Marine Mammal Regional Study Area [as described in Section 5.4], with potential impacts assessed against the relevant UK MU populations in Section 5.8.
5.7.4 With regard to receptors, the Scottish Ministers advise that harbour seal or common dolphin should not be scoped out of further assessment in the EIA Report at this stage and advise that the Applicant discusses this further with NatureScot prior to submission of the EIA Report.	Harbour seal (<i>Phoca vitulina</i>) and short-beaked common dolphin (<i>Delphinus delphis</i>) have been retained within the marine mammal assessment of potential impacts in Section 5.8. Baseline characterisation is provided in Section 5.4.
5.7.5 The Applicant outlines the impacts proposed to be scoped in for assessment in the EIA Report in Table 7.34, while impacts proposed to be scoped out from further assessment in the EIA Report are outlined in Table 7.35. The Scottish Ministers broadly agree with what the Applicant has proposed however, draw the Applicant's attention to the NatureScot representation regarding geophysical surveys and injury and disturbance from underwater sound generation in relation to UXO clearance and request that this is fully considered and implemented in the EIA Report.	Potential impacts associated with underwater sound from geophysical surveys and UXO clearance have been considered within the marine mammal assessment presented in Section 5.8. Commitments relating to avoid or reduce potential injury to marine mammals associated with underwater sound-generating activities, including geophysical surveys and UXO clearance, are described in Section 5.7, including through the Outline MMMP (CoT36) which will be submitted as part of the

Comment	How and where considered in the PEIR
	DCO application and Marine Licence application(s) to the Scottish Ministers. The full list of commitments provided in Volume 1, Annex 4.1: Draft Commitments Register, of the PEIR.
5.7.6 The Scottish Ministers disagree with the approach to assessment for marine mammals and highlight the representation by NatureScot in this regard. The Scottish Ministers advise that the Applicant must consult with NatureScot further on the proposed approach to assessment prior to submitting the EIA Report.	The approach to the assessment of marine mammals, including the assessment of species individually rather than grouped as IEFs, has been discussed with the relevant consultation bodies, including NatureScot, through the EPP, as summarised in Section 5.3.2.
5.7.6 The Scottish Ministers additionally request that the NatureScot representation regarding density estimates, UXO clearance and European Protected Species licence requirements are fully considered and implemented by the Applicant in the EIA Report.	NatureScot's advice regarding density estimates, UXO clearance and EPS licensing has informed the assessment. Baseline density estimates are described in Section 5.4.4, potential impacts on marine mammals assessed in Section 5.8, including the potential need for MHPGC Project activities to require an EPS licence where applicable. Commitments relevant to marine mammals and UXO clearance are presented in Section 5.7 (such as the MMMP (CoT36) and UXO clearance hierarchy (CoT58)), with the full list of commitments provided in Volume 1, Annex 4.1: Draft Commitments Register, of the PEIR.
5.7.7 In terms of mitigation, the Scottish Ministers have reviewed Section 7.6.7 of the Scoping Report which presents embedded mitigation measures and advise that the full range of mitigation measures and published guidance must be included in the EIA Report along with further information on marine mammal monitoring. The Scottish Ministers highlight the NatureScot representation on mitigation and monitoring and advise that this must be fully considered by the Applicant within the EIA Report.	Commitments relevant to marine mammals are presented in Section 5.7, including the development of an Outline MMMP (CoT36), which will be submitted as part of the DCO and Marine Licence application(s) to the Scottish Ministers. Monitoring requirements of relevance to marine mammals, where necessary, will be outlined within the Offshore In-Principle Monitoring Plan (OIPMP; CoT56) [see Section 5.7]. A detailed Offshore Monitoring Plan will be produced and agreed through the post-consent process in consultation with the relevant statutory advisors and regulators. The full list of commitments provided in Volume 1, Annex 4.1: Draft Commitments Register, of the PEIR.
5.7.8 The Applicant presents the approach to the assessment of cumulative effects in Section 7.6.9 of the MHPGC Project Scoping Report for marine mammal receptors. The Scottish Ministers are broadly content with the approach presented, however highlight the representation by NatureScot regarding inclusion of projects up to one year on either side of the MHPGC Project in terms of both temporal and spatial overlap and request that this is implemented by the Applicant in the EIA Report.	The CEA has considered relevant plans and projects with temporal and spatial overlap the MHPGC Project, including projects with construction periods occurring up to one year before or one year after the MHPGC Project construction window. Where project-specific underwater sound outputs were

Comment	How and where considered in the PEIR
	not available, EDRs have been used where appropriate to define the relevant Zols (JNCC, 2025b) [see full methodology described in Section 5.9.1]. The CEA is presented in Section 5.9.
5.7.9 The Applicant has proposed to screen in a number of impact pathways into the EIA transboundary assessment for marine mammal receptors. The Scottish Ministers advise that there is no potential for transboundary impacts from the MHPGC Project and no further consideration is required within the EIA Report. This is a view supported by the NatureScot representation.	The potential for transboundary effects on marine mammals has been considered in Section 5.10. While the Scottish Ministers advised that no potential for transboundary impacts was identified, transboundary screening has been retained in response to consultation advice from the Danish Agency for Green Transition and Aquatic Environment regarding potential effects on Danish marine mammal populations, and PINS request that the EIA Report identify and consider the potential for significant transboundary effects. The screening process documented in Volume 1, Annex 4.2: Transboundary Screening, of the PEIR.
5.7.10 The Scottish Ministers note that an MPA screening assessment has been provided in Appendix E of the Scoping Report. The Scottish Ministers advise that the potential for disturbance to the minke whale qualifying feature of the Southern Trench MPA can be scoped out from further assessment only if low order deflagration is undertaken for any UXO clearance. If low order deflagration is not proposed to be undertaken, the Scottish Ministers advise that the Applicant must discuss this further prior to submission of the EIA Report.	Potential impacts on the minke whale qualifying feature of the Southern Trench ncMPA are considered within the Approach to Marine Protected Area/Marine Conservation Zone and Highly Protected Marine Area Assessments, prepared to accompany the PEIR. The ncMPA is screened out from further assessment as it is outside the relevant Zol for underwater sound. The MPA/MCZ Assessment and HPMA Ecosystem Level Assessment will consider potential impacts associated with UXO clearance and other MHPGC Project activities which will be undertaken and submitted in support of the DCO application and Marine Licence application(s) to the Scottish Ministers. The timings for such were discussed and agreed with Natural England in a meeting on the 24th July 2026.
NatureScot	
Appendix B – Underwater Sound <u>Baseline characterisation (Underwater sound sources)</u> It is noted in 7.2.5.4 that the primary sources of anthropogenic sound are likely to be related to shipping activity and, to a lesser extent, oil and gas activity. Just to highlight that construction of offshore wind farms are also likely to be a source of anthropogenic sound, particularly in this region off the east coast of Scotland and will need to be considered in the CEA.	The CEA presented in Section 5.9 includes relevant offshore wind farm construction activities and other projects with the potential to contribute to cumulative underwater sound where appropriate.

Comment	How and where considered in the PEIR
<u>Potential impacts</u> The impact 'increased underwater sound from non-impulsive sound sources' is proposed to be scoped in for all phases, which we agree with. It is noted within the justification column that the exact sources of non-impulsive sound has not yet been explicitly defined but are likely to include vessel activity, cable laying, burial and protection installation as well as decommissioning. Just to highlight that a wide range of cable burial techniques are included in the PDE, including dredging, mechanical trenching, rock cutting etc., which will all have different levels of non-impulsive underwater noise associated. This should be considered to ensure that the assessment is based on a realistic worst-case scenario.	Potential non-impulsive sound sources associated with the full range of MHPGC Project activities, including offshore export cable installation and burial techniques, has been assessed in relation to marine mammals in Section 5.8. Further details are provided in the Volume 2, Annex 5.1: Underwater Sound Modelling Report, of the PEIR.
<u>Potential impacts</u> It is proposed to scope out the impact 'effects of particle motion element of underwater sound on marine mammals during all phases', the justification provided states that there is no evidence that particle motion has any effect on marine mammals. There is no mention of particle motion from underwater sound impacts on fish and shellfish receptors and it is unclear whether this impact is being scoped in or out for this receptor, clarity on this point would be welcomed. Also just to highlight that any potential impacts on fish could lead to indirect impacts on marine mammals and ornithology receptors. In our view, due to the likely low levels of impulsive underwater sound for this proposal (noting that geophysical surveys may use impulsive sound but this will be intermittent and short term in nature), it is unlikely that there will be significant effects of particle motion on fish & shellfish receptors. However, justification should be provided within the EIA Report if this potential impact is to be scoped out of the assessment.	Potential impacts associated with the particle motion element of underwater sound on marine mammals has been scoped out of the assessment across all phases [see Table 5.37], with the exception of any indirect effects on prey resources, which is assessed in Section 5.8.
<u>Approach to assessment</u> We are content that Southall <i>et al.</i> (2019) will be used to describe the Permanent Threshold Shift (PTS) and Temporary Threshold Shift (TTS) onset criteria for both impulsive and non-impulsive sound for marine mammals, with NOAA (2019) thresholds being used to assess behavioural responses.	The marine mammal assessment in Section 5.8 has been informed by the updated NMFS (2024) technical guidance for auditory injury criteria together with Southall <i>et al.</i> (2019), as described in Section 5.2.6. The assessment methodology has been discussed with the relevant consultation bodies through the EPP, as summarised in Section 5.3.2.
<u>Mitigation and monitoring</u> As a result of being unable, at this stage, to commit to using low-order UXO disposal to reduce underwater sound then we advise that this designed in measure cannot be used to reduce predicted impacts (e.g. magnitude) within the assessment. We advise our preference for low order (deflagration) detonation as the technique to be implemented, and the assessment of high order as a worst-case scenario for assessment purposes only.	The MHPGC Projects includes a commitment to seek to minimise impact from UXO clearance through the hierarchy set out in CoT58, which identified low order techniques, such as deflagration, as the preferred method where practicable and appropriate. Associated marine mammal mitigation set out in Section 5.7, including the development of an Outline MMMP (CoT36) which will be submitted as part of the DCO application and Marine Licence application(s) to the Scottish Ministers. The full list of commitments provided in Volume 1, Annex 4.1: Draft Commitments Register, of the PEIR. Potential impacts to marine mammals from UXO clearance is assessed in Section 5.8.2. Low order UXO clearance is intended to be consented as part of the MHPGC Project through the DCO,

Comment	How and where considered in the PEIR
	and associated dMLs and Marine Licence(s) to be submitted to the Scottish Ministers, while high order UXO clearance has been assessed for information only and if required, would be subject to a separate Marine Licence application
<u>Transboundary impacts</u> In relation to the potential for transboundary impacts, it is noted in Section 7.2.11 that consideration will be given to transboundary impacts of underwater sound on relevant receptors in the respective sections, including marine mammals and fish & shellfish ecology. We are content with this approach.	The potential for transboundary effects on marine mammals has been considered in Section 5.10, including potential impacts from underwater sound produced by MHPGC Project activities. The screening process documented in Volume 1, Annex 4.2: Transboundary Screening, of the PEIR.
Appendix E – Marine mammals <u>Study Area</u> Two study areas have been proposed for the marine mammal assessment in Section 7.6.3. The Marine Mammal Study Area, defined as the area encompassing the MHPGC scoping boundary plus 4km buffer – this was defined for aerial surveys of the array area for ornithology and marine mammal surveys. The second study area is defined as the marine mammal regional study area and extends over the northern North Sea geographic region to the European coastline as shown in Figure 7.21. We are content with both study areas proposed.	The Marine Mammal Study Areas presented as scoping have been retained for the PEIR, as described in Section 5.4.2. The approach to defining the study areas has been discussed with the relevant consultation bodies through the EPP, as summarised in Section 5.3.2.
<u>Baseline characterisation (Data sources)</u> Key data sources are provided in Table 7.32 and site-specific survey data from the Morven Array in Table 7.32 – we are content that a combination of existing data sources and site-specific surveys should provide adequate information to characterise the baseline environment but recommend consideration of the additional data sources below. The proposed Ossian Offshore Wind Farm is located approximately 5km away, we suggest information contained within the Ossian Offshore Wind Farm EIA Report could help inform the marine mammal baseline for the MHPGC Project.	Information contained within the Ossian Offshore Wind Farm EIA Report (RPS, 2024) has been used to inform the marine mammal baseline characterisation presented in Section 5.4.
<u>Baseline characterisation (Data sources)</u> We also note from other receptor sections of the EIA Scoping Report that eDNA has been collected from sediment and water to determine species composition. If DNA metabarcoding has included marine mammals, it would be useful to present the results of this in the EIA Report to add additional context.	Environmental DNA (eDNA) surveys were undertaken to characterise fish and elasmobranch communities and did not identify any marine mammal species within the MHPGC Project PEIR Red Line Boundary. Further details are provided in the Volume 2, Chapter 4: Fish and Shellfish Ecology, of the PEIR.
<u>Baseline characterisation (Reference populations)</u> In relation to the reference populations, we advise use of the population estimates for the UK portion of the Inter-Agency marine Mammal Working Group (IAMMWG) MUs rather than the full MUs for species with very large MUs. This is to present the most realistic assessment of numbers of animals affected by the proposal in Scottish waters. The MUs for most species are very large and in most cases are too big for a meaningful understanding of impacts to potentially impacted populations. Although we acknowledge this is based on a non-biological delineation, we feel that using the UK portion of the MU better reflects the likely size of populations affected by the potential impact pathways.	Marine mammal reference populations and their associated MUs have been used to define the Marine Mammal Regional Study Area [as described in Section 5.4], with potential impacts assessed against the relevant UK MU populations in Section 5.8.

Comment	How and where considered in the PEIR
The use of population estimates for the full MUs are still useful for context and baseline characterisation. Therefore, we advise stating the total MU population for context and then assessing impacts against the UK portion of the MU.	
<u>Baseline characterisation (Receptors)</u> The list of marine mammal species proposed to be scoped into the assessment is provided in Section 7.6.5.60 and we are generally content with those listed. However, as noted in Paragraph 7.6.5.53, harbour seal are known to occur in the Marine Mammal Study Area, albeit in low numbers, and they are a vulnerable species experiencing large population decline on the east coast. In addition, we note that common dolphin was recorded in the Morven North and Morven South DAS along with a number of unidentified dolphins and dolphin/porpoises. Therefore, we advise that it is too early to scope out harbour seal or common dolphin from further assessment and suggest further discussion prior to application submission.	Harbour seal and short-beaked common dolphin have been retained within the marine mammal assessment of potential impacts in Section 5.8. Baseline characterisation, including Morven North and Morven South Digital Aerial Survey (DAS) data, presented in Section 5.4.
<u>Baseline characterisation (Designated sites)</u> Paragraph 7.6.5.5 states that the Southern Trench ncMPA, designated for minke whale, lies 48km from the MHPGC scoping boundary and as minke whale is only protected within the boundaries of the MPA there is not anticipated to be any requirement for inclusion of this site within an MPA assessment as there is not expected to be a pathway from the impacts to the MPA. We advise that underwater sound impacts, particularly from UXO clearance, could extend some distance beyond the MHPGC scoping boundary.	Potential impacts on the minke whale qualifying feature of the Southern Trench ncMPA are considered within the MHPGC Project MPA, MCZ and HPMA Screening and Assessment Approach Technical Note, prepared to accompany the PEIR. The ncMPA is screened out from further assessment as it is outside the relevant Zol for underwater sound. The MPA/MCZ Assessment and HPMA Ecosystem Level Assessment will consider potential impacts associated with UXO clearance and other MHPGC Project activities which will undertaken and submitted in support of the DCO application and Marine Licence application(s) to the Scottish Ministers.
<u>Potential impacts</u> Injury and disturbance from underwater sound generation in relation to UXO clearance is scoped in for the construction phase, which we agree with. We note from Table 7.34 that it is intended for the assessment to incorporate recommendations outlined in the joint interim position statement on UXO clearance (UK Government <i>et al.</i>, 2022). Just to highlight that the policy in relation to UXO clearance was updated in January 2025 - low noise methods should be the default used to clear any type of UXO in the marine environment. If there are extraordinary circumstances which means that low noise clearance cannot be undertaken, Applicants should engage with MD-Lot at the earliest opportunity. We advise our preference is for low order (deflagration) detonation as the technique to be implemented, and the assessment of high order as a worst-case scenario for assessment purposes only.	The MHPGC Project includes a commitment to seek to minimise impacts from UXO clearance through the hierarchy set out in CoT58, which identified low order techniques, such as deflagration, as the preferred method where practicable and appropriate. Associated marine mammal mitigation is set out in Section 5.7, including the development of an Outline MMMP (CoT36), which will be submitted as part of the DCO application and Marine Licence application(s) to the Scottish Ministers. The full list of commitments provided in Volume 1, Annex 4.1: Draft Commitments Register, of the PEIR. Potential impacts associated with underwater sound, including those associated with UXO clearance are assessed in Section 5.8. The assessment has been informed by the updated UK Joint Position Statement (UK Government, 2025) and relevant JNCC guidance, as presented in Section 5.2.6.

Comment	How and where considered in the PEIR
<u>Potential impacts</u> It is noted that the potential impact 'disturbance to marine mammals from pre-construction site investigation surveys' is in relation to geophysical surveys in the pre-construction phase only. If geophysical surveys are likely to be required during the operation and maintenance phase and/or decommissioning phase i.e. for cable repair or cable assessment activities, then this impact should be scoped in for assessment across all phases of the proposal. Alternatively, if geophysical surveys form part of the 'disturbance to marine mammals from vessel use and other sound-producing activities' then this should be made explicitly clear.	Potential impacts associated with underwater sound from site investigation surveys have been considered for all relevant phases of the MHPGC Project, as described in Section 5.8.
<u>Potential impacts</u> Whilst we acknowledge that EPS licences will be sought for these activities separately (as with UXO clearance) they should also be considered within the EIA.	Potential impacts on EPS have been considered within the assessment presented in Section 5.8. The assessment includes consideration of relevant EPS legislation and licensing requirements and provides the mitigation measures proposed to avoid or reduce potential impacts, including the development of an Outline MMMP (CoT36), which will be submitted as part of the DCO application and Marine Licence application(s) to the Scottish Ministers [see Section 5.7]. The full list of commitments provided in Volume 1, Annex 4.1: Draft Commitments Register, of the PEIR.
<u>Approach to assessment</u> Paragraph 7.6.8.4 states that the marine mammal species carried forward to the assessment will be grouped into broad ecological groups called Important Ecological Features (IEFs) - these IEFs will be those features against which impacts associated with the MHPGC Project will be assessed. The rationale behind this is not explained and we do not support this proposed approach for the assessment of impacts to marine mammals. We expect marine mammals to be assessed independently rather than grouped together for assessment. For species where quantitative assessment is possible, we expect to see a percentage of each species respective (UK portion) reference population when assigning the magnitude of each assessed impact. Therefore, we advise the Applicant to consult us further on the proposed assessment approach for this receptor prior to application submission.	Marine mammal species have been assessed individually rather than grouped as IEFs. Where quantitative assessment has been undertaken in Section 5.8, potential impacts have been considered in the context of the species-specific ecology and relevant UK MU reference population. Following consultation with the relevant consultation bodies, including NatureScot through the EPP, the assessment approach was refined as described in Section 5.3.2.
<u>Approach to assessment (Density estimates)</u> We advise that density estimates could be generated from site-specific DAS (for those species with sufficient data), particularly as this comprises a considerable part of the MHPGC proposal scoping boundary within Scottish waters, and then the most precautionary estimate between SCANS IV and DAS is used for the assessment. If there are no density estimates available from DAS or SCANS-IV, or the SCANS-III modelled density surfaces are significantly higher, then SCANS-III should be used instead. If this is not available, we can accept Waggitt <i>et al.</i> (2019). If no density estimates are available, then we would advise assessing the species qualitatively. For seals we would advise a quantitative assessment using Carter <i>et al.</i> (2020) density estimates.	The assessment presented in Section 5.8 has been informed by the most appropriate available density estimates, including Small Cetacean Abundance in the North Sea (SCANS)-IV, SCANS-III, Waggitt <i>et al.</i> (2020) and Carter <i>et al.</i> (2025), where relevant. Site-specific density estimates were generated from DAS undertaken over the Morven North and Morven South Red Line Boundary and buffer; however, the DAS coverage does not extend across the full MHPGC Project PEIR Red Line Boundary. Accordingly, these available DAS density estimates provide additional context within the wider region but have not been applied across

Comment	How and where considered in the PEIR
	the MHPGC Project PEIR Red Line Boundary. The density estimates used and supporting data sources are described in the baseline characterisation presented in Section 5.4. The data sources used to inform the assessment have been presented and agreed with the relevant consultation bodies through the EPP, as summarised in Section 5.3.2.
<u>Approach to assessment (UXO clearance)</u> In relation to auditory injury impacts from underwater noise (UXO clearance), we expect to see a sensitivity score of High for all cetacean species. This is due to the known importance of hearing function to these species, the uncertainty of this impact in the long term as well as the high vulnerability and low recoverability of individuals from the impact. In relation to disturbance from UXO clearance we would expect a score of Low or Negligible due to the short duration of impact particularly if using low order deflagration techniques.	The assessment methodology, including the approach to assigning receptor sensitivity scores, is described in Section 5.5.2. The assessment of potential underwater sound impacts from UXO clearance is presented in Section 5.8 and takes account of species-specific sensitivities relevant guidance and the proposed UXO clearance strategy (CoT58) [see Section 5.7].
<u>Approach to assessment (EPS Licence requirements)</u> We do not expect a full EPS Risk Assessment at this stage but an understanding of the implications for cetaceans from the proposal under offshore regulations, together with mitigation options. This will provide confidence, should the proposal be consented, that any impact is able to be addressed through a subsequent derogation under EPS licensing. In our experience, leaving this entirely to the post-consent stage has led to difficulties and delays.	Potential impacts on EPS have been considered within the assessment presented in Section 5.8, and will inform any EPS licensing requirements, where applicable. Mitigation measures proposed to avoid or reduce potential impacts are described in Section 5.7, with the full list of commitments provided in Volume 1, Annex 4.1: Draft Commitments Register, of the PEIR.
<u>Cumulative impact assessment</u> Section 7.6.9 notes that the CEA will follow the approach outlined in Chapter 4 (EIA Methodology), which generally appears appropriate subject to our comments in the cover letter on the MHPGC Project proposal elements. We recommend including all projects up to a year on either side of the MHPGC Project, looking at both temporal and spatial overlap. Where underwater noise outputs are not available for other projects, we can accept the use of effective deterrent ranges.	The CEA presented in Section 5.9 includes consideration of projects with potential temporal and spatial overlap up to a year on either side of the MHPGC Project. Where underwater noise outputs are not available for other projects, EDRs (JNCC, 2025b) have been used to define representative Zols, where appropriate.
<u>Mitigation and monitoring</u> Designed in measures and mitigation relevant to marine mammals is outlined in Table 7.36. We welcome the identification of embedded mitigation at an early stage. However, as noted in the cover letter and previous appendices, much of the designed in measures/mitigation includes adherence to post-consent plans. Plans do not strictly constitute mitigation as it is the measures contained within the plans that will mitigate impacts for which no detail has been provided yet. Paragraph 7.6.7.2 states that the determination of magnitude and significance will assume the implementation of such measures – care needs to be taken that there is a commitment to specific measures in order for these to be truly embedded measures that will reduce impacts and thus could be used in the assessment to reduce the magnitude and significance of effects. Furthermore, should significant effects be identified during the EIA, the embedded measures may be insufficient to mitigate impacts.	Where the assessment [see Section 5.8] identifies the need for specific mitigation measures, these have been incorporated into the assessment and will be secured through the relevant project commitments and, where appropriate the relevant management plans (i.e. OEMP; CoT06). The MHPGC Project commitments are described in Section 5.7, including the preparation of an Outline MMMP (CoT36), which will be submitted as part of the DCO application and Marine Licence application(s) to the Scottish Ministers. The full list of commitments

Comment	How and where considered in the PEIR
	provided in Volume 1, Annex 4.1: Draft Commitments Register, of the PEIR.
<u>Transboundary impacts</u> The potential for transboundary impacts to marine mammals is discussed in Section 7.6.11 of the MHPGC Project Scoping Report. The Applicant proposes to screen in a number of impact pathways, including underwater sound into the EIA transboundary assessment for this receptor group. We advise that there is no potential for transboundary impacts from the proposal description and information provided within the EIA Scoping Report.	The potential for transboundary effects on marine mammals has been considered in Section 5.10. While NatureScot and MD-LOT advised that there was no potential for transboundary impacts based on the information available at scoping, transboundary screening has been retained in response to consultation advice from the Danish Agency for Green Transition and Aquatic Environment regarding potential effects on Danish marine mammal populations, and PINS request that the EIA Report identify and consider the potential for significant transboundary effects. The screening process in Volume 1, Annex 4.2: Transboundary Screening, of the PEIR.
<u>MPA screening assessment</u> An MPA screening assessment (Appendix E) has been provided within the MHPGC Project Scoping Report. The Southern Trench ncMPA is located 48km from the MHPGC Project Scoping Boundary and is designated for minke whale. As noted in Paragraph E.3.1.17, based on experience from other offshore wind farms in Scotland, the ncMPA is located outside the area within which injury to minke whales could occur from the proposal. In terms of potential for disturbance to minke whales from underwater sound, it is unlikely that there would be significant impacts from the MHPGC proposal during the cable lay and if low-order deflagration (as preferred) is undertaken for any UXO clearance then we advise potential impacts could be scoped out from further assessment.	Potential impacts on the minke whale qualifying feature of the Southern Trench ncMPA are considered within the MHPGC Project MPA, MCZ and HPMA Screening and Approach Technical Note, prepared to accompany the PEIR. The ncMPA is screened out from further assessment as it is outside the relevant ZOI for underwater sound. The MPA/MCZ Assessment and HPMA Ecosystem Level Assessment will consider potential impacts associated with UXO clearance and other MHPGC Project activities which will be undertaken and submitted in support of the DCO application and Marine Licence application(s) to the Scottish Ministers.. The MHPGC Project includes a commitment to seek to minimise impacts from UXO clearance through the hierarchy set out in CoT58, which identifies low order techniques, such as deflagration, as the preferred method where practicable and appropriate. Associated marine mammal mitigation is set out in Section 5.7, including the development of an Outline MMMP (CoT36), which will be submitted as part of the DCO application and Marine Licence application(s) to the Scottish Ministers. The full list of commitments provided in Volume 1, Annex 4.1: Draft Commitments Register, of the PEIR.
MMO	
3.9 Underwater Noise	The impact pathways identified at scoping have been taken forward and are assessed in Section 5.8 .

Comment	How and where considered in the PEIR
3.9.1 The MMO notes that three impacts pathways relevant to underwater noise have been scoped into the EIA, these comprise: - Increased underwater sound from UXO clearance; - Increased underwater sound from non-impulsive sound sources; - Increased underwater sound from geophysical surveys. 3.9.2 These impact pathways are appropriate and the MMO agrees with the scoping decision for each of these. The MMO considers that the pathways could be refined to indicate the receptors of focus, but this does not require clarification.	
3.9.3 The MMO notes that one impact pathway has been scoped out of the EIA: Effects of the particle motion element of underwater sound on marine mammals during all phases. The justification for this scoping decision is that: "The ability of marine mammals to detect particle motion is poorly understood (Mooney <i>et al.</i> 2016) and consequently there is no evidence that particle motion has any effect on marine mammals." The MMO considers that this is fairly typical of EIAs for underwater noise, and the MMO does not find the justification unacceptable.	Effects of the particle motion element of underwater sound on marine mammals have been scoped out across all phases, with the exception of any indirect effects on prey resources, which is assessed in Section 5.8.
3.9.4 For impulsive sounds (e.g. UXO) underwater noise modelling will be undertaken, the results of which will be presented in an underwater sound technical report, and any possible impacts will be incorporated into the relevant receptor-specific chapter. The report states that "a range of UXO sizes and clearance methodologies will be explored... (e.g. largest and most likely size/type" and that "the modelled sound contours will be applied to the marine mammal density values...and used to quantify the number of animals that may experience injury...or disturbance impacts" (pp 265). The MMO deems that this is appropriate. 3.9.5 The MMO notes that it is often the case that developers will seek consent for any UXO clearance in a separate Marine Licence and this is the MMO's position. The MMO requests that this is clarified in the eventual EIA.	Potential impacts associated with UXO clearance are assessed in Section 5.8. The assessment considers both low order and high order UXO clearance scenarios, with the high order scenario assessed for information only. The MHPGC Project includes a commitment to seek to minimise impacts from UXO clearance through the hierarchy set out in CoT58, which identifies low order techniques, such as deflagration, as the preferred method where practicable and appropriate. Associated marine mammal mitigation described in Section 5.7, including the development of an Outline MMMP (CoT36), which will be submitted as part of the DCO application and Marine Licence application(s) to the Scottish Ministers. The full list of commitments provided in Volume 1, Annex 4.1: Draft Commitments Register, of the PEIR. Low order UXO clearance is intended to be consented as part of the MHPGC Project through the DCO, and associated dMLs and Marine Licence(s) to be submitted to the Scottish Ministers, while high order UXO clearance has been assessed for information only and if required, would be subject to a separate Marine Licence application.
3.9.7 For non-impulsive sounds effects on marine mammals, desk top study will be used to define the zone of influence for the assessment, comments on which the MMO defers to Natural England/JNCC. The Applicant proposes to model sound emissions from a suite of different vessel types to enable a quantitative assessment. The MMO has no concerns with this proposal.	Project-specific underwater sound modelling has been undertaken to inform the assessment of non-impulsive underwater sound, as presented in Volume 2, Annex 5.1: Underwater Sound Modelling Report, of the PEIR. Potential impacts to marine mammals are assessed in Section 5.8.

Comment	How and where considered in the PEIR
3.9.9 The proposed methodology for the cumulative impacts assessment is outlined in Chapter 4.7. The MMO notes that methodology appears appropriate and the relevant projects to be considered seem sensible.	The CEA has been undertaken using the methodology described in Section 5.9, with the relevant plans and projects identified through the CEA screening process in Volume 1, Annex 4.3 Cumulative Screening and Location Plan.
Natural England	
Annex A – Natural England’s Advice on EIA Scoping <u>16 Marine Mammal impact assessments</u> If not already considered, we advise Applicants to include reference to the following guidance: • IAMMWG. 2022. Updated abundance estimates for cetacean Management Units in UK waters (Revised 2022); • Scientific Advice on Matters Related to the Management of Seal Populations; • Carter <i>et al.</i> (2022). Natural England also advise that the following report is obtained from Natural England and is used as part of the desk-based study for grey seals: • Thompson, D, Russell, D.J and Morris, C. 2017. Berwickshire and North Northumberland Coast Special Area of Conservation: grey seal population status. Sea Mammal Research Unit, Aberdeen.	The recommended guidance and reference documents have been considered in the marine mammal baseline characterisation presented in Section 5.4. Reference to Carter <i>et al.</i> (2025), which is an update on the 2022 publication has also been included where relevant.
Annex B: Detailed comments <u>Marine Mammals - Data sources</u> ID 24 (Scoping Report Section 7.6; Paragraph 7.6.4.2) Aerial surveys data for Marine Mammals for the Morven North and Morven South have not been provided as part of the scoping report so no detailed comments can be offered from Natural England. Natural England would welcome engagement through our DAS on surveys completed to date and what is proposed.	Relevant marine mammal data, including DAS data from the Morven North and Morven South, have been incorporated within the marine mammal baseline characterisation in Section 5.4. The approach to the marine mammal assessment has been discussed with the relevant consultation bodies, including Natural England, through the EPP, as summarised in Section 5.3.2.
<u>Bottlenose dolphin, harbour seal and other marine mammal species</u> ID 25 (Section 7.6; Paragraph 7.6.5.29-40; 7.6.5.47-53; 7.6.5.54-7.6.5.59; 7.6.5.63) These sections ask for feedback from consultees on approach. Further information is required on noisy activities such as UXO clearance, and marine mammal populations within auditory range of UXO clearance. We direct the applicant to recent Defra policy and SNCB advice on noise: • Reducing marine noise; • Marine environment: unexploded ordnance clearance Joint Position Statement. Natural England would welcome engagement on the assessment approaches set out within these paragraphs.	The approach to the marine mammal assessment has been discussed and agreed with the relevant consultation bodies, including Natural England, through the EPP, as summarised in Section 5.3.2. Relevant guidance relating to underwater sound and UXO clearance [see Section 5.2.6] has informed the marine mammal impact assessment presented in Section 5.8.
<u>Marine Mammals - Species scoped in and out</u> ID 26 (Section 7.6; 7.6.5.59; 7.6.5.61-63) Various marine mammals have been scoped out of future assessment within the EIA. The rationale behind scoping out these species is based on their low likelihood of occurrence and/or rarity in the study area which in Natural England’s view would make these species more sensitive to the project. Due to an increase in noise in the North Sea, we are becoming more concerned regarding the cumulative impacts of noisy activities. As such we advise that no species present are scoped out of assessment, regardless of	Marine mammal species identified within the baseline characterisation in Section 5.4, have been considered within the assessment of potential impacts in Section 5.8, with the assessment approach using a quantitative basis where appropriate and where robust density data are available for individual species.

Comment	How and where considered in the PEIR
abundance, and quantitative assessments are carried out where appropriate.	Species for which quantitative density estimates are not available or which are uncommon within the study area have not been assessed individually; potential effects on these species are instead considered through the relevant functional hearing groups. This approach also aligns with consultation advice received from NatureScot, which advised against screening out common dolphin and harbour seal from further assessment at the scoping stage; both species have therefore been retained within the assessment.
Ministry of Green Transition (Denmark)	
The Agency for Green Transition and Aquatic Environment have read the material on the MHPGC Project Scoping Report and have the following remarks. The Agency for Green Transition and Aquatic Environment would like to remark that marine mammals inhabiting the Danish Nature 2000 areas are through telemetry data been observed traveling from Denmark to areas outside the coast of Great Britain. The Agency for Green Transition and Aquatic Environment therefore request that the environmental assessment on MHPGC Project regarding marine mammals includes assessment on influence on the Danish marine mammal populations. The Agency for Green Transition and Aquatic Environment's would like to follow the further process on Environmental Impact Assessment on the MHPGC Project.	The potential for transboundary effects on marine mammals, including consideration of marine mammal populations associated with other European Economic Area (EEA) States has been considered in Section 5.10, with the screening process documented in Volume 1, Annex 4.2: Transboundary Screening, of the PEIR.

5.3.2 Further consultation and engagement

- 5.3.2.1 As part of the MHPGC Project EPP, an Expert Working Group (EWG) meeting was held in November 2025 with stakeholders to discuss the proposed approach to the marine mammal assessment, including baseline characterisation and impact pathways scoped in for each phase of the MHPGC Project. NatureScot were unable to attend the EWG meeting but provided comments on materials and minutes.
- 5.3.2.2 A second EWG meeting was held in July 2026 to present updates to the marine mammal assessment and discuss the preliminary findings of the PEIR. The outcomes of the meeting have been considered in the preparation of this PEIR, where relevant.
- 5.3.2.3 Additional consultation has been summarised in **Table 5.5**.

Table 5.5: Summary of further consultation and engagement

Date	Consultee and response type	Comment	How and where considered in the PEIR
18 November 2025	EWG meeting with stakeholders: - MMO; - Natural England.	The approach to the assessment was discussed with stakeholders, including the outline methods for assessing the ‘injury and disturbance from underwater sound’ impact pathway. The EWG meeting aimed to address key scoping opinion comments provided. Impact pathways to be scoped into the marine mammal’s assessment were also discussed and agreed as well as the relevant marine mammal receptors to be considered, with the addition of harbour seal and common dolphin. Following this meeting, stakeholders provided responses on points raised for discussion which are detailed in the following rows.	The consultation outcomes have informed the marine mammal baseline, assessment methodology and impact assessment presented in Sections 5.4, 5.5 and 5.8 .
18 December 2025	Written response from Natural England on EWG meeting minutes.	Natural England agrees with the key references proposed to establish the marine mammal baseline. However, the list might not be exhaustive, and any new, relevant data sources should be added to the list of references.	The marine mammal baseline has been informed by a comprehensive review of available data sources, including those recommended by Natural England, as presented in Section 5.4 .
18 December 2025	Written response from Natural England on EWG meeting minutes.	Natural England agrees with the use of the most recent NFMS guidance (2024) to inform impacts to marine mammals from underwater sound.	The updated NMFS (2024) hearing thresholds have been used to inform the underwater sound impact assessment in Section 5.8 .
18 December 2025	Written response from Natural England on EWG meeting minutes.	Natural England notes that the Developer plans to consider only low order deflagration within the assessment. Should high order be required, a separate licence will be sought. Natural England do not have any objections with this approach. Natural England agrees with the proposed scenarios for the UXO assessment.	The MHPGC Project includes a commitment to seek to minimise impacts from UXO clearance through the hierarchy set out in CoT58, which identifies low order techniques, such as deflagration, as the preferred method where practicable and appropriate [see Section 5.7]. Low order UXO clearance intended to be consented as part of the MHPGC Project through the DCO, associated dMLs and Marine Licence application(s) to the the Scottish Minsters. Should high order UXO clearance be required, this would be subject to a separate marine licence application. The marine mammal assessment presents the committed low order approach together

Date	Consultee and response type	Comment	How and where considered in the PEIR
			with precautionary information on high order (detonation) UXO clearance in Section 5.8 .
16 December 2025	Written response from MMO on EWG meeting minutes	The MMO's position is as follows: - Any UXO clearances should not be within the Deemed Marine Licence (DML). - The MMO's position is that any UXO clearance activities are sought within a separate marine licence due to the nature of the impacts. This includes low order. - The MMO is content for the UXO investigation activities to be included and recommend this is a clearly identifiable activity within the DML.	The MHPGC Project includes a commitment to seek to minimise the impacts from UXO clearance through the hierarchy set out in CoT58, which identifies low order techniques, such as deflagration, as the preferred method where practicable and appropriate [see Section 5.7]. The Applicant notes the MMO's position that UXO clearance should be authorised through a separate marine licence, including low order clearance. However, the Applicant intends to seek consent for low order UXO clearance through the MHPGC Project DCO and associated dMLs. Should high order UXO clearance be required, this would be subject to a separate marine licence. The marine mammal assessment presents the committed low order approach together with precautionary information on high order (detonation) UXO clearance in Section 5.8.
06 November 2025	NatureScot advice on EWG materials	The below advice was provided by NatureScot in preparation of the EWG Meeting and following a review of the presentation slides provided by the applicant. NatureScot agree that the following are in line with their Scoping advice: - Harbour seals and common dolphin will be fully considered within the assessment. 'Injury and disturbance from underwater sound' impact will encompass sound from pre-construction survey, UXO clearance and vessels. All designed-in mitigation will be clearly identified in the PEIR and ES. This will include a vessel management plan and JNCC guidance for geophysical survey and UXO to be secured through a MMMP (JNCC, 2025 in draft; JNCC, 2025). No marine mammal monitoring is required for the MHPGC Project.	Harbour seal and common dolphin have been included within the marine mammal assessment [see Section 5.8] following considered within the baseline characterisation [see Section 5.4]. MHPGC Project commitments, including preparation of an Outline MMMP (CoT36) and Outline VTMP (CoT30), are described in Section 5.7.
06 November 2025	NatureScot advice on EWG materials	In general, NatureScot agree with the proposed marine mammal assessment approach. They ask the applicant to take into account any advice they provided in their scoping response. For example, the inclusion of harbour seal and	The advice provided by NatureScot through the EPP and EWG, in addition to the Scoping Responses, has been taken into

Date	Consultee and response type	Comment	How and where considered in the PEIR
		common dolphin in the assessment and the use of the UK portion of MUs for reference populations when assessing impacts.	consideration in the marine mammal assessment. Harbour seal and common dolphin have been included within the marine mammal assessment The UK portions of the marine mammal relevant MUs have been used as the reference populations within the assessment [see Sections 5.4 and 5.4].
06 November 2025	NatureScot advice on EWG materials	In the EWG Meeting the applicant proposed that Low order (deflagration) UXO clearance is to be considered within the assessment. If high order (detonation) UXO clearance is required, this will be considered post-licence as a separate application. Impacts to the minke whale feature of Southern Trench MPA can be scoped out on this basis. NatureScot do not agree with this approach. They refer to their advice at Scoping, which states that the assessment of high order detonation should be included in the assessment as a worst-case scenario. This advice is reflected in the MHPGC Project Scoping Opinion.	The MHPGC Project is committed to low order UXO clearance techniques [see Section 5.7], with precautionary information on high order (detonation) UXO clearance considered within the assessment in Section 5.8. Potential impacts on the minke whale qualifying feature of the Southern Trench ncMPA are considered within the MHPGC Project MPA,MCZ and HPMA Screening and Assessment Approach, prepared to accompany the PEIR. This ncMPA is screened out from further assessment as it is outside the relevant ZoI for underwater sound. The MPA/MCZ Assessment and HPMA Ecosystem Level Assessment will consider potential impacts associated with UXO clearance and other MHPGC Project activities which will be undertaken and submitted in support of the DCO application and Marine Licence application(s) to the Scottish Ministers.
06 November 2025	NatureScot advice on EWG materials	NatureScot agree with the approach to consider EPS licencing as a separate application. They do not expect a full EPS Risk Assessment in the Application but would like to see an understanding of the implications for cetaceans from the proposal under Offshore Regulations, together with mitigation options. This will provide confidence, should the proposal be consented, that any impact is able to be addressed through a subsequent derogation under EPS licencing.	Potential impacts on EPS have been considered within the impact assessment [see Section 5.8], including the implications for subsequent EPS licencing where relevant. The assessment will be used to inform any subsequent application for an EPS Licence.
13 January 2026	Written response from NatureScot on EWG meeting minutes	NatureScot agree with the proposed underwater sound modelling approach but refer to their Scoping response for specific advice. Following the EWG	Project specific underwater sound modelling has been undertaken to inform the assessment [see Volume 2, Annex 5.1 :

Date	Consultee and response type	Comment	How and where considered in the PEIR
		Meeting, NatureScot provided additional advice on the underwater sound assessment methodology: - NatureScot agree with the proposal to use predictive modelling to estimate sound sources from activities such as cable installation (non-impulsive), vessel traffic (non-impulsive), geophysical surveys (impulsive), piling (impulsive), and UXO clearance (impulsive). - NatureScot welcome the modelling of UXO detonation using the proposed methodology. It is not necessary to model a moving UXO source, as the UXO will be static on the seabed. - NatureScot do not recommend the sole use of EDRs for UXO clearance in Scottish waters, due to the site-specific nature of UXO noise propagation. We will accept EDRs to be used alongside calculated auditory injury/TTS threshold onset ranges for marine mammal receptor groups. - NatureScot agree that the density of receptor species should be calculated using the most recent literature and reports. Where densities are unavailable for certain species (e.g., within the SCANS-IV report) then the next available figures should be used (e.g., from SCANS-III) to identify animal densities that reflect a worst-case scenario. - NatureScot welcome the use of the updated NMFS (2024) hearing thresholds for marine mammal species.	Underwater Sound Modelling Report, of the PEIR. The modelling has considered the relevant MHPGC sound-generating activities; piling is not proposed as part of the MHPGC Project. Marine mammal density estimates have been selected using the most appropriate available evidence, including SCANS-IV and SCANS-III where appropriate. The updated NMFS (2024) hearing thresholds have been used to inform the underwater sound impact assessment in Section 5.8. For UXO clearance, both disturbance ranges and auditory injury/TTS threshold onset ranges have been considered, alongside the use of EDRs where appropriate.
13 January 2026	Written response from NatureScot on EWG meeting minutes	Following the EWG Meeting, NatureScot provided additional advice on the design scenario: - NatureScot acknowledge the two possible design scenario options. Option 2, where six UXO in Scottish waters (with an extra two added as a contingency) is most appropriate. The assessment will then assume eight UXO in Scottish waters. - NatureScot also agree that UXO placement should be assessed using multiple scenarios to reflect possible UXO distribution. These can include spacing at regular intervals to assume each detonation is disruptive to a new subset of marine mammals, as well as the UXOs being concentrated in one location. Therefore, we agree with both of the assessment scenarios.	The MDS for UXO clearance, including the two assessment scenarios adopted to reflect UXO distribution consistent with NatureScot advice, is presented in Table 5.38. The corresponding assessment is provided in Section 5.8, and supporting information in Volume 2, Annex 5.1: Underwater Sound Modelling Report, of the PEIR.
13 January 2026	Written response from NatureScot on EWG meeting minutes	Following the EWG Meeting, NatureScot provided additional advice on key considerations:	The potential impacts on the minke whale qualifying feature of the Southern Trench ncMPA are considered within the MHPGC Project MPA, MCZ and HPMA Screening and

Date	Consultee and response type	Comment	How and where considered in the PEIR
		• The Southern Trench MPA designated for minke whale should only be scoped out if there is no potential for direct noise impacts overlapping the MPA area. • Low noise alternatives to high order detonations should be prioritised in UXO clearance. • If high-order clearance is necessary, NatureScot would need to be consulted if there is potential for an impact on the Berwickshire and Northumberland SAC designated for the grey seal. This will be better understood after assessment scenario 2 is completed. • However, we do accept the use of the 5km EDR for geophysical survey activity, as this is highly precautionary. • For UXOs, we advise the use of TTS (temporary threshold shift) as a proxy for disturbance. This is because the noise is so short-term that displacement or other behavioural responses are unlikely. TTS is therefore the most likely worst case (sub-injury) consequence of this activity. • TTS should not be used as a proxy for disturbance for other noise sources (piling, geophysical survey, vessel noise, etc). • For UXO clearance, a mitigation zone must be defined. This is the full extent within which auditory injury could occur or a 1km radius, whichever is larger. Ensuring the full extent of the mitigation zone is clear of marine mammals before explosive use may require multiple mitigation techniques to be applied. The full extent of the mitigation zone will be agreed during the application process. If the mitigation zone extends to distances which can't be effectively mitigated, an EPS licence for injury may be required.	Assessment Approach, prepared to accompany the PEIR. This ncMPA is screened out from further assessment as it is outside the relevant ZoI for underwater sound. The MPA/MCZ Assessment and HPMa Ecosystem Level Assessment will consider potential impacts associated with UXO clearance and other MHPGC Project activities which will be undertaken and submitted in support of the DCO application and Marine Licence application(s) to the Scottish Ministers. The MHPGC Project includes a commitment to seek to minimise impact from UXO clearance through the hierarchy set out in Cot58, which identifies low order techniques, such as deflagration, as the preferred method where practicable and appropriate [see Section 5.7], with precautionary information on high order (detonation) UXO clearance presented within the assessment in Section 5.8 for information only. Potential impacts on Berwickshire and North Northumberland Coast SAC are considered within the MHPGC Project HRA Screening Report, of the PEIR, MHPGC Project RIAA, of the PEIR.. The marine mammal assessment [see Section 5.8] considers the updated JNCC EDRs (JNCC, 2025b) where appropriate and presents TTS impact ranges as a proxy for disturbance from UXO clearance, but not for other sources where behavioural disturbance thresholds are available. Relevant MHPGC Project commitments of relevance to marine mammals are described in Section 5.7, including the preparation of an Outline MMMP (CoT36), which will be submitted as part of the DCO application and

Date	Consultee and response type	Comment	How and where considered in the PEIR
			Marine Licence application(s) to the Scottish Ministers, with details of mitigation zones have been considered as part of the impact assessment [see Section 5.8]. The full list of projects commitments is provided in Volume 1, Annex 4.1: Draft Commitments Register, of the PEIR .
16 July 2026	EWG meeting with stakeholders: - MMO; - Natural England; - NatureScot.	The second EWG meeting considered updates to the marine mammal assessment following initial topics discussed at EWG1 (held 18 November 2025), including responses to outstanding actions, MHPGC Project route planning and site selection updates and initial assessment outputs. Following the meeting, stakeholders provided further comments on points raised for discussion, which are detailed in the following rows.	The consultation outcomes have informed the marine mammal baseline, assessment methodology and impact assessment presented in Sections 5.4, 5.5 and 5.8 .
23 July 2026	Written response from NatureScot on EWG2 slides	NatureScot was unable to comment on the preliminary underwater sound modelling results without sight of the underwater sound modelling report. NatureScot also requested clarification of the modelling inputs and advised that the Scottish swim speeds for VHF and HF cetaceans should be checked. NatureScot reiterated that, while low-order UXO clearance is preferred, high-order detonation should be considered as a worst-case scenario for assessment purposes.	The underwater sound modelling methodology and inputs are presented in Volume 2, Annex 5.1: Underwater Sound Modelling Report, of the PEIR . The Scottish swim speeds applied in the modelling have been reviewed and corrected, with 1.4m/s applied for harbour porpoise (VHF cetacean) and 1.52m/s for (HF cetacean) dolphin species. The MHPGC Project includes a commitment to seek to minimise impacts from UXO clearance through the hierarchy set out in CoT58, which identifies low order techniques, such as deflagration, as the preferred method where practicable and appropriate [see Section 5.7]. High-order detonation has been considered for information only within the assessment in Section 5.8 , recognising that any high-order UXO clearance, if required, would be subject to a separate Marine Licence application.
23 July 2026	Written response from NatureScot on EWG2 slides	NatureScot considered the proposed Scottish designated sites to be in line with its scoping advice, but noted that the Southern Trench ncMPA appeared to be missing from the list.	The Southern Trench ncMPA has been considered within the MHPGC Project MPA, MCZ and HPMA Screening and Assessment Approach, which accompanies the PEIR . The

Date	Consultee and response type	Comment	How and where considered in the PEIR
			site is screened out from further assessment based on the relevant underwater sound ZOI. The MPA/MCZ Assessment and HPMA Ecosystem Level Assessment will consider potential impacts associated with UXO clearance and other MHPGC Project activities which will be undertaken and submitted in support of the DCO application and Marine Licence application(s) to the Scottish Ministers.
23 July 2026	Written response from NatureScot on EWG2 slides	NatureScot considered the proposed updated impact pathways to be in line with its scoping advice and was content with the approach. NatureScot noted that, in addition to the commitment to provide various post-consent plans, within which specific mitigation measures may be required, there may be a requirement for monitoring and recommended that this be considered alongside its advice for the Morven North and Morven South applications. NatureScot was content with the proposed outline post-consent plans.	The updated impact pathways have been detailed in Section 5.6 and incorporated into the marine mammal assessment presented in Section 5.8. Section 5.7 lists the relevant marine mammal mitigation and any post-consent plans that will be based on relevant Outline plans that will be submitted to support the DCO application and Marine Licence application(s) to the Scottish Ministers, including the MMMP (CoT36), VTMP (CoT30) under the OEMP (CoT06) and the OIPMP (CoT51).
23 July 2026	Written response from NatureScot on EWG2 slides	NatureScot noted that the CEA scenarios presented reflect the approach taken in the Morven North and Morven South Section 36 applications and requested that its marine mammal advice for these projects be reviewed once available, as this may have a bearing on the MHPGC Project assessment. Further regarding the CEA initial approach outlined as part of the EWG, NatureScot requested further explanation of the dual-approach method presented for the CEA, including the definition of 'Other (lower-risk) activities' and the spatial and temporal assessment areas, to enable further advice.	The marine mammal CEA is presented in Section 5.9, with the detailed methodology for identification and screening projects for the short list outlined in Section 5.9.1. Full details of the screening undertaken for the long list is provided in Volume 1, Annex 4.3: Cumulative Screening and Location Plan, of the PEIR. This includes the approach to compiling the long list of plans and projects, the definition and treatment of 'Other (lower-risk) activities', and the spatial and temporal criteria applied to identify projects for consideration in the assessment. Relevant marine mammal advice provided in relation to Morven North and Morven South, together with any further relevant

Date	Consultee and response type	Comment	How and where considered in the PEIR
			consultation comments received following submission of the PEIR, will be considered and, where appropriate, incorporated into the ES supporting the DCO application and separate Marine Licence application(s) to the Scottish Ministers.
18 August 2026	Written response from Natural England on EWG2 slides	Natural England agreed with the key references proposed to establish the marine mammal baseline, the assessment approach described at EWG1, and the proposed low-order UXO approach and assessment scenarios.	The marine mammal baseline has continued to be informed by the key references identified through the EWG process, together with other relevant data sources identified through subsequent review [see Section 5.4.3]. The marine mammal assessment in Section 5.8 is based on the MDS presented in Table 5.38, incorporating relevant marine mammal-related commitments in Section 5.7. The MHPGC Project includes a commitment to seek to minimise impacts from UXO clearance through the hierarchy set out in CoT58, which identifies low order techniques, such as deflagration, as the preferred method where practicable and appropriate [see Section 5.7]. High-order detonation has been considered for information only within the assessment in Section 5.8, recognising that any high-order UXO clearance, if required, would be subject to a separate Marine Licence application.
18 August 2026	Written response from Natural England on EWG2 slides	Natural England noted that it will need to review the underwater sound modelling report before agreeing that the modelling outputs are acceptable.	The underwater sound modelling methodology, assumptions and outputs utilised in the marine mammal assessment in Section 5.8 are presented in Volume 2, Annex 5.1: Underwater Sound Modelling Report, of the PEIR .
18 August 2026	Written response from Natural England on EWG2 slides	Natural England requests further information on the definition of 'Other (lower-risk) activities' to provide advice on the proposed dual-approach method described for the CEA approach as part of the EWG slides.	The marine mammal CEA is presented in Section 5.9 , with the detailed methodology for identification and screening projects for the short list outlined in Section 5.9.1 . Full

Date	Consultee and response type	Comment	How and where considered in the PEIR
		Natural England notes that where project alone assessment concludes negligible significance (and therefore not significant in EIA terms), that this impact pathway will not be taken forward into the CEA. Natural England advises that caution is taken with this approach as it may miss impacts, as the combination of the project-alone impacts together with cumulative impacts could result in a significant conclusion under EIA if the receptor is highly sensitive. Each project-alone impact pathway scoped out of the CEA based on negligible significance should ensure that justification is provided to support this	details of the screening undertaken for the long list is provided in Volume 1, Annex 4.3: Cumulative Screening and Location Plan, of the PEIR . This includes the approach to compiling the long list of plans and projects, the definition and treatment of 'Other (lower-risk) activities', and the spatial and temporal criteria applied to identify projects for consideration in the assessment.
03 September 2026	Written response from MMO on EWG2 slides	Following the EWG2 Meeting, MMO provided additional advice on the assessment of underwater sound (Section 6: Underwater Noise (UWN)): - The MMO has no significant concerns at this stage. However, the underwater noise modelling outputs presented are preliminary in nature and can only be reviewed in a limited capacity, as the underlying modelling methodology, assumptions, source characteristics and input parameters have not been provided. A more detailed technical review of the underwater noise assessment will only be possible once the supporting assessment documentation becomes available. - The MMO has no objections to the presentation of both Scottish and English flee speeds, recognising that these reflect established differences in regional assessment approaches. Provided the underlying assumptions, selected flee speeds and resulting outputs are clearly presented within the assessment, this response is considered appropriate. - The range of sources proposed for inclusion within the underwater noise modelling appears comprehensive and encompasses the principal survey, construction and vessel-related activities likely to contribute to underwater noise emissions during the project. It is noted that high-order UXO clearance is being modelled for illustrative purposes only and is not currently proposed as part of the Development Consent Order or Marine Licence application. Licensing of any UXO clearance works will be subject to a standalone Marine Licence application if required.	The underwater sound modelling methodology and inputs are presented in Volume 2, Annex 5.1: Underwater Sound Modelling Report, of the PEIR. The MHPGC Project includes a commitment to seek to minimise impacts from UXO clearance through the hierarchy set out in CoT58, which identifies low order techniques, such as deflagration, as the preferred method where practicable and appropriate [see Section 5.7]. High-order detonation has been considered for information only within the assessment in Section 5.8, recognising that any high-order UXO clearance, if required, would be subject to a separate Marine Licence application.
03 September 2026	Written response from MMO on EWG2 slides	The MMO supports the proposed use of the National Marine Fisheries Service (NMFS) (2024) criteria for Auditory Injury (AUD INJ) and Temporary Threshold Shift (TTS) and provided the following additional advice: These represent the most recent iterations of the NMFS marine mammal acoustic exposure criteria and provide an appropriate basis for assessing potential hearing-related effects on marine mammal	The NMFS (2024) criteria for AUD INJ and TTS have been applied within the underwater sound modelling and assessment. The underwater sound modelling methodology and application of the NMFS criteria are detailed in Volume 2, Annex 5.1: Underwater

Date	Consultee and response type	Comment	How and where considered in the PEIR
		receptors. The MMO raises no concerns regarding their proposed use within the updated underwater noise modelling. Level B harassment is a behavioural disturbance metric used by the U.S. NMFS under the Marine Mammal Protection Act (MMPA). It refers to activities that have the potential to disturb, but not injure, marine mammals by disrupting normal behavioural patterns such as migration, feeding, breeding, nursing, breathing or sheltering. Whilst the NMFS Level B harassment approach provides useful contextual information on the potential range of behavioural disturbance, the MMO notes that more sophisticated approaches have been developed for offshore wind assessments. These include dose-response methods and empirically derived distance of effect approaches, which may provide a more realistic representation of behavioural responses by considering the probability and extent of disturbance rather than relying on a single criterion.	Sound Modelling Report, of the PEIR, with the assessment of potential effects presented in Section 5.8. Level B harassment ranges have been modelled within Volume 2, Annex 5.1: Underwater Sound Modelling Report, of the PEIR, and presented as contextual information on the potential spatial extent of behavioural disturbance for relevant activities in Section 5.8. However the assessment also considers other evidence relevant to behavioural responses, including other evidence relevant to behavioural responses, including empirical evidence-based ranges such as the JNCC (2025b) EDRs, where available, as described in Section 5.8.
03 September 2026	Written response from MMO on EWG2 slides	The MMO has no concerns regarding the proposed mitigation and commitments presented at this stage and had the following specific comment: - The proposed measures are broadly consistent with those typically applied to marine mammal mitigation, vessel management and UXO clearance. However, the information currently provided remains high-level in nature and does not include the detailed mitigation measures that would ultimately be implemented. Accordingly, the effectiveness and appropriateness of the mitigation measures can only be fully assessed once the Outline Marine Mammal Mitigation Protocol (MMMP) and supporting assessment documentation become available. - The MMO welcome the commitment to avoid UXO hazards where practicable and to consider removal techniques prior to detonation, with low-order techniques proposed where detonation is required. Further details regarding any proposed high-order clearance activities and associated mitigation measures would be expected within subsequent assessment and licencing documentation.	The relevant mitigation measures and commitments are presented in Section 5.7, with the full list of commitments provided in Volume 1, Annex 4.1: Draft Commitments Register, of the PEIR. The MHPGC Project includes a commitment to seek to minimise impacts from UXO clearance through the hierarchy set out in CoT58, which identifies low order techniques, such as deflagration, as the preferred method where practicable and appropriate [see Section 5.7]. High-order detonation has been considered for information only within the assessment in Section 5.8, recognising that any high-order UXO clearance, if required, would be subject to a separate Marine Licence application.

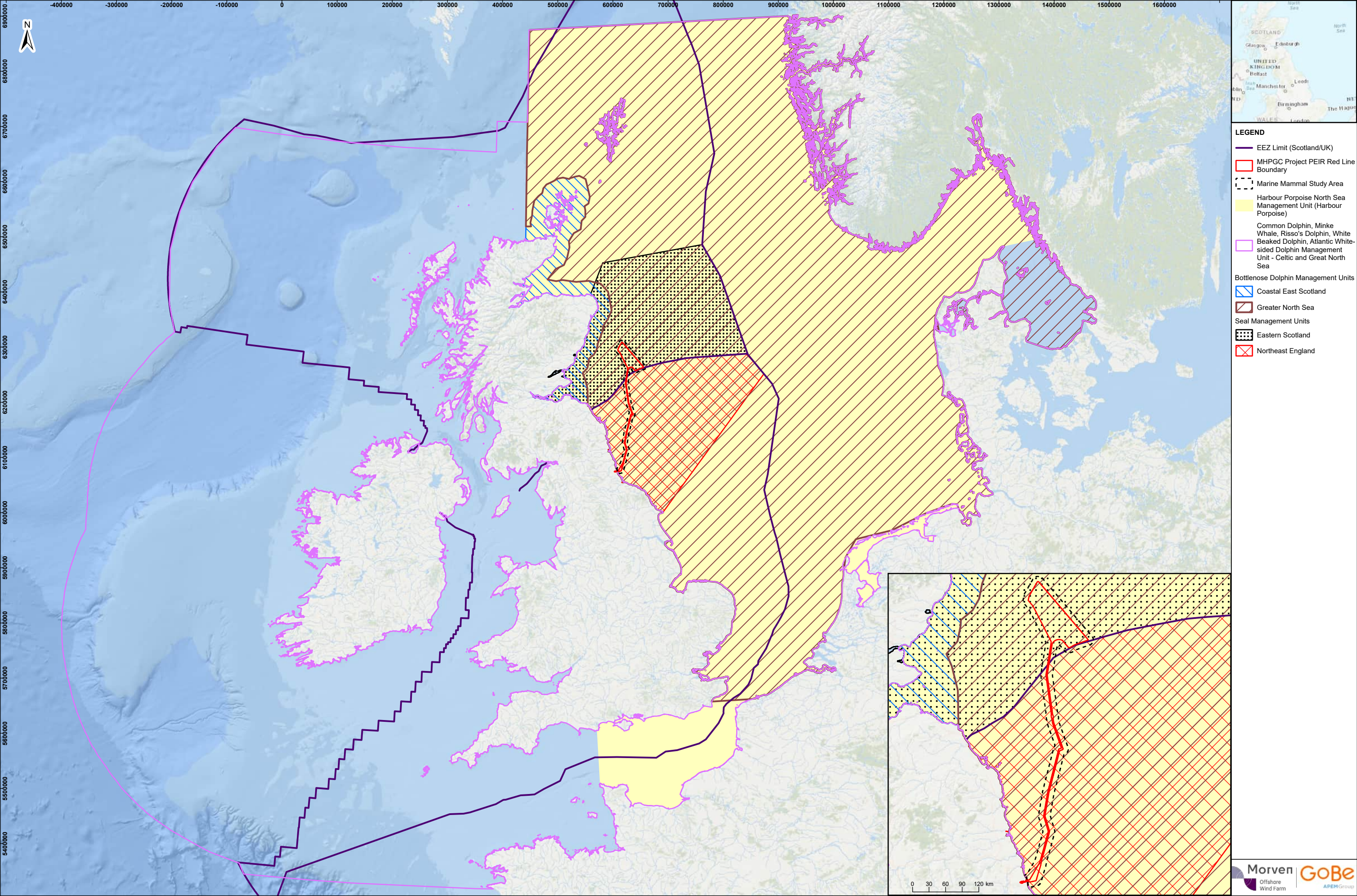
5.4 Baseline Characterisation

5.4.1 Overview

- 5.4.1.1 **Volume 1, Chapter 2: Project Description, of the PEIR**, sets out the description of the MHPGC Project and **Volume 1, Chapter 4: Approach to Environmental Impact Assessment, of the PEIR**, sets out the overarching approach that has been used in developing the preliminary environmental information.
- 5.4.1.2 This section describes the methods and data sources used to characterise the baseline for marine mammals within the study areas and describes the existing baseline characteristics.

5.4.2 Marine Mammal Study Area

- 5.4.2.1 Two study areas have been defined for marine mammals:
- **Marine Mammal Regional Study Area:** Marine mammals are highly mobile, and their range may extend over large distances. Therefore, the Marine Mammal Regional Study Area extends across the central and northern North Sea to the European coastline, providing the regional geographical context for the assessment. The Marine Mammal Regional Study Area reflects the relevant marine mammal Management Units (MUs) defined by the Inter-Agency Marine Mammal Working Group (IAMMWG) for the seven most common cetaceans in UK waters according to biological population structure, movement, habitat use and relevant management boundaries (IAMMWG, 2023). These MUs are used to define the reference populations for the assessment, with quantitative assessments (i.e. comparing the number of animals affected by a given impact against the species-specific MU) undertaken against the UK portion of each MU, where appropriate.
 - **Marine Mammal Study Area:** The Marine Mammal Study Area is defined as the area encompassing the MHPGC Project PEIR Red Line Boundary plus a 4km buffer up to MHWS. This approach is consistent with that presented in the MHPGC Project Scoping Report (RPS, 2025), accepted through the Scoping Opinion, and further discussed and agreed with consultees through the EPP [see **Section 5.3**]. The 4km buffer reflects established EIA practice for marine mammal baseline characterisation, is consistent with the approach adopted for aerial survey planning (Natural Resources Wales (NRW) *et al.*, 2017) and aligns with the approach adopted for the Morven North and Morven South ES.
- 5.4.2.2 The Marine Mammal Study Area has been defined based on the characteristics of the receiving environment and the nature and extent of the likely significant effects associated with the MHPGC Project, rather than the maximum spatial extent of any individual impact pathway (i.e. the Zone of Influence (Zoi)). This approach ensures that the baseline environment is characterised at an appropriate scale, while recognising that the spatial extent of potential effects may vary between impact pathways and are considered within the relevant impact assessments.
- 5.4.2.3 The Marine Mammal Regional Study Area and the Marine Mammal Study Area are shown in **Figure 5.1**.



Project Name:
MORVEN HAWTHORN PIT GRID
CONNECTION PROJECT

Drawing Title:
MHPGC PROJECT MARINE MAMMAL REGIONAL STUDY AREA AND MARINE
MAMMAL STUDY AREA

0 40 80 120 km
Scale@A31:6,000,000

Geodetic Information:
Datum: European 1950
Projection: ED 1950 UTM Zone 30N

Data Sources:
BP, Ordnance Survey

Service Layer Credits:
World Topographic Map: Esri, HERE, Garmin, FAO, NOAA, USGS
World Ocean Base: OceanWise, Esri, GEBCO, Garmin, NaturalVue

Drawing Number:				
FIGURE 5-1				
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5.4.3 Baseline data sources

Desk study

- 5.4.3.1 A desk-based review of literature, technical reports and publicly available datasets has been undertaken to inform the marine mammal baseline characterisation within the Marine Mammal Regional Study Area. The key desktop reports and datasets used to inform the baseline are summarised in **Table 5.6**.
- 5.4.3.2 The data sources used to inform the marine mammal baseline, and their relevance to characterising marine mammal distribution and abundance, have been discussed and agreed through the EPP process [see **Section 5.3.2**].

Table 5.6: Summary of key desktop reports and datasets used to characterise the marine mammal baseline

Title	Survey Date / Year	Author
At-sea distribution of seals on the Northwest European Shelf: Towards transboundary conservation and management	2005 to 2023	Carter <i>et al.</i> (2025)
Spatial models of cetacean density in European Atlantic waters based on SCANS-IV summer 2022 survey data	2022	Gilles <i>et al.</i> (2025)
winterSCANS: Estimates of cetacean abundance in the southern North Sea in winter 2024	2024	Ramirez-Martinez <i>et al.</i> (2025)
Scientific advice on matters related to the management of seal populations: 2025	2025	Special Committee on Seals (SCOS) (2025)
Morven North and Morven South Seal Telemetry and Haul-out Data Study	2023	Stevens (2025)
Site Condition Monitoring of bottlenose dolphins within the Moray Firth Special Area of Conservation	2001 to 2022	Cheney <i>et al.</i> (2024)
Estimates of cetacean abundance in European Atlantic waters in summer 2022 from the SCANS-IV aerial and shipboard surveys	2022	Giles <i>et al.</i> (2023)
Review of Management Unit boundaries for cetaceans in UK waters (2023)	2023	IAMMWG (2023)
Sympatric Seals, Satellite Tracking and Protected Areas: Habitat-Based Distribution Estimates for Conservation and Management	2005 to 2019	Carter <i>et al.</i> (2022)
Modelled density surfaces of Cetaceans in European Atlantic waters in summer 2016 from the SCANS-III surveys.	2016	Lacey <i>et al.</i> (2022)
Estimates of cetacean abundance in European Atlantic waters from the SCANS-III aerial and shipboard surveys	2016	Hammond <i>et al.</i> (2021)
Regional Baselines for marine mammal knowledge across the North Sea and Atlantic areas of Scottish waters	2020	Hague <i>et al.</i> (2020)
Habitat use of a coastal delphinid population investigated using passive acoustic monitoring	2013 to 2015	Palmer <i>et al.</i> (2019)
Distribution maps of cetacean and seabird populations in the North East Atlantic	1980 to 2018	Waggitt <i>et al.</i> (2020)
Seasonal and diel acoustic presence of North Atlantic minke whale in the North Sea	2016	Risch <i>et al.</i> (2019)
Berwickshire and North Northumberland Coast Special Area of Conservation grey seal population status	2016	Thompson <i>et al.</i> (2017)

Title	Survey Date / Year	Author
Revised Phase III Data Analysis of Joint Cetacean Protocol Data Resources	1994 to 2010	Paxton <i>et al.</i> (2016)
JNCC Report 544: The identification of discrete and persistent areas of relatively high harbour porpoise density in the wider UK marine area	1994 to 2011	Heinänen and Skov (2015)
Atlas of cetacean distribution in north-west European waters	1973 to 2003	Reid <i>et al.</i> (2003)

Other offshore development survey data

5.4.3.3 Marine mammal survey data from a number of offshore wind developments within the Marine Mammal Regional Study Area have also been considered to support the marine mammal baseline characterisation in **Section 5.4.4**. While most of these surveys do not cover the full extent or overlap with the MHPGC Project PEIR Red Line Boundary, these data provide a useful context for the wider distribution of marine mammals in the North Sea.

5.4.3.4 Given the highly mobile nature of marine mammals and the availability of extensive regional survey information across the Marine Mammal Regional Study Area, including data from nearby offshore wind developments within the North Sea, additional project-specific Digital Aerial Surveys (DAS) was not considered likely to materially improve the characterisation of baseline conditions for the MHPGC Project PEIR Red Line Boundary. The marine mammal baseline has therefore been informed by the best available site-specific and regional datasets, with the level of survey evidence considered proportionate to the scale and nature of the MHPGC Project and its potential impact pathways.

Morven North and Morven South

5.4.3.5 Site-specific DAS were undertaken monthly between January 2021 and September 2023 to inform the marine mammal baseline for the Morven North and Morven South Project (APEM, 2025). These surveys covered the Morven North and Morven South Red Line Boundary plus a 4km buffer, located within the northern section of the MHPGC Project PEIR Red Line Boundary and entirely within Scottish waters [see **Figure 5.1**]. As such, the Morven North and Morven South Project DAS provide the most representative site-specific information available for the northern Scottish section of MHPGC Project, but does not cover the full MHPGC Project PEIR Red Line Boundary or extend into English waters.

5.4.3.6 The remainder of the MHPGC Project PEIR Red Line Boundary (and assumed buffer) was not subject to marine mammal DAS, as additional site-specific survey effort was not considered proportionate to the scale and nature of the potential impact pathways associated with the offshore export cable installation activities.

Other nearby developments

5.4.3.7 Other nearby offshore wind development survey datasets considered within the baseline characterisation include:

- Ossian Offshore Wind Farm DAS (2021 to 2023) (Ossian Offshore Wind Farm Limited (OWFL), 2024);
- Berwick Bank Wind Farm DAS (2019 to 2021) (SSE Renewables, 2022);
- Seagreen Alpha/Bravo Project boat-based surveys (2010 to 2011) (Sparling, 2012) and incidental marine mammal records from ornithology surveys (2017) (Seagreen Wind Energy Limited, 2018);
- Neart Na Gaoithe Offshore Wind boat-based surveys (2009 to 2011) (Macleod and Sparling, 2011; Mainstream Renewable Power Limited, 2012);
- Analysis of The Crown Estate aerial survey data for marine mammals for the Forth and Tay Offshore Wind Developers Group region (2009 to 2010) (Grellier and Lacey, 2012).

Data limitations and assumptions

- 5.4.3.8 Although the availability of data for marine mammals within the North Sea region are considered sufficient to provide a comprehensive understanding of the existing environment within the Marine Mammal Regional Study Area, there are inherent limitations and resulting assumptions associated with these datasets.
- 5.4.3.9 Marine mammals are highly mobile and spend the majority of their time underwater. Consequently, visual survey datasets represent a snapshot of existing conditions at the time of the survey and rely on visibility of individuals at the surface. There is therefore inherent uncertainty associated with detectability, species identification and environmental conditions, all of which may influence the observed distribution and abundance of marine mammals.
- 5.4.3.10 The density estimates used within the assessment have been selected from the most appropriate and up-to-date available datasets for each species. Where multiple data sources were available, the most precautionary density estimate considered appropriate for the assessment has been selected, taking account of temporal changes in distribution, survey coverage and the availability of more recent information.
- 5.4.3.11 For cetaceans, the SCANS programme provides the principal source of density information used within the assessment. However, the SCANS surveys are undertaken during the summer (mostly between June and August) and therefore do not capture seasonal variation in cetacean distribution and abundance. The winter SCANS survey (Ramirez-Martinez *et al.*, 2025) provides additional information for the southern North Sea during winter (January to March 2024); however, this survey did not extend across the full extent of the Marine Mammal Regional Study Area.
- 5.4.3.12 Similarly, at-sea seal distributions presented in Carter *et al.* (2022; 2025) were estimated for harbour and grey seals during their foraging seasons, when they are anticipated to spend more of their time at sea. As such, although the available data only provides snapshots in time, the abundances are considered to represent the worst-case scenario and indicate the greatest abundances likely to be encountered within the Marine Mammal Study Area.
- 5.4.3.13 The marine mammal baseline has therefore been developed using the best available information at the time of writing. Whilst the available datasets are subject to inherent temporal and spatial variability that may influence the observed distribution and abundance of marine mammals, the use of multiple complementary datasets, together with a precautionary approach to data selection and assessment, provides a robust baseline. The extent of baseline information is considered proportionate to the scale and nature of the MHPGC Project and the associated impact pathways.

5.4.4 Overview of baseline environment

- 5.4.4.1 The Marine Mammal Regional Study Area supports a range of marine mammal species comprising two broad taxonomic groups: cetaceans (whales, dolphins, porpoises) and pinnipeds (seals). Marine mammals are highly mobile, and individuals occurring within the Marine Mammal Regional Study Area form part of wider regional populations that extend throughout UK waters and the north-west European shelf.
- 5.4.4.2 The IAMMWG have defined MUs for the seven most common cetacean species occurring in UK waters, based on biological population structure, movement patterns, habitat use and management considerations (IAMMWG, 2023). These MUs provide the reference populations used within the assessment. The MHPGC Project PEIR Red Line Boundary overlaps the following relevant cetacean MUs [see **Figure 5.1**]:
- North Sea MU:
 - Harbour porpoise (*Phocoena phocoena*).
 - Greater North Sea MU:
 - Bottlenose dolphin (*Tursiops truncatus*).
 - Celtic and Greater North Sea MU:
 - White-beaked dolphin (*Lagenorhynchus albirostris*);

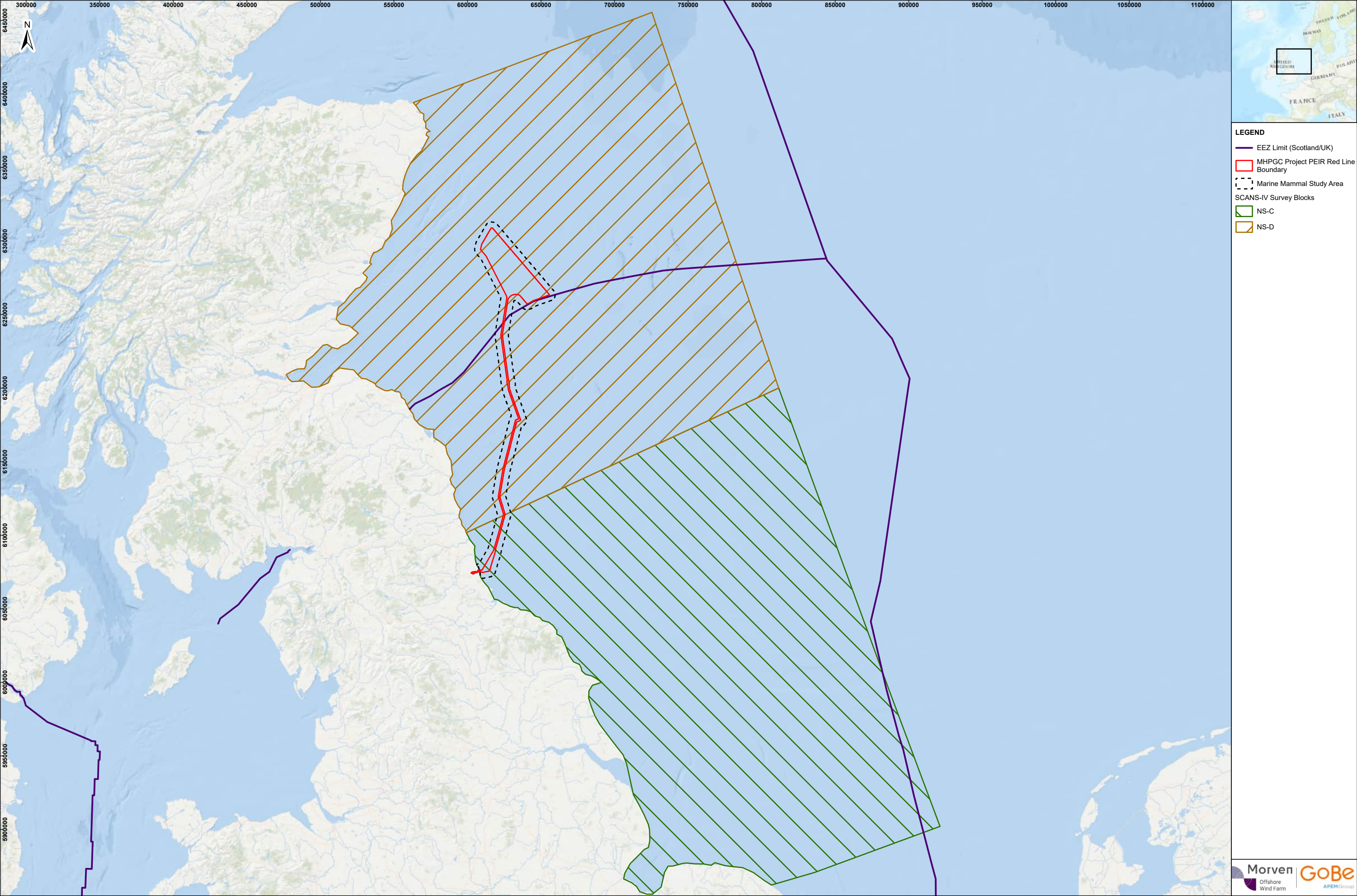
- Minke whale (*Balaenoptera acutorostrata*);
- Risso's dolphin (*Grampus griseus*);
- Atlantic white-sided dolphin (*Lagenorhynchus acutus*);
- Common dolphin (*Delphinus delphis*).

- 5.4.4.3 For pinnipeds, the UK supports important concentrations of both harbour seal (*Phoca vitulina*) and grey seal (*Halichoerus grypus*). Seal Monitoring Units (SMUs), defined by the Special Committee on Seals (SCOS, 2025), provide a framework for considering seal populations and their management. The MHPGC Project PEIR Red Line Boundary lies within the Northeast England and East Scotland SMUs for both harbour and grey seal, which provide the relevant reference areas for consideration of seal populations within the assessment [see **Figure 5.1**].
- 5.4.4.4 In addition to the other species listed above, several other cetacean species may occur occasionally within UK waters and the wider Marine Mammal Regional Study Area, including humpback whale (*Megaptera noveangliae*), killer whale (*Orcinus orca*) and long-finned pilot whale (*Globicephala melas*) (International Council for the Exploration of the Sea (ICES), 2025).
- 5.4.4.5 Cetacean species abundance estimates are derived from SCANS survey blocks. The MHPGC Project PEIR Red line Boundary occurring primarily within SCANS-IV block NS-D (equivalent to SCANS-III block R) from kilometre point (KP) 259 to KP44 and a small southern section (KP44 to KP0) overlapping the SCANS-IV block NS-C (equivalent to SCANS-III block O)² [see **Figure 5.2**]. Scottish waters occur from KP180.5 to KP259 and are entirely within SCANS block NS-D/NS-R and English waters occur from KP0 to KP180.5 and occur in SCANS block NS-D/R and block NS-C/O.
- 5.4.4.6 All cetaceans considered within this assessment are afforded strict protection as EPS under the Habitat Regulations [see **Section 5.2.2**]. Whilst harbour and grey seals are not designated as EPS, they are also afforded protection under relevant national marine conservation legislation and form qualifying features of designated sites [see **Section 5.4.5**]. A summary of the legal protection afforded to the most common marine mammal species considered within this assessment is provided in **Table 5.7**.

² Note that the Block names were changed between SCANS-III and SCANS-IV but the boundaries of the Blocks of relevance for the MHPGC Project did not change. Therefore, the boundaries for SCANS-III Blocks R and O are the same as those for SCANS-IV, Blocks NS-D and ND-C respectively.

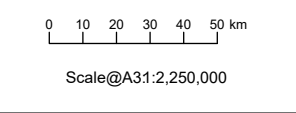
Table 5.7: UK legislative protection afforded to the most common marine mammals present in the Marine Mammal Regional Study Area ("-" represents a species which is not covered by the UK legislative document)

Legislative instrument	Harbour porpoise	Bottlenose dolphin	White-beaked dolphin	Minke whale	Risso's Dolphin	White-sided dolphin	Common dolphin	Grey seal	Harbour seal
National Legislation									
Marine Strategy Regulations 2010	✓	✓	✓	✓	✓	✓	✓	✓	✓
The Conservation of Offshore Habitats and Species Regulations 2017	✓	✓	✓	✓	✓	✓	✓	✓	✓
The Wildlife and Countryside Act 1981	✓	✓	✓	✓	✓	✓	✓	-	-
Scottish waters									
Marine (Scotland) Act 2010	-	-	-	-	-	-	-	✓	✓
The Conservation (Natural Habitats, &c.) Regulations 1994 (as amended)	✓	✓	✓	✓	✓	✓	✓	-	-
Nature Conservation (Scotland) Act 2004	✓	✓	✓	✓	✓	✓	✓	-	-
The Protection of Seals (Designation of Haul-Out Sites) (Scotland) Order 2014	-	-	-	-	-	-	-	✓	✓
Priority Marine Feature	✓	✓	✓	✓	✓	✓	✓	✓	✓
English waters									
The Conservation of Habitats and Species Regulations 2017	✓	✓	✓	✓	✓	✓	✓	-	-
Conservation of Seals Act 1970	-	-	-	-	-	-	-	✓	✓



Project Name:
MORVEN HAWTHORN PIT GRID
CONNECTION PROJECT

Drawing Title:
SCANS-IV SURVEY BLOCKS (GILLES *ET AL.*, 2023)



Geodetic Information:
Datum: European 1950
Projection: ED 1950 UTM Zone 30N

Data Sources:
BP, Ordnance Survey

Service Layer Credits:
World Ocean Base: OceanWise, Esri, GEBCO, Garmin, NaturalVue
World Topographic Map: Esri, HERE, Garmin, FAO, NOAA

Drawing Number:
FIGURE 5-2

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- LEGEND**
- EEZ Limit (Scotland/UK)
 - MHPGC Project PEIR Red Line Boundary
 - Marine Mammal Study Area
 - SCANS-IV Survey Blocks
 - NS-C
 - NS-D



Harbour porpoise

- 5.4.4.7 Harbour porpoise are widely distributed throughout the North Sea and are the most abundant cetacean species in the region (Chevallard *et al.*, 2019; Evans and Waggitt, 2020; Hammond *et al.*, 2021; Joint Cetacean Data Programme (JCDP), 2025). Harbour porpoise occur year-round within the Marine Mammal Regional Study Area, although their distribution and abundance exhibit seasonal variation. Persistently high-density areas have been identified around Smith Bank and the outer Moray Firth during summer months in Scottish waters, and at the northwestern edge of Dogger Bank during summer, offshore the Norfolk coast and outer Thames Estuary during winter, and around the Inner Silver Pit throughout the year in English waters (Heinänen and Skov, 2015). The importance of harbour porpoise in the southern North Sea is reflected in the designation of the Southern North Sea SAC, located approximately 100km south of the MHPGC Project PEIR Red Line Boundary.
- 5.4.4.8 Seasonal changes in harbour porpoise distribution have been reported throughout the North Sea. In Scottish waters, harbour porpoises are present year-round but exhibit peak densities in inshore waters during summer months before moving towards the innermost North Sea during winter (Hague *et al.*, 2020; Waggitt *et al.*, 2020). In English waters, harbour porpoise densities are greatest in the southern North Sea, reflecting a documented shift in the distribution of the population over recent decades away from the northern North Sea towards the waters of eastern and southeastern England, particularly during winter months (Sea Watch Foundation, 2020a; Waggitt *et al.*, 2020).
- 5.4.4.9 Predicted seasonal movements of harbour porpoise indicate that individuals are concentrated in the innermost North Sea during winter and around Dogger Bank during spring, while moderate densities are also predicted offshore northern England and southern Scotland (Gilles *et al.*, 2016). During summer, the distribution is predicted to shift southwards, with greater concentrations in the southern North Sea (Gilles *et al.*, 2016). In autumn, overall densities decline relative to spring and summer and become more spatially heterogeneous (Gilles *et al.*, 2016).
- 5.4.4.10 Harbour porpoise distribution within the North Sea is influenced by a range of environmental variables, including sea surface temperature, water depth, distance from coast and prey availability (Gilles *et al.*, 2016), particularly sandeel (*Ammodytes* spp.) (Natural England *et al.*, 2025). Within the MHPGC Project PEIR Red Line Boundary, predicted densities of buried lesser sandeel (*Ammodytes marinus*) are generally low and patchily distributed with the highest predicted densities occurring to the west of the MHPGC Project PEIR Red Line Boundary in Scottish waters, particularly around the Firth of Forth and Firth of Tay (Langton *et al.*, 2021). More extensive areas of high predicted sandeel density occur within the central and southern North Sea in English waters (Langton *et al.*, 2021), where harbour porpoise densities are also generally greater (Waggitt *et al.*, 2020), reflecting the importance of prey availability in influencing the predicted distribution of harbour porpoise in the North Sea.
- 5.4.4.11 The MHPGC Project PEIR Red Line Boundary lies within the IAMMWG North Sea MU for harbour porpoise which extends throughout the North Sea and an eastern section of the English Channel [see **Figure 5.1**]. The most recent abundance estimate for the UK portion of this MU is 159,632 individuals (IAMMWG, 2023), which provide the reference population for the assessment [see **Table 5.8**]. However, the MU estimate does not identify distribution patterns within the MU.
- 5.4.4.12 The MHPGC Project PEIR Red Line Boundary occurs predominantly within SCANS-IV block NS-D (equivalent to SCANS-III block R), with a small southern section occurring within SCANS-IV block NS-C (equivalent to SCANS-III block O). Abundance and density estimates for the relevant SCANS blocks indicate similar abundances and densities across both blocks, while winterSCANS surveys³ indicate lower harbour porpoise densities during winter months (Gilles *et al.*, 2023; Ramirez-Martinez *et al.*, 2025) [see **Table 5.8**].

³ winterSCANS surveys were undertaken between January and March 2024 as an extension to the long-term SCANS summer monitoring programme. The surveys covered the same North Sea survey blocks as SCANS-IV, enabling comparisons of harbour porpoise density estimates between summer and winter.

- 5.4.4.13 These regional abundance and density estimates are supported by a number of site-specific surveys undertaken for offshore wind developments in the Marine Mammal Regional Study Area [see **Section 5.4.3**]. Collectively, these surveys indicate that harbour porpoise occur throughout the year, with generally greater numbers observed during spring and summer months compared to autumn and winter [see **Table 5.9**]. However, one project, Neart na Gaoithe, reported lower observations between May and June in the outer Firth of Forth and Firth of Tay (Macleod and Sparling, 2011).
- 5.4.4.14 Habitat-based modelling provides additional information on the spatial distributions of harbour porpoise density within the North Sea and across the Marine Mammal Study Area. Predicted density surfaces developed from SCANS-IV survey data (Gilles *et al.*, 2025) and by Waggitt *et al.* (2020) indicate that harbour porpoise occur throughout the MHPGC Project PEIR Red Line Boundary, with spatial variation in predicted density across jurisdictions along the route [see **Figure 5.3** and **Table 5.10**]. The modelled grid cell-specific densities within the Marine Mammal Study Area (MHPGC Project PEIR Red Line Boundary plus a 4km buffer) is 0.496 individuals per km² based on the SCANS-IV model (Gilles *et al.*, 2025), compared with a predicted density of 0.587 individuals per km² within the MHPGC Project PEIR Red Line Boundary based on Waggitt *et al.* (2020) [see **Table 5.10**].
- 5.4.4.15 Based on the available regional datasets, site-specific surveys, and habitat-based modelling, harbour porpoise are considered highly likely to occur throughout the Marine Mammal Study Area.
- 5.4.4.16 The most recent conservation status assessment of harbour porpoise in UK waters concluded that the overall conservation status is Unfavourable-inadequate, with a stable overall trend (JNCC *et al.*, 2026a). This represents a change from the previous assessment conclusion of Unknown (JNCC, 2019a), reflecting an improved evidence base and increased confidence in the available data.

Table 5.8: Harbour porpoise reference population, abundance and density estimates relevant to the Marine Mammal Regional Study Area

Reference population/survey area	Abundance	SCANS-III density (individuals/km ²)	SCANS-IV density (individuals/km ²)	winterSCANS density (individuals/km ²)
IAMMWG North Sea MU	346,601	-	-	-
IAMMWG North Sea MU (UK Waters)	159,632	-	-	-
SCANS-IV block NS-D	38,577	-	0.5985	0.2569
SCANS-III block R	38,646	0.599	-	-
SCANS-IV block NS-C	36,286	-	0.6027	0.3780
SCANS-III block O	53,485	0.888	-	-

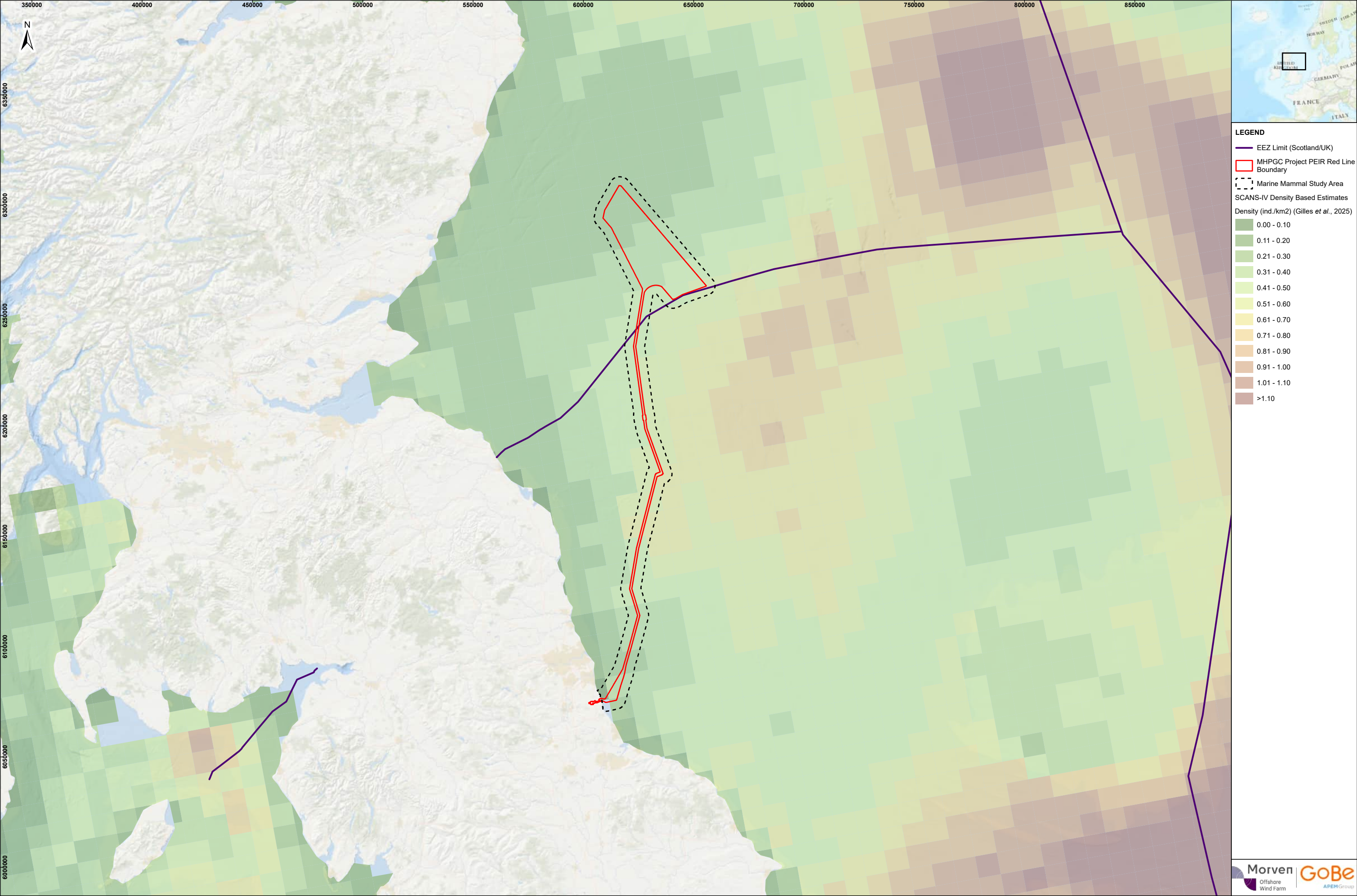
Note: SCANS-IV and SCANS-III used different survey block boundaries. The SCANS-III blocks presented in this table represent the closest spatially corresponding blocks to the SCANS-IV blocks shown (SCANS-IV NS-D and NS-C correspond most closely to SCANS-III R and O, respectively).

Table 5.9: Mean density estimates for harbour porpoise observed during site-specific surveys for nearby developments

Project	Jurisdiction	Corresponding SCANS block	Approximate distance to MHPGC Project PEIR Red line Boundary (km)	Spring density (individuals/km ²)	Summer density (individuals/km ²)	Autumn density (individuals/km ²)	Winter density (individuals/km ²)
Morven North and Morven South Project	Scotland	NS-D/R	Onsite	0.21	0.113	0.066	0.014
Ossian Offshore Wind Farm	Scotland and England	NS-D/R NS-C/O	5	0.173	0.382	0.013	0.039
Berwick Bank Offshore Wind Farm	Scotland and England	NS-D/R	13	0.826	0.179	0.096	0.092
Seagreen Project	Scotland	NS-D/R	23.27 to 38.1	N/A	0.099	N/A	0.048
Neart na Gaoithe	Scotland	NS-D/R	64	N/A	0.099	N/A	0.048

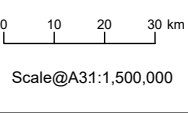
Table 5.10: Predicted harbour porpoise density within the Marine Mammal Study Area

Jurisdiction	Nearest KP	Corresponding SCANS block	Waggitt <i>et al.</i> (2020) peak predicted density (individuals/km ²)	SCANS-IV predicted density (individuals/km ²) (Gilles <i>et al.</i> , 2025)
MHPGC Project PEIR Red Line Boundary	KP0 to KP259	NS-D/R NS-C/O	0.5873	0.496
Scotland	KP 259 to KP180.5	NS-D/R	0.604	0.452
England	KP180.5 to KP44	NS-D/R	0.487	0.512
	KP44 to KP0	NS-C/O	0.547	



Project Name:
MORVEN HAWTHORN PIT GRID
CONNECTION PROJECT

Drawing Title:
PREDICTED HARBOUR PORPOISE DENSITY DISTRIBUTION BASED ON SCANS-IV
DATA (GILLES *ET AL.*, 2025)



Geodetic Information:
Datum: European 1950
Projection: ED 1950 UTM Zone 30N

Data Sources:
BP, Ordnance Survey

Service Layer Credits:
World Ocean Base: OceanWise, Esri, GEBCO, Garmin, NaturalVue
World Topographic Map: Esri, HERE, Garmin, FAO, NOAA

LEGEND

- EEZ Limit (Scotland/UK)
- MHPGC Project PEIR Red Line Boundary
- Marine Mammal Study Area
- SCANS-IV Density Based Estimates
- Density (ind./km2) (Gilles *et al.*, 2025)

0.00 - 0.10
0.11 - 0.20
0.21 - 0.30
0.31 - 0.40
0.41 - 0.50
0.51 - 0.60
0.61 - 0.70
0.71 - 0.80
0.81 - 0.90
0.91 - 1.00
1.01 - 1.10
>1.10

Morven
Offshore
Wind Farm

GoBe
APEN Group

Drawing Number:
FIGURE 5-3

VER	DATE	DETAILS	BY	CHECK
00	22/09/2025	Initial Issue	GB	BW
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Bottlenose dolphin

- 5.4.4.17 Bottlenose dolphin are widely distributed throughout UK waters, with individuals occurring in both coastal and offshore waters (Avant, 2008). Two ecotypes for bottlenose dolphin are recognised in UK waters: a wide-ranging offshore ecotype and a more resident coastal ecotype (Louis *et al.*, 2014). Within the North Sea, the coastal ecotype is considered the more prevalent form, with sightings typically concentrated within 10km of the coastline.
- 5.4.4.18 Distinct coastal populations have been identified in UK waters, including populations associated with the east and west coasts of Scotland. Along the east coast, the Moray Firth and Firth of Tay populations form part of the wider Coastal East Scotland population, while populations also occur along the west coast within the Inner Hebrides and Sound of Barra (Cheney *et al.*, 2013; van Geel, 2016; Hague *et al.*, 2020).
- 5.4.4.19 In English waters, bottlenose dolphins have previously been considered uncommon, although recent evidence indicates that the range of the east coast population has expanded southwards to include the northeast coast of England (Arso-Civil *et al.*, 2021, NatureScot, 2024). There has been a reported decline in the number of individuals using waters in the Moray Firth SAC in the summer months, with a concurrent increase in the number of individuals occurring in the Firth of Tay and English coastline to the south (Cheney *et al.*, 2024). Citizen science and photo-identification studies have also documented increasing occurrence of bottlenose dolphins along the northeast coast of England, extending as far as south as Withernsea (Hackett, 2022; Sea Watch Foundation, 2022) and the Humber Estuary (MARINELife, 2024).
- 5.4.4.20 Bottlenose dolphins demonstrate high flexibility in both their foraging behaviour and habitat use (Fernandez-Betelu *et al.*, 2019). Previously unknown long-range movements of individuals associated with the Moray Firth SAC population have been observed as far as Denmark, Ireland, the Isle of Man, the Netherlands, and the southern English coast (Cheney *et al.*, 2024). Most female bottlenose dolphins found in the Moray Firth were found to give birth from six to 13 years of age, with calves born predominantly from May to October, peaking during the summer months with increased water temperatures (Robinson *et al.*, 2017).
- 5.4.4.21 The MHPGC Project PEIR Red Line Boundary is located within the IAMMWG Greater North Sea (GNS) MU for bottlenose dolphin and approximately 12km west of the IAMMWG Coastal East Scotland (CES) MU [see **Figure 5.1**]. The most recent abundance estimates for bottlenose dolphin are 1,885 individuals in the GNS MU and 224 in the CES MU (IAMMWG, 2023), with the GNS MU providing the reference population for the assessment [see **Table 5.11**]. However, the adjacent CES MU has also been considered because recent evidence demonstrates connectivity between this resident population with key foraging habitat along the east coast of Scotland and north-east England (IAMMWG, 2023), indicating that individuals associated with the CES population may occur within the MHPGC Project PEIR Red Line Boundary.
- 5.4.4.22 Although the Moray Firth SAC is located approximately 356km from the MHPGC Project PEIR Red Line Boundary, the SAC represents the core area associated with the CES MU population rather than the full extent of its distribution. The CES MU hosts the only year-round resident population of bottlenose dolphin in the North Sea (Robinson *et al.*, 2017), with individuals demonstrating high fidelity to the Moray Firth area, while also undertaking wider movements along the east coast of Scotland (Cheney *et al.*, 2018; Fernandez-Betelu *et al.*, 2019). The Moray Firth SAC is one of only two SACs in UK waters specifically established to protect bottlenose dolphin.
- 5.4.4.23 Abundance and density estimates from the relevant SCANS blocks indicate generally low densities of less than 0.05 individuals per km², while no bottlenose dolphins were observed during winter SCANS surveys (Ramirez-Martinez *et al.*, 2025) [see **Table 5.11**]. However, these broadscale surveys are unlikely to capture localised coastal concentrations associated with the CES MU.
- 5.4.4.24 Site-specific survey data from nearby offshore wind developments in the Marine Mammal Regional Study Area [see **Section 5.4.3**] also support estimates of a low density of bottlenose dolphin in the Marine Mammal Study Area. No bottlenose dolphin sightings were recorded during monthly DAS undertaken for Morven North and Morven South and Ossian Wind Farm (Ossian OWFL, 2024; APEM, 2025). Berwick Bank Offshore Wind Farm, which is located closer to the CES MU population, observed occasional bottlenose dolphins in very low numbers during aerial surveys (one to six

individuals); however, but not in sufficient quantities to derive site-specific density estimates (SSE Renewables, 2022).

- 5.4.4.25 Habitat-based modelling provides additional information on the spatial distribution of bottlenose dolphin within the North Sea and across the Marine Mammal Study Area. Predicted density surfaces developed from SCANS-IV survey data (Gilles *et al.*, 2025) and Waggitt *et al.* (2020) indicate very low predicted densities throughout the MHPGC Project PEIR Red Line Boundary [see **Figure 5.4** and **Table 5.12**]. The modelled grid cell-specific densities within the Marine Mammal Study Area is 0.024 individuals per km² based on SCANS-IV (Gilles *et al.*, 2025), compared with 0.003 individuals per km² based on Waggitt *et al.* (2020) [see **Table 5.12**].
- 5.4.4.26 Waggitt *et al.* (2020) modelling predicted that bottlenose dolphin are largely absent from the North Sea in both summer and winter months. However, this modelling represents the offshore ecotype only and therefore does not account for the coastal ecotype individuals associated with the CES MU population. Consequently, whilst regional modelling predicts generally very low predicted densities throughout the Marine Mammal Study Area, the potential for bottlenose dolphins associated with the CES MU population to occur cannot be discounted.
- 5.4.4.27 The most recent conservation status assessment of bottlenose dolphin in UK waster concluded that the overall conservation status is Favourable, with a stable overall trend (JNCC *et al.*, 2026b). This represents an improvement from the previous assessment, which concluded that the conservation status was Unknown (JNCC, 2019b). The updated assessment reflects improved evidence, with all assessment parameters for the species now assessed as Favourable, except for habitats, which remains assessed as Unknown (JNCC *et al.*, 2026b).
- 5.4.4.28 In addition, a separate conservation assessment has recently been published for the UK Coastal MU of bottlenose dolphin. This assessment also concluded that the overall conservation status is Favourable; however, the overall trend was assessed as Unknown, reflecting that this is the first assessment undertaken and there is insufficient information to determine long-term trends (JNCC *et al.*, 2026c).

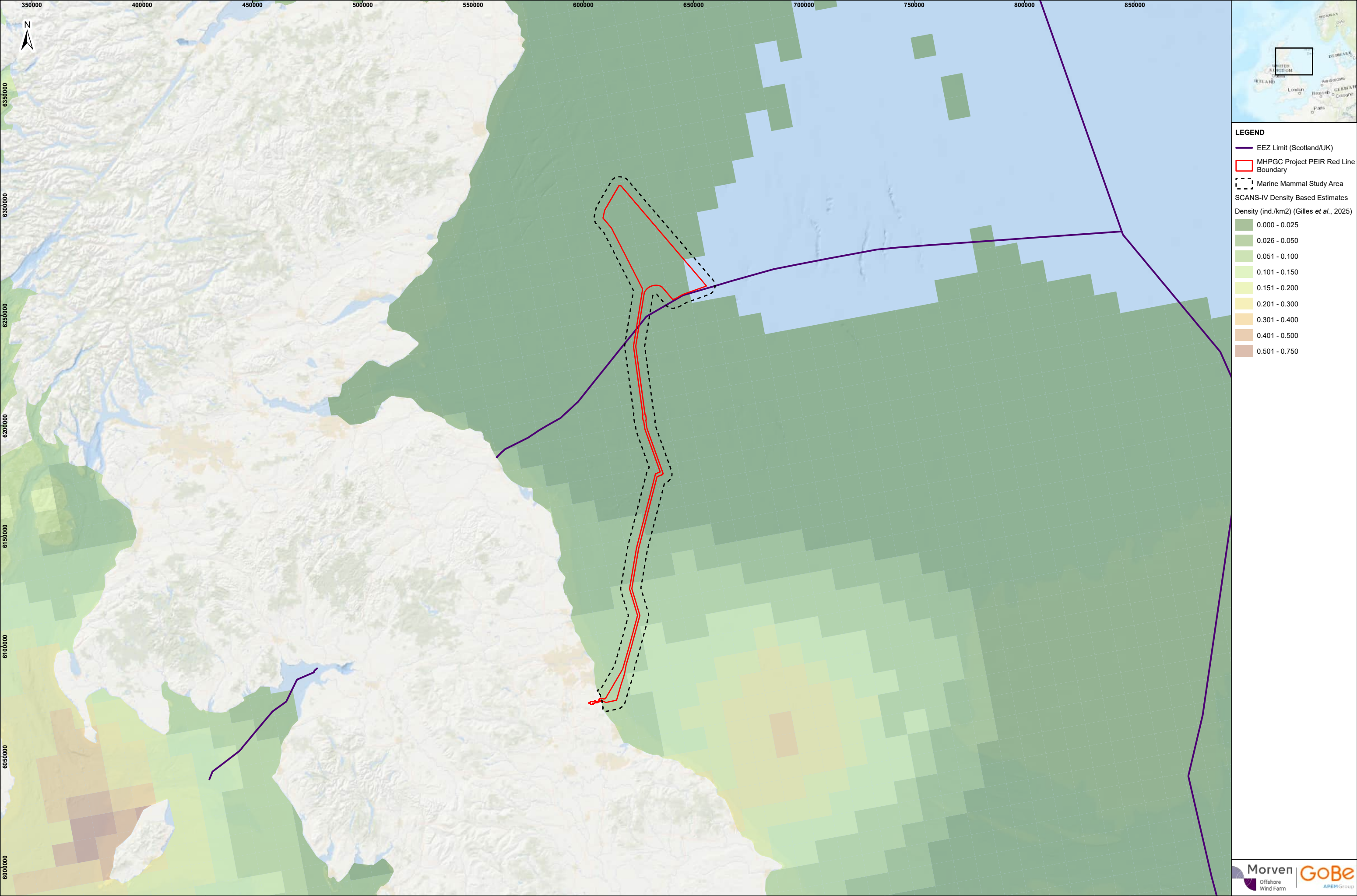
Table 5.11: Bottlenose dolphin reference population, abundance and density estimates relevant to the Marine Mammal Regional Study Area

Reference population/survey area	Abundance	SCANS-III density (individuals/km ²)	SCANS-IV density (individuals/km ²)	winterSCANS density (individuals/km ²)
IAMMWG Greater North Sea (GNS) MU	2,022	-	-	-
IAMMWG GNS MU (UK Waters)	1,885	-	-	-
IAMMWG Coastal Eastern Scotland (CES) MU	224	-	-	-
SCANS-IV block NS-D	N/A	-	N/A	N/A
SCANS-III block R	1,924	0.0298	-	-
SCANS-IV block NS-C	2,520	-	0.0419	N/A
SCANS-III block O	N/A	N/A	-	-

Note: SCANS-IV and SCANS-III used different survey block boundaries. The SCANS-III blocks presented in this table represent the closest spatially corresponding blocks to the SCANS-IV blocks shown (SCANS-IV NS-D and NS-C correspond most closely to SCANS-III R and O, respectively).

Table 5.12: Predicted bottlenose dolphin density within the Marine Mammal Study Area

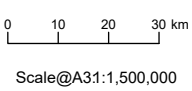
Jurisdiction	Nearest KP	Corresponding SCANS block	Waggitt <i>et al.</i> (2020) peak predicted density (individuals/km ²)	SCANS-IV predicted density (individuals/km ²) (Gilles <i>et al.</i> , 2025)
MHPGC Project PEIR Red Line Boundary	KP0 to KP259	NS-D NS-C/O	0.0034	0.024
Scotland	KP 259 to KP180.5	NS-D/R	0.002	0.000
England	KP180.5 to KP44	NS-D/R	0.004	0.033
	KP44 to KP0	NS-C/O	0.004	



- LEGEND**
- EEZ Limit (Scotland/UK)
 - MHPGC Project PEIR Red Line Boundary
 - Marine Mammal Study Area
 - SCANS-IV Density Based Estimates
 - Density (ind./km2) (Gilles *et al.*, 2025)
 - 0.000 - 0.025
 - 0.026 - 0.050
 - 0.051 - 0.100
 - 0.101 - 0.150
 - 0.151 - 0.200
 - 0.201 - 0.300
 - 0.301 - 0.400
 - 0.401 - 0.500
 - 0.501 - 0.750

Project Name:
MORVEN HAWTHORN PIT GRID
CONNECTION PROJECT

Drawing Title:
PREDICTED BOTTLENOSE DOLPHIN DENSITY DISTRIBUTION BASED ON SCANS-
IV DATA (GILLES *ET AL.*, 2025)



Geodetic Information:
Datum: European 1950
Projection: ED 1950 UTM Zone 30N

Data Sources:
BP, Ordnance Survey

Service Layer Credits:
World Topographic Map: Esri, HERE, Garmin, FAO, NOAA, USGS
World Ocean Base: OceanWise, Esri, GEBCO, Garmin, NaturalVue



Drawing Number:				
FIGURE 5-4				
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00	22/09/2025	Initial Issue	GB	BW
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White-beaked dolphin

- 5.4.4.29 White-beaked dolphin are endemic to cold temperate and subpolar waters of the North Atlantic, including the North Sea. They typically occur over continental shelf waters between approximately 50m and 100m depth and are one of the most common cetacean species within the northern and central area of the North Sea (Sea Watch Foundation, 2020b), second after the harbour porpoise (Schick *et al.*, 2020). Distribution is strongly influence by sea temperature, with the species predominantly in waters with temperatures below 12 to 14°C (MacLeod, 2013). Although little is known regarding the species' reproductive behaviours, calving is believed to occur in summer months between May and September (Ijsseldijk *et al.*, 2018).
- 5.4.4.30 White-beaked dolphin occur throughout the North Sea year-round, although their distribution varies seasonally (Waggitt *et al.*, 2020). During winter, individuals are concentrated around northwestern Scotland, including Shetland, Orkney, and the Outer Hebrides, with comparatively low densities occurring within the North Sea. During summer, densities increase across their entire UK range, with the species becoming more abundant throughout the central and northern North Sea, including waters off the north-east coast of England (Waggitt *et al.*, 2020). Peak densities found along the Scottish coast coincide with the expected calving period (ICES, 2019; Waggitt *et al.*, 2020).
- 5.4.4.31 The MHPGC Project PEIR Red Line Boundary is located within the IAMMWG Celtic and Greater North Sea (CGNS) MU for white-beaked dolphin [see **Figure 5.1**]. The most recent abundance estimates for the UK portion of this MU is 34,025 individuals (IAMMWG, 2023), which provides the reference population for the assessment [see **Table 5.13**].
- 5.4.4.32 Abundance and density estimates from the relevant SCANS survey blocks indicate that white-beaked dolphin occur at relatively low densities within the Marine Mammal Regional Study Area. Densities within SCANS-IV block NS-D were lower than those reported for SCANS-III, whereas SCANS-IV block NS-C recorded comparatively higher densities during winterSCANS, potentially reflecting seasonal shifts in distribution [see **Table 5.13**]. Individuals were recorded within both survey blocks during winterSCANS surveys, indicating year-round occurrence in the region (Ramirez-Martinez *et al.*, 2025) [see **Table 5.13**].
- 5.4.4.33 Site-specific surveys undertaken for nearby offshore wind developments in the Marine Mammal Regional Study Area [see **Section 5.4.3**], also reported that white-beaked dolphin occur at low densities throughout the region [see **Table 5.14**]. Individuals were observed throughout the year at Morven North and Morven South, Ossian Offshore Wind Farm and Seagreen Project, although peak abundance was consistently reported in summer months (between June and September) in all projects (Seagreen Wind Energy Limited, 2018; Ossian OWFL, 2024; APEM, 2025).
- 5.4.4.34 Habitat-based modelling provides additional information on the spatial distribution of white-beaked dolphin within the North Sea and across the Marine Mammal Study Area. Predicted density surfaces developed from SCANS-IV survey data (Gilles *et al.*, 2025) and Waggitt *et al.* (2020) indicate that white-beaked dolphin occur throughout the MHPGC Project PEIR Red Line Boundary, with higher predicted densities within the Scottish section of the route [see **Table 5.14** and **Figure 5.5**]. The modelled grid cell-specific densities within the Marine Mammal Study Area is 0.024 individuals per km² based on SCAN-IV (Gilles *et al.*, 2025), compared with 0.148 individuals per km² based on Waggitt *et al.* (2020) [see **Table 5.14**].
- 5.4.4.35 Based on the available regional datasets, site-specific surveys and habitat-based modelling, white-beaked dolphin are considered likely to occur regularly throughout the Marine Mammal Study Area, with highest occurrence expected during summer months. Therefore, the highest relevant density estimates available from the SCANS surveys have been taken forward for the impact assessment.
- 5.4.4.36 The most recent conservation status assessment of white-beaked dolphin in UK waters concluded that the overall conservation status is Unknown, with a stable overall trend (JNCC *et al.*, 2026d). Although this is unchanged from the previous assessment conclusion (JNCC, 2019c), the latest assessment reflects improved knowledge and increased confidence in the available evidence.

Table 5.13: White-beaked dolphin reference population, abundance and density estimates relevant to the Marine Mammal Regional Study Area

Reference population/survey area	Abundance	SCANS-III density (individuals/km ²)	SCANS-IV density (individuals/km ²)	winterSCANS density (individuals/km ²)
IAMMWG Celtic and Greater North Sea (CGNS) MU	43,951	-	-	-
IAMMWG CGNS MU (UK Waters)	34,025	-	-	-
SCANS-IV block NS-D	5,149	-	0.0799	0.0049
SCANS-III block R	15,694	0.243	-	-
SCANS-IV block NS-C	894	-	0.0149	0.0589
SCANS-III block O	143	0.002	-	-

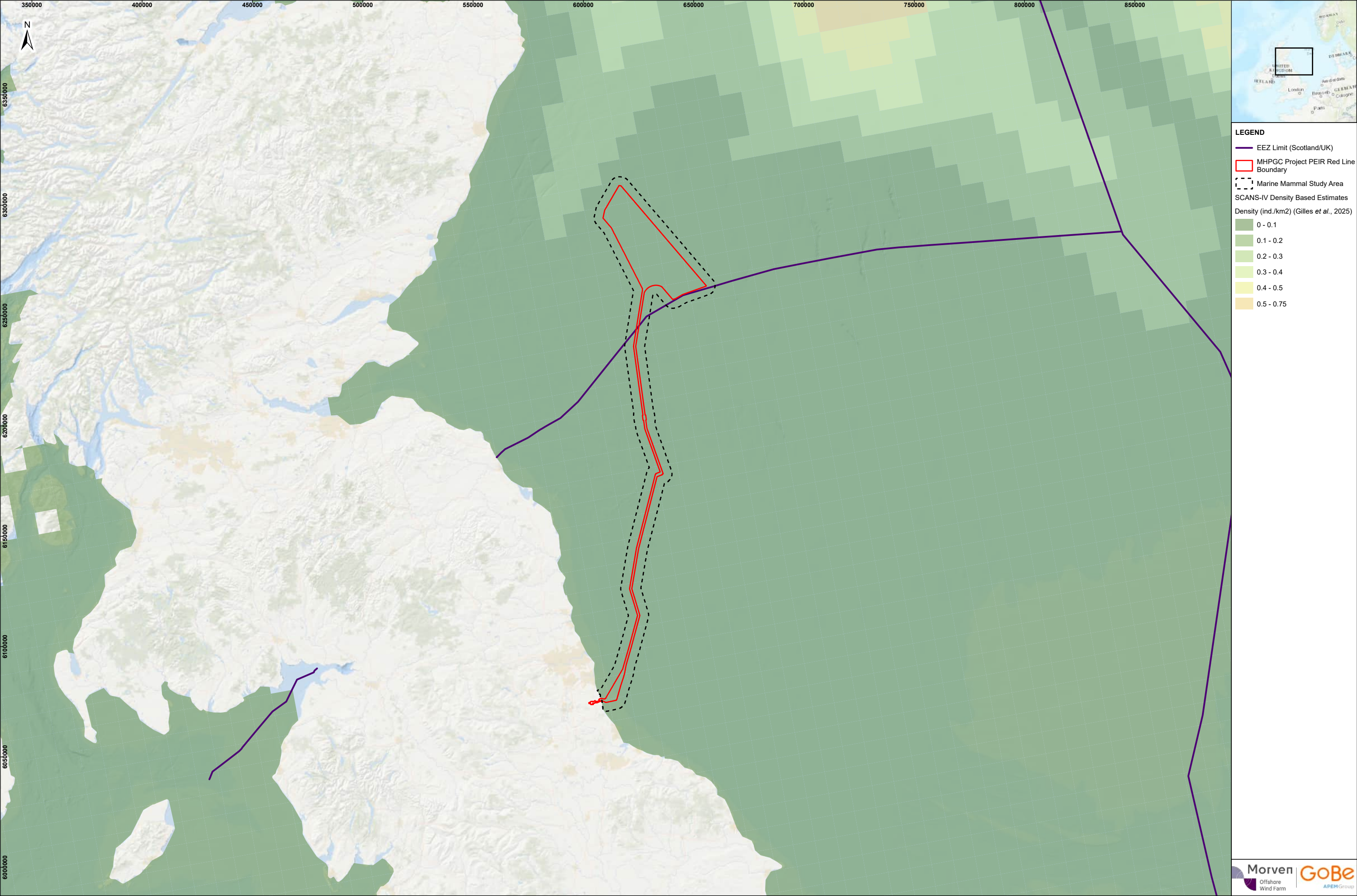
Note: SCANS-IV and SCANS-III used different survey block boundaries. The SCANS-III blocks presented in this table represent the closest spatially corresponding blocks to the SCANS-IV blocks shown (SCANS-IV NS-D and NS-C correspond most closely to SCANS-III R and O, respectively).

Table 5.14: Mean density estimates for white-beaked dolphin observed during site-specific surveys for nearby developments

Project	Jurisdiction	Corresponding SCANS block	Approximate Distance to MHPGC Project PEIR Red line Boundary (km)	Spring density (individuals/km ²)	Summer density (individuals/km ²)	Autumn density (individuals/km ²)	Winter density (individuals/km ²)
Morven North and Morven South	Scotland	NS-D/R	Onsite	0.003	0.031	0.016	0.009
Ossian Offshore Wind Farm	Scotland and England	NS-D/R NS-C/O	5	0.004	0.010	0.003	0.004
Berwick Bank Offshore Wind Farm	Scotland and England	NS-D/R	12.96	0.009 (mean monthly density)			
Seagreen Project	Scotland	NS-D/R	23.27 to 38.1	N/A	0.052	N/A	0.024

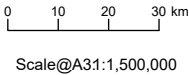
Table 5.15: Predicted white-beaked dolphin density within the Marine Mammal Study Area

Jurisdiction	Nearest KP	Corresponding SCANS block	Waggitt <i>et al.</i> (2020) peak predicted density (individuals/km ²)	SCANS-IV predicted density (individuals/km ²) (Gilles <i>et al.</i> , 2025)
MHPGC Project PEIR Red Line Boundary	KP0 to KP259	NS-D/R NS-C/O	0.148	0.024
Scotland	KP 259 to KP180.5	NS-D/R	0.129	0.041
England	KP180.5 to KP44	NS-D/R	0.161	0.018
	KP44 to KP0	NS-C/O	0.143	



Project Name:
MORVEN HAWTHORN PIT GRID
CONNECTION PROJECT

Drawing Title:
PREDICTED WHITE-BEAKED DOLPHIN DENSITY DISTRIBUTION BASED ON
SCANS-IV DATA (GILLES *ET AL.*, 2025)



Geodetic Information:
Datum: European 1950
Projection: ED 1950 UTM Zone 30N

Data Sources:
BP, Ordnance Survey

Service Layer Credits:
World Ocean Base: OceanWise, Esri, GEBCO, Garmin, NaturalVue
World Topographic Map: Esri, HERE, FAO, NOAA

Drawing Number:				
FIGURE 5-5				
VER	DATE	DETAILS	BY	CHECK
00	22/09/2025	Initial Issue	GB	BW
-	-	-	-	-

Minke whale

- 5.4.4.37 The minke whale is the most abundant baleen whale (mysticete) species occurring in UK waters (Evans and Waggitt, 2020; Robinson *et al.*, 2021). Recent studies have determined there to be approximately 9,000 individuals in the North Sea, with most sightings associated with continental shelf waters, particularly in the northern North Sea, generally in waters up to 200m deep (Robinson *et al.*, 2021; JCDP, 2023). Although minke whales are recorded throughout the year, sightings increase between April to October as the species undertakes seasonal movements associated with feeding (Reid *et al.*, 2003; Dolman *et al.*, 2013; ICES, 2019; Waggitt *et al.*, 2020).
- 5.4.4.38 The species' relatively small size and elusive behaviour have resulted in uncertainty regarding their migratory routes and seasonal distributions, making effective conservation and management difficult (Risch *et al.*, 2019). In Scottish waters, minke whales are common along the east coast, with significant distributions known to occur along the important feeding habitat within the Moray Firth and reflected by the designation of the Southern Trench ncMPA off Aberdeenshire. In Scotland, sightings peak from July to August, relating to meso-scale oceanographic features that likely increase foraging opportunities in the area (Tetley *et al.*, 2008; Robinson *et al.*, 2009). In English waters, they are considered common as far as the Yorkshire coast but become rare in the southern North Sea and English Channel (Sea Watch Foundation, 2020c).
- 5.4.4.39 Modelling of minke whale distribution in the North Sea indicated that the species occurs in low densities throughout the year in northern Scotland waters, with densities increasing across the northern and central North Sea during summer months, with the greatest densities predicted near the Scottish and northeast English coastlines (Waggitt *et al.*, 2020). These inshore seasonal movements are considered to reflect increased prey availability associated with frontal systems and aggregations of sandeel and other shoaling forage fish (MacDougall and Robinson, 2025).
- 5.4.4.40 The MHPGC Project PEIR Red Line Boundary is located within the IAMMWG CGNS MU for minke whale, which includes the entire North Sea [see **Figure 5.1**]. The most recent abundance estimates for the UK portion of this MU is 10,288 individuals (IAMMWG, 2023), which provides the reference population for the assessment [see **Table 5.16**].
- 5.4.4.41 Abundance estimates for the relevant SCANS survey blocks indicate minke whale are more abundant within SCANS block NS-D/R, which lies to the north of block NS-C/O [see **Table 5.16**]. Densities were broadly comparable between the SCANS-III and SCANS-IV for both blocks. Only three minke whales were recorded during winter SCANS surveys, therefore observations were insufficient to derive abundance or density estimates (Ramirez-Martinez *et al.*, 2024) [see **Table 5.16**].
- 5.4.4.42 Site-specific surveys undertaken for nearby offshore wind developments [see **Section 5.4.3**] also indicate that minke whales occur only occasionally within the Marine Mammal Regional Study Area [see **Table 5.17**]. Morven North and Morven South, Ossian Offshore Wind Farm, Berwick Bank Offshore Wind Farm and the Seagreen Project all recorded relatively few individuals, with observations occurring predominantly during spring and summer months; however, observations were too low to provide season-specific density estimates (Seagreen Wind Energy, 2018; SSE Renewables, 2022; Ossian OWFL, 2024; APEM, 2025). At Morven North and Morven South, the highest monthly density was recorded in July (0.009 individuals per km²), although no minke whales were recorded within the Morven South Study Area (APEM, 2025).
- 5.4.4.43 Habitat-based modelling provides additional information on the spatial distribution of minke whale within the North Sea and across the Marine Mammal Study Area. Predicted density surfaces developed from SCANS-IV survey data (Gilles *et al.*, 2025) and Waggitt *et al.* (2020) indicate low predicted densities throughout the MHPGC Project PEIR Red Line Boundary, with higher predicted densities within the Scottish section of the Project [see **Figure 5.6** and **Table 5.18**]. The average modelled grid-cell within the Marine Mammal Study Area is 0.022 individuals per km² based on the SCANS-IV model (Gilles *et al.*, 2025), compared with 0.025 individuals per km² based on Waggitt *et al.* (2020) [see **Table 5.18**].
- 5.4.4.44 Based on the available regional datasets, site-specific surveys and habitat-based modelling, minke whales are considered likely to occur regularly within the Marine Mammal Study Area, with highest occurrence expected during the spring and summer months.

5.4.4.45 The most recent conservation status assessment of minke whale in UK waters concluded that the overall trend in conservation status is Unfavourable-inadequate, with an unknown overall trend (JNCC *et al.*, 2026e). This represents a change from the previous assessment conclusion of Unknown due to inefficient evidence to determine population trends or assess future prospects (JNCC, 2019d). The latest assessment notes that uncertainties remain regarding the UK minke whale population abundance, particularly as the SCANS-IV survey did not include the offshore waters to the west of Scotland, which are considered important to the species (JNCC *et al.*, 2026e).

Table 5.16: Minke whale reference population, abundance and density estimates relevant to the Marine Mammal Regional Study Area

Reference population/survey area	Abundance	SCANS-III density (individuals/km ²)	SCANS-IV density (individuals/km ²)	winterSCANS density (individuals/km ²)
IAMMWG CGNS MU	20,118	-	-	-
IAMMWG CGNS MU (UK Waters)	10,288	-	-	-
SCANS-IV block NS-D	2,702	-	0.0419	N/A
SCANS-III block R	2,489	0.0387	-	-
SCANS-IV block NS-C	412	-	0.0068	N/A
SCANS-III block O	603	0.0100	-	-

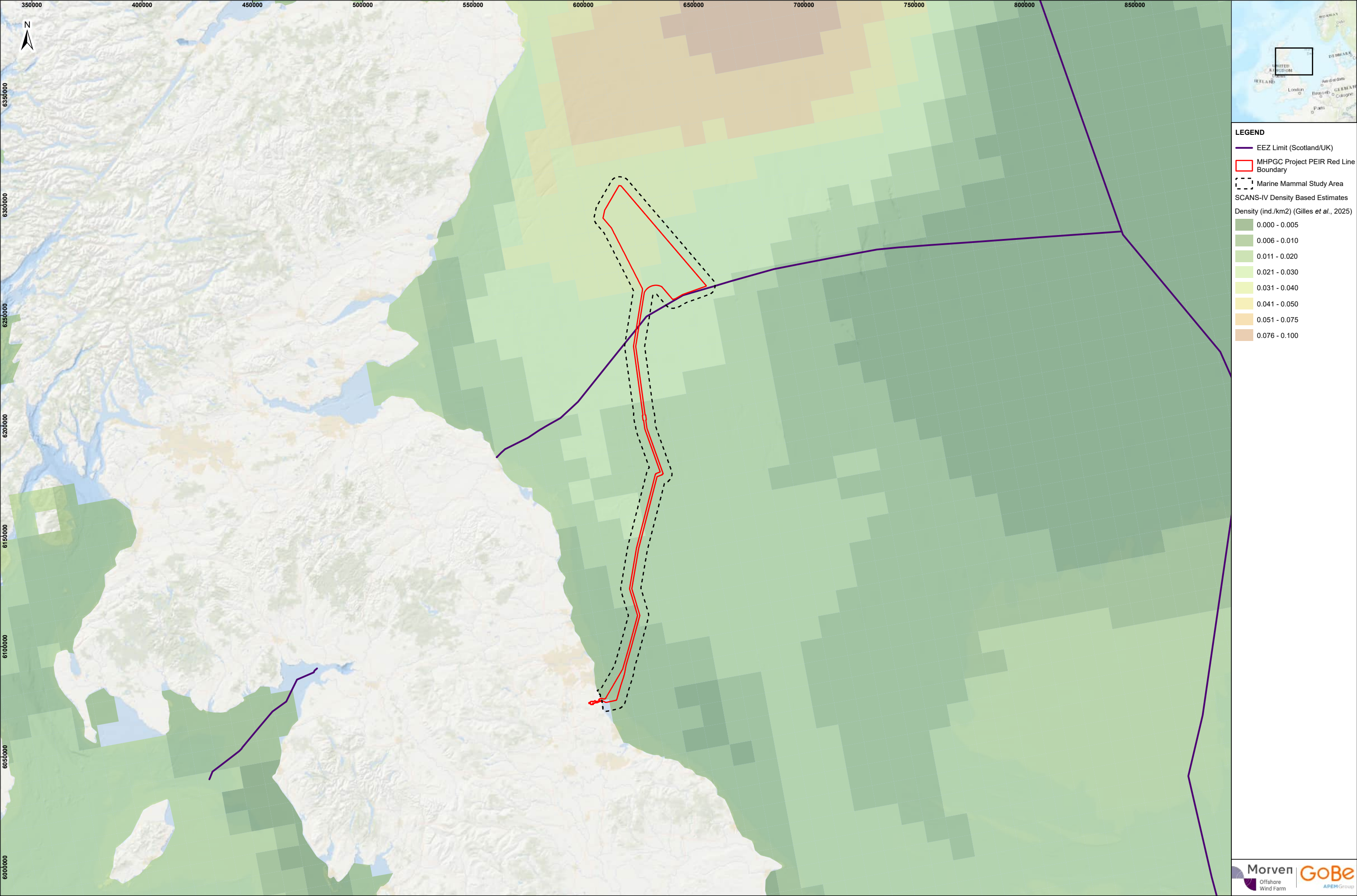
Note: SCANS-IV and SCANS-III used different survey block boundaries. The SCANS-III blocks presented in this table represent the closest spatially corresponding blocks to the SCANS-IV blocks shown (SCANS-IV NS-D and NS-C correspond most closely to SCANS-III R and O, respectively).

Table 5.17: Abundance estimates for minke whale observed during site-specific surveys for nearby developments

Project	Jurisdiction	Corresponding SCANS block	Approximate Distance to MHPGC Project PEIR Red Line Boundary (km)	Abundance	Mean monthly density (individuals/km ²)
Morven North and Morven South	Scotland	NS-D	Onsite	6	0.002
Ossian Offshore Wind Farm	Scotland and England	NS-D/R	5	12	N/A
Berwick Bank Offshore Wind Farm	Scotland and England	NS-D/R	12.96	57	0.007
Seagreen Project	Scotland	NS-D/R	23.27 to 38.1	15	N/A

Table 5.18: Predicted minke whale density within the Marine Mammal Study Area

Jurisdiction	Nearest KP	Corresponding SCANS block	Waggitt <i>et al.</i> (2020) peak predicted density (individuals/km ²)	SCANS-IV predicted density (individuals/km ²) (Gilles <i>et al.</i> , 2025)
MHPGC Project PEIR Red Line Boundary	KP0 to KP259	NS-D/R NS-C/O	0.025	0.022
Scotland	KP 259 to KP180.5	NS-D/R	0.016	0.035
England	KP180.5 to KP44	NS-D/R	0.028	0.017
	KP44 to KP0	NS-C/O	0.032	



- LEGEND**
- EEZ Limit (Scotland/UK)
 - MHPGC Project PEIR Red Line Boundary
 - Marine Mammal Study Area
 - SCANS-IV Density Based Estimates
 - Density (ind./km2) (Gilles *et al.*, 2025)
 - 0.000 - 0.005
 - 0.006 - 0.010
 - 0.011 - 0.020
 - 0.021 - 0.030
 - 0.031 - 0.040
 - 0.041 - 0.050
 - 0.051 - 0.075
 - 0.076 - 0.100

Project Name:
MORVEN HAWTHORN PIT GRID
CONNECTION PROJECT

Drawing Title:
PREDICTED MINKE WHALE DENSITY DISTRIBUTION BASED ON SCANS-IV DATA
(GILLES *ET AL.*, 2025)

0 10 20 30 km
Scale@A31:1,500,000

Geodetic Information:
Datum: European 1950
Projection: ED 1950 UTM Zone 30N

Data Sources:
BP, Ordnance Survey

Service Layer Credits:
World Ocean Base: OceanWise, Esri, GEBCO, Garmin, NaturalVue
World Topographic Map: Esri, HERE, FAO, NOAA

Drawing Number: FIGURE 5-6				
VER	DATE	DETAILS	BY	CHECK
00	22/09/2025	Initial Issue	GB	BW
-	-	-	-	-

Risso's dolphin

- 5.4.4.46 Risso's dolphin typically inhabit deep offshore waters of the continental slope and shelf edge (approximately 200m to 1,000m water depth), although they are occasional visitors to coastal waters (Hodgins *et al.*, 2024). In UK waters, the species is most frequently observed along the west coast of Scotland, Orkney, Shetland, and northern Scottish mainland, where sightings have been reported in waters shallower than 20m (Hodgins *et al.*, 2024). Although Risso's dolphin have been recorded in the North Sea for several decades, they are comparatively less common, with most sightings occurring around Caithness (Hodgins *et al.*, 2024). Historical sightings indicate that the species occurs year-round in northern Scottish waters, particularly around the Pentland Firth and Orkney Islands, with relatively few records from the Moray coast (Hodgins *et al.*, 2024). In English waters of the North Sea, Risso's dolphin are considered uncommon (Sea Watch Foundation, 2020d).
- 5.4.4.47 Modelling of Risso's dolphin distribution in the UK indicate that Risso's dolphin are largely absent from the North Sea during winter months. During summer, their predicted distribution expands to include waters offshore eastern Scotland and northeast England, although predicted densities remain very low (less than 0.00767 individuals per km²) (Waggitt *et al.*, 2020). The highest predicted densities occur along the northern and western Scottish coastline, reflecting the species' preference for deeper shelf-habitats (Waggitt *et al.*, 2020).
- 5.4.4.48 The MHPGC Project PEIR Red Line Boundary is located within the IAMMWG CGNS MU for Risso's dolphin, encompassing all UK waters [see **Figure 5.1**]. The most recent abundance estimate for the UK portion of this MU is 8,687 individuals (IAMMWG, 2023), which provides the reference population for the assessment [see **Table 5.19**].
- 5.4.4.49 No Risso's dolphin were observed within the relevant SCANS-III, SCANS-IV or winterSCANS survey blocks [see **Table 5.19**]. Similarly, no individuals were reported during DAS undertaken for Morven North and Morven South (APEM, 2025). Risso's dolphins are not scoped in for assessment in Berwick Bank Offshore Wind Farm or Ossian Wind Farm, indicating the species occurs infrequently within the Marine Mammal Regional Study Area (SSE Renewables, 2022; Ossian OWFL, 2024).
- 5.4.4.50 Habitat-based modelling provides additional information on the potential distribution of Risso's dolphin within the Marine Mammal Study Area. As no Risso's dolphin were recorded during SCANS-III and SCANS-IV survey effort, habitat-based density surface models were not developed for this species. Waggitt *et al.* (2020) predicted very low densities throughout the MHPGC Project PEIR Red Line Boundary, with a maximum predicted density of less than 0.01 individuals per km².
- 5.4.4.51 Based on the available regional datasets, site-specific surveys and habitat-based modelling, Risso's dolphin are considered unlikely to occur within the Marine Mammal Study Area.
- 5.4.4.52 The most recent conservation status assessment of Risso's dolphin in UK waters concluded that the overall conservation status is Favourable, with a stable overall trend (JNCC *et al.*, 2026f). This represents an improvement from the previous assessment, which concluded that the conservation status was Unknown (JNCC, 2019e), reflecting an improved evidence base and greater confidence in the available data.

Table 5.19: Risso's dolphin reference population, abundance and density estimates relevant to the Marine Mammal Regional Study Area

Reference population/survey area	Abundance	SCANS-III density (individuals/km ²)	SCANS-IV density (individuals/km ²)	winterSCANS density (individuals/km ²)
IAMMWG CGNS MU	12,262			
IAMMWG CGNS MU (UK Waters)	8,687	-	-	
SCANS-IV block NS-D	N/A		N/A	N/A

SCANS-III block R	N/A	N/A	-	-
SCANS-IV block NS-C	N/A	N/A	N/A	N/A
SCANS-III block O	N/A	N/A	-	-

Note: SCANS-IV and SCANS-III used different survey block boundaries. The SCANS-III blocks presented in this table represent the closest spatially corresponding blocks to the SCANS-IV blocks shown (SCANS-IV NS-D and NS-C correspond most closely to SCANS-III R and O, respectively).

Atlantic white-sided dolphin

- 5.4.4.53 Atlantic white-sided dolphin are restricted to sub-polar and temperate waters of the North Atlantic. In the northeast Atlantic they are common around Greenland, Iceland, and the Faroe Islands (Sea Watch Foundation, 2020e). Within UK waters, the species occurs predominantly in the northern and central North Sea but is recorded infrequently. Sightings are concentrated in the coastal waters of northern and northwest Scotland during summer months, whereas the species is considered rare within the southern North Sea and English waters (Sea Watch Foundation, 2020e).
- 5.4.4.54 The MHPGC Project PEIR Red Line Boundary is located within the IAMMWG CGNS MU for white-sided dolphin, which encompasses the entirety of UK waters [see **Figure 5.1**]. The most recent abundance estimate for the UK portion of this MU is 12,293 individuals (IAMMWG, 2023), which provides the reference population of the assessment [see **Table 5.20**].
- 5.4.4.55 Abundance and density estimates from the relevant SCANS survey blocks indicate that Atlantic white-sided dolphin occur at very low densities within the Marine Mammal Regional Study Area [see **Table 5.20**]. No individuals were recorded within SCANS-IV or winterSCANS surveys blocks NS-D or NS-C, with the only North Sea observations reported around Shetland and Norwegian waters (Gilles *et al.*, 2023). During SCANS-III surveys, Atlantic white-sided dolphins were recorded within survey block R in Scottish waters, with an estimated abundance of 644 individuals and a corresponding density of 0.0100 individuals per km² [see **Table 5.20**].
- 5.4.4.56 Site-specific surveys undertaken for nearby offshore wind developments also indicate that Atlantic white-sided dolphin occur only rarely within the region. A single sighting comprising ten individuals were observed during boat-based surveys undertaken for the Firth of Forth Round 3 surveys associated with the Seagreen Project (Sparling, 2012). No additional records were reported during more recent site-specific surveys undertaken for Morven North and Morven South (APEM, 2025), Berwick Bank Offshore Wind Farm (SSE Renewables, 2022), or Ossian Offshore Wind Farm (Ossian OWFL, 2024).
- 5.4.4.57 Habitat-based modelling provides additional information on the spatial distribution of Atlantic white-sided dolphin within the North Sea and across the Marine Mammal Study Area. Waggitt *et al.* (2020) predicted very low densities throughout the MHPGC Project PEIR Red Line Boundary, with an average modelled grid-cell specific density of 0.043 individuals per km² [see **Table 5.21**]. Peak predicted densities were slightly higher within the English section of the route than the Scottish section but remained consistently low throughout the year (Waggitt *et al.*, 2020).
- 5.4.4.58 Based on the available regional datasets, site-specific surveys and habitat-based modelling, Atlantic white-sided dolphin are considered unlikely to occur regularly within the Marine Mammal Study Area and, if present, they are expected to occur only in very low numbers.
- 5.4.4.59 The most recent conservation status assessment of Atlantic white-sided dolphin in UK waters concluded that the overall conservation status remains Unknown, with an unknown overall trend (JNCC *et al.*, 2026g), consistent with the previous assessment conclusion (JNCC, 2019f). However, the latest assessment highlights that offshore waters west of Scotland, which support approximately 80% of the UK population of Atlantic white-sided dolphins, were not surveyed during SCANS-IV, meaning that the current UK population estimate is likely to represent a significant underestimate (JNCC *et al.*, 2026g).

Table 5.20: Atlantic white-sided dolphin reference population, abundance and density estimates relevant to the Marine Mammal Regional Study Area

Reference population/survey area	Abundance	SCANS-III Density (individuals/km ²)	SCANS-IV density (individuals/km ²)	winterSCANS density (individuals/km ²)
IAMMWG CGNS MU	18,128	-	-	-
IAMMWG CGNS MU (UK Waters)	12,293	-	-	-
SCANS-IV block NS-D	N/A	-	N/A	N/A
SCANS-III block R	644	0.0100	-	-
SCANS-IV block NS-C	N/A	-	N/A	N/A
SCANS-III block O	N/A	N/A	-	-

Note: SCANS-IV and SCANS-III used different survey block boundaries. The SCANS-III blocks presented in this table represent the closest spatially corresponding blocks to the SCANS-IV blocks shown (SCANS-IV NS-D and NS-C correspond most closely to SCANS-III R and O, respectively).

Table 5.21: Predicted white-sided dolphin density within the Marine Mammal Study Area

Jurisdiction	Nearest KP	Corresponding SCANS block	Waggitt <i>et al.</i> (2020) peak predicted density (individuals/km ²)	SCANS-IV predicted density (individuals/km ²) (Gilles <i>et al.</i> , 2025)
MHPGC Project PEIR Red Line Boundary	KP0 to KP259	NS-D/R NS-C/O	0.0434	-
Scotland	KP 259 to KP180.5	NS-D/R	0.028	-
England	KP180.5 to KP44	NS-D/R	0.055	-
	KP44 to KP0	NS-C/O	0.035	

Short-beaked common dolphin

- 5.4.4.60 Short-beaked common dolphin are widely distributed throughout the Atlantic and Pacific Oceans. Within UK, waters they occur most frequently in western Scotland and the Western Approaches, although their range has expanded into the northern North Sea in recent decades (MacLeod *et al.*, 2005; Sea Watch Foundation, 2020f; van Weelden *et al.*, 2021). Despite this northward expansion, the species remains an occasional visitor to the northern North Sea, reflecting its preference for warmer temperate and tropical waters.
- 5.4.4.61 The MHPGC Project PEIR Red Line Boundary is located within the IAMMWG CGNS MU for common dolphin, which encompasses the entirety of UK waters [see **Figure 5.1**]. The most recent abundance estimate for the UK portion of this MU is 57,417 individuals (IAMMWG, 2023), which provides the reference population for the assessment [see **Table 5.22**].
- 5.4.4.62 Abundance and density estimates from the relevant SCANS survey blocks indicate that common dolphin occur at very low densities within the Marine Mammal Regional Study Area [see **Table 5.22**]. No individuals were recorded within SCANS-III surveys or SCANS-IV survey block NS-D, while SCANS-IV block NS-C recorded a density of 0.003 individuals per km². No common dolphins were observed during winterSCANS surveys (Ramirez-Martinez *et al.*, 2025).

- 5.4.4.63 Site-specific surveys undertaken for nearby offshore wind developments also indicate that common dolphin occur only rarely within the region. A single sighting comprising of eight individuals was reported during DAS undertaken for Morven North and Morven South (APEM, 2025). No additional recordings were reported during other site-specific surveys undertaken for Ossian Offshore Wind Farm (Ossian OWFL, 2024), Berwick Bank Offshore Wind Farm (SSE Renewables, 2022), Seagreen (Seagreen Wind Energy Limited, 2018) or others in the region (Grellier and Lacey, 2012; Macleod and Sparling, 2011).
- 5.4.4.64 Habitat-based modelling provides additional information on the spatial distribution of common dolphin with the North Sea and across the Marine Mammal Study Area [see **Table 5.23**]. Predicted density surface estimates developed from SCANS-IV survey data (Gilles *et al.*, 2025) indicate that common dolphin occur at very low densities throughout the Marine Mammal Study Area and MHPGC Project PEIR Red line Boundary [see **Figure 5.7**]. The modelled grid cell-specific density within the Marine Mammal Study Area is 0.022 individuals per km² based on the SCANS-IV model (Gilles *et al.*, 2025), while Waggitt *et al.* (2020) predicted a maximum density of 0.06 individuals per km². The SCANS-IV model predicts slightly higher densities within the English section of the route than the Scottish section, consistent with the SCANS survey results, which recorded no common dolphin within survey block NS-D (covering most of the Scottish section of the MHPGC Project PEIR Red Line Boundary), but recorded individuals within NS-C, which overlaps the English section of the route.
- 5.4.4.65 Based on the available regional datasets, site-specific surveys and habitat-based modelling, short-beaked common dolphin are considered unlikely to occur regularly within the Marine Mammal Study Area and, if present, they are expected to occur only in very low numbers.
- 5.4.4.66 The most recent conservation status assessment of common dolphin in UK waters concluded that the overall conservation status is Favourable, with a stable overall trend (JNCC *et al.*, 2026h). This represents an improvement from the previous assessment, which concluded that the conservation status was Unknown (JNCC, 2019g). The latest assessment notes that uncertainty remains regarding the species' future prospects because changes in distribution, likely driven by climate change, are becoming increasingly apparent (JNCC *et al.*, 2026h).

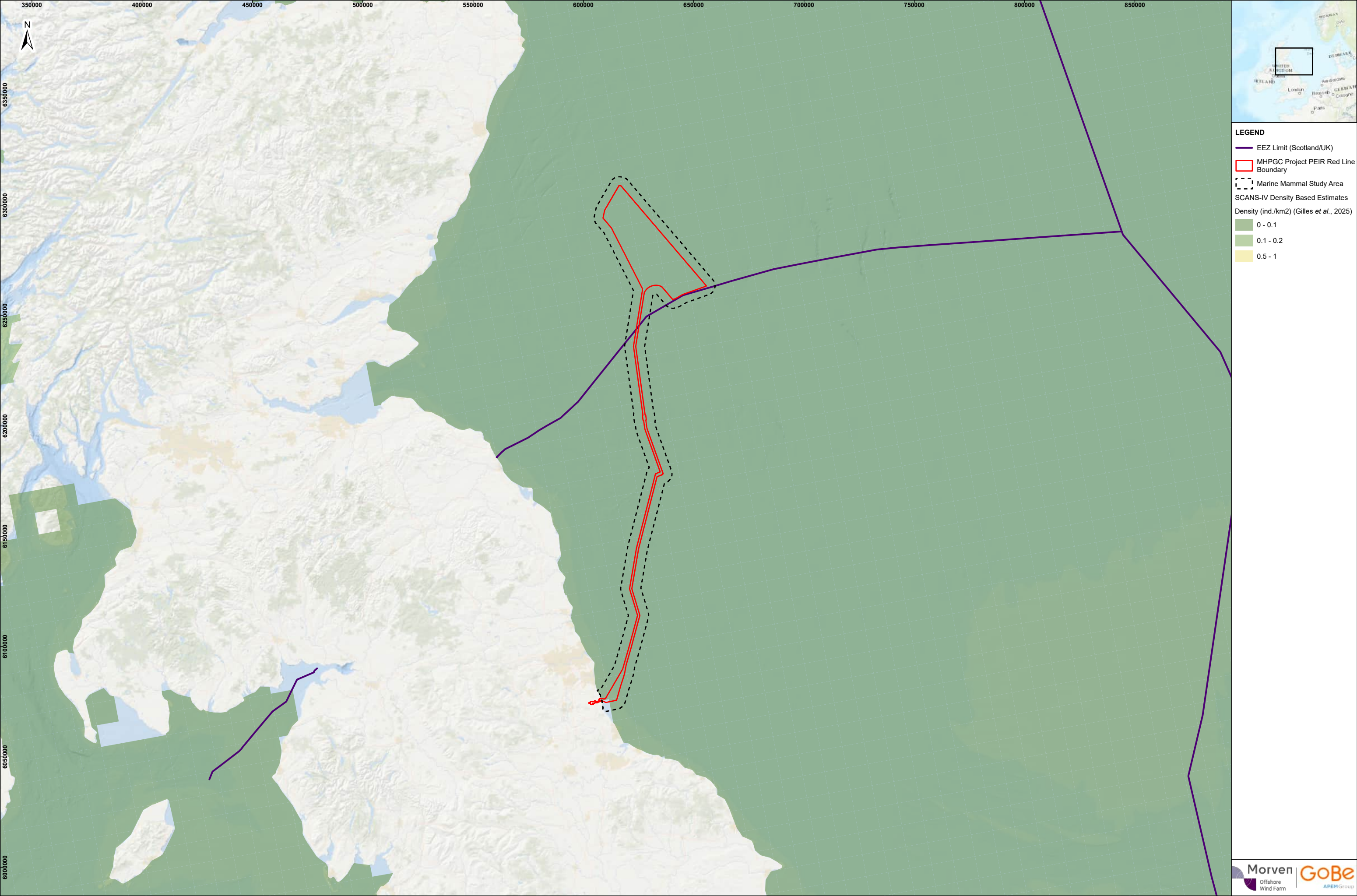
Table 5.22: Common dolphin reference population, abundance and density estimate relevant to the Marine Mammal Regional Study Area

Reference population/survey area	Abundance	SCANS-III Density (individuals/km ²)	SCANS-IV density (individuals/km ²)	winterSCANS density (individuals/km ²)
IAMMWG CGNS MU	102,656	-	-	-
IAMMWG CGNS MU (UK Waters)	57,417	-	-	-
SCANS-IV block NS-D	N/A	-	N/A	N/A
SCANS-III block R	N/A	N/A	-	-
SCANS-IV block NS-C	192	-	0.0032	N/A
SCANS-III block O	N/A	N/A	-	-

Note: SCANS-IV and SCANS-III used different survey block boundaries. The SCANS-III blocks presented in this table represent the closest spatially corresponding blocks to the SCANS-IV blocks shown (SCANS-IV NS-D and NS-C correspond most closely to SCANS-III R and O, respectively).

Table 5.23: Predicted common dolphin density within the Marine Mammal Study Area

Jurisdiction	Nearest KP	Corresponding SCANS block	Waggitt <i>et al.</i> (2020) peak predicted density (individuals/km ²)	SCANS-IV predicted density (individuals/km ²) (Gilles <i>et al.</i> , 2025)
MHPGC Project PEIR Red Line Boundary	KP0 to KP259	NS-D/R NS-C/O	0.06	0.022
Scotland	KP 259 to KP180.5	NS-D/R	-	0.016
England	KP180.5 to KP44	NS-D/R	-	0.024
	KP44 to KP0	NS-C/O	-	



Project Name:
MORVEN HAWTHORN PIT GRID
CONNECTION PROJECT

Drawing Title:
PREDICTED COMMON DOLPHIN DENSITY DISTRIBUTION BASED ON SCANS-IV
DATA (GILLES *ET AL.*, 2025)

0 10 20 30 km
Scale@A31:1,500,000

Geodetic Information:
Datum: European 1950
Projection: ED 1950 UTM Zone 30N

Data Sources:
BP, Ordnance Survey

Service Layer Credits:
World Topographic Map: Esri, HERE, Garmin, FAO, NOAA, USGS
World Ocean Base: OceanWise, Esri, GEBCO, Garmin, NaturalVue

Drawing Number:				
FIGURE 5-7				
VER	DATE	DETAILS	BY	CHECK
00	22/09/2025	Initial Issue	GB	BW
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Other cetacean species

- 5.4.4.67 A number of other cetacean species are also known to occur within the Marine Mammal Regional Study Area but are considered infrequent or occasional visitors. These include the humpback whale, killer whale, long-finned pilot whale, pygmy sperm whale (*Kogia breviceps*) and sei whale (*Balaenoptera borealis*) (ICES, 2025).
- 5.4.4.68 Humpback whales are widely distributed globally and occur seasonally within shelf waters of the North Atlantic. In UK waters, sightings primarily occur along the west coast of Scotland (Sea Watch Foundation, 2020g), although observations along the east coast have increased in recent years, including within inshore waters and the Firth of Forth (O'Neil *et al.*, 2019; Evans and Waggitt, 2023). Within the Firth of Forth, recent sightings have been reported primarily during winter (December to March), with occasional records in August and October (O'Neil *et al.*, 2019; Hauge, 2023). No abundance or density estimates for humpback whales in the North Sea are available, with no individuals recorded during any SCANS surveys between 1994 and 2022 (Hammond *et al.*, 2002; 2013; 2021; Gilles *et al.*, 2023). However, a single humpback whale was observed in May 2022 during the Morven North and Morven South DAS (APEM, 2025). Given the highly migratory nature of this species, humpback whales are considered unlikely to occur regularly within the Marine Mammal Study Area and, if present, are expected to occur only in very low numbers.
- 5.4.4.69 Killer whale, long-finned pilot whale, pygmy sperm whale and sei whale have also been recorded as rare or occasional visitors within the Marine Mammal Regional Study Area (Reid *et al.*, 2003). Regional survey data support this pattern, with one killer whale (during summer 2009 surveys) and a group of eight long-finned pilot whales (during winter 2009 to 2010 surveys) recorded during DAS for the Firth of Forth and Tay Offshore Wind Developers Group (Grellier and Lacey, 2012) while none of these species were reported during the Morven North and Morven South DAS (APEM, 2025). Based on the available regional evidence, these species are considered unlikely to occur regularly within the Marine Mammal Study Area and, if present, are expected to occur only in very low numbers of observations.

Grey seal

- 5.4.4.70 Grey seals are widely distributed throughout UK waters, supporting approximately 34% of the global breeding population, around 70% of which breed at colonies in Scotland (SCOS, 2025). Grey seals regularly haul-out along coastlines for resting, breeding, and moulting before undertaking foraging trips that can extend considerable distances. Individuals have been recorded travelling up to 448km without returning to a haul-out sites, although most foraging activity occurs within approximately 100km (Carter *et al.*, 2022).
- 5.4.4.71 In the UK, grey seal abundance is monitored through periodic large-scale aerial surveys to count the number of hauled-out individuals, providing a consistent long-term index of population size (SCOS, 2025). Although the largest breeding colonies occur on the west coast of Scotland, important breeding sites are also present on the east coast, including the outer Firth of Forth and the Berwickshire and North Northumberland coast, spanning both Scottish and English waters [see **Figure 5.8**]. These colonies underpin the designation of the Berwickshire and North Northumberland Coast SAC (25.6km from the MHPGC Project PEIR Red Line Boundary) and Isle of May SAC (94.1km from the MHPGC Project PEIR Red Line Boundary), for which grey seal is a qualifying feature [see **Section 5.4.5**]. Additional haul-out sites occur throughout the Firth of Forth, including Kinghorn Rocks in Fife, Inchmickery, Cow and Calves on Inchmickery Island, and Inchkeith Island in the middle of the Firth (National Marine Plan Interactive (NMPi), 2022).
- 5.4.4.72 The MHPGC Project PEIR Red Line Boundary lies within both the East Scotland and Northeast England SCOS SMUs for grey seal [see **Figure 5.1**]. The most recent population estimates for these SMUs are presented in **Table 5.24**. Given the wide-ranging movements of grey seals and connectivity between these areas, the total UK grey seal population estimate of 160,012 individuals is considered the appropriate reference population for the assessment (SCOS, 2025).
- 5.4.4.73 The Berwickshire and North Northumberland coastline represents an important breeding area for grey seals on the east coast of Britain, with the English component of this colony considered representative of the Northeast England SMU population (Thompson *et al.*, 2017; SCOS, 2025). The most recent August count for the Northeast SMU was 4,251 individuals in 2023, while 97 individuals

were recorded at the Isle of May in 2021 (SCOS, 2025). Population trends indicate continued increases in pup production within Northeast England SMU, primarily associated with the expanding Fast Castle colony with the Berwickshire and North Northumberland Coast SAC. In contrast, pup production within the East Scotland SMU has remained broadly stable in recent years, following redistribution of breeding animals from the Isle of May SAC to other colonies rather than a decline in the wider East Scotland SMU population (SCOS, 2025).

- 5.4.4.74 Telemetry studies demonstrate the wide-ranging movements of grey seals within these SMUs. Tracking of 69 individuals across the East Scotland and Northeast England SMUs showed movements between the Berwickshire and North Northumberland Coast SAC, Isle of May SAC, the Firth of Tay and Eden SAC, and the Humber Estuary SAC, with some individuals travelling as far as the Outer Hebrides and Denmark (Sinclair, 2022). Additional telemetry studies (Carter *et al.*, 2022; Stevens, 2025) indicate that grey seals associated with the Berwickshire and North Northumberland SAC regularly forage offshore within areas overlapping the MHPGC Project PEIR Red Line Boundary [see **Figure 5.9**], predominantly within approximately 100km of the coastline. Historic surveys also indicate frequent grey seal occurrence over shallow sandbanks, including Scalp Bank, Marr Bank, Wee Bankie and Berwick Bank, which are considered important sandeel habitat, a key prey resource for grey seal (Sparling, 2012; SSE Renewables, 2022).
- 5.4.4.75 Site-specific surveys undertaken for Morven North and Morven South recorded very low numbers of grey seals, with mainly single observations recorded during nine months of the 33-month DAS campaign (APEM, 2025). Similarly, other nearby offshore wind developments reported low grey seal densities throughout the year, although relatively higher densities were estimated for Berwick Bank Offshore Wind Farm, reflecting its closer proximity to important haul-out sites (SSE Renewables, 2022) [see **Table 5.25**]. Boast-based surveys undertaken for Seagreen and Nearth na Gaoithe also recorded grey seals, although density estimates were not presented (Macleod and Sparling, 2011; Sparling, 2012). In addition, a single adult grey seal was observed ashore during an intertidal ecological walkover survey undertaken on 09 April 2026 at the proposed landfill.
- 5.4.4.76 Habitat-based modelling provides additional information on grey seal distribution with the Marine Mammal Study Area. Carter *et al.* (2020; 2022; 2025) developed at-sea spatial distribution maps for grey seals using telemetry-based habitat preference models and SCOS haul-out data, producing predicted abundance and density estimates at a 5km by 5km grid resolution [see **Figure 5.10**]. Within the Marine Mammal Study Area, the updated model predicts a mean abundance of 928 grey seals, corresponding to a mean density of 0.395 individuals per km² [see **Table 5.26**]. Predicted densities were slightly higher within English waters (0.419 individuals per km²) compared with Scottish waters (0.332 individuals per km²), reflecting the relative contribution of the Northeast England and East Scotland SMUs to the local grey seal population.
- 5.4.4.77 Based on the available regional population data, telemetry studies, site-specific surveys and habitat-based modelling, grey seals are considered likely to occur year-round throughout the Marine Mammal Study Area.
- 5.4.4.78 The most recent conservation status assessment of grey seals in UK waters concluded that the overall conservation status remains Favourable, with a stable overall trend (JNCC *et al.*, 2026i). This represents a change from the previous assessment, which reported an improving trend (JNCC, 2019h).

Table 5.24: Grey seal reference population and abundance estimates relevant to the Marine Mammal Regional Study Area

SMU	Most recent August haul-out count	Estimated population	% of UK Total
East Scotland	1,584	6,298	3.9%
Northeast England	5,381	21,396	13.4%
UK Total Population	40,243	160,012	-

Source: SCOS (2025)

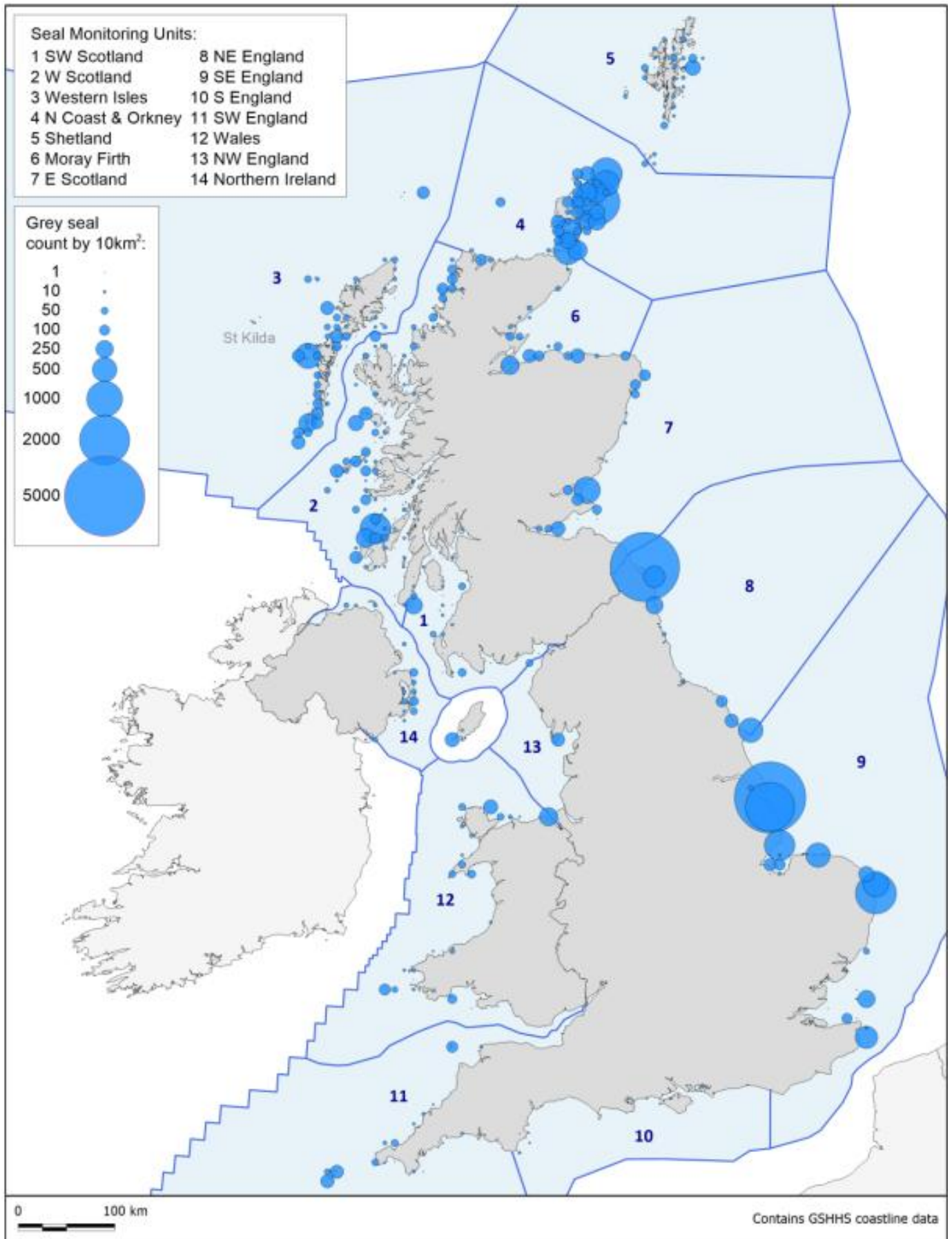
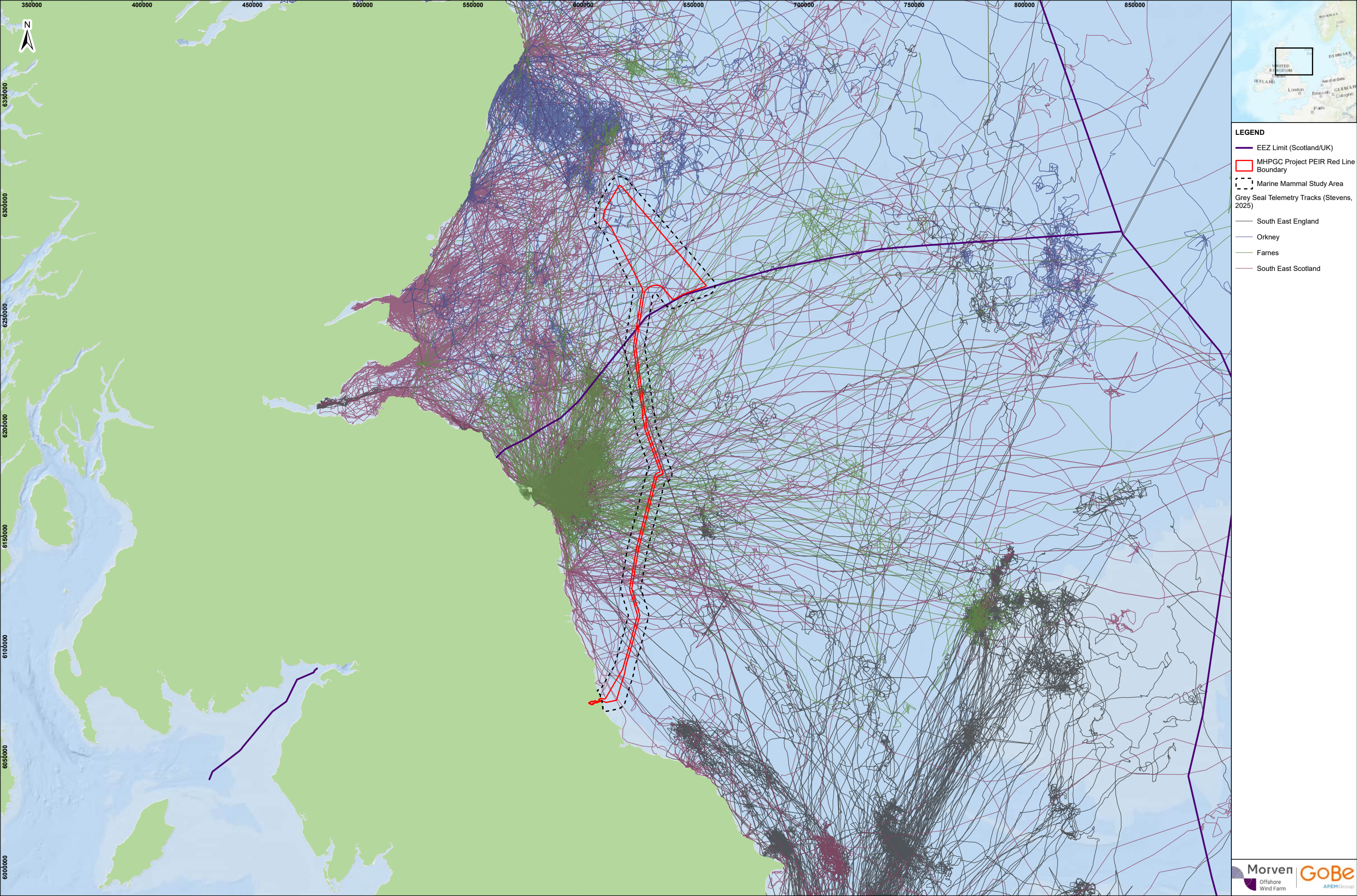
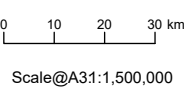


Figure 5.8: Grey seal haul-out sites and SMUs (SCOS, 2025)



Project Name:
MORVEN HAWTHORN PIT GRID
CONNECTION PROJECT

Drawing Title:
ADULT GREY SEAL TELEMETRY TRACKS IN THE EAST SCOTLAND AND NORTH
EAST ENGLAND MU (STEVENS, 2025)



Geodetic Information:
Datum: European 1950
Projection: ED 1950 UTM Zone 30N

Data Sources:
BP, Ordnance Survey

Service Layer Credits:
World Topographic Map: Esri, HERE, Garmin, FAO, NOAA, USGS
World Ocean Base: OceanWise, Esri, GEBCO, Garmin, NaturalVue



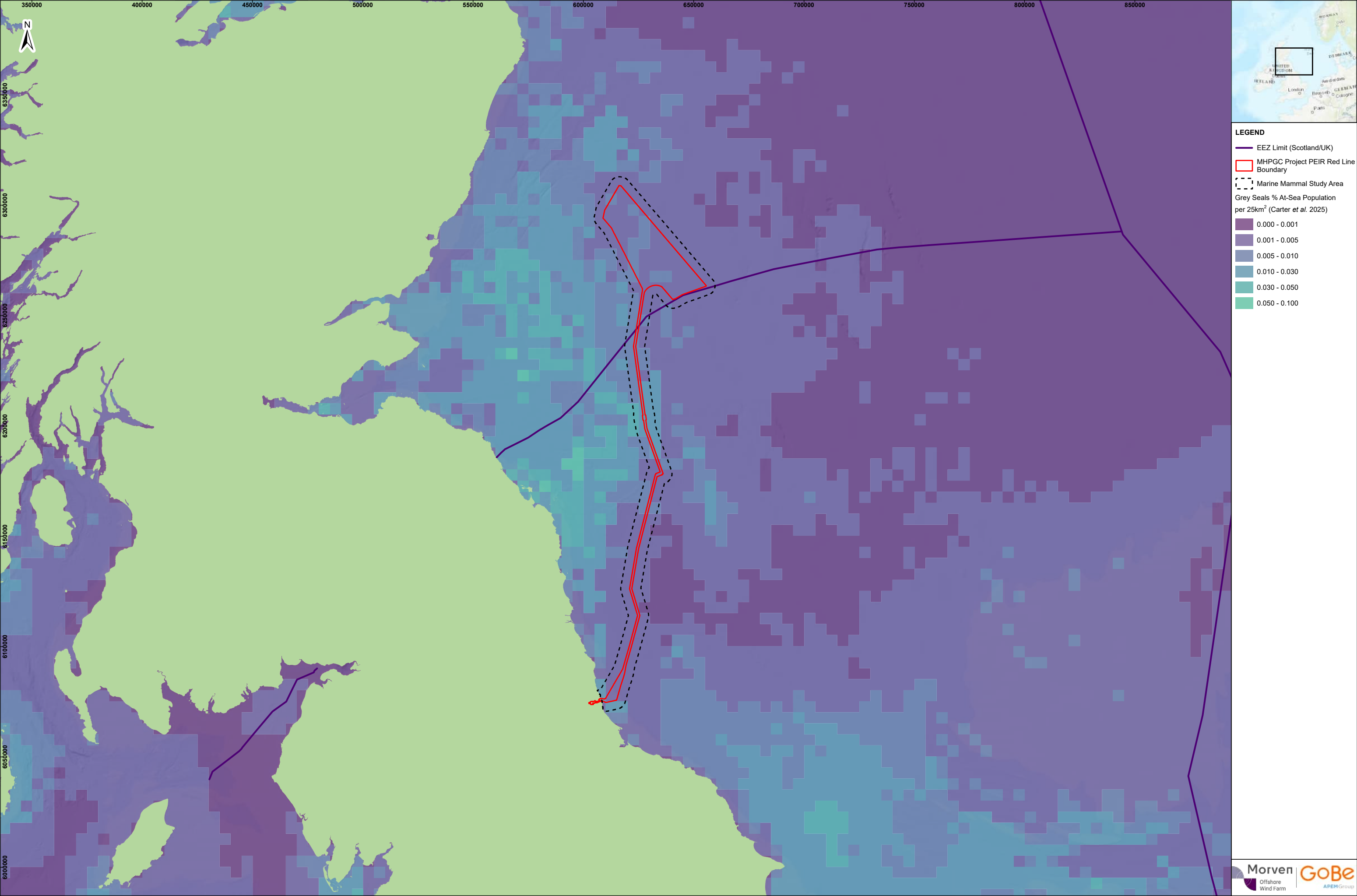
Drawing Number:				
FIGURE 5-9				
VER	DATE	DETAILS	BY	CHECK
00	22/09/2025	Initial Issue	GB	BW
-	-	-	-	-

Table 5.25: Mean density estimates for grey seal observed during site-specific surveys for nearby developments

Project	Corresponding SMU	Approximate distance to the MHPGC Project PEIR Red Line Boundary(km)	Spring density (individuals/km ²)	Summer density (individuals/km ²)	Autumn density (individuals/km ²)	Winter density (individuals/km ²)
Morven North and Morven South	East Scotland Northeast England	Onsite	0.016	0.012	0.011	0.009
Ossian Offshore Wind Farm	East Scotland	5	0.004	0.003	0.001	0.005
Berwick Bank Offshore Wind Farm	East Scotland	12.96	0.321	0.288	0.308	0.186
Forth and Tay Offshore Wind Developers Group (grey and harbour seal combined)	East Scotland	23.27 to 38.1	N/A	0.137	N/A	0.051

Table 5.26: Predicted grey seal density estimates within the Marine Mammal Study Area

Jurisdiction	Nearest KP	Corresponding SMU	Predicted abundance	Mean predicted density (individuals/km ²)
MHPGC Project PEIR Red Line Boundary	KP0 to KP259	East Scotland Northeast England	928	0.395
Scotland	KP 259 to KP180.5	East Scotland	216	0.332
England	KP180.5 to KP0	Northeast England	712	0.419
Source: Carter et al. (2025)				



Harbour seal

- 5.4.4.79 Harbour seals are widely distributed throughout UK waters, supporting approximately 30% of the European population, around 85% of which occurs in Scotland (SCOS, 2025). They are most abundant along the west coast of Scotland, particularly throughout the Hebrides and Northern Isles (SCOS, 2025). Like grey seals, harbour seals regularly haul-out to rest, breed and moult before undertaking foraging trips at sea. Individuals have been recorded travelling up to 273km from haul-out sites, although most remain within approximately 50km (Carter *et al.*, 2022).
- 5.4.4.80 In the UK, harbour seal abundance is monitored through periodic aerial surveys of hauled-out animals during their annual moult, providing a consistent long-term index of population size (SCOS, 2025). Along the eastern UK coast, important harbour seal haul-out sites occur around major estuaries including the Firth of Forth, Firth of Tay, Moray Firth and The Wash (SCOS, 2025) [see **Figure 5.11**]. These colonies underpin the Firth of Tay and Eden Estuary SAC (98.1km from the MHPGC Project PEIR Red Line Boundary), Dornoch Firth and Morrich More SAC (202.9km from the MHPGC Project PEIR Red Line Boundary) and the Wash and North Norfolk Coast SAC (214.21km from the MHPGC Project PEIR Red Line Boundary), for which harbour seal is a qualifying feature [see **Section 5.4.5**]. Additional designated haul-out sites occur within the Firth of Forth at Kinghorn Rocks in Fife, Inchmickery and Cow and Calves in the central Firth of Forth (NMPi, 2022).
- 5.4.4.81 The MHPGC Project PEIR Red Line Boundary lies within both the East Scotland and Northeast England SCOS MUs for harbour seal [see **Figure 5.1**]. The most recent population estimates for these SMUs are presented in **Table 5.27**. Given the wide-ranging movements of harbour seals and connectivity between these areas, the total UK harbour seal population estimate of 36,956 individuals is considered the appropriate reference population for the assessment (SCOS, 2025).
- 5.4.4.82 Harbour seal abundance is considerably greater within the East Scotland SMU than the Northeast England SMU, reflecting the concentration of animals around the Firth of Forth, Firth of Tay and Moray Firth. Within the Northeast England SMU, the principal haul-out site is located in the Tees Estuary, where the most recent monitoring recorded 36 hauled-out individuals (Industry Nature Conservation Association (INCA), 2024; SCOS, 2025).
- 5.4.4.83 Telemetry studies indicate that harbour seals associated with the Firth of Forth and Firth of Tay haul-out sites remain primarily within 70km of the coastline and have very limited overlap with the MHPGC Project PEIR Red Line Boundary, except for occasional individuals (Stevens, 2025) [see **Figure 5.12**].
- 5.4.4.84 During the site-specific DAS of the Morven North and Morven South, no sightings of harbour seal were reported (APEM, 2025). Similarly, nearby offshore wind developments reported very few harbour seal observations throughout their survey periods [see **Table 5.28**]. Seagreen boat-based surveys show that harbour seals were seen in low numbers during most months in 2010, with the only exceptions being October and November when no harbour seals were recorded (Sparling, 2012). However, it should be noted that the Seagreen boat-based surveys were conducted in the areas closer to the shorelines, Firth of Forth and Firth of Tay, where harbour seal habitat usage is higher. No harbour seals were recorded during the Seagreen surveys in 2017 (Seagreen Wind Energy Limited, 2018).
- 5.4.4.85 Habitat-based modelling provides additional information on harbour seal distribution with the Marine Mammal Study Area. Carter *et al.* (2020; 2022; 2025) developed at-sea spatial distribution maps for harbour seals using telemetry-based habitat preference models and SCOS haul-out data, producing predicted abundance and density estimates at a 5km by 5km grid resolution [see **Figure 5.13**]. Within the Marine Mammal Study Area, the updated model predicts a mean abundance of 18 harbour seals, corresponding to a mean density of 0.008 individuals per km² [see **Table 5.29**]. Predicted occurrence is restricted to English section of the route (0.010 individuals per km²), with no predicted abundance within the Scottish section (0.000 individuals per km²).
- 5.4.4.86 Based on the available regional population data, telemetry studies, site-specific surveys and habitat-based modelling, harbour seals are considered unlikely to occur regularly within the Marine Mammal Study Area and, where present, are expected to occur only in low numbers. Although harbour seal populations on the east coast of Scotland have undergone long-term declines, the available evidence indicates that the MHPGC Project PEIR Red Line Boundary is not located within an important area for this species.

5.4.4.87 The most recent conservation status assessment of harbour seals in UK waters concluded that the overall conservation status remains Unfavourable-inadequate, with the overall conservation status trend now stable (JNCC *et al.*, 2026j). While the overall conservation status is unchanged from the previous assessment (JNCC, 2019f), the overall trend has been revised from unknown to stable. Despite this, the latest assessment identifies poor future prospects for the population, reflecting continuing declines in some regional populations (JNCC *et al.*, 2026j).

Table 5.27: Harbour seal reference population and abundance estimates relevant to the Marine Mammal Regional Study Area

SMU	Most recent haul-out count	Estimated population abundance	% of UK Total
East Scotland	276	383	1.0%
Northeast England	106	147	0.4%
UK Total Population	26,608	36,956	-

Source: SCOS (2025)

Table 5.28: Abundance estimates for harbour seal observed during site-specific surveys for nearby developments

Project	Distance to the MHPGC Project PEIR Red Line Boundary (km)	Number of observations
Morven North and Morven South	Onsite	0
Ossian Offshore Wind Farm	5	2
Berwick Bank Offshore Wind Farm	12.96	3
Seagreen Project (boat-based surveys)	23.27 to 38.1	24

Table 5.29: Predicted harbour seal density estimates within the Marine Mammal Study Area

Jurisdiction	Nearest KP	Corresponding SMU	Predicted abundance	Mean predicted density (individuals/km ²)
MHPGC Project PEIR Red Line Boundary	KP0 to KP259	East Scotland Northeast England	18	0.008
Scotland	KP 259 to KP180.5	East Scotland	0	0.000
England	KP180.5 to KP0	Northeast England	18	0.010

Source: Carter *et al.* (2025)

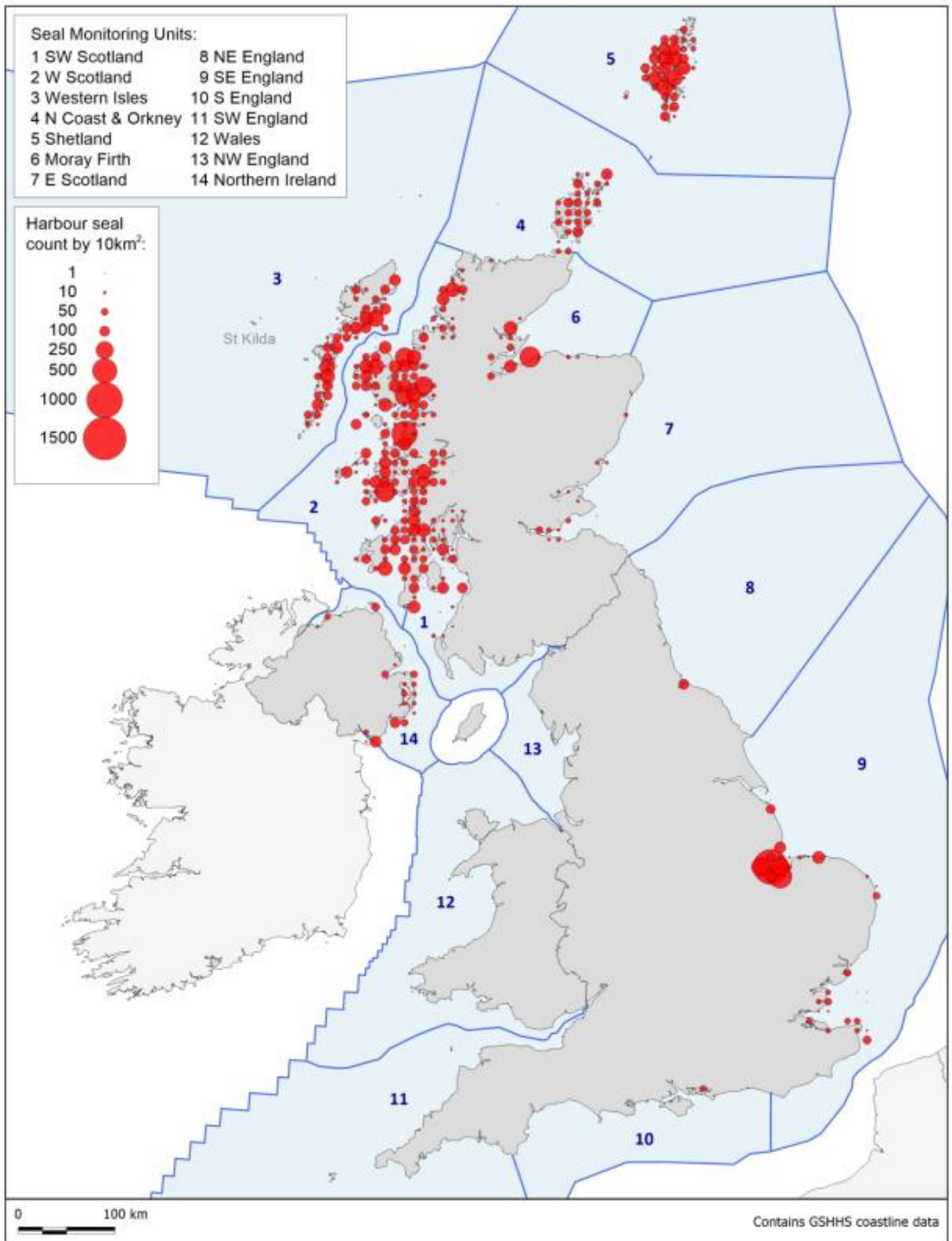
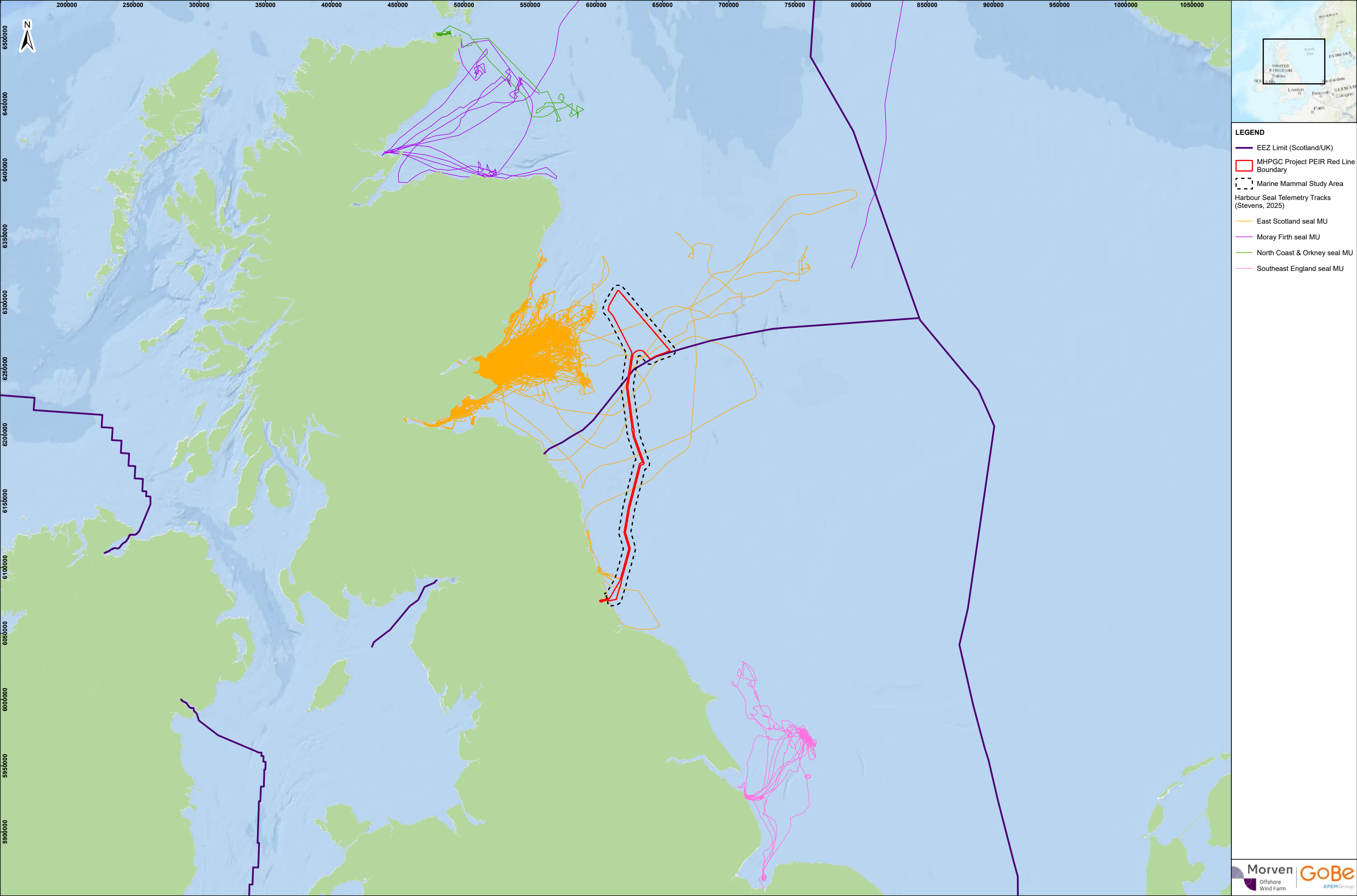
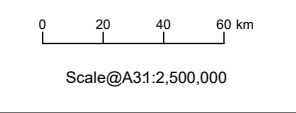


Figure 5.11: Harbour seal haul-out sites and SMUs (SCOS, 2025)



Project Name:
MORVEN HAWTHORN PIT GRID
CONNECTION PROJECT

Drawing Title:
ADULT GREY SEAL TELEMETRY TRACKS IN THE EAST SCOTLAND AND NORTH
EAST ENGLAND MU (STEVENS, 2025)

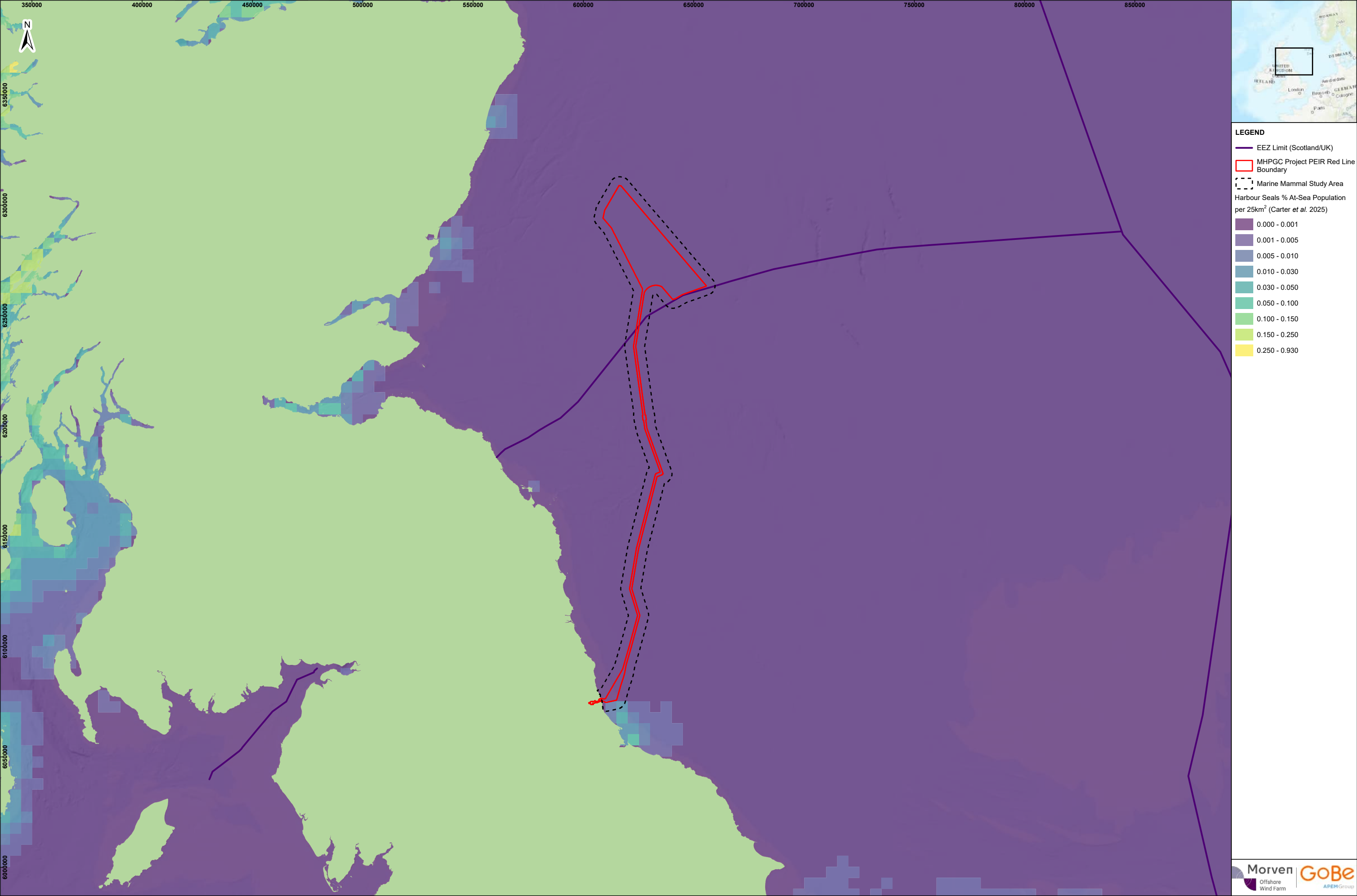


Geodetic Information:
Datum: European 1950
Projection: ED 1950 UTM Zone 30N

Data Sources:
BP, Ordnance Survey

Service Layer Credits:
World Topographic Map: Esri, HERE, Garmin, FAO, NOAA, USGS
World Ocean Base: OceanWise, Esri, GEBCO, Garmin, NaturalVue

Drawing Number: FIGURE 5-12				
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Project Name:
MORVEN HAWTHORN PIT GRID
CONNECTION PROJECT

Drawing Title:
AT-SEA RELATIVE DENSITY OF HARBOUR SEAL (CARTER *ET AL.*, 2025)

0 10 20 30 km
Scale@A31:1,500,000

Geodetic Information:
Datum: European 1950
Projection: ED 1950 UTM Zone 30N

Data Sources:
BP, Ordnance Survey

Service Layer Credits:
World Topographic Map: Esri, HERE, Garmin, FAO, NOAA, USGS
World Ocean Base: OceanWise, Esri, GEBCO, Garmin, NaturalVue

Drawing Number:
FIGURE 5-13

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00	22/09/2025	Initial Issue	GB	BW
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Summary

5.4.4.88 Based on the available baseline evidence, the following marine mammal species are considered likely to occur within the Marine Mammal Study Area:

- harbour porpoise;
- bottlenose dolphin;
- white-beaked dolphin;
- minke whale;
- grey seal.

5.4.4.89 Additional marine mammal species that may occur within the Marine Mammal Study Area, but are considered infrequent or occasional visitors and/ or are expected to occur in only low numbers, include:

- Risso's dolphin;
- Atlantic white-sided dolphin;
- short-beaked common dolphin;
- humpback whale;
- killer whale;
- long-finned pilot whale;
- pygmy sperm whale;
- sei whale;
- harbour seal.

5.4.4.90 Representative density estimates for marine mammal species taken forward to the impact assessment are presented in **Table 5.30**. For each species for which a suitable density estimate is available, the most appropriate density estimate identified in **Section 5.4.4** has been selected based on the available evidence and provide a precautionary basis for calculating the maximum number of animals that could be affected by the MHPGC Project. Species for which suitable density estimates are not available have not been subject to a quantitative assessment of the number of animals potentially affected.

Table 5.30: Representative and assessment density estimates for marine mammal species taken forward for assessment within the Marine Mammal Study Area

Species	Representative density within the Marine Mammal Study Area (individuals/km ²)	Density taken forward for impact assessment (individuals/km ²)	Assessment dataset
Harbour porpoise	0.496	0.603	SCANS-IV block NS-C
Bottlenose dolphin	0.024	0.042	SCANS-IV block NS-D
White-beaked dolphin	0.024	0.080	SCANS-IV block NS-D
Minke whale	0.022	0.042	SCANS-IV block NS-D
Atlantic white-sided dolphin	N/A	0.055	Waggitt <i>et al.</i> (2020)
Common dolphin	0.022	0.060	Waggitt <i>et al.</i> (2020)
Grey seal	0.395	0.419	Carter <i>et al.</i> (2025)
Harbour seal	0.008	0.010	Carter <i>et al.</i> (2025)

5.4.5 Designated Sites

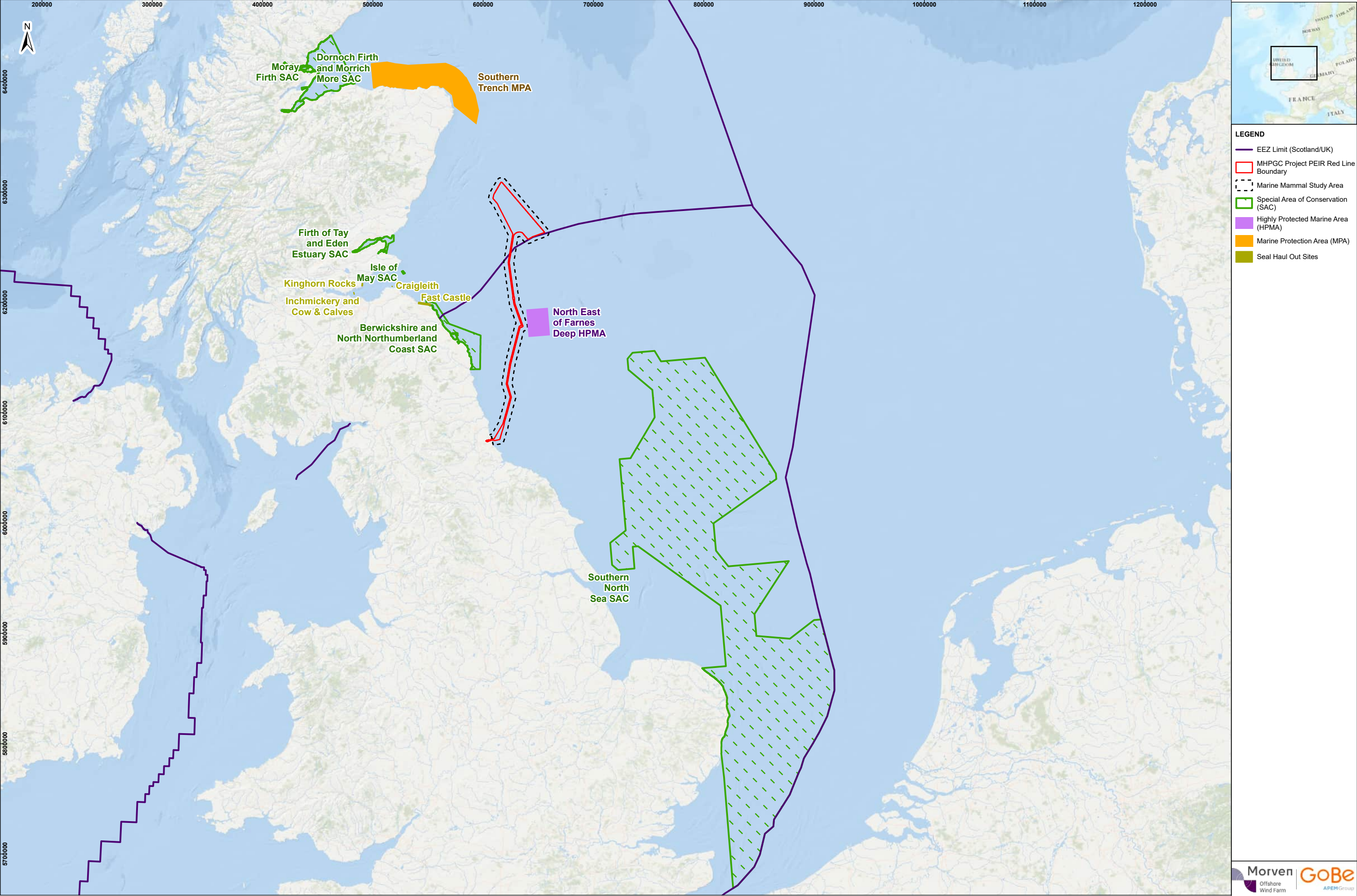
5.4.5.1 The MHPGC Project PEIR Red Line Boundary does not overlap with any protected sites designated for marine mammal features [see **Figure 5.14**]. However, a number of designated sites with relevant marine mammal qualifying features occur within the Marine Mammal Regional Study Area or have potential ecological connectivity with the MHPGC Project PEIR Red Line Boundary. These include

SACs designated for Annex II marine mammal species, as well as MPAs, HPMAs and seal haul-out sites where marine mammals are identified as protected features [see **Section 5.2.2**].

- 5.4.5.2 **Table 5.31** presents designated sites with relevant marine mammal qualifying or protected features identified within the Marine Mammal Regional Study Area, with consideration given to species-specific ecology, including foraging ranges, habitat use and connectivity with the relevant MHPGC Project activities.
- 5.4.5.3 A full screening of sites with qualifying marine mammal features has been undertaken in the **MHPGC Project HRA Screening Report, prepared to accompany the PEIR**, and a **Marine Protected Area, Marine Conservation Zone and Highly Protected Marine Area Screening and Assessment Approach, prepared to accompany the PEIR**. Potential impacts on relevant European sites are assessed within the **MHPGC Project RIAA, prepared to accompany the PEIR**. A further MPA/MCZ Assessment and HPMA Ecosystem Level Assessment will be undertaken and submitted in support of the DCO application and Marine Licence application(s) to the Scottish Ministers.

Table 5.31: Designated sites and seal haul-out sites with relevant marine mammal features within the Marine Mammal Regional Study Area

Site	Distance to MHPGC Project PEIR Red Line Boundary (km)	Relevant Designated Feature
Scottish waters		
Berwickshire and North Northumberland Coast SAC	25.6	Grey seal
Southern Trench ncMPA	56.8	Minke whale
Fast Castle Seal Haul-Out Site	74.6	Grey seal
Isle of May SAC	94.1	Grey seal
Firth of Tay and Eden Estuary SAC	98.1	Harbour seal
Craigleith Seal Haul-Out Site	106.9	Grey seal
Inchkeith Seal Haul-Out Site	132.7	Grey seal
Kinghorn Rocks Seal Haul-Out Site	133.2	Grey seal, harbour seal
Inchmickery Cow and Calves Seal Haul-Out Site	142.0	Grey seal, harbour seal
Moray Firth SAC	168.8	Bottlenose dolphin
Dornoch Firth and Morrich More SAC	203.0	Harbour seal
English waters		
North East of Farnes Deep HPMA	4.1	The marine ecosystem of the area (all marine fauna including five marine mammal species including the harbour porpoise and white-beaked dolphin)
Berwickshire and North Northumberland Coast SAC	25.6	Grey seal
Southern North Sea SAC	99.2	Harbour porpoise
Humber Estuary SAC	122.5	Grey seal
The Wash and North Norfolk Coast SAC	214.2	Harbour seal



Project Name: MORVEN HAWTHORN PIT GRID CONNECTION PROJECT	Drawing Title: DESIGNATED SITES WITH MARINE MAMMAL FEATURES IN PROXIMITY TO THE MARINE MAMMAL STUDY AREA	0204060 km Scale@A31:3,000,000	Geodetic Information: Datum: European 1950 Projection: ED 1950 UTM Zone 30N	Data Sources: BP, Ordnance Survey	Service Layer Credits: World Ocean Base: OceanWise, Esri, GEBCO, Garmin, NaturalVue World Topographic Map: Esri, HERE, Garmin, FAO, NOAA	Drawing Number: FIGURE 5-14 <table><tr><th>VER</th><th>DATE</th><th>DETAILS</th><th>BY</th><th>CHECK</th></tr><tr><td>00</td><td>22/09/2025</td><td>Initial Issue</td><td>GB</td><td>BW</td></tr><tr><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td></tr></table>	VER	DATE	DETAILS	BY	CHECK	00	22/09/2025	Initial Issue	GB	BW	-	-	-	-	-
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5.4.6 Future baseline conditions

- 5.4.6.1 During the anticipated 35-year operational lifetime of the MHPGC Project, the marine mammal environment can be expected to change both naturally and in response to global trends such as climate change and other anthropogenic activities.
- 5.4.6.2 The Infrastructure Planning (EIA) Regulations 2017 and the Marine Works (EIA) Regulations 2007 require that "an outline of the likely evolution thereof without implementation of the development as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge" is included. Therefore, an assessment of future baseline conditions, in the absence of the MHPGC Project, has been undertaken and is described within this section.
- 5.4.6.3 Harbour porpoise are one of the most abundant cetacean species in the North Sea; however, evidence indicates that their distribution has shifted over recent decades. Studies have reported a shift in core distribution from northern to southern areas of the North Sea (Hammond *et al.*, 2013; Waggitt *et al.*, 2020), with declines in summer abundance observed at some northern areas between 2002 and 2019 (Nachtsheim *et al.*, 2021). Drivers of these changes are uncertain but are considered likely to be associated with prey availability (Hammond *et al.*, 2013; Nachtsheim *et al.*, 2021). Conversely, analysis of Cetacean Porpoise Detector (C-POD) data around offshore wind farms in the German North Sea between 2010 and 2023 indicated stable detection rates over time (Rose *et al.*, 2025), while harbour porpoise trends within the OSPAR Greater North Sea Assessment Unit have previously been considered stable (1994 to 2016; Geelhoed *et al.*, 2022). Therefore, although future changes in distribution remain possible, harbour porpoise are expected to remain a key marine mammal receptor within the Marine Mammal Study Area.
- 5.4.6.4 Bottlenose dolphin associated with Scottish waters comprise primarily a coastal population, with individuals typically concentrated within approximately 10km of the coastline. This population has shown evidence of stable or increasing trends in recent years (Geelhoed *et al.*, 2022), with increases primarily associated with the Firth of Tay and evidence of continued range expansion southwards into English coastal waters (Cheney *et al.*, 2024). Offshore bottlenose dolphins have also shown an apparent increase in abundance between 2005 to 2007 and 2016 (Geelhoed *et al.*, 2022). Although changes in distribution and abundance may continue in response to environmental conditions, the available evidence indicates that bottlenose dolphin will remain present within UK waters and the current baseline remains appropriate for the MHPGC Project assessment.
- 5.4.6.5 For other cetacean species occurring within the Marine Mammal Regional Study Area, including white-beaked dolphin, common dolphin and minke whale, available evidence broadly indicates stable abundance within the OSPAR Greater North Sea Assessment Unit, with similar abundance estimates reported in 2016 compared with previous estimates from 2005 to 2007 (Geelhoed *et al.*, 2022). Given their current distribution patterns and the low numbers recorded within the Marine Mammal Regional Study Area, these changes are not expected to alter their consideration as occasional or infrequent visitors within the Marine Mammal Study Area.
- 5.4.6.6 Grey seal populations within the Marine Mammal Regional Study Area are expected to remain an important component of future marine mammal baseline, given the presence of established breeding colonies and haul-out sites along the east coast of Scotland and northeast England (SCOS, 2025). Population trends indicate that some local colonies, particularly those associated with the Berwickshire and North Northumberland Coast, continue to increase; however, grey seals are already considered likely to occur year-round within the Marine Mammal Study Area. Therefore, although some of these sites are experiencing an increasing trend in pup production, when considering the substantial current local population, it is unlikely these changes would alter the conclusion that grey seal represents a key marine mammal receptor for the MHPGC Project.
- 5.4.6.7 Harbour seal populations within eastern Scotland and northeast England represent a small proportion of the UK population and are primarily associated with established haul-out sites, including those within the Firth of Forth and Firth of Tay. Although harbour seals remain vulnerable to changes in environmental conditions and their overall UK conservation status remains Unfavourable-inadequate (JNCC *et al.*, 2026j), available evidence indicates that individuals associated with these populations are not expected to regularly use the Marine Mammal Study Area. Future changes in population size or distribution are possible, particularly in response to

environmental changes such as prey availability and climate change; however, these are unlikely to alter the conclusion that harbour seals are expected to occur only in low numbers within the MHPGC Project area.

- 5.4.6.8 Environmental conditions, including sea surface temperature and prey availability, are recognised drivers of marine mammal species distribution patterns (Gilles, *et al.*, 2016). As these conditions are expected to change over the lifetime of the MHPGC Project, some future shifts in species distribution and seasonal occurrence are possible. However, the direction and magnitude of these changes remain uncertain.
- 5.4.6.9 Considering the above factors, including population trends, observed changes in distribution and the potential influence of future environmental changes, some changes in marine mammal distribution and abundance may occur during the lifetime of the MHPGC Project. However, based on the available evidence, the baseline conditions used to inform the assessment are considered likely to remain representative for the duration of the MHPGC Project and are not expected to substantially change over this time period.

5.5 Impact assessment methodology

5.5.1 Overview

- 5.5.1.1 **Volume 1, Chapter 4: Approach to Environmental Impact Assessment, of the PEIR** sets out the overarching approach that has been used in developing the preliminary environmental information. This section describes the technical methods used to determine the sensitivity of the receptors and magnitude of impacts and sets out the significance criteria that have been used for the preliminary marine mammal assessment. The methodologies for assessing sensitivity, magnitude and significance for marine mammals are described in more detail below.

5.5.2 Receptor sensitivity

- 5.5.2.1 When defining sensitivity, reference has been made to the criteria levels set out in **Volume 1, Chapter 4: Approach to Environmental Impact Assessment, of the PEIR**. To determine sensitivity of the receptor, the vulnerability of the receptor to the specific impact and its ability to recover and adapt were also considered [see **Table 5.32**].
- 5.5.2.2 For marine mammals, receptor sensitivity has been defined based on the ability of the receptor to adapt to a proposed change, its tolerance to that change and its ability to recover following cessation of the activity. Tolerance refers to the susceptibility of a species to a specific change and its capacity to accommodate that change, while recoverability refers to the ability of individuals to return to a condition comparable to that prior to the change.
- 5.5.2.3 Conservation status, legal protection and population importance have been considered within the receptor baseline characterisation [see **Section 5.4.4**]. However, these factors do not independently determine sensitivity, as all marine mammal species considered within this assessment are protected features or species of conservation importance.

Table 5.32: Definition of terms relating to the sensitivity of marine mammal receptors

Sensitivity	Definition
Very High	Sensitivity: receptor has no ability to adapt behaviour to accommodate the proposed change, such that survival and reproduction rates are affected. Tolerance: receptor has no tolerance to the proposed change. Recoverability: receptor has no ability to recover following cessation of the activity causing the change.
High	Sensitivity: receptor has a limited ability to adapt to the proposed change, such that survival and reproduction rates could be affected. Tolerance: receptor has limited tolerance to the proposed change. Recoverability: receptor has limited ability to recover following cessation of the activity causing the change.
Medium	Sensitivity: receptor has some ability to adapt to the proposed change, with reproduction rates likely to be affected but survival rates unlikely to be affected. Tolerance: receptor has some tolerance to the proposed change. Recoverability: receptor is expected to return to previous conditions following cessation of the activity causing the change.
Low	Sensitivity: receptor is able to adapt behaviour so that survival and reproduction rates are not affected. Tolerance: receptor is able to tolerate the impact without impact on reproduction and survival rates. Recoverability: receptor is expected to return to previous behavioural status or habitat use following cessation of the impact.
Negligible	Sensitivity: receptor has very little or no measurable response to the proposed change. Tolerance: receptor is highly tolerant of the proposed change. Recoverability: recovery is expected to occur rapidly following cessation of the activity causing the change, or no recovery is required.

5.5.3 Magnitude of impact

- 5.5.3.1 The magnitude of an impact on marine mammals is influenced by several key factors, including the scale of the change, the spatial extent over which the impact is likely to occur, and the duration and frequency of the impact. When defining the magnitude of the impact, criteria detailed in **Volume 1, Chapter 4: Approach to Environmental Impact Assessment, of the PEIR** have been applied and further developed to reflect the potential consequences of impacts on marine mammal receptors [see **Table 5.33**].

Table 5.33: Definition of terms relating to the magnitude of an impact

Magnitude	Definition
High	Adverse: impact would result in large-scale and/or long-term effects on the behaviour, distribution or habitat use of marine mammal receptors, with sufficient severity to affect the long-term viability of the population over a generational scale.
	Beneficial: long-term, large-scale improvements in habitat conditions resulting in an increase in the population trajectory over a generational scale
Medium	Adverse: impact would result in temporary or permanent effects on individuals, including changes in behaviour, distribution or habitat use, with the potential to reduce lifetime reproductive success or individual survival, but not at a level expected to alter population trajectory over a generational scale.
	Beneficial: improvements to habitat conditions that would influence quality and/or would result in increased foraging efficiency, reproductive potential, population health or population size.
Low	Adverse: impact would result in some measurable but localised or temporary effects at an individual level, such as short-term changes in behaviour, distribution or habitat use but would be unlikely to be measurable at a population level.
	Beneficial: minor improvements to habitat conditions or ecological characteristics that may benefit individuals but are unlikely to be measurable at a population level.
Negligible	Adverse: impact would result in a very minor, temporary and reversible effect, with no measurable consequences for individual survival, reproductive success or population trajectory.
	Beneficial: very minor improvements to habitat conditions that may benefit a limited number of individuals but would not be expected to provide measurable benefits at a population level.

5.5.4 Significance of effect

- 5.5.4.1 The significance of the effect upon marine mammal is determined by correlating the magnitude of the impact and the sensitivity of the receptor. The method employed for this assessment is presented in **Table 5.34**. Where the combination of sensitivity and magnitude falls between two significance categories, professional judgement is applied to determine the most appropriate outcome, considering the specific context of the receptor and the nature of the impact.
- 5.5.4.2 Following the classification of an effect using this methodology, a clear statement will then be made as to whether that effect is significant or not significant. Major and moderate effects are considered to be significant, whilst minor and negligible effects are considered to be not significant. However, professional judgement will also be applied in reaching conclusions as to the significance of effects. Typical definitions for the classification of effects are shown in **Table 5.35**.

Table 5.34: Matrix used for the assessment of the significance of the effect

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

Table 5.35: Significance definitions

Significance classification	Definition	Significant effect
Major	A large and detrimental change to a valuable/sensitive receptor, likely exceeding an accepted threshold. A large and beneficial change, resulting in enhancements in baseline conditions, transitioning from previously poor conditions to new legal compliance, or making a major contribution to national goals. These effects may represent key factors in the decision-making process. Potentially associated with sites and features of national importance or likely to be important considerations at a regional scale. Major effects may relate to features that are unique and irreplaceable.	Significant
Moderate	A medium scale change that, although not beyond an accepted threshold, is still considered to be generally unacceptable, unless offset by significant positive benefits of the project. If adverse, these effects are likely to be important at a regional or local scale and on their own could influence on decision making. A positive moderate effect is a medium scale change that improves baseline conditions sufficiently to contribute to guideline targets.	Significant
Minor	A minor adverse change that remains within legal and planning policy limits. minor positive change that is unlikely to significantly impact the overall balance of considerations. These effects might be raised as local issues and could be relevant to the detailed design of a project, but they are unlikely to be critical in the decision-making process.	Not significant
Negligible	A very small change that is so inconsequential it can be considered acceptable to disregard. These effects fall below perceptible limits, lie within normal variations, or fall within the margin of forecasting error. They are unlikely to influence decision-making.	Not significant

5.5.5 Assumptions and limitations of the assessment

- 5.5.5.1 The marine mammal impact assessment has been informed by the best available scientific evidence at the time of writing. As marine mammals are highly mobile, their occurrence within the Marine Mammal Study Area is naturally variable over spatial and temporal scales. Consequently, baseline survey and modelling datasets provide a representation of species distribution, abundance and density at the time they were collected, rather than continuous observations of marine mammal occurrence.
- 5.5.5.2 Multiple regional survey datasets and habitat-based models were available for several species and, in some cases, resulted in different estimates of abundance and density. Professional judgement has therefore been applied to identify the most appropriate evidence for use within the assessment, taking account of factors including survey coverage, temporal relevance, spatial applicability and scientific robustness. The data sources used to characterise the marine mammal baseline, together with their associated assumptions and limitations, are described in **Section 5.4.3**.
- 5.5.5.3 The assessment has also been informed by published evidence describing marine mammal responses to anthropogenic activities, including offshore wind developments and comparable marine activities across a variety of jurisdictions. This assumes that the available evidence is applicable to the environmental conditions and species present within the Marine Mammal Study Area, recognising that behavioural responses may vary between species, locations and environmental conditions.
- 5.5.5.4 There are inherent uncertainties with assessing the effects of underwater sound on marine mammals. These include uncertainty in predicting the sound experienced by individual animals, the number of animals exposed, and the extent to which individual responses may translate into effect

at the population level. The assessment has been informed by underwater sound modelling undertaken for the MHPGC Project. The methodology, input parameters, modelling scenarios and associated limitations are presented within **Volume 2, Annex 5.1: Underwater Sound Modelling Report, of the PEIR**. Accordingly, these assumptions are not repeated within this chapter, which relies upon the modelling outputs to inform the assessment where relevant.

- 5.5.5.5 To address these uncertainties, a precautionary approach has been applied throughout the assessment. Where uncertainty exists, assessment assumptions have been selected to ensure that the potential for likely significant effects is not underestimated.

5.6 Key parameters for assessment

5.6.1 Scope of the assessment

- 5.6.1.1 The approach to assessment was presented in the MHPGC Project Scoping Report and has been refined through consultation with relevant statutory and non-statutory consultees, as detailed in **Section 5.2.6**, and consideration of the MHPGC Project Scoping Opinions received from the PINS and MD-LOT.
- 5.6.1.2 **Table 5.36** summarises the impacts considered as part of the assessment, while a summary of the effects scoped out of the assessment is presented in **Table 5.37**.

Table 5.36: Impacts scoped into the assessment

Impact	Phase			Potential impacts scoped into the assessment
	C	O&M	D	
Underwater sound from offshore export cable installation activities, site investigations, and vessel movements, and other non-UXO sound generating activities	✓	✓	✓	Underwater sound generated from construction, O&M and decommissioning phase activities has the potential to result in injury and/or disturbance of marine mammals occurring within the Marine Mammal Study Area.
Underwater sound from UXO clearance	✓	X	X	Underwater sound generated from UXO clearance during the construction phase has the potential to result in injury and/or disturbance of marine mammals occurring within the Marine Mammal Study Area.
Changes in prey availability	✓	✓	✓	Construction, O&M and decommissioning phase activities have the potential to affect marine mammal prey species, resulting in indirect effects on marine mammals through changes in prey availability, distribution or foraging opportunities.
Collision with vessels	✓	✓	✓	Vessel activity associated with the MHPGC Project has the potential to result in collision risk for marine mammals occurring within the Marine Mammal Study Area.

C = construction; O&M = operations and maintenance; D = decommissioning

Table 5.37: Impacts scoped out of the assessment

Impact	Justification for scoping out of the assessment
All MHPGC Project phases	
Increased SSC and associated sediment deposition	Disturbance to water quality resulting from MHPGC Project activities is unlikely to result in direct impacts to marine mammals. Marine mammals are highly mobile species and generally rely on acoustic cues rather than visual cues for prey detection and navigation. They are also known to forage in naturally turbid environments, including areas with high tidal flows (e.g. Marubini <i>et al.</i>, 2009; Pierpoint, 2008; Hastie <i>et al.</i>, 2016). Whilst elevated levels of SSC arising during the MHPGC Project are predicted to occur (see Volume 2, Chapter 1: Physical Processes, of the PEIR), these effects are expected to be temporary and localised, with sediments rapidly dispersing over one tidal excursion. Therefore, increased SSC and associated sediment disposition are not expected to result in effects on marine mammal receptors. This approach has also been considered through the consultation process, with no further assessment of this impact requested by consultees [see Table 5.4]. Therefore, this impact has been scoped out of further consideration.
Accidental pollution	There is a risk of accidental pollution (e.g. fuel or oil releases) during the construction, O&M and decommissioning phases from sources including vessels, vehicles, equipment and machinery. Such effects have the potential to result in direct effects in marine mammals or indirect effects through impacts on prey availability. However, the likelihood of such events occurring is considered to be very low due to the implementation of project-specific pollution prevention and emergency response measures, including a Outline Marine Pollution Contingency Plan (CoT37) [see Section 5.7]. The Outline Marine Pollution Contingency Plan (CoT37) will be submitted with the DCO application and Marine Licence application(s) to the Scottish Ministers and will set out hazards, response strategies and step-by-step actions for handling spills, contaminant releases and vessel collisions, and will include all essential emergency contacts and information. In the unlikely event of an accidental release, the magnitude of any potential effects would be reduced through implementation of these control measures set out in the Outline Marine Pollution Contingency Plan (CoT37) [see Table 5.39]. The approach to accidental pollution has also been considered through the consultation process, with no further assessment of this impact requested by consultees [see Table 5.4]. Therefore, this impact has been scoped out of further consideration.
Effects of the particle motion element of underwater sound on marine mammals	There is currently no evidence that exposure to particle motion from anthropogenic underwater sound sources results in effects on marine mammals. This approach has been considered through the consultation process, with no further assessment of this impact requested by consultees [see Table 5.4]. Therefore, this impact has been scoped out of further consideration.
O&M phase	
Impact of EMF (from surface laid or buried cables)	Although uncertainties remain regarding the potential effects of EMF from marine renewables developments, there is currently limited evidence of cetacean responses and no evidence that marine mammals can detect or respond to EMF. In addition, magnetic fields generated by alternating current cables attenuate rapidly with distance from the cable and are expected to be highly localised (Hutchison <i>et al.</i>, 2020). Potential exposure would be further reduced through the commitment to bury cables where practicable, as set out in the Outline Offshore Cable Specification and Installation Plan (CSIP; CoT08)[see Section 5.7; Table 5.39], which would refuse EMF and thermal emissions to the surrounding environment. Given the limited evidence of sensitivity, the highly localised nature of potential EMF effects and the reduced exposure resulting from cable burial, EMF effects are not expected to result in impacts on marine mammals. The available evidence and the proposed cable burial commitment have been considered in response to consultation feedback regarding the potential for effects from EMF [see Table 5.4]. Therefore, this impact has been scoped out of further consideration.

5.6.2 Maximum design scenario

- 5.6.2.1 The Maximum Design Scenario (MDS) for each impact identified in **Section 5.6.1** has been selected as that having the potential to result in the greatest effect on an identified receptor or receptor group. The MDS presented in **Table 5.38** has been selected from the parameters provided in **Volume 1, Chapter 2: Project Description, of the PEIR** and methodology outlined in **Volume 1, Chapter 4: Approach to Environmental Impact Assessment, of the PEIR**.

Table 5.38: MDS relevant for the assessment of potential impacts on marine mammals

Impact	Maximum Design Scenario	Explanation
Note: The cable length measurements are for the maximum distance between the Morven North or Morven South OSP and trenchless drill exit pit unless otherwise stated. For clarity one trench length is as follows: - OSP to exit pit – up to 324.67km; - OSP to MHWS – up to 326.00km; - Scottish waters (OSP – Scottish-English offshore waters boundary) – up to 98.00km; - English waters (English offshore waters boundary – exit pit) – up to 226.67km; and - English waters (English offshore waters boundary – MHWS) – up to 228.00km.		
Construction		
Injury and disturbance from underwater sound produced by offshore export cable installation activities	Construction duration: up to four years. Offshore export cable Installation: - Installation of up to 324.67km of cable per trench: - Scottish waters: maximum length (per cable) of 98km; - English waters: maximum length (per cable) of 226.67km. Export cable installation characteristics includes: - Seabed preparation: - Sandwave clearance (plough/mass flow excavator/dredging); - Pre-lay grapnel run. - Boulder/debris clearance: - Ploughing / pre-lay trenching; - Rock carpet; - Dredging (spot soil movements). - Burial techniques: - Mechanical cutting; - Jet trenching; - Controlled flow excavation; - Ploughing (during or post lay trenching). - Cable protection: - Concrete mattresses / rock bags;	Offshore export cable installation includes seabed preparation, boulder/debris clearance, burial and cable protection activities, undertaken using methods such as mechanical cutting, jet trenching, ploughing or Controlled Flow Extraction (CFE) (for localised points along the route only). The MDS for the effects of underwater sound on marine mammal receptors assumes the offshore export cable installation activities associated with the greatest spatial extent of potential acoustic impacts. For offshore export cable installation, this is represented by the Cable Laying Vessel (CLV), which has the greatest modelled spatial extent of potential underwater sound effects based on the sound source characteristics and frequency range of the activity relative to marine mammal hearing ranges.

Impact	Maximum Design Scenario	Explanation
	– Rock installation; – Cable Protection Systems (CPS). Trenchless techniques (landfall) (English waters): • Such as horizontal Directional Drilling (HDD) or direct pipe. See MDS for Injury to marine mammals due to collision with vessels	
Injury and disturbance from underwater sound produced by pre-construction site investigation surveys	Pre-construction duration: two years site preparation activities Pre-construction geophysical survey investigations: • High resolution Multibeam Echosounder (MBES) with an operating frequency of 200 to 400kHz; • Side Scan Sonar (SSS) with an operating frequency of 300 to 600kHz; • Single Beam Echosounder (SBES) with an operating frequency of 20 to 40kHz; • Sub-Bottom Profilers (SBP) with operating frequencies of 0.2 to 14kHz (chirp) and 85 to 115kHz (high frequency); • Ultra-High Resolution Seismic (UHRS) (such as sparker) with an operating frequency of 0.05 to 4kHz; • Ultra-Short Baseline (USBL) acoustic positioning transponder with an operating frequency of 21 to 31kHz; • Remotely Operated Vehicle (ROV). Pre-construction geotechnical surveys investigations: • Seismic Cone Penetration Tests (CPT) with receiver frequency of approximately 28Hz; • Vibrocoring (VC) with operating frequency of 20 to 35Hz (this may depend on the type of vibrator motor unit used in the equipment). Up to two survey vessels may be present on site at any one time.	A range of geophysical and geotechnical activities prior to construction, using equipment assumed to be typical for the types of surveys anticipated. The MDS for the effects of underwater sound on marine mammal receptors assumes the use of survey equipment with the highest source levels and frequencies that overlap with marine mammal hearing ranges, resulting in the greatest spatial extent of potential acoustic impacts.
Injury and disturbance from underwater sound produced by unexploded ordnance (UXO) clearance	Pre-construction duration: two years site preparation activities UXO clearance: • Low order clearance of up to 22 UXOs, within the export cable corridor:	The MDS for UXO clearance includes the maximum number and maximum size of UXO anticipated to be encountered, as these represent the greatest potential number of clearance events and the largest potential source of underwater sound. The most likely and maximum donor charges are assessed for low order UXO

Impact	Maximum Design Scenario	Explanation
	– Scottish waters: 8 UXOs (for funnel area out with overlap with Morven North and Morven South); – English waters: 14 UXOs. • Low order UXO clearance: – Maximum size of donor charge: 0.08kg; – Maximum charge configuration for low yield technique: 4 x 0.75kg.	clearance, and it should be noted that only low order clearance techniques will be sought under the DCO application and Marine Licence application(s) to the Scottish Ministers.
Impacts on marine mammals due to changes in prey availability	As described in Volume 2, Chapter 4: Fish and Shellfish Ecology, of the PEIR: • Temporary habitat loss and disturbance; • Increased SSC and associated sediment deposition; • Disturbance/remobilisation of sediment bound contaminants; • Underwater sound from UXO clearance: mortality, injury, behavioural impacts and auditory masking; • Underwater sound (excluding UXO): mortality, injury, behavioural impacts and auditory masking; • Increased risk of introduction and spread of invasive non-native species.	As described in Volume 2, Chapter 4: Fish and Shellfish Ecology, of the PEIR.
Injury to marine mammals due to collision with vessels	Construction duration: up to four years. Offshore vessel activity: • Up to 550 return trips during the construction phase by installation vessels (including CLV, Trenching Support Vessels (TSV), Installation Support Vessel (ISV), Guard Vessels (GV), survey vessels, pre-lay grapnel run vessel, out of service cable removal vessel, boulder clearance vessel, dredging vessel, Crew Transport Vessel (CTV), rock dumping vessel, construction support vessel, tug/anchor handler and cable barge); • A maximum of 33 vessels may be operational at any one time during the construction phase. Landfall vessel activity:	The MDS assumes the maximum number of vessels present on site at one time during the construction phase and the greatest number of vessel movements during this phase, representing the broadest range of vessel types with the potential to interact with marine mammal receptors.

Impact	Maximum Design Scenario	Explanation
	- Up to 250 return trips by installation and support vessels (including CLV, ISV, GV, dredging vessels, tug/anchor handlers, cable barge, CTV and Dive Support Vessels (DSV)); - A maximum of 14 vessels may be operational at any one time during the construction phase.	
O&M		
Injury and disturbance from underwater sound produced during offshore export cable operation and maintenance activities	Operational lifespan: 35 years. Maximum of two routine inspections of offshore export cable and cable protection per year; - Estimated 41 cable repairs during operational lifespan; - Up to 4% of the cable route length, up to 13km, may require remediation per year. Remediation may occur in different locations and for varying lengths, but it is anticipated that up to 13km of export cable length per year per trench will require remediation with a maximum width of 20m. See MDS for injury to marine mammals due to collision with vessels	Offshore export cable burial and repair activities may be undertaken during the O&M phase. The MDS for the effects of underwater sound on marine mammal receptors assumes the O&M offshore export cable installation activities associated with the highest underwater sound source levels and frequencies that overlap with marine mammal hearing ranges. For offshore export cable repair and reburial activities, this is represented by the CLV, resulting in the greatest spatial extent of potential acoustic impacts.
Injury and disturbance from underwater sound produced during site investigation surveys	Operational lifespan: 35 years Maximum of five geophysical surveys per year; including: - Vessel(s) with SSS; - MBES; - SBP; - Magnetometer (MAG) and or Gradiometer.	A range of geophysical activities during O&M, using equipment assumed to be typical for the types of surveys anticipated. No survey methods are expected to interact with the seabed. The MDS for the effects of underwater sound on marine mammal receptors assumes the use of survey equipment with the highest source levels and frequencies that overlap with marine mammal hearing ranges, resulting in the greatest spatial extent of potential acoustic impacts.
Impacts on marine mammals due to changes in prey availability	As described in Volume 2, Chapter 4: Fish and Shellfish Ecology, of the PEIR: - Long term habitat loss; - Temporary habitat loss and disturbance; - Increased SSCs and associated deposition; - Disturbance/remobilisation of sediment bound contaminants;	As described in Volume 2, Chapter 4: Fish and Shellfish Ecology, of the PEIR.

Impact	Maximum Design Scenario	Explanation
	• Underwater sound (excluding UXO): mortality, injury, behavioural impacts and auditory masking; • EMF from subsea electrical cabling; • Thermal emissions from operational activities; • Increased introduction and spread of invasive non-native species; • Colonisation of hard structures.	
Injury to marine mammals due to collision with vessels	Operational lifespan: 35 years. Vessel presence: Routine inspection (no remediation/repair) constitutes survey activity (survey vessel) up to 2 surveys per year per trench; duration 2 weeks per survey; 3 return trips per survey; 2 vessels max at 1 time per survey. • Per year for 2 trenches: – Surveys – 4 – Return trip – 4x3 = 12 – Total vessels at time – 2 Routine inspection (no remediation/repair) constitutes survey activity (Uncrewed Surface Vessel (USV)) up to 2 surveys per year per trench; duration 6 weeks per survey; 110 return trips (up to 4 USV + 1 guard vessel with port call every 4 days) (55 per survey = 110); up to 4 USV + 1 guard vessel = 5 max at 1 time per survey. • Per year for 2 trenches: – Surveys – 4 – Return trips – 4x55 = 220 – Total vessels at time – 5 – Remediation (up to 13.056km per year per trench, in different locations along route) Vessels on site for remediation activities, for up to two trenches: • Up to four O&M vessels on site at any one time, comprising a combination of Construction Support Vessel (CSV) and/or Service Operation Vessels (SOV) and/or guard vessel and/or rock dump vessels and/or CTVs/workboats. Vessel movements (remediation), for up to two trenches:	The MDS assumes the maximum number of vessels present on site at one time during the O&M phase and the greatest number of vessel movements during this phase, representing the broadest range of vessel types with the potential to interact with marine mammal receptors.

Impact	Maximum Design Scenario	Explanation
	- Up to 62 O&M vessel movements (return trips) each year, consisting of CSV or SOV and/or guard vessel and/or rock dump vessels and/or CTVs/workboats; - Repair (41 lifetime repairs, for up to two trenches). Vessels on site for repair activities, for up to trenches: - Up to four O&M vessels on site at any one time, comprising a combination of CLV and/or barge and/or barge handlers/tugs and/or jack-up and/or CSV and/or CTV and/or rock dump. Vessel movements (repair), for up to two trenches: - Up to 245 O&M vessel movements (return trips) over the operational lifetime (35 yrs) consisting of CLV and/or barge and/or jack-up and/or barge handlers/tugs and/or CSV and/or CTV and/or rock dump.	
Decommissioning		
Injury and disturbance from underwater sound from decommissioning activities	The MDS for the decommissioning phase is assumed to be as that described for the construction phase (offshore export cable installation activities).	The decommissioning methodology is not yet defined. The construction-phase MDS has therefore been used to provide a conservative basis for assessing potential underwater sound effects from decommissioning activities, recognising that the activities required for removal of offshore export cable infrastructure could vary depending on the decommissioning approach adopted. The decommissioning approach will be reviewed at the time of decommissioning, taking account of the most up-to-date and best available guidance.
Injury and disturbance from underwater sound produced during site investigation surveys	The MDS for the decommissioning phase is assumed to be as that described for the pre-construction phase (pre-construction site investigation surveys).	The decommissioning methodology is not yet defined. The pre-construction site investigation survey MDS has therefore been used to provide a conservative basis for assessing potential underwater sound effects from decommissioning activities, recognising that the activities required during decommissioning could vary depending on the approach adopted. The decommissioning approach will be reviewed at the time of decommissioning, taking account of the most up-to-date and best available guidance.

Impact	Maximum Design Scenario	Explanation
Impacts on marine mammals due to changes in prey availability	As described in Volume 2, Chapter 4: Fish and Shellfish Ecology, of the PEIR: • Temporary habitat loss and disturbance; • Increased SSCs and associated sediment deposition; • Disturbance/remobilisation of sediment bound contaminants; • Increased risk of introduction and spread of invasive non-native species; • Underwater sound (excluding UXO): mortality, injury, behavioural impacts and auditory masking; • Removal of hard substrate.	As described in Volume 2, Chapter 4: Fish and Shellfish Ecology, of the PEIR .
Injury to marine mammals due to collisions with vessels	The MDS for the decommissioning phase is assumed to be as that described for the construction phase (injury to marine mammals due to collisions with vessels).	The decommissioning methodology is not yet defined. The construction-phase vessel collision MDS has therefore been used as a basis for assessing potential collision risk during decommissioning, recognising that vessel activity during decommissioning could vary depending on the approach adopted. The decommissioning approach will be reviewed at the time of decommissioning, taking account of the most up-to-date and best available guidance.

5.7 Commitments adopted as part of the MHPGC Project

- 5.7.1.1 As set out in **Volume 1, Chapter 4: Approach to Environmental Impact Assessment, of the PEIR** and **Volume 1, Annex 4.1: Draft Commitments Register, of the PEIR**, several measures have been adopted as part of the MHPGC Project to reduce the potential for impacts on marine mammals.
- 5.7.1.2 Embedded mitigation includes the following measures as identified in the Guide to Shaping Quality Development (Institute of Sustainability and Environmental Professionals (ISEP), formerly Institute of Environmental Management and Assessment (IEMA⁴), 2015):
- Primary mitigation - measures included as part of the project design. ISEP (formerly IEMA) describes these as “modifications to the location or design of the development made during the pre-application phase that are an inherent part of the project and do not require additional action to be taken”. This includes modifications arising through the iterative design process. These measures will be secured through the consent itself through the description of the project and the parameters secured in the DCO and marine licence, or both;
 - Tertiary mitigation - ISEP describes these as “actions that would occur with or without input from the EIA feeding into the design process. These include actions that will be undertaken to meet other existing legislative requirements, or actions that are considered to be standard practices used to manage commonly occurring environmental effects”.
- 5.7.1.3 Embedded mitigation measures that will form part of the final design (and are established legislative requirements/good practice, or both) have been taken into account as part of the initial assessment presented in **Section 5.8** (i.e., the initial determination of impact magnitude and significance of effects assumes implementation of these measures). This ensures that the measures that the Applicant is committed to are considered in the assessment of effects.
- 5.7.1.4 Where the assessment identifies the potential for likely significant adverse effects following implementation of embedded mitigation, secondary mitigation measures may be proposed to further avoid or reduce those effects. They are defined by ISEP as “actions that will require further activity to achieve the anticipated outcome” and may be imposed as part of the planning consent, or through inclusion in the ES. These include measures required to reduce the significance of environmental effects and may be secured through an environmental management plan. Where secondary mitigation measures are identified, both the pre-mitigation and residual effects are presented.
- 5.7.1.5 The embedded measures relevant to marine mammals are outlined in **Table 5.39**. As there is a secured commitment to implementing these measures, they are considered inherently part of the design of the MHPGC Project and have therefore been considered in the assessment presented in **Section 5.8**.

⁴ IEMA became the Institute of Sustainability and Environmental Professionals (ISEP) in 2024. References to IEMA in this document relate to guidance published prior to the name change and have been retained for consistency with the original source.

Table 5.39: Embedded commitments relevant to marine mammals implemented as part of the MHPGC Project

Commitment number	Measure adopted	How the measure will be secured via an appropriate consent condition
CoT06	An Outline Offshore Environmental Management Plan (OEMP) will be prepared and submitted with the application for development consent and as part of the marine licence application(s) to the Scottish Ministers. A Detailed OEMP will be developed substantially in accordance with the Outline OEMP and submitted and approved by the MMO and MD-LOT. The Outline OEMP will include: • an Outline Marine Biosecurity Plan; • an Outline Marine Pollution Contingency Plan; • an Outline Marine Mammal Mitigation Plan; • an Outline Vessel Traffic Management Plan; • an Outline Navigational Safety Plan; • a chemical risk assessment that includes information such as how chemicals will be used, stored, and transported, in line with recognised best-practice guidance; • a dropped-object protocol will be established to cover the reporting and recovery of any items lost overboard that could endanger other sea users; • a Marine Emergency Action Card outlining the steps to be followed in the case of a marine emergency; • provisions for the handling and disposal of waste.	The Outline OEMP will be secured through the relevant requirements and conditions of the DCO and associated dML(s), and Scottish Marine Licence(s).
CoT07	An Outline Offshore Operations and Maintenance Plan will be prepared and submitted as part of the application for development consent and as part of the marine licence application(s) to the Scottish Ministers. A Detailed Offshore Operations and Maintenance Plan will be produced substantially in accordance with the Outline plan, prior to entering the operation and maintenance phase.	The Outline Offshore Operations and Maintenance Plan will be secured through the relevant requirements and conditions of the DCO and associated dML(s), and Scottish Marine Licence(s).

Commitment number	Measure adopted	How the measure will be secured via an appropriate consent condition
CoT08	An Outline Offshore Cable Specification and Installation Plan (CSIP) will be prepared and submitted with the application for development consent and as part of the marine licence application(s) to the Scottish Ministers. It will include cable burial to be the preferred option for cable protection, where practicable. A Detailed CSIP will be developed prior to construction that will be substantially in accordance with the Outline CSIP. The Outline CSIP will include (but is not limited to): • a Cable Burial Risk Assessment (CBRA), which will define burial depths and safeguards, based on seabed conditions and external aggression and climate change hazards, to keep the offshore export cables protected and compliant through all project phases while upholding navigational and environmental safety; • the implementation, management and monitoring of cable protection; • details on the development of offshore export cable installation and protection design within the Farnes Deep Nephrops ground, which will seek to maximise cable burial and minimise the requirements for external cable protection, where technically feasible, taking account of cable stability, integrity and other engineering requirements.	The Outline Offshore CSIP will be secured through the relevant requirements and conditions of the DCO and associated dML(s), and Scottish Marine Licence(s).
CoT30	An Outline Vessel Traffic Management Plan (VTMP) will form part of the Outline OEMP, which will be prepared and submitted with the application for development consent and as part of the marine licence application(s) to the Scottish Ministers. A Detailed VTMP will be developed pre-construction substantially in accordance with the Outline VTMP, and in line with the relevant legislation, guidance and industry best-practice. The Detailed VTMP will: • detail vessel routing to and from construction areas and ports to avoid areas of high risk, including liaison with the Port of Seaham and the Port of Sunderland; • include vessel standards and a code of conduct for vessel operators in compliance with international marine regulations as adopted by the Flag State, including the International Regulations for Preventing Collisions at Sea (COLREGs) (International Maritime Organisation (IMO), 1972/77) and the International Convention for the Safety of Life at Sea (SOLAS) (IMO, 1974); • detail measures to reduce disturbance to marine mammal receptors from transiting vessels, such as slow transit through the MHPGC Project and other measures as detailed in the Outline Marine Mammal Mitigation Protocol; • detail measures to reduce disturbance to red throated diver from transiting vessels, such as slow transit through the MHPGC Project and other measures as detailed in the Red Throated Diver Protocol.	The Outline VTMP will be secured through the relevant requirements and conditions of the DCO and associated dML(s), and Scottish Marine Licence(s).

Commitment number	Measure adopted	How the measure will be secured via an appropriate consent condition
CoT36	An Outline Marine Mammal Mitigation Protocol (MMMP) will form part of the Outline OEMP, which will be prepared and submitted with the application for development consent, and as part of the marine licence application(s) to the Scottish Ministers. A Detailed MMMP will be developed substantially in accordance with the Outline MMMP, which will include measures such as: • will include use of low-order techniques for unexploded ordnance (UXO) clearance; • adherence to JNCC guidelines, where appropriate, regarding the minimisation of injury from underwater sound generated from known project activities of geophysical surveys (JNCC, 2017) and UXO clearance (JNCC, 2025a); • adherence to the Scottish Marine Wildlife Watching Code (NatureScot, 2023) and Defra Marine and Coastal Wildlife Code (Department for Environment, Food & Rural Affairs (Defra), 2023); • reporting requirements for the Marine Noise Registry and marine mammal observer sightings.	The Outline MMMP will be secured through the relevant requirements and conditions of the DCO and associated dML(s), and Scottish Marine Licence(s).
CoT37	An Outline Marine Pollution Contingency Plan (MPCP) will form part of the Outline OEMP, which will be prepared and submitted with the application for development consent and as part of the marine licence application(s) to the Scottish Ministers. The Outline MPCP will describe the hazards, response strategies, and step-by-step actions for handling spills, contaminant releases (including details of non-toxic, biodegradable drilling fluids), and vessel collisions during construction or operations below MHWS, and will include all essential emergency contacts and information. A Detailed MPCP will be developed in accordance with the Outline MPCP.	The Outline MPCP will be secured through the relevant requirements and conditions of the DCO and associated dML(s), and Scottish Marine Licence(s).
CoT44	An Offshore Decommissioning Programme will be developed and submitted to the MMO and MD-LOT prior to the commencement of any offshore construction. It will be in line with the latest relevant legislation and available guidance at the time of production, as far as reasonably practicable.	The Offshore Decommissioning Programme will be secured through the relevant requirements and conditions of the DCO and associated dML(s), and Scottish Marine Licence(s).
CoT56	An Offshore In-Principal Monitoring Plan (OIPMP) will be prepared and submitted as part of the application for development consent and as part of the marine licence application(s) to the Scottish Ministers. The OIPMP will include for monitoring as part of the operational asset integrity surveys. A Detailed Offshore Monitoring Plan will be produced prior to operation and maintenance phases in accordance with the OIPMP, and will be approved in consultation with statutory advisors and regulators.	The OIPMP will be secured through the relevant requirements and conditions of the DCO and associated dML(s), and Scottish Marine Licence(s).

Commitment number	Measure adopted	How the measure will be secured via an appropriate consent condition
CoT58	UXO hazards will be avoided where practicable and appropriate. Where avoidance is not possible, removal techniques will be considered prior to detonation. Low order techniques, such as deflagration, will be the preferred method where practicable and appropriate. Should low order not be practicable, relocation is considered and if no alternative exists high order clearance may be required. If high order is required for UXO clearance works, licencing will be subject to a standalone Marine Licence application(s). The application(s) will provide details of measures to seek to minimise impacts on marine mammals where appropriate.	Will be secured through the relevant requirements and conditions of the DCO and associated dML(s), and Scottish Marine Licence(s).

5.8 Assessment of impacts

5.8.1 Overview

- 5.8.1.1 This section presents the assessment of the potential effects of the MHPGC Project on marine mammals during the construction, O&M and decommissioning phases [see **Table 5.38**]. A summary of the potential effects is presented in **Section 5.12** [see **Table 5.60**].
- 5.8.1.2 The potential for MHPGC Project activities to result in an offence in relation to EPS has been considered, and any requirements for EPS licensing will be addressed prior to undertaking the relevant activity and comply with any conditions of the licence.

Underwater sound assessment approach

- 5.8.1.3 Marine mammals are highly reliant on underwater sound for a range of ecological functions, including communication, navigation, echolocation (for odontocetes) and prey detection. Anthropogenic underwater sound has the potential to disrupt these functions through mechanisms such as auditory masking, behavioural disturbance and, where exposure levels are sufficiently high, auditory injury. The potential for effects depends on the characteristics of the sound source and whether the frequencies produced overlap with the hearing capabilities of the species present.
- 5.8.1.4 Marine mammal hearing capabilities vary between species and have been classified into functional hearing groups based on their generalised hearing ranges (Southall *et al.*, 2007; Southall *et al.*, 2019; NMFS, 2024), as described in **Table 5.40**.

Table 5.40: Marine mammal functional hearing groups and auditory thresholds (NMFS, 2024)

Functional hearing group	Common species in Marine Mammal Study Area	Generalised hearing range*
Low Frequency (LF) cetaceans (baleen whales)	Minke whale.	7Hz to 36kHz
High Frequency (HF) cetaceans (dolphins, toothed whales, beaked whales, bottlenose whales)	- Bottlenose dolphin; - White-beaked dolphin; - Atlantic white-sided dolphin; - Common dolphin.	150Hz to 160kHz
Very High Frequency (VHF) cetaceans (true porpoises, river dolphins)	Harbour porpoise.	200Hz to 165kHz
Phocid pinnipeds in Water (PW) (true seals)	- Grey seal; - Harbour seal.	40Hz to 90kHz

**The generalised hearing range represents the composite range for all species within each functional hearing group; individual species' hearing ranges may not extend across the full range. Additionally, animals are able to detect very loud sounds above and below the generalised hearing range.*

- 5.8.1.5 The potential effects of underwater sound generated by anthropogenic activities depend on several factors, including the intensity of the sound source (measured in decibels (dB)), whether the sound is impulsive or non-impulsive, the frequency characteristics of the sound and the duration of exposure. Effects may range from masking of biologically relevant sounds, through to behavioural responses and, where sound exposure levels are of high intensity or of very long duration, auditory injury. Auditory injury occurs where exposure results in damage to the auditory system, which can lead to a reduction in hearing sensitivity.
- 5.8.1.6 Where underwater sound does not occur at levels capable of inducing auditory injury, there remains the potential for behavioural responses and/or indirect effects. Behavioural responses are highly variable and context dependent and may range from increased alertness or alteration of movement and diving behaviour to temporary displacement from preferred habitats. Masking may also occur

where anthropogenic underwater sound partially or completely reduces the audibility of communication signals and/or sounds associated with prey detection, potentially affecting individual fitness and population-level processes.

5.8.1.7 The potential effects of underwater sound on marine mammals are grouped as follows:

- Auditory injury (AUD INJ): this includes permanent threshold shift in hearing (PTS), which is a permanent and irreversible increase in the threshold of audibility at a specified frequency or across a portion of an individual's hearing range above a previously established reference level. PTS may result from exposure to intense impulsive sound sources and/or prolonged exposure to elevated sound levels;
- Temporary Threshold Shift (TTS): a recoverable and reversible increase in the threshold of audibility following exposure to elevated sound levels. TTS represents a temporary reduction in hearing sensitivity and may occur where exposure levels are insufficient to cause permanent auditory injury;
- Behavioural responses: responses are highly variable and context specific, and may include increased alertness, alteration of movement or diving behaviour, interruption of social interactions and temporary or permanent habitat displacement from an area;
- Masking: where anthropogenic underwater sound partially or completely reduces the audibility of signals of interest, including those used for communication and prey detection.

5.8.1.8 Underwater sound effects to marine mammals depend on both the characteristics of the sound source and the sensitivity of a receptor to that particular sound source. Underwater sound is broadly categorised as either impulsive (comprising 'pulsed' sounds) or non-impulsive (also referred to as continuous) sounds. Impulsive sources include short duration sounds with rapid changes in pressure, such as those generated by some geophysical survey equipment, impact piling, or UXO detonations. Non-impulsive sounds sources typically include vessel engine noise, drilling and activities associated with offshore export cable installation such as dredging, ploughing and trenching.

5.8.1.9 The frequency characteristics of a sound source influence whether it can be detected by a marine mammal species. Where sound occurs outside the hearing range of a species, the potential for direct auditory effects is considered negligible. However, where sound occurs within the hearing range of a species of interest, the potential for effects depends on the source level, exposure duration and sensitivity of the receptor.

5.8.1.10 Impact assessments use sound pressure levels (SPL) and sound exposure levels (SEL) to characterise underwater sound sources. SPL is a measure of a sound's amplitude or intensity and is typically presented as either a peak (SPL_{pk}) or root mean square (SPL_{rms}) value. SPL_{peak} represents the maximum instantaneous pressure level of an acoustic signal, while SPL_{rms} represents the square root of the average squared pressure over a defined time period. SPL values are expressed as dB re 1 μ Pa. SEL is a time-integrated measure of sound energy that accounts for both sound intensity and exposure duration and is expressed as dB re 1 μ Pa²s.

5.8.1.11 Underwater sound attenuates as it propagates through the marine environment, with propagation characteristics influenced by factors including water depth, seabed characteristics and bathymetry. The underwater sound characteristics associated with the MHPGC Project depend on equipment specifications, which at this stage have been assessed according to industry standard equipment and/or literature-derived source levels [see **Volume 2, Annex 5.1: Underwater Sound Modelling Report, of the PEIR**]. Where a range of sound levels were available, a realistic worst-case scenario has been assumed for the MDS [see **Table 5.38**].

5.8.1.12 To assess the potential effects of underwater sound generated by the MHPGC Project, project-specific underwater sound modelling has been undertaken using the dBSea underwater acoustics propagation model (Version 3.0) and is presented in **Volume 2, Annex 5.1: Underwater Sound Modelling Report, of the PEIR**. The modelled received sound levels have been compared with the relevant assessment criteria to determine the predicted spatial extent over which thresholds may be exceeded and potential effects may occur.

Auditory injury (PTS) and TTS

- 5.8.1.13 For determining the potential risk of auditory effects, including AUD INJ (PTS) and TTS, the most up to date sound exposure criteria published by the NMFS (2024) have been applied and are presented in **Table 5.41** below. For impulsive sound sources, criteria are based on dual metrics comprising peak SPL (SPL_{pk}) and M-weighted cumulative SEL (SEL_{cum}). For continuous sound sources, criteria are provided for SEL_{cum} only. M-weighting accounts for the hearing sensitivity of each marine mammal functional hearing group.
- 5.8.1.14 Impulsive sound sources are characterised by rapid changes in pressure and high peak sound levels, which can increase the potential for auditory injury compared with non-impulsive sources. For impulsive sound sources, the SPL_{pk} criterion represents the peak pressure level above which tissue injury is predicted to occur. The SEL_{cum} metric accounts for both the received sound level and duration of sound exposure (NMFS, 2024), allowing comparison of the cumulative sound energy associated with different impulsive sound sources with varying time intervals. Consequently, exposure to a lower received sound source over a longer duration may result in similar cumulative sound exposure, and therefore similar auditory effects, to exposure to a higher received sound level over a shorter duration.
- 5.8.1.15 Modelling of sound exposure is undertaken over a duration of 24-hours in accordance with the NMFS (2024) criteria. For survey activities, it is considered highly unlikely that a marine mammal would remain at a fixed location relative to a moving survey vessel for a continuous 24-hour period. Therefore, acoustic modelling has been undertaken assuming animals move away from the sound source at accepted species-specific swimming speeds, as detailed in **Volume 2, Appendix 5.1 Underwater Sound Modelling Report, of the PEIR**.

Table 5.41: Threshold criteria for AUD INJ and TTS or marine mammals exposed to underwater sound (NMFS, 2024)

Hearing Group	Impulsive sound				Continuous sound	
	SPL_{pk}		SEL_{cum}		SEL_{cum}	
	PTS	TTS	PTS	TTS	PTS	TTS
LF cetaceans	222	216	183	168	197	177
HF cetaceans	230	224	193	178	201	181
VHF cetaceans	202	196	159	144	181	161
PW seals	223	217	183	168	195	175

Units: SPL dB re 1 uPa; SEL (M-weighted): dB re 1 uPa²s

- 5.8.1.16 Auditory injury criteria are based on the best available scientific evidence but cannot be validated experimentally for PTS in marine mammals, as to test this would be inhumane. Consequently, PTS-onset thresholds are derived from TTS-onset data together with other available evidence (Southall *et al.*, 2019; NMFS, 2024). Predictions of PTS should therefore be regarded as precautionary estimates of the potential spatial extent over which injury thresholds may be exceeded.
- 5.8.1.17 TTS represents a temporary reduction in hearing sensitivity following exposure to elevated underwater sound and may temporarily affect an animal's ability to detect predators, forage or communicate. However, there is currently no established threshold at which TTS is considered to result in biologically meaningful effects or population-level consequences, and TTS-onset thresholds represent the smallest measurable change in hearing sensitivity rather than a threshold of ecological significance (Southall *et al.*, 2007; 2019). Accordingly, TTS ranges are presented within this assessment to provide context on the predicted extent of temporary auditory effects. They are not used in isolation to determine impact magnitude or significance, which is based on the weight of evidence and the wider ecological context.

Behavioural disturbance

- 5.8.1.18 Whilst it is assumed that not all animals found within predicted impact ranges will be disturbed, there is likely to be significant variability between individuals and between species. Differences in the response between individuals of the same species are well documented to be context and sound-type specific (Ellison *et al.*, 2012). Understanding the potential for significant detrimental effects requires a consideration of contextual factors including life history, foraging and energetic cost when determining risk.
- 5.8.1.19 Unlike auditory injury, behavioural disturbance does not have established quantitative thresholds that can be consistently applied across marine mammal species and sound sources. Behavioural responses are highly variable and influenced by the characteristics of the sound source, the behavioural state of the animal and the wider exposure context (Gomez *et al.*, 2016; Southall *et al.*, 2019). Consequently, behavioural responses cannot be reliably predicted from received sound levels alone, and neither NMFS (2024) nor Southall *et al.* (2019) provide universally applicable quantitative criteria for assessing behavioural disturbance.
- 5.8.1.20 Historically, the United States NOAA (2005) Level B harassment thresholds have been used as precautionary indicators of the potential for behavioural disturbance from non-explosive impulsive noise and continuous noise. However, these thresholds are generic across marine mammal groups and sound source types and have limited empirical support (Darias-O'Hara *et al.*, 2025). Accordingly, where such behavioural thresholds or proxies are considered within this assessment, they are interpreted as precautionary indicators of the potential for behavioural disturbance rather than definitive thresholds of effect and are considered alongside the wider ecological context.

5.8.2 Construction phase

Injury and disturbance from underwater sound produced by offshore export cable installation activities

- 5.8.2.1 For the purposes of this assessment, underwater sound generated during cable installation activities is considered across Scottish and English waters together, as the same construction activities, noise-generating equipment and underwater sound propagation characteristics are anticipated throughout the MHPGC Project PEIR Red Line Boundary. Furthermore, marine mammal receptors are not constrained by jurisdictional boundaries and occur across the wider regional seas. Consequently, a single assessment of the potential for auditory injury and behavioural disturbance has been undertaken.
- 5.8.2.2 Offshore export cable installation has the potential to generate underwater sound through a range of activities, including seabed preparation, boulder and debris clearance, cable burial and cable protection. Potential activities outlined in the MDS of relevance to this assessment [see **Table 5.38**] may involve techniques such as mechanical cutting, jet trenching, ploughing, CFE, sandwave clearance, pre-lay grapnel runs, localised dredging, and trenchless techniques (e.g. HDD or direct pipe) will also be used at landfall.
- 5.8.2.3 The MDS for offshore export cable installation activities assumes the installation of up to 324.67km of offshore export cable per trench (up to two trenches) over a construction period of up to four years [see **Table 5.38**]. These activities have the potential to generate continuous underwater sound that may result in auditory injury and/or behavioural disturbance of marine mammals. To inform this assessment, project-specific underwater sound modelling has been undertaken for representative offshore export cable installation activities where suitable source levels were available, including rock cutting, dredging, CLV and both medium and small support vessels [see **Volume 2, Appendix 5.1: Underwater Sound Modelling Report, of the PEIR**]. The modelling provides the basis for the assessment of the spatial extent and magnitude of potential underwater sound effects.

Receptor Sensitivity

Auditory injury (PTS)

- 5.8.2.4 Offshore export cable installation activities generate continuous (non-impulsive) underwater sound. These sources are typically characterised as broadband, with the majority of acoustic energy generally concentrated below 1kHz (MMO, 2015; Todd *et al.*, 2015).

- 5.8.2.5 Underwater sound from cable laying is generally considered to be dominated by the vessel undertaking the installation rather than the installation process itself (Genesis, 2011). In general, support and supply vessels (50 to 100m) and large commercial vessels (>100m) typically generate broadband continuous sound dominated by propeller, thruster and machinery noise, with the majority of acoustic energy occurring below 1kHz (OSPAR Commission, 2009; MMO, 2015).
- 5.8.2.6 Permanent auditory injury (PTS) is considered unlikely to occur from these activities because continuous underwater sound sources generally have lower source levels than impulsive activities. Nevertheless, should PTS occur, the effect is irreversible and could reduce hearing sensitivity used for communication, navigation and prey detection.
- 5.8.2.7 For harbour porpoises (VHF cetaceans), dolphins (HF cetaceans) and seal species (PW), hearing sensitivity is focused at higher frequencies than the dominant frequencies generated by offshore export cable installation activities. As a result, the likelihood of exposure to sound levels sufficient to cause PTS is considered low. However, PTS, if it were to occur, would be irreversible and therefore have no potential for recovery following cessation of the activity. Given the low likelihood of exposure, the expected limited extent of any potential injury and the absence of anticipated consequences for survival, reproductive success or population trajectory, sensitivity to auditory injury from these offshore export cable installation activities is considered **medium** in both Scottish and English waters.
- 5.8.2.8 Minke whales (LF cetaceans) have hearing sensitivity that overlaps more closely with the dominant low-frequency sound generated by offshore export cable installation activities and may therefore have greater potential susceptibility to auditory effects than other marine mammal species. Minke whale communication signals are predominantly below 2kHz (Mellinger *et al.*, 2000; Gedamke *et al.*, 2001; Risch *et al.*, 2013; 2014). However, offshore export cable installation activities generate continuous sound sources with comparatively lower source levels than impulsive activities, and the potential for PTS remains low. Although recoverability from PTS would be irreversible, the limited likelihood of exposure and the expected consequences of any potential injury are not expected to affect survival, reproductive success or population trajectory. Therefore, sensitivity of minke whale to auditory injury from these cable installation activities is also considered **medium** in both Scottish and English waters.
- Behavioural disturbance
- 5.8.2.9 Behavioural disturbance is considered the most likely effect pathway for marine mammals from offshore export cable installation activities. Sensitivity to behavioural disturbance has been assessed separately from auditory injury, based on the receptor-specific vulnerability, tolerance and recoverability criteria set out in **Table 5.32**. However, empirical evidence relating specifically to behavioural responses of marine mammals to non-piling construction activities is limited, with available studies focusing on dredging and vessel activity. Behavioural responses are highly variable and depend on factors including species, behavioural state, previous exposure, and vessel characteristics such as type and behaviour (i.e. the speed and direction) (Oakley *et al.*, 2017; Farcas *et al.*, 2020). Furthermore, underwater sound generated by offshore export cable installation activities is closely associated with vessel presence, making it difficult to isolate behavioural responses to underwater sound from those associated with vessel activity more broadly (Todd *et al.*, 2015).
- 5.8.2.10 Harbour porpoise are considered the most susceptible species to behavioural disturbance from offshore export cable installation activities. Studies have demonstrated reductions in harbour porpoise occurrence in response to increased vessel activity (Heinänen and Skov, 2015; Benhemma-Le Gall *et al.*, 2021), while high levels of vessel noise have shown to disrupt foraging behaviour (Wisniewska *et al.*, 2018). Therefore, temporary avoidance of active construction areas may occur. However, harbour porpoise are widely distributed throughout the Marine Mammal Regional Study Area and utilise extensive foraging grounds. Consequently, temporary displacement associated with localised construction vessel activity is unlikely to restrict access to prey resources or result in effects on survival or reproduction. Sensitivity to behavioural disturbance from offshore export cable installation activities is considered **medium** in both Scottish and English waters.
- 5.8.2.11 Behavioural responses of dolphin species to non-piling construction activities are variable and appear to be influenced by local environmental conditions. During dredging works at Aberdeen Harbour, bottlenose dolphin occurrence declined with increasing dredging intensity, with bottlenose

dolphins absent for five weeks during the initial dredging operations (Pirrotta *et al.*, 2013). In contrast, Anderwald *et al.* (2013) identified a positive relationship between bottlenose dolphin occurrence and construction vessel activity during offshore export cable installation in a bay in Ireland, while Marley *et al.* (2017) observed site-specific differences in bottlenose dolphin responses to dredging in an urbanised estuary in Western Australia. Similarly, Culloch *et al.* (2016) found no evidence of negative effects on common dolphins associated with construction related activity (including dredging) in northwest Ireland, construction related activity (including dredging). Collectively, these studies indicate that dolphin responses are context-dependent and are unlikely to result in long-term consequences where suitable alternative habitat is available. Sensitivity to behavioural disturbance from offshore export cable installation activities is therefore considered **medium** in both Scottish and English waters.

- 5.8.2.12 The same study conducted by Culloch *et al.* (2016) identified lower fine-scale temporal occurrence of minke whales during periods of construction activity in northwest Ireland, suggesting temporary avoidance of active works. However, minke whales are highly mobile and utilise extensive foraging areas throughout the Marine Mammal Regional Study Area. In addition, their large body size and greater energetic reserves are likely to make them less susceptible to short-term disruption of foraging than smaller odontocetes such as harbour porpoise. Consequently, individuals are expected to be able to adapt to localised and temporary displacement by using alternative foraging habitat and are expected to return following cessation of construction activities. As such, temporary disturbance is unlikely to affect survival or reproduction. Sensitivity to behavioural disturbance from offshore export cable installation activities is therefore considered **medium** in both Scottish and English waters.
- 5.8.2.13 Empirical evidence describing behavioural responses of grey and harbour seals specifically to offshore export cable installation activities is limited (Todd *et al.*, 2015). Available studies indicate that seals may exhibit temporary avoidance of offshore construction activities, although responses are generally short-lived and individuals return following cessation of works (Russell *et al.*, 2016; Sarnocińska *et al.*, 2020). Studies of vessel disturbance have also demonstrated that seals can be particularly sensitive at haul-out sites, although these responses are not directly comparable to animals at sea (Jansen *et al.*, 2010). Given the mobility of both seal species and the localised and temporary nature of offshore export cable installation activities, individuals are expected to adapt to temporary disturbance and recover following completion of the works. Sensitivity to behavioural disturbance from offshore export cable installation activities is therefore considered **medium** in both Scottish and English waters.

Magnitude of impact

Auditory injury (PTS) and TTS

- 5.8.2.14 Project-specific underwater sound modelling has been undertaken for representative offshore export cable installation activities, including the CLV, support vessels, dredging and rock cutting, where suitable source data were available [see **Volume 2, Appendix 5.1: Underwater Sound Modelling Report of the PEIR**]. **Table 5.42** presents the maximum predicted AUD INJ and TTS ranges for each activity. The full range of predicted distances for all modelling scenarios is presented in **Volume 2, Appendix 5.1: Underwater Sound Modelling Report of the PEIR**.

Table 5.42: Predicted distance (m) to AUD INJ and TTS thresholds for representative offshore export cable installation activities

Functional hearing group	SEL _{cum}									
	Rock cutting		Dredging		Medium support vessel		Small support vessel		CLV	
	AUD INJ	TTS	AUD INJ	TTS	AUD INJ	TTS	AUD INJ	TTS	AUD INJ	TTS
LF cetaceans	<10	180	<10	<10	<10	40	<10	<10	10	1800
HF cetaceans	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
VHF cetaceans	<10	140	<10	<10	<10	<10	<10	<10	<10	440
PW	<10	60	<10	<10	<10	<10	<10	<10	<10	710
SEL (M-weighted): dB re 1 uPa ² s										

- 5.8.2.15 The modelling indicates that the spatial extent of potential AUD INJ is highly localised for all offshore export cable installation activities [see **Table 5.42**]. Predicted PTS ranges are less than 10m for all activities and marine mammal hearing groups, with the exception of the CLV where the LF cetacean PTS range extends to 10m. Predicted TTS ranges are greater but remain limited, with the largest predicted range of 1.8km for LF cetaceans associated with the 140m CLV. Smaller TTS ranges are predicted for VHF cetaceans (440m) and PW (710m), while no TTS thresholds are exceeded for HF cetaceans.
- 5.8.2.16 Although the MDS assumes up to 33 vessels operating during the construction phase [see **Table 5.38**], these vessels would undertake different activities along the offshore MHPGC Project PEIR Red Line Boundary and would not be expected to operate concurrently within the same location. Therefore, simultaneous exposure of marine mammals to multiple construction sound sources is unlikely to result in materially increased sound exposure compared with the individual activities assessed. The potential for AUD INJ arising from multiple simultaneous construction phase activities is therefore considered limited.
- 5.8.2.17 Overall, the magnitude of impact from underwater sound generated during offshore export cable installation activities is considered **negligible** in both Scottish and English waters. Predicted PTS ranges are highly localised ($\leq 10\text{m}$) across all modelled activities and hearing groups, indicating a very limited potential for AUD INJ. Although TTS-onset thresholds are exceeded for some hearing groups, these effects would be temporary and reversible with no measurable consequences for individual survival, reproductive success or population trajectory.
- 5.8.2.18 The potential for offshore export cable installation activities to result in an offence in relation to EPS has been considered. The predicted AUD INJ ranges are highly localised ($\leq 10\text{m}$) and therefore the potential for an EPS to be injured as a result of exposure to underwater sound from cable installation activities is considered very low.

Behavioural disturbance

- 5.8.2.19 Offshore export cable installation activities are closely associated with vessel presence, as installation activities require the operation of a CLV and supporting vessels. Behavioural responses to vessels may arise from both underwater sound and the physical presence and movement of vessels, and it is difficult to isolate responses attributable solely to underwater sound. Vessel-related disturbance responses are highly variable and depend on factors including species, behavioural state, previous exposure and vessel characteristics such as vessel type, speed and operating behaviour (Oakley *et al.*, 2017; Farcas *et al.*, 2020). However, vessels associated with offshore export cable installation activities will generally operate in a constrained manner along the cable route and are not expected to remain within a fixed location for prolonged periods.
- 5.8.2.20 Underwater sound modelling has been undertaken to estimate the potential spatial extent of behavioural disturbance associated with offshore export cable installation activities. The modelled distances based on the precautionary Level B harassment threshold for continuous sound (NOAA,

2005) extent up to 27km for the CLV, 15km for rock cutting, 10km for dredging, 12km for medium support vessels and 420m for small support vessels [see **Volume 2, Appendix 5.1: Underwater Sound Modelling Report, of the PEIR**].

- 5.8.2.21 These modelled distances should be interpreted with caution, as the 120dB SPL_{rms} threshold represents a precautionary indicator for behavioural disturbance rather than a definitive threshold for response. The threshold does not account for variation in species sensitivity, behavioural context, previous exposure, or the nature and duration of the response. Furthermore, it does not distinguish between different types or severities of behavioural response and therefore does not directly indicate whether a response would result in biologically meaningful consequences.
- 5.8.2.22 The precautionary nature of this threshold is particularly relevant within the North Sea, where marine mammals are exposed to existing levels of anthropogenic sound, predominantly from shipping activity. Data collected in the North Sea in 2017 demonstrated that annual median broadband sound levels (63Hz to 4kHz) exceeded the 120dB SPL_{rms} across large areas of the North Sea, particularly in coastal regions and near ports (Farcas *et al.*, 2020). Therefore, the modelled disturbance ranges are likely to overestimate the spatial extent of additional behavioural responses attributable to offshore export cable installation activities.
- 5.8.2.23 The modelling represents sound propagation from individual vessels or activities; however, multiple activities may occur concurrently within the MHPGC Project PEIR Red Line Boundary, but would not be expected to occur concurrently at the same location. Although this may increase the area over which elevated sound levels occur, construction activities will progress along the cable route, and vessels will not remain within a single location for extended periods. Furthermore, individual activities will not occur continuously throughout the entire construction phase. It is recognised that the severity of behavioural responses may be influenced by interacting stressors, including changes in prey availability, underwater sound and disturbance from other activities (Lacy *et al.*, 2017); however, these factors are considered separately within the wider assessment.
- 5.8.2.24 Construction vessels will operate in accordance with the VTMP (CoT30) [see **Table 5.39; Section 5.7**], which includes measures to minimise disturbance to marine mammals, including the management of vessel speeds and other measures detailed in the MMMP (CoT36). Vessels undertaking offshore export cable installation activities during construction are expected to operate at relatively low speeds due to the nature of the equipment interacting with the seabed and operational constraints. This will reduce the likelihood of rapid vessel approaches and is expected to minimise the potential for disturbance responses associated with vessel movement.
- 5.8.2.25 Overall, the magnitude of impact from behavioural disturbance associated with offshore export cable installation activities is considered **low** in both Scottish and English waters. Although precautionary disturbance footprints extend over several kilometres, with the largest modelled ranges extending to 27km for the CLV, these represent the spatial extent over which behavioural responses could potentially occur rather than the extent of biologically meaningful effects. The available JNCC (2025b) guidance does not provide established EDRs for the range of offshore export cable installation activities assessed, and the Level B (120dB SPL_{rms}) threshold has therefore been used as a precautionary basis for identifying the potential spatial extent of behavioural disturbance. Construction may occur over a period of up to four years; however, installation will progress along the offshore cable route and individual activities will be temporary and intermittent, such that exposure of individual marine mammals to active construction is not expected to be continuous throughout this period. Consequently, while behavioural responses may occur over a relatively extensive area, effects are not expected to result in measurable consequences for individual survival, reproductive success or population trajectory.
- 5.8.2.26 Behavioural disturbance associated with offshore export cable installation activities is therefore expected to be temporary and reversible, and not expected to result in adverse effect on the conservation status of relevant marine mammal populations. Individuals able to move away from active construction areas and return following cessation of the works, reducing the likelihood of prolonged exposure to disturbance. . Therefore, the potential for offshore export cable installation activities to result in an EPS disturbance offence is considered low. Where an EPS licence is required the Applicant will obtain the necessary licence prior to undertaking the relevant activity and comply with any conditions of that licence.

Significance of the effect

Auditory injury (PTS)

- 5.8.2.27 Overall, it is considered that the sensitivity of marine mammal receptors to AUD INJ has been assessed as **medium**, and the magnitude of impact has been assessed as **negligible**. The resulting significance of effect is considered to be negligible or minor [see **Table 5.34**].
- 5.8.2.28 Therefore, the significance of effect from underwater sound associated with offshore export cable installation activities on marine mammals through auditory injury (PTS) during the construction phase is considered to be **negligible (adverse)**, which is **not significant** in EIA terms in both Scottish and English waters. This reflects the highly localised spatial extent of predicted AUD INJ ranges, which are $\leq 10\text{m}$ for all modelled activities and hearing groups, and the very limited potential for marine mammals to be exposed to sound levels sufficient to result in PTS..

Behavioural disturbance

- 5.8.2.29 Overall, it is considered that the sensitivity of marine mammal receptors to behavioural disturbance has been assessed as **medium**, and the magnitude of impact has been assessed as **low**.
- 5.8.2.30 Therefore, the significance of effect from underwater sound associated with offshore export cable installation activities on marine mammals through behavioural disturbance during the construction phase is considered to be **minor (adverse)**, which is **not significant** in EIA terms in both Scottish and English waters. This reflects the potentially extensive spatial extent of precautionary disturbance ranges, including a maximum modelled range of 27km for the CLV, together with the temporary and intermittent nature of individual installation activities and the absence of anticipated consequences for survival, reproductive success or population trajectory.

Additional mitigation and residual effect

- 5.8.2.31 At this stage, no additional mitigation measures or monitoring requirements have been identified in relation to the effects of underwater sound associated with offshore export cable installation activities to marine mammals during the construction phase of the MHPGC Project in Scottish or English waters, taking into account the mitigation measures already identified [see **Table 5.39**]. Therefore, the residual effect remains **negligible or minor (adverse)** which is **not significant** in EIA terms.

Injury and disturbance from underwater sound produced by pre-construction site investigation surveys

- 5.8.2.32 For the purposes of this assessment, underwater sound generated during pre-construction site investigation activities is considered across Scottish and English waters together, as the same site investigation activities, noise-generating equipment and underwater sound propagation characteristics are anticipated throughout the MHPGC Project PEIR Red Line Boundary. Furthermore, marine mammal receptors are not constrained by jurisdictional boundaries and occur across the wider regional seas. Consequently, a single assessment of the potential for auditory injury and behavioural disturbance has been undertaken.
- 5.8.2.33 Pre-construction site investigation surveys comprise a range of geophysical and geotechnical activities undertaken to inform the detailed design and installation of the offshore export cable. Geophysical surveys use acoustic equipment to characterise seabed and shallow sub-seabed conditions, while geotechnical surveys involve direct sampling and *in situ* testing of seabed sediments [see **Volume 1, Chapter 2: Project Description, of the PEIR**]. Underwater sound may be generated by both survey equipment and the vessels required to undertake these activities. Vessel-related underwater sound associated with construction activities has been assessed separately within this chapter; therefore, this assessment focuses on the underwater sound generated by the site investigation survey equipment.
- 5.8.2.34 The MDS for site investigation surveys assumes the use of representative geophysical and geotechnical survey equipment with the highest source levels and the greatest overlap with marine mammal hearing ranges over a pre-construction period of up to two years [see **Table 5.38**]. To inform this assessment, project-specific underwater sound modelling has been undertaken for representative survey equipment, including SBES, SBP, UHRS, acoustic positioning equipment (USBL), VC and seismic CPT [see **Volume 2, Appendix 5.1. Underwater Sound Modelling Report, of**

the PEIR]. MBES and SSS have not been considered further as they operate at frequencies outside the hearing range of marine mammals.

- 5.8.2.35 ROV operations have not been modelled separately as the underwater sound associated with ROV operation is expected to be substantially lower than that generated by the representative acoustic survey equipment modelled and is therefore not expected to represent a material additional source of underwater sound for marine mammals.

Receptor Sensitivity

Auditory injury (PTS)

- 5.8.2.36 The potential for auditory injury from pre-construction site investigation surveys depends on the type of equipment used, the characteristics of the sound source and hearing sensitivity of the receptors. Geophysical and geotechnical activities include both impulsive (e.g. UHRS and seismic CPT) and continuous (e.g. SBES, SBP, VC) sound sources. Although impulsive sound sources generally have a greater potential to cause auditory injury than continuous sound sources due to their rapid rise times and high peak sound levels, source levels associated with site investigation surveys are generally lower than those generated by activities such as impact piling and seismic airguns (MMO, 2015; Todd *et al.*, 2015).
- 5.8.2.37 A review of marine acoustic sources by Ruppel *et al.* (2022) categorised most high-resolution geophysical survey sources, including SBPs, as having a low likelihood of causing injury to marine mammals, particularly where exposure is limited spatially and temporally. The potential injury ranges associated with these sources are generally limited to relatively small areas around the source. In addition, marine mammals are expected to exhibit avoidance behaviour in response to approaching survey vessels and active sound sources, reducing the likelihood of prolonged exposure to sound levels capable of causing auditory injury (Benhemma-Le Gall *et al.*, 2023).
- 5.8.2.38 TTS represents a temporary and reversible reduction in hearing sensitivity. Studies investigating recovery from TTS in harbour porpoise indicate recovery within approximately one to 48 hours depending on the characteristics and intensity of the exposure, with impulsive sources generally resulting in greater effects (SEAMARCO, 2011; Kastelerin *et al.*, 2021). Although equivalent data are limited for other cetacean species, there is no evidence to suggest recovery would be substantially different. Seals are also expected to be less vulnerable to TTS than harbour porpoise and studies in relation to seals show that rapid recovery, within hours, can occur (Kastelein *et al.*, 2018).
- 5.8.2.39 The survey equipment considered within this assessment operates across a broad range of frequencies, resulting in varying degrees of hearing overlap across all marine mammal functional hearing groups [see **Table 5.40**]. Consequently, all marine mammal species have the potential to detect one or more survey sound sources. However, survey activities are temporary, progressive in nature and generate comparatively low source levels. Although susceptibility to individual survey sources varies between each marine mammal functional hearing group, the potential for PTS is expected to be highly localised, and any exposure resulting in permanent auditory injury unlikely to affect survival, reproductive success or population trajectory. Given the irreversible nature of PTS, recoverability is considered negligible; however, sensitivity to auditory injury from pre-construction site investigation surveys is therefore considered **medium** for all marine mammal species across both Scottish and English waters.

Behavioural disturbance

- 5.8.2.40 Behavioural disturbance is considered the most likely effect pathway associated with pre-construction site investigation surveys. Responses to survey activities are expected to vary depending on the species, behavioural state, previous exposure and the characteristics of the sound source (Stone, 2003; Southall *et al.*, 2007). Available evidence indicates that responses to geophysical survey activities are generally characterised by localised avoidance or short-term changes in behaviour, with animals typically returning following cessation of survey activities (Thompson *et al.*, 2013; Kavanagh *et al.*, 2019).
- 5.8.2.41 Marine mammal receptors are considered to have some ability to adapt to temporary disturbance, some tolerance to the proposed change and the ability to recover following cessation of survey activities. Although temporary disturbance may affect behaviour and habitat use, the localised and short-term nature of responses means that effects are unlikely to affect survival or population trajectory. Consequently, the sensitivity of all marine mammal receptors to behavioural disturbance

from pre-construction site investigation surveys is therefore considered **medium** in both Scottish and English waters.

Magnitude of impact

Auditory injury (PTS) and TTS

- 5.8.2.42 Project-specific underwater sound modelling has been undertaken for representative geophysical and geotechnical survey activities, including SBES, SBP (chirp), high-frequency SBP, UHRS, USBL, VC and seismic CPT. **Table 5.43** and **Table 5.44** present the maximum predicted distances to the AUD INJ and TTS thresholds, respectively. The full range of predicted distances for all modelling scenarios is presented in **Volume 2, Appendix 5.1: Underwater Sound Modelling Report of the PEIR**.
- 5.8.2.43 The potential for AUD INJ during site investigation surveys is highly localised. For impulsive sound sources (USBL, UHRS and seismic CPT), the SPL_{pk} and SEL_{cum} criteria were not exceeded beyond the immediate vicinity of the source (<10m) for most hearing groups [see **Table 5.43**]. The greatest predicted AUD INJ range was associated with VHF cetaceans, with SEL_{cum} -based ranges of up to 150m for USBL and 10m for UHRS. For continuous sound sources, potential AUD INJ ranges were also limited, with all predicted distances less than 10m.

Table 5.43: Predicted distance (m) to the AUD INJ (PTS) thresholds for geophysical and geotechnical survey activities

Functional hearing Group	Continuous sources (SEL_{cum})				Impulsive sources					
	SBES	SBP (chirp)	High frequency SBP	VC	USBL		UHRS		Seismic CPT	
					SPL_{pk}	SEL_{cum}	SPL_{pk}	SEL_{cum}	SPL_{pk}	SEL_{cum}
LF cetaceans	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
HF cetaceans	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
VHF cetaceans	<10	<10	<10	<10	<10	150	10	<10	<10	<10
PW	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10

Note: For impulsive sound sources (USBL, UHRS and seismic CPT), AUD INJ thresholds are assessed against both SPL_{pk} (dB re 1 μ Pa) and SEL_{cum} (dB re 1 μ Pa²s) criteria. Continuous sound sources are assessed using SEL_{cum} only.

- 5.8.2.44 For TTS, the SPL_{pk} criterion for impulsive sound sources was generally limited in extent, with predicted ranges of less than 10m for most hearing groups and sources [see **Table 5.44**]. The largest SPL_{pk} -based TTS range for impulsive sources was predicted for VHF cetaceans during UHRS operations, extending to 30m. Predicted SEL_{cum} -based TTS ranges were greater, with exceedance predicted for some continuous and impulsive survey sources [see **Table 5.44**]. The greatest SEL_{cum} -based TTS range was also predicted for VHF cetaceans, associated with VC, extending to 1,100m. For LF cetaceans, HF cetaceans and PW seals, the maximum predicted SEL_{cum} -based TTS ranges were 150m, 10m and 270m, respectively.

Table 5.44: Predicted distance (m) to the TTS thresholds for geophysical and geotechnical survey activities

Functional hearing Group	Continuous sources (SEL_{cum})				Impulsive sources		
	SBES			VC	USBL	UHRS	Seismic CPT

		SBP (chirp)	High frequency SBP		SPL _{pk}	SEL _{cum}	SPL _{pk}	SEL _{cum}	SPL _{pk}	SEL _{cum}
LF cetaceans	<10	60	150	110	<10	<10	<10	<10	<10	<10
HF cetaceans	<10	<10	<10	10	<10	<10	<10	<10	<10	<10
VHF cetaceans	740	740	160	1,100	<10	1,400	30	<10	<10	<10
PW	20	150	30	270	<10	<10	<10	<10	<10	<10

Note: For impulsive sound sources (USBL, UHRS and seismic CPT), TTS thresholds are assessed against both SPL_{pk} (dB re 1 µPa) and SEL_{cum} (dB re 1 µPa²s) criteria. Continuous sound sources are assessed using SEL_{cum} only.

- 5.8.2.45 The predicted AUD INJ ranges are therefore limited spatially, and exposure is expected to be temporary due to the mobile nature of the survey activities. The greatest potential ranges occur for VHF cetacean hearing sensitivity and the frequencies generated by some survey equipment. The predicted PTS ranges remain within the Marine Mammal Observation (MMOb) mitigation zone of 500m that will be adopted for relevant survey activities in accordance with JNCC guidance (JNCC, 2017) (CoT36) [see **Table 5.39; Section 5.7**]. This mitigation is intended to reduce the potential for exposure to sound levels capable of causing PTS. Although larger distances are predicted for TTS-onset thresholds, these represent the potential spatial extent over which temporary auditory effects could occur and are not considered indicative of biologically meaningful effects in isolation.
- 5.8.2.46 It is expected that marine mammals would move away from active survey equipment prior to prolonged exposure to sound levels capable of inducing auditory injury, particularly where MMOb searches and soft-start procedures, where equipment has that facility, are implemented in accordance with the MMMP (CoT36) and appropriate JNCC (2017) guidelines (CoT36) [see **Table 5.39**].
- 5.8.2.47 The temporary and mobile nature of site investigation activities, combined with the implementation of mitigation measures outlined within the MMMP (CoT36) [see **Section 5.7**], including MMOb searches and soft-start procedures where equipment has that facility, will minimise the likelihood of prolonged exposure to elevated sound levels. Consequently, the potential for auditory injury is expected to be highly localised, while any TTS would be temporary and reversible, with no measurable consequences for individual survival, reproductive success or population trajectory. Therefore, the magnitude of impact from auditory injury (PTS) associated with pre-construction site investigation surveys is considered **negligible** in both Scottish and English waters.
- 5.8.2.48 The potential requirement for an EPS risk assessment will be reviewed at the post-consent stage, once the final survey parameters and equipment specifications are confirmed. The assessment has identified highly localised potential AUD INJ ranges, with the maximum predicted range of 150m, which is within the 500m MMOb mitigation zone to be implemented through the MMMP (CoT36). On this basis, and taking into account the implementation of MMOb searches and soft-start procedures where the survey equipment has that facility, it is expected that no marine mammals will be injured and that an EPS licence for injury will not be required.

Behavioural disturbance

- 5.8.2.49 Project-specific underwater sound modelling has been undertaken for representative geophysical and geotechnical survey activities, including SBES, SBP (chirp), high-frequency SBP, UHRS, USBL, VC and seismic CPT [see **Volume 2, Appendix 5.1: Underwater Sound Modelling Report, of the PEIR**]. **Table 5.45** presents the maximum predicted distances at which the NOAA (2005) Level B behavioural disturbance thresholds are exceeded.
- 5.8.2.50 The continuous sound threshold of 120dB re 1µPa SPL_{rms} and impulsive sound threshold of 160dB re 1µPa SPL_{rms} have therefore been used to inform the assessment but are considered alongside wider ecological context and empirical evidence. These modelled disturbance ranges should be

interpreted with caution, as the thresholds represent precautionary indicators of the potential spatial extent over which behavioural responses could occur rather than definitive thresholds for biologically meaningful disturbance. The predicted ranges do not account for differences in species sensitivity, behavioural state, previous exposure or the duration and nature of any response.

- 5.8.2.51 The predicted behavioural disturbance ranges vary depending on the characteristics of the sound source [see **Table 5.45**]. The greatest predicted ranges are associated with continuous sources, with high-frequency SBP resulting in the largest potential disturbance footprint of up to 16km, followed by VC (13km) and chirp SBP (12km). Predicted disturbance ranges associated with SBES are smaller (up to 2.6km), while impulsive sources (USBL, UHRS and seismic CPT) are limited to the immediate vicinity of the source (<10m).

Table 5.45: Predicted distance (m) to the NOAA (2005) Level B behavioural disturbance threshold for site investigation survey activities

Functional hearing group	Continuous source				Impulsive source		
	SBES	SBP (chirp)	High frequency SBP	VC	USBL	UHRS	Seismic CPT
All	2,600	12,000	16,000	13,000	<10	<10	<10

Note: The NOAA (2005) Level B behavioural disturbance thresholds are 120dB re 1 μ Pa SPL_{rms} for continuous sound sources and 160dB re 1 μ Pa SPL_{rms} for impulsive sound sources.

- 5.8.2.52 Effective Deterrent Ranges (EDRs) provide an evidence-based approach for estimating the potential spatial extent of behavioural responses, based on observed responses of harbour porpoise to specific noise-generating activities rather than solely on predicted underwater sound levels. EDRs represent the distance within which disturbance or displacement has the potential to occur and are therefore distinct from acoustic thresholds used to define the spatial extent of sound exposure. The updated JNCC (2025b) EDRs are derived from a review of available empirical and modelled evidence (Majewska *et al.*, 2025) and remain precautionary, while providing a more robust evidence base for assessing potential disturbance footprints.
- 5.8.2.53 For SBP and USBL sources, JNCC (2025b) provides an EDR of 3km for harbour porpoise. Although the project-specific modelling predicts larger disturbance footprints for some continuous sources, these represent the area over which precautionary acoustic thresholds may be exceeded rather than the area over which biologically meaningful behavioural responses are expected to occur. As harbour porpoise are considered particularly sensitive to survey sound sources within this assessment, the JNCC (2025b) EDR provides useful context for interpreting the potential spatial extent of disturbance for other marine mammal receptors.
- 5.8.2.54 Furthermore, site investigation surveys will be temporary, mobile and spatially constrained along the offshore export cable corridor, with vessels progressing along the survey route rather than remaining within a fixed location for prolonged periods. Although behavioural responses may occur at an individual level, these are expected to be temporary and reversible, with no measurable consequences for individual survival, reproductive success or population trajectory (Thompson *et al.*, 2013; Hoekendijk *et al.*, 2018; Kavanagh *et al.*, 2019).
- 5.8.2.55 The implementation of MMOB searches and soft-start procedures, where applicable, in accordance with the relevant JNCC guidance (e.g. JNCC, 2017) and the MMMP (CoT36) [see **Section 5.7**; **Table 5.39**], is primarily intended to reduce the risk of auditory injury by minimising the likelihood of marine mammals being present in close proximity to active survey equipment. However, these measures also provide a secondary benefit by reducing the potential for prolonged exposure to elevated underwater sound levels and associated behavioural responses.
- 5.8.2.56 Therefore, although precautionary disturbance footprints extend over several kilometres for some survey activities, these represent the potential spatial extent over which behavioural responses could occur rather than the extent of biologically meaningful disturbance. The temporary and mobile nature of pre-construction site investigation surveys, together with the absence of expected consequences

for individual survival, reproductive success or population trajectory, means the magnitude of impact from behavioural disturbance associated with pre-construction site investigation surveys is considered **negligible** in both Scottish and English waters.

- 5.8.2.57 The potential requirement for an EPS risk assessment will be reviewed at the post-consent stage, once the final survey parameters and equipment specifications are confirmed. For disturbance, the assessment has concluded that behavioural disturbance associated with pre-construction site investigation surveys would be temporary and localised and would not be expected to affect survival or reproductive success or result in effects detrimental to maintaining the species at Favourable Conservation Status (FCS). An EPS licence for disturbance is therefore not expected to be required.

Significance of the effect

Auditory injury (PTS)

- 5.8.2.58 Overall, it is considered that the sensitivity of marine mammal receptors to AUD INJ associated with underwater sound from site investigation surveys has been assessed as **medium**, and the magnitude of impact has been assessed as **negligible**. The resulting significance is considered to be negligible or minor [see **Table 5.34**].

- 5.8.2.59 Therefore, the significance of effect from underwater sound associated with site investigation activities on marine mammals through auditory injury (PTS) during the pre-construction phase is considered to be **negligible (adverse)**, which is **not significant** in EIA terms in both Scottish and English waters. This reflects the highly localised spatial extent of predicted AUD INJ ranges, with the maximum predicted range of 150m, which is within the 500m MMOb mitigation zone to be implemented for relevant survey activities, and the temporary nature of site investigation activities.

Behavioural disturbance

- 5.8.2.60 Overall, it is considered that the sensitivity of marine mammal receptors to behavioural disturbance associated with underwater sound from site investigation surveys has been assessed as **medium**, and the magnitude of impact has been assessed as **negligible**. The resulting significance is considered to be negligible or minor [see **Table 5.34**].
- 5.8.2.61 Therefore, the significance of effect of underwater sound associated with site investigation activities on marine mammals through behavioural disturbance during the pre-construction phase of the MHPGC Project is considered to be **negligible (adverse)**, which is **not significant** in EIA terms in both Scottish and English waters. This reflects the precautionary nature of the modelled disturbance footprints, which represents the potential spatial extent of behavioural responses rather than the extent of biologically meaningful disturbance, together with the temporary and mobile nature of site investigation activities and the absence of anticipated consequences for individual survival, reproductive success or population trajectory.

Additional mitigation and residual effect

- 5.8.2.62 At this stage, no additional mitigation measures or monitoring requirements, beyond those committed through the MHPGC Project-specific MMMP (CoT36), have therefore been identified in relation to the effects of underwater sound associated with site investigation activities to marine mammals during the pre-construction phase of the MHPGC Project in Scottish or English waters. Therefore, the residual effect remains **negligible (adverse)**, which is **not significant** in EIA terms.

Injury and disturbance from underwater sound produced by UXO clearance

- 5.8.2.63 Prior to construction of the MHPGC Project, UXO clearance may be required. A desk-based risk assessment identified the potential presence of UXO within the MHPGC Project PEIR Red Line Boundary, with the majority of the offshore cable route identified as a moderate risk and a smaller section of the route identified as a low-moderate risk (TetraTech RPS Energy, 2026). Potential UXO includes mines, projectiles, aerial bombs, torpedoes and depth charges, and therefore UXO clearance has been assessed on a precautionary basis.
- 5.8.2.64 In line with the current UK Joint Position Statement (UK Government, 2025) and supporting JNCC guidance, low-noise methods of UXO clearance are the default proposed approach where practicable, with high order detonation considered only where low order clearance is not feasible. The MHPGC Project will seek to minimise impacts from UXO clearance through the hierarchy set out in CoT58, whereby UXO hazards will be avoided where practicable and appropriate; where avoidance

is not possible, removal techniques will be considered prior to detonation; and low order techniques, as such deflagration, will be the preferred method where practicable and appropriate [see **Table 5.39**]. Where low order clearance is not practicable, relocation will be considered where no alternative exists.

- 5.8.2.65 The consenting approach for UXO clearance differs between English and Scottish waters. In English waters, low order UXO clearance will be included within the MHPGC Project DCO application and is proposed to be authorised through the relevant dML(s). In Scottish waters, UXO clearance is excluded from the primary Marine Licence and will subject to a separate Marine Licence application(s), supported by the MHPGC Project EIA. High order UXO detonation will not form part of the MHPGC Project DCO application or the proposed Scottish Marine Licence application(s) and, if required following post-consent UXO surveys, would be subject to a separate Marine Licence application and assessment based on the specific UXO characteristics and location(s) identified at the time and is therefore considered for information only within this assessment.
- 5.8.2.66 As the specific type, size and location of any UXO cannot be confirmed until post-consent surveys are undertaken, however, to ensure a robust assessment is undertaken, a range of potential UXO charge sizes has been considered in the underwater sound propagation modelling as detailed in **Volume 2, Annex 5.1: Underwater Sound Modelling Report, of the PEIR**. Project-specific underwater sound modelling has been undertaken following the methodology described in Soloway and Dahl (2014), using a range of charge sizes, including a maximum charge size of 697kg Net Explosive Quality (NEQ).
- 5.8.2.67 The modelling has applied the latest frequency-dependent auditory weighting functions (NMFS, 2024) to compare predicted sound exposure levels against marine mammal hearing-weighted AUD INJ and TTS thresholds. As UXO clearance comprises a single impulsive event, cumulative sound exposure is assessed using the single-strike sound exposure level (SEL_{ss}) rather than a SEL_{cum} exposure metric..
- 5.8.2.68 In the absence of established behavioural disturbance thresholds for UXO detonation, TTS-onset threshold are presented as a precautionary indicator of the potential spatial extent over which behavioural disturbance may occur. However, TTS-onset thresholds are not used in isolation to determine impact magnitude or significance, as the occurrence and severity of behavioural responses will also depend on the characteristics of the detonation, the receiving environment and the behavioural state of the receptor.
- 5.8.2.69 The assessment considers up to 22 UXO detonations across the MHPGC Project PEIR Red Line Boundary, with the distribution of potential UXO risk between Scottish and English waters applied on a pro-rata basis [see **Table 5.38**]. The quantitative assessment is undertaken at the scale of the relevant marine mammal MUs and SMUs, as these populations extend across jurisdictional boundaries and are not constrained by administrative limits. Therefore, estimates of potentially exposed individuals are presented for the MHPGC Project as a whole, with reference to the relevant UK portion of the MU or population estimate [see **Section 5.4.4**].

Receptor sensitivity

Auditory injury (PTS)

- 5.8.2.70 UXO clearance generates high-energy impulsive underwater sound and therefore has the potential to cause auditory injury (PTS) where marine mammals are exposed at sufficiently close range. PTS is irreversible and may impair an individual's ability to detect predators, forage, communicate and navigate (Southall *et al.*, 2007; Erbe *et al.*, 2018). However, the ecological consequences of auditory injury will depend on the extent of hearing loss, the hearing frequencies affected and the ecology of the species.
- 5.8.2.71 The sound produced by UXO clearance is dominated by low-frequency energy (von Benda-Beckmann *et al.*, 2015; Salomons *et al.*, 2021). Although this overlaps more closely with the hearing range of LF cetaceans (minke whales), all marine mammal functional hearing groups have the potential to detect components of UXO clearance sound and therefore have the potential to experience auditory injury if exposed sufficiently close to the source.
- 5.8.2.72 Evidence from UXO clearance indicates that marine mammals can be exposed to sound levels capable of causing permanent hearing loss over several kilometres. For example, Salomons *et al.*

(2021) derived PTS effect distances of approximately 2km to 6km for harbour porpoise following detonations of 140kg and 325kg UXOs, based on measured sound levels and established auditory injury criteria. Evidence of physical blast injury to the auditory system has also been reported in harbour porpoises following the clearance of marine ammunition (Siebert *et al.*, 2022). Although the susceptibility of other marine mammal species to UXO clearance is less well studied, the potential for permanent auditory injury represents a serious and irreversible effect across marine mammal functional hearing groups.

- 5.8.2.73 Recoverability from AUD INJ would be negligible due to the permanent nature of the effect, and tolerance to exposure capable of causing permanent hearing loss is considered limited. Marine mammals may also have a limited ability to adapt to the consequences of auditory injury where hearing loss affects essential functions such as foraging, communication, navigation or predator detection. Therefore, the sensitivity of marine mammal receptors to auditory injury from UXO clearance is considered **high** in both Scottish and English waters.

Behavioural disturbance

- 5.8.2.74 Behavioural disturbance is expected to be the most likely response to UXO clearance. Responses may include startle, avoidance or short-term displacement and are likely to vary depending on species, behavioural state and proximity to the detonation (Southall *et al.*, 2007; 2019). Although UXO clearance generates high peak sound levels, each clearance event is of very short duration and does not represent a continuous or prolonged source of disturbance.
- 5.8.2.75 Available evidence indicates that sensitivity to underwater explosions may vary between species. While evidence is limited, some studies suggest that bottlenose dolphins may exhibit lower sensitivity to explosive noise than harbour porpoise. Santos *et al.* (2010) reported no adverse behavioural or morphological effects following clearance of a small explosive charge (35kg) within an area used by resident bottlenose dolphins in Portugal, although the applicability of these findings to other explosive scenarios is uncertain. Historical observations have also reported limited behavioural responses in dolphins exposed to explosive events despite evidence of physical injury (Ketten *et al.*, 1993). However, species-specific sensitivity remains poorly understood, and the absence of observed behavioural responses should not be interpreted as evidence of absence of auditory effects.
- 5.8.2.76 JNCC (2020) notes that a single UXO detonation would generally be expected to elicit a startle response rather than widespread or prolonged displacement. Although the spatial extent and likelihood of behavioural disturbance responses may differ between low order and high order UXO clearance, behavioural responses to an individual clearance event are expected to be temporary, with marine mammal receptors are considered to have some ability to adapt to temporary disturbance, some tolerance to the proposed change and to recover following cessation of the activity. Consequently, survival, reproductive success and population trajectory are not expected to be affected, and the sensitivity of all marine mammal receptors to behavioural disturbance from UXO clearance is considered **low** in both Scottish and English waters.

Magnitude of impact

Auditory injury (PTS)

- 5.8.2.77 Project-specific underwater sound modelling has been undertaken for a range of representative low order donor charge configurations (0.08kg, 0.5kg, 2 x 0.75kg and 4 x 0.75kg NEQ) together with a range of high-order charge sizes for comparison for information purposes only [see **Volume 2, Annex 5.1: Underwater Sound Modelling Report, of the PEIR**]. **Table 5.46** presents the maximum predicted distances to the AUD INJ thresholds for each marine mammal functional hearing group. The full range of modelling results is provided in **Volume 2, Annex 5.1: Underwater Sound Modelling Report, of the PEIR**.
- 5.8.2.78 For the low order donor charge configurations included within the MDS, predicted AUD INJ ranges increase with donor charge size and vary between marine mammal hearing groups [see **Table 5.46**]. The greatest predicted injury ranges are associated with VHF cetaceans (e.g. harbour porpoise), with the maximum SEL_{ss}-based AUD INJ range extending to 5.1km for the largest donor charge configuration (4 x 0.75kg). Corresponding maximum SEL_{ss}-based ranges for LF cetaceans (e.g. minke whale), HF cetaceans (dolphin species) and PW (seal species) are 2.3km, 160m, 1.3km,

respectively. Predicted SPL_{pk} -based AUD INJ ranges are substantially smaller, not exceeding 70m for any hearing group.

Table 5.46: Predicted distances (m) to the AUD INJ (PTS) thresholds for representative low order donor charge configurations and high-order UXO charge sizes

Charge size (kg NEQ)	LF cetaceans		HF cetaceans		VHF cetaceans		PW	
	SPL_{pk}	SEL_{ss}	SPL_{pk}	SEL_{ss}	SPL_{pk}	SEL_{ss}	SPL_{pk}	SEL_{ss}
Low order and low-yield donor charge configurations								
0.08	10	590	<10	30	340	1,900	10	260
0.5	20	1,100	<10	70	830	3,400	20	650
2 x 0.75	40	1,800	10	110	1,700	4,500	30	910
4 x 0.75	70	2,300	30	160	2,600	5,100	40	1,300
High-order charge configurations								
1.2	30	1,700	10	100	1,400	4,400	30	850
3.5	70	2,400	20	170	2,900	5,200	50	1,500
High-order UXO clearance								
136	370	3,500	80	290	7,500	7,600	360	2,200
270	430	4,400	90	430	11,000	8,400	420	2,800
431	600	5,000	110	560	14,000	8,900	570	3,200
697	770	5,900	230	680	18,000	9,500	700	3,900
<i>Note: Predicted distances for the NMFS (2024) impulsive sound criteria using both SPL_{pk} (dB re 1 μPa) and SEL_{ss} (dB re 1 μPa²s) thresholds.</i>								

- 5.8.2.79 For completeness, **Table 5.46** also presents the predicted AUD INJ ranges for representative high-order UXO charge sizes. As expected, predicted injury ranges are substantially greater than those associated with low order donor charges, with the largest SEL_{ss} -based ranges again predicted for VHF cetaceans. These results are presented for contextual purposes only. High-order UXO detonation will not form part of the MHPGC Project DCO application or the associated Scottish Marine Licence application(s) and, should it be identified as necessary, high order detonation would be subject to a separate consent and assessment process (including EPS licencing requirements) based on the confirmed UXO characteristics, charge size and location. The high order UXO clearance modelling results [see **Table 5.46**] are therefore not used to determine the magnitude or significance of the effects assessed for the MHPGC Project.
- 5.8.2.80 The predicted AUD INJ ranges should be interpreted in the context of the precautionary assumptions applied within the underwater sound modelling. The model assumes detonation occurs in the water column, whereas UXO items are more likely to be resting on, partially buried within, or buried beneath the seabed. In practice, interaction with the seabed would be expected to reduce the acoustic energy transmitted into the water column. The model also does not account for variation in exposure resulting from the vertical distribution and diving behaviour of marine mammals in the water column. In addition, the explosive content of historic munitions may have degraded over time, potentially reducing the energy released during detonation. Consequently, the predicted AUD INJ ranges represent precautionary estimates of the potential spatial extent of sound exposure.
- 5.8.2.81 It is also recognised that the sound produced by both low order clearance and high-order detonation events is unlikely to retain an impulsive character at ranges beyond a few kilometres from the source. As such, predicted auditory injury ranges extending to tens of kilometres should be treated with caution and are likely to overestimate the distances at which injury could realistically occur. Furthermore, low order clearance techniques generate substantially lower acoustic outputs than equivalent high-order detonations. Robinson *et al.* (2020) demonstrated that low order deflagration

can reduce both SPL_{pk} and SEL_{ss} levels by more than 20dB compared with high-order detonation of the same munition. For low-order clearance techniques, the radiated acoustic output is determined by the donor charge rather than the explosive content of the UXO itself.

- 5.8.2.82 The predicted AUD INJ ranges are consistent with available empirical studies investigating the effects of underwater explosions on harbour porpoise. Although direct observations of AUD INJ effects in wild marine mammals are limited, evidence from field measurements indicates that permanent auditory effects may occur at distances of several kilometres from UXO detonations (Siebert *et al.*, 2022). For example, von Benda-Beckmann *et al.* (2015) measured underwater sound levels from aerial bomb detonations in the southern North Sea and estimated that PTS onset could occur beyond the maximum measurement distance of 2km for charge sizes of 121 to 263kg NEQ. The study identified potential impact distances ranging from hundreds of metres to greater than 10 km for charge sizes between 10kg and 1,000kg NEQ. Similarly, Salomons *et al.* (2021) identified potential PTS onset distances of approximately 2 to 6km for harbour porpoise for charge masses of 140 to 325kg. These studies provide context that the predicted AUD INJ ranges for the MHPGC Project are within the range of distances reported in the scientific literature, while recognising differences in charge characteristics, propagation conditions and modelling approaches.
- 5.8.2.83 To provide context on the potential scale of AUD INJ (PTS) effects, the theoretical number of marine mammals that could occur within the predicted AUD INJ range has been estimated for the range of UXO clearance scenarios modelled in **Table 5.47**. Estimates have been calculated using the maximum ranges for both SPL_{pk} and SEL_{ss} presented in **Table 5.46** and the highest relevant marine mammal density estimates from the baseline characterisation [see **Section 5.4.4**; **Table 5.30**].
- 5.8.2.84 These estimates represent a precautionary upper bound, as they assume that animals are uniformly distributed throughout the predicted AUD INJ range and remain within the area at the time of clearance event [see **Table 5.47**]. They do not account for avoidance behaviour, animal movement, the short duration of the exposure event or the implementation of embedded mitigation measures.

Table 5.47: Estimated number of marine mammals potentially occurring within the predicted AUD INJ (PTS) ranges for representative UXO clearance scenarios

Species	Density (animals/km ²)	Metric	Low order and low-yield donor charge configurations				High-order charge		High-order UXO clearance			
			0.08kg	0.05kg	2x 0.75kg	4x 0.075kg	1.2kg	3.5kg	136kg	270kg	431kg	697kg
Unweighted SPL _{pk} (dB re 1μPa)												
Harbour porpoise	0.603	# animals	<1	2	6	13	4	16	107	230	372	614
		% UK MU	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	0.01%	0.07%	0.14%	0.23%	0.38%
Bottlenose dolphin	0.042	# animals	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
		% UK MU (GNS MU)	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%
		% UK MU (CES MU)	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%
White-beaked dolphin	0.080	# animals	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
		% UK MU	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%
Minke whale	0.042	# animals	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
		% UK MU	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%
Atlantic white-sided dolphin	0.055	# animals	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
		% UK MU	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%
Common dolphin	0.060	# animals	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
		% UK MU	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%
Grey seal	0.419	# animals	<1	<1	<1	<1	<1	1	1	1	1	1
		% UK pop	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%
Harbour seal	0.010	# animals	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
		% UK pop	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%

Species	Density (animals/km ²)	Metric	Low order and low-yield donor charge configurations				High-order charge		High-order UXO clearance			
			0.08kg	0.05kg	2x 0.75kg	4x 0.075kg	1.2kg	3.5kg	136kg	270kg	431kg	697kg
Weighted SEL _{ss} (dB re 1µPa ² s)												
Harbour porpoise	0.603	# animals	7	22	39	50	37	52	110	134	150	171
		% UK MU	<0.01%	0.01%	0.02%	0.03%	0.02%	0.03%	0.07%	0.08%	0.09%	0.11%
Bottlenose dolphin	0.042	# animals	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
		% UK MU (GNS MU)	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%
		% UK MU (CES MU)	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	0.01%	0.01%	0.02%	0.03%
White-beaked dolphin	0.080	# animals	<1	<1	<1	<1	<1	<1	<1	<1	<1	1
		% UK MU	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%
Minke whale	0.042	# animals	<1	1	1	1	1	1	2	3	4	5
		% UK MU	<0.01%	<0.01%	<0.01%	<0.01%	0.01%	0.02%	0.02%	0.03%	0.03%	0.05%
Atlantic white-sided dolphin	0.055	# animals	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
		% UK MU	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%
Common dolphin	0.060	# animals	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
		% UK MU	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%
Grey seal	0.419	# animals	<1	1	2	3	1	3	7	11	14	20
		% UK pop	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	0.01%	0.01%	0.01%
Harbour seal	0.010	# animals	<1	<1	<1	<1	<1	<1	1	1	1	1
		% UK pop	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%

- 5.8.2.85 Across the low order UXO clearance scenarios included within the MDS, the number of marine mammals potentially occurring within the predicted AUD INJ footprint varies between species and reflects differences in both predicted injury ranges and species-specific estimates [see **Table 5.47**]. The SEL_{ss}-based criteria generally result in larger predicted footprints than the SPL_{pk} criteria and therefore provide the more precautionary estimate of potential exposure.
- 5.8.2.86 Although the number of individuals potentially occurring within the predicted AUD INJ footprints represents a small proportion of the relevant reference populations [see **Table 5.47**], all cetacean species are protected as EPS [see **Section 5.2.2**]. Therefore, the assessment has considered both the potential for individual-level effects and the potential for population-level consequences. While the predicted number of individuals potentially occurring within the AUD INJ footprint is small relative to the relevant reference populations, the potential for auditory injury cannot be discounted, particularly for harbour porpoise due to the larger predicted AUD INJ ranges associated with the VHF cetacean hearing group.
- 5.8.2.87 The greatest number of potentially exposed individuals is predicted for harbour porpoise, reflecting the larger injury ranges predicted for VHF cetacean hearing group and the relatively high density of this species within the MHPGC Project PEIR Red Line Boundary. For the largest low-order donor charge configuration included within the MDS (4x0.75kg NEQ), the maximum number of harbour porpoise potentially occurring within the SEL_{ss}-based AUD INJ footprint is estimated at 50 individuals, representing 0.03% of the UK portion of the North Sea MU [see **Table 5.47**].
- 5.8.2.88 For all other cetacean species, the estimated number of individuals potentially occurring within the AUD INJ footprint is generally less than one individual for the low order scenarios assessed, reflecting both the smaller predicted injury ranges and lower species densities. Grey seal represents the largest potential exposure among the pinniped species, with up to three individuals estimated within the SEL_{ss}-based AUD INJ footprint for the largest low order donor charge configuration (4x0.75kg NEQ) [see **Table 5.47**]. However, this represents less than 0.01% of the total UK grey seal population.
- 5.8.2.89 For contextual comparison, the high-order UXO scenarios presented in **Table 5.47** result in larger predicted numbers of potentially exposed individuals, reflecting the substantially larger AUD INJ footprints associated with these higher charge sizes. For example, the largest high-order UXO charge assessed results in a SEL_{ss}-based AUD INJ footprint containing up to 171 harbour porpoise (0.11% of the reference population) and 20 grey seals (0.01% of the reference population) [see **Table 5.47**]. These results are presented for information only and do not contribute to the assessment of the proposed MHPGC Project, as high order clearance is not included within the current consent applications.
- 5.8.2.90 In accordance with relevant JNCC (2025a) guidance, low order UXO clearance will be undertaken under a MHPGC Project-specific MMMP (CoT36), including a minimum 60-minute pre-detonation observation search within a 1km MMOb mitigation zone [see **Table 5.39**; **Section 5.7**]. UXO clearance will only be undertaken during daylight hours, with at least two JNCC-certified MMObS monitoring the mitigation zone prior to clearance to reduce the likelihood of marine mammals being present within the immediate vicinity of a clearance event.
- 5.8.2.91 Despite the implementation of the 1km pre-detonation MMOb mitigation zone, the potential for AUD INJ cannot be completely excluded, particularly for harbour porpoise, for which the largest SEL_{ss}-based injury ranges are predicted. This reflects the high sensitivity of harbour porpoise to underwater sound and the larger AUD INJ ranges predicted for the VHF cetacean hearing group. Harbour porpoise are also known to be difficult to detect at distance using visual observations (JNCC, 2025a), and therefore increasing the size of the visual observation zone would not necessarily provide a proportionate increase in mitigation effectiveness.
- 5.8.2.92 Where the predicted AUD INJ range for a low order UXO clearance event extends beyond the 1km mitigation zone, additional measures, including the use of an appropriate Acoustic Deterrent Device (ADD), will be considered in accordance with JNCC (2023; 2025a) guidance. Where required, the selection and operation of an ADD would be determined through the MHPGC Project-specific MMMP (CoT36), taking account of the predicted AUD INJ range and the effectiveness of the device in achieving the required exclusion range. The EDR of some ADDs may extend beyond the 5km EDR

anticipated for low order UXO clearance (JNCC, 2025b), and therefore the potential for acoustic exposure from the ADD itself will also be considered.

- 5.8.2.93 The implementation of ADDs, where required, would further reduce the likelihood of marine mammals being present within the AUD INJ Zol at the time of detonation. However, there is some uncertainty regarding the potential for ADDs themselves to result in auditory effects. Some studies have indicated that ADDs have the potential to cause auditory injury, particularly where devices are operated continuously over prolonged periods (Findlay *et al.*, 2021), while modelling undertaken by Boisseau *et al.* (2021) predicted no potential for AUD INJ to LF cetaceans from ADD exposure under the operating scenarios assessed. The potential to induce AUD INJ in marine mammals from ADDs is therefore considered primarily associated with prolonged exposure to high-output devices, rather than the short-duration use anticipated as part of UXO clearance mitigation.
- 5.8.2.94 Any ADD would therefore be operated for the shortest duration and at the lowest effective output required to achieve the intended deterrence objective, with consideration given the available evidence on device performance (e.g. McGarry *et al.*, 2020; Phillips *et al.*, 2025). The mitigation measures secured through the MMMP (CoT36) are therefore considered appropriate to reduce the likelihood of marine mammals being present within the immediate vicinity of a UXO clearance event, while recognising that they cannot fully eliminate the potential for exposure at greater distances [see **Section 5.7**].
- 5.8.2.95 Overall, although low order UXO clearance has the potential to result in auditory injury to individual marine mammals, predicted exposure represents a small proportion of relevant populations and is highly precautionary due to the conservative assumptions applied within the underwater sound modelling. The temporary and discrete nature of UXO clearance events, combined with the implementation of embedded mitigation measures, means that no measurable consequences for marine mammal population trajectories are expected. Therefore, the magnitude of impact from AUD INJ (PTS) associated with low order UXO clearance is considered **negligible** in both Scottish and English waters.
- 5.8.2.96 Potential auditory injury associated with low order UXO clearance is expected to be highly localised, with embedded mitigation measures implemented to reduce the likelihood of marine mammals being present within the immediate vicinity of a clearance event. The assessment concludes that the magnitude of residual AUD INJ effects is negligible and is not expected to affect survival or reproductive success or result in an adverse effect on the conservation status of relevant populations. Therefore, the potential for low order UXO clearance to result in an EPS injury offence is considered low, and an EPS licence for injury is not expected to be required.

Behavioural disturbance

- 5.8.2.97 Project-specific underwater sound modelling has been undertaken to predict the potential spatial extent over which sound levels associated with UXO clearance may exceed the NMFS (2024) TTS-onset thresholds [see **Volume 2, Annex 5.1: Underwater Sound Modelling Report, of the PEIR**]. For a single impulsive event, TTS-onset thresholds are used as a precautionary indicator of the potential spatial extent over which behavioural responses may occur, rather than as a direct predictor of disturbance. **Table 5.48** presents the maximum predicted distances to the TTS thresholds for each marine mammal functional hearing group.
- 5.8.2.98 For the low order donor charge configurations included within the MDS, predicted TTS ranges increase with increasing donor charge size and vary between hearing groups [see **Table 5.48**]. As with AUD INJ, the greatest predicted ranges are associated with VHF cetaceans (e.g. harbour porpoise), for which the maximum SEL_{ss}-based TTS range is 13km for the largest donor charge configuration (4x0.75kg NEQ). Corresponding maximum SEL_{ss}-based ranges for LF cetaceans, HF cetaceans and PW are 13km, 1.8km and 7.9km, respectively. Predicted SPL_{pk}-based TTS ranges are considerably smaller, with maximum ranges of 320m, 40m, 5.1km and 110m, respectively [see **Table 5.48**]. The high order UXO scenarios are also presented in **Table 5.48** for contextual comparison and result in larger predicted TTS footprints. These scenarios are provided for reference as high-order UXO detonation will not form part of the MHPGC Project DCO application or Scottish Marine Licence application(s).

Table 5.48: Predicted distance (m) to the TTS threshold for representative for low order donor charge configurations and high-order UXO charge sizes

Charge size (kg NEQ)	LF cetacean		HF cetacean		VHF cetacean		PW	
	SPL _{pk}	SEL _{ss}	SPL _{pk}	SEL _{ss}	SPL _{pk}	SEL _{ss}	SPL _{pk}	SEL _{ss}
Low order and low-yield donor charge configurations								
0.08	20	4,300	<10	350	830	7,400	10	2,600
0.5	70	7,800	20	800	2,900	9,600	50	4,900
2x0.75	90	11,000	30	1,300	4,100	11,000	80	6,700
4x0.75	320	13,000	40	1,800	5,100	13,000	110	7,900
High-order charge configurations								
1.2	80	10,000	20	1,200	3,500	11,000	80	6,200
3.5	330	14,000	40	1,900	5,300	13,000	120	8,300
High-order UXO clearance								
136	950	17,000	330	3,100	20,000	16,000	760	11,000
270	1,700	19,000	370	4,000	28,000	18,000	1,200	13,000
431	2,000	21,000	420	4,600	36,000	19,000	1,700	14,000
697	2,900	23,000	600	5,100	47,000	20,000	2,400	15,000

Note: Predicted distances for the NMFS (2024) impulsive sound criteria using both SPL_{pk} (dB re 1 μ Pa) and SEL_{ss} (dB re 1 μ Pa²s) thresholds.

5.8.2.99 To provide context on the potential scale of behavioural disturbance, the theoretical number of marine mammals that could occur within the predicted TTS footprint has been estimated for the range of UXO clearance scenarios modelled in **Table 5.49**. Estimates have been calculated using the maximum ranges for both SPL_{pk} and SEL_{ss} presented in **Table 5.48** and the highest relevant marine mammal density estimates from the baseline characterisation [see **Section 5.4.4**; **Table 5.30**].

5.8.2.100 These estimates represent a precautionary upper bound, assuming animals are uniformly distributed throughout the predicted TTS footprint and remain within the affected area during the clearance event. They do not account for avoidance behaviour, movement responses, or the temporary and mobile nature of UXO clearance activities.

Table 5.49: Estimated number of marine mammals potentially occurring within the predicted TTS range for representative UXO clearance scenarios

Species	Density (animals/km²)	Metric	Low order and low-yield donor charge configurations				High-order charge		High-order UXO clearance			
			0.08kg	0.05kg	2x0.75kg	4x 0.075kg	1.2kg	3.5kg	136kg	270kg	431kg	697kg
Unweighted SPL _{pk} (dB re 1µPa)												
Harbour porpoise	0.603	# animals	2	16	32	50	24	54	758	1,486	2,456	4,185
		% UK MU	<0.01%	0.01%	0.02%	0.03%	0.02%	0.03%	0.48%	0.93%	1.24%	2.62%
Bottlenose dolphin	0.042	# animals	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
		% UK MU (GNS MU)	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%
		% UK MU (CES MU)	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%
White-beaked dolphin	0.080	# animals	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
		% UK MU	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%
Minke whale	0.042	# animals	<1	<1	<1	<1	<1	<1	<1	1	1	2
		% UK MU	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	0.01%
Atlantic white-sided dolphin	0.055	# animals	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
		% UK MU	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%

Species	Density (animals/km ²)	Metric	Low order and low-yield donor charge configurations				High-order charge		High-order UXO clearance			
			0.08kg	0.05kg	2x0.75kg	4x 0.075kg	1.2kg	3.5kg	136kg	270kg	431kg	697kg
Common dolphin	0.060	# animals	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
		% UK MU	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%
Grey seal	0.419	# animals	<1	<1	<1	<1	<1	<1	1	2	4	8
		% UK pop	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	0.01%
Harbour seal	0.010	# animals	<1	<1	<1	<1	<1	<1	<1	<1	<1	1
		% UK pop	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%
Weighted SEL _{ss} (dB re 1µPa ² s)												
Harbour porpoise	0.603	# animals	104	175	230	321	230	321	485	614	684	758
		% UK MU	0.07%	0.11%	0.14%	0.20%	0.15%	0.20%	0.30%	0.39%	0.43%	0.48%
Bottlenose dolphin	0.042	# animals	<1	<1	1	1	1	1	2	3	3	4
		% UK MU (GNS MU)	<0.01%	<0.01%	0.01%	0.02%	0.01%	0.02%	0.07%	0.11%	0.15%	0.18%
		% UK MU (CES MU)	<0.01%	0.04%	0.10%	0.19%	0.09%	0.21%	0.57%	0.94%	1.25%	1.53%
	0.080	# animals	<1	1	1	1	1	1	3	4	6	7

Species	Density (animals/km ²)	Metric	Low order and low-yield donor charge configurations				High-order charge		High-order UXO clearance			
			0.08kg	0.05kg	2x0.75kg	4x 0.075kg	1.2kg	3.5kg	136kg	270kg	431kg	697kg
White-beaked dolphin		% UK MU	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	0.01%	0.01%	0.02%	0.02%
Minke whale	0.042	# animals	3	8	16	23	14	26	39	48	59	70
		% UK MU	0.02%	0.08%	0.16%	0.22%	0.13%	0.25%	0.37	0.46%	0.57%	0.68%
Atlantic white-sided dolphin	0.055	# animals	<1	1	1	1	1	1	2	3	4	5
		% UK MU	<0.01%	<0.01%	<0.01%	0.01%	<0.01%	0.01%	0.01%	0.02%	0.03%	0.34%
Common dolphin	0.060	# animals	<1	1	1	1	1	1	3	3	4	5
		% UK MU	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	<0.01%	0.01%	0.01%	0.01%
Grey seal	0.419	# animals	9	32	59	83	51	91	160	223	258	297
		% UK pop	<0.01%	0.02%	0.04%	0.05%	0.03%	0.06%	0.10%	0.14%	0.16%	0.19%
Harbour seal	0.010	# animals	1	1	2	2	2	3	4	6	7	7
		% UK pop	<0.01%	<0.01%	<0.01%	0.01%	<0.01%	0.01%	0.01%	0.01%	0.02%	0.02%

- 5.8.2.101 Across the low order UXO scenarios included within the MDS [see **Table 5.38**], the number of marine mammals potentially occurring within the predicted TTS footprint is expected to remain low in the context of relevant UK portion of the MUs and populations ($\leq 0.2\%$ of reference populations). The greatest number of potentially exposed individuals is predicted for harbour porpoise, reflecting the larger TTS ranges predicted for the VHF cetacean hearing group and the relatively high density of this species within the MHPGC Project PEIR Red Line Boundary. For the largest low order donor charge configuration ($4 \times 0.75\text{kg}$ NEQ), up to 321 harbour porpoise may occur within the predicted TTS footprint, representing 0.20% of the reference population of the North Sea MU [see **Table 5.49**].
- 5.8.2.102 For other cetacean species and pinnipeds, the estimated number of individuals potentially exposed is expected to be lower, reflecting both smaller predicted TTS ranges and lower species densities. Minke whales had up to 23 individuals presented (0.22% of the reference population) and grey seal represents the greatest potential exposure among pinnipeds, with up to 83 individuals predicted within the largest low order TTS footprint, representing 0.05% of the relevant reference population [see **Table 5.49**].
- 5.8.2.103 The predicted TTS-onset ranges provide an indication of the potential spatial extent of elevated sound exposure may occur; however, the occurrence or severity of behavioural responses cannot be inferred directly from acoustic thresholds alone. JNCC (2025a) therefore recommends the use of EDRs for assessing potential disturbance from UXO clearance. EDRs incorporate available empirical evidence of behavioural responses and measured SEL (Majewska *et al.*, 2025), providing a more appropriate basis for interpreting the potential disturbance footprint.
- 5.8.2.104 For low order deflagration, JNCC (2025b) recommends an EDR of 5km. This value is supported by sound measurement studies covering 166 clearance events, which identified TTS-onset ranges between 0.1km and 5km for donor charges ranging from 0.03 to 0.45kg NEQ. The EDR applies to low order clearance irrespective of the size of the UXO, as acoustic output is determined by the donor charge rather than the explosive content of the UXO itself.
- 5.8.2.105 For contextual comparison on high-order UXO clearance, JNCC (2025b) recommends an EDR of 20km without noise abatement for UXO up to 263kg NEQ, and 10km where bubble curtain mitigation is successfully applied for UXO up to 525kg NEQ. These values reflect the available empirical evidence of harbour porpoise responses and measured sound levels, with higher uncertainty remaining for larger charge sizes.
- 5.8.2.106 The estimated number of marine mammals potentially occurring within the relevant JNCC (2025b) EDRs is presented in **Table 5.50**. These estimates have been calculated using the relevant EDR radius and the highest marine mammal density estimates from the baseline characterisation [see **Section 5.4.4**; **Table 5.30**]. The estimates represent the potential number of individuals within the disturbance footprint of a single clearance event and assume animals are uniformly distributed within the area. They do not account for avoidance behaviour, animal movement, or the implementation of mitigation measures.

Table 5.50: Estimated number of marine mammals potentially occurring within the JNCC (2025b) EDR for low order UXO clearance

Species	Density (individuals/km ²)	Low order 5km EDR		High order 10km EDR		High order 20km EDR	
		Estimated number of individuals	% of reference population	Estimated number of individuals	% of reference population	Estimated number of individuals	% of reference population
Harbour porpoise	0.603	47	<0.01%	189	<0.01%	758	0.47%
Bottlenose dolphin	0.042	3	<0.01% (GNS MU)	13	0.01% (GNS MU)	53	2.80% (GNS MU)
			0.02% (CES MU)		0.06% (CES MU)		23.56% (CES MU)
White-beaked dolphin	0.080	6	<0.01%	25	<0.01%	101	0.30%
Minke whale	0.042	3	<0.01%	13	<0.01%	53	0.51%
White-sided dolphin	0.055	4	<0.01%	17	<0.01%	69	0.56%
Common dolphin	0.060	5	<0.01%	19	<0.01%	75	0.13%
Grey seal	0.419	33	<0.01%	132	<0.01%	527	0.33%
Harbour seal	0.010	1	<0.01%	3	<0.01%	13	0.03%

5.8.2.107 The EDR-based estimates in **Table 5.50** provide a precautionary indication of the potential number of marine mammals that could occur within the spatial extent of behavioural disturbance associated with a single UXO clearance event. However, occurrence within an EDR does not indicate that all individuals would exhibit a behavioural response, nor that any response would result in biologically significant consequences.

5.8.2.108 For low order UXO clearance, the 5km EDR results in relatively small numbers of potentially exposed individuals across all species considered, reflecting the restricted disturbance footprint and the low acoustic output associated with donor charges [see **Table 5.50**]. Harbour porpoise represent the species with the greatest potential exposure, with 47 individuals potentially occurring within a 5km EDR, representing <0.01% of the UK portion of the North Sea MU. For all other cetacean and pinniped species, the number of individuals potentially occurring within the EDR represents a negligible proportion (<0.01%) of the relevant reference populations.

5.8.2.109 The larger EDRs and potential number of individuals exposure in **Table 5.50** associated with high-order UXO clearance result in a greater number of potentially exposed individuals, particularly for harbour porpoise and grey seal, due to the increased spatial extent of the disturbance footprint. For example, with the 20km high-order EDR scenario, the proportion of the relevant reference populations potentially occurring within the disturbance footprint remains low for most species assessed. However, the higher proportion estimated for bottlenose dolphin against the CES MU reflects the relatively small population size of this MU and does not represent an assessment conclusion for the MHPGC Project, as high-order UXO detonation will not form part of the MHPGC Project DCO application or Scottish Marine Licence application(s) and would be subject to a separate post-consent Marine Licence application and project-specific assessment, including consideration of EPS licencing, if required.

5.8.2.110 When considering the precautionary TTS-onset ranges as an indicator of potential elevated sound exposure, the predicted number of individuals potentially exposed is greater, particularly where SEL_{ss}-based ranges are applied. However, these estimates represent the maximum potential spatial

extent of sound exposure and do not indicate that all individuals within this area would respond behaviourally, or that any responses would result in biologically significant consequences. The uncertainty associated with predicting behavioural responses at greater distances from the source is also recognised.

- 5.8.2.111 Although behavioural responses associated with UXO clearance may occur at an individual level, individual UXO clearance events are inherently short duration and localised. Available evidence indicates that responses to individual impulsive events are generally expected to be short-term and reversible, with no evidence that a single UXO clearance event would result in prolonged disturbance at a level likely to affect survival, reproductive success or population trajectory (JNCC, 2020; Majewska *et al.*, 2025).
- 5.8.2.112 The implementation of the MMMP (CoT36), including pre-detonation searches and monitoring measures in accordance with the JNCC (2025a) recommended mitigation measures for UXO clearance, is primarily intended to reduce the risk of auditory injury by minimising the likelihood of marine mammals being present within the immediate vicinity of a detonation event [see **Table 5.39; Section 5.7**]. By reducing the likelihood of close-range exposure, these measures also provide a secondary benefit by reducing the potential for disturbance responses.
- 5.8.2.113 Taking into account the precautionary nature of the TTS-onset and EDR-based assessments, the small proportion of marine mammal populations potentially exposed, the short duration and temporary nature of expected behavioural responses, and the implementation of embedded mitigation measures, the magnitude of behavioural disturbance from low-order UXO clearance is considered **low** for marine mammals in both Scottish and English waters.
- 5.8.2.114 Behavioural disturbance associated with low-order UXO clearance is expected to be temporary and localised, with individuals able to move away from the source and return following cessation of the clearance event. The assessment concludes that such disturbance is not expected to affect survival or reproductive success or result in an adverse effect on the conservation status of relevant populations. Therefore, the potential for low-order UXO clearance to result in an EPS disturbance offence is considered low. An EPS licence for disturbance is expected to be required prior to undertaking low order UXO clearance, where required.

Significance of impact

Auditory injury (PTS)

- 5.8.2.115 Overall, it is considered that the sensitivity of marine mammal receptors to AUD INJ associated with low order UXO clearance has been assessed as **high**, and the magnitude of impact has been assessed as **negligible**.
- 5.8.2.116 Therefore, the significance of effect from underwater sound associated with low order UXO clearance activities on marine mammals through auditory injury (PTS) during the pre-construction phase is considered to be **minor (adverse)**, which is **not significant** in EIA terms in both Scottish and English waters. This reflects that, although UXO clearance has the potential to result in AUD INJ to individuals, the predicted number of individuals potentially occurring within the predicted AUD INJ range represents a very small proportion of the relevant reference populations. Furthermore, the predicted injury ranges are considered precautionary due to the conservative assumptions applied within the underwater sound modelling. The temporary and discrete nature of UXO clearance events, together with the implementation of embedded mitigation measures, means that exposure to sound levels capable of causing AUD INJ is expected to be limited and no measurable consequences for marine mammal population trajectories are expected.

Behavioural disturbance

- 5.8.2.117 Overall, it is considered that the sensitivity of marine mammal receptors from behavioural disturbance associated with low order UXO clearance has been assessed as **low**, and the magnitude of impact has been assessed as **low**. The resulting significance of effect is considered to be negligible or minor [see **Table 5.34**].
- 5.8.2.118 Therefore, the significance of effect from underwater sound associated with UXO clearance activities on marine mammals through behavioural disturbance during the pre-construction phase is considered to be **minor (adverse)**, which is **not significant** in EIA terms in both Scottish and English waters. This reflects that, although behavioural responses may occur at an individual level within the

predicted disturbance footprint, the number of marine mammals potentially occurring within this footprint represents a small proportion of the relevant reference populations. UXO clearance events are short duration, and any responses are expected to be temporary and reversible, with no evidence that a single clearance event would result in disturbance at a level likely to affect survival, reproductive success or population trajectory.

Additional mitigation and residual effect

5.8.2.119 At this stage, no additional mitigation measures or monitoring requirements, beyond those committed through the MHPGC Project-specific MMMP (CoT36) and **Table 5.39**, have therefore been identified in relation to the effects of underwater sound associated with UXO clearance in English or Scottish waters. Therefore, the residual effect of underwater sound associated with low-order UXO clearance on marine mammals during the pre-construction phase is considered **minor (adverse)** and **not significant** in EIA terms..

Changes in prey availability

5.8.2.120 Marine mammals may be indirectly affected as predators where MHPGC Project activities alter the abundance, distribution or availability of prey species. As described in **Volume 2, Chapter 4: Fish and Shellfish Ecology, of the PEIR**, the principal pathways by which construction activities could affect fish and shellfish receptors include [see **Table 5.38**]:

- Temporary habitat loss and disturbance;
- Increased SSC and associated sediment deposition;
- Disturbance/remobilisation of sediment bound contaminants;
- Underwater sound from UXO clearance: mortality, injury, behavioural impacts and auditory masking;
- Underwater sound (excluding UXO): mortality, injury, behavioural impacts and auditory masking;
- Increased risk of introduction and spread of invasive non-native species.

Receptor sensitivity

5.8.2.121 Marine mammals within the Marine Mammal Study Area are opportunistic predators with varied diets, including a range of pelagic and demersal fish species, cephalopods and crustaceans [see **Section 5.4.4**]. The key prey species for marine mammals include small shoaling fish from demersal or pelagic habitats, particularly gadoids such as Atlantic cod (*Gadus morhua*), haddock (*Melanogrammus aeglefinus*) and whiting (*Merlangius merlangus*), clupeids (e.g. Atlantic herring (*Clupea harengus*)), European sprat (*Sprattus sprattus*), sandeel, mackerel (*Scomber scombrus*) and flatfish (including plaice (*Pleuronectes platessa*), sole (*Solea solea*), flounder (*Platichthys flesus*) and dab (*Limanda limanda*)) [see **Table 5.51**].

5.8.2.122 As described in **Volume 2, Chapter 4 Fish and Shellfish Ecology, of the PEIR**, herring and sandeel are considered the fish species with the greatest sensitivity to MHPGC Project activities due to their sensitivity to underwater sound and, for sandeel, their reliance on specific seabed sediment characteristics for spawning and burrowing. Therefore, potential effects on these species are considered most relevant when assessing indirect effects on marine mammals.

Table 5.51: Principal prey species of marine mammal receptors considered within the assessment

Marine mammal receptor	Key prey species	Source
Harbour porpoise	Sandeel, herring, sprat, whiting, cod, haddock, mackerel, gobies, cephalopods	Santos <i>et al.</i> (2006)
Bottlenose dolphin	Salmonids, cod, whiting, haddock, saithe, mackerel, flatfish, gobies, cephalopods	Santos <i>et al.</i> (2001); Hernandez-Milian <i>et al.</i> (2015)
White-beaked dolphin	Cod, whiting, haddock, hake, herring, sandeel, mackerel, gobies, squid	Canning <i>et al.</i> (2008); Jansen <i>et al.</i> (2010); MacLeod (2013)

Marine mammal receptor	Key prey species	Source
Minke whale	Sandeel, herring, sprat, mackerel, Norway pout, gobies	Pierce <i>et al.</i> (2004); Anderwald and Evans (2007)
Risso's dolphin	Squid, cuttlefish, octopus, haddock, whiting, poor cod	MacLeod <i>et al.</i> (2014)
Atlantic white-sided dolphin	Poor cod, pouting, blue whiting, mackerel, silvery pout	Hernandez-Milian <i>et al.</i> (2016)
Common dolphin	Mackerel, horse mackerel, sardine, herring, sprat, blue whiting, squid	Brophy <i>et al.</i> (2009); Santos <i>et al.</i> (2013)
Humpback whale	Herring, mackerel, capelin, blue whiting, krill	Løviknes <i>et al.</i> (2021)
Grey seal	Saithe, whiting, cod, haddock, rockling, sandeel, herring, sprat, mackerel, flatfish, salmonids	Hammond and Wilson (2016)
Harbour seal	Sandeel, cod, haddock, whiting, saithe, herring, sprat, mackerel, plaice, dab, flounder	Wilson and Hammond (2016)

5.8.2.123 However, marine mammals are highly mobile and generally exhibit broad, flexible diets and extensive foraging ranges. Although some species may show preferences for particular prey species or foraging areas, populations are not considered dependent on a single prey species or localised area within the MHPGC Project PEIR Red Line Boundary. Therefore, marine mammals are considered able to adapt to temporary and localised changes in prey availability without effects on survival and reproductive success. The sensitivity of marine mammals to changes in prey availability during the construction phase is considered **low** in both Scottish and English waters.

Magnitude of impact

5.8.2.124 The Fish and Shellfish Ecology assessment concludes that, at most, construction activities would result in a **minor adverse** effect, which is **not significant** in EIA terms. The effects are predicted to be temporary, localised and reversible and are not expected to result in significant changes to fish or shellfish populations. Consequently, any indirect effects on marine mammals would only arise through temporary, localised changes in prey availability within the ZoI of MHPGC Project activities.

5.8.2.125 Underwater sound modelling undertaken for fish receptors indicate that, with the exception of high-order UXO clearance presented for context only, predicted disturbance effects are limited to relatively small spatial extents (i.e. no more than a few hundred metres) [see **Volume 2, Appendix 5.1. Underwater Sound Modelling Report, of the PEIR**]. High-order UXO detonation will not form part of the MHPGC Project DCO application and Scottish Marine Licence application(s) and would be subject to separate assessment if required. Nonetheless, to maintain a precautionary and holistic approach, the potential effects of high-order UXO detonation on fish and shellfish receptors were included in the assessment for information purposes only.

5.8.2.126 The fish species considered most relevant to indirect effects on marine mammals are those with particular sensitivity to MHPGC Project activities, including herring and sandeel. In relation to impacts to the seabed from construction, the potential for disturbance is only likely in those species, herring and sandeel, that rely on the seabed for spawning grounds or as nursery habitat. No areas of particular importance for herring spawning were identified within the MHPGC Project PEIR Red Line Boundary.

5.8.2.127 A detailed assessment of potential effects on sandeel (a common prey species for marine mammals) spawning activity within the MHPGC Project PEIR Red Line Boundary is provided in **Volume 2, Annex 4.1: Herring and Sandeel Assessment, of the PEIR**. In Scottish waters, the MHPGC Project PEIR Red Line Boundary is considered to be located within unsuitable sandeel habitat. In English waters, the MHPGC Project PEIR Red Line Boundary overlaps with known sandeel spawning habitat between KP173 to KP129; however, this habitat forms part of an extensive area of preferred sandy habitat present within the wider Fish and Shellfish Ecology Study Area. The remaining areas of the MHPGC Project PEIR Red Line Boundary are considered unsuitable for sandeel spawning.

- 5.8.2.128 Given the MHPGC Project construction activities on the seabed are unlikely to result in significant effects on demersal spawning species, and that all other mobile pelagic species can avoid temporary and localised disturbance, any changes to fish distribution or availability are expected to be limited in spatial extent and duration. Therefore, effects on fish receptors associated with disturbance from MHPGC Project construction activities are considered to be negligible [see **Volume 2, Chapter 4 Fish and Shellfish Ecology, of the PEIR**].
- 5.8.2.129 Important marine mammal foraging areas are identified outside of the MHPGC Project PEIR Red Line Boundary are also likely to be unaffected. The Moray Firth SAC, designated for bottlenose dolphin, is located 168.8km north of the MHPGC Project PEIR Red Line Boundary, supports seasonal aggregations associated with salmonid migration (NatureScot, 2025a). Similarly, the Southern Trench ncMPA, designated for minke whale specifically in relation to foraging grounds (NatureScot, 2025b), is located approximately 56.8km from the MHPGC Project PEIR Red Line Boundary. Both sites are outside the predicted spatial extent of predicted effects on fish receptors.
- 5.8.2.130 Likewise, Berwick Bank and Wee Bankie within the Firth of Forth Banks Complex MPA support sand and gravel habitats suitable for sandeel colonisation and have been identified as important foraging habitat for grey seals and seabirds (JNCC, 2024). Berwick Bank is also thought to be a spawning ground for plaice, the larvae of which may be important for repopulating exploited stocks along the east coast of England. These areas are located at least 12km northwest from the MHPGC Project PEIR Red Line Boundary and are outside the spatial extent of predicted effects on fish receptors. Consequently, no measurable changes in prey availability are expected within important marine mammal foraging areas.
- 5.8.2.131 Taking into account that effects on fish and shellfish receptors are predicted to be temporary, localised and not significant, together with the wide foraging ranges and dietary flexibility of marine mammals, no meaningful changes in prey availability are expected to occur as a result of the MHPGC Project. Therefore, the magnitude of indirect impacts to marine mammals as a result of prey availability during the construction phase is considered to be **negligible** in both Scottish and English waters.

Significance of effect

- 5.8.2.132 Overall, it is considered that the sensitivity of marine mammal receptors associated with changes in prey availability has been assessed as **low**, and the magnitude of impact has been assessed as **negligible**. The resulting significance of effect is considered to be negligible or minor [see **Table 5.34**].
- 5.8.2.133 Therefore, the significance of effect associated with changes in prey availability during the construction phase is considered to be **negligible (adverse)**, which is **not significant** in EIA terms in both Scottish and English waters. This reflects the temporary and localised nature of predicted effects on fish and shellfish receptors, the absence of predicted effects within identified important marine mammal foraging areas, and the wide foraging ranges and dietary flexibility of marine mammals, such that no measurable consequences for individual survival, reproductive success or population trajectory are expected.

Additional mitigation and residual effect

- 5.8.2.134 At this stage, no additional mitigation measures or monitoring requirements have been identified for the effects of changes in prey availability to marine mammals during the construction phase of the MHPGC Project in Scottish or English waters, taking into account the mitigation measures already identified [see **Table 5.39**]. Therefore, the residual effects remain **negligible (adverse)**, which is **not significant** in EIA terms.

Collisions with vessels

- 5.8.2.135 Offshore construction of the MHPGC Project will require the use of a range of vessels, including geophysical and geotechnical survey vessels, pre-clearance vessels, offshore export cable installation vessels and associated support vessels. Across the four-year construction period, a maximum of approximately 550 return vessel trips are anticipated, with up to 33 vessels operational at any one time [see **Table 5.38**]. These vessels have the potential to interact with marine mammals within and surrounding the MHPGC Project PEIR Red Line Boundary, resulting in a potential risk of injury or mortality through collision.

Receptor sensitivity

- 5.8.2.136 Collisions between vessels and marine mammals do occur, although collision risk has primarily been studied with regard to large whales (e.g. baleen whales) (IAMMWG, 2015). For example, collisions between vessels and large whales are reported to often lead to death or serious injury (Kraus, 1990). Most lethal and serious injuries are caused by large ships (e.g. 80m or longer) and vessels travelling at speeds faster than 14 knots (Laist *et al.*, 2001). Where such collisions result in physical injury, this may reduce foraging abilities or individual fitness (Moore *et al.*, 2013).
- 5.8.2.137 Avoidance behaviour in cetaceans has been observed primarily in response to fast, unpredictable vessels such as speedboats and jet-skis (Bristow and Reeves, 2001; Gregory and Rowden, 2001), but neutral or even positive reactions have been observed, particularly for dolphins, with larger, slow moving vessels such as cargo ships (Ng and Leung, 2003; Sini *et al.*, 2005).
- 5.8.2.138 Marine mammals are generally considered capable of detecting and avoiding approaching vessels, although the effectiveness of avoidance will depend on factors including species, vessel characteristics and the behavioural state of the individuals. An initial disturbance or avoidance response to approaching vessels may provide an opportunity for individuals to move away from the vessel path. However, all marine mammals remain potentially vulnerable to collisions with vessels, with smaller cetaceans potentially experiencing increased collision risk in some coastal areas (Schoeman *et al.*, 2020).
- 5.8.2.139 Overseas studies have shown that whales may spend some night-time hours in an inactive resting state resulting in much higher collision in hours of darkness (Izadi *et al.*, 2018; Schoeman *et al.*, 2020; Keen *et al.*, 2019). However, smaller cetaceans are highly mobile and are generally considered capable of avoiding vessel collisions. Evidence from the UK Cetacean Strandings Investigation Programme (Cetacean Strandings Investigation Programme (CSIP) found that, of 53 harbour porpoise strandings investigated in 2015, only four (8%) animals showed evidence of death associated with physical trauma (CSIP, 2015). Similarly, long-term photo-identification studies of bottlenose dolphin identified only one individual out of 277 animals with marks indicative of vessel interactions (Olson *et al.*, 2022).
- 5.8.2.140 The risk of vessel collision with pinnipeds is generally considered to be lower than that for cetaceans (Jones *et al.*, 2017). In the Moray Firth, seals have been observed maintaining a distance of at least 20m from vessels (Onoufriou *et al.*, 2016), while studies of seal strandings have attributed less than 2% to vessel collision (Goldstein *et al.*, 1999; Swails, 2005). Although there have been previous reports of vessel propeller type injuries in seals, further research indicated that these injuries can likely be attributed to grey seal predation (Brownlow *et al.*, 2016). Furthermore, individual seals have been observed easily avoiding vessel movements during slow-moving dredging operations (Todd *et al.*, 2014).
- 5.8.2.141 Although marine mammals demonstrate an ability to detect and avoid vessels and vessel collision events are considered relatively uncommon, a collision has the potential to result in direct serious physical injury or mortality to an individual. The consequences of a collision are not necessarily lethal on all occasions, recovery from physical injury is possible where injuries are non-fatal (Van Waerebeek *et al.*, 2007). Considering the potential consequences of collisions events, together with the ability of marine mammals to avoid vessels and the generally low likelihood of documented incidents, the sensitivity of marine mammal receptors to vessel collision risk is considered to be **medium** in both Scottish and English waters.

Magnitude of impact

- 5.8.2.142 The risk of collision is influenced by vessel speed, size, density and the likelihood of spatial overlap with marine mammals. Vessels travelling at higher speeds pose an increased collision risk due to reduced manoeuvrability, shorter detection times and greater potential consequences to individuals in the event of collision (Wang *et al.*, 2007; Schoeman *et al.*, 2020). Increased mortality has been associated with larger vessels (>80m) travelling at speeds exceeding 14 knots (Laist *et al.*, 2001), as well as vessels with larger drafts (Rockwood *et al.*, 2017). However, the relationship between vessel speed and collision severity varies between species (Schoeman *et al.*, 2020).
- 5.8.2.143 The majority of offshore construction vessels associated with the MHPGC Project will operate at low speeds while undertaking offshore installation and survey activities. Geophysical survey vessels, pre-lay grapnel run, trenching and cable protection activities will operate at slow operational speeds

due to interacting with the seabed, with the latter activities occurring at a maximum speed of approximately 0.3 knots [see **Volume 1, Chapter 2: Project Description, of the PEIR**]. Vessel transit speeds will be higher than operational speeds but vessel movements will be managed through the VTMP (CoT30) [see **Table 5.38; Section 5.7**]. The predominantly low operational speeds are below those associated with the greatest risk of serious injury to marine mammals and the management of vessels through the VTMP (CoT30) and MMMP (CoT36) will reduce the likelihood and potential severity of vessel-marine mammal interactions.

- 5.8.2.144 Small support vessels and other construction vessels transiting between the offshore export cable corridor and ports may operate at higher speeds and therefore present a relatively increased likelihood of collision and potential for injury compared to slow-moving installation vessels. However, these activities will be temporary and intermittent, and marine mammals are expected to avoid vessels where possible. Furthermore, although a variety of marine mammals are known to occur within the vicinity of the MHPGC Project PEIR Red Line Boundary, densities are generally low [see **Section 5.4.4**], reducing the likelihood of vessel and marine mammal interactions.
- 5.8.2.145 Modelling of vessel collision risk for cetaceans in the northeast Atlantic identified the highest predicted collision risk within the southern North Sea and English Channel, reflecting the high density of commercial vessel traffic in these areas (Jomopans, 2022; Robbins, 2022; EMODnet, 2023). Although elevated co-occurrence between vessels and species including white-beaked dolphin, killer whale, and minke whale has been observed around the coastal waters of Aberdeenshire, these areas were not identified as among the highest collision risk areas within the northeast Atlantic (Robbins, 2022).
- 5.8.2.146 The potential for collision with pinnipeds is also expected to be limited. The Berwickshire and North Northumberland SAC, designated for grey seal, is located approximately 26km from the MHPGC Project PEIR Red Line Boundary. At this distance at-sea grey seal density data indicates a low abundance [see **Figure 5.10**]. Furthermore, when considering the vessel activity already present within the vicinity of the MHPGC Project and wider central North Sea (EMODnet, 2023), the additional vessels associated with the MHPGC Project are not expected to represent a substantial increase above existing vessel movements and shipping levels.
- 5.8.2.147 Considering the temporary and intermittent nature of vessel activity, the predominantly slow operational speeds of MHPGC Project construction and survey vessels, the management of vessels through the VTMP (CoT30) and MMMP (CoT36) [see **Table 5.38; Section 5.7**], and the generally low density of marine mammals within the MHPGC Project PEIR Red Line Boundary, the likelihood of vessel-marine mammal interactions is expected to be low. However, the potential for a collisions involving faster-moving vessel support and transit vessels, together with the potential for a collision to result in serious injury or mortality, means that the magnitude of vessel collision risk during the construction phase is considered **low** in both Scottish and English waters.

Significance of effect

- 5.8.2.148 Overall, it is considered that the sensitivity of marine mammal receptors from vessel collision risk has been assessed as **medium**, and the magnitude of impact has been assessed as **low**.
- 5.8.2.149 Therefore, the significance of effect from vessel collision risk during the construction phase is considered to be **minor (adverse)**, which is **not significant** in EIA terms in both Scottish and English waters. This reflects the temporary and intermittent nature of vessel activity, the predominantly slow operational speeds of construction and survey vessels, the management of vessel movements through the VTMP (CoT30), and the generally low density of marine mammals within the vicinity of the MHPGC Project PEIR Red Line Boundary. While a collision has the potential to result in serious injury or mortality, the likelihood of such an interaction is expected to remain low.

Additional mitigation and residual effect

- 5.8.2.150 At this stage, no additional mitigation measures or monitoring requirements have been identified for the effects of vessel collision risk to marine mammals during the construction phase beyond the embedded mitigation measures incorporated into the MHPGC Project, including the implementation of the VTMP (CoT30) and MMMP (CoT36) in both Scottish and English waters. Therefore, the residual effect remains **minor (adverse)**, which is **not significant** in EIA terms.

5.8.3 O&M phase

- 5.8.3.1 The O&M phase comprises a range of activities associated with the inspection, maintenance and repair of the MHPGC Project. The activities and parameters assessed below are based on the MDS [see **Table 5.38**] based on **Volume 1, Chapter 2: Project Description, of the PEIR**.
- 5.8.3.2 An Outline Offshore Operations and Maintenance Plan will be prepared and submitted as part of the application for development consent and marine licence application(s), with a Detailed Offshore Operations and Maintenance Plan to be produced in accordance with the Outline plan prior to entering the O&M phase (CoT07) [see **Table 5.39**].

Injury and disturbance from underwater sound produced during offshore export cable operation and maintenance activities

- 5.8.3.3 Potential underwater sound during the O&M phase of the MHPGC Project would arise from offshore export cable remediation and repair activities. These activities are expected to be comparable in character to that assessed for construction offshore export cable installation activities and involve the same types of vessels and continuous, non-impulsive sound sources [see **paragraphs 5.8.2.1 to 5.8.2.31**].
- 5.8.3.4 The MDS assumes remediation of up to 13km of offshore export cable per year and an estimated 41 cable repairs over the 35-year operational lifetime. Depending on the activity, up to five O&M vessels may be operating simultaneously, comprising survey vessels and/or USVs with a guard vessel during routine inspections, or up to four vessels during offshore export cable remediation or repair activities [see **Table 5.38**].
- 5.8.3.5 The potential for injury and disturbance of EPS as a result of O&M offshore export cable remediation and repair activities will be considered through the relevant EPS risk assessment and licensing process once the nature and parameters of the relevant activity are confirmed. Where an EPS licence is required, the Applicant will obtain the necessary licence prior to undertaking the relevant activities and comply with any associated conditions.

Receptor sensitivity

- 5.8.3.6 The sensitivity of marine mammals to underwater sound associated with offshore export cable remediation and repair activities during the O&M phase is unchanged from that assessed for offshore export cable installation activities during the construction phase [see **Section 5.8.2**]. The potential activities would generate continuous, non-impulsive underwater sound, with the potential for exposure to occur over relatively localised areas and for temporary periods. The potential for auditory injury is considered low given the characteristics of the sound sources and the predicted exposure levels. Marine mammals are highly mobile and able to adapt their behaviour to avoid temporary continuous underwater sound associated with vessel operations and offshore export cable maintenance activities, with recovery expected following cessation of the activity. Therefore, the sensitivity of marine mammal receptors to injury auditory injury and behavioural disturbance from underwater sound associated with O&M activities is considered to be **medium** in both Scottish and English waters.

Magnitude of impact

- 5.8.3.7 Underwater sound generated during offshore export cable remediation and repair activities comprises continuous, non-impulsive sound sources associated with vessels and seabed intervention activities. As discussed for the construction phase, continuous sound sources are primarily associated with behavioural responses, with auditory injury not predicted for the activities assessed.
- 5.8.3.8 Offshore export cable remediation and repair activities are limited to localised maintenance events affecting sections of the offshore export cable, rather than installation of the full cable length. Therefore, the spatial extent and duration of sound-generating activities are expected to be reduced compared with the construction phase.
- 5.8.3.9 As concluded for the construction phase, underwater sound generated during offshore export cable remediation and repair activities is not predicted to result in auditory injury to marine mammals. Temporary behavioural disturbance may occur in the vicinity of maintenance activities; however, any responses are expected to be localised, short-term and reversible. Taking into account the localised

nature of maintenance activities, the limited number of vessels involved, and the reduced spatial extent of works compared with construction, the magnitude of underwater sound effects from operation and maintenance activities to marine mammals is considered **negligible** in both Scottish and English waters.

Significance of effect

- 5.8.3.10 Overall, it is considered that the sensitivity of marine mammal receptors associated with underwater sound effects from cable remediation and repair activities has been assessed as **medium**, and the magnitude of impact has been assessed as **negligible**. The resulting significance of effect is considered to be negligible or minor [see **Table 5.34**].
- 5.8.3.11 Therefore, the significance of effect of underwater sound associated with offshore export cable remediation and repair activities on marine mammals during the O&M phase is considered to be **negligible (adverse)**, which is **not significant** in EIA terms in both English and Scottish waters. This reflects the absence of predicted AUD INJ, the temporary and reversible nature of potential behavioural responses, and the limited spatial extent, duration and frequency of individual maintenance activities. The intermittent nature of O&M activities and the mobility of marine mammals further reduce the potential for prolonged exposure to underwater sound.

Additional mitigation and residual effects

- 5.8.3.12 At this stage, no additional mitigation measures or monitoring requirements have been identified for the effects of underwater sound associated with O&M activities to marine mammals during the O&M phase of the MHPGC Project in both Scottish and English waters. Therefore, the residual effect remains **negligible (adverse)**, which is **not significant** in EIA terms.

Injury and disturbance from underwater sound produced during site investigation activities

- 5.8.3.13 Potential underwater sound during the O&M phase of the MHPGC Project may arise from periodic site investigation surveys associated with the monitoring of the offshore export cable. The MDS assumes up to five geophysical surveys per year during the 35-year operational lifetime of the MHPGC Project, including the use of SSS, MBES, SBP and MAG and/or gradiometer equipment [see **Table 5.38**].
- 5.8.3.14 As described for the pre-construction phase survey assessment, SSS, MBES and MAG are not considered to generate underwater sound at levels requiring assessment for marine mammals [see **paragraphs 5.8.2.32 to 5.8.2.35**]. MAG and MBES equipment is not considered to generate underwater sound at levels requiring assessment for marine mammals. Therefore, the potential for underwater sound effects during O&M site investigation surveys relates primarily to the use of SBP equipment.
- 5.8.3.15 The potential for injury and disturbance of EPS as a result of O&M site investigation activities will be considered through the relevant EPS risk assessment and licensing process once the survey parameters and equipment specifications are confirmed. Where an EPS licence is required, the Applicant will obtain the necessary licence prior to undertaking the relevant survey activities and comply with any associated conditions.

Receptor sensitivity

- 5.8.3.16 The sensitivity of marine mammals to underwater sound associated with site investigation activities during the O&M phase is unchanged from that assessed for equivalent survey activities during the pre-construction phase [see **paragraphs 5.8.2.36 to 5.8.2.41**]. The potential for auditory injury is highly localised given the characteristics of the survey equipment and the predicted exposure levels. Marine mammals are highly mobile and able to adapt their behaviour to avoid temporary continuous underwater sound associated with survey activities, with recovery expected following cessation of the activity. Therefore, the sensitivity of marine mammal receptors to auditory injury and behavioural disturbance from underwater sound associated with O&M site investigation surveys is considered to be **medium** in both Scottish and English waters.

Magnitude of impact

- 5.8.3.17 SBP equipment produces continuous, non-impulsive underwater sound, with the potential to result in temporary behavioural disturbance to marine mammals. As concluded for the pre-construction

and construction phase assessment, SBP surveys are not predicted to result in AUD INJ (PTS) to marine mammals [see **Table 5.43**].

- 5.8.3.18 O&M site investigation surveys will be undertaken periodically throughout the operational lifetime of the MHPGC Project; however, individual surveys would be temporary and spatially restricted to the areas requiring inspection. Although surveys may occur throughout the operational lifetime, exposure of individual marine mammals will remain intermittent and short-term. Marine mammals are highly mobile and any behavioural responses to SBP sound are expected to be temporary and reversible, with no significant effects expected at the individual level and no effects on marine mammal population trajectories anticipated.
- 5.8.3.19 Taking into account the continuous nature of the sound source, adherence to relevant JNCC guidance for geophysical surveys relevant at the time (i.e. JNCC, 2017), the absence of predicted AUD INJ and the limited spatial and temporal extent of individual survey events, the magnitude of auditory injury and behavioural disturbance from underwater sound effects associated with O&M site investigation activities is considered to be **negligible** in both Scottish and English waters.

Significance of effect

- 5.8.3.20 Overall, it is considered that the sensitivity of marine mammal receptors associated with underwater sound effects from site investigation activities has been assessed as **medium**, and the magnitude of impact has been assessed as **negligible**. The resulting significance of effect is considered to be negligible or minor [see **Table 5.34**].
- 5.8.3.21 Therefore, the significance of effect of underwater sound associated with site investigation activities on marine mammals during the O&M phase is considered to be **negligible (adverse)**, which is **not significant** in EIA terms in both Scottish and English waters.

Additional mitigation and residual effects

- 5.8.3.22 At this stage, no additional mitigation measures or monitoring requirements have been identified for the effects of underwater sound associated with site investigation activities to marine mammals during the O&M phase in Scottish or English waters. Any future geophysical surveys involving sound-generating equipment will be undertaken in accordance with the relevant regulatory requirements and applicable JNCC guidance in place at the time of the survey, including any appropriate marine mammal mitigation and monitoring measures [see **Section 5.7**]. The specific mitigation requirements will be confirmed when the survey parameters, equipment and timing are known and, where relevant, implemented into the Detailed Offshore Operations and Maintenance Plan (CoT07) produced prior to entering the O&M phase [see **Table 5.38**]. Therefore, the residual effect remains **negligible (adverse)**, which is **not significant** in EIA terms.

Changes in prey availability

- 5.8.3.23 Marine mammals may be indirectly affected as predators where MHPGC Project O&M phase activities associated with cable maintenance, repair and operation alter the abundance, distribution or availability of prey species. As described in **Volume 2, Chapter 4: Fish and Shellfish Ecology, of the PEIR**, the principal pathways by which O&M activities could affect fish and shellfish receptors include [see **Table 5.38**]:
- Long term habitat loss;
 - Temporary habitat loss and disturbance;
 - Increased SSC and associated sediment deposition;
 - Disturbance/remobilisation of sediment bound contaminants;
 - Underwater sound (excluding UXO): mortality, injury, behavioural impacts and auditory masking;
 - EMF from subsea electrical cabling;
 - Thermal emissions from operational activities;
 - Increased risk of introduction and spread of invasive non-native species;
 - Colonisation of hard structures.

Receptor sensitivity

- 5.8.3.24 The sensitivity of marine mammal receptors to changes in prey availability during the O&M phase is considered to be consistent with that assessed for the construction phase [see **paragraphs**

5.8.2.120 to 5.8.2.123]. Marine mammals are highly mobile and forage over large areas, with most species utilising a wide variety of prey species [see **Table 5.51**]. Although some marine mammal species may show preference for particular prey items or foraging areas, populations are not considered dependent on a single prey species or localised habitat resources within the MHPGC Project PEIR Red Line Boundary. Therefore, considering the ability of marine mammals to adapt foraging behaviour and switch prey resources without effects on survival and reproductive success, the sensitivity to changes in prey availability is considered **low** in both Scottish and English waters.

Magnitude of impact

- 5.8.3.25 The Fish and Shellfish Ecology assessment concludes that, at most, O&M activities would result in a **minor adverse** effect, which is **not significant** in EIA terms. The effects are predicted to be temporary, localised and reversible and are not expected to result in significant changes to fish or shellfish populations. Consequently, any indirect effects on marine mammals would only arise through temporary, localised changes in prey availability within the ZoI of MHPGC Project activities.
- 5.8.3.26 O&M activities associated with cable maintenance and repair will be considerably smaller in scale than those undertaken during construction [see **paragraphs 5.8.2.124 to 5.8.2.131**], with works restricted to localised sections of the offshore export cable route where cable repairs may be required. Potential effects on prey species would therefore be limited spatially and temporally.
- 5.8.3.27 Considering the limited spatial extent of O&M activities, the mobility and adaptability of marine mammal receptors, and the absence of likely significant effects predicted for fish and shellfish receptors, no meaningful changes in prey availability are expected to occur as a result of the MHPGC Project. Therefore, the magnitude of indirect impacts to marine mammals as a result of prey availability during the O&M phase is considered to be **negligible** in both Scottish and English waters.

Significance of effect

- 5.8.3.28 Overall, it is considered that the sensitivity of marine mammal receptors associated with changes in prey availability has been assessed as **low**, and the magnitude of impact has been assessed as **negligible**. The resulting significance of effect is considered to be negligible or minor [see **Table 5.34**].
- 5.8.3.29 Therefore, the significance of effect from changes in prey availability during the O&M phase is considered to be **negligible (adverse)**, which is **not significant** in EIA terms in both Scottish and English waters. This reflects the temporary and localised nature of predicted effects on fish and shellfish receptors, the absence of predicted effects within identified important marine mammal foraging areas, and the wide foraging ranges and dietary flexibility of marine mammals, such that no measurable consequences for individual survival, reproductive success or population trajectory are expected.

Additional mitigation and residual effects

- 5.8.3.30 At this stage, no additional mitigation measures or monitoring requirements have been identified in relation to changes in prey availability during the O&M phase of the MHPGC Project in Scottish or English waters, taking into account the mitigation measures already identified [see **Table 5.39**]. Therefore, the residual effect remains **negligible (adverse)**, which is **not significant** in EIA terms.

Collisions with vessels

- 5.8.3.31 During the O&M phase, vessel activity will be associated with routine inspections, cable remediation and cable repair activities. The MDS assumes up to five geophysical surveys per year, remediation of up to 13km of offshore export cable per year and an estimated 41 cable repairs over the 35-year operational lifetime. Depending on the activity, up to five vessels may be operating simultaneously during routine inspections and up to four vessels during cable remediation or repair activities [see **Table 5.38**].

Receptor sensitivity

- 5.8.3.32 The sensitivity of marine mammals to vessel collision during the O&M phase is considered to be unchanged from that assessed for the construction phase [see **paragraphs 5.8.2.136 to 5.8.2.141**]. Marine mammals generally exhibit avoidance behaviour in response to vessels and, although collisions may occasionally occur have the potential to result in injury or mortality. However, recovery from non-lethal injuries is possible, and avoidance behaviour reduces the overall likelihood of

collision. Therefore, the sensitivity of marine mammal receptors to vessel collision is considered to be **medium** in both Scottish and English waters.

Magnitude of impact

- 5.8.3.33 Vessel collision risk during the O&M phase is expected to be lower than that assessed during construction phase [see **paragraphs 5.8.2.142 to 5.8.2.147**], owing to the reduced number of vessels operating at any one time and the lower frequency of vessel activity. Routine inspections comprise survey vessels or USVs, while cable remediation and repair activities are localised and infrequent maintenance events throughout the 35-year operational lifetime.
- 5.8.3.34 Similar to the construction phase, the risk of collision is influenced by vessel speed, vessel size and the likelihood of spatial overlap with marine mammals. Routine inspection, remediation and repair activities will generally involve slow-moving vessels while undertaking offshore works, with higher speeds limited to transit to and from ports along pre-determined routes. Marine mammals are expected to avoid approaching vessels, reducing the likelihood of collision. The additional vessel activity associated with the MHPGC Project is not expected to represent a substantial increase above existing background vessel traffic within the region.
- 5.8.3.35 Any O&M vessel activities will be undertaken in accordance with relevant regulatory requirements and applicable marine mammal guidance in place at the time of the activity, including appropriate measures to minimise the risk of vessel collision with marine mammals. The specific mitigation requirements will be confirmed when the O&M activities, vessel requirements and timing are known in accordance with the Offshore Operations and Maintenance Plan (CoT07).
- 5.8.3.36 Although the occurrence of any collisions could cause injury or death, the likelihood of vessel collision with marine mammals is unlikely when considering the reduced number of vessels compared with construction, the intermittent and localised nature of O&M activities, expected vessel operating speeds and the generally slow vessel speeds during offshore works. Taking these factors into account, the magnitude of vessel collision risk during the O&M phase is considered to be **low** in both Scottish and English waters.

Significance of effect

- 5.8.3.37 Overall, it has been considered that the sensitivity of marine mammal receptors from vessel collision risk has been assessed as **medium**, and the magnitude of impact has been assessed as **low**.
- 5.8.3.38 Therefore, the significance of effect from vessel collision risk during the O&M phase is considered to be **minor (adverse)**, which is **not significant** in EIA terms in both Scottish and English waters. This reflects the temporary and intermittent nature of vessel activity, the predominantly slow operational speeds during offshore activities, the expected management of vessel movements, and the generally low density of marine mammals within the vicinity of the MHPGC Project PEIR Red Line Boundary. While a collision has the potential to result in serious injury or mortality, the likelihood of such an interaction is expected to remain low.

Additional mitigation and residual effects

- 5.8.3.39 At this stage, no additional mitigation measures or monitoring requirements have been identified for vessel collision risk during the O&M phase beyond the embedded mitigation measures incorporated into the MHPGC Project [see **Table 5.39**] in Scottish or English waters. The need for, and nature of, any vessel management measures will be confirmed when the O&M activities, vessel requirements and timing are known. Therefore, the residual effect remains **minor (adverse)**, which is **not significant** in EIA terms.

5.8.4 Decommissioning phase

- 5.8.4.1 The MHPGC Project has a lifespan of approximately 35 years. As this work is planned decades into the future, the exact methodology required for decommissioning is not known, though it will be based on the best available technology at the time.
- 5.8.4.2 In the years leading up to the end of the MHPGC Project's operational life, decommissioning options will be evaluated through environmental, technical, and economic assessments, with the objective being to minimise short and long-term effects on the environment, whilst ensuring the sea is safe for other users to navigate. An Offshore Decommissioning Programme will be developed and

submitted to the MMO and MD-LOT prior to the commencement of any offshore construction associated with the of the MHPGC Project (CoT44) [see **Table 5.39**].

- 5.8.4.3 The current approach and MDS [see **Table 5.38**], which has been assessed for decommissioning, is the full removal of the offshore export cable and associated structures and cable protection where it is practicable and environmentally appropriate [see **Volume 1, Chapter 2: Project Description, of the PEIR**]. However, in many cases it may be more environmentally beneficial to leave the offshore export cable buried *in situ*.
- 5.8.4.4 In the event of the full removal of the offshore export cable and cable protection, this would likely have similar impacts as the construction phase and/or the O&M phase. Should the offshore export cable be left *in situ*, there would likely be no further impacts to marine mammals. Thus, as a worst-case scenario, impacts during decommissioning are likely to be of a similar magnitude to construction phase and/or O&M phase activities, depending upon the decommissioning option selected. This has been detailed below.

Injury and disturbance from underwater sound produced during decommissioning activities

Receptor sensitivity

- 5.8.4.5 The sensitivity of marine mammal receptors to underwater sound associated with decommissioning activities is expected to be comparable to those assessed for the equivalent construction (offshore export cable installation activities) and O&M phase activities [see **Sections 5.8.2 and 5.8.3**]. Therefore, sensitivity of marine mammal receptors from auditory injury and behavioural disturbance associated with underwater sound produced during decommissioning activities is considered to be **medium** in both Scottish and English waters.

Magnitude of impact

- 5.8.4.6 Assuming the precautionary scenario of full removal of offshore export cables and associated infrastructure, the activities and number of vessels undertaken during the decommissioning phase are expected to be comparable to those assessed for the construction phase. Accordingly, the underwater sound modelling and assessment presented for the construction phase [see **Volume 2, Appendix 5.1: Underwater Sound Modelling Report, of the PEIR**] is considered applicable to the decommissioning assessment.

Auditory injury (PTS)

- 5.8.4.7 As AUD INJ was not predicted for the modelled offshore export cable installation activities [see **Table 5.41**], the magnitude of auditory injury associated with underwater sound effects from decommissioning activities is considered to be **negligible** in both Scottish and English waters.

Behavioural disturbance

- 5.8.4.8 The underwater sound generated during decommissioning activities is expected to be comparable to that assessed for offshore export cable installation, with continuous, non-impulsive sound sources associated with vessels and seabed intervention activities. The precautionary full-removal scenario could therefore result in behavioural responses within the disturbance ranges identified for the equivalent construction activities. However, decommissioning activities would progress along the offshore export cable corridor rather than remain at a fixed location, and individual activities would be temporary and intermittent. Marine mammals are therefore not expected to experience prolonged exposure to active decommissioning activities.
- 5.8.4.9 Taking into account the precautionary nature of the modelled disturbance ranges [see **paragraph 5.8.2.20**], the temporary and intermittent nature of decommissioning activities, the mobile nature of marine mammal receptors and the absence of anticipated consequences for individual survival, reproductive success or population trajectory, the magnitude of impact from behavioural disturbance associated with decommissioning activities is considered **low** in both Scottish and English waters.

Significance of effect

Auditory injury (PTS)

- 5.8.4.10 Overall, it is considered that the sensitivity of marine mammal receptors to auditory injury associated with underwater sound effects from decommissioning activities are expected has been assessed as

medium, and the magnitude of impact has been assessed as **negligible**. The resulting significance is considered to be negligible or minor [see **Table 5.34**].

- 5.8.4.11 Therefore, the significance of effect of underwater sound associated with decommissioning activities on marine mammals through auditory injury (PTS) during the decommissioning phase is considered to be **negligible**, which is **not significant** in EIA terms in both English and Scottish waters. This reflects the absence of predicted AUD INJ from the equivalent modelled construction activities and the temporary and intermittent nature of decommissioning activities.

Behavioural disturbance

- 5.8.4.12 Overall, it is considered that the sensitivity of marine mammal receptors to behavioural disturbance associated with decommissioning activities has been assessed as **medium**, and the magnitude of impact has been assessed as low.
- 5.8.4.13 Therefore, the significance of effect of underwater sound associated with decommissioning activities on marine mammals through behavioural disturbance during the decommissioning phase is considered to be **minor (adverse)**, which is **not significant** in EIA terms in both English and Scottish waters. This reflects the precautionary nature of the modelled disturbance ranges, together with the temporary and intermittent nature of decommissioning activities and the absence of anticipated consequences for individual survival, reproductive success or population trajectory.

Additional mitigation and residual effects

- 5.8.4.14 At this stage, no additional mitigation measures or monitoring has been identified for the effects of underwater sound from decommissioning activities to marine mammals during the decommissioning phase of the MHPGC Project in both Scottish and English waters, taking into account the mitigation measures identified for equivalent construction activities [see **Table 5.39**]. Therefore, the residual effect remains **negligible or minor (adverse)**, which is **not significant** in EIA terms.

Injury and disturbance from underwater sound produced during site investigation surveys

Receptor sensitivity

- 5.8.4.15 The sensitivity of marine mammal receptors to underwater sound associated with site investigation surveys is considered to be unchanged from that assessed for the equivalent pre-construction and O&M phase activities [see **Sections 5.8.2** and **5.8.3**]. Marine mammals are highly mobile and able to adapt their behaviour to avoid temporary continuous underwater sound associated with survey activities, with recovery expected following cessation of the activity. Therefore, the sensitivity of marine mammal receptors to auditory injury and behavioural disturbance associated with underwater sound from decommissioning site investigation surveys is considered to be **medium** in both Scottish and English waters.

Magnitude of impact

- 5.8.4.16 Site investigation surveys may be required prior to decommissioning to inform the development of the Decommissioning Plan (CoT44). Should such any surveys be required, they are expected to comprise comparable geophysical or geotechnical survey activities to those assessed for the pre-construction and O&M phases. Accordingly, the underwater sound modelling and assessment presented for those phases are considered applicable to the decommissioning assessment. Therefore, the magnitude of auditory injury and behavioural disturbance from underwater sound effects associated with decommissioning site investigation activities is considered to be **negligible** in both Scottish and English waters.
- 5.8.4.17 Any future site investigation surveys involving sound-generating equipment will be undertaken in accordance with the relevant regulatory requirements and applicable guidance in place at the time of the survey, including any appropriate marine mammal mitigation and monitoring measures. The specific mitigation requirements will be confirmed when the survey parameters, equipment and timing are known.

Significance of effect

- 5.8.4.18 Overall, it is considered that the sensitivity of marine mammal receptors associated with underwater sound effects from site investigation activities has been assessed as **medium**, and the magnitude

of impact has been assessed as **negligible**. The resulting significance is considered to be negligible or minor [see **Table 5.34**].

- 5.8.4.19 Therefore, the significance of effect of underwater sound associated with site investigation activities on marine mammals during the decommissioning phase is considered to be **negligible (adverse)**, which is **not significant** in EIA terms in both Scottish and English waters.

Additional mitigation and residual effects

- 5.8.4.20 At this stage, no additional mitigation measures or monitoring has been identified for the effects of underwater sound associated with site investigation activities to marine mammals during the decommissioning phase in Scottish or English waters. The need for, and nature of, any mitigation and monitoring measures will be confirmed when the survey parameters, equipment and timing are known. Therefore, the residual effect remains **negligible (adverse)**, which is **not significant** in EIA terms.

Changes in prey availability

- 5.8.4.21 Marine mammals may be indirectly affected as predators where MHPGC Project decommissioning phase activities associated with offshore cable removal and infrastructure removal alter the abundance, distribution or availability of prey species. As described in **Volume 2, Chapter 4: Fish and Shellfish Ecology, of the PEIR**, the principal pathways by which decommissioning could affect fish and shellfish receptors include [see **Table 5.38**]:

- Temporary habitat loss and disturbance;
- Increased SSCs and associated sediment deposition;
- Disturbance/remobilisation of sediment bound contaminants;
- Increased risk of introduction and spread of invasive non-native species;
- Underwater sound (excluding UXO): mortality, injury, behavioural impacts and auditory masking;
- Removal of hard substrate.

Receptor sensitivity

- 5.8.4.22 The sensitivity of marine mammal receptors to changes in prey availability during the decommissioning phase is expected to be comparable to those assessed for the construction and O&M phases [see **Sections 5.8.2 and 5.8.3**]. Marine mammals are highly mobile and forage over large areas, with most species utilising a wide variety of prey species [see **Table 5.51**]. Although some marine mammal species may show preference for particular prey items or foraging areas, populations are not considered dependent on a single prey species or localised habitat resources within the MHPGC Project PEIR Red Line Boundary. Therefore, considering the ability of marine mammals to adapt foraging behaviour and switch prey resources without effects on survival and reproductive success, the sensitivity to changes in prey availability is considered **low** in both Scottish and English waters.

Magnitude of impact

- 5.8.4.23 Under the precautionary assumption of full removal of the offshore export cable and associated infrastructure, decommissioning activities have the potential to affect fish and shellfish receptors through the same mechanisms as those assessed for the construction phase [see **paragraphs 5.8.2.124 to 5.8.2.131**].
- 5.8.4.24 As these activities are expected to be comparable to those assessed during the construction phase, the Fish and Shellfish Ecology assessment and associated conclusions presented for the construction phase are considered applicable to the decommissioning assessment. No significant effects on fish and shellfish populations are predicted and, consequently, any indirect effects on marine mammals arising from changes in prey availability would be limited to temporary and localised changes in prey resources.
- 5.8.4.25 Therefore, the magnitude of indirect effects on marine mammals arising from changes in prey availability during the decommissioning phase is considered to be **negligible** in both Scottish and English waters.

Significance of effect

- 5.8.4.26 Overall, it is considered that the sensitivity of marine mammal receptors associated with changes in prey availability has been assessed as **low**, and the magnitude of impact has been assessed as **negligible**. The resulting significance of effect is considered to be negligible or minor [see **Table 5.34**].
- 5.8.4.27 Therefore, the significance of effect from changes in prey availability during the decommissioning phase is considered to be **negligible (adverse)**, which is **not significant** in EIA terms in both Scottish and English waters.

Additional mitigation and residual effects

- 5.8.4.28 At this stage, no additional mitigation measures or monitoring requirements have been identified in relation to changes in prey availability during the decommissioning phase of the MHPGC Project in Scottish or English waters, taking into account the mitigation measures already identified [see **Table 5.39**]. Therefore, residual effect remains **negligible (adverse)**, which is **not significant** in EIA terms.

Collisions with vessels

Receptor sensitivity

- 5.8.4.29 In the event of the full removal of the offshore export cable and associated infrastructure, the sensitivity of marine mammals in response to collisions with vessels during the decommissioning phase is expected to be comparable from that assessed for the construction phase [see **paragraphs 5.8.2.136 to 5.8.2.141**]. Marine mammals generally exhibit avoidance behaviour in response to vessels and, although collisions may occasionally occur have the potential to result in injury or mortality. However, recovery from non-lethal injuries is possible, and avoidance behaviour reduces the overall likelihood of collision. Therefore, the sensitivity of marine mammal receptors to vessel collision during the decommissioning phase is considered to be **medium** in both Scottish and English waters.

Magnitude of impact

- 5.8.4.30 Under the precautionary assumption of full removal of the offshore export cable and associated infrastructure, decommissioning activities would require the use of construction-type vessels comparable to those assessed during the construction phase [see **paragraphs 5.8.2.142 to 5.8.2.147**]. Vessel movements would be associated with cable recovery, seabed intervention and support activities.
- 5.8.4.31 As these activities are expected to be comparable to those assessed for the construction phase, the construction phase assessment of vessel collision risk is considered applicable to the decommissioning assessment. Marine mammals are expected to avoid approaching vessels, vessel activity would be temporary and localised, and the additional vessel movements associated with decommissioning would not be expected to represent a substantial increase above existing background vessel traffic within the region.
- 5.8.4.32 Any decommissioning vessel activities will be undertaken in accordance with relevant regulatory requirements and applicable marine mammal guidance in place at the time of decommissioning, including appropriate measures to minimise the risk of vessel collision with marine mammals. The specific mitigation requirements will be confirmed when the decommissioning activities, vessel requirements and timing are known.
- 5.8.4.33 Therefore, the magnitude of vessel collision risk to marine mammals during the decommissioning is considered to be **low** in both Scottish and English waters.

Significance of effect

- 5.8.4.34 Overall, it is considered that the sensitivity of marine mammal receptors associated with vessel collision risk has been assessed as **medium**, and the magnitude of impact has been assessed as **low**.
- 5.8.4.35 Therefore, the significance of effect from vessel collision risk during the decommissioning phase, is considered to be **minor (adverse)**, which is **not significant** in EIA terms. While a collision has the potential to result in serious injury or mortality, the likelihood of such an interaction is expected to remain low.

Additional mitigation and residual effect

- 5.8.4.36 At this stage, no additional mitigation or monitoring requirements have been proposed in relation to the risk of marine mammal collisions with decommissioning vessels in either Scottish or English waters, beyond the embedded mitigation measures incorporated into the MHPGC Project [see **Table 5.39**]. This may be reviewed depending on the specific approach adopted at the time of decommissioning. Therefore, the residual effect remains **minor (adverse)**, which is **not significant** in EIA terms.

5.9 Cumulative effects

5.9.1 Cumulative effects assessment methodology

- 5.9.1.1 The Morven Programme comprises four distinct projects: Morven North, Morven South, MHPGC Project, and Morven Branxton Area Grid Connection Project (MBAGC Project).
- 5.9.1.2 The following assessment scenarios have been considered to identify the Likely Significant Effects (LSE) of the MHPGC Project in combination with other projects on the same receptor, as follows [and summarised in **Table 5.52**]:
- Whole project assessment: to identify the potential impacts associated with MHPGC Project together with Morven North and Morven South in turn, (Scenario 1: Morven North and Scenario 2: Morven South), each of which would comprise a “whole project”;
 - Morven Programme assessment: to identify potential impacts associated with all four components of the Morven Programme (Morven North, Morven South, MHPGC Project, and MBAGC Project) (Scenario 3);
 - Cumulative Effects Assessment (CEA): to identify the potential impacts associated with MHPGC Project together with relevant projects, plans and activities, including other components of the Morven Programme, using a tiered approach (Scenario 4).
- 5.9.1.3 The whole project assessment and CEA have been undertaken in accordance with the methodology described in **Volume 1, Chapter 4: Approach to Environmental Impact Assessment, of the PEIR**. The cumulative projects screening process and the assessment scenarios taken forward were discussed and agreed with SNCBs during the EPP [see **Section 5.3.2**].

Table 5.52: Scenarios to be considered in the MHPGC Project whole project assessment and Cumulative Effects Assessment for marine mammals

Whole project assessment		Morven Programme assessment (Offshore Ornithology and Shipping and Navigation chapters only)		CEA
Scenario 1	Scenario 2	Scenario 3	Scenario 4	
MHPGC Project and Morven North	MHPGC Project and Morven South	MHPGC Project, Morven North, Morven South and MBAGC Project	MHPGC Project, Tier 1 (including Morven North and Morven South), Tier 2 and Tier 3 (including MBAGC Project) projects and plans screened in	

- 5.9.1.4 For the purposes of this chapter, Scenarios 1, 2, and 4 have been taken forward for assessment; Scenario 3 has not been included as it is not applicable to this chapter. As discussed in **Volume 1, Chapter 4: Approach to Environmental Impact Assessment, of the PEIR**, the Morven Programme assessment (Scenario 3) is only required for specific chapters to provide further context to, and to support, the conclusions of the CEA scenario (Scenario 4), in agreement with the relevant stakeholders for these topics. As Scenario 3 does not form the basis of the CEA conclusions, it is considered a supplementary assessment to the CEA scenario (Scenario 4) for these specific topics.
- 5.9.1.5 The approach to CEA presented in this chapter complies with the requirements under the EIA Regulations to assess the LSE on the environment arising from the MHPGC Project cumulatively with

other relevant plans, projects and activities, and no supplementary assessment of the Morven Programme (Scenario 3) is required or has been requested by relevant stakeholders with regard to marine mammals.

- 5.9.1.6 The projects and plans selected as relevant to the CEA presented in this chapter are based on the screening exercise presented in **Volume 1, Annex 4.3: Cumulative Screening and Location Plan, of the PEIR**. Each project or plan has been considered on a case-by-case basis for screening in or out according to data confidence, effect-receptor pathways and the relevant spatial and temporal scales involved.
- 5.9.1.7 In undertaking the CEA for MHPGC Project, it should be noted that other projects and plans under consideration will have differing potential for proceeding to an operational stage and hence a differing potential to ultimately contribute to a cumulative impact alongside MHPGC Project. Therefore, a tiered approach has been adopted, whereby all third-party projects and plans considered have been allocated into 'tiers' reflecting their current stage within the planning and development process. This provides a framework for placing relative weight upon the potential for each project/plan included in the CEA to ultimately be realised, based upon the project/plan's current stage of maturity and certainty in the project/plan's parameters. The tiered approach utilised within the MHPGC Project CEA employs the following tiers:
- Tier 1 assessment – Existing developments either built (operational) or under construction⁵; approved developments awaiting implementation; and permitted/submitted application(s), but not yet determined, including Morven North and Morven South.
 - Tier 2 assessment – All plans/projects assessed under Tier 1, plus plans/projects where a scoping report has been submitted and is in the public domain.
 - Tier 3 assessment – All plans/projects assessed under Tier 1 and 2, plus MBAGC Project, and plans/projects that are reasonably foreseeable (e.g. projects identified in development plans, projects in other plans and programmes, offshore renewable energy projects that have a Crown Estate Scotland Lease Option Agreement).
- 5.9.1.8 The specific projects and plans screened into the CEA for marine mammals are presented in **Table 5.54** and **Figure 5.15**. A staged screening process was undertaken to identify those projects with the potential to contribute to cumulative effects with the MHPGC Project, as follows:
- Long list screening:
 - Projects located within the Marine Mammal Regional Study Area were screened in, as agreed with SNCBs.
 - Projects with no temporal overlap with any phase of the MHPGC Project were screened out.
 - Projects with no effect-receptor pathway to marine mammals were screened out.
 - The remaining projects were taken forward to short list screening.
 - Short list screening:
 - Projects where construction, O&M and/or decommissioning activities had already been completed by 2025 were screened out and considered part of the baseline.
 - Projects expected to begin and/or remain under construction up to one year before commencement as well as one year post completion of the MHPGC Project construction phase were retained within the CEA.

⁵ Note that existing developments are included in Tier 1 CEA long list but are generally screened out of the CEA assessments, aside from the following exceptions:

1) Existing developments which were not present at the time of baseline characterisation, where a potential cumulative impact-receptor pathway has been identified.

2) Existing developments are screened into tier 1 assessments for specific topics where there is a large conceptual, temporal and spatial overlap between project impacts. In these instances, the potential for ongoing effects through cumulative impact-receptor pathways throughout project lifetime, across the development phases, means that they are considered within quantitative assessment for these topic CEAs (e.g., offshore ornithology assessments consider the cumulative effects of operational offshore wind farms).

- The remaining projects were reviewed on a species-specific basis, with consideration given to the relevant MU or SMU for each species. Projects outside the relevant population unit were screened out for that species.

- 5.9.1.9 The potential impacts taken forward to the whole project assessment and CEA represent a subset of those assessed for MHPGC Project alone [see **Table 5.53**]. All impacts scoped into the project-level assessment were considered for inclusion in the whole project assessment and CEA. However, impacts assessed as being of ‘negligible’ significance in the MHPGC Project-alone assessment [see **Section 5.8**] were screened out where they were not considered capable of interacting cumulatively with similar impacts arising from other plans or projects. The impacts scoped out of the whole project assessment and CEA, together with the justification for their exclusion, are presented in **Table 5.53**.
- 5.9.1.10 Some of the potential impacts assessed for the MHPGC Project alone are specific to a particular phase of development (e.g. construction, O&M or decommissioning), such as underwater noise produced by offshore export cable installation activities and UXO clearances, which occur during only the construction phase. While cumulative effects can occur where there is potential for spatial and temporal overlap between the MHPGC Project and other relevant plans or projects during the same phase of development, only construction phase impacts have been taken forward to the whole project assessment and CEA for marine mammals. O&M and decommissioning phase impacts were not considered capable of contributing to cumulative effects based on the conclusions of the MHPGC Project-alone assessment [see **Sections 5.8.3** and **5.8.4**].
- 5.9.1.11 For potential impacts within the construction phase, temporal overlap was assumed where projects were expected to undertake construction within one year either side of the anticipated MHPGC Project construction period (2033 to 2037). Accordingly, projects with construction activities occurring between 2032 and 2038 were considered to have the potential for temporal overlap for a relevant impact. Impact-specific effects were then screened based on the outcome of the MHPGC Project alone assessment [see **Section 5.8.2**], taking a proportionate approach to focus the CEA on those impacts with the potential for a cumulative effect.

Table 5.53: Impacts screened in and out of the whole project Assessment and CEA for marine mammals

Impact	Phase ⁶⁷			Screened in or out of whole project assessment and CEA	Justification
	C	O&M	D		
Injury from underwater sound produced by offshore export cable installation activities	✓	X	X	Out	AUD INJ (PTS) is not predicted from offshore export cable installation activities for the MHPGC Project alone during the construction phase. As no project-alone effect is identified, there is no potential for cumulative auditory injury effects.
Disturbance from underwater sound produced by offshore export cable installation activities	✓	X	X	In	Behavioural disturbance from offshore export cable installation activities was assessed as minor adverse (not significant) for the MHPGC Project alone. As equivalent activities as well as activities which may produce greater levels of underwater sound leading to disturbance may occur concurrently with other offshore developments, this impact has been taken forward to determine whether cumulative behavioural disturbance could arise.
Injury from underwater sound produced by UXO clearance	✓	X	X	Out	UXO clearance will be undertaken using low order clearance techniques (CoT58) in accordance with the MHPGC Project-specific MMMP (CoT36). The MMMP (CoT36) will include mitigation measures to minimise the risk of injury to marine mammals during UXO clearance. AUD INJ is therefore not predicted for the MHPGC Project alone and there is no realistic pathway for cumulative auditory injury effects.
Disturbance from underwater sound produced by UXO clearance	✓	X	X	In	Behavioural disturbance associated with low order UXO clearance was assessed as resulting in a minor adverse effect (not significant) for the MHPGC Project alone. As equivalent activities may occur concurrently with other offshore developments, this impact has been taken forward to determine whether cumulative behavioural disturbance could arise.

⁶ C= Construction, O= Operations and maintenance, D= Decommissioning phases.

⁷ "✓" is used to denote the phase the potential impact can occur, "X" outlines there is no impact within this project phase.

Impact	Phase ⁶⁷			Screened in or out of whole project assessment and CEA	Justification
	C	O&M	D		
Injury from underwater sound produced by site investigation surveys	✓	✓	✓	Out	Site investigation surveys will be undertaken in accordance with the MMMP (CoT36), including implementation of the relevant JNCC (2017) guidelines for geophysical surveys, where applicable. AUD INJ (PTS) is not predicted for the MHPGC Project alone and there is no realistic pathway for cumulative auditory injury effects.
Disturbance from underwater sound produced by site investigation surveys	✓	✓	✓	Out	Behavioural disturbance associated with site investigation surveys is predicted to be localised, temporary and of negligible magnitude for the MHPGC Project alone. Given the limited spatial extent and intermittent nature of these activities, there is no realistic pathway for significant cumulative behavioural disturbance.
Changes in prey availability	✓	✓	✓	Out	Changes in prey availability are anticipated to be highly localised across all phases and there were no likely significant effects predicted for fish and shellfish receptors from the MHPGC Project alone or cumulatively during any phase [see Volume 2, Chapter 4: Fish and Shellfish Ecology]. Consequently, no significant indirect effects on marine mammal prey availability are predicted. Given the highly localised nature of habitat disturbance and the ability of marine mammals to exploit a range of prey resources, there is no realistic pathway for cumulative effects.
Collision with vessels	✓	✓	✓	Out	Vessel movements will be managed through the implementation of the MHPGC Project-specific VTMP (CoT30) and MMMP (CoT36), which includes vessel codes of conduct such as limited speeds, following designated transit routes and ensure compliance with international marine regulations. Vessel collision is not predicted for the MHPGC Project alone, as the risk of collision is anticipated to be very low. As such, there is no realistic pathway for cumulative effects.

Table 5.54: List of other projects and plans considered within the Cumulative Effects Assessment for marine mammals

Project/plan	Status	Distance from MHPGC Project (km)	Description of project/plan	Estimated dates of construction (If applicable)	Estimated dates of operation (If applicable)	Overlap with MHPGC Project
MHPGC Project	Pre-planning	-	Proposed Development	2034-2037	2038 onwards	-
Tier 1						
Offshore wind projects and associated cables						
Morven North	Application submitted, awaiting decision	0.00	Proposed for up to 96 turbines.	2033-2042 ⁸	2038 onwards ⁹	Scenario 1, 2 and 4
Morven South	Application submitted, awaiting decision	0.00	Proposed for up to 95 turbines.	2033-2042 ⁸	2038 onwards ⁸	Scenarios 1, 2 and 4

⁸ At this stage, Morven North and Morven South could be constructed anywhere between 2033 to 2042, with both projects possibly being constructed concurrently or one after the other. As a precaution the widest possible construction phase of 10 years has been used in the CEA.

⁹ While Morven North and Morven South could be constructed anywhere between 2033 to 2042, the O&M phase has been assumed as commencing in 2038 as a precaution in the instance that one project is constructed first and operational while the other is still in its construction phase.

Project/plan	Status	Distance from MHPGC Project (km)	Description of project/plan	Estimated dates of construction (If applicable)	Estimated dates of operation (If applicable)	Overlap with MHPGC Project
Ossian Offshore Wind Farm (OWF)	Application submitted, awaiting decision	5.50	The Ossian OWF is proposed for up to 3,610MW capacity.	2031-2034	2035 onwards	Yes. Overlap of construction phase or operational phase with the construction or operational phases of MHPGC Project.
Bowdun OWF	Application submitted, awaiting decision	10.03	Bowdun OWF is proposed for up to 67 turbines (either floating and/or fixed foundations) at a capacity of 1,008MW.	2031-2034	2035 onwards	Yes. Overlap of construction phase or operational phase with the construction or operational phases of MHPGC Project.
Bowdun Export Cable Corridor (ECC)	Application submitted, awaiting decision	19.54	Bowdun ECC is the ECC associated with Bowdun OWF.	2031-2034	2035 onwards	Yes. Overlap of construction phase or operational phase with the construction or operational phases of MHPGC Project.

Project/plan	Status	Distance from MHPGC Project (km)	Description of project/plan	Estimated dates of construction (If applicable)	Estimated dates of operation (If applicable)	Overlap with MHPGC Project
Bellrock ECC	Application submitted, awaiting decision	24.70	Bellrock ECC is the ECC associated with the Bellrock OWF.	2029-2033	2034 onwards	Yes. Overlap of construction phase or operational phase with the construction or operational phases of MHPGC Project.
Bellrock OWF	Application submitted, awaiting decision	34.98	Bellrock Floating OWF is proposed for up to 132 turbines at a capacity of 1,800MW.	2029-2033	2034 onwards	Yes. Overlap of construction phase or operational phase with the construction or operational phases of MHPGC Project.
Seagreen Phase 1A OWF	Consented	40.96	Seagreen Phase 1A OWF is proposed for up to 36 turbines at a capacity of 540MW.	2030-2032	2033	No. Construction is anticipated to be complete a year prior to the construction or operational phases of MHPGC Project.

Project/plan	Status	Distance from MHPGC Project (km)	Description of project/plan	Estimated dates of construction (If applicable)	Estimated dates of operation (If applicable)	Overlap with MHPGC Project
Seagreen Phase 1A Offshore ECC	Consented	48.45	Seagreen Phase 1A Offshore ECC is the ECC associated with the Seagreen Phase 1A OWF.	2029-2033	2034 onwards	Yes. Overlap of construction phase or operational phase with the construction or operational phases of MHPGC Project.
Muir Mhòr OWF	Application submitted, awaiting decision	58.16	Muir Mhòr OWF is proposed for a capacity of 798MW.	2029-2033	2034 onwards	Yes. Overlap of construction phase or operational phase with the construction or operational phases of MHPGC Project.
Muir Mhòr ECC	Application submitted, awaiting decision	60.80	Muir Mhòr ECC is the ECC associated with Muir Mhòr OWF.	2029-2033	2034 onwards	Yes. Overlap of construction phase or operational phase with the construction or operational phases of MHPGC Project.

Project/plan	Status	Distance from MHPGC Project (km)	Description of project/plan	Estimated dates of construction (If applicable)	Estimated dates of operation (If applicable)	Overlap with MHPGC Project
Buchan Preferred ECC	Application submitted	84.21	Buchan Preferred ECC is the ECC associated with the Buchan OWF.	2029-2032	2033	No. Construction is anticipated to be complete a year prior to the construction or operational phases of MHPGC Project.
Hornsea Project 4 ECC	Consented	107.96	Hornsea Project 4 ECC is the ECC associated with the Hornsea Project 4 OWF.	2028-2032	2033	No. Construction is anticipated to be complete a year prior to the construction or operational phases of MHPGC Project.
Marram ECC	Application submitted, awaiting decision	124.55	Marram ECC is the ECC associated with the Marram OWF.	2028-2035	2036 onwards	Yes. Overlap of construction phase or operational phase with the construction or operational phases of MHPGC Project.

Project/plan	Status	Distance from MHPGC Project (km)	Description of project/plan	Estimated dates of construction (If applicable)	Estimated dates of operation (If applicable)	Overlap with MHPGC Project
Marram OWF	Application submitted, awaiting decision	124.55	Marram OWF is proposed for up to 225 turbines at a capacity of 3,000MW	2028-2035	2036 onwards	Yes. Overlap of construction phase or operational phase with the construction or operational phases of MHPGC Project.
Buchan OWF	Application submitted	148.83	Buchan OWF is proposed for up to 70 turbines at a capacity of 1,000MW.	2028-2032	2033	No. Construction is anticipated to be complete a year prior to the construction or operational phases of MHPGC Project.
Dogger Bank South (West) OWF	Consented	159.44	Dogger Bank South (West) OWF is proposed for up to 100 turbines at a capacity of up to 1,500MW.	2030-2032	2033	No. Construction is anticipated to be complete a year prior to the construction or operational phases of MHPGC Project.

Project/plan	Status	Distance from MHPGC Project (km)	Description of project/plan	Estimated dates of construction (If applicable)	Estimated dates of operation (If applicable)	Overlap with MHPGC Project
Ayre OWF	Application submitted	213.72	Ayre OWF is proposed for up to 67 turbines at a capacity of 1,000MW.	2029-2032	2033	No. Construction is anticipated to be complete a year prior to the construction or operational phases of MHPGC Project.
Ayre ECC	Application submitted	202.27	Ayre ECC is the ECC associated with the Ayre OWF.	2030-2032	2033	No. Construction is anticipated to be complete a year prior to the construction or operational phases of MHPGC Project.
Tier 2						
Offshore wind projects and associated cables						
Stromar ECC	Pre-planning	106.39	Stromar ECC is the ECC associated with the Stromar OWF.	2030-2034	2035 onwards	Yes. Overlap of construction phase or operational phase with the construction or operational phases of MHPGC Project.

Project/plan	Status	Distance from MHPGC Project (km)	Description of project/plan	Estimated dates of construction (If applicable)	Estimated dates of operation (If applicable)	Overlap with MHPGC Project
Broadshore OWF	Scoping submitted report	141.43	Broadshore OWF is proposed for up to 60 turbines at a capacity of 900MW.	2030-2033	2034 onwards	Yes. Overlap of construction phase or operational phase with the construction or operational phases of MHPGC Project.
Stromar OWF	Scoping submitted report	174.94	Stromar OWF is proposed floating OWF for up to 71 turbines at a capacity of 1,500MW.	2028-2033	2034 onwards	Yes. Overlap of construction phase or operational phase with the construction or operational phases of MHPGC Project.
Arven ECC	Pre-planning	361.87	Arven ECC is the ECC associated with the Arven OWF.	2031-2034	2035 onwards	Yes. Overlap of construction phase or operational phase with the construction or operational phases of MHPGC Project.

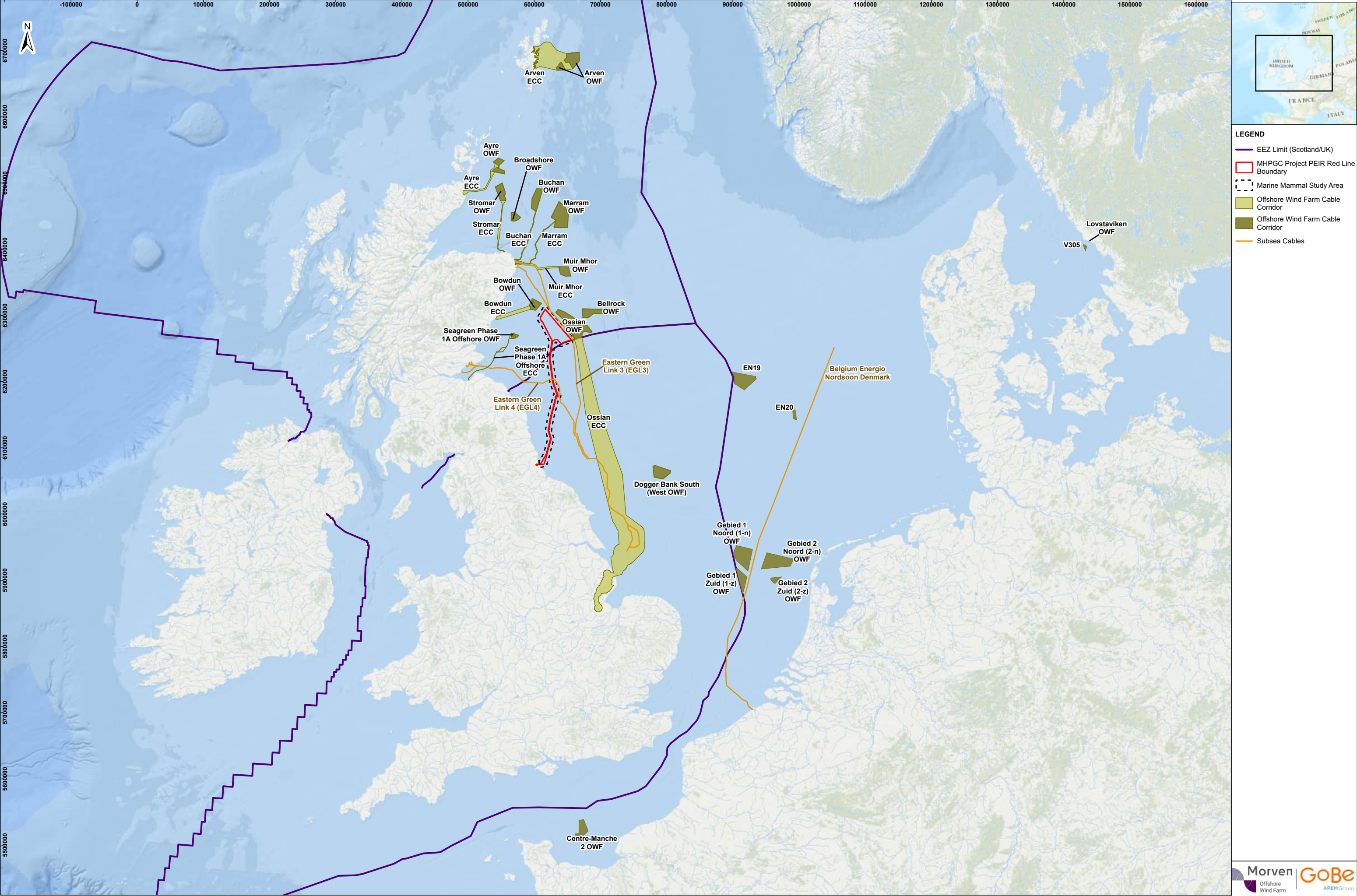
Project/plan	Status	Distance from MHPGC Project (km)	Description of project/plan	Estimated dates of construction (If applicable)	Estimated dates of operation (If applicable)	Overlap with MHPGC Project
Arven OWF	Scoping report submitted	361.87	Arven OWF is proposed floating OWF for up to 161 turbines at a capacity of 2,300MW split between two sites.	2030-2033	2034 onwards	Yes. Overlap of construction phase or operational phase with the construction or operational phases of MHPGC Project.
Other cables and pipelines						
Eastern Green Link 4 (EGL4) Scoping Route	Scoping report submitted	0.00	Subsea cable in development connecting Scotland and England to increase renewable energy transmission capacity.	2029-2032	2033	No. Construction is anticipated to be complete a year prior to the construction or operational phases of MHPGC Project.
Eastern Green Link 3 (EGL3) Scoping Route	Scoping report submitted	2.33	Subsea cable in development connecting Scotland and England to increase renewable energy transmission capacity.	2030-2032	2033	No. Construction is anticipated to be complete a year prior to the construction or operational phases of MHPGC Project.
Tier 3						
Offshore wind projects and associated cables						

Project/plan	Status	Distance from MHPGC Project (km)	Description of project/plan	Estimated dates of construction (If applicable)	Estimated dates of operation (If applicable)	Overlap with MHPGC Project
MBAGC Project	Pre-planning	0.00	Alternative Morven Project ECC corridor; included part of Scenario 4.	2031 onwards	N/A	Part of Scenario 4
Ossian ECC	Pre-planning	33.50	Ossian Transmission Infrastructure is the ECC associated with the Ossian OWF.	2031-2034	2035 onwards	Yes. Overlap of construction phase or operational phase with the construction or operational phases of MHPGC Project.
Broadshore ECC	Pre-planning	141.43	Broadshore ECC is the ECC associated with the Broadshore OWF.	2030-2033	2034 onwards	Yes. Overlap of construction phase or operational phase with the construction or operational phases of MHPGC Project.
EN19	Proposed	248.02	Proposed OWF development area in the German North Sea.	2029-2032	2033	No. Construction is anticipated to be complete a year prior to the construction or operational phases of MHPGC Project.

Project/plan	Status	Distance from MHPGC Project (km)	Description of project/plan	Estimated dates of construction (If applicable)	Estimated dates of operation (If applicable)	Overlap with MHPGC Project
Gebied 1 Noord (1-n)	Proposed	315.69	Offshore wind development area proposed in the Dutch North Sea.	2030-2032	2033	No. Construction is anticipated to be complete a year prior to the construction or operational phases of MHPGC Project.
Gebied 1 Zuid (1-z)	Proposed	329.83	Offshore wind development area proposed in the Dutch North Sea.	2030-2032	2033	No. Construction is anticipated to be complete a year prior to the construction or operational phases of MHPGC Project.
EN20	Proposed	343.94	Proposed OWF development area in the German North Sea.	2030-2034	2035 onwards	Yes. Overlap of construction phase or operational phase with the construction or operational phases of MHPGC Project.

Project/plan	Status	Distance from MHPGC Project (km)	Description of project/plan	Estimated dates of construction (If applicable)	Estimated dates of operation (If applicable)	Overlap with MHPGC Project
EN18	Proposed	348.62	Proposed OWF development area in the German North Sea.	2027-2032	2033	No. Construction is anticipated to be complete a year prior to the construction or operational phases of MHPGC Project.
Gebied 2 Noord (2-n)	Proposed	362.16	Offshore wind development area proposed in the Dutch North Sea.	2029-2032	2033	No. Construction is anticipated to be complete a year prior to the construction or operational phases of MHPGC Project.
Centre-Manche 2	Proposed	539.56	Proposed OWF in the French English Channel.	2029-2032	2033	No. Construction is anticipated to be complete a year prior to the construction or operational phases of MHPGC Project.

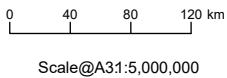
Project/plan	Status	Distance from MHPGC Project (km)	Description of project/plan	Estimated dates of construction (If applicable)	Estimated dates of operation (If applicable)	Overlap with MHPGC Project
Lovstaviken	Proposed	796.09	OWF in southwest Sweden.	2029-2032	2033	No. Construction is anticipated to be complete a year prior to the construction or operational phases of MHPGC Project.
V305	Proposed	786.71	Proposed OWF development area in Swedish waters.	2029-2032	2033	No. Construction is anticipated to be complete a year prior to the construction or operational phases of MHPGC Project.
Other cables and pipelines						
Belgium Energio Nordsoon Denmark	Proposed	343.94	Subsea cable in development to connect Belgium and Denmark.	2036	NA	Yes. Overlap of construction phase or operational phase with the construction or operational phases of MHPGC Project.



- LEGEND**
- EEZ Limit (Scotland/UK)
 - MHPGC Project PEIR Red Line Boundary
 - Marine Mammal Study Area
 - Offshore Wind Farm Cable Corridor
 - Offshore Wind Farm Cable Corridor
 - Subsea Cables

Project Name:
MORVEN HAWTHORN PIT GRID
CONNECTION PROJECT

Drawing Title:
PROJECTS AND PLANS CONSIDERED WITHIN THE CUMULATIVE EFFECTS
ASSESSMENT FOR MARINE MAMMALS



Geodetic Information:
Datum: European 1950
Projection: ED 1950 UTM Zone 30N

Data Sources:
BP, Ordnance Survey

Service Layer Credits:
World Topographic Map: Esri, HERE, FAO, NOAA
World Ocean Base: Esri, GEBCO, Garmin, NaturalVue

Drawing Number:				
FIGURE 5-15				
VER	DATE	DETAILS	BY	CHECK
00	22/09/2025	Initial Issue	GB	BW
-	-	-	-	-

5.9.2 Maximum design scenario – CEA

- 5.9.2.1 The marine mammal CEA MDSs identified in **Table 5.55** have been selected as those having the potential to result in the greatest potential effect on an identified receptor or receptor group in relation to the whole project assessment and CEA. The marine mammal CEA MDSs have been based on the MHPGC Project alone assessment MDS [see **Table 5.38**], as well as publicly available information on other third-party projects and plans that have been screened into the CEA [see **Table 5.54**]. Where applicable, the Morven North and Morven South alone assessment MDSs, and project information available for MBAGC Project have also informed the MDSs outlined in **Table 5.55**.

Table 5.55: Maximum Design Scenario considered for the assessment of potential whole project and cumulative effects on marine mammals

Potential Effect	Phase ¹⁰¹¹			Maximum Design Scenario	Justification
	C	O	D		
Behavioural disturbance from underwater sound produced by construction activities	✓	✗	✗	Scenario 1 MDS as described for MHPGC Project [see Table 5.38], assessed cumulatively with Morven North. Scenario 2 MDS as described for MHPGC Project [see Table 5.38], assessed cumulatively with Morven South. Scenario 4 MDS as described for MHPGC Project [see Table 5.38], assessed cumulatively with the following other projects and plans: Tier 1 - Offshore Wind Farm projects (<i>Construction phase</i>): - Morven North; - Morven South; - Ossian OWF; - Ayre OWF; - Bowdun OWF; - Bellrock OWF; - Buchan OWF; - Dogger Bank South (West) OWF; - Seagreen Phase 1A OWF; - Muir Mhòr OWF; and - Marram OWF. - Cables: - Ayre ECC;	Projects and plans included within these scenarios involve activities that may result in temporary behavioural disturbance from underwater sound sources produced by construction activities. Where spatial and/or temporal overlap occurs with MHPGC Project, these activities have the potential to contribute cumulatively to disturbance effects on marine mammals. The selected projects therefore represent a precautionary MDS for cumulative underwater sound effects.

¹⁰ C= Construction, O= Operations and maintenance, D= Decommissioning phases¹¹ "✓" is used to denote the phase the potential impact can occur, "✗" outlines there is no impact within this project phase

Potential Effect	Phase ¹⁰¹¹			Maximum Design Scenario	Justification
	C	O	D		
				– Bowdun ECC; – Bellrock ECC; – Buchan Preferred ECC; – Hornsea Project 4 ECC; – Seagreen Phase 1A Offshore ECC; – Muir Mhòr ECC; – Marram ECC. Tier 2 • Offshore Wind Farm project (Construction phase): – Broadshore OWF; – Stromar OWF; – Arven OWF. • Cables: – Arven ECC; – Stromar ECC; – EGL4 Scoping Route; – EGL3 Scoping Route. Tier 3 • Offshore Wind Farm Project (Construction): – EN18; – EN19; – EN20; – Gebied 1 Noord (1-n); – Gebied 1 Zuid (1-z); – Gebied 2 Noord (2-n); – Centre-Manche 2; – Lovstaviken; – V305. • Cables (Construction): – MBAGC Project;	

Potential Effect	Phase ¹⁰¹¹			Maximum Design Scenario	Justification
	C	O	D		
				– Ossian ECC; – Broadshore ECC; – Belgium Energio Nordsoon Denmark. • Seismic Surveys: – 4 Seismic Surveys (Cetaceans); and – 2 Seismic Surveys (Seals)	

5.9.3 Whole project assessment and CEA

Overview

- 5.9.3.1 A description of the significance of whole project and cumulative effects upon marine mammal receptors arising from each identified impact is given below. The whole project assessment and CEA for MHPGC Project is presented in Table 5.57 and **Table 5.58**.
- 5.9.3.2 For underwater sound effects, the CEA MDS has been defined based on the potential for concurrent or sequential disturbance from activities that generate underwater sound within the Marine Mammal Regional Study Area. Projects have been screened into the MDS where activities have the potential to overlap spatially and/or temporally with the MHPGC Project and contribute to cumulative underwater sound exposure. This includes offshore wind farm and offshore export cable installation activities, as well as seismic surveys, which have been included due to their potential to generate underwater sound over larger spatial scales and result in temporary disturbance to marine mammals.

Behavioural disturbance from underwater sound produced by construction activities

- 5.9.3.3 There is potential for cumulative behavioural disturbance from underwater sound, including UXO clearance, as a result of activities associated with MHPGC Project occurring concurrently with other relevant offshore developments screened into the whole project assessment and CEA.

Methodology

- 5.9.3.4 For the MHPGC Project, the quantitative assessment of behavioural disturbance presented in the project-alone assessment has been used [see **Section 5.8.2**]. The maximum predicted number of animals disturbed per day has been taken forward into the whole project assessment and CEA. For offshore wind farm projects where project-specific quantitative underwater sound assessments were publicly available, the maximum number of animals predicted to be disturbed per day from the relevant construction activity (typically pile driving) was extracted from the relevant assessment and used directly within the CEA.
- 5.9.3.5 Where project-specific quantitative assessments were not available, the indicative number of animals potentially disturbed per day was estimated using species-specific densities. For cetaceans, densities were derived from the relevant SCANS-IV survey block (Gilles *et al.*, 2023). For grey seal and harbour seal, densities were derived from SCOS (2025) SMU population estimates converted to density across the relevant SMUs.
- 5.9.3.6 Project-specific disturbance footprints have been defined using a fixed EDR approach (JNCC, 2025b). The fixed EDR approach is intentionally precautionary and is associated with a number of conservative assumptions, as described below. The EDR threshold parameters used to assess the numbers of animals potentially disturbed from offshore projects are:
- A 20km EDR for piling of all offshore wind farm projects (fixed and floating) in UK waters based on guidance from JNCC (2025b) for unabated pile driving of a monopile, and an impact area of 1,256.64km²;
 - A 20km EDR for UXO clearance, based on the high order detonation of UXOs without noise abatement (i.e. without a bubble curtain), as recommended by JNCC (2025b), and an impact area of 1,256.64km²;
 - A 15km EDR for piling of EU offshore wind farm projects based on the current noise abatement expectations for those countries, and an impact area of 706.9km²;
 - A 5km EDR for seismic surveys (assuming a mini-airguns of sizes ≤12in³ used) and an impact area of 78.5km² as per JNCC (2025b) advice;
 - A 5km EDR for subsea cabling based on guidance from JNCC (2025b) (assuming that only geophysical surveys (SBPs, SBES or MBES used) will be undertaken) and an impact area of 78.5 km².
- 5.9.3.7 Given that the timing of UXO clearance activities is generally unknown for other projects, and that low order clearance techniques are now expected in accordance with the Joint Position Statement (UK Government, 2025), cumulative disturbance associated with UXO clearance has not been quantified separately. Furthermore, the precautionary 20 km EDR applied to offshore wind farm piling

is equivalent to the disturbance EDR recommended by JNCC (2025b) for high-order UXO clearance without noise abatement. As piling activities represent a longer-duration and more frequent construction activity than UXO clearance, any potential contribution from UXO clearance is considered to be encompassed within the worst-case piling assessment.

- 5.9.3.8 In the absence of a recommended methodology for quantitatively assessing cumulative disturbance from seismic surveys, a precautionary approach has been adopted. This assumes that seismic airguns are operating continuously throughout the survey day. In practice, this is highly conservative because airguns are routinely switched off during line changes and other operational pauses (Stone *et al.*, 2017). For example, a review of UK seismic surveys undertaken during 2018 found that airguns were active for only approximately 52% of potential survey time (Department for Business, Energy and Industrial Strategy (BEIS), 2020).
- 5.9.3.9 Seismic surveys have been included as Tier 3 projects because the location and number of future surveys are uncertain. As a precaution, it has been assumed that up to four concurrent seismic surveys could occur within the North Sea Management Unit for cetaceans, representing simultaneous surveys in the northern and southern North Sea across UK and neighbouring waters. For seals, whose SMUs are substantially smaller, a maximum of two concurrent seismic surveys has been assumed. Species-specific densities used to estimate the number of marine mammals potentially disturbed by seismic surveys are presented in **Table 5.56**.

Table 5.56: Summary of parameters used to predict the number of marine mammals potentially disturbed from seismic surveys

Receptor	Assumed location of seismic survey	Abundance	Area (km ²)	Density (individuals/km ²)
Harbour porpoise	North Sea	346,601	680,487	0.509
Bottlenose dolphin	Greater North Sea	2,022	642,199	0.003
White-beaked dolphin	North Sea	43,951	1,568,078	0.028
Minke whale	North Sea	20,181	1,568,078	0.013
Atlantic white-sided dolphin	North Sea	18,128	1,568,078	0.012
Common dolphin	North Sea	102,656	1,568,078	0.07
Grey seal	Southwest Scotland	3,022	7,694	0.393
	Northeast England	21,396	87,570	0.244
	Combined	24,418	95,264	0.256
Harbour seal	Southwest Scotland	1,563	7,694	0.203
	Northeast England	106	87,570	0.001
	Combined	1,669	95,264	0.018

Precaution in the CEA

- 5.9.3.10 The CEA incorporates a number of precautionary assumptions relating to project design, construction programmes and disturbance footprints. Collectively, these assumptions are likely to overestimate the number of marine mammals potentially disturbed and therefore represent a precautionary assessment of cumulative effects. The main areas of precaution in the assessment include:
- The assumption that a large number of offshore developments could undertake underwater sound-generating activities concurrently. For example, the maximum cumulative scenario for harbour porpoise assumes that up to 11 offshore wind farms, nine cable projects and four seismic surveys could all be active simultaneously. Such a scenario is considered highly

unlikely given construction programmes and the global availability of specialist installation vessels.

- Inclusion of Tier 2 and Tier 3 developments, for which project information is generally less certain than for consented or submitted projects. Where project-specific construction details or underwater sound assessments were unavailable, precautionary assumptions have been applied using generic disturbance ranges.
- The assumption that noisy construction activities (e.g. pile driving) may occur at any point during the construction period for each project. As detailed construction schedules are generally unavailable, activities have been assumed to overlap where temporal overlap is possible, although in reality these activities would typically occur over relatively short periods within the overall construction programme.
- The assumption that disturbance footprints from individual projects do not spatially overlap when estimating the total number of animals disturbed. Given the proximity of several offshore developments, overlap between disturbance areas is likely, meaning that the same individuals may be counted more than once. Consequently, the cumulative numbers presented are likely to represent an overestimate.
- The assumption that all offshore wind farm projects involving foundations are installed using unabated piling, with a 20km EDR applied in accordance with JNCC (2025b). In practice, project-specific foundation designs may include alternative installation methods, pin piles, or noise abatement systems that would reduce disturbance ranges (e.g. 11km EDR presented in JNCC, 2025b).
- The application of fixed EDRs where project-specific underwater sound modelling was unavailable. The JNCC (2025b) EDRs were developed primarily for harbour porpoise and have been applied consistently across all marine mammal species as a precautionary approach. As species differ in their sensitivity and behavioural responses to underwater sound, this is likely to overestimate disturbance for some species.
- The use of generic density estimates derived from SCANS-IV (Gilles *et al.*, 2023) and extrapolated SCOS (2025) populations where project-specific baseline information was unavailable. These densities represent broad-scale averages and do not account for local or seasonal variation in marine mammal distribution.
- Seismic surveys have been represented using a precautionary assumption that airguns operate continuously throughout survey days. In practice, airguns are routinely shut down during line changes and operational pauses, resulting in considerably shorter sound exposure periods than assumed in this assessment.

5.9.3.11 There is also the possibility that the same individuals might be affected on multiple occasions across projects sequentially. Given uncertainties surrounding animal turnover and movements at this temporal and spatial scale it is very challenging to predict a realistic overall level of disturbance. Sinclair (2025) provides a detailed discussion on the challenges for offshore wind cumulative assessment for marine mammals. Key challenges are a lack of standardisation of the screening range, the timeframe for consideration, and the approach to the quantitative assessment. It is highlighted in this paper that CEAs assume compounding worst-case scenarios.

5.9.3.12 Accordingly, the cumulative assessment presented below should be regarded as a realistic worst-case assessment and is expected to overestimate the scale of cumulative disturbance that would occur in practice.

Whole project Assessment

5.9.3.13 The summary of the whole project assessment for disturbance from underwater sound (including unexploded ordnance clearance) is presented in **Table 5.57**.

Table 5.57: MHPGC Project whole project assessment for disturbance from underwater sound (including unexploded ordnance clearance)

	Whole project assessment	
	Scenario 1: MHPGC Project and Morven North	Scenario 2: MHPGC Project and Morven South
Construction phase		
Magnitude of impact	Harbour porpoise Number of individuals potentially impacted by Morven North: 1,693 individuals (0.49% of total MU) Number of individuals impacted by MHPGC Project: 47 (0.01% of total MU) Total: 1,740 individuals (0.50% of total MU) Bottlenose dolphin (GNS MU) Number of individuals potentially impacted by Morven North: 15 individuals (0.74% of total MU) Number of individuals impacted by MHPGC Project: 3 (0.15% of total MU) Total: 18 individuals (0.89% of total MU) White-beaked dolphin Number of individuals potentially impacted by Morven North: 227 individuals (0.52% of total MU) Number of individuals impacted by MHPGC Project: 6 (0.01% of total MU) Total: 233 individuals (0.53% of total MU) Minke whale Number of individuals potentially impacted by Morven North: 119 individuals (0.59% of total MU) Number of individuals impacted by MHPGC Project: 3 (0.01% of total MU) Total: 122 individuals (0.61% of total MU)	Harbour porpoise Number of individuals impacted by Morven South: 1,739 individuals (0.50% of total MU) Number of individuals impacted by MHPGC Project: 47 (0.01% of total MU) Total: 1,786 individuals (0.52% of total MU) Bottlenose dolphin (GNS MU) Number of individuals potentially impacted by Morven South: 15 individuals (0.74% of total MU) Number of individuals impacted by MHPGC Project: 3 (0.15% of total MU) Total: 18 individuals (0.89% of total MU) White-beaked dolphin Number of individuals potentially impacted by Morven South: 233 individuals (0.53% of total MU) Number of individuals impacted by MHPGC Project: 6 (0.01% of total MU) Total: 233 individuals (0.53% of total MU) Minke whale Number of individuals potentially impacted by Morven South: 122 individuals (0.61% of total MU) Number of individuals impacted by MHPGC Project: 3 (0.01% of total MU) Total: 125 individuals (0.62% of total MU)

	Whole project assessment	
	Scenario 1: MHPGC Project and Morven North	Scenario 2: MHPGC Project and Morven South
	Atlantic white-sided dolphin Number of individuals potentially impacted by Morven North: 13 individuals (0.07% of total MU) Number of individuals impacted by MHPGC Project: 4 (<0.02% of total MU) Total: 17 individuals (0.09% of total MU) Common dolphin Number of individuals potentially impacted by Morven North: 0 individuals (0.00% of total MU) Number of individuals impacted by MHPGC Project: 5 (<0.01% of total MU) Total: 5 (<0.01% of total MU) Grey seal Number of individuals potentially impacted by Morven North: 582 individuals (2.10% of the reference population) Number of individuals impacted by MHPGC Project: 33 (0.12% of the reference population) Total: 615 individuals (2.22% of the reference population) Harbour seal Number of individuals potentially impacted by Morven North: 1 individual (0.19% of the reference population) Number of individuals impacted by MHPGC Project: 1 individual (0.19% of the reference population) Total: 2 individuals (0.38% of the reference population) The cumulative effect is predicted to be of regional spatial extent, medium term duration, intermittent and high reversibility. It is predicted that the impact of disturbance from underwater noise will affect the receptor directly. The magnitude is therefore considered to be	Atlantic white-sided dolphin Number of individuals potentially impacted by Morven South: 13 individuals (0.07% of total MU) Number of individuals impacted by MHPGC Project: 4 (0.02% of total MU) Total: 17 individuals (0.09% of total MU) Common dolphin Number of individuals potentially impacted by Morven South: 0 individuals (0.00% of total MU) Number of individuals impacted by MHPGC Project: 5 (<0.01% of total MU) Total: 5 (<0.01% of total MU) Grey seal Number of individuals potentially impacted by Morven South: 408 individuals (1.47% of the reference population) Number of individuals impacted by MHPGC Project: 33 (0.12% of the reference population) Total: 441 individuals (1.59% of the reference population) Harbour seal Number of individuals potentially impacted by Morven South: 1 individual (0.19% of the reference population) Number of individuals impacted by MHPGC Project: 1 individual (0.19% of the reference population) Total: 2 individuals (0.38% of the reference population) The cumulative effect is predicted to be of regional spatial extent, medium term duration, intermittent and high reversibility. It is predicted that the impact of disturbance from underwater noise will affect the receptor directly. The magnitude is therefore considered to be

	Whole project assessment	
	Scenario 1: MHPGC Project and Morven North	Scenario 2: MHPGC Project and Morven South
	negligible for all marine mammal species considered in both Scottish and English waters.	negligible for all marine mammal species considered in both Scottish and English waters.
Sensitivity of receptor	The sensitivity of the receptor is as detailed in Section 5.8.2 for the alone assessment and not repeated here. The sensitivity of all marine mammal receptors to behavioural disturbance from underwater noise is considered medium in both Scottish and English waters.	
Significance of effect	For all marine mammal receptors (harbour porpoise, bottlenose dolphin, white-beaked dolphin, minke whale, white-sided dolphin, grey seal and harbour seal), overall, the magnitude of the cumulative impact is deemed to be negligible and the sensitivity of the receptors considered to be medium. The cumulative effect will, therefore, be of negligible or minor significance, which is not significant in EIA terms in both Scottish and English waters.	
Additional mitigation and residual significance	No additional mitigation measures for marine mammal receptors is considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 5.38), is not significant in EIA terms.	

CEA (Scenario 4)

- 5.9.3.14 As detailed in Table 5.55, Morven North, Morven South and 17 other Tier 1 projects, seven Tier 2 projects and 13 Tier 3 projects were identified with the potential for cumulative impacts associated with underwater sound during construction. The summary of the CEA (Scenario 4) is presented in **Table 5.58**.

Harbour porpoise

Tier 1

- 5.9.3.15 The highest number of harbour porpoises predicted to be disturbed across Tier 1 projects between 2026 and 2038 onwards is in 2033, which does coincide with the expected construction phase of the MHPGC Project. The maximum cumulative number of harbour porpoise predicted to be disturbed in 2033 is estimated as 29,867 animals (8.62% of the MU population). The number of harbour porpoise predicted to be impacted by the MHPGC Project during the construction period represents 0.16% of this total.

Tier 1 and 2

- 5.9.3.16 The highest number of harbour porpoises predicted to be disturbed across Tier 1 and 2 projects between 2026 and 2038 onwards is in 2033, which does coincide with the expected construction phase of the MHPGC Project. The maximum cumulative number of harbour porpoise predicted to be disturbed in 2033 is estimated as 31,223 animals (9.01% of the MU population). The number of harbour porpoise predicted to be impacted by the MHPGC Project during the construction period represents 0.15% of this total.

Tier 1, 2 and 3

- 5.9.3.17 The highest number of harbour porpoises predicted to be disturbed across Tier 1, 2 and 3 projects between 2026 and 2038 onwards is in 2031 and 2032, which does not coincide with the expected construction phase of the MHPGC Project. During 2031 and 2032 the maximum cumulative number of harbour porpoise predicted to be is estimated to be 35,360 animals (10.20% of the MU population).
- 5.9.3.18 The maximum cumulative number of harbour porpoise predicted to be disturbed during the expected construction phase of the MHPGC Project is in 2033, estimated as 32,115 animals (9.27% of the MU population). The number of harbour porpoise predicted to be impacted by the MHPGC Project during the construction period represents 0.15% of this total.

Bottlenose dolphin (GNS MU)

Tier 1

- 5.9.3.19 The highest number of bottlenose dolphin predicted to be disturbed across Tier 1 projects between 2026 and 2038 onwards is in 2031 and 2032, which does not coincide with the expected construction phase of the MHPGC Project. During 2031 and 2032 the maximum cumulative number of bottlenose dolphin predicted to be is estimated to be 349 animals (17.26% of the MU population).
- 5.9.3.20 The maximum cumulative number of bottlenose dolphin predicted to be disturbed during the expected construction phase of the MHPGC Project is in 2033, estimated as 279 animals (13.80% of the MU population). The number of bottlenose dolphin predicted to be impacted by the MHPGC Project during the construction period represents 1.43% of this total.

Tier 1 and 2

- 5.9.3.21 The highest number of bottlenose dolphin predicted to be disturbed across Tier 1 and 2 projects between 2026 and 2038 onwards is in 2031 and 2032, which does not coincide with the expected construction phase of the MHPGC Project. During 2031 and 2032 the maximum cumulative number of bottlenose dolphin predicted to be is estimated to be 367 animals (18.15% of the MU population).
- 5.9.3.22 The maximum cumulative number of bottlenose dolphin predicted to be disturbed during the expected construction phase of the MHPGC Project is in 2033, estimated as 298 animals (14.29% of the MU population). The number of bottlenose dolphin predicted to be impacted by the MHPGC Project during the construction period represents 1.38% of this total.

Tier 1, 2 and 3

- 5.9.3.23 The highest number of bottlenose dolphin predicted to be disturbed across Tier 1, 2 and 3 projects between 2026 and 2038 onwards is in 2031 and 2032, which does not coincide with the expected

construction phase of the MHPGC Project. During 2031 and 2032 the maximum cumulative number of bottlenose dolphin predicted to be is estimated to be 387 animals (19.14% of the MU population), which does coincide with the expected construction phase of the MHPGC Project.

- 5.9.3.24 The maximum cumulative number of bottlenose dolphin predicted to be disturbed during the expected construction phase of the MHPGC Project is in 2033, estimated as 302 animals (14.94% of the MU population). The number of bottlenose dolphin predicted to be impacted by the MHPGC Project during the construction period represents 1.32% of this total.

White-beaked dolphin

Tier 1

- 5.9.3.25 The highest number of white-beaked dolphins predicted to be disturbed across Tier 1 projects between 2026 and 2038 onwards is in 2031 and 2032, which does not coincide with the expected construction phase of the MHPGC Project. During 2031 and 2032 the maximum cumulative number of white-beaked dolphin predicted to be is estimated to be 9,401 animals (21.39% of the MU population).
- 5.9.3.26 The maximum cumulative number of white-beaked dolphin predicted to be disturbed in 2033 is estimated as 9,327 animals (21.22% of the MU population). The number of white-beaked dolphin predicted to be impacted by the MHPGC Project during the construction period represents 0.08% of this total.

Tier 1 and 2

- 5.9.3.27 The highest number of white-beaked dolphins predicted to be disturbed across Tier 1 and 2 projects between 2026 and 2038 onwards is in 2031 and 2032, which does not coincide with the expected construction phase of the MHPGC Project. During 2031 and 2032 the maximum cumulative number of white-beaked dolphin predicted to be is estimated to be 9,979 animals (22.70% of the MU population).
- 5.9.3.28 The maximum cumulative number of white-beaked dolphin predicted to be disturbed during the expected construction phase of the MHPGC Project is in 2033, estimated as 9,891 animals (22.50% of the MU population). The number of white-beaked dolphin predicted to be impacted by the MHPGC Project during the construction period represents 0.07% of this total.

Tier 1, 2 and 3

- 5.9.3.29 The highest number of white-beaked dolphins predicted to be disturbed across Tier 1, 2 and 3 projects between 2026 and 2038 onwards is in 2031 and 2032, which does not coincide with the expected construction phase of the MHPGC Project. During 2031 and 2032 the maximum cumulative number of white-beaked dolphin predicted to be is estimated to be 10,116 animals (23.02% of the MU population).
- 5.9.3.30 The maximum cumulative number of white-beaked dolphin predicted to be disturbed during the expected construction phase of the MHPGC Project is in 2033, estimated as 9,943 animals (22.62% of the MU population). The number of white-beaked dolphin predicted to be impacted by the MHPGC Project during the construction period represents 0.07% of this total.

Minke whale

Tier 1

- 5.9.3.31 The highest number of minke whales predicted to be disturbed across Tier 1 projects between 2026 and 2038 onwards is in 2033, which does coincide with the expected construction phase of the MHPGC Project. The maximum cumulative number of minke whale predicted to be disturbed in 2033 is estimated as 1,265 animals (6.29% of the MU population). The number of minke whale predicted to be impacted by the MHPGC Project during the construction period represents 0.32% of this total.

Tier 1 and 2

- 5.9.3.32 The highest number of minke whales predicted to be disturbed across Tier 1 and 2 projects between 2026 and 2038 onwards is in 2033, which does coincide with the expected construction phase of the MHPGC Project. The maximum cumulative number of minke whale predicted to be disturbed in 2033 is estimated as 1,311 animals (6.52% of the MU population). The number of minke whale predicted to be impacted by the MHPGC Project during the construction period represents 0.31% of this total.

Tier 1, 2 and 3

- 5.9.3.33 The highest number of minke whales predicted to be disturbed across Tier 1, 2 and 3 projects between 2026 and 2038 onwards is in 2031 and 2032, which does not coincide with the expected construction phase of the MHPGC Project. During 2031 and 2032 the maximum cumulative number of minke whale predicted to be is estimated to be 2,037 animals (10.13% of the MU population).
- 5.9.3.34 The maximum cumulative number of minke whale predicted to be disturbed during the expected construction phase of the MHPGC Project is in 2033, estimated as 1,336 animals (6.64% of the MU population). The number of minke whale predicted to be impacted by the MHPGC Project during the construction period represents 0.30% of this total.

Atlantic white-sided dolphin

Tier 1

- 5.9.3.35 The highest number of white-sided dolphins predicted to be disturbed across Tier 1 projects between 2026 and 2038 onwards is in 2031 and 2032, which does not coincide with the expected construction phase of the MHPGC Project. During 2031 and 2032 the maximum cumulative number of white-sided dolphin predicted to be is estimated to be 92 animals (0.51% of the MU population).
- 5.9.3.36 The maximum cumulative number of white-sided dolphin predicted to be disturbed during the expected construction phase of the MHPGC Project is in 2033, estimated as 89 animals (0.49% of the MU population). The number of white-sided dolphin predicted to be impacted by the MHPGC Project during the construction period represents 5.62% of this total.

Tier 1 and 2

- 5.9.3.37 The highest number of white-sided dolphins predicted to be disturbed across Tier 1 and 2 projects between 2026 and 2038 onwards is in 2031 and 2032, which does not coincide with the expected construction phase of the MHPGC Project. During 2031 and 2032 the maximum cumulative number of white-sided dolphin predicted to be is estimated to be 113 animals (0.62% of the MU population).
- 5.9.3.38 The maximum cumulative number of white-sided dolphin predicted to be disturbed during the expected construction phase of the MHPGC Project is in 2033, estimated as 108 animals (0.60% of the MU population). The number of white-sided dolphin predicted to be impacted by the MHPGC Project during the construction period represents 4.63% of this total.

Tier 1, 2 and 3

- 5.9.3.39 The highest number of white-sided dolphins predicted to be disturbed across Tier 1, 2 and 3 projects between 2026 and 2038 onwards is in 2031 and 2032, which does not coincide with the expected construction phase of the MHPGC Project. During 2031 and 2032 the maximum cumulative number of white-sided dolphin predicted to be is estimated to be 129 animals (0.71% of the MU population).
- 5.9.3.40 The maximum cumulative number of white-sided dolphin predicted to be disturbed during the expected construction phase of the MHPGC Project is in 2033, estimated as 124 animals (0.68% of the MU population). The number of white-sided dolphin predicted to be impacted by the MHPGC Project during the construction period represents 4.03% of this total.

Common dolphin

Tier 1

- 5.9.3.41 The highest number of common dolphins predicted to be disturbed across Tier 1 projects between 2026 and 2038 onwards is between 2029 and 2032, which does not coincide with the expected construction phase of the MHPGC Project. Between 2029 and 2032 the maximum cumulative number of common dolphin predicted to be is estimated to be 6 animals (0.01% of the MU population).
- 5.9.3.42 The maximum cumulative number of common dolphin predicted to be disturbed during the expected construction phase of the MHPGC Project is between 2033 and 2037, estimated as 5 animals (<0.01% of the MU population). The MHPGC Project accounts for all of the quantified disturbance for common dolphin within this total; however, this reflects the projects included within the assessment for which common dolphin disturbance was quantified and does not necessarily indicate that no other projects could result in disturbance to this species.

Tier 1 and 2

- 5.9.3.43 The highest number of common dolphins predicted to be disturbed across Tier 1 and 2 projects between 2026 and 2038 onwards is between 2029 and 2032, which does not coincide with the expected construction phase of the MHPGC Project. Between 2029 and 2032 the maximum cumulative number of common dolphin predicted to be is estimated to be 8 animals (0.01% of the MU population).
- 5.9.3.44 The maximum cumulative number of common dolphin predicted to be disturbed during the expected construction phase of the MHPGC Project is between 2033 and 2037, estimated as 5 animals (<0.01% of the MU population). The MHPGC Project accounts for all of the quantified disturbance for common dolphin within this total; however, this reflects the projects for which common dolphin disturbance was quantified within the cumulative assessment and does not necessarily indicate that other Tier 1 or 2 projects would have no potential to disturb common dolphins.

Tier 1, 2 and 3

- 5.9.3.45 The highest number of common dolphins predicted to be disturbed across Tier 1, 2 and 3 projects between 2026 and 2038 onwards is between 2031 and 2032, which does not coincide with the expected construction phase of the MHPGC Project. Between 2031 and 2032 the maximum cumulative number of common dolphin predicted to be is estimated to be 19 animals (0.02% of the MU population).
- 5.9.3.46 The maximum cumulative number of common dolphin predicted to be disturbed during the expected construction phase of the MHPGC Project is between 2036 and 2037, estimated as seven animals (0.01% of the MU population). The number of common dolphin predicted to be impacted by the MHPGC Project during the construction period represents 71.43% of this total, with the remaining quantified disturbance associated with other projects included in the cumulative assessment.

Grey seal

Tier 1

- 5.9.3.47 The highest number of grey seals predicted to be disturbed across Tier 1 projects between 2026 and 2038 onwards is in 2033, which does coincide with the expected construction phase of the MHPGC Project. The maximum cumulative number of grey seal predicted to be disturbed in 2033 is estimated as 1,924 animals (6.95% of the reference population). The number of grey seal predicted to be impacted by the MHPGC Project during the construction period represents 1.72% of this total.

Tier 1 and 2

- 5.9.3.48 The highest number of grey seals predicted to be disturbed across Tier 1 and 2 projects between 2026 and 2038 onwards is in 2031 and 2032, which does not coincide with the expected construction phase of the MHPGC Project. In 2031 and 2032 the maximum cumulative number grey seal predicted to be is estimated to be 1,199 animals (4.33% of the reference population).
- 5.9.3.49 There were no Tier 2 projects relevant to grey seals identified as overlapping with the expected construction phase of the MHPGC Project, therefore the assessment remains the same as Tier 1.

Tier 1, 2 and 3

- 5.9.3.50 The highest number of grey seals predicted to be disturbed across Tier 1, 2 and 3 projects between 2026 and 2038 onwards is in 2033, which does coincide with the expected construction phase of the MHPGC Project. The maximum cumulative number of grey seal predicted to be disturbed in 2033 is estimated as 1,995 animals (7.20% of the reference population). The number of grey seal predicted to be impacted by the MHPGC Project during the construction period represents 1.65% of this total.

Harbour seal

Tier 1

- 5.9.3.51 The highest number of harbour seals predicted to be disturbed across Tier 1 projects between 2026 and 2038 onwards is in 2031 and 2032, which does not coincide with the expected construction phase of the MHPGC Project. During 2031 and 2032 the maximum cumulative number of harbour seal predicted to be is estimated to be 52 animals (9.81% of the reference population).
- 5.9.3.52 The maximum cumulative number of harbour seal predicted to be disturbed during the expected construction phase of the MHPGC Project is 2033, estimated as 36 animals (6.79% of the reference

population). The number of harbour seal predicted to be impacted by the MHPGC Project during the construction period represents 2.78% of this total.

Tier 1 and 2

- 5.9.3.53 The highest number of harbour seals predicted to be disturbed across Tier 1 and 2 projects between 2026 and 2038 onwards is in 2031 and 2032, which does not coincide with the expected construction phase of the MHPGC Project. In 2031 and 2032 the maximum cumulative number harbour seal predicted to be is estimated to be 58 animals (10.94% of the reference population).

There were no Tier 2 projects relevant to grey seals identified as overlapping with the expected construction phase of the MHPGC Project, therefore the assessment remains the same as Tier 1

Tier 1, 2 and 3

- 5.9.3.54 The highest number of harbour seals predicted to be disturbed across Tier 1, 2 and 3 projects between 2026 and 2038 onwards 2031 and 2032, which does not coincide with the expected construction phase of the MHPGC Project. During 2031 and 2032 the maximum cumulative number of harbour seal predicted to be is estimated to be 64 animals (12.08% of the reference population).
- 5.9.3.55 The maximum cumulative number of harbour seal predicted to be disturbed during the expected construction phase of the MHPGC Project is in 2033, estimated as 42 animals (7.92% of the reference population). The number of harbour seal predicted to be impacted by the MHPGC Project during the construction period represents 2.38% of this total.

Table 5.58: MHPGC Project CEA for disturbance from underwater sound (including UXO clearance)

	Cumulative Effects Assessment
	Scenario 4: MHPGC Project, Tier 1 (including Morven North and Morven South), Tier 2, and Tier 3 (including MBAGC Project) Projects
Construction phase	
Magnitude of impact	The CEA for Scenario 4 considers MHPGC Project plus Morven North and Morven South together with the Tier 1, Tier 2 and Tier 3 below. <u>Tier 1</u> Harbour porpoise For Tier 1 projects with higher data confidence, the cumulative average proportion of the MU population predicted to be disturbed during the MHPGC Project period, plus a year either side (2032-2038) is low, at 3.44%. Predicted disturbance is marginally lower during 2026-2031, when an average of 3.35% of the MU population may be affected. Across all years considered in the CEA (2026-2038 onwards), the average proportion potentially disturbed is 3.40%. Bottlenose dolphin (GNS MU) Predicted disturbance of bottlenose dolphin from Tier 1 projects with higher data confidence remains relatively low throughout the assessment period. During 2032-2038, an average of 6.54% of the MU population is predicted to be disturbed, compared with 8.08% during 2026-2031. The average level of disturbance across the full CEA period (2026-2038 onwards) is 7.25% of the MU population. White-beaked dolphin The highest levels of disturbance among the species assessed are predicted for white-beaked dolphin. During the MHPGC Project period, plus a year either side (2032-2038), the cumulative average proportion of the MU population potentially disturbed is 7.30%, increasing to 9.41% during 2026-2031. Across all years included within the CEA, the average proportion potentially disturbed is 8.28%. Minke whale For minke whale, the cumulative average proportion of the MU population predicted to be disturbed by Tier 1 projects with higher data confidence is 2.54% during the MHPGC Project period, plus a year either side (2032-2038). This is slightly below the average predicted for 2026-2031 (2.63%). Across the entire CEA period (2026-2038 onwards), average disturbance is estimated at 2.58% of the MU population. Atlantic white-sided dolphin For white-sided dolphin, predicted disturbance remains very low throughout the assessment period. The cumulative average proportion of the MU population potentially disturbed during 2031-2038 is 0.29%, compared with 0.20% during 2026-2031. Across the full CEA period, the average proportion potentially disturbed is 0.25%. Common dolphin Predicted disturbance of common dolphin is low. During the MHPGC Project period, plus a year either side (2032-2038), the cumulative average proportion of the MU population potentially disturbed is less than 0.01%, with the average across the entire CEA period (2026-2038 onwards) also remaining below 0.01%. Grey seal

	Cumulative Effects Assessment
	For grey seal, the cumulative average proportion of the MU population predicted to be disturbed during the MHPGC Project period, plus a year either side (2032-2038) is 4.00%. This exceeds the average predicted for the earlier period of 2026-2031 (1.33%). Across all years considered in the CEA, the average proportion potentially disturbed is 2.77% of the reference population. Harbour seal Predicted disturbance of harbour seal is consistently low. During both the MHPGC Project period, plus a year either side (2032-2038) the cumulative average proportion of the reference population potentially disturbed is 3.15% and the earlier period of 2026-2031, the cumulative average proportion of the MU population potentially disturbed is 3.90%. Across the full CEA period (2026-2038 onwards), the average proportion potentially disturbed is 3.50%. <u>Tier 1 and 2</u> Harbour porpoise For harbour porpoise, the highest cumulative disturbance predicted from Tier 1 and Tier 2 projects during construction of the MHPGC Project occurs in 2033, when up to 31,223 animals may be disturbed, equivalent to 9.01% of the MU population. Across the proposed construction period plus a year either side (2032-2038), an average of 12,332 animals (3.56% of the MU population) are predicted to be disturbed. Across all years considered in the CEA (2026–2038 onwards), the average proportion of the MU population potentially disturbed is 3.55%. Bottlenose dolphin (GNS MU) For bottlenose dolphin, cumulative disturbance associated with Tier 1 and Tier 2 projects during the construction phase of the MHPGC Project is predicted to peak in 2033, with up to 289 animals potentially disturbed, representing 14.29% of the MU population. Across the MHPGC Project construction period, plus a year either side (2031–2038), the average number of animals predicted to be disturbed is 136 (6.73% of the MU population). Across the full CEA period, the average proportion of the MU population potentially disturbed is 7.57%. White-beaked dolphin White-beaked dolphin indicates the highest proportional disturbance of the species assessed. In 2033, cumulative disturbance from Tier 1 and Tier 2 projects may affect up to 9,891 animals, equivalent to 22.50% of the MU population. Across the construction period, plus a year either side (2032-2038) an average of 3,372 animals (7.67% of the MU population) are predicted to be disturbed. Across the entire CEA period, the average proportion of the MU population potentially disturbed is 8.74%. Minke whale For minke whale, the maximum cumulative disturbance predicted from Tier 1 and Tier 2 projects occurs in 2033, when up to 1,311 animals may be disturbed, corresponding to 6.52% of the MU population. Averaged across the construction period, plus a year either side (2032-2038), approximately 525 animals (2.61% of the MU population) are predicted to be disturbed. Across all years included within the CEA, the average proportion of the MU population potentially disturbed is 2.68%. Atlantic white-sided dolphin Predicted disturbance of white-sided dolphin from Tier 1 and Tier 2 projects remains low throughout the assessment period. The greatest level of cumulative disturbance is estimated in 2033, when up to 108 animals may be disturbed (0.60% of the MU population). Across the construction period plus a year either side (2032-2038), the average number disturbed is 57 animals (0.32% of the MU population), while the average proportion potentially disturbed across all CEA years is 0.28%. Common dolphin

	Cumulative Effects Assessment
	Predicted disturbance of common dolphin from Tier 1 and Tier 2 projects is low throughout the assessment period. The maximum cumulative disturbance occurs in between 2029 and 2032, when up to eight animals may be disturbed, representing <0.01% of the MU population. Across the construction period, an average of five animals (<0.01% of the MU population) are predicted to be disturbed. Similarly, the average proportion of the MU population potentially disturbed across all years considered in the CEA remains <0.01%. Grey seal For grey seal, the cumulative average proportion of the reference population predicted to be disturbed across Tier 1 and Tier 2 projects during the MHPGC Project period, plus a year either side (2032-2038) is 4.03%. This exceeds the average predicted for the earlier period of 2026-2031 (1.45%). Across all years considered in the CEA, the average proportion potentially disturbed is 2.84% of the reference population. Harbour seal For harbour seal, the greatest level of cumulative disturbance from Tier 1 and Tier 2 projects is estimated in 2032, when up to 58 animals may be disturbed (10.94% of the MU population). The cumulative average proportion of the reference population predicted to be disturbed across Tier 1 and Tier 2 projects during the MHPGC Project period, plus a year either side (2032-2038) is 3.32%. This is lower than the average predicted for the earlier period of 2026-2031 (4.56% of the reference population). Across all years considered in the CEA, the average proportion potentially disturbed is 3.89% of the reference population <u>Tier 1, 2 and 3</u> The cumulative disturbance estimates presented below represent a highly precautionary scenario, based on the assumed temporal overlap of noise-generating activities across all Tier 1, 2 and 3 projects. The likelihood of all projects undertaking noise-generating activities simultaneously is extremely low, and the estimates therefore represent a conservative assessment of the maximum potential spatial overlap of disturbance rather than the expected level of concurrent disturbance. Harbour porpoise For harbour porpoise, the highest cumulative disturbance predicted during construction of the MHPGC Project, plus a year either side occurs in 2031 and 2032, when up to 35,370 animals may be disturbed, equivalent to 10.20% of the MU population. Across the proposed construction period plus a year either side (2032–2038), an average of 13,320 animals (3.84% of the MU population) are predicted to be disturbed. Across all years considered in the CEA (2026–2038 onwards), the average proportion of the MU population potentially disturbed is 4.00%. Bottlenose dolphin (GNS MU) Predicted cumulative disturbance of bottlenose dolphin also peaks in 2031 and 2032, with up to 387 animals potentially disturbed, representing 19.14% of the MU population. During the construction period as a whole, plus a year either side (2032–2038), the average number disturbed is estimated at 145 animals (7.16% of the MU population). Across the full CEA period, the average proportion of the MU population potentially disturbed is 8.03%. White-beaked dolphin The largest proportional disturbance predicted among the species assessed is for white-beaked dolphin. In 2031 and 2032, cumulative disturbance may affect up to 10,116 animals, equivalent to 23.02% of the MU population. Across the construction period plus a year either side (2032–2038), an average of 3,407 animals (7.75% of the MU population) are predicted to be disturbed. The average proportion of the MU population potentially disturbed across the entire CEA period is 8.85%. Minke whale For minke whale, the maximum cumulative disturbance is predicted in 2031 and 2032, when 2,037 animals may be disturbed, corresponding to 10.13% of the MU population. Averaged across the MHPGC Project construction period plus a year either side (2032–2038), 697 animals are

	Cumulative Effects Assessment
	predicted to be disturbed annually, equivalent to 3.46% of the MU population. Across all years included within the CEA, the average proportion of the MU potentially disturbed is 4.13%. Atlantic white-sided dolphin Predicted disturbance of white-sided dolphin remains low throughout the assessment period. The maximum cumulative number disturbed is estimated at 129 animals in 2031 and 2032 (0.71% of the MU population), while the average across the construction period plus a year either side (2032–2038) is 62 animals (0.34% of the MU population). Across all years considered in the CEA, the average proportion potentially disturbed is 0.31%. Common dolphin Disturbance of common dolphin is predicted to be low. The maximum cumulative disturbance occurs in both 2031 and 2032, when up to 19 animals may be disturbed, representing 0.02% of the MU population. Across the construction period plus a year either side (2032–2038), the average number disturbed is 7 animals (0.01% of the MU population), while the average proportion potentially disturbed across all CEA years being 0.01%. Grey seal For grey seal, cumulative disturbance is greatest in 2033, when up to 1,995 animals may be disturbed, equivalent to 7.20% of the reference population. Across the construction period plus a year either side (2032–2038), the average number potentially disturbed is 1,170 animals (4.22% of the reference population). Across the wider CEA period, the average proportion of the MU population potentially disturbed is 3.03%. Harbour seal Predicted disturbance of harbour seal is low. The maximum cumulative disturbance is estimated at 64 animals in 2031 and 2032, representing 12.08% of the reference population. Across the MHPGC Project construction period plus a year either side (2032–2038), an average of 22 animals (4.20% of the reference population) are predicted to be disturbed, while the average proportion potentially disturbed across all years considered in the CEA is likewise low at 4.76%. The cumulative impact is predicted to be of regional spatial extent, medium term duration, intermittent and high reversible. The impact of disturbance from underwater noise is predicted to affect marine mammal receptors directly. In both Scottish and English waters, the magnitude is therefore considered to be low for all marine mammal species considered, with the exception of white-beaked dolphin, which the magnitude is considered to be medium.
Sensitivity of receptor	The sensitivity of the receptor is as detailed in Section 5.8.2 for the alone assessment and not repeated here. The sensitivity of all marine mammal receptors to behavioural disturbance from underwater noise is considered medium in both Scottish and English waters
Significance of effect	For all marine mammal receptors (harbour porpoise, bottlenose dolphin, minke whale, white-sided dolphin, white-beaked dolphin, grey seal and harbour seal), overall, the magnitude of the cumulative impact is deemed to be low and the sensitivity of the receptors considered to be medium. The cumulative effect will, therefore, be of negligible or minor significance, which is not significant in EIA terms in both Scottish and English waters.
Additional mitigation and residual significance	The cumulative disturbance estimates presented for Tier 1, Tier 2 and Tier 3 projects represent a highly precautionary scenario, based on the assumed temporal overlap of noise-generating activities across multiple projects. In practice, the likelihood of all projects undertaking noise-generating activities simultaneously is expected to be very low. In addition, the assessment assumes the implementation of measures to

	Cumulative Effects Assessment
	minimise the risk of AUD INJ, including the use of ADDs where appropriate. Such measures, together with other marine mammal mitigation and monitoring measures that may be implemented during construction across projects and plans, are also expected to reduce the likelihood of marine mammals being exposed to the highest levels of underwater sound and therefore reduce the potential for both auditory injury and disturbance. No additional mitigation measures for marine mammal receptors have been identified at this stage beyond the designed in measures outlined in Table 5.38. All marine mammal receptors, the cumulative effect is considered negligible or minor and is not significant in EIA terms.

Proposed monitoring

- 5.9.3.56 Site-specific monitoring is not proposed at this stage. The assessment of the MHPGC Project alone concluded that MHPGC Project would not give rise to significant effects for marine mammals, while the cumulative assessment identified a moderate and significant effect for white-beaked dolphin under a highly precautionary scenario with other plans, projects or activities. The Applicant will, however, continue to liaise with relevant stakeholders and other key stakeholders to identify opportunities for proportionate, evidence-led regional or strategic monitoring that can improve understanding of the environmental implications of offshore development, particularly where recognised evidence gaps exist, including through relevant initiatives such as the ScotMER programme.

5.10 Transboundary effects

5.10.1.1 Marine mammals are wide ranging and may occur across UK and continental European waters. A screening of potential transboundary effects has therefore been undertaken to determine whether the construction, O&M and decommissioning phases of the MHPGC Project could result in effects on marine mammal receptors in other European Economic Area (EEA) Member States. The screening has considered available evidence on marine mammal distribution and movements, the location of relevant areas supporting marine mammal receptors and the spatial extent of potential impact pathways associated with the MHPGC Project [see **Table 5.59**].

Table 5.59: Natura 2000 sites within the Marine Mammal Regional Study Area with relevant marine mammal qualifying features

Jurisdiction	Site name	Distance to the MHPGC Project PEIR Red Line Boundary (km)
Netherlands	Doggersbank [NL2008001]	257.77
	Klaverbank [NL2008002]	263.55
	Noordzeekustzone [NL9802001]	427.86
	Waddenzee [NL1000001]	434.97
	Duinen en Lage Land Texel [NL2003060]	435.73
	Duinen Vlieland [NL2003061]	438.83
	Duinen Terschelling [NL2003059]	447.63
	Voordelta [NL4000017]	464.82
	Vlakte van de Raan [NL2008003]	469.10
	Westerschelde & Saeftinghe [NL9803061]	480.16
	Oosterschelde [NL3009016]	480.17
Belgium	Vlaamse Banken [BEMNZ0001]	440.35
	Vlakte van de Raan [BEMNZ0005]	467.81
Denmark	Sydlig Nordsø [DK00VA347]	482.97
	Gule Rev [DK00VA259]	537.02
	Sandbanker ud for Thyborøn [DK00VA340]	538.91
	Vadehavet med Ribe Å, Tved Å og Varde Å vest for Varde [DK00AY176]	556.69
	Store Rev [DK00VA258]	619.02
	Skagens Gren og Skagerak [DK00FX112]	662.87
	Ålborg Bugt, Randers Fjord og Mariager Fjord [DK00FX122]	672.08
	Hirsholmene, havet vest herfor og Ellinge Å's udløb [DK00FX122]	693.79
	Strandenge på Læsø og havet syd herfor [DK00FX010]	710.25
	Havet omkring Nordre Rønner [KD00FX257]	714.14
	Herthas Flak [DK00VA248]	717.66
	Læsø Trindel og Tønneberg Banke [DK00VA249]	734.26
	Anholt og havet nord for [DK00DX146]	746.02
	Kims Top og den Kinesiske Mur [DK00VA247]	753.70

Jurisdiction	Site name	Distance to the MHPGC Project PEIR Red Line Boundary (km)
	Store Middlegrund [DK00VA250]	791.87
	Gilleleje Flak og Tragten [DK00VA171]	803.56
Germany	Doggerbank [DE1003301]	281.46
	Sylter Außenriff [DE1209301]	462.85
	Borkim-Riffgrund [DE2104301]	478.28
	Nationalpark Niedersächsisches Wattenmeer [DE2306301]	518.30
	NTP S-H Wattenmeer und angrenzende Küstengebiete [DE0916391]	565.20
	Helgoland mit Helgoländer Felssockel [DE1813391]	579.30
	Steingrund [DE174391]	587.49
	Hamburgisches Wattenmeer [DE2016301]	612.84
	Unterelbe [DE2018331]	645.77
France	Banc des Flandres [FR3102002]	446.17
	Ridens et dunes hydrauliques du détroit du Pas-de-Calais [FR3102004]	462.98
	Récifs Gris-Nez Blanc-Nez [FR3102003]	464.45
	Falaises du Cran aux Oeufs et du Cap Gris-Nez, Dunes du Chatelet, Marais de Tardingen et Dunes de Wissant [FR3100478]	476.34
	Baie de Canche et couloir des trois estuaires [FR3102005]	504.76
	Récifs et marais arrière-littoraux du Cap Lévi à la Pointe de Saire [FR2500085]	561.34
Sweden	Kosterfjorden-Väderöfjorden [SE0520170]	738.82
	Fladen [SE0510127]	765.21
	Vrångöskärgården [SE0520001]	768.63
	Lilla Middelgrund [SE0510126]	774.31
	Balgö [SE0510050]	787.72
	Stora Middelgrund och Röde bank [SE0510186]	790.10
	Västra Getterön [SE0510048]	797.55
	Nordvästra Skånes havsområde [SE0420360]	797.83
	Kullaberg [SE0420002]	819.83

5.10.1.2 Harbour porpoise are widely distributed throughout the North Sea. Their distribution has primarily been informed by modelling studies, which indicate that substantial numbers occur throughout the region, with the distribution in the central and southern North Sea primarily associated with coastal UK waters and the Wadden Sea (ASCOBANS, 2024). Although there is limited individual-level tracking data for harbour porpoise in this region, satellite telemetry has demonstrated movements of individuals associated with Danish and German waters into coastal UK waters and waters in the vicinity of the MHPGC Project PEIR Red Line Boundary (Scheidat *et al.*, 2024). Connectivity between harbour porpoise occurring in UK waters and individuals associated with Natura 2000 sites in Denmark and Germany can therefore not be excluded [see **Table 5.59**].

- 5.10.1.3 Bottlenose dolphins are wide-ranging within the North Sea and wider northwest European waters. Available evidence indicates that bottlenose dolphins associated with the east coast of Scotland may occur intermittently in the southern and central North Sea, including waters off the Netherlands, Belgium, Germany and northern France (OSPAR Commission, 2017; Scottish Government, 2021; JCDP, 2026). However, available survey and acoustic data are insufficient to reliably assign individual animals occurring in the vicinity of the MHPGC Project PEIR Red Line Boundary to particular populations or Natura 2000 sites.
- 5.10.1.4 One Natura 2000 site outside UK waters has been identified within the Marine Mammal Regional Study Area designated for bottlenose dolphin as an Annex II qualifying feature (FR2500085), located 561.52km away in a straight line from the MHPGC PEIR Red Line Boundary [see **Table 5.59**]. The available information for the site indicates that the site may be used by bottlenose dolphins for movement between the western and eastern English Channel. The potential for effects on the site is therefore considered further in relation to the spatial extent and nature of the impact pathways associated with the MHPGC Project.
- 5.10.1.5 A recent analysis of grey and harbour seal movements in the North Sea has indicated that grey seals present within UK North Sea waters can be apportioned to haul-out sites in France (~700 individuals), the Netherlands (~115 individuals) and Germany (~40 individuals; Carter *et al.*, 2025). For harbour seal, <10 individuals were reported to result from haul-out sites in other EEA member states within the North Sea (Carter *et al.*, 2025). Furthermore, genetic analysis has suggested that the grey seal population within the North Sea (including Shetland, southeast England, France, Belgium, Wadden Sea, northwest Denmark, Skagerrak, Kattegat, and southwestern Norway) represent a single genetic unit (McCarthy *et al.*, 2025).
- 5.10.1.6 Review of the telemetry tracks, however, suggest that although some individuals may occur near the MHPGC Project, most of these individuals remain in the central and southern North Sea or English Channel (Brasseur, 2017; Carter *et al.*, 2025). Additionally, although grey seal are known to have wide foraging ranges up to 480km (Carter *et al.*, 2022), the MHPGC Project PEIR Red Line Boundary occurs beyond this distance for individuals associated with French Natura 2000 sites and at the edge of the foraging range for individuals associated with the Wadden Sea and Dutch/German Natura 2000 sites [see **Table 5.59**].
- 5.10.1.7 Thus, although small numbers of individual grey or harbour seals may occur near the MHPGC Project from other EEA Member States, they are unlikely to occur in substantial numbers to warrant further consideration under the transboundary assessment.
- 5.10.1.8 This screening has identified potential transboundary effects to Danish marine mammal populations, which telemetry data has indicated travel to UK waters, with the largest ZOI associated with the MHPGC Project being in relation to underwater sound. The potential transboundary impacts are screened within **Volume 1, Annex 4.2: Transboundary Screening, of the PEIR**:
- Injury and disturbance from underwater sound (excluding UXO);
 - Injury and disturbance from underwater sound produced by UXO clearance;
 - Changes in prey availability;
 - Collision with vessels.
- 5.10.1.9 The offshore components of the MHPGC Project and the Marine Mammal Study Area are located within UK territorial waters, which were considered as part of the baseline characterisation [see **Section 5.4**]. Potential impacts on marine mammal receptors associated with construction, O&M and decommissioning activities are expected to be spatially limited, with the maximum ZOI extending approximately 27km from the MHPGC Project PEIR Red Line Boundary for disturbance from CLV [see **Section 5.8.2**].
- 5.10.1.10 While connectivity between marine mammal populations occurring in the North Sea cannot be entirely excluded, the spatial extent of the potential impact pathways associated with the MHPGC Project does not extend beyond UK territorial waters does not extend to the identified Natura 2000 sites [see **Table 5.59**]. Therefore, no potential transboundary impacts on marine mammal receptors in other EEA Member States are anticipated, and no further assessment of transboundary effects is considered necessary.

5.11 Inter-related effects

5.11.1.1 Inter-related effects are the combined impact of multiple aspects of the MHPGC Project on a single receptor. These are as follows:

- **Project lifetime effects:** Assessment of the scope for effects that occur throughout more than one phase of the MHPGC Project (construction, O&M and decommissioning), to interact to potentially create a more significant effect on a receptor than if just assessed in isolation in these three phases.
- **Receptor led effects:** Assessment of the scope for all effects (including inter-relationships between environmental topics) to interact, spatially and temporally, to create inter-related effects on a receptor.

5.11.1.2 For marine mammals, the following potential impacts have been considered within the inter-related assessment:

- Underwater sound from site investigations, offshore export cable installation and vessel movements, and other non-UXO sound generating activities during all MHPGC Project phases;
- Underwater sound from UXO clearance during the construction phase;
- Changes in prey availability during all MHPGC Project phases;
- Collision with vessels during all MHPGC Project phases.

5.11.1.3 Inter-related effects are assessed within **Volume 4, Chapter 5: Inter-related Effects, of the PEIR** with no likely significant inter-related effects on marine mammals anticipated.

5.12 Summary

5.12.1 Summary of effects

5.12.1.1 This chapter has assessed the potential impacts on marine mammals from the construction, O&M and decommissioning phases of the MHPGC Project. **Table 5.60** presents a summary of impacts and confirms the residual effects.

5.12.2 Summary of secondary mitigation and monitoring

5.12.2.1 Additional mitigation or monitoring proposed at this stage of the MHPGC Project further to the embedded commitments provided in **Table 5.39** are summarised below in **Table 5.60**.

Table 5.60: Summary of impacts and residual effects

Impact	Jurisdiction	Sensitivity of receptor	Magnitude of impact	Significance of effect	Additional mitigation and monitoring	Residual effect
Construction phase						
Injury and disturbance from underwater sound produced by offshore export cable installation activities	Scotland	AUD INJ: Medium	AUD INJ: Negligible	AUD INJ: Negligible or minor	N/A	AUD INJ: Negligible (adverse)
	England					
	Scotland	Behavioural disturbance: Medium	Behavioural disturbance: Low	Behavioural disturbance: Minor		Behavioural disturbance: Minor (adverse)
	England					
Injury and disturbance from underwater sound produced by pre-construction site investigation surveys	Scotland	AUD INJ: Medium	AUD INJ: Negligible	AUD INJ: Negligible or minor	N/A	Negligible (adverse)
	England					
	Scotland	Behavioural disturbance: Medium	Behavioural disturbance: Negligible	Behavioural disturbance: Negligible or minor		
	England					
Injury and disturbance from underwater sound produced by UXO clearance	Scotland	AUD INJ: High	AUD INJ: Negligible	AUD INJ: Minor	N/A	AUD INJ: Minor (adverse)
	England					
	Scotland	Behavioural disturbance: Low	Behavioural disturbance: Low	Behavioural disturbance: Negligible or minor		Behavioural disturbance: Minor (adverse)
	England					
Changes in prey availability	Scotland	Low	Negligible	Negligible or minor	N/A	Negligible (adverse)
	England					
Collision with vessels	Scotland	Medium	Low	Minor	N/A	Minor (adverse)
	England					
O&M phase						
Injury and disturbance from underwater	Scotland	Medium	Negligible	Negligible or minor	N/A	Negligible (adverse)

Impact	Jurisdiction	Sensitivity of receptor	Magnitude of impact	Significance of effect	Additional mitigation and monitoring	Residual effect
sound produced during offshore export cable O&M activities	England					
Injury and disturbance from underwater sound produced during site investigation activities	Scotland	Medium	Negligible	Negligible or minor	N/A	Negligible (adverse)
	England					
Changes in prey availability	Scotland	Low	Negligible	Negligible or minor	N/A	Negligible (adverse)
	England					
Collision with vessels	Scotland	Medium	Low	Minor	N/A	Minor (adverse)
	England					
Decommissioning phase						
Injury and disturbance from underwater sound produced during decommissioning activities	Scotland	Medium	AUD INJ: Negligible	AUD INJ: Negligible or minor	N/A	AUD INJ: Negligible (adverse)
	England		Behavioural disturbance: Low	Behavioural disturbance: Minor		Behavioural disturbance: Minor (adverse)
Injury and disturbance from underwater sound produced during site investigation activities	Scotland	Medium	Negligible	Negligible or minor	N/A	Negligible (adverse)
	England					
Changes in prey availability	Scotland	Low	Negligible	Negligible or minor	N/A	Negligible (adverse)
	England					
Collision with vessels	Scotland	Medium	Low	Minor	N/A	Minor (adverse)
	England					

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