



Morven Hawthorn Pit Grid Connection Project

Preliminary Environmental Information Report

Volume 2, Chapter 3: Benthic Subtidal and
Intertidal Ecology

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Table of contents

3	Benthic Subtidal and Intertidal Ecology	1
3.1	Introduction.....	1
3.2	Legislative and policy context	2
3.3	Consultation and engagement	13
3.4	Baseline characterisation	30
3.5	Impact assessment methodology	73
3.6	Key parameters for assessment	77
3.7	Commitments adopted as part of the MHPGC Project	92
3.8	Assessment of impacts	95
3.9	Whole project assessment and Cumulative Effects Assessment methodology .	132
3.10	Whole project assessment and Cumulative Effects Assessment.....	150
3.11	Transboundary effects.....	204
3.12	Inter-related effects.....	204
3.13	Summary.....	204
3.14	References	208

List of tables

Table 3.1: Summary of legislation relevant to Benthic Subtidal and Intertidal Ecology	2
Table 3.2: Summary of the NPS provisions relevant to Benthic Subtidal and Intertidal Ecology	4
Table 3.3: Summary of NPPF requirements relevant to Benthic Subtidal and Intertidal Ecology	9
Table 3.4: Marine planning policy relevant to benthic subtidal and intertidal ecology	10
Table 3.5: Local policy relevant to benthic ecology	11
Table 3.6: Summary of scoping responses relevant to benthic ecology	13
Table 3.7: Summary of further consultation and engagement.....	24
Table 3.8: Baseline data sources	34
Table 3.9: Summary of designated sites within the Benthic Subtidal and Intertidal Ecology Study Areas and relevant qualifying features (Figure 3.7)	61
Table 3.10: Valued Ecological Receptors (VERs) identified within the Project PEIR Red Line Boundary and Benthic Subtidal Ecology Study Area in Scottish waters	65
Table 3.11: Valued Ecological Receptors (VERs) identified within the Project PEIR Red Line Boundary and Benthic Subtidal Ecology Study Area in English waters.....	68
Table 3.12: Definition of terms relating to the magnitude of an impact.	74
Table 3.13: Definition of terms relating to the sensitivity of the receptor.	75
Table 3.14: Matrix used for the assessment of the significance of the effect.....	76
Table 3.15: Impacts scoped into the assessment	77
Table 3.16: Impacts scoped out of the assessment	78

Table 3.17: Embedded commitments relevant to benthic ecology implemented as part of the MHPGC Project	93
Table 3.18: MarESA sensitivity ratings for Scottish and English marine benthic features assessed for abrasion/ disturbance of the surface of the seabed	98
Table 3.19: MarESA sensitivity ratings for Scottish and English marine benthic features assessed for increased SSCs and associated deposition during construction	104
Table 3.20: MarESA sensitivity ratings for Scottish and English marine benthic features assessed for disturbance or remobilisation of sediment bound contaminants	111
Table 3.21: Scenarios to be considered in the MHPGC Project whole project assessment and Cumulative Effects Assessment for benthic ecology	132
Table 3.22: List of other projects and plans considered within the Cumulative Effects Assessment for benthic ecology	134
Table 3.23: Maximum Design Scenario considered for the assessment of potential whole project and cumulative effects on benthic ecology	139
Table 3.24: MHPGC Project whole project assessment for long-term habitat loss	151
Table 3.25: MHPGC Project CEA for long-term habitat loss	152
Table 3.26: MHPGC Project whole project assessment for temporary habitat loss and disturbance	155
Table 3.27: MHPGC Project CEA for of temporary habitat loss and disturbance	158
Table 3.28: MHPGC Project whole project assessment for increased SSC and associated deposition	164
Table 3.29: MHPGC Project CEA for increased SSC and associated deposition	166
Table 3.30: MHPGC Project whole project assessment for disturbance/redistribution of sediment bound contaminants	170
Table 3.31: MHPGC Project CEA for disturbance/redistribution of sediment bound contaminants	173
Table 3.32: MHPGC Project whole project assessment for changes in physical processes	177
Table 3.33: MHPGC Project CEA for changes to physical processes	178
Table 3.34: MHPGC Project whole project assessment for increased risk of introduction and spread of INNS	181
Table 3.35: MHPGC Project CEA for increased risk of introduction and spread of INNS	184
Table 3.36: MHPGC Project whole project assessment for colonisation of hard substrates	189
Table 3.37: MHPGC Project CEA for colonisation of hard substrates	190
Table 3.38: MHPGC Project whole project assessment for impacts on benthic invertebrates due to EMF ..	193
Table 3.39: MHPGC Project CEA for impact on benthic invertebrates due to EMF	194
Table 3.40: MHPGC Project whole project assessment for thermal emissions from subsea electrical cables	197
Table 3.41: MHPGC Project CEA for thermal emissions from subsea electrical cables	198
Table 3.42: MHPGC Project whole project assessment for removal of hard substrate	201
Table 3.43: MHPGC Project CEA for removal of hard substrates	202
Table 3.44: Summary of impacts and residual effects	206

List of figures

Figure 3.1: Benthic Subtidal and Intertidal Ecology Study Areas..... 32

Figure 3.2: EUNIS habitat classification within the Benthic Subtidal Ecology Study Area (EMODnet, 2023; JNCC, 2026; Marine Directorate, 2026)..... 50

Figure 3.3: EUNIS habitat classification and sediment type and features within the MHPGC Project PEIR Red Line Boundary (OWC, 2025) - Sheet 1 51

Figure 3.4: EUNIS habitat classification and sediment type and features within the MHPGC Project PEIR Red Line Boundary (OWC, 2025) - Sheet 2 52

Figure 3.5: EUNIS habitat classification and sediment type and features within the MHPGC Project PEIR Red Line Boundary (OWC, 2025) - Sheet 3 53

Figure 3.6: Intertidal seabed substrates within the Benthic Intertidal Ecology Study Area (BGS, 2015) 58

Figure 3.7: Sites designated for nature conservation 63

Annexes

Annex number	Annex title
3.1	Benthic Ecology Technical Report

Glossary

Term	Meaning
Annex I Habitat	Annex I refers to a habitat as defined under the European Union (EU) Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (the Habitats Directive).
The Applicant	The legal entity making the applications for consent; Morven Offshore Wind Limited (MvOWL).
Benthic ecology	Benthic ecology encompasses the study of the organisms living in and on the sea floor, the interactions between them and impacts on the surrounding environment.
Biodiversity Net Gain (BNG)	Biodiversity Net Gain (BNG) is a process whereby development leaves biodiversity in a measurably better state and is a planning policy requirement in England under the National Planning Policy Framework (2025). BNG is a statutory requirement under the Environment Act (2021) for certain Town and Country Planning Act (TCPA) developments setting out a mandatory 10 percent (%) net gain in biodiversity. At the time of writing, the 10% statutory requirement is not in force for Nationally Significant Infrastructure Projects (NSIPs), although is expected in November 2026. Guidance has been provided by the Department for Environment, Food and Rural Affairs (Defra).
Biotope	The combination of physical environment (habitat) and its distinctive assemblage of characterising species.
Bivalve	A class of molluscs, which have a hard calcareous shell made of two parts or 'valves'.
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.
Centre for Environment, Fisheries and Aquaculture Science (Cefas)	The UK Government's marine and freshwater science organisation and an executive agency sponsored by Defra, providing expert scientific advice, data, and monitoring to support the sustainable management of the aquatic environment, fisheries, and aquaculture.
Circalittoral	The region from the lower limit of the infralittoral zone to the maximum depth at which photosynthesis is still possible.
Climate change	A change in global or regional climate patterns, in particular a change apparent from the mid to late 20th century onwards and attributed to the increased levels of atmospheric carbon dioxide produced by the use of fossil fuels.
Commitments	Measures (embedded mitigation and secondary) to be adopted during the construction, operation and maintenance, and decommissioning phases of the MHPGC Project.
Cumulative effect	The combined effect of the MHPGC Project in combination with the effects from other proposed developments, on the same receptor or resource.
Cumulative effects assessment	Assessment of the likely effects arising from the MHPGC Project alongside the likely effects arising from other proposed developments on the same receptor or resource.

Term	Meaning
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.
Electromagnetic Field (EMF)	An electric and magnetic force field that surrounds a moving electrical charge.
Embedded mitigation	Measures included as part of the project design. Includes both primary and tertiary mitigation.
Environment Agency (EA)	The EA is the public body responsible for protecting and improving the environment in England, including regulating activities that affect land, water, and biodiversity. For a DCO, the EA acts as a statutory consultee, advising on flood risk, water quality and ecological impacts.
Environmental Assessment (EIA) Impact	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.
Epifauna	Animals living on the surface of the seabed
Expert Working Group (EWG)	A topic-specific group of specialists formed under the 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.
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 100kV and 800kV.
Highly Protected Marine Area (HPMA)	Areas of the sea (including the shoreline) that allow the protection and full recovery of marine ecosystems. HPMA's protect all species and habitats and associated ecosystem processes within the site boundary, including the seabed and water column.
Impact	A change caused by an action that occurs during a project's lifetime.

Term	Meaning
Infralittoral	The shallow subtidal zone below the Lowest Astronomical Tide (LAT), typically characterised by bedrock or other hard substrata and dominated by marine algae, including kelp species.
Infauna	The animals living in the sediments of the seabed.
Intertidal area	The area between Mean High Water Springs (MHWS) and the Mean Low Water Springs (MLWS).
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
Invasive non-native species (INNS)	Species introduced outside their natural range that spread rapidly and cause harm to the environment, economy or human health. They often outcompete native species and disrupt ecosystems.
Landfall	The area in which the offshore export cables make landfall (come onshore) and the transitional area between the offshore cabling and the onshore cabling. This term applies to the entire landfall area between the trenchless technique exit pits and the transition joint bay inclusive of all construction works.
Lowest Astronomical Tide (LAT)	The lowest tide level that can be expected to occur under average meteorological conditions and under any combination of astronomical conditions.
Macrofauna	Animals which can be retained in a sieve with a mesh size of at least 1 mm. This term is used in relation to benthic subtidal ecology.
Magnitude	A combination of the spatial extent, duration, frequency and reversibility of an impact.
Marine Conservation Zone (MCZ)	An area designated under the Marine and Coastal Access Act 2009 in English waters for the purpose of conserving marine flora, fauna, habitats, or features of geological or geomorphological interest.
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 Licence	A marine licence permits the undertaking of different activities in the marine environment, including construction, the deposition or removal of substances or objects from the seabed, and dredging. The Marine and Coastal Access Act 2009 requires a marine licence to be obtained for licensable marine activities within the Scottish offshore region (12nm – 200nm) and in English offshore and inshore regions (noting that deemed marine licences will be included within the DCO application).
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.
Marine Protected Area (MPA)	Areas within the United Kingdom's seas designated for the protection of marine life and habitats against damage caused by human activities.

Term	Meaning
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 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 ('MBAGC Project')	The MBAGC Project will be comprised of the offshore export cable in Scottish waters from the Morven North or the Morven South Offshore Substation Platforms (OSP(s)), the onshore export cable and the onshore land substation in the vicinity of Branxton in East Lothian, Scotland.
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 Screening Report	A Habitats Regulations Assessment (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 the Planning Inspectorate (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 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 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 Preliminary Environmental Information Report (PEIR)	A report that provides preliminary environmental information in accordance with the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017. This is information that enables

Term	Meaning
	consultees to understand the likely significant environmental effects of a project and which helps to inform consultation 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 PINS and submitted to the Scottish Ministers, via the 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) and the Marine Management Organisation (MMO) in response to the MHPGC Project Scoping Report. The MHPGC Scoping Opinions contain the range of issues that the PINS, and MD-LOT in consultation with statutory stakeholders, have identified should be considered within the EIA process.
Morven Hawthorn Pit Grid Connection Project ('MHPGC Project')	The MHPGC Project is comprised of the offshore export cables in Scottish and English waters from the Morven North or the Morven South 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.
Morven North Boundary	Boundary within which the wind turbines and foundations, OSP(s) and foundations, inter-array and interconnector cables and associated infrastructure for Morven North will be located.
Morven North Offshore Wind Array Project ('Morven North')	The Morven North Offshore Wind Array Project which includes the wind turbines and foundations, OSP(s) and foundations, inter-array and interconnector cables and associated infrastructure located within the Morven North Boundary..
Morven North Offshore Wind Array Project and Morven South Offshore Wind Array Project ('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 Boundary	Boundary within which the wind turbines foundations, Offshore Substation Platforms and foundations, inter-array and interconnector cables and associated infrastructure for Morven South will be located.
Morven South Offshore Wind Array Project ('Morven South')	The Morven South Offshore Wind Array Project, which includes the wind turbines and foundations, OSP(s) and foundations, inter-array and interconnector cables and associated infrastructure located within the Morven South Boundary.

Term	Meaning
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 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 (DESNZ) and designated under the Planning Act 2008, setting out national policy for 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 in England, 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.
Offshore export cables	HVDC cables which bring electricity from either the Morven North or Morven South OSP to the Transition Joint Bay (TJB) at landfall.
Offshore export cable corridor	The proposed corridor in which the offshore export cables will be located, from either the Morven North or Morven South OSP to the TJB at landfall.
Offshore substation platform (OSP)	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 collector substations; HVDC converter substations.
Operations and maintenance phase (O&M)	The operational and maintenance phase of the MHPGC Project.
Outline Cable Specification and Installation Plan (CSIP)	An outline plan describing cable installation, burial, protection and monitoring, including a Cable Burial Risk Assessment (CBRA). 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 Pollution Contingency Plan	Outline plan to establish emergency response procedures for accidental marine pollution incidents, detailing methods and procedures, reporting and remediation actions.
Outline Offshore Operation & Maintenance Plan	Outline plan to describe how offshore assets will be inspected, maintained and repaired throughout their operational life, ensuring safety, reliability and minimising environmental impact.
Planning Inspectorate (PINS)	The PINS is an executive agency of the UK Government responsible for administering and examining DCO applications for NSIPs in England. PINS manages the application process, oversees consultation and examination, and makes a recommendation to the relevant Secretary of State (SoS) on whether consent should be granted.

Term	Meaning
Polyaromatic hydrocarbons (PAH)	A class of chemicals that occur naturally in coal, crude oil, and gasoline.
Polychlorinated biphenyls (PCB)	They belong to a broad family of human-created organic chemicals known as chlorinated hydrocarbons. Although most were banned in 1986, they linger on in detectable levels in animals, fish and humans.
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.
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 (EMP). 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.
Species	A group of living organisms that share common characteristics and can interbreed to produce fertile offspring. Members of a species have similar genetic makeup and are classified under the same scientific name.
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 and are based on the maximum spatial extent across which likely significant effects of the MHPGC Project may be experienced by the relevant receptors (i.e. Zone of Influence (ZoI)).
Subtidal	An area below the Lowest Astronomical Tide (LAT) that is always submerged by water.
Tertiary mitigation	Actions that would occur with or without input from the EIA process 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.
Tidal ellipse	The illustration of the variance of tidal currents in horizontal space.

Term	Meaning
The Wildlife Trusts	The Wildlife Trusts are a federation of local conservation charities dedicated to protecting and restoring wildlife and wild places across the UK. For a DCO, The Wildlife Trusts act as a consultee, advising on biodiversity, habitat protection and ecological enhancements to ensure compliance with conservation objectives.
Transboundary impact	Potential impacts resulting from the MHPGC Project and affecting another European Economic Area state.
Transboundary effects	Assessment of likely significant effects resulting from the MHPGC Project on the interests of another European Economic Area state.
Transition Joint Bay (TJB)	An underground bay housing a joint which connects the offshore export cables to the onshore export cables. The TJB will be located in the vicinity of the onshore side of the landfall.
Trenchless techniques	Construction methods used to install underground or sub-surface infrastructure without the need for continuous open trench excavation, thereby avoiding or minimising disturbance to surface features, habitats and existing land users.
Unexploded Ordnance (UXO)	Unexploded ordnance are explosive weapons (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
AL	Action level
BGS	British Geological Survey
BNG	Biodiversity Net Gain
CBRA	Cable Curial Risk Assessment
CEA	Cumulative Effects Assessment
Cefas	Centre for Environment, Fisheries and Aquaculture Science
CFE	Controlled Flow Excavation
CIEEM	Chartered Institute for Ecology and Environmental Management
CLV	Cable Lay Vessels
CMS	Construction Method Statement
CPS	Cable Protection Systems
CPT	Cone Penetration Testing
CSIP	Cable Specification and Installation Plan
CSQG	Canadian Sediment Quality Guideline
CSV	Crew Transport Vessel

Acronym	Meaning
CTV	Construction Support Vessel
DCO	Development Consent Order
Defra	Department for Environment, Food & Rural Affairs
DESNZ	Department for Energy Security and Net Zero
DDV	Drop Down Video
ECC	Export Cable Corridor
EEA	European Environment Agency
EIA	Environmental Impact Assessment
EMF	Electromagnetic Field
EMODnet	European Marine Observation Data Network
EMP	Environmental Management Plan
EPP	Evidence Plan Process
EQS	Environmental Quality standards
ERL	Effects Low Range
ES	Environmental Statement
EUNIS	European Union Nature Identification System
EWG	Export Working Group
FeAST	Feature Activity Sensitivity Tool
FOCI	Features of Conservation Interest
GES	Good Environmental Status
GIS	Geographical Information System
GV	Guard Vessels
HDD	Horizontal Directional Drilling
HPI	Habitats of Principle Importance
HPMA	Highly Protected Marine Areas
HRA	Habitats Regulations Assessment
IBTS	International Bottom Trawl Survey
IMO	International Marine Organisation
INNS	Invasive Non-Native Species
ISEP	Institute of Sustainability and Environmental Professionals
IQI	Infauna Quality Index
ISV	Installation Support Vessel
JNCC	Joint Nature Conservation Committee
KP	Kilometre Point
LAT	Lowest Astronomical Tide
MAGIC	Multi-Agency Geographic Information for the Countryside

Acronym	Meaning
MarESA	Marine Evidence based Assessment
MarLIN	Marine Life Information Network
MARPOL	International Convention for the Prevention of Pollution from Ships
MBAGC	Morven Branxton Area Grid Connection
MBES	Multi Beam Echo Sounder
MBP	Marine Biosecurity Plan
MCZ	Marine Conservation Zone
MCS	Marine Conservation Society
MCMP	Marine Pollution Contingency Plan
MD-LOT	Marine Directorate – Licensing Operations Team
MDS	Maximum Design Scenario
MFE	Mass Flow Extractor
MHPGC	Morven Hawthorn Pit Grid Connection
MHWS	Mean High Water Springs
MLWS	Mean Low Water Springs
MMO	Marine Management Organisation
MNCR	Marine Nature Conservation Review
MPA	Marine Protected Area
MPCP	Marine Pollution Contingency Plan
MPS	Marine Spatial Plan
MSFD	Marine Strategy Framework Directive
NBN	National Biodiversity Network
NECO	North East Coastal Observatory
NEQ	Net Explosive Quantity
NERC	Natural Environment and Rural Communities
NNR	National Nature Reserves
NMPi	National Marine Plan interactive
NPPF	National Planning Policy Framework
NPS	National Policy Statements
O&M	Operations and Maintenance
OEMP	Offshore Environmental Management Plan
OSP	Offshore Substation Platform
OSPAR	Convention for the Protection of the Marine Environment of the North-East Atlantic
OWEC	Offshore Wind Evidence and Change Programme
OWF	Offshore Wind farm

Acronym	Meaning
PAH	Polyaromatic Hydrocarbons
PCB	Polychlorinated Biphenyls
PDE	Project Design Envelope
PEIR	Preliminary Environmental Information Report
PINS	Planning Inspectorate
PLGR	Pre-Lay Grapnel Run
PLONOR	Pose Little or No Risk
PMF	Priority Marine Feature
PSA	Particle Size Analysis
RIAA	Report to Inform Appropriate Assessment
ROV	Remotely Operated Vehicle
SAC	Special Area of Conservation
SBP	Sub-bottom Profiling
SoS	Secretary of State
SOV	Service Operation Vessels
SPA	Special Protection Area
SSC	Suspended Sediment Concentration
SSS	Side Scan Sonar
SSSI	Site of Special Scientific Interest
TEL	Threshold Effect Level
TSV	Trenching Support Vessels
TWP	Thistle Wind Partners
UAV	Unmanned Aerial Vehicle
UHRS	Ultra High Resolution Seismic
UK	United Kingdom
UK BAP	UK Biodiversity Action Plan
USV	Unmanned Surface Vessel
UXO	Unexploded ordnance
VER	Valued Ecological Receptor
ZoI	Zone of Influence

Units

Unit	Meaning
kg	Kilogram
Kg/m ³	Kilogram per metre cubed
Kg/s	Kilogram per second
km	Kilometre
m	Metre
m ²	Metre squared
m ³	Metre cubed
mm	Millimetre
m/hr	Metre per hour
mG	Milligauss
nm	Nautical mile
μT	Micro Tesla
Mg/l	Milligrams per litre
%	Percentage

3 Benthic Subtidal and Intertidal Ecology

3.1 Introduction

- 3.1.1.1 This chapter of the Preliminary Environmental Information Report (PEIR) presents the 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**.
- 3.1.1.2 This chapter considers the potential impacts and likely significant effects on benthic ecology 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, through English offshore and inshore waters, to Mean High Water Springs (MHWS) at the landfall in County Durham.
- 3.1.1.3 This chapter describes the methodology, datasets that have informed the preliminary assessment, baseline conditions, including future baseline, any required mitigation measures and the preliminary residual effects on benthic ecology that could result from the MHPGC Project.
- 3.1.1.4 The assessment should be read alongside following chapters as part 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 1: Physical Processes, of the PEIR;**
 - **Volume 2, Chapter 4: Fish and Shellfish Ecology, of the PEIR;**
 - **Volume 4, Chapter 5: Inter-related Effects, of the PEIR.**
- 3.1.1.5 The chapter also draws on information contained within the following annexes prepared to support 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, prepared to support the PEIR;**
 - **Volume 2, Annex 3.1: Benthic Ecology Technical Report, of the PEIR;**
 - **Volume 2, Annex 1.2: Model Design Validation and Results, of the PEIR;**
 - **Volume 2, Annex 4.1: Herring and Sandeel Assessment, of the PEIR;**
 - **Volume 2, Annex 4.2: Morven HVDC EMF Study, of the PEIR.**
- 3.1.1.6 The chapter also draws on information contained within the following appendices:
- **MHPGC Project Habitats Regulations Assessment (HRA)/Habitats Regulations Appraisal Screening Report, prepared to support the PEIR;**
 - **MHPGC Project Habitats Regulations Appraisal/HRA Report to Inform Appropriate Assessment (RIAA), prepared to support the PEIR.**
- 3.1.1.7 The PEIR provides a comprehensive overview of the MHPGC Project's preliminary likely significant environmental effects and mitigation measures, presenting data to stakeholders for review and

feedback. The PEIR is also informed by the ongoing pre-application consultation process (**Section 3.3**).

- 3.1.1.8 Following statutory consultation, comments will be reviewed and considered, where appropriate, in preparation of the Environmental Statement (ES) that will accompany the application to the Planning Inspectorate (PINS) for development consent and a marine licence application to Marine Directorate Licensing Operations Team (MD-LOT).

3.2 Legislative and policy context

3.2.1 Overview

- 3.2.1.1 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 benthic subtidal and intertidal ecology.

3.2.2 Legislation

- 3.2.2.1 Relevant international, United Kingdom, Scottish and English legislation provides the statutory framework for the protection and sustainable management of marine habitats and species and has informed the assessment of benthic subtidal and intertidal ecology for the MHPGC Project. The legislative framework includes requirements relating to marine planning and licensing, the protection of internationally and nationally designated sites, and the conservation of habitats, species and biodiversity.
- 3.2.2.2 **Table 3.1** provides a summary of the legislation relevant to benthic subtidal and intertidal ecology and identifies how and where the requirements of the legislation have been considered within the PEIR.

Table 3.1: Summary of legislation relevant to Benthic Subtidal and Intertidal Ecology

Legislation/Convention	Summary of relevant requirements	How and where considered in the PEIR
International		
Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) 1979	Promotes the conservation of wild flora, fauna and natural habitats, including marine habitats and species.	Baseline characterisation of benthic habitats and species is provided in Section 3.4 , with assessment of potential impacts presented in Section 3.8 .
Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR) 1998	Promotes protection of the marine environment, including OSPAR threatened and/or declining habitats and species.	Relevant OSPAR habitats and species are identified within the baseline (Section 3.4) and considered within the impact assessment (Section 3.8).
United Kingdom		
Marine and Coastal Access Act 2009	Establishes the marine licensing regime and provides for the designation and protection of Marine Conservation Zones (MCZs). Part 3 of the Act introduced a marine planning system, while Part 4 introduced a marine licensing system for regulating activities in the marine environment. The Act requires a marine licence to be obtained for certain activities and works carried out in the marine area. Part 5 of the Act enables the designation of MCZs in England and Wales, as well as	The MHPGC Project will be subject to marine licensing requirements. A deemed Marine Licence (dML) will be included within the DCO application for the Project in English offshore and inshore regions. For assets located within Scottish waters Marine Licence(s) will be applied for from the Marine Directorate - Licensing Operations Team (MD-LOT). Relevant MCZs are identified in Section 3.4.7 and potential impacts on protected benthic features are

Legislation/Convention	Summary of relevant requirements	How and where considered in the PEIR
	in offshore waters within the United Kingdom (UK) marine area.	assessed in Section 3.8 . A document outlining the approach to the MPA/MCZ assessment is provided within Approach to Marine Protected Area (MPA)/MCZ and Highly Protected Marine Area (HPMA) Assessments, prepared to support the PEIR . A detailed MPA/MCZ assessment will be provided to support the and Scottish Marine Licence application(s).
Wildlife and Countryside Act 1981 (as amended)	Provides protection for nationally important habitats, species and Sites of Special Scientific Interest (SSSIs).	Relevant designated sites and protected ecological features are identified within Section 3.4.7 and considered within the impact assessment in Section 3.8 .
Marine Strategy Regulations 2010	Transpose the Marine Strategy Framework Directive into UK law and require activities not to hinder achievement or maintenance of Good Environmental Status (GES).	Potential impacts on benthic habitats and species, including seabed integrity and biodiversity, are assessed within Section 3.8 .
Conservation of Offshore Marine Habitats and Species Regulations 2017 (as amended)	Provides protection for internationally designated sites within UK offshore waters and requires assessment of plans or projects which may affect Special Areas of Conservation (SACs) and Special Protection Areas (SPAs).	Relevant designated sites are identified in Section 3.4.7 and assessed in Section 3.8 . Detailed consideration is provided within the MHPGC Project HRA/Habitats Regulations Appraisal Screening Report, prepared to support of the PEIR .
Scotland		
Marine (Scotland) Act 2010	Establishes marine planning, marine licensing and MPA provisions in Scottish waters.	The MHPGC Project has been developed in accordance with relevant marine planning and licensing requirements. Relevant MPAs and protected benthic features are assessed in Section 3.8 .
Conservation (Natural Habitats, &c.) Regulations 1994 (as amended)	Provides protection for SACs and SPAs within Scottish territorial waters and requires Habitats Regulations Assessment where significant effects may occur to a European site.	Relevant SACs and SPAs are identified in Section 3.4.7 , assessed in Section 3.8 and considered further within the MHPGC Project HRA/Habitats Regulations Appraisal Screening Report, prepared to support the PEIR .
England		
Conservation of Habitats and Species Regulations 2017 (as amended)	Provides protection for SACs and SPAs in English waters and requires Habitat Regulations Assessment (HRA) where likely significant effects cannot be excluded.	Relevant designated sites are identified in Section 3.4.7 and assessed in Section 3.8 . Further consideration is provided within the MHPGC Project HRA/Habitats Regulations Appraisal Screening Report, prepared to support the PEIR .
Section 41 of the Natural Environment and Rural Communities Act 2006	Requires public authorities to have regard to habitats and species of principal importance for biodiversity conservation.	Relevant Section 41 habitats and species are identified within the baseline (Section 3.4) and considered within the impact assessment (Section 3.8).

Legislation/Convention	Summary of relevant requirements	How and where considered in the PEIR
Environment Act 2021	Establishes statutory environmental targets and supports biodiversity recovery and enhancement. Focuses on four priority areas: air quality, biodiversity, water, and waste, and includes the introduction of Biodiversity Net Gain (BNG) (HM Government, 2021).	Relevant commitments to avoid and reduce impacts on biodiversity are provided in Section 3.7, with the full list of commitments relevant to benthic ecology provided in Volume 1, Annex 4.1: Draft Commitments Register, of the PEIR. In addition, an Outline Biodiversity Net Gain Plan will be prepared and submitted with the DCO application in relation to onshore components of the project, setting out the assessment and measures proposed to secure the MHPGC Project's statutory Biodiversity Net Gain objective.

3.2.3 National policy context

National Policy Statements

3.2.3.1 National Policy Statements (NPS) set out the primary policy framework for a DCO under which the MHPGC Project will be considered. This framework includes guidelines, requirements and criteria that the MHPGC Project must meet to obtain consent and proceed with development. **Table 3.2** provides details of the NPS relevant to benthic subtidal and intertidal ecology and how and where they are covered in the PEIR:

- NPS for energy (NPS EN-1) (DESNZ, 2025a);
- NPS for renewable energy infrastructure (NPS EN-3) (DESNZ, 2025b);
- NPS for electricity networks infrastructure (NPS EN-5) (DESNZ, 2025c).

Table 3.2: Summary of the NPS provisions relevant to Benthic Subtidal and Intertidal Ecology

Summary of relevant NPS provisions	How and where considered in the PEIR
NPS EN-1	
Paragraph 4.5.7 <i>"Applicants are encouraged to approach the marine licensing regulator (MMO in England and Natural Resources Wales in Wales) in preapplication, to ensure that they are aware of any needs for additional marine licenses alongside their Development Consent Order application". This NPS may also be a relevant consideration in planning decisions in Scotland (Paragraph 1.4.2).</i>	Consultation with the MMO and MD-LOT was undertaken during the scoping stage with engagement ongoing via the Evidence Plan Process (EPP) and Expert Working Groups (EWGs). Relevant comments are provided in Section 3.3.2.
Paragraph 4.5.8 <i>"Applicants for a Development Consent Order must take account of any relevant Marine Plans and are expected to complete a Marine Plan assessment as part of their project development, using this information to support an application for development consent".</i>	Relevant Marine Plans are identified in Section 3.2.4 and considered in Section 3.5 and Section 3.8.
Paragraph 4.5.9 <i>"Applicants are encouraged to refer to Marine Plans at an early stage, such as in preapplication, to inform project planning, for example to avoid less favourable locations as a result of other uses or environmental constraints".</i>	Relevant Marine Plans are identified in Section 3.2.4 and considered in Section 3.5. Further detail on the routing including consideration of the relevant Marine Plans during the site selection and route refinement process, is considered in Volume 1, Chapter 3: Site Selection & Consideration of Alternatives, of the PEIR and Volume 1, Annex 3.1: Selection and Refinement of Cable Landfall, of the PEIR.

Summary of relevant NPS provisions	How and where considered in the PEIR
Paragraph 5.4.18 <i>"Where the development is subject to EIA, the applicant should ensure that the 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 being of principal importance for the conservation of biodiversity, including irreplaceable habitats".</i>	Details of internationally, nationally, and locally designated sites and protected species, and other habitats and species of principal importance are provided in Section 3.4.7 and an assessment of potential impacts can be found in Section 3.8. An assessment of potential impacts on designated sites is available in the HRA (see MHPGC Project HRA/Habitats Regulations Appraisal Screening Report, prepared to support the PEIR; and MHPGC Project Habitats Regulations Appraisal/HRA RIAA, prepared to support the PEIR). A document outlining the approach to the MPA/MCZ/HPMA assessment is provided within Approach to MPA/MCZ and HPMA Assessments, prepared to support the PEIR. A detailed MPA/MCZ/HPMA assessment will be provided to support the DCO application and Scottish Marine Licence applications.
Paragraph 5.4.20 <i>"The applicant should show how the project has taken advantage of opportunities to conserve and enhance biodiversity and geological conservation interests".</i>	Relevant commitments to avoid and reduce impacts on biodiversity are provided in Section 3.7, with the full list of commitments with relevance to benthic ecology provided in Volume 1, Annex 4.1: Draft Commitments Register, of the PEIR. In addition, an Outline Biodiversity Gain Plan will be prepared and submitted with the DCO application in relation to onshore components of the project, setting out the assessment and measures proposed to secure the MHPGC Project's statutory Biodiversity Gain objective. Further detail on the routing including consideration of the relevant Marine Plans during the site selection and route refinement process, is considered in Volume 1, Chapter 3: Site Selection & Consideration of Alternatives, of the PEIR and Volume 1, Annex 3.1: Selection and Refinement of Cable Landfall, of the PEIR. Through this process, opportunities to avoid and minimise potential effects on biodiversity and geological conservation interests were taken into account during the development and refinement of the MHPGC Project.
Paragraph 5.4.21 <i>"Applicants should consider ecosystem services and natural capital when designing biodiversity measures and environmental mitigation."</i>	Relevant commitments to avoid and reduce impacts on habitats and biodiversity are provided in Section 3.7, with the full list of commitments with relevance to benthic ecology provided in Volume 1, Annex 4.1: Draft Commitments Register, of the PEIR. In addition, an Outline Biodiversity Gain Plan will be prepared and submitted with the DCO application in relation to onshore components of the project, setting out the assessment and measures proposed to secure the MHPGC Project's statutory Biodiversity Gain objective.
Paragraph 5.4.24 <i>"Energy projects will need to ensure vessels used by the project follow existing regulations and guidelines to manage ballast water."</i>	Relevant commitments include an Outline Marine Biosecurity Plan (MPB) which will be prepared and submitted with the DCO application and will ensure full compliance with

Summary of relevant NPS provisions	How and where considered in the PEIR
	the International Marine Organisation (IMO) Ballast Water Management Guidelines (Section 3.7);
Paragraph 5.4.34 <i>"Applicants should consider any reasonable opportunities to maximise the restoration, creation, and enhancement of wider biodiversity, and the protection and restoration of the ability of habitats to store or sequester carbon as set out under Section 4.6."</i>	Relevant commitments identified to avoid and reduce impacts on biodiversity (and support ecosystem services and natural capital) are provided in Section 3.7, with the full list of commitments with relevance to benthic ecology provided in Volume 1, Annex 4.1: Draft Commitments Register, of the PEIR. In addition, an Outline Biodiversity Gain Plan will be prepared and submitted with the DCO application in relation to onshore components of the project, setting out the assessment and measures proposed to secure the MHPGC Project's statutory Biodiversity Gain objective.
Paragraph 5.4.35 <i>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, beyond those under protection and identified as being of principal importance. This may include considerations and opportunities identified through Local Nature Recovery Strategies, and national goals and targets set through the Environment Act 2021 and the Environmental Improvement Plan.</i>	Relevant commitments identified to avoid and reduce impacts on biodiversity (and support ecosystem services and natural capital) are provided in Section 3.7, with the full list of commitments with relevance to benthic ecology provided in Volume 1, Annex 4.1: Draft Commitments Register, of the PEIR. In addition, an Outline Biodiversity Gain Plan will be prepared and submitted with the DCO application in relation to onshore components of the project, setting out the assessment and measures proposed to secure the MHPGC Project's statutory Biodiversity Gain objective.
Paragraph 5.4.36 <i>"...Applicants should include appropriate avoidance, mitigation, compensation and enhancement measures as an integral part of the proposed development".</i>	Commitments relevant to benthic ecology have been identified are provided in Section 3.7, with the full list of commitments provided in Volume 1, Annex 4.1: Draft Commitments Register, of the PEIR. Further detail on the routing including consideration of the relevant Marine Plans during the site selection and route refinement process, is considered in Volume 1, Chapter 3: Site Selection & Consideration of Alternatives, of the PEIR and Volume 1, Annex 3.1: Selection and Refinement of Cable Landfall, of the PEIR. Through this process, opportunities to avoid and minimise potential effects on biodiversity and geological conservation interests were taken into account during the development and refinement of the MHPGC Project.
NPS EN-3	
Paragraphs 2.8.44 – 2.8.46, 2.8.94, 2.8.106 and 2.8.199 – 2.8.202 <i>"...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 EIAs, HRAs and MCZ assessments".</i>	A baseline of subtidal benthic ecology is provided in Section 3.4 and an assessment of potential impacts can be found in Section 3.5. An assessment of potential impacts on designated sites is available in the HRA (see MHPGC Project HRA/Habitats Regulations Appraisal Screening Report, prepared to support the PEIR; and MHPGC Project Habitats Regulations Appraisal/HRA RIAA, prepared to support the PEIR). A document outlining the approach to the MPA/MCZ/HPMA assessment is provided within Approach to MPA/MCZ and

Summary of relevant NPS provisions	How and where considered in the PEIR
	HPMA Assessments, prepared to support the PEIR. A detailed MPA/MCZ/HPMA assessment will be provided to support the DCO and Marine Licence applications.
Paragraph 2.8.97 <i>"...Applicants should consult at an early stage of pre-application with relevant statutory consultees and energy not-for profit organisations, as appropriate, on the assessment methodologies, baseline data collection, and potential avoidance, mitigation and compensation options which should be undertaken".</i>	Consultation with the statutory consultees, including the MMO and Natural England, was undertaken during the scoping stage and is ongoing. Relevant comments are provided in Section 3.3.
Paragraph 2.8.112 <i>"...Applicant assessments of the effects of installing offshore transmission infrastructure across the intertidal/ coastal zone should demonstrate compliance with mitigation measures in any relevant plan-level HRA or MCZ assessment including those prepared by The Crown Estate as part of its leasing round, and include information, where relevant, about:</i> <i>Any alternative landfall sites that have been considered by the applicant during the design phase and an explanation for the final choice;</i> <i>Any alternative cable installation methods that have been considered by the applicant during the design phase and an explanation for the final choice;</i> <i>Potential loss of habitat;</i> <i>Disturbance during cable installation, maintenance/repairs and removal (decommissioning);</i> <i>Increased suspended sediment loads in the intertidal zone during installation and maintenance/repairs;</i> <i>Potential risk from invasive and non-native species;</i> <i>Predicted rates at which the intertidal zone might recover from temporary effects, based on existing monitoring data;</i> <i>Protected sites; and</i> <i>Impacts on delivery of the Environment Agency's habitat compensation and restoration programme."</i>	During the construction of the MHPGC Project, the offshore export cables will be installed beneath the intertidal zone using trenchless techniques. As a result, there will be no direct construction works or disturbance within the intertidal zone, and direct impacts on intertidal habitats are not anticipated. This is a result of the site selection and alternatives process, which identified a trenchless landfall solution as the preferred approach in order to avoid direct disturbance to intertidal habitats (see Volume 1, Chapter 3: Site Selection and Consideration of Alternatives and Volume 1, Annex 3.1: Selection and Refinement of Cable Landfall, of the PEIR). A trenchless solution will be used at the landfall, with the exit pit entirely in the subtidal zone. However, an intertidal survey has been undertaken in August 2026 and baseline reporting will be updated in the ES. A baseline of subtidal benthic ecology is provided in Section 3.4 and an assessment of potential impacts can be found in Section 3.5 where these impact pathways have been assessed. An assessment of potential impacts on designated sites is available in the HRA (see MHPGC Project HRA/Habitats Regulations Appraisal Screening Report, prepared to support the PEIR and MHPGC Project Habitats Regulations Appraisal/HRA RIAA, prepared to support the PEIR. A document outlining the approach to the MPA/MCZ/HPMA assessment is provided within Approach to MPA/MCZ and HPMA Assessments, prepared to support the PEIR. A detailed MPA/MCZ/HPMA assessment will be provided to support the DCO and Marine Licence applications.
Paragraph 2.8.116 <i>"...Applicant assessment of the effects on the subtidal environment should include:</i> <i>Loss of habitat due to foundation type including associated seabed preparation, predicted scour, scour protection and altered sedimentary processes, e.g. sand wave/boulder/unexploded ordnance (UXO) clearance;</i> <i>Environmental appraisal of inter-array and other offshore transmission and installation/maintenance methods, including predicted loss of habitat due to predicted scour and scour/cable protection and sand wave/boulder/ UXO clearance;</i>	A baseline of subtidal benthic ecology is provided in Section 3.4 and an assessment of potential impacts on the subtidal marine environment can be found in Section 3.8. As the only offshore components of the MHPGC Project comprise only the offshore export cables and required cable protection, the assessment is limited to the impact pathways associated with these project components.

Summary of relevant NPS provisions	How and where considered in the PEIR
- Habitat disturbance from construction and maintenance/repair vessels' extendable legs and anchors; - Increased suspended sediment loads during construction and from maintenance/repairs; - Predicted rates at which the subtidal zone might recover from temporary effects; - Potential impacts from EMF on benthic fauna; - Potential impacts upon natural ecosystem functioning; - Protected sites; and - Potential for invasive/non-native species introduction".	
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 ...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".	Commitments relevant to benthic ecology that have been identified are provided in Section 3.7, with the full list of MHPGC Project commitments provided in Volume 1, Annex 4.1: Draft Commitments Register, of the PEIR.
Paragraph 2.13.15 "...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."	Landfall design is summarised in Volume 1, Chapter 2: Project Description and Volume 1, Annex 3.1: Selection and Refinement of Cable Landfall, of the PEIR. When identifying and developing the proposed landfall, consideration was given to the sensitivities of the coastal and marine environment, together with potential environmental, community and other effects on neighbouring onshore areas. These considerations informed the selection and refinement of the landfall design, including the adoption of trenchless installation techniques to minimise impacts where relevant. Commitments relevant to benthic ecology that have been identified are provided in Section 3.7, with the full list of MHPGC Project commitments provided in Volume 1, Annex 4.1: Draft Commitments Register, of the PEIR.
Paragraph 2.14.2(Part) "...In the assessments of their designs, applicants 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 the mitigation hierarchy has been followed, in particular to avoid the need for compensatory measures for coastal, inshore and offshore developments affecting SACs SPAs, and Ramsar sites".	Commitments relevant to benthic ecology that have been identified are provided in Section 3.7, with the full list of MHPGC Project commitments provided in Volume 1, Annex 4.1: Draft Commitments Register, of the PEIR. Potential effects on relevant SACs, SPAs and Ramsar sites have been assessed within the MHPGC Project HRA/Habitats Regulations Appraisal Screening Report, prepared to support the PEIR; and MHPGC Project Habitats Regulations Appraisal/HRA RIAA, prepared to support the PEIR. Cumulative effects are assessed in Section 3.10.

National Planning Policy Framework

- 3.2.3.2 The National Planning Policy Framework (NPPF) has the potential to be considered important and relevant to the Secretary of State (SoS) consideration of the MHPGC Project (Ministry of Housing, Communities & Local Government, 2026). **Table 3.3** provides details of the elements of the NPPF that are relevant to benthic subtidal and intertidal ecology and how and where they are covered in the PEIR or will be covered within the ES.

Table 3.3: Summary of NPPF requirements relevant to Benthic Subtidal and Intertidal Ecology

NPPF section	How and where considered in the PEIR
Policy N1: Identifying environmental opportunities and safeguards <i>"Development plans should safeguard and enhance the natural environment... identify the hierarchy of international, national and locally designated sites... identify opportunities for the conservation, enhancement and recovery of habitats and priority or threatened species, including habitat restoration and the creation and strengthening of ecological networks..."</i>	Potential impacts to benthic ecology are considered in this chapter from Section 3.8 onwards. The assessment includes consideration of internationally and nationally designated sites, habitats and species of conservation importance, and ecological networks where relevant to benthic receptors. An assessment of potential impacts on designated sites is available in the HRA (see MHPGC Project HRA/Habitats Regulations Appraisal Screening Report, prepared to support the PEIR and MHPGC Project Habitats Regulations Appraisal/HRA RIAA, prepared to support the PEIR). A document outlining the approach to the MPA/MCZ/HPMA assessment is provided within Approach to MPA/MCZ and HPMA Assessments, prepared to support the PEIR. A detailed MPA/MCZ/HPMA assessment will be provided to support the DCO and Marine Licence applications.
Policy N2: Improving the natural environment <i>"Development proposals should consider the environmental qualities of land proposed for development, including habitats... identify opportunities for those qualities to be conserved or enhanced... take suitable opportunities to connect to and strengthen ecological networks... minimise any adverse impacts on biodiversity..." and "If significant harm to biodiversity resulting from a development cannot be avoided, adequately mitigated or, as a last resort, compensated for, then the development should be refused."</i>	Potential impacts to benthic ecology are considered in Section 3.8 onwards, including the application of embedded mitigation and consideration of the mitigation hierarchy where appropriate. The assessment considers potential effects on benthic habitats, communities and protected features and identifies measures to avoid, reduce or mitigate impacts where required.
Policy N6: Areas of particular importance for biodiversity and geodiversity <i>"Development proposals affecting a site of international importance... should be refused unless..." and "A site of national importance... should only be supported if..." specified tests are met.</i>	A full list of sites designated for the protection of benthic ecological features is provided in Section 3.4. Consideration of internationally designated sites is included within the HRA (see (see MHPGC Project HRA/Habitats Regulations Appraisal Screening Report, prepared to support the PEIR and MHPGC Project Habitats Regulations Appraisal/HRA RIAA, prepared to support the PEIR). A document outlining the approach to the MPA/MCZ/HPMA assessment is provided within Approach to MPA/MCZ and HPMA Assessments, prepared to support the PEIR. A detailed MPA/MCZ/HPMA assessment will be provided to support the DCO application and Marine licence.

3.2.4 Marine planning policy context

3.2.4.1 The following marine plans are relevant to benthic ecology and have informed the assessment of effects in this chapter:

- The UK Marine Policy Statement (MPS) (Department for Environment, Food & Rural Affairs (Defra), 2020);
- Scotland's National Marine Plan (Marine Directorate, 2015);
- Northeast Inshore and Northeast Offshore Marine Plan (MMO, 2024).

3.2.4.2 The relevance of the marine plans to the MHPGC Project is outlined in **Table 3.4** below.

Table 3.4: Marine planning policy relevant to benthic subtidal and intertidal ecology

Marine plan description	How and where considered in the PEIR
UK Marine Policy Statement	
The UK MPS is the framework for preparing Marine Plans and taking decisions affecting the marine environment. The MPS ensures that marine resources are used in a sustainable way by ensuring biodiversity is protected and conserved by using the precautionary principle and relying on sound evidence.	In line with policy objectives in the MPS, this Chapter has taken into consideration measures that can be taken to avoid biodiversity loss. Where possible, consideration has been given to conserving and avoiding harm to benthic ecology through routeing, mitigation and consideration of reasonable alternatives. Potential adverse effects to designated sites and protected features have been avoided where possible. Details of protected sites and species designations are provided in Section 3.4 , with an assessment of potential impacts in Section 3.8 . Commitments relevant to benthic ecology have been identified are provided in Section 3.7 , with the full list of commitments provided in Volume 1, Annex 4.1: Draft Commitments Register, of the PEIR .
Scottish National Marine Plan	
The Scottish National Marine Plan covers the management of both Scottish inshore waters and offshore waters. This National Marine Plan sets out strategic policies for the sustainable development of Scotland's marine resources.	Routeing of the MHPGC Project has been selected to avoid sensitive habitats (see Volume 1, Chapter 3: Site Selection and Consideration of Alternatives, of the PEIR and Volume 1, Annex 3.1: Selection and Refinement of Cable Landfall, of the PEIR). An ecosystems-based approach has been adopted, whereby route selection and project design have sought to avoid or minimise effects on habitats and species and maintain the integrity and functioning of the wider marine ecosystem. Potential cumulative impacts have also been considered, to ensure that effects from MHPGC Project activities do not adversely impact benthic ecology. Details of protected sites and species designations are provided in Section 3.4 , with an assessment of potential impacts and in Section 3.8 . Commitments relevant to benthic ecology have been identified are provided in Section 3.7 , 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.	Routeing of the MHPGC Project has been selected to avoid sensitive habitats (see Volume 1, Chapter 3: Site Selection and Consideration of Alternatives). An ecosystems-based approach has been adopted, and potential cumulative impacts have been considered, to ensure that effects from MHPGC Project activities do not adversely impact benthic ecology. Details of protected sites and species designations are provided in Section 3.4, with an assessment of impacts and in Section 3.8. Commitments relevant to benthic ecology have been identified are provided in Section 3.7, with the full list of commitments provided in Volume 1, Annex 4.1: Draft Commitments Register, of the PEIR.

3.2.5 Local policy context

- 3.2.5.1 The MHPGC Project landfall lies within the jurisdiction of Durham County Council. Policy within the County Durham Plan that is relevant to benthic ecology and has informed the assessment of effects in this chapter (Durham County Council, 2020), the relevance to the MHPGC Project is outlined in **Table 3.5**.

Table 3.5: Local policy relevant to benthic ecology

Policy description	How and where considered in the PEIR
County Durham Plan	
Policy 37: The council will seek to protect and enhance the Durham Heritage Coast and wider Coastal Zone. Development proposals within the Durham Heritage Coast or wider Coastal Zone or that have the potential to individually or cumulatively impact on their setting must: - be appropriate in terms of scale, massing and design; - not give rise to adverse impacts upon the tranquil or isolated character of the area; - not increase the risk from climate change, flooding, erosion or land instability; - demonstrate consistency with the protection, conservation and enhancement of its natural assets and heritage features; - not be inconsistent with the purposes of the Heritage Coast and objectives of the Heritage Coast Management Plan. Other types of development within, or within the setting of, the Durham Heritage Coast or wider Coastal Zone will only be permitted where they meet criteria above and it can be clearly demonstrated that there are overriding social, environmental and/or economic benefits which will be derived from that particular proposal and that it cannot be accommodated outside of the wider Coastal Zone.	During the construction of the MHPGC Project, there will be no works in the intertidal area at the landfall location in County Durham. A trenchless technique installation will be used at the landfall to install the offshore export cables, with the exit pit entirely in the subtidal area. The trenchless techniques will re-emerge above MHWS, and beyond the coastal railway line, in the terrestrial environment, completely avoiding the intertidal area. Therefore, this approach will avoid direct impacts to the Durham Heritage Coast and the wider coastal zone. Potential indirect impacts to the intertidal area, including increases in SSCs, sediment deposition and the disturbance or remobilisation of sediment-bound contaminants, have been considered within the assessment presented in Section 3.8. The “wider coastal zone” refers to the “the area of land between the mean low water mark on the seaward side and the coastal railway line, from the county boundary with Hartlepool to Hawthorn Junction south of Dawdon. To the north of this point, the wider coastal zone is defined as the cliff line as far as the Seaham Hall car park and then the B1287...” as defined within Policy 37 of the County Durham Plan (Durham County Council, 2020).
Policy 41: Proposals for new development will not be permitted if significant harm to biodiversity or geodiversity resulting from the	Benthic ecology features which could be potentially impacted by the MHPGC Project activities are characterised in Section 3.4 and

Policy description	How and where considered in the PEIR
development cannot be avoided, or appropriately mitigated, or, as a last resort, compensated for. Proposals for new development will be expected to minimise impacts on biodiversity by retaining and enhancing existing biodiversity assets and features and providing net gains for biodiversity including by establishing coherent ecological networks. Measures should be appropriate, consistent with the biodiversity of the site and contribute to the resilience and coherence of local ecological networks.	an assessment of potential impacts can be found in Section 3.8. Commitments relevant to benthic ecology are detailed in Section 3.7.
Policy 42: Development that has the potential to have an effect on internationally designated site(s), (including all development within 0.4 kilometres (km) of the sites), either individually or in combination with other plans or projects, will need to be screened in the first instance to determine whether significant effects on the site are likely and, if so, will be subject to an Appropriate Assessment. Development will be refused where it cannot be ascertained, following Appropriate Assessment, that there would be no adverse effects on the integrity of the site, unless the proposal is able to pass the further statutory tests of ‘no alternatives’ and ‘imperative reasons of overriding public interest’ as set out in Regulation 64 of the Conservation of Habitats and Species Regulations 2017 (HM Government, 2017a). In these exceptional circumstances, where these tests are met, appropriate compensation will be required in accordance with Regulation 68.	Consideration has been given to internationally designated sites in the MHPGC Project design. Details for relevant designated sites is provided in Section 3.4.7 and the HRA (see MHPGC Project HRA/Habitats Regulations Appraisal Screening Report, prepared to support the PEIR and MHPGC Project Habitats Regulations Appraisal/HRA RIAA, prepared to support the PEIR).
Policy 43: All development proposals in, or which are likely to adversely impact upon (either individually or in combination with other developments) SSSIs or National Nature Reserves (where not a component of an internationally designated site) will only be permitted where the benefits of development in that location clearly outweigh the impacts on the interest features on the site and any wider impacts on the network of sites. All development proposals in, or which are likely to adversely impact upon, Local Sites (Geology and Wildlife) or Local Nature Reserves will only be permitted when it can be demonstrated that the benefits of development in that location outweigh the impacts on the local nature conservation interest or scientific interest on the site and any wider impacts on the network of sites. In all cases where development impacts adversely on a designated site, mitigation, or as a last resort compensation, must be provided and it must be demonstrated that the proposed mitigation or compensatory measures are appropriate to the designations assigned to the site and deliver clear net gains for the habitats and/or species assemblages the site is designated for. In relation to protected species and their habitats, all development which, alone or in combination, has a likely adverse impact on the ability of species to survive, reproduce and maintain or expand their current distribution will not be permitted unless: • appropriate mitigation, or as a last resort compensation, can be provided, which maintains a viable population and where possible provides opportunities for the population to expand; • where the species is a European protected species, the proposal also meets the licensing criteria of overriding public interest, no satisfactory alternative and favourable conservation status.	Consideration has been given to designated sites and protected species in the MHPGC Project design. However, there are no SSSIs or National Nature Reserves (NNRs) designated for benthic ecology features in the Benthic Subtidal and Intertidal Ecology Study Area. Details for relevant designated sites is provided in Section 3.4.7 and the HRA (see MHPGC Project HRA/Habitats Regulations Appraisal Screening Report, prepared to support the PEIR and MHPGC Project Habitats Regulations Appraisal/HRA RIAA, prepared to support the PEIR). Commitments relevant to benthic ecology are detailed in Section 3.7.

3.3 Consultation and engagement

3.3.1 Scoping

- 3.3.1.1 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 SoS) and MD-LOT both provided Scoping Opinions in March 2025 (PINS, 2025; MD-LOT, 2025, respectively). A summary of scoping responses relevant to benthic ecology is outlined in **Table 3.6**.

Table 3.6: Summary of scoping responses relevant to benthic ecology

Comment	How and where considered in the PEIR
MD-LOT	
The MHPGC Project Scoping Report presents the two study areas defined for benthic subtidal and intertidal ecology: the Benthic Ecology Study Area and the Regional Benthic Ecology Study Area. The Scottish Ministers are broadly content with the study areas presented by the Applicant however, the Scottish Ministers highlight the representation by NatureScot regarding the maximum spring tidal excursion distance and advise that this should be clarified by the Applicant.	In the MHPGC Project Scoping Report, the Benthic Subtidal Ecology Study Area was defined as the MHPGC Project Scoping Boundary plus a buffer extending approximately 5km to 9km. Physical processes modelling, provided in Volume 2, Annex 1.2: Model Design Validation and Results, of the PEIR , has now been undertaken for the MHPGC Project PEIR Red Line Boundary, which defines the maximum spring tidal excursion distance, and hence the Benthic Subtidal Ecology Study Area buffer distance is 9km around the MHPGC Project PEIR Red Line Boundary. This is described in further detail in Section 3.4.2 . The 9 km buffer was agreed with consultees during EWG2 and has therefore been adopted as the Benthic Subtidal Ecology Study Area for the PEIR.
The Scottish Ministers advise that 'increased suspended sediment concentrations (SSC) and associated deposition' and 'of temporary habitat disturbance and loss' must be scoped in for further assessment during the O&M phase of the MHPGC Project.	'Increased SSCs and associated deposition' and 'temporary habitat disturbance and loss' during the MHPGC Project have been scoped in for assessment during the O&M phase and assessed in Section 3.8 .
The Scottish Ministers request that 'colonisation of hard structures' and 'changes in physical processes' are fully considered.	'Colonisation of hard structures' is only considered during the operation phase in Section 3.8 as during decommissioning the current Maximum Design Scenario (MDS) is to remove hard structures which would prevent further colonisation. If they are left <i>in situ</i> during decommissioning, any change would be considered negligible compared to the O&M phase. 'Changes in physical processes' during all project phases have been scoped in for further assessment in Section 3.8 .
The Scottish Ministers advise that impacts to benthic invertebrates due to thermal emissions from subsea electrical cables is scoped in for further assessment.	'Impacts to benthic invertebrates due to thermal emissions from subsea cables' during the O&M phase has been scoped in for further assessment in Section 3.8 .
The Scottish Ministers request that priority marine features (PMF) and EMF are fully considered.	PMFs have been considered within the baseline characterisation (Section 3.4) and potential impacts to identified PMFs have been assessed (Section 3.8). 'Impacts to benthic invertebrates due to EMF' during the O&M phase has been scoped in for further assessment in Section 3.8 .
The Scottish Ministers are broadly content with the embedded measures and mitigation described in the MHPGC Project Scoping Report but advise that the full range of mitigation measures and published guidance is considered and discussed.	Commitments relevant to benthic ecology have been identified are provided in Section 3.7 , with the full list of commitments provided in Volume 1, Annex 4.1: Draft Commitments Register, of the PEIR . Published guidance considered in this assessment are provided in Section 3.4.4
With regards to transboundary impacts, the Scottish Ministers agree that these can be scoped out from further assessment.	Transboundary effects for benthic ecology have been scoped out from further assessment (see Section 3.9).

Comment	How and where considered in the PEIR
The Scottish Ministers agree that the benthic features of the Firth of Forth Banks Complex MPA should be screened in for further assessment.	Consideration has been given to relevant designated sites in Section 3.4.7 A detailed MPA/MCZ/HPMA assessment will be provided to support the DCO and Marine Licence applications, including the Firth of Forth Banks Complex MPA. A document outlining the approach to the MPA/MCZ/HPMA assessment is provided within Approach to MPA/MCZ and HPMA Assessments, prepared to support the PEIR.
NatureScot	
In relation to the Benthic Ecology Study Area our comments on Physical Processes Study Area also apply. NatureScot would welcome clarification as to why the maximum spring tidal excursion distance differs to that proposed for the Morven North Offshore Wind Array Project and Morven South Offshore Wind Array Project (hereafter 'Morven North and Morven South'), which the MHPGC Project Scoping Boundary encompasses.	The Benthic Subtidal and Intertidal Ecology Study Area is defined in Section 3.4.2. The Benthic Subtidal Ecology Study Area has now been informed by physical processes modelling (see Volume 2, Annex 1.2: Model Design Validation and Results, of the PEIR and Section 3.4.2) for the specific MHPGC Project area, where the maximum spring tidal excursion has been defined as 9km. Although the predicted excursion distance ranges from approximately 5 to 9km around the MHPGC Project PEIR Red Line Boundary, the maximum value has been applied on a precautionary basis. Accordingly, a precautionary maximum tidal excursion of 9km has been used to define the Benthic Subtidal Ecology Study Area for the purposes of the impact assessment. The MHPGC Project tidal excursion distance differs from Morven North and Morven South. Please refer to Table 1.5 in Volume 2, Chapter 1: Physical Processes of the PEIR for justification.
NatureScot are content that the list of data sources along with the site-specific survey data will be sufficient to characterise the baseline environment and inform the subsequent assessment. Just to highlight that the MHPGC Project Scoping Report there is reference to the document relating to EUSeaMap 2019 – there is a more up to date version in EUSeaMap 2023 (European Marine Observation Data Network (EMODnet), 2023).	A full list of the baseline data sources used to inform the benthic ecology baseline characterisation is provided in Section 3.4.4. The data sources include the most recent data from the European Marine Observation Data Network (EMODnet) Seabed Habitats Project data detailing broad-scale habitat maps of the Benthic Subtidal Ecology Study Area (EMODnet, 2023).
The MHPGC Project Scoping Boundary lies immediately adjacent to the Montrose Bank portion of the Firth of Forth Banks Complex MPA. This means that the Benthic Ecology Study Area overlaps with the MPA. The MHPGC Project Scoping Report discusses the features of the Firth of Forth Banks Complex MPA that are relevant to benthic ecology, but there is no mention of 'ocean quahog aggregations', instead referring to the relevant feature as 'ocean quahog'. The Firth of Forth Banks Complex Data Confidence Assessment may be helpful in assessing potential impacts to this site (Joint Nature Conservation Committee (JNCC), 2014).	Consideration has been given to relevant designated sites in Section 3.4.7 including the 'ocean quahog aggregations' feature of Firth of Forth Banks Complex MPA. The Montrose Bank portion of the Firth of Forth Banks Complex MPA is approximately 0.04km to the west from the MHPGC Project PEIR Red Line Boundary and this is reflected in the assessment of potential impacts provided in Section 3.8. The Firth of Forth Banks Complex Data Confidence Assessment (JNCC, 2014) has also been used to inform the assessment. The Firth of Forth Banks Complex Data Confidence Assessment (JNCC, 2014) assesses the confidence of data informing the mapping of protected features within the boundaries of the Firth of Forth Banks Complex MPA. A document outlining the approach to the MPA/MCZ/HPMA assessment is provided within Approach to MPA/MCZ and HPMA Assessments, prepared to support the PEIR. A detailed MPA/MCZ/HPMA assessment will be provided to support the DCO and Marine Licence applications.
In addition to designated sites, there may be a number of habitats and species of conservation importance present within the Benthic Ecology Study Area. Although, benthic surveys have been undertaken for the MHPGC Project, we note that the results are not available yet. However, considerable evidence is presented in the MHPGC Project Scoping Report to	Species and habitats of conservation importance are discussed in Section 3.4, including the consideration of Annex I habitats and PMF.

Comment	How and where considered in the PEIR
suggest that habitats and species of conservation importance are likely to be present. Therefore, we advise that we expect consideration to be given to Annex I habitats and PMFs.	
The potential impact of ‘increased SSCs and associated deposition’ and ‘temporary habitat disturbance and loss’ is scoped out for the O&M phase as it is noted that this is expected to be minimal and associated with minor repair and reburial only. However, NatureScot advise that at this stage and without further justification or evidence provided that repairs are likely to be minor in nature, these impacts should be scoped into the O&M phase for further assessment.	‘Increased SSCs and associated deposition’ and ‘temporary habitat loss/disturbance’ have been scoped in for assessment during the O&M phase and assessed in Section 3.8.
For the potential impacts of ‘colonisation of hard structures’ and ‘changes in physical processes’ it is proposed to only assess the impact during the operation and maintenance phase. However, it is noted in MHPGC Project Scoping Report, in relation to decommissioning that it is anticipated that all offshore cables and offshore cable protection may be left in-situ to minimise environmental impacts associated with their removal. If it is anticipated that cable infrastructure will be left in-situ post O&M phase, then it should be made clear within the assessment that these impacts could be permanent.	‘Changes in physical processes’ is considered for all phases of the MHPGC Project, in Section 3.8. ‘Colonisation of hard structures’ has only been considered for the O&M phase as during decommissioning the current MDS is to remove hard structures which would prevent further colonisation. If they are left <i>in situ</i> during decommissioning, any change would be considered negligible compared to the O&M phase.
In Scotland, current policy is that all infrastructure associated with offshore renewable energy should be removed during decommissioning. Therefore, we advise further advice should be sought from MD-LOT in relation to decommissioning and assessment requirements.	The current MDS for decommissioning is to remove hard structures. However, this approach will be reviewed at the time of decommissioning following the most up to date and best available guidance. The detailed decommissioning strategy will be developed closer to the end of the Project’s operational life through the Offshore Decommissioning Programme (CoT44).
NatureScot advise that assessments should be undertaken for all benthic PMF habitats and species recorded within the Benthic Ecology Study Area. The assessment should quantify, where possible, the likely impacts to PMFs and assess whether this could lead to a significant impact on the national status of each PMF.	All PMFs within the Benthic Subtidal and Intertidal Ecology Study Area are identified in Section 3.43.4 and described in detail within Volume 2, Annex 3.1: Benthic Ecology Technical Report, of the PEIR. Potential impacts on PMFs, including consideration of the scale and significance of potential effects, have been assessed in Section 3.8.
It is noted that the impacts to benthic invertebrates from EMF effects will be assessed for the O&M phase but that no specific modelling will be undertaken. It does state in the MHPGC Project Scoping Report that the assessment will be quantitative and based on information derived from the Project Design Envelope (PDE). NatureScot would usually expect modelling to inform the assessment; therefore, we advise consulting us in advance of application submission on the proposed assessment methodology to ensure that the potential impacts to benthic species from EMF effects is sufficiently assessed. We are also aware that the Offshore Wind Energy and Change Programme funded Floating Offshore Wind Environmental Response to Stressors project is due to report in spring this year and this may have pertinent information to consider in respect of EMF effects (Marine Data Exchange, 2025).	Impacts to benthic invertebrates due to EMF during the O&M phase has been considered in Section 3.8. MHPGC-Project specific EMF modelling has been undertaken (see Volume 2, Annex 4.2: Morven HVDC EMF Study, of the PEIR) and has informed the assessment in Section 3.8. The Offshore Wind Evidence and Change Programme (OWEC) funded Floating Offshore Wind Environmental Response to Stressors (FLOWERS) WP2 Electromagnetic Fields (EMFs) report (Gill <i>et al.</i>, 2025) has also been considered within the EMF impact assessment within Section 3.8.

Comment	How and where considered in the PEIR
One aspect that we advise should be considered cumulatively is EMF impacts. NatureScot are concerned that the spatial and temporal scale is not being sufficiently considered cumulatively across the network of cables. The Applicant should seek agreement with MD-LOT on the list of projects and plans to be included within the Cumulative Effects Assessment (CEA).	'Impacts to benthic invertebrates due to EMF' during the O&M phase have also been considered in the cumulative assessment in Section 3.9.
We note that mitigation measure MM-7 'placement of cable protection will be minimised as far as possible' has only been proposed for the O&M phase and only included as a designed in measure for fish and shellfish. This mitigation measure may also benefit benthic receptors, particularly if it was also implemented during the construction phase.	Relevant commitments identified to conserve and enhance biodiversity are provided in Section 3.7, with the full list of commitments provided in Volume 1, Annex 4.1: Draft Commitments Register.
MM-10 'development and adherence to a Cable Specification and Installation Plan (CSIP)' has been proposed for all phases and is included for a number of receptors, including benthic ecology. It isn't clear if the CSIP will incorporate the mitigation measure of minimising the placement of cable protection as far as possible. NatureScot recommend that it does.	Relevant commitments identified to conserve and enhance biodiversity are provided in Section 3.7, with the full list of commitments provided in Volume 1, Annex 4.1: Draft Commitments Register. This includes the development of and adherence to a CSIP (CoT08/MM-010). It will include cable burial to be the preferred option for cable protection, where practicable.
NatureScot agree that as the benthic features of the Firth of Forth Banks Complex MPA: 'ocean quahog aggregations' and 'offshore subtidal sands and gravels', are located immediately adjacent to the MHPGC Project Scoping Boundary and could be impacted by the proposal e.g. increased SSCs and associated deposition, that they should be screened in for further assessment. NatureScot advise that potential impacts to these benthic features should be assessed against the relevant Firth of Forth Banks Complex MPA Conservation Objectives (JNCC, 2018a).	Consideration has been given to relevant designated sites in Section 3.4.7. A document outlining the approach to the MPA/MCZ/HPMA assessment is provided within Approach to MPA/MCZ and HPMA Assessments, prepared to support the PEIR. A detailed MPA/MCZ/HPMA assessment will be provided to support the DCO and Marine Licence applications. This will include consideration of 'ocean quahog aggregations' and 'subtidal sands' features of Firth of Forth Banks Complex MPA, and of relevant conservation objectives.
Scottish Fishermen's Federation	
The Scottish Fishermen's Federation would like to see the 'Impacts to benthic invertebrates due to thermal emissions from subsea electrical cables' to also be scoped in since any temperature change in the invertebrate's habitat would have adverse effects on their behaviour and increase their mortality rate.	'Impacts to benthic invertebrates due to thermal emissions from subsea cables' during the O&M phase has been scoped in for further assessment in Section 3.8.
Natural England	
MCZs and HPMAs are areas that protect a range of nationally important, rare or threatened habitats and species. Locations of MCZs and their special interest features can be viewed on the Multi-Agency Geographic Information for the Countryside (MAGIC) for designated and protected sites (Defra, 2024) and factsheets that establish the purpose of designation and conservation objectives for each of the MCZ's were published by Department for Environment, Food & Rural Affairs (Defra) (2019). HPMAs are areas of the sea designated for the protection and recovery of marine ecosystems. They prohibit extractive, destructive and depositional uses, allowing only non-damaging levels of other activities to	A full list of baseline data sources used to inform the benthic ecology baseline characterisation is provided in Section 3.4.4, including MAGIC for designated and protected sites (Defra, 2024). Consideration has been given to relevant designated sites in Section 3.4.7 and a detailed MPA/MCZ/HPMA assessment will be provided to support the DCO and marine licence applications. A document outlining the approach to the MPA/MCZ/HPMA assessment is provided within Approach to MPA/MCZ and HPMA Assessments, prepared to support the PEIR. Coquet to St. Mary's MCZ, Swallow Sands MCZ, Runswick Bay MCZ and Aln Estuary MCZ are all considered to fall outside of the maximum Zone of Influence (Zoi) for the MHPGC Project, based on project-specific sediment

Comment	How and where considered in the PEIR
the extent permitted by international law. The key purpose of HPMA's is marine nature recovery. Designating areas of sea with high levels of protection, will allow nature to recover to a more natural state, allowing ecosystems to thrive. HPMA's have the highest level of protection in English waters, and it is Department for Environment, Food & Rural Affairs (Defra) policy that there should be no extractive, destructive or depositional activities in them. The MHPGC Project is within, or may impact, on the following MCZs and HMPAs: • Farnes East MCZ; • North East of Farnes Deep MCZ/HPMA; • Coquet to St. Mary's MCZ; • Swallow Sands MCZ; • Runswick Bay MCZ; • AIn Estuary MCZ. The assessment should consider including information on the impacts of this development on MCZ and HMPA interest features, to inform the assessment of impacts on habitats and of principle importance for this location as part of an MCZ Assessment.	distribution modelling that has been undertaken (see Volume 2, Annex 1.2: Model Design Validation and Results, of the PEIR and Section 3.4.2). At the Benthic EWG meeting in November 2025 the screening of MCZ/HPMA sites was presented. Natural England's response (Appendix 4 of NE letter dated 19/12/2025) states "Natural England supports the approach to screen out sites, if evidence is provided that they will not be affected. We advise that the Zol for the impacts resulting from the project is provided in a map format to clearly show there is no overlap with sites. We also support the proposal to continue to include sites close to the Zol to enable precautionary assessments. Therefore, Coquet to St. Mary's MCZ, Swallow Sands MCZ, Runswick Bay MCZ and AIn Estuary MCZ have been screened out. This MCZ screening approach was agreed in consultation with Natural England during EWG meeting in November 2025 (see Table 3.7).
No information has been provided regarding the anticipated locations or total area of impact (both direct and indirect) for seabed preparation. Natural England advise that the total area of impact (both direct and indirect) should be provided for cable route clearance activities. For boulder clearance in protected sites, this should also include where the boulders are placed and where they have been removed from. Specific locations should also be provided for these activities and any sensitive habitats identified. Sensitive habitats include, but are not restricted to, Annex I habitats outside protected sites and Section 41 priority habitats. Natural England also advise that the avoid, reduce, mitigate hierarchy should be used to reduce environmental impacts. These potential impacts should be considered scoped in and assessed.	Areas of potential direct and indirect impact are outlined in Section 3.6, based on MHPGC Project details (Volume 1, Chapter 2: Project Description, of the PEIR). These have been considered in relation to sensitive habitats and features within the assessment (see Section 3.8). Specific locations of boulder clearance are not currently known at this stage and therefore it is assumed that it could occur anywhere within the MHPGC Project PEIR Red Line Boundary. However, as the MHPGC Project PEIR Red Line Boundary does not overlap with any designated sites, boulder clearance will not occur within designated sites. Boulder clearance requirements have been provided in Section 3.6.2 and disturbance impacts assessed in Section 3.8. Commitments relevant to benthic ecology have been identified are provided in Section 3.7, with the full list of commitments provided in Volume 1, Annex 4.1: Draft Commitments Register, of the PEIR.
The MHPGC Project Scoping Report states that information on the sensitivities of benthic ecology receptors will largely be drawn from the Marine Life Information Network's (MarLIN) Marine Evidence based Assessment (MarESA) (MarLIN, 2026) for receptors within English waters as MarESA determines sensitivity based on resistance and resilience. We advise that MarLIN is used for the English portion of the cable, rather than Feature Activity Sensitivity Tool (FeAST) (NatureScot, 2026).	For English waters, the sensitivity ratings for benthic ecology receptors have been determined using MarLIN's MarESA for English waters (MarLIN, 2026), as discussed in Section 3.5. For sensitivity of benthic ecology receptors in Scottish waters, FeAST (Nature Scot, 2026), where available, has been used.
Ocean quahog (<i>Artica islandica</i>) is a feature of the Farnes East MCZ and is missing from the MHPGC Project Scoping Report. Natural England advise this must be scoped in for assessment. In addition, the 'peat and clay exposures' feature of the Coquet to St Mary's MCZ must be scoped in for assessment.	Consideration has been given to relevant designated sites in Section 3.4.7. A detailed MPA/MCZ/HPMA assessment will also be provided to support the DCO and marine licence applications. A document outlining the approach to the MPA/MCZ/HPMA assessment is provided within Approach to MPA/MCZ and HPMA Assessments, prepared to support the PEIR. The assessment will include consideration of 'ocean quahog' feature of Farnes East MCZ.

Comment	How and where considered in the PEIR
	Coquet to St Mary's MCZ is 16km from the MHPGC PEIR Red Line boundary and therefore, falls outside of the maximum Zol (9km) for the MHPGC Project based on project-specific sediment dispersion modelling undertaken (see Volume 2, Annex 1.2: Model Design Validation and Results, of the PEIR and Section 3.4.2) and has not been considered further in this assessment. This screening approach was agreed in consultation with Natural England during EWG meeting in November 2025 (see Table 3.7).
Natural England cannot comment on whether the surveys completed in 2023 and 2024, combined with desk study data, are sufficient for the EIA at this stage as there is no detail of the methodology provided in the MHPGC Project Scoping Report. It is not clear from the MHPGC Project Scoping Report whether further site-specific surveys are proposed for this topic or whether these are the surveys completed in 2024. Natural England would welcome engagement regarding surveys completed to date and what is proposed.	Details regarding site specific surveys are outlined within Section 3.4.4 and Volume 2, Annex 3.1: Benthic Ecology Technical Report, of the PEIR. The site-specific surveys undertaken in 2023 and 2024/2025 have been used to inform the benthic ecology baseline characterisation in Section 3.4. Further consultation with Natural England regarding site specific surveys is detailed within Section 3.3.2.
Natural England agrees that 'thermal emissions from subsea cables' can be scoped out for future assessment.	Based on MHPGC Project Scoping Opinion from MD-LOT, 'impacts to benthic invertebrates due to thermal emissions from subsea cables' during the O&M phase has been scoped in for further assessment in Section 3.8.
North East of Farnes Deep MCZ is designated for: • subtidal coarse sediment; • subtidal sand; • subtidal mixed sediments; • subtidal mud; • ocean quahog. The same area has been designated as a HPMA and provides protection to "the whole ecosystem", meaning all marine flora and fauna, all marine habitats and all geological or geomorphological interests, including all abiotic elements and all supporting ecosystem functions and processes, in the seabed, water column and the surface of the sea (JNCC, 2024b). The conservation objectives of North East of Farnes Deep is to: • achieve full recovery of the protected feature, including its structure and functions, its qualities and the composition of its characteristic biological communities present within the North East of Farnes Deep HPMA, to a natural state; • prevent further degradation and damage to the protected feature, subject to natural change. We advise where impacts on HPMAs are identified in the screening report, that design routes or installation methodologies are be altered to avoid the impact. Appropriate buffer areas would also need to be considered for HPMAs. Defra, Joint Nature Conservation Committee (JNCC) and Natural England advised in 2021 that exclusion buffers of 2km for offshore wind, are required during construction, O&M and decommissioning phases. Natural England therefore advise that in line with 2021 advice, a 2km exclusion buffer be applied around HPMA to ensure that there is minimised likelihood of indirect effects.	Consideration has been given to relevant designated sites in Section 3.4.7 and a detailed MPA/MCZ/HPMA assessment will be provided to support the DCO and marine licence applications. A document outlining the approach to the MPA/MCZ/HPMA assessment is provided within Approach to MPA/MCZ and HPMA Assessments, prepared to support the PEIR. Consideration of fish, marine mammals and ornithological receptors is also provided in Volume 2, Chapter 4: Fish and Shellfish Ecology, of the PEIR, Volume 2, Chapter 5: Marine Mammals, of the PEIR and Volume 2, Chapter 6: Marine Ornithology, of the PEIR, respectively. The MHPGC Project is located 4.1km from the North East of Farnes Deep HPMA at its closest point. Although outside the 2km exclusion buffer advised by Defra, JNCC and Natural England, a detailed HPMA assessment will be provided to support the DCO and Marine Licence applications.

Comment	How and where considered in the PEIR
The assessment must consider the activity-pressure-feature interaction including the impact, the location and marine processes occurring. Fish, birds, and marine mammals have not been scoped into the MHPGC Project Scoping Report as protected features of this HPMA and will need to be scoped in to ensure that the potential impacts on the HPMA and its conservation objective can be assessed. Natural England advise that all habitats and species within the HPMA are assessed within an MCZ assessment.	
Some features of Farnes East MCZ have been omitted in some parts of the MHPGC Project Scoping Report. Farnes East MCZ is designated for: • moderate energy circalittoral rock; • ocean quahog; • sea-pen and burrowing megafauna communities; • subtidal coarse sediments; • subtidal mixed sediments; • subtidal mud; • subtidal sand. Natural England advise that all features are assessed within an MCZ assessment. Subtidal mud, sea-pen and burrowing megafauna communities, and ocean quahog currently have 'restore to favourable condition' objectives, and the rest of the features have 'maintain in favourable condition' objectives. Natural England advise that detailed modelling is carried out to estimate predicted impacts of sedimentation and deposition in this site.	Consideration has been given to relevant designated sites in Section 3.4.7 and a detailed MPA/MCZ/HPMA assessment will be provided to support the DCO and Marine Licence applications. A document outlining the approach to the MPA/MCZ/HPMA assessment is provided within Approach to MPA/MCZ and HPMA Assessments, prepared to support the PEIR. Assessments of indirect impacts, such as 'increased SSC and associated deposition' has been informed by physical processes modelling (see Volume 2, Chapter 1: Physical Processes, of the PEIR) and is provided in Section 3.8.
The 'high energy intertidal rock' feature of Coquet to St Mary's MCZ has been omitted in the MHPGC Project Scoping Report. Natural England advise this must be scoped in for assessment.	Coquet to St Mary's MCZ is 16km from the MHPGC PEIR Red Line Boundary and therefore, falls outside of the maximum Zol (9km) for the MHPGC Project based on project-specific sediment dispersion modelling undertaken (see Volume 2, Annex 1.2: Model Design Validation and Results, of the PEIR and Section 3.4.2) and therefore has not been considered further in this assessment. This approach to scoping of MCZ sites has been agreed during EWG consultation with Natural England. Consideration has been given to relevant designated sites in Section 3.4.7, and a detailed MPA/MCZ/HPMA assessment will be provided to support the DCO and marine licence applications. A document outlining the approach to the MPA/MCZ/HPMA assessment is provided within Approach to MPA/MCZ and HPMA Assessments, prepared to support the PEIR.
Swallow Sands MCZ is designated for 'subtidal coarse sediment', 'subtidal sand', and 'North Sea glacial tunnel valleys'. All three of these features are in favourable condition. As Swallow Sand MCZ is located approximately 20km away from the MHPGC Project, Natural England do not currently anticipate that any associated activity will have an impact on this MPA. However, it remains important to assess all potential O&M impact-pathways.	Swallow Sands MCZ is 20km from the MHPGC PEIR Red Line Boundary and is therefore, located outside of the maximum Zol (9km) based on sediment dispersion modelling conducted for the MHPGC Project (see Volume 2, Annex 1.2: Model Design Validation and Results, of the PEIR and Section 3.4.2). Therefore, Swallow Sands MCZ has not been considered further in this assessment. This approach to scoping of MCZ sites has been agreed during EWG consultation with Natural England. Consideration has been given to relevant designated sites in Section 3.4.7. A detailed MPA/MCZ/HPMA assessment will also be provided to support the DCO and marine licence

Comment	How and where considered in the PEIR
	applications. A document outlining the approach to the MPA/MCZ/HPMA assessment is provided within Approach to MPA/MCZ and HPMA Assessments, prepared to support the PEIR.
Environment Agency	
Centre for Environment, Fisheries and Aquaculture Science (Cefas) OneBenthic data modelling and visualisation tool not included in the list of key resources used to understand benthic habitats around the MHPGC Project (Cefas, 2024). Incomplete sets of evidence have been used to assess risk, leading to potentially detrimental impacts to benthic habitats as a result of the MHPGC Project.	The Cefas OneBenthic Portal Macrofaunal Assemblage Tool and Non-Native Species Tool (Cefas, 2024) has been used to inform the benthic habitats around the MHPGC Project and is included in detail in Volume 2, Annex 3.1, Benthic Ecology Technical Report, of the PEIR. The full list of baseline data sources used to inform the benthic ecology baseline characterisation is provided in Section 3.4.
The MHPGC Project Scoping Report incorrectly states that the Cambois Connection Marine Scheme is “expected” to overlap with the regional benthic ecology study area, when in actual fact the Cambois Connection Marine Scheme will fall entirely within the regional benthic ecology study area. Incorrect interpretation of overlap with other projects may mean in combination effects are not assessed appropriately.	The Cambois Connection (also referred to as the Berwick Bank Export Cable Corridor) overlaps with the Benthic Subtidal Ecology Study Area and has been considered within the baseline characterisation (Section 3.4) and CEA (Section 3.9).
The MHPGC Project Scoping Report incorrectly states that heat conduction is likely to be negligible for cables that are unburied and protected by thick concrete mattresses or rock berms. Heat conduction increases with density, so the opposite pattern will be true. Incorrect statements lead to incorrect interpretation about risks and impacts.	‘Impacts to benthic invertebrates due to thermal emissions from subsea cables’ during the O&M phase has been scoped in for further assessment in Section 3.8 . The potential for increased exposure of benthic habitats and invertebrates to thermal emissions associated with the presence of cable protection has been considered within the assessment. Based on the embedded mitigation measures and the anticipated localised extent of any temperature increases, the magnitude of effect is currently considered to be low.
PINS	
ID 3.4.1 The MHPGC Project Scoping Report states that impacts associated with ‘temporary habitat loss and disturbance’ during the O&M phase are expected to be minimal, and associated with minor repair and reburial events only, with much smaller areas of disturbance expected than during the construction and decommissioning phases. As such, this impact is not proposed to be assessed for the O&M phase. As the O&M activities are not fully described, the Inspectorate does not feel that it has sufficient justification to agree to scope this matter out. In the absence of information such as evidence demonstrating clear agreement with relevant consultation bodies, the Inspectorate is not able to agree to scope these matters from the assessment. The ES should include an assessment of ‘temporary habitat loss/disturbance’ during O&M.	Based on MHPGC Project Scoping Opinion issued by MD-LOT and NatureScot, ‘Temporary habitat loss/disturbance’ has been scoped in for further assessment for all phases of the MHPGC Project (see Section 3.8).
ID 3.4.10 The applicant’s attention is directed to the comments of the Environment Agency with regards to the availability of the CEFAS OneBenthic data modelling and visualisation tool. The applicant should consider this source of benthic data in preparing the baseline information for assessment.	A full list of baseline data sources used to inform the benthic ecology baseline characterisation is provided in Section 3.4 , including the Cefas OneBenthic Macrofaunal Assemblage Tool (Cefas, 2024).
ID 3.4.11	Consideration has been given to relevant designated sites in Section 3.4.7 . A detailed MPA/MCZ/HPMA assessment,

Comment	How and where considered in the PEIR
Ocean quahog is a protected feature of Farnes East MCZ. This feature should be fully considered and assessed.	including consideration of the 'ocean quahog' feature of Farnes East MCZ, will be provided to support the DCO. A document outlining the approach to the MPA/MCZ/HPMA assessment is provided within Approach to MPA/MCZ and HPMA Assessments, prepared to support the PEIR.
ID 3.4.11 'Peat and clay exposures' are a protected feature of the Coquet to St Mary's MCZ. This feature should be fully considered and assessed.	Coquet to St Mary's MCZ is 16km from the MHPGC PEIR Red Line Boundary and therefore, falls outside the maximum Zol (9km) for the MHPGC Project based on project-specific sediment dispersion modelling (see Volume 2, Annex 1.2: Model Design Validation and Results and Section 3.4.2) and therefore has not been considered further in this assessment. This approach to scoping of MCZ sites has been agreed during EWG consultation with Natural England. A document outlining the approach to the MPA/MCZ/HPMA assessment is provided within Approach to MPA/MCZ and HPMA Assessments, prepared to support the PEIR. A detailed MPA/MCZ/HPMA assessment will be provided to support the DCO and Marine Licence applications.
ID 3.4.2 The MHPGC Project Scoping Report considers that impacts associated with increased SSCs and associated deposition during the O&M phase are expected to be minimal, and associated with minor repair and reburial events only, with SSCs and redeposition expected to be considerably lower than during the construction and decommissioning phases. As such, this impact is not proposed to be assessed for the O&M phase. The Inspectorate advises that this matter should be scoped into the assessment.	Based on MHPGC Project Scoping Opinions by MD-LOT and NatureScot, 'Increased SSCs and associated deposition' has been scoped in for further assessment for all phases (see Section 3.8) and is informed by physical processes modelling (see Volume 2, Annex 1.2, Model Design, Validation and Results, of the PEIR).
ID 3.4.3 The impact of the introduction of artificial structures and the colonisation of said structures by marine biota is not proposed to be assessed during the construction and decommissioning phases. The Inspectorate notes that removal of hard substrates is scoped into the assessment for the decommissioning stage. Taking into consideration the length of time anticipated for construction, the Inspectorate considers that colonisation of hard structures may occur during construction and therefore the Inspectorate does not agree to scope this matter out. The assessment should include impacts of colonisation of hard structures during construction and decommissioning where significant effects are likely to occur.	'Colonisation of hard structures' has only been considered for the O&M phase as colonisation occurs over a prolonged period of time after construction is complete and is therefore most likely to occur during the O&M phase, rather than during the construction phase. As per comments on EWG1, NatureScot agrees with the approach of the assessment of 'colonisation of hard structures' only scoped in for effects during the O&M phase. During decommissioning, the current MDS is to remove hard structures which would prevent further colonisation. If they are left <i>in situ</i> during decommissioning, any change would be considered negligible compared to the O&M phase.
ID 3.4.4 The MHPGC Project Scoping Report states that the presence of cable protection may introduce localised changes to the tidal flow and wave climate, which in turn may result in potential changes to the sediment transport pathways and associated impacts to benthic ecology. No justification is provided to explain why this matter is to be scoped out for the construction and decommissioning phases. The MHPGC Project Scoping Report describes the proposed modelling for physical processes, which will be used to inform the assessment of changes due to installation and operation. Given that the likely type and volume of cable protection is not yet known, including likely timescales for installing cable protection during the construction	'Changes in physical processes' has been scoped in for further assessment for all phases of the MHPGC Project (see Section 3.8). The assessment will consider the potential for changes in sediment transport processes and the associated effects on benthic ecology, informed by physical processes modelling and the evolving cable protection design and will be informed by physical processes modelling (see Volume 2, Chapter 1: Physical Processes, of the PEIR).

Comment	How and where considered in the PEIR
phase, the Inspectorate does not agree that changes in physical processes resulting from the proposed development on benthic species can be scoped out. Similarly in respect of decommissioning, it is also not yet known whether cable protection would be left in situ or removed and thus whether there is potential for impacts due to changes in physical processes at the decommissioning stage. The assessment should consider 'changes in physical processes' during construction and decommissioning phases.	
ID 3.4.5 The Inspectorate concurs that the 'removal of hard substrates' can be scoped out for the construction phase on the basis that loss of existing habitats during construction is scoped into the assessment and there would be no removal of hard substrates associated with the proposed development at the construction stage. The Inspectorate considers there may be removal of hard substrates due to potential O&M activities. As the O&M activities are not fully described, the Inspectorate does not feel that it has sufficient justification to agree to scope this matter out. In the absence of information such as evidence demonstrating clear agreement with relevant consultation bodies, the Inspectorate is not able to agree to scope this matter from the assessment. The assessment should include the impact of the 'removal of hard substrates' during O&M.	Based on discussions during the EWG meeting in November 2025 (Table 3.7) 'Removal of hard substrates' has been scoped in for further assessment during the O&M and decommissioning phases only (see Section 3.8).
ID 3.4.7 The applicant proposes to scope 'accidental release of pollutants' out on the basis that control and management measures will be set out and implemented through standard post-consent plans (e.g. Environmental Management Plan (EMP), including a Marine Pollution Contingency Plan (MPCP)). Outline management plans are to be provided with the ES. The MHPGC Project Scoping Report states that following the implementation of these plans the likelihood of an accidental spill occurring is very low and in the unlikely event that such an event did occur, the magnitude will be minimised through measures outlined in the MPCP. The Inspectorate agrees that this matter can be scoped out on the basis that the mitigation measures proposed within the outline management plans should be sufficient to address the likely impacts and avoid a likely significant effect. The assessment should include details of the mitigation and explain how its delivery is assured with reference to relevant documents.	The 'accidental release of pollutants' is scoped out from further assessment. Details of mitigation and relevant post-consent management plans, including the Outline Offshore Environmental Management Plan (OEMP) and Outline Marine Pollution Contingency Plan (MPCP), are provided in Volume 1, Annex 4.1: Draft Commitments Register, of the PEIR.
ID 3.4.8 The MHPGC Project Scoping Report references scientific literature which acknowledges that buried cables can warm the sediment in direct contact with the cable, and the thermal profile can depend heavily on the physical characteristics of the burial and the sediment. For buried cables, the temperature change at the seabed is reduced due to the distance between the cable and the seabed surface due to the increased dissipation of heat with distance from the cable. Cable protection material, such as rock berms and concrete	Based on MHPGC Project Scoping Opinions from MD-LOT and further consultation with the Scottish Fishermen's Federation, 'impacts to benthic invertebrates due to thermal emissions from subsea cables' during the O&M phase has been scoped in for further assessment in Section 3.8. As part of commitments set out in Volume 1, Annex 4.1: Draft Commitments Register, of the PEIR an Outline CSIP (CoT08/MM-010) is being developed to support the DCO and Marine Licence applications to the Scottish Ministers.

Comment	How and where considered in the PEIR
mattresses, is also concluded to reduce heat conduction to negligible levels. The Inspectorate agrees that as cables are proposed to be buried at depths of between 0.5 and 2.5 m, or where this is not practicable, be surrounded by cable protection measures, significant effects on benthic ecology due to thermal emissions are unlikely to occur. The Scoping Report includes commitment to developing and adhering to CSIP and concludes there is limited scope for impacts to benthic invertebrates due to heat from subsea cables. On this basis, the Inspectorate agrees this matter can be scoped out of further assessment.	
ID 3.4.9 The Inspectorate is not able to agree to scope this matter out until it has undertaken its own transboundary screening. See the Inspectorate's comments at ID 2.2.4 of this Opinion: 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 European Economic Area States would be affected. The Inspectorate will undertake a transboundary screening on behalf of the SoS in due course.	Transboundary effects for benthic ecology have been scoped out from further assessment (see Section 3.9). All the construction, O&M and decommissioning works associated with the MHPGC Project fall within UK waters, extending across both Scottish and English jurisdictions and including areas both within and beyond 12nm. Given the distance of the MHPGC Project from international boundaries with the closest international boundary being the Norwegian Exclusive Economic Zone (EEZ), located approximately 190 km to the east, and the maximum potential ZoI of 9km for benthic receptors, no pathway for significant transboundary effects has been identified.
ID 3.5.11 The MHPGC Project Scoping Report contains limited reference to the potential impact associated with spreading of invasive non-native species (INNS). The Inspectorate notes proposed mitigation measure MM-6, which includes a commitment to include measures within the outline Code of Construction Practice, such as the Biosecurity Plan, to control the spread of INNS and mitigate impacts on fish and shellfish receptors. The assessment should include details of the mitigation and explain how its delivery is assured with reference to relevant documents.	The DCO will be submitted alongside an Outline Marine Biosecurity Plan (MBP) outlining measures to manage INNS (CoT38). This has been considered within the assessment (see Section 3.8).

3.3.2 Further consultation and engagement

- 3.3.2.1 As part of the MHPGC Project EPP, EWG meetings were held in November 2025 and July 2026 with stakeholders to discuss points regarding the benthic ecology baseline including the MMO, Cefas, Natural England the Environment Agency and Yorkshire Wildlife Trust. NatureScot were unable to attend the EWG meetings, although provided written comments on materials and minutes which are summarised below in **Table 3.7**. This included information on the type of surveys which feed into the assessment and the impact pathways which have been scoped in for each phase of the MHPGC Project.

3.3.2.2 Additional consultation has been summarised in **Table 3.7**.

Table 3.7: Summary of further consultation and engagement

Date	Consultee and response type	Comment	How and where considered in the PEIR
November 2025	Benthic Ecology EWG meeting with stakeholders: • MMO; • Cefas; • Natural England; • Environment Agency; • Yorkshire Wildlife Trust.	The approach to the assessment was discussed with stakeholders, including the use of MHPGC Project specific data and habitat mapping. The EWG meeting aimed to address key scoping opinion comments provided. For example, the MCZs and MPAs to be included in the assessment were discussed in relation to the ZoI (see Section 3.4.2). Impact pathways to be scoped into the benthic ecology assessment were also discussed and agreed. Following this meeting, stakeholders provided responses on points raised for discussion which are detailed in the following rows.	Points discussed in the EWG and in responses provided by stakeholders have been addressed in Section 3.3 and Section 3.8 .
November 2025	NatureScot advice on Benthic Ecology EWG materials	NatureScot advise that assessments should be undertaken for all benthic PMF habitats and species recorded within the Benthic Ecology Study Area.	All benthic PMF habitats and species within the Benthic Subtidal and Intertidal Ecology Study Area have been considered in Section 3.4.5 and Section 3.4.6 and included in the assessment in Section 3.8 .
November 2025	NatureScot advice on Benthic Ecology EWG materials	NatureScot agreed that, in line with their scoping advice, 'Increased SSCs and associated deposition' and 'temporary habitat loss/disturbance' should be scoped into all phases of the assessment.	'Increased SSCs and associated deposition' and 'temporary habitat loss/disturbance' have been assessed for construction and decommissioning only Section 3.8 . Routine O&M activities are not expected to result in substantial increases in SSCs or associated sediment deposition. Any seabed disturbance associated with maintenance activities would be infrequent, localised and temporary, and is therefore not considered likely to result in significant effects on benthic receptors. As such, this impact is scoped out for the O&M phase.
November 2025	NatureScot advice on Benthic Ecology EWG materials	NatureScot agreed that, in line with their scoping advice, 'Changes in physical processes' should be scoped into all phases of the assessment.	'Changes in physical processes' have been assessed for all phases in Section 3.8 . Construction and decommissioning activities are not expected to result in long-term changes to physical processes, as any effects associated with seabed disturbance are temporary and reversible. As such, this impact is scoped out for the

Date	Consultee and response type	Comment	How and where considered in the PEIR
			construction and decommissioning phases.
November 2025	NatureScot advice on Benthic Ecology EWG materials	NatureScot agreed that 'Colonisation of hard structures' is only to be assessed for O&M phase	'Colonisation of hard structures' have been assessed for O&M in Section 3.8.3 .
November 2025	NatureScot advice on Benthic Ecology EWG materials	NatureScot suggested that the tidal excursion distance should align with Morven North and Morven South, if appropriate, and that assessments should be informed by physical processes modelling.	Physical processes modelling, provided in Volume 2, Annex 1.2: Model Design Validation and Results, of the PEIR , has now been undertaken for the MHPGC PEIR Red Line Boundary, which defines the maximum spring tidal excursion distance, and hence the Benthic Subtidal Ecology Study Area buffer distance to be 9km. This is described in further detail in Section 3.4.2 and in Volume 2, Annex 1.1: Physical Processes Technical Report . A justification of the higher tidal excursion distance range for Morven North and Morven South when compared to the MHPGC Project is detailed within Table 1.5 of Volume 2, Chapter 1: Physical Processes, of the PEIR .
November 2025	NatureScot advice on Benthic Ecology EWG materials	NatureScot agree that, whilst all export cable materials are in theory removable for decommissioning (using methods analogous to reversing the installation), in many cases it may be less environmentally impactful to leave assets in place. It is currently proposed that cables will be removed where possible and appropriate to do so. However, this approach will be reviewed at the time of decommissioning following the most up to date and best available guidance. The actual decommissioning strategy will be defined and be subject to an EIA at the (future) time of decommissioning, in line with and subject to prevailing EIA requirements at the (future) time of decommissioning.	Potential decommissioning effects have been assessed in Section 3.8.4 . The detailed decommissioning strategy will be developed closer to the end of the Project's operational life through the Offshore Decommissioning Programme (CoT44).
November 2025	NatureScot advice on Benthic Ecology EWG materials	NatureScot welcomed the clarification that the cable protection options under consideration are in theory removable for decommissioning, but in many cases, it may be less environmentally impactful to leave assets in place. The project position is that cable protection (cable ducting, rock dumping, etc) will preferably be left in situ, but removal has been assessed as the MDS.	Potential decommissioning effects have been assessed in Section 3.8.4 . The detailed decommissioning strategy will be developed closer to the end of the Project's operational life through the Offshore Decommissioning Programme (CoT44).
November 2025	NatureScot advice on Benthic Ecology EWG materials	NatureScot agree with the proposed assessment approach to EMF impacts.	Potential impacts resulting from EMF are considered for

Date	Consultee and response type	Comment	How and where considered in the PEIR
			the O&M phase in Section 3.8.3
November 2025	Benthic Ecology EWG meeting with stakeholders: • MMO; • Cefas; • Natural England; • Environment Agency; • Yorkshire Wildlife Trust.	Natural England note that EWG members agree with the Applicant that the list of potential impacts scoped into the benthic subtidal and intertidal ecology assessment, as presented at the EWG meeting, and will be assessed for all MHPGC Project phases is acceptable and proportionate to inform the PEIR and subsequent ES. Natural England agrees that 'colonisation of hard structures' can be scoped in for only the operational phase as the effects of colonised structures on benthic ecology will be assessed via other impact pathways.	An assessment of the impacts scoped in is provided in Section 3.8 , including colonisation of hard structures which is only assessed for the O&M phase.
November 2025	Benthic Ecology EWG meeting with stakeholders: • MMO; • Cefas; • Natural England; • Environment Agency; • Yorkshire Wildlife Trust.	EWG members agreed that the use of a precautionary 13.5km and site specific sediment dispersion modelling for the Benthic Ecology Study Area was appropriate for the PEIR and subsequent ES. Natural England agrees that the study area should be informed by the tidal excursion distance and site specific sediment dispersion modelling. Once modelling is available for consideration, we will be able to provide further advice on the proposed study area.	Following site-specific physical processes modelling, the Benthic Subtidal Ecology Study Area has now been refined to 9km in line with the tidal excursion distance. See Section 3.4.2 for further detail. The refined 9km study area was presented and discussed at EWG2, with no objections raised by stakeholders.
November 2025	Benthic Ecology EWG meeting with stakeholders: • MMO; • Cefas; • Natural England; • Environment Agency; • Yorkshire Wildlife Trust.	EWG members agree that the Applicant's completed and proposed surveys are sufficient to inform benthic ecology assessments in the PEIR and subsequent ES. However, Natural England advises that the survey design should consider how far different impacts will travel from the cable route and any nearby MCZs to ensure there is sufficient baseline information available to enable a robust impact assessment. Natural England will be able to provide further advice on surveys and desk study data once they have been provided.	The methodology for each survey undertaken is provided in Section 3.4.4 . The surveys have predominantly focused on the MHPGC Project PEIR Red Line Boundary as impacts are considered to be highly localised (Section 3.8).
July 2026	NatureScot advice on Benthic Ecology EWG materials	NatureScot agree with the proposed Valued Ecological Receptors (VERs) and study area which they understand includes the 9km spring tidal excursion range.	NatureScot's agreement with the proposed VERs and the 9km Benthic Subtidal Ecology Study Area is noted. No changes are required in response to this comment.
July 2026	NatureScot advice on Benthic Ecology EWG materials	NatureScot highlight that the CEA scenarios outlined reflect the approach taken in the section 36 applications for Morven North and Morven South currently being consulted upon. Once available, NatureScot ask that their Benthic Ecology advice for Morven North and Morven South is reviewed as this may have a bearing on the CEA for the MHPGC Project.	NatureScot's advice is noted. Any published NatureScot benthic ecology advice for the Morven North and Morven South applications that becomes available during preparation of the application will be reviewed and considered, where relevant, within the CEA.

Date	Consultee and response type	Comment	How and where considered in the PEIR
July 2026	NatureScot advice on Benthic Ecology EWG materials	NatureScot welcomes the commitment to reduce effects of EMF and thermal exposure. NatureScot understand that the ScotMER project 'A Targeted Approach to Characterising EMF from Subsea Cables and Understanding Potential Impacts on Fish and Benthic Species' is due to report shortly. Recommendations from this, together with those in FLOWERS – Floating Offshore Wind Environmental Response to Stressors – WP2 electromagnetic fields (EMFs), should be considered further to inform mitigation and or monitoring requirements to validate emissions.	The FLOWERS WP2 EMF report (Gill <i>et al.</i> , 2025) has been considered in the benthic ecology impact assessment of EMF (Section 3.8.3). The ScotMER project referenced by NatureScot was reviewed; however, no published outputs were available at the time of drafting and therefore its findings could not be taken into account.
August 2026	North Sea Wildlife Trust advice on EWG2 materials	We do not consider it appropriate at this stage to agree to the proposed scoping out of long-term habitat loss from the construction phase. The Scoping Report itself identifies the potential for long-term habitat loss beneath cable protection (p161) and recognises that permanent habitat loss may occur where infrastructure is not removed at the end of the project lifetime. This pathway is therefore directly relevant to the construction phase, as any external cable protection installed during construction could result in a long-term change in seabed habitat.	Long-term habitat loss is assessed during the O&M phase, as this is the period when all project infrastructure, including any residual external cable protection, is present within the marine environment and may result in a permanent loss of seabed habitat. Consequently, this impact has not been scoped out and has been assessed in line with the approach adopted for comparable projects. Temporary seabed disturbance associated with construction and decommissioning activities is considered separately under the relevant impact pathways, furthermore removal of hard substrates is considered at the decommissioning stage.
August 2026	North Sea Wildlife Trust advice on EWG2 materials	While we approve of the commitment by the applicant to minimise the use of cable protection as much as possible (p226), the stated justification for doing this is to reduce the extent of habitat loss. The current commitment to minimise protection "as far as possible" does not provide sufficient certainty to rule out the associated habitat-loss pathway. The current project design envelope retains considerable flexibility regarding cable burial and protection. It identifies a range of potential cable protection measures, including rock placement, concrete mattresses, rock bags and other protection systems, but does not currently provide a clear maximum length, footprint or volume of cable protection. Consequently, it is not currently possible to establish the maximum magnitude or spatial extent of long-term habitat loss. We therefore request that long-term habitat loss remains scoped into the assessment and is assessed against a clearly defined maximum design scenario for cable protection, including	North Sea Wildlife Trust's comment is noted. The MDS presented within the PEIR defines the maximum anticipated extent of cable protection and the range of protection measures that may be used. The O&M phase assessment therefore considers a precautionary worst-case scenario for long-term habitat loss resulting from cable protection and other offshore infrastructure. The Applicant remains committed to minimising the requirement for external cable protection where practicable. As set out in Commitment CoT08/MM-010, an Outline Offshore CSIP will be submitted with the application

Date	Consultee and response type	Comment	How and where considered in the PEIR
		the maximum anticipated length, width/area and volume of protection, the types of protection that may be used, and assumptions regarding its retention or removal at decommissioning.	and will identify cable burial as the preferred option for cable protection where practicable. The Outline CSIP will include a Cable Burial Risk Assessment (CBRA) to inform burial depth requirements and identify any locations where external cable protection may be required. The Applicant therefore considers that long-term habitat loss is appropriately assessed within the O&M phase and does not consider that separate construction or decommissioning assessments are necessary.
August 2026	North Sea Wildlife Trust advice on EWG2 materials	The North Sea Wildlife Trusts agree that the proposed VERs are appropriate and sufficiently comprehensive to inform the PEIR, including protected habitat features and species/communities of conservation importance. We expect all relevant protected features within the Zone of Influence, including those associated with the North East of Farnes Deep HPMA and Farnes East MCZ, to be appropriately considered within the assessment.	The agreement on VERs and the approach to assessment is noted. Further details on VERs are detailed in Section 3.4.8 .
August 2026	North Sea Wildlife Trust advice on EWG2 materials	The North Sea Wildlife Trusts do not consider that an impact pathway should automatically be excluded from the cumulative effects assessment solely because the project-alone effect is assessed as negligible or not significant in EIA terms. Small, spatially overlapping effects from multiple projects may interact to produce a materially greater cumulative effect, particularly for sediment deposition and other indirect effects on benthic receptors. We therefore recommend that the Applicant provides a clear justification for any impact pathways excluded from the benthic CEA on the basis of the project-alone assessment and demonstrates that potentially cumulative pathways remain appropriately considered.	North Sea Wildlife Trust's comment is noted. All project-alone impacts have been considered in the CEA, including impact pathways assessed as negligible or not significant in the project-alone assessment.
August 2026	North Sea Wildlife Trust advice on EWG2 materials	The North Sea Wildlife Trusts recognise and welcome the range of proposed benthic mitigation and commitments, including the Outline Offshore Environmental Management Plan, Marine Pollution Contingency Plan, Marine Biosecurity Plan, Cable Specification and Installation Plan, Construction Method Statement, micro-siting and cable burial measures. These provide an appropriate framework for managing a number of potential benthic impacts. The Scoping Report also commits to minimising cable protection as far	The Applicant remains committed to minimising the requirement for external cable protection where practicable. This commitment relates to reducing the extent of cable protection from the precautionary maximum extent defined within the MDS, which forms the basis of the assessment. As set out in Commitment CoT08/MM-010, an Outline Offshore Cable

Date	Consultee and response type	Comment	How and where considered in the PEIR
		as possible, specifically to reduce the extent of habitat loss. However, we do not consider the current commitments sufficient to agree this matter without further detail. Firstly, the commitment to minimise cable protection does not currently establish a maximum extent or footprint of cable protection. This is relevant to the potential for long-term habitat loss and should be resolved through the Project Design Envelope and/or Cable Specification and Installation Plan before the assessment concludes that this pathway can be excluded.	Specification and Installation Plan (CSIP) will be submitted with the application and will identify cable burial as the preferred option for cable protection where practicable. The Outline CSIP will be informed by a Cable Burial Risk Assessment (CBRA), which will define burial requirements and any necessary cable protection measures. The implementation, management and monitoring of cable protection will also be detailed within the CSIP. Please also see related response above, in relation to scoping out long-term habitat loss for the construction phase.
August 2026	North Sea Wildlife Trust advice on EWG2 materials	Secondly, we consider that further specific mitigation should be considered in relation to sediment resuspension and deposition in the vicinity of the North East of Farnes Deep HPMa and Farnes East MCZ. Both sites are in close proximity to the Project and are therefore potentially sensitive to indirect effects associated with suspended sediment and deposition. The preliminary sediment dispersion modelling presented at EWG2 is encouraging in indicating that sediment plumes are generally expected to be transported along the cable route rather than substantially towards the protected sites. Nevertheless, the EWG2 discussion confirmed that jetting represents the Maximum Design Scenario for sediment resuspension. We therefore recommend that the Applicant commits, where technically feasible, to using ploughing rather than water-jetting techniques for cable installation through the section of route adjacent to the North East of Farnes Deep HPMa and Farnes East MCZ. This would provide a clear and proportionate means of reducing the risk of indirect smothering effects to protected benthic features.	The sediment dispersion assessment has considered a precautionary maximum design scenario for sediment disturbance and demonstrates that increases in suspended sediment concentrations and sediment deposition are spatially limited and are not predicted to result in significant effects on the Farnes East MCZ or the North East of Farnes Deep HPMa. The Applicant has set out the approach to MPA/MCZ and HPMa assessments in Approach to Marine Protected Area/Marine Conservation Zone and Highly Protected Marine Area Assessments, prepared to accompany the PEIR. Any additional work undertaken to support the DCO and Marine Licence applications will be considered as part of the ongoing assessment process, and the need for any additional mitigation measures will be evaluated at that stage. Installation methods will be selected during detailed design having regard to seabed conditions, burial requirements, cable protection requirements and environmental considerations. Accordingly, the Applicant

Date	Consultee and response type	Comment	How and where considered in the PEIR
			does not consider it necessary at this stage to commit to a specific installation technique in order to avoid or reduce significant effects. Nevertheless, environmental considerations will form part of the installation method selection process, and lower-impact techniques will be adopted where technically feasible and appropriate.
August 2026	North Sea Wildlife Trust advice on EWG2 materials	We also recommend that the PEIR clearly distinguish between commitments to prepare management plans and the specific mitigation measures that those plans will contain. Any measures required to avoid or reduce effects on protected benthic receptors should be clearly defined, secured and capable of being secured through the eventual consent.	North Sea Wildlife Trust's comment is noted. Commitments secured through the OEMP (including the MPCP and MBP), the CSIP, and the Construction Method Statement (CMS) provide an appropriate framework for avoiding and minimising impacts to benthic receptors during construction, operation and maintenance activities. The Applicant will consult relevant stakeholders during the development of these plans, and the final documents will be submitted for approval by the relevant regulatory body.

3.4 Baseline characterisation

3.4.1 Overview

- 3.4.1.1 The MHPGC Project would connect the offshore substation platform(s) of Morven North or Morven South, located approximately 61km, at their closest point, from the Aberdeenshire coast in Scottish waters, to the National Grid Hawthorn Pit Substation in County Durham, England. The offshore export cables would traverse Scottish offshore, English offshore and English inshore¹ waters.
- 3.4.1.2 A description of the MHPGC Project is detailed in **Volume 1, Chapter 2: Project Description, of the PEIR. 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.
- 3.4.1.3 This section describes the methods and data sources used to characterise the baseline for benthic ecology within the study area and describes the existing baseline characteristics.

¹ Inshore within 12 nautical miles (nm), offshore beyond 12nm.

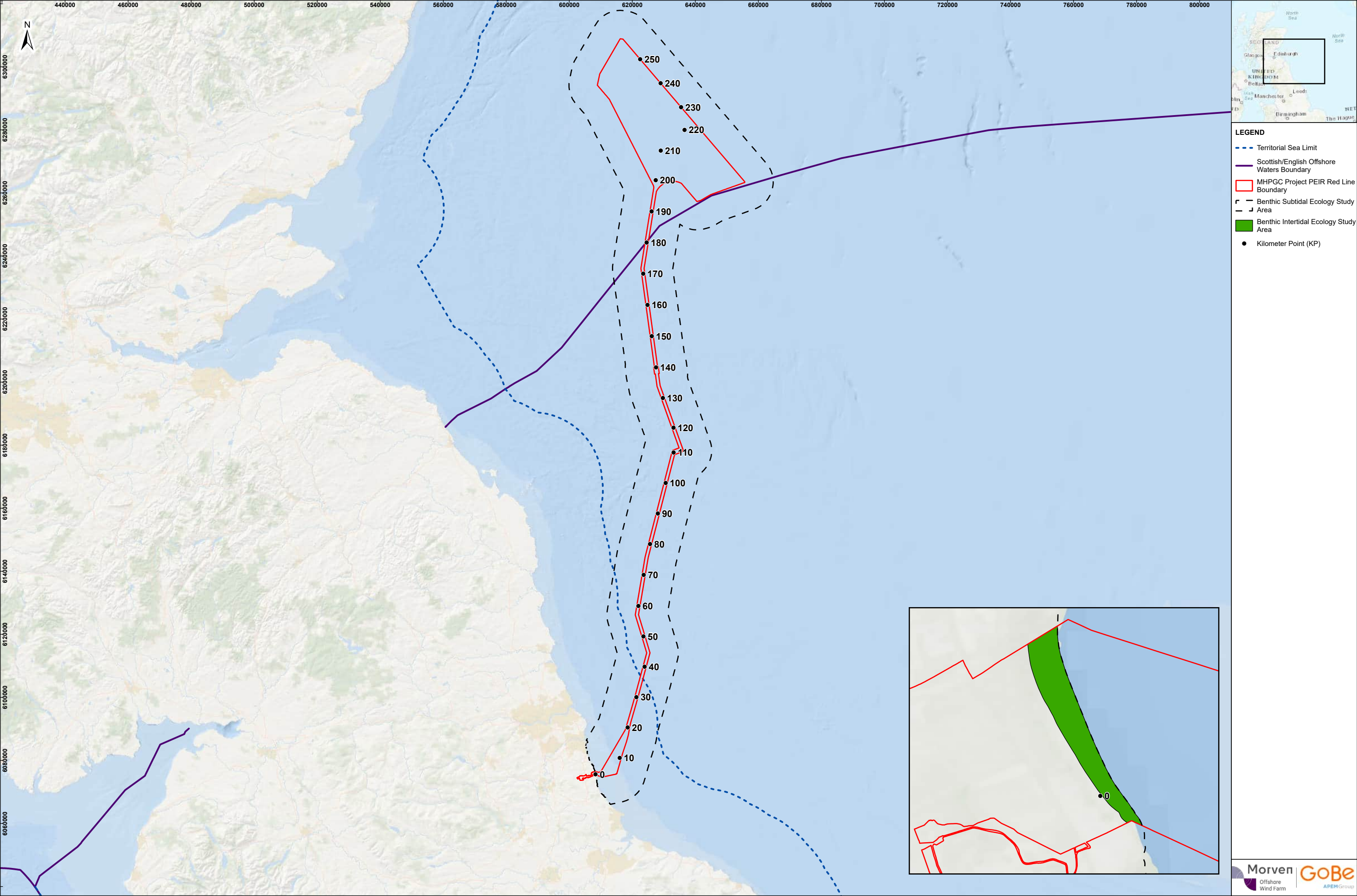
3.4.2 Benthic Subtidal and Intertidal Ecology Study Area

3.4.2.1 For the purposes of this report, the study areas for benthic subtidal and intertidal ecology have been defined by the following:

- The offshore extent of the MHPGC Project PEIR Red Line Boundary up to MHWS: The MHPGC Project PEIR Red Line Boundary extends from the landfall at MHWS in English waters (Kilometre Point (KP) 0) to the northern extent in Scottish waters. In Scottish waters, the offshore extent of the MHPGC Project PEIR Red Line Boundary includes KP180 to KP250 and the area of overlap with Morven North and Morven South. (KPs are linear reference markers positioned at 1km intervals along the nominal MHPGC-Project centreline and are used for reference purposes only.);
- The **Benthic Subtidal Ecology Study Area** comprises the offshore extent of the MHPGC Project PEIR Red Line Boundary from MLWS seaward, together with a 9km buffer around the offshore extent of the MHPGC Project PEIR Red Line Boundary. The 9 km buffer equates to the maximum distance of one spring tidal ellipse, to incorporate the maximum distance sediments may travel in one tidal cycle, as described in **Volume 2, Annex 1.2: Model Design Validation and Results, of the PEIR**. This buffer defines the likely maximum spatial extent of potential indirect impacts of the MHPGC Project; and
- The **Benthic Intertidal Ecology Study Area** is defined by the intertidal habitats from MLWS up to the MHWS mark within the MHPGC Project PEIR Red Line Boundary, with no buffer applied. As trenchless technique will be used at landfall, with the exit pits in the subtidal environment, no direct impacts to intertidal benthic ecology receptors are expected; however, the intertidal area is included for completeness.

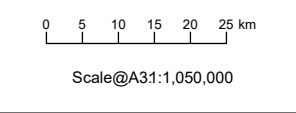
3.4.2.2 MHPGC Project-specific data and other regional benthic ecology data have been used to characterise the study areas, with data from the wider North Sea also considered to contextualise the study areas identified above and provide a broader understanding of baseline conditions and ecological variability.

3.4.2.3 The Benthic Subtidal and Intertidal Ecology Study Areas are shown on **Figure 3.1**.



Project Name:
MORVEN HAWTHORN PIT GRID
CONNECTION PROJECT

Drawing Title:
BENTHIC SUBTIDAL AND INTERTIDAL ECOLOGY STUDY AREA



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

Data Sources:
BP, Ordnance Survey

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

Drawing Number:				
FIGURE 3-1				
VER	DATE	DETAILS	BY	CHECK
00	04/09/2025	Initial Issue	GB	AdB
-	-	-	-	-

3.4.3 Relevant guidance

3.4.3.1 The preliminary assessment has been carried out in accordance with the following guidance documents:

- Scottish Natural Heritage Descriptions of Scottish PMFs (Tyler-Waters *et al.*, 2016);
- Chartered Institute for Ecology and Environmental Management (CIEEM) Guidelines for Ecological Impact Assessment in Britain and Ireland – Terrestrial, Freshwater, Coastal and Marine (CIEEM, 2024);
- Guidance on the assessment of the environmental impacts of subsea cables (OSPAR Commission, 2023), which assesses the environmental impacts of sea cables in terms of their relevance for the area covered by the Convention;
- EIA Guide to Delivering Quality Development by the Institute of Sustainability and Environmental Professionals (ISEP), formerly Institute of Environmental Management and Assessment (IEMA) (IEMA, 2015);
- Seabed disturbance following high order clearance of UXO (Cooke and Bardwell, 2025);
- The Convention for the Protection of the Marine Environment of the North-East Atlantic, or OSPAR Convention (the Convention for the Protection of the Marine Environment of the North-East Atlantic), produced the OSPAR List of Threatened and/or Declining Species and Habitats, considered to be of conservation concern within the north-east Atlantic (OSPAR Commission, 2008);
- Natural England and JNCC 2022 guidance 'Nature conservation considerations and environmental best practice for subsea cables for English Inshore and UK offshore waters.' (Natural England and JNCC, 2022);
- Refining the criteria for defining areas with a 'low resemblance' to Annex I stony reef (Golding, Albrecht, & McBreen, 2020) which supports habitat classification;
- The identification of the main characteristics of Annex I stony reef habitats under the Habitats Directive (Irving, 2009);
- UK Government - Marine environment: unexploded ordnance clearance Joint Position Statement (UK Government, 2025).

3.4.4 Baseline data sources

Desk study

3.4.4.1 A significant amount of publicly available data exists within the Benthic Subtidal and Intertidal Ecology Study Areas. This includes broadscale habitat mapping, publicly available data sources and literature and information collected for Offshore Wind Farms (OWFs) and associated subsea cables and interconnector projects. Where relevant, this information has been used to help inform the benthic ecology baseline characterisation in relation to the MHPGC Project.

3.4.4.2 Key data sources for the benthic ecology baseline are detailed in **Table 3.8**.

Table 3.8: Baseline data sources

Source	Summary	Coverage of Study Areas
Existing OWF data		
Morven North and Morven South Offshore Wind Array Project EIA Report: Volume 3, Annex 8.1 Benthic Subtidal Ecology Shared Technical Report (Tetra Tech RPS Energy, 2026a)	A technical report for Morven North and Morven South that presents a baseline characterisation of the seabed habitats and benthic communities within these respective site boundaries. The report includes the analysis of benthic site-specific survey data from a survey undertaken from April to August 2022 by Gardline Ltd. within the Morven North and Morven South study areas (extending to 5-14km around the respective boundaries). The sampling strategy was designed to characterise the benthic communities associated with all the broadscale habitats and identify any potentially sensitive features. There were 100 sampling stations across the two study areas at which grab sampling and Drop Down Video (DDV) surveys were undertaken, with DDV surveys also completed at an additional two stations. Three sediment samples were collected at each of the 100 grab sampling stations, with samples used for macrofaunal and eDNA analyses. Physicochemical analyses were undertaken at 52 stations, while eDNA analyses were completed for 50 of the 100 samples. These data have been used to identify the seabed sediments and biotopes likely to occur within the Benthic Subtidal Ecology Study Area.	Partial coverage of the Benthic Subtidal Ecology Study Area in Scottish waters. Morven North and Morven South lie within the MHPGC Project PEIR Red Line Boundary.
Morven North and Morven South Offshore Wind Array Project EIA Report: Volume 3, Annex 7.1 Physical Processes Shared Technical Report (Tetra Tech RPS Energy, 2026b)	A technical report for Morven North and Morven South presents a baseline characterisation of physical processes within these respective site boundaries. The report includes an analysis of a geophysical site-specific data from a survey undertaken from April to August 2022 by Gardine and XOcean to establish bathymetry, seabed geology, morphology and sediments. The surveys comprised geophysical methods (including Multibeam Echosounder (MBES), Side-Scan Sonar (SSS), Sub-Bottom Profiling (SBP) and an Ultra High Resolution Seismic (UHRS) system). This data has been used to identify the seabed sediments and biotopes likely to occur within the Benthic Subtidal Ecology Study Area.	Partial coverage of the Benthic Subtidal Ecology Study Area in Scottish waters. Morven North and Morven South lie within the MHPGC Project PEIR Red Line Boundary.
Eastern Green Link 1 – Scotland England Green Link 1 / Eastern Link 1 – Marine Scheme (AECOM, 2022a)	The Eastern Green Link 1 Environmental Appraisal Report presents a baseline characterisation of seabed habitats and benthic communities within the cable corridor. A benthic characterisation survey was undertaken by Fugro, with offshore survey operations conducted between October and December 2020 and nearshore and intertidal survey operations undertaken in November 2021. The survey comprised DDV surveys and benthic grab sampling at 46 subtidal environmental sampling stations, together with 31 camera transects. A modified Phase I walkover habitat mapping survey and intertidal core sampling were also undertaken at the landfall locations. These data have been used to identify the seabed sediments and biotopes likely to occur within the Benthic Subtidal and Intertidal Ecology Study Area.	Partial coverage of the Benthic Subtidal Ecology Study Area in English waters. Intersects the MHPGC Project PEIR Red Line Boundary approximately 8 km from the proposed MHPGC Project landfall. The proposed landfall for Eastern Green Link 1 in English waters is approximately 3.4 km north of the proposed MHPGC Project landfall.
Eastern Green Link 2 – Marine Scheme: Environmental Appraisal Report, Volume 2, Chapter 8 Benthic Ecology (AECOM, 2022b)	The Eastern Green Link 2 Environmental Appraisal Report presents a baseline characterisation of seabed habitats and benthic communities within the cable corridor. A benthic characterisation survey was undertaken by Next Geosolutions, with nearshore survey operations conducted between 19 April and 20 May 2021 and offshore survey operations conducted between 14 and 30 July 2021. The benthic survey comprised DDV surveys and benthic grab sampling at a total of 63 environmental sampling stations. In	Partial coverage of the Benthic Subtidal Ecology Study Area. Eastern Green Link 2 intersects the MHPGC Project PEIR Red Line Boundary, with limited

Source	Summary	Coverage of Study Areas
	addition, 146 video and camera ground-truthing stations were surveyed across the corridor. A modified Phase I walkover habitat mapping survey and intertidal core sampling were undertaken at the landfall locations. A further 30 grab and core samples were collected to characterise the intertidal benthic environment in terms of physicochemical characteristics and biological communities. These data have been used to identify the seabed sediments and biotopes likely to occur within the Benthic Subtidal Ecology Study Area.	overlap in the northwest in Scottish waters, and intersection of the central section in English waters.
Cambois Connection – Marine Scheme Environmental Statement – Volume 3, Appendix 8.1 Benthic Survey Report (Phase 1 and 2) (Natural Power, 2023)	A technical report for the Cambois Connection Marine Scheme presents a baseline characterisation of the seabed habitats and benthic communities within the Cambois Connection export cable corridor. The Cambois Connection is one of two proposed export cable corridor routes for the Berwick Bank OWF. Benthic surveys were undertaken in two phases: The Phase 1 survey included benthic grab sampling at 58 planned survey stations, DDV at 27 of the survey stations and incorporation of geophysical survey data and Phase 1 survey data into benthic habitat mapping. The Phase 2 survey included DDV at an additional 43 sampling stations and incorporation of Phase 1 and Phase 2 survey data into benthic habitat mapping. These data have been used to identify the seabed sediments and biotopes likely to occur within the Benthic Subtidal Ecology Study Area.	Partial coverage of the Benthic Subtidal Ecology Study Area. The Cambois Connection lies approximately 0.25km west of the MHPGC Project PEIR Red Line Boundary in English waters, making landfall at Cambois Beach, Northumberland, approximately 39 km north of the MHPGC Project landfall location.
Cambois Connection – Marine Scheme Environmental Statement – Volume 3, Appendix 8.2: Intertidal Survey Report (Ocean Ecology Ltd., 2023)	A technical report for the Cambois Connection Marine Scheme presents a baseline characterisation of the seabed habitats and benthic communities within two intertidal survey areas at Cambois Beach, Northumberland, the proposed landfall locations for the Cambois Connection export cable corridor. The Cambois Connection is one of two proposed export cable corridor routes for the Berwick Bank OWF. At both locations, situated within the north and south of Cambois Beach, surveys comprised intertidal walkover surveys and Unmanned Aerial Vehicle (UAV) mapping. These surveys were used to identify and map European Union Nature Identification System (EUNIS) habitats and biotopes, as well as features of conservation interest and INNS. The walkover surveys were undertaken between 11 and 14 December 2022, while UAV imagery was collected during low-water periods on 12 December 2022. A total of 254 images were collected at the southern site and 387 images at the northern site. This data has been used to identify the seabed sediments and biotopes likely to occur within the Benthic Intertidal Ecology Study Area.	Partial coverage of the Benthic Subtidal Ecology Study Area. The Cambois Connection lies approximately 0.25km west of the MHPGC Project PEIR Red Line Boundary in English waters, making landfall at Cambois Beach, Northumberland, approximately 39km north of the MHPGC Project landfall location.
Ossian Array EIA Report: Appendix 8.1 Benthic Subtidal Ecology Technical Report (RPS, 2024a)	A technical report for Ossian OWF provides a baseline characterisation of seabed habitats and benthic communities within the Ossian array area, based on a combination of desktop data review and site-specific surveys undertaken in 2022. The surveys comprised geophysical methods (including MBES, SSS and SBP) and environmental sampling, including 80 grab sampling stations (0.1m ²) for macrofauna and Particle Size Analysis (PSA), 10 additional grab samples for sediment contaminants, 80 DDV stations with photographic imagery, and 10 epibenthic beam trawl transects. These data have been used to identify the seabed sediments and biotopes likely to occur within the Benthic Subtidal Ecology Study Area.	Partial coverage of the Benthic Subtidal Ecology Study Area. The Ossian Array Area lies approximately 5.50km east of the MHPGC Project PEIR Red Line Boundary, in Scottish waters.
Bowdun OWF EIA Report: Appendix 8.1: Benthic Ecology	A technical report for the Bowdun OWF. The report provides a baseline characterisation of seabed habitats and benthic communities within the Bowdun array area and offshore export cable corridor, based on a combination of desktop data review and site-specific surveys undertaken between 2023 and 2024. The	The Bowdun OWF lies approximately 10.03km northwest of the MHPGC

Source	Summary	Coverage of Study Areas
Technical Report (Thistle Wind Partners (TWP), 2026)	surveys comprised geophysical methods (including MBES, SSS, SBP and ultra-high-resolution seismic) and environmental sampling, including 93 DDV stations with still imagery, 91 grab sampling stations (0.1–0.2 m ²) for macrofauna and PSA, 46 sediment samples for contaminant analysis, 16 blue carbon samples, and water quality sampling at 16 stations. Intertidal surveys included Phase 1 walkover surveys with seven transects and quadrat sampling at the landfall. These data have been used to identify the seabed sediments and biotopes likely to occur within the Benthic Subtidal Ecology Study Area.	Project PEIR Red Line Boundary, in Scottish waters.
Seagreen Alpha and Bravo OWF: ES – Chapter 11: Benthic Ecology and Intertidal Ecology (Seagreen, 2012)	An ES Chapter for the Seagreen OWF. The chapter provides a baseline characterisation of seabed habitats and benthic communities within Project Alpha, Project Bravo and the offshore export cable corridor, based on a combination of desktop data and site-specific surveys undertaken in 2011. The surveys comprised geophysical data and environmental sampling, including 169 grab sampling stations (0.1 m ² mini Hamon grab) for macrofauna and PSA, 53 epibenthic beam trawl stations, and DDV sampling at all grab and trawl locations using a VideoRay Remotely Operated Vehicle (ROV). Intertidal surveys were undertaken at proposed landfalls using Phase 1 walkover methods with transects and quadrat sampling. These data have been used to identify the seabed sediments and biotopes likely to occur within the Benthic Subtidal Ecology Area.	The Seagreen Alpha and Bravo Array Areas lie approximately 25.15km west of the MHPGC Project PEIR Red Line Boundary, in Scottish waters.
Publicly Available Datasets		
EMODnet EUSeaMap broad-scale seabed habitat map for Europe (EMODnet, 2023).	Broad-scale predictive seabed habitat map for Europe, using EUNIS (2022) classifications. This data has been used to identify the seabed sediments and biotopes likely to occur within the Benthic Subtidal and Intertidal Ecology Study Area.	Full coverage of the Benthic Subtidal Ecology Study Area.
National Marine Plan interactive (NMPI) PMF datasets (Marine Directorate, 2026)	Provides mapped spatial layers of Scotland's PMFs. They collate verified species and habitat records from Marine Directorate, NatureScot and JNCC into standardised Geographic Information System (GIS) datasets that show the known distribution of PMFs and related protected-area features. This data has been used to identify PMFs likely to occur within the Benthic Subtidal Ecology Study Area.	Partial coverage of the Benthic Subtidal Ecology Study Area in Scottish waters.
EUNIS Level 3 Combined Map (JNCC, 2026), accessed via MAGIC Maps (2026)	A spatial dataset providing a broad-scale classification of seabed habitats across UK waters, based on the EUNIS habitat classification. The dataset integrates a range of survey data, legacy mapping programmes (e.g. Marine Nature Conservation Review (MNCR)), and modelled and composite products (including Mapping European Seabed Habitats (MESH)-derived datasets) to produce a nationally consistent, full-coverage map of marine habitats. It supports the identification of dominant substrate types and biological communities likely to occur. While attributes may indicate links to Annex I habitats (e.g. reefs), these represent derived interpretations rather than primary conservation designations. This data has been used to identify seabed habitats likely to occur within the Benthic Subtidal Ecology Study Area.	Partial coverage of the Benthic Subtidal Ecology Study Area in Scottish and English waters.
Cefas OneBenthic Baseline Tool (Cefas, 2025)	OneBenthic is a cloud-based data platform that visualises faunal cluster identities from benthic grab and core samples (0.1m ² , 1mm sieve) stored in the OneBenthic database – a large, standardised compilation of seabed macrofauna and sediment particle-size data from UK government, industry, and academic sources. The Cefas OneBenthic habitat classification assigns benthic macrofaunal assemblages following the methodology of Cooper et al. (2019), based on comparable 0.1 m ² grab and core samples collected since 1998. The dataset is used to map macrofaunal assemblage groups (faunal clusters), originally defined alongside their associated sediment types by Cooper and Barry (2017) (Cefas, 2025). This data	Partial coverage of the Benthic Subtidal and Intertidal Ecology Study Areas.

Source	Summary	Coverage of Study Areas
	has been used to identify the seabed sediments likely to occur within the Benthic Subtidal and Intertidal Ecology Study Area.	
British Geological Survey (BGS) - Intertidal Substrate Foreshore (England and Scotland) (BGS, 2015)	Beach composition classification data collated as a desk study. Data created as part of the FutureCoast Project. This data has been used to identify the seabed sediments likely to occur within the Benthic Intertidal Ecology Study Area.	Partial coverage of the Benthic Intertidal Ecology Study Area.
North East Coastal Observatory (NECO) Map Viewer and Catalogue – Habitat Mapping 2023 data (NECO, 2023)	Comprises a high-resolution, locally derived classification of terrestrial, intertidal and inshore habitats along the coastline. The dataset is based on interpretation of recent aerial imagery and supporting coastal survey data and includes a broad range of habitat types consistent with Phase 1/UKHab-style classifications. It provides detailed spatial coverage of coastal and intertidal environments. This data has been used to identify the seabed sediments and habitats that are likely to occur within the Benthic Intertidal Ecology Study Area.	Partial coverage of the Benthic Intertidal Ecology Study Area.
Literature		
Marine Conservation Zone Benthic Community Analysis (Sotheran <i>et al.</i> , 2016)	This report presents the outputs of a UK-wide analysis of benthic survey data collected to support MCZ designation and assessment. The report compiles and standardises seabed imagery and sample data from multiple surveys, including those undertaken in 2012 and 2014, to classify benthic habitats and communities using the EUNIS system. This enables the identification and mapping of biotopes across MCZs, including Farnes East MCZ, and supports the evidence base for determining the presence, extent and conservation status of designated features and broader benthic habitat types. This data has been used to identify the benthic biotopes likely to occur within the Benthic Subtidal Ecology Study Area.	Partial coverage of the Benthic Subtidal Ecology Study Area.
Biotope assignment of grab samples from four surveys undertaken in 2011 across Scotland's Seas (2012) (Pearce <i>et al.</i> , 2014)	This report presents the analysis of benthic grab sample data collected during four surveys undertaken across Scottish waters in 2011, including the Firth of Forth, North Sea, North East Atlantic and Windsack areas. The study is based on 291 benthic grab samples collected using a range of grab types (e.g. Day grab, Hamon grab and box corer), with associated particle size distribution data where available. Biological (macrofaunal) and sediment data were analysed using multivariate statistical techniques (e.g. cluster analysis) to identify faunal assemblages and assign biotopes within standard classification schemes (e.g. EUNIS). Where existing classifications were insufficient, new biotopes were proposed based on the observed assemblages and environmental conditions. This data has been used to identify the benthic biotopes likely to occur within the Benthic Subtidal Ecology Study Area.	Partial coverage of the Benthic Subtidal Ecology Study Area.
Analysis of seabed imagery from the 2011 survey of the Firth of Forth Banks Complex, the 2011 International Bottom Trawl Survey (IBTS) Q4 survey and additional deep-water sites from Marine Scotland Science	This report presents the analysis of seabed imagery from surveys in Scottish waters, including the 2011 Firth of Forth Banks Complex survey, the 2011 IBTS Quarter 4 (Q4) survey, and selected Marine Scotland Science deep-water surveys. The study is based on DDV and still photography used to identify habitats, characterise epifaunal communities and assign biotopes. Survey effort included 31 stations in the Firth of Forth (approximately 10.5 hours of video and 649 still images), seven IBTS stations (approximately 3.5 hours of video and 221 images), and six deep-water camera transects. Data were analysed to describe substrata, record fauna and classify habitats using standard biotope schemes. This data has been used to categorise the benthic biotopes likely to occur within the Benthic Subtidal Ecology Study Area.	Partial coverage of the Benthic Subtidal Ecology Study Area.

Benthic Subtidal and Intertidal Ecology

Source	Summary	Coverage of Study Areas
surveys (2012) (Axelsson et al., 2014)		
North East of Farnes Deep rMCZ Post-survey Site Report (Defra, 2015)	This report presents the findings of a dedicated seabed survey undertaken in March 2012 to provide direct evidence of seabed habitats and associated biological communities to inform MCZ designation. The survey combined acoustic data (multibeam bathymetry and backscatter) with ground-truthing methods, including 46 grab sampling stations (0.1 m ² Hamon grab) for macrofauna and PSA, and 18 drop-down video and still image stations using a towed camera system. Sediment and faunal data were analysed and integrated with acoustic data to classify seabed habitats (e.g. EUNIS broadscale habitats) and produce an updated spatial habitat map of the site. This data has been used to categorise the benthic biotopes likely to occur within the Benthic Subtidal Ecology Study Area.	Partial coverage of the Benthic Subtidal Ecology Study Area.
Community Analysis of Offshore MCZ Grab and Video Data (2014) (Allen et al., 2016)	This report presents a regional-scale analysis of benthic grab and video survey data collected across multiple offshore MCZs between 2012 and 2014, including North East of Farnes Deep. The study applies standardised analytical methods to characterise benthic communities and assign EUNIS biotopes based on species composition and environmental variables. The outputs provide a consistent evidence base for identifying, mapping and comparing benthic habitats across sites, supporting MCZ designation and informing understanding of the distribution and ecological characteristics of benthic communities.	Partial coverage of the Benthic Subtidal Ecology Study Area.
Durham Heritage Coast Seasearch Survey Report 2009 (Marine Conservation Society (MCS), 2009)	The Seasearch Survey Report (2009) documents a programme of volunteer diver surveys undertaken along the Durham Heritage Coast to characterise marine habitats and species following historic industrial impacts. Surveys were conducted at six inshore sites using standard Seasearch methodology, with divers recording habitat types, species observations and notable environmental features during timed dives. The study targeted a range of shallow subtidal environments (approximately 4m to 10m depth), with data collected through in situ observations and photographic records. The report provides site-based descriptions of seabed habitats, a species inventory and comparison with earlier surveys (1991). This data has been used to identify the seabed sediments and habitats likely to occur within the Benthic Subtidal and Intertidal Ecology Study Area.	Partial coverage of the Benthic Subtidal Ecology Study Area.
The Durham Heritage Coast Seasearch Site Surveys 1991-2016 (MCS, 2016)	The Seasearch Site Surveys Report (1991 to 2016) compiles volunteer diver records collected along the Durham Heritage Coast (including the 2009 survey; MCS, 2009). Using standard Seasearch methods, data were gathered from multiple inshore and offshore dive sites to record habitats, species and notable features, with a focus on improving understanding of marine biodiversity and informing conservation priorities. This data has been used to identify the seabed sediments and habitats likely to occur within the Benthic Subtidal and Intertidal Ecology Study Area.	Partial coverage of the Benthic Subtidal and Intertidal Ecology Study Areas.
Cell 1 Regional Coastal Monitoring Programme Update Report 17: 'Partial Measures' Survey 2025 (Royal HaskoningDHV, 2025)	The survey forms part of the Cell 1 Regional Coastal Monitoring Programme and provides site-specific coastal monitoring data along the Durham frontage. The report presents results from repeat beach profile, topographic and cliff-top surveys undertaken in spring 2018, enabling assessment of short-term and longer-term changes in coastal morphology, including beach levels, sediment distribution and cliff recession. The dataset is derived from systematic, repeated field surveys along fixed transects and control points, and is used to support understanding of coastal processes, erosion trends and shoreline stability within the Benthic Subtidal and Intertidal Ecology Study Area. Of particular relevance to the MHPGC Project,	Partial coverage of the Benthic Intertidal Ecology Study Area.

Benthic Subtidal and Intertidal Ecology

Source	Summary	Coverage of Study Areas
	Blast Beach (located within the landfall area) has been subject to detailed monitoring, including assessment of beach profile variability and sediment dynamics. This data has been used to identify the seabed sediments and habitats likely to occur within the Benthic Intertidal Ecology Study Area.	

Site-specific surveys

- 3.4.4.3 Several MHPGC Project specific surveys have been undertaken to inform the benthic ecology baseline and assessment. These comprise geophysical surveys, geotechnical surveys, subtidal benthic surveys and an intertidal survey. Further detail on these site-specific surveys is provided in **Volume 2, Annex 3.1: Benthic Ecology Technical Report, of the PEIR**.

Geophysical surveys

- 3.4.4.4 Geophysical surveys were undertaken in 2022 for the Morven North and Morven South projects, with information presented in **Table 3.8**.
- 3.4.4.5 Two geophysical survey campaigns have been undertaken by XOCEAN Ltd as part of the MHPGC Project. An initial survey was conducted in 2023 within the MHPGC Project Scoping Boundary, focussing on a range of offshore export cable route and landfall options. Therefore, it did not provide full coverage of the final offshore export cable corridor. Survey techniques included MBES, SBP, SSS and magnetometer data collected across a survey corridor of up to 500m in width (XOCEAN Ltd., 2023).
- 3.4.4.6 Further surveys were undertaken between 2024 and 2025 within the MHPGC Project PEIR Red Line Boundary, focussed on achieving full coverage of the offshore export cable corridor and associated landfall options. Survey techniques included MBES, SBP, SSS and magnetometer surveys (XOCEAN Ltd., 2025). In addition, geophysical data from previous survey campaigns and nearshore data purchases were incorporated where relevant to support interpretation of baseline conditions. The 2024-2025 surveys achieved full geophysical coverage of the selected offshore export cable corridor and associated landfall options and therefore form the primary geophysical dataset used to characterise baseline conditions along the current offshore export cable route. The surveys covered a 1km wide corridor along the approximately 210km offshore export cable corridor, extending from the proposed landfall location in English waters to the Morven North and Morven South projects in Scottish waters.
- 3.4.4.7 Geotechnical survey data informed the geophysical interpretation of seabed sediments and geological features. Information on geotechnical investigations undertaken for the MHPGC Project is provided in **Volume 2, Annex 1.1: Physical Processes Report**.

Subtidal benthic surveys

- 3.4.4.8 Subtidal benthic surveys were undertaken in 2022 for the Morven North and Morven South projects, with information presented in **Table 3.8**.
- 3.4.4.9 Two project-specific subtidal surveys were undertaken by Gardline Ltd. as part of the MHPGC Project (Gardline Ltd., 2024a; 2025a). An initial survey was conducted between June and November 2023, focussing on a range of offshore export cable route and landfall options. A subsequent survey was undertaken during August and September 2024, focussing on infilling data gaps and refining the baseline conditions along the offshore export cable route and associated landfall options. Collectively, the surveys were designed to characterise seabed sediments, benthic communities and habitat and species of ecological importance within the MHPGC Project PEIR Red Line Boundary.
- 3.4.4.10 Both surveys followed a broadly consistent methodology and were informed by available geophysical data collected by XOCEAN Ltd. The surveys comprised grab sampling using a 0.1m² Day grab for PSA, sediment chemistry and benthic macrofaunal analysis, together with DDV surveys to characterise seabed habitats, epifaunal communities and biotope distribution. The 2023 survey was designed to provide broad spatial coverage across the survey area, whereas the 2024 survey adopted a more targeted and higher-resolution approach focused on the offshore export cable corridor.

Habitat classification, analysis and mapping

- 3.4.4.11 Each seabed photograph and image was assigned a EUNIS Habitat classification based on observed depth, sediment type and visible fauna. The EUNIS biotope classifications are based on a hierarchical system to classify habitats in the marine environment depending on their sediment type and biota (European Environment Agency (EEA), 2021).
- 3.4.4.12 Habitat mapping within the MHPGC Project PEIR Red Line Boundary was undertaken by OWC Ltd. using data from the 2023 and 2024 benthic subtidal surveys (Gardline Ltd., 2024a, 2024b, 2025a and 2025b), together with geophysical and seabed imagery datasets (XOCEAN Ltd., 2023 and 2025), as presented in **Volume 2, Annex 3.1: Benthic Ecology Technical Report of the PEIR** (OWC Ltd., 2025).
- 3.4.4.13 DDV, PSA and macrofaunal data were used to classify the sampled areas in accordance with the EUNIS habitat classification system. The resulting habitat classifications were subsequently assessed to determine their ecological and conservation importance, with reference to relevant current marine legislation and guidance.

Intertidal survey

- 3.4.4.14 An intertidal Phase I walkover and UAV survey and a Phase II quantitative sampling survey was completed in August 2026 of the intertidal habitats and communities present to provide baseline information for the intertidal area at landfall at Blast Beach.
- 3.4.4.15 The intertidal surveys will be used to identify, describe and map the extent and spatial distribution of the biotopes and biotope complexes present within the survey area. The survey area has been defined based on landfall refinement and therefore will cover the entire intertidal area within the MHPGC Project PEIR Red Line Boundary at the landfall location. The intertidal survey was undertaken by a combination of broadscale biotope mapping undertaken in the Phase I walkover survey, supplemented by the Phase II collection of physical core samples, for sediment and faunal analysis.
- 3.4.4.16 The survey methodology can be found in **Appendix H of Volume 2, Annex 3.1: Benthic Ecology Technical Report, of the PEIR**. The results from the intertidal survey will be presented within the ES at DCO submission.

Data limitations and assumptions

- 3.4.4.17 Conducting field surveys for sediment sampling can present some limitations through sampling design and collection processes. Some key limitations regarding field survey data include:
- Data collected from discrete sample locations, in combination with geophysical data, have been used to characterise the MHPGC PEIR Red Line Boundary and therefore some interpretation and extrapolation has been necessary in the development of the full coverage biotope map;
 - The boundaries of where one biotope begins, and ends are not exactly precise as benthic communities transition between biotopes and many species can be mobile;
 - Classifying data into biotopes is determined by available data and it is not always possible to determine faunal based biotopes as descriptions and species lists cannot always be precisely matched.
- 3.4.4.18 Notwithstanding these limitations, the assessment assumes that the survey effort, spatial coverage and quality of the geophysical, seabed imagery and benthic sampling data are sufficient to provide a representative characterisation of habitats and benthic communities within the MHPGC PEIR Red Line Boundary. The habitat maps and biotope classifications presented should therefore not be regarded as definitive representations of fixed habitat boundaries but as a robust characterisation of the receiving environment based on the best available evidence.
- 3.4.4.19 The assessment further assumes that the habitat affinities, ecological characteristics and sensitivities assigned to identified habitats and species, based on currently available guidance and

literature, are appropriate for informing the impact assessment. Accordingly, the available evidence base is considered sufficiently robust to support the conclusions presented within this chapter.

3.4.5 Overview of subtidal baseline environment

- 3.4.5.1 The following sections provide an overview of the benthic ecology baseline within the Benthic Subtidal and Intertidal Study Areas and wider central and northern North Sea, in Scottish and English waters, using site-specific survey data and publicly available data (**Section 3.4.4**). Further detail is provided in **Volume 2, Annex 3.1: Benthic Ecology Technical Report, of the PEIR** and its associated appendices.

Bathymetry seabed features

Scottish waters

Regional

- 3.4.5.2 The Firth of Forth Banks Complex MPA (Montrose Bank component) lies within the Benthic Subtidal Ecology Study Area and is approximately 0.04km to the west from the MHPGC Project PEIR Red Line Boundary (
- 3.4.5.3 **Figure 3.7**). The MPA comprises a series of shelf banks and mounds with water depths ranging from approximately 30m to 110m below sea level (JNCC, 2024a).

MHPGC Project PEIR Red Line Boundary

- 3.4.5.4 Morven North and Morven South, which overlap with the northern section of the MHPGC Project PEIR Red Line Boundary in Scottish waters, occur in water depths of approximately 64m to 75m and 64m to 76m below Lowest Astronomical Tide (LAT), respectively (Tetra Tech RPS Energy, 2026b).
- 3.4.5.5 Bathymetry along the offshore export cable corridor within Scottish waters is generally uniform, with water depths ranging between approximately 55m and 71m below LAT (XCOEAN, 2023; 2025). Limited bathymetric variation is present across this section of the route, with depths gradually transitioning into those recorded within English waters.

English waters

Regional

- 3.4.5.6 At a regional scale, the MHPGC Project PEIR Red Line Boundary is located within the wider North Sea basin, approximately 150km northwest of Dogger Bank, a large shallow sandbank that forms a prominent bathymetric feature within the North Sea (Quante *et al.*, 2016).
- 3.4.5.7 Farnes East MCZ and North of Farnes East Deep MCZ/HMPA are located within the Benthic Subtidal Ecology Study Area and in close proximity to the MHPGC Project PEIR Red Line Boundary (2.2km to the west and 4.1km to the east, respectively) (
- 3.4.5.8 **Figure 3.7**). Water depths within these sites range from approximately 30m to 100m (JNCC, 2024b; JNCC, 2025).

MHPGC Project PEIR Red Line Boundary

- 3.4.5.9 Water depths along the MHPGC Project PEIR Red Line Boundary in English waters, vary from nearshore depths at the landfall to a maximum of approximately 106m below LAT offshore (XCOEAN, 2023; 2025). From the Scottish border southwards, depths remain relatively consistent at approximately 60m to 70m below LAT before increasing to approximately 90m to 106m below LAT in the central section of the MHPGC Project PEIR Red Line Boundary in English waters. Depths then progressively decrease towards the shoreline.

- 3.4.5.10 Overall, the bathymetry of the MHPGC Project PEIR Red Line Boundary in English waters is characterised by a relatively smooth seabed profile with gradual changes in water depth and an absence of pronounced seabed relief (XCOEAN, 2023; 2025).

Sediment characteristics

Scottish waters

Regional

- 3.4.5.11 Evidence from neighbouring developments and infrastructure projects demonstrates a consistent pattern of sand-dominated seabed conditions within the central and northern North Sea; Eastern Green Link 2 (slightly intersects the MHPGC Project PEIR Red Line Boundary in Scottish waters; AECOM, 2022a), Ossian OWF (5.50km east; RPS, 2024a), Bowdun OWF (10.03km northwest; TWP, 2025), Seagreen OWF (25.15km west; Seagreen, 2012) and the Cambois Connection (0.25km west; Ocean Ecology Ltd., 2023) identified predominantly circalittoral sand, mixed sediment or muddy sand habitats, with localised gravel deposits. Mobile seabed features, including megaripples, ripples and sandwaves, were commonly recorded, indicating active sediment transport processes. Occasional furrows associated with erosion and isolated boulders or bedrock exposures were also reported in parts of the wider area.
- 3.4.5.12 The Montrose Bank component of the Firth of Forth Banks Complex MPA which lies adjacent to the MHPGC Project PEIR Red Line Boundary (**Figure 3.1**), is designated for 'offshore subtidal sands and gravels' (a PMF and habitat on the Scottish Biodiversity List), reflecting the presence of a heterogeneous mosaic of coarse sandy, mixed sediment, mud and localised rocky habitats shaped by natural hydrodynamic processes (JNCC, 2014). As such, NMPI records of 'offshore subtidal sands and gravels' lie within Montrose Bank and extend into the adjacent Benthic Subtidal Ecology Study Area but lie outside the MHPGC Project PEIR Red Line Boundary (**Figure 3.2**; Marine Directorate, 2026).
- 3.4.5.13 The Scottish section of the Benthic Subtidal Ecology Study Area, including the MHPGC Project PEIR Red Line Boundary, is characterised by predominantly sandy offshore sediments typical of the central and northern North Sea. EUSeaMap habitat data (EMODnet, 2023) indicate widespread Atlantic offshore circalittoral sand habitats, with more localised areas of Atlantic offshore circalittoral coarse sediment, particularly in the northwest and southwest of the Benthic Subtidal Ecology Study Area (**Figure 3.2**).
- 3.4.5.14 OneBenthic data (Cefas, 2025) support this interpretation, indicating that the seabed is largely composed of gravelly sand and gravelly muddy sand supporting infaunal communities dominated by polychaetes, bivalves, amphipods and brittlestars (Figure 4.2 of **Volume 2, Annex 3.1: Benthic Ecology Technical Report, of the PEIR**). The mapped faunal assemblages are characteristic of offshore sandy and mixed sediment habitats.

MHPGC Project PEIR Red Line Boundary

- 3.4.5.15 Geophysical and benthic surveys undertaken for Morven North and Morven South show that sediments within and surrounding the MHPGC Project PEIR Red Line Boundary in Scottish waters are relatively homogeneous and dominated by fine- to medium-grained sand (Tetra Tech RPS Energy, 2026a; 2026b). Gravel, shell fragments, cobbles and occasional boulders are present, with coarser sediments generally occurring within the Morven North Boundary and wider study area (5-14km buffer around the Morven North Boundary) and slightly muddier sediments recorded within the Morven South Boundary and wider study area (5km to 14km buffer around the Morven South Boundary).
- 3.4.5.16 Geophysical and benthic surveys undertaken for the MHPGC Project, within the southern section of the MHPGC Project PEIR Red Line Boundary in Scottish waters determined that the seabed is predominantly sandy with limited seabed complexity (XOCEAN, 2023; Gardline, 2024a; XOCEAN, 2025; Gardline, 2025a). Localised patches of mixed sediment and gravel were identified at several

locations, including near the Scottish-English maritime boundary (**Figure 3.3** to **Figure 3.5**). PSA confirmed that sediments within the corridor are primarily sand and muddy sand.

3.4.5.17 Seabed features within the southern section of the MHPGC Project PEIR Red Line Boundary in Scottish waters are limited and mainly comprise homogenous sand with occasional pitted seabed associated with sandwave crests and other irregular seabed areas (XOCEAN, 2023; XOCEAN, 2025). Sparse boulders were recorded intermittently along approximately 30km of the southern section of the MHPGC Project PEIR Red Line Boundary in Scottish waters, extending from Scottish waters into English waters (**Figure 3.3** to **Figure 3.5**).

3.4.5.18 Overall, the MHPGC Project PEIR Red Line Boundary in Scottish waters is characterised by predominantly sandy sediments with localised gravel, shell, cobble and boulder components, consistent with the wider sedimentary environment.

English waters

Regional

3.4.5.19 Evidence from surveys undertaken for the Cambois Connection project, which traverses the central and northern North Sea and lies within close proximity to the MHPGC Project PEIR Red Line Boundary (0.25km to the west), demonstrate a transition from predominantly sandy and muddy sand habitats in offshore areas to offshore mud and mixed sediment habitats further south and inshore (Ocean Ecology Ltd. 2023). Sediments are generally classified as muddy sand, sandy mud and, locally, muddy sandy gravel.

3.4.5.20 Surveys undertaken for Eastern Green Link 1, which intersects the MHPGC Project PEIR Red Line Boundary approximately 8 km offshore from the proposed landfall, similarly identified a seabed dominated by sand and muddy sand sediments, with localised areas of mixed sediment, coarse sediment and rock habitat along the cable corridor. These results reflect the heterogeneous nature of benthic habitats across the offshore and nearshore sections of the northeast English coast (AECOM, 2022b).

3.4.5.21 The Benthic Subtidal Ecology Study Area contains several designated marine sites that reflect the diversity of seabed habitats present. The Farnes East MCZ (2.2km to the west of the MHPGC Project PEIR Red Line Boundary) (**Figure 3.1**) supports protected features including subtidal coarse sediment, sand, mixed sediment and mud habitats, together with limited areas of circalittoral rock (JNCC, 2021). The North East of Farnes Deep MCZ and HPMA (4.1km to the east of the MHPGC Project PEIR Red Line Boundary) (**Figure 3.1**) comprises predominantly mixed sediments, together with extensive areas of sand and coarse sediment and smaller areas of mud (Defra, 2015).

3.4.5.22 The English section of the Benthic Subtidal Ecology Study Area, including the MHPGC Project PEIR Red Line Boundary, is characterised by a gradient in sediment types from predominantly sandy habitats in the north to muddier sediments in the south. Specifically, EUSeaMap data (EMODnet, 2023) indicate that Atlantic offshore circalittoral sand dominates the northern section of the Benthic Subtidal Ecology Study Area, with smaller areas of offshore coarse sediment, while offshore mud habitats become increasingly prevalent further south (**Figure 3.2**). Inshore areas support a mosaic of sand, mixed sediment and mud habitats. OneBenthic data (Cefas, 2025) are consistent with these habitat classifications Figure 4.2 of **Volume 2, Annex 3.1: Benthic Ecology Technical Report, of the PEIR**).

MHPGC Project PEIR Red Line Boundary

3.4.5.23 Benthic surveys and geophysical data available for the MHPGC Project indicate that the MHPGC Project PEIR Red Line Boundary in English waters is dominated by sand, muddy sand and sandy mud sediments (XOCEAN, 2023; Gardline, 2024a; XOCEAN, 2025; Gardline, 2025a), consistent with the wider regional baseline (EMODnet, 2023; Cefas, 2025). The seabed comprises predominantly soft sediment habitats with localised areas of mixed and coarser sediments.

- 3.4.5.24 The offshore seabed contains a range of sedimentary features, including seabed furrows, sediment waves and areas of localised scouring. Isolated rock outcrops, potential boulder field habitats and sand ripple features are also present in discrete locations (**Figure 3.3** to **Figure 3.5**).
- 3.4.5.25 Towards landfall, sediments become increasingly characterised by gravelly sand and sandy gravel overlying rocky substrates (**Figure 3.3** to **Figure 3.5**). Overall, the benthic environment within the MHPGC Project PEIR Red Line Boundary is representative of the wider regional seabed, comprising predominantly sedimentary habitats that support characteristic soft-sediment benthic communities.

Sediment chemistry

Scottish waters

Regional

- 3.4.5.26 Available sediment chemistry data from developments within and adjacent to the Benthic Subtidal Ecology Study Area indicate that sediments are generally reflective of natural North Sea background conditions.
- 3.4.5.27 Sediment contaminant concentrations recorded along the Eastern Green Link 2 corridor (which slightly overlaps the MHPGC Project PEIR Red Line Boundary in Scottish waters) were within expected regional background levels, with no evidence of elevated contamination (AECOM, 2022a). Similarly, sediment chemistry data from OWF developments within the central and northern North Sea, including Ossian OWF (5.50km to the east of the MHPGC Project PEIR Red Line Boundary), Bowdun OWF (10.03km northwest) and the Seagreen Project Alpha (25.15km west), similarly identified generally low concentrations of contaminants, including trace metals, polyaromatic hydrocarbons (PAH), polychlorinated biphenyls (PCBs) and organotins (Seagreen, 2012; RPS, 2024b; TWP, 2026). While isolated exceedances of arsenic, and occasionally chromium, were recorded at some locations with regards to these projects, concentrations remained below effects-based assessment thresholds and were considered representative of natural background conditions (RPS, 2024; TWP, 2026; Seagreen, 2012). Overall, these studies indicate limited evidence of widespread sediment contamination outside of the Benthic Subtidal Ecology Study Area, within the central and northern North Sea.

MHPGC Project PEIR Red Line Boundary

- 3.4.5.28 Within the area of the MHPGC Project PEIR Red Line Boundary that overlaps with Morven North and Morven South, sediment chemistry indicated generally low contaminant concentrations (Tetra Tech RPS Energy, 2025a). Concentrations of PCB, PAH and organotins were either below detection limits or below relevant assessment thresholds. While one arsenic exceedance of Marine Scotland Action Level (AL) 1 and Canadian Sediment Quality Guideline (CSQG) Threshold Effect Level (TEL) was identified, the sample was located just outside of the MHPGC Project PEIR Red Line Boundary and remained below higher effects-based thresholds, indicating a low ecological risk.
- 3.4.5.29 Analysis of sediment samples collected during the MHPGC Project-specific benthic surveys showed that concentrations of PCBs, PAHs and organotins were below detection limits and/or did not exceed relevant marine sediment Environmental Quality Standards (EQS) (Gardline, 2024a; 2025a). Heavy metal concentrations were generally consistent with background levels typical of the central North Sea. No exceedances of assessment criteria were identified for cadmium, copper, mercury, barium or vanadium. A single sediment sample exceeded the Effects Range-Low (ERL) threshold for arsenic, while all remaining samples and metals were below applicable sediment quality guidelines and considered representative of natural background concentrations.
- 3.4.5.30 Overall, sediment chemistry within the Scottish waters section of the MHPGC Project PEIR Red Line Boundary indicates predominantly uncontaminated sediments with contaminant concentrations consistent with regional background conditions.

English waters

Regional

- 3.4.5.31 Available sediment chemistry data indicate that sediments within the wider Benthic Subtidal Ecology Study Area are generally characterised by low contaminant concentrations. Sediment samples collected for the Cambois Connection (0.25km west of the MHPGC Project PEIR Red Line Boundary) identified low concentrations of trace metals, organotins, PCBs, PAHs and hydrocarbons, with the majority of results below Cefas AL1 and other relevant sediment quality guidelines (Natural Power, 2023). Localised exceedances of AL1 were recorded for hydrocarbons, chromium and nickel at a small number of nearshore stations, likely reflecting shipping activity associated with the Port of Blyth; however, no contaminants exceeded Cefas AL2 (Natural Power, 2023).
- 3.4.5.32 Sediment chemistry data from nearby developments in Scottish waters, including Eastern Green Link 1, Eastern Green Link 2, Bowdun, Seagreen and Ossian OWFs, similarly indicate generally low contaminant concentrations and support the conclusion that sediments in the wider regional area are largely representative of natural background conditions (Seagreen, 2012; AECOM, 2022a; AECOM, 2022b; Natural Power, 2023; RPS, 2024b; Tetra Tech RPS Energy, 2026a; TWP, 2026).
- 3.4.5.33 The nearshore environment along the northeast coast has been influenced historically by colliery spoil disposal, particularly along the Durham coastline. Although remediation activities have reduced these pressures, some evidence of historic disturbance and anthropogenic material remains within local seabed sediments (MCS, 2009; 2016).

MHPGC Project PEIR Red Line Boundary

- 3.4.5.34 Sediment samples collected for the MHPGC Project within the MHPGC Project PEIR Red Line Boundary were analysed for heavy metals, PAHs, PCBs and organotins (Gardline, 2024a; 2025a). Concentrations of PCB and organotins were below relevant marine sediment EQS.
- 3.4.5.35 Heavy metal concentrations were generally low and consistent with natural background variability. No exceedances of sediment quality criteria were recorded for cadmium, copper or mercury (Gardline, 2024a; 2025a). Concentrations of arsenic, chromium, nickel, lead and zinc exceeded Cefas AL1 at a limited number of sampling stations, with the highest concentrations recorded in the nearshore section of the route. No contaminants exceeded Cefas AL2, and the elevated concentrations were associated with a higher proportion of fine sediments, indicating that they are likely attributable to natural sediment characteristics rather than significant contamination.
- 3.4.5.36 Overall, sediment chemistry within the English waters section of the MHPGC Project PEIR Red Line Boundary indicates predominantly uncontaminated sediments, with contaminant concentrations generally below relevant assessment thresholds and consistent with regional background conditions.

Seabed habitat and communities

Scottish waters

Regional

- 3.4.5.37 Regional survey data indicate that Scottish waters within and adjacent to the Benthic Subtidal Ecology Study Area are dominated by circalittoral soft sediment biotopes. The biotope '*Abra prismatica*, *Bathyporeia elegans* and polychaetes in circalittoral fine sand

(MC5212/SS.SSa.CFiSa.ApriBatPo)² was recorded within the Cambois Connection survey area (0.25km west of the MHPGC Project PEIR Red Line Boundary) (Natural Power, 2023), while the dominant biotope within the Bowdun OWF survey area (10.03km northwest of the MHPGC Project PEIR Red Line Boundary) was '*Echinocyamus pusillus*, *Ophelia borealis* and *Abra prismatica* in circalittoral fine sand' (MC5211/SS.SSa.CFiSa.EpusOborApri), alongside circalittoral muddy sand, offshore circalittoral sand and localised coarse sediment biotopes (TWP, 2026). Surveys within the Firth of Forth Banks Complex MPA (adjacent to the MHPGC Project PEIR Red Line Boundary, to the west) identified a mosaic of soft sediment, mixed sediment and coarse sediment habitats, with circalittoral muddy sand biotopes, characterised by bivalves, brittlestars and sand stars, being the most widespread (Axelsson et al., 2014).

3.4.5.38 Benthic communities recorded across Scottish waters were typical of North Sea circalittoral sediment habitats. Surveys at Ossian OWF (5.50km to the west of the MHPGC Project PEIR Red Line Boundary) identified infaunal assemblages dominated by polychaete worms, including *Lanice conchilega* and *Spiophanes bombyx*, with epifaunal communities characterised by cnidarians and bryozoans (Ossian, 2024). Similar communities were reported from Bowdun OWF, where assemblages were dominated by polychaetes and echinoderms, particularly brittlestars, with secondary contributions from bivalves and crustaceans (TWP, 2026). Seagreen OWF supported relatively low-diversity communities dominated by polychaetes and bivalves (Seagreen, 2012), while surveys of the Firth of Forth Banks Complex MPA identified assemblages associated with deep sands and coarse sediments dominated by the polychaete worm *S. bombyx*, as well as mixed sand and gravel communities supporting diverse polychaete and epifaunal taxa, including squat lobster (*Galathea intermedia*) (Pearce et al., 2014). Other fauna of note includes soft corals such as dead man's fingers (*Alcyonium digitatum*) and ascidians identified in coarser sediments of the Firth of Forth Banks Complex MPA (Axelsson et al., 2014) but not within the MHPGC Project PEIR Red Line Boundary.

MHPGC Project PEIR Red Line Boundary

3.4.5.39 Benthic survey data collected for the MHPGC Project within the southern section of the MHPGC Project PEIR Red Line Boundary in Scottish waters was classified as '*Paramphinome jeffreysii*, *Thyasira* spp. and *Amphiura filiformis* in Atlantic offshore circalittoral sandy mud' (MD6218/SS.SMu.OMu.PjefThyAfil) (Gardline, 2024b; 2025b). This biotope falls within the Scottish PMF 'offshore deep-sea mud' habitat (also referred to as 'subtidal mud'), which is typically dominated by polychaetes, brittlestars and bivalves, and it is therefore of high conservation value and of national importance.

3.4.5.40 In addition, the dominant biotopes recorded within the area of the MHPGC Project PEIR Red Line Boundary that overlaps with Morven North and Morven South were:

- '*Abra prismatica*, *Bathyporeia elegans* and polychaetes in circalittoral fine sand' (MC5212/SS.SSa.CFiSa.ApriBatPo);
- '*Echinocyamus pusillus*, *Ophelia borealis* and *Abra prismatica* in circalittoral fine sand' (MC5211/SS.SSa.CFiSa.EpusOborApri);
- '*Siphonoecetes*, *Nephtyidae* polychaetes and venerid bivalves in circalittoral sand' (MC521/SS.SSa.CFiSa) (Tetra Tech RPS Energy, 2026a).

3.4.5.41 All benthic stations sampled in relation to the MHPGC Project were assigned high ecological status, as per the Infauna Quality Index (IQI) indicating diverse and abundant benthic invertebrate communities characteristic of undisturbed seabed conditions. The dominant benthic communities were associated with soft sediment habitats and were characterised by a range of polychaete

² A full reference list of biotope names and associated biotope codes is presented in **Appendix J.1** in **Volume 2, Annex 3.1: Benthic Ecology Technical Report, of the PEIR**.

worms, including *P. jeffreysii*, *O. borealis* and catworms (Nephtyidae spp.); bivalve molluscs, including thyasirid bivalves (*Thyasira* spp.), prismatic white furrow shell (*Abra prismatica*) and venus clams (Veneridae); echinoderms, including slender brittle star (*A. filiformis*) and sea potato (*E. pusillus*); and crustaceans, including elegant sandhopper (*B. elegans*).

- 3.4.5.42 Across the area of the MHPGC Project PEIR Red Line Boundary that overlaps with Morven North and Morven South, visible epifaunal communities were generally sparse (Tetra Tech RPS Energy, 2026a). Soft sediments supported assemblages dominated by annelids, arthropods, cnidarians, echinoderms and molluscs, while coarser sediments supported fewer species.

English waters

Regional

- 3.4.5.43 Offshore circalittoral sand, sandy mud, mixed sediment and mud biotopes dominate the Benthic Subtidal Ecology Study Area and wider region. The Eastern Green Link 2 corridor (which intersects the MHPGC Project PEIR Red Line Boundary) was characterised largely by offshore circalittoral sand and offshore circalittoral mixed sediment, with localised areas of offshore circalittoral coarse sediment and *S. spinulosa* biotopes (AECOM, 2022a).
- 3.4.5.44 Similarly, Eastern Green Link 1 was dominated by deep circalittoral sand habitats, with additional areas of deep circalittoral mixed sediment, deep circalittoral mud, deep circalittoral coarse sediment and circalittoral rock habitats identified along the route (AECOM, 2022b). Communities recorded during Eastern Green Link 1 surveys were characteristic of North Sea soft-sediment habitats and were dominated by polychaetes, bivalves, crustaceans and echinoderms, including taxa associated with circalittoral sand, mixed sediment and mud habitats (AECOM, 2022b).
- 3.4.5.45 Similarly, surveys associated with the Cambois Connection (0.25km to the west of the MHPGC Project PEIR Red Line Boundary) identified the biotopes '*Paramphinome jeffreysii*, *Thyasira* spp. and *Amphiura filiformis* in Atlantic offshore circalittoral sandy mud' (MD6218/SS.SMu.OMu.PjefThyAfil) and 'Atlantic offshore circalittoral mixed sediment' (MD42/SS.SMx) lying adjacent to the MHPGC Project PEIR Red Line Boundary (Natural Power, 2023) and are therefore of particular relevance to the MHPGC Project. In addition to the following biotopes in the wider survey area:
- '*Kurtiella bidentata* and *Thyasira* spp. in circalittoral muddy mixed sediment' (MC4213/SS.SMx.CMx.KurThyMx);
 - '*Abra prismatica*, *Bathyporeia elegans* and polychaetes in circalittoral fine sand' (MC5212/SS.SSa.CFiSa.ApriBatPo);
 - '*Owenia fusiformis* and *Amphiura filiformis* in offshore circalittoral sand or muddy sand' (MD5212/SS.SSa.OSa.OfusAfil);
 - '*Thyasira* spp. and *Ennucula tenuis* in circalittoral sandy mud' (MC6212/SS.SMu.CSaMu.ThyEten);
 - 'Atlantic offshore circalittoral mud' (MD62/SS.SMu);
 - '*Paramphinome jeffreysii*, *Thyasira* spp. and *Amphiura filiformis* in offshore circalittoral sandy mud' (MD6218/SS.SMu.OMu.PjefThyAfil);
 - '*Fabulina fabula* and *Magelona mirabilis* with venerid bivalves and amphipods in infralittoral compacted fine muddy sand' (MB5236/SS.SSa.IMuSa.FfabMag).
- 3.4.5.46 Sotheran *et al.* (2016) also recorded the following biotopes within Farnes East MCZ (2.2km to the west of the MHPGC Project PEIR Red Line Boundary) in 2012 and 2014:
- '*Echinocyamus pusillus*, *Ophelia borealis* and *Abra prismatica* in circalittoral fine sand' (MC5211/SS.SSa.CFiSa.EpusOborApri);

- '*Thyasira* spp. and *Ennucula tenuis* in circalittoral sandy mud' (SS.SMu.CSaMu.ThyEten – assigned to EUNIS (2022) habitat class M5.4 (circalittoral mud); broadly corresponding to Atlantic circalittoral sandy mud habitats (e.g. MC6212));
- 'Offshore circalittoral mixed sediment' (MD42/SS.SMx);
- 'Offshore circalittoral coarse sediment' (MD321/SS.SCS.OCS);
- '*Owenia fusiformis* and *Amphiura filiformis* in offshore circalittoral sand or muddy sand' (MD5212/SS.SSa.OSa.OfusAfil).

3.4.5.47 Biotopes identified from surveys of North East of Farnes Deep MCZ and HPMA (Allen *et al.*, 2016) (4.1km to the east of the MHPGC Project PEIR Red Line Boundary) included:

- 'Polychaete-rich deep Venus community in offshore mixed sediments' (MD4211/SS.SMx.OMx.PoVen);
- '*Echinocyamus pusillus*, *Ophelia borealis* and *Abra prismatica* in circalittoral fine sand' (MC5211/SS.SSa.CFiSa.EpusOborApri);
- '*Owenia fusiformis* and *Amphiura filiformis* in offshore circalittoral sand or muddy sand' (MD5212/SS.SSa.OSa.OfusAfil);
- 'Circalittoral fine sand' (MC521/SS.SSa.CFiSa);
- 'Circalittoral mixed sediment' (MC42/SS.SMx.CMx).

3.4.5.48 Regional benthic communities are characteristic of central North Sea soft-sediment environments and are dominated by polychaetes, bivalves and echinoderms. Common taxa recorded across Farnes East MCZ and North East of Farnes Deep MCZ/HPMA included the polychaetes Norwegian tube worm (*Hydroides norvegica*), Jeffreys' fireworm (*P. jeffreysii*), oweniid worm (*Galathowenia oculata*), lyre ragworm (*Paradoneis lyra*) and slender thread worm (*Mediomastus fragilis*); the echinoderm pea urchin (*E. pusillus*); and a range of ribbon worms (Nemertea) and peanut worms (Sipuncula) (Allen *et al.*, 2016; Sotheran *et al.*, 2016).

3.4.5.49 Durham coast Seasearch surveys carried out in 2009 showed generally low-diversity communities associated with sediment-covered bedrock habitats, while mixed-ground habitats supported richer assemblages including dead men's fingers (*A. digitatum*) and hornwrack (*Flustra foliacea*). Nearshore rocky habitats also supported sparse kelp communities dominated by *Laminaria hyperborea* and *L. digitata*.

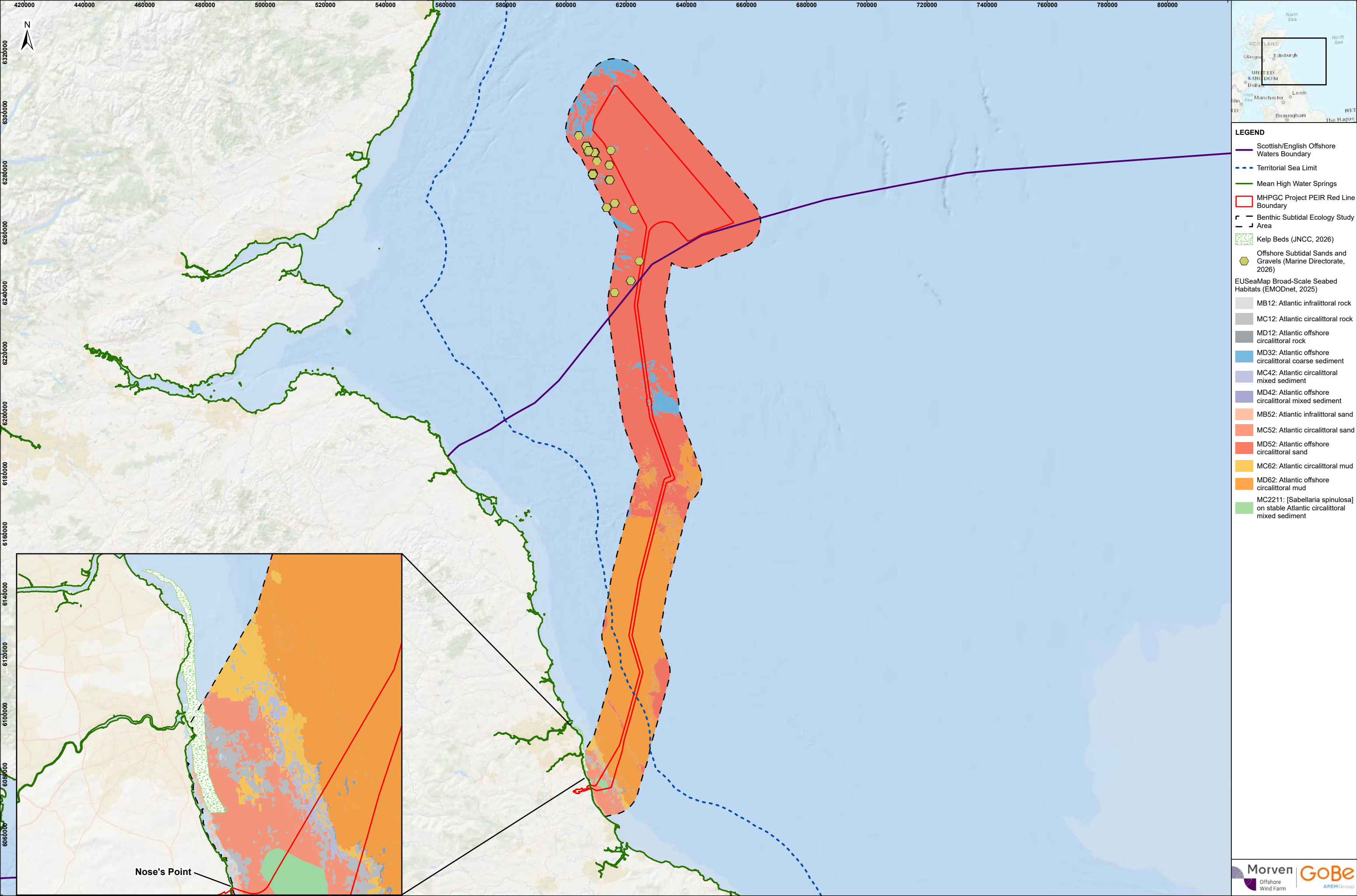
MHPGC Project PEIR Red Line Boundary

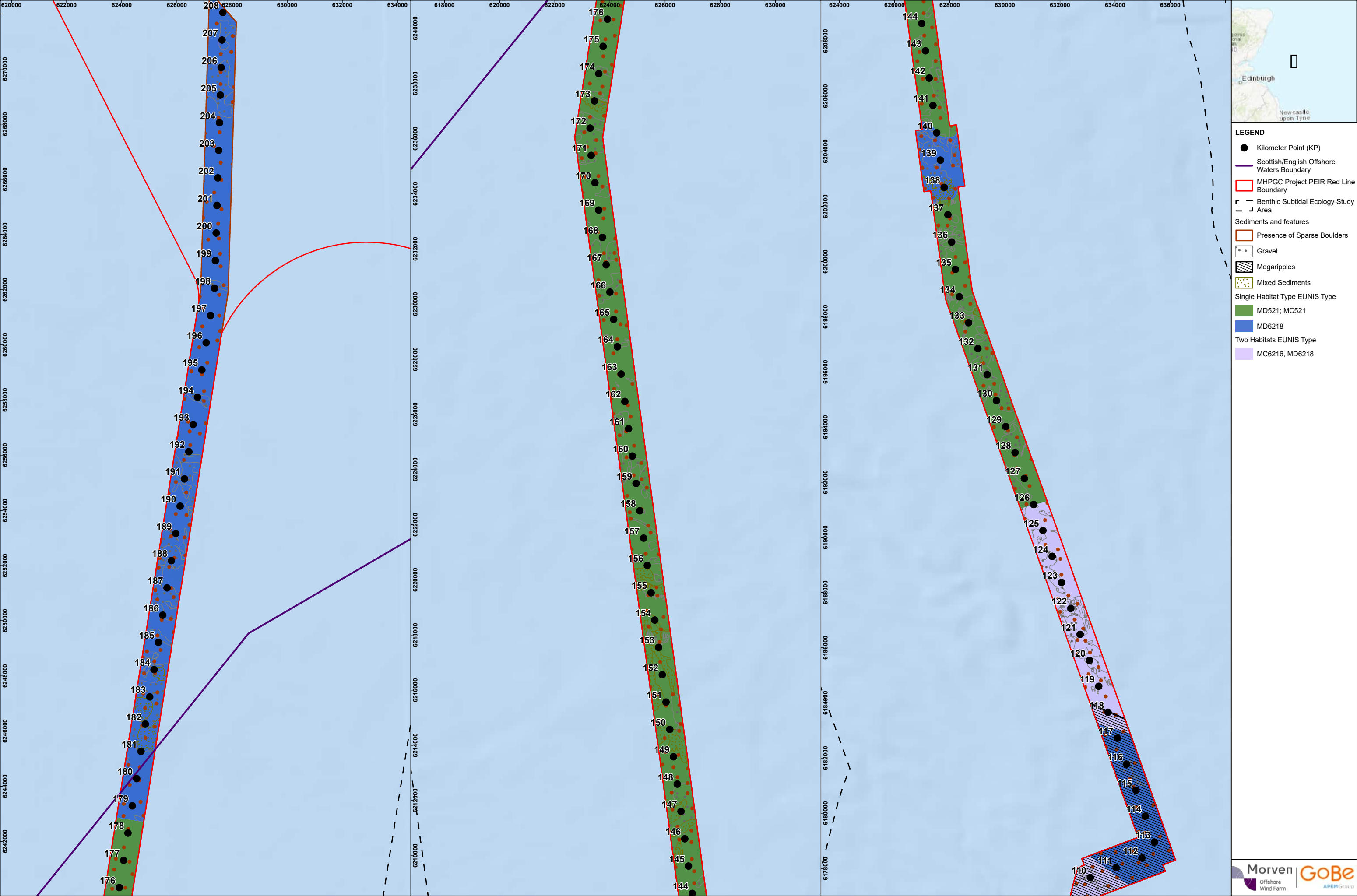
3.4.5.50 A summary of the EUNIS habitat codes identified within MHPGC Project PEIR Red Line Boundary in English waters is provided below and is illustrated in **Figure 3.3** to **Figure 3.5**:

- '*Paramphinoe jeffreysii*, *Thyasira* spp. and *Amphiura filiformis* in Atlantic offshore circalittoral sandy mud' (MD6218/SS.SMu.OMu.PjefThyAfil);
- 'Faunal communities of Atlantic circalittoral sand / Faunal communities in Atlantic offshore circalittoral sand' (MC521/MD521; SS.SSa.CFiSa/SS.SSa.OSa);
- 'Sea pens and burrowing megafauna in Atlantic circalittoral fine mud' (MC6216/SS.SMu.CFiMu.SpnMeg);
- '*Levinsenia gracilis* and *Heteromastus filiformis* in Atlantic offshore circalittoral mud and sandy mud' (MD6217/SS.SMu.OMu.LevHet);
- 'Faunal communities of Atlantic circalittoral mixed sediment' (MC421/SS.SMx.CMx).
- 'Faunal turf communities on Atlantic circalittoral rock' (MC121/CR.HCR.FaT);
- '*Spisula subtruncata* and *Nephtys hombergii* in Atlantic infralittoral muddy sand' (MB5238/SS.SSa.IMuSa.SsubNhom);

- 'Atlantic circalittoral mixed sediment' (MC42/SS.SMx.CMx).

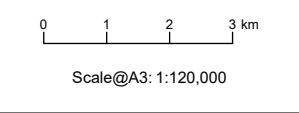
3.4.5.51 Communities within the MHPGC Project PEIR Red Line Boundary were strongly associated with sandy mud, sand and mixed sediment habitats. Dominant assemblages were characterised by polychaete worms, including *P. jeffreysii*, *L. gracilis* and the red thread worm (*H. filiformis*); bivalve molluscs, including thyasirid bivalves (*Thyasira* spp.); and echinoderms, including the slender brittle star (*A. filiformis*).





Project Name:
MORVEN HAWTHORN PIT GRID
CONNECTION PROJECT

Drawing Title:
EUNIS HABITAT CLASSIFICATION AND SEDIMENT TYPE AND FEATURES WITHIN
THE MHPGC PEIR RED LINE BOUNDARY (OWC, 2025) - SHEET 1

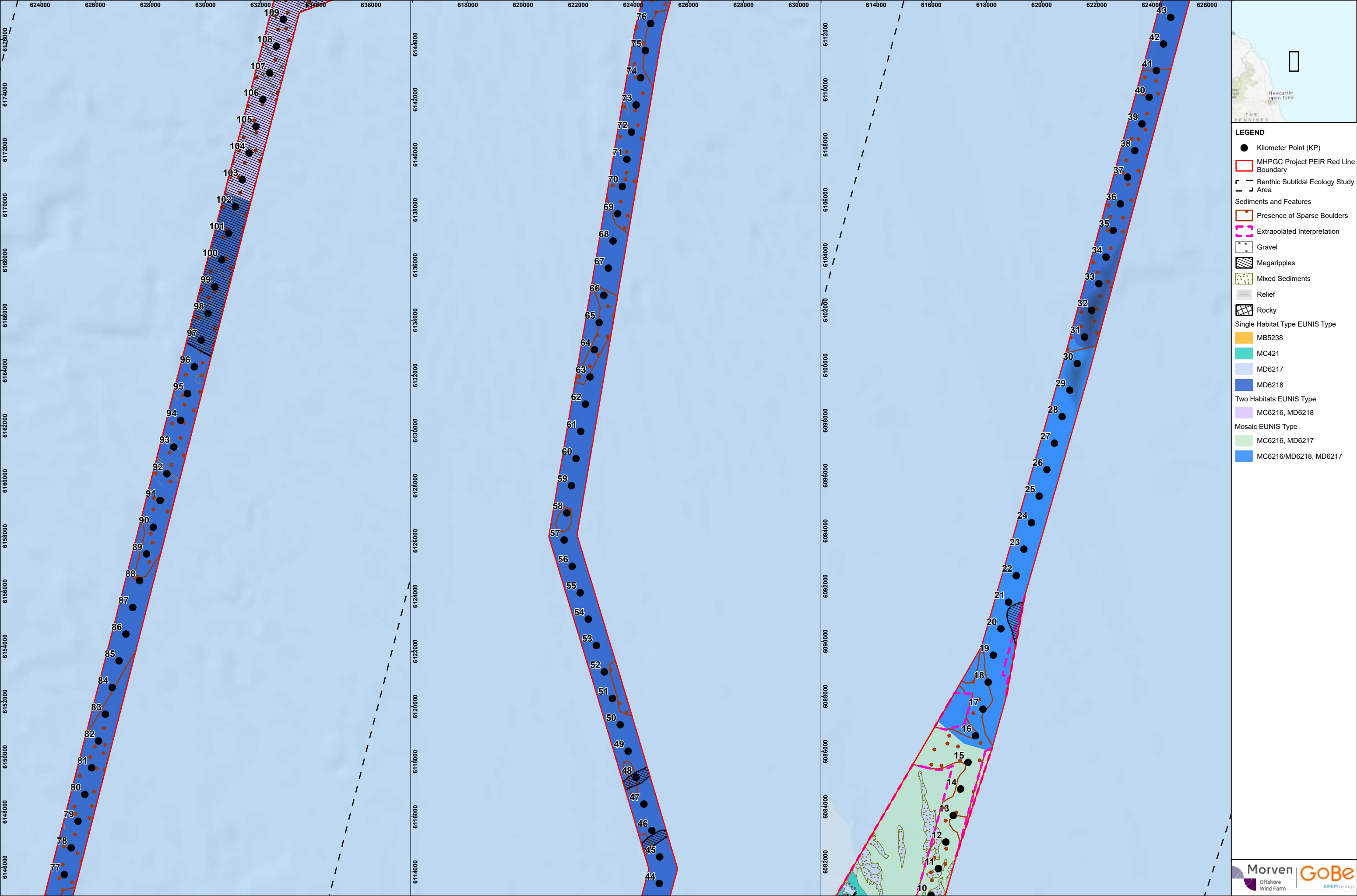


Geodetic Information:
Datum: European 1950
Projection: ED 1950 UTM Zone 30N

Data Sources:
BP, Ordnance Survey

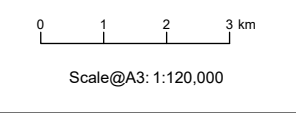
Service Layer Credits:
World Ocean Base: OceanWise, Esri, Garmin, NaturalVue
World Topographic Map: Esri, HERE, Garmin, FAO, NOAA, USGS

Drawing Number:				
FIGURE 3-3				
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Project Name:
MORVEN HAWTHORN PIT GRID
CONNECTION PROJECT

Drawing Title:
EUNIS HABITAT CLASSIFICATION AND SEDIMENT TYPE AND FEATURES WITHIN
THE MHPGC PEIR RED LINE BOUNDARY (OWC, 2025) - SHEET 2



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

Data Sources:
BP, Ordnance Survey

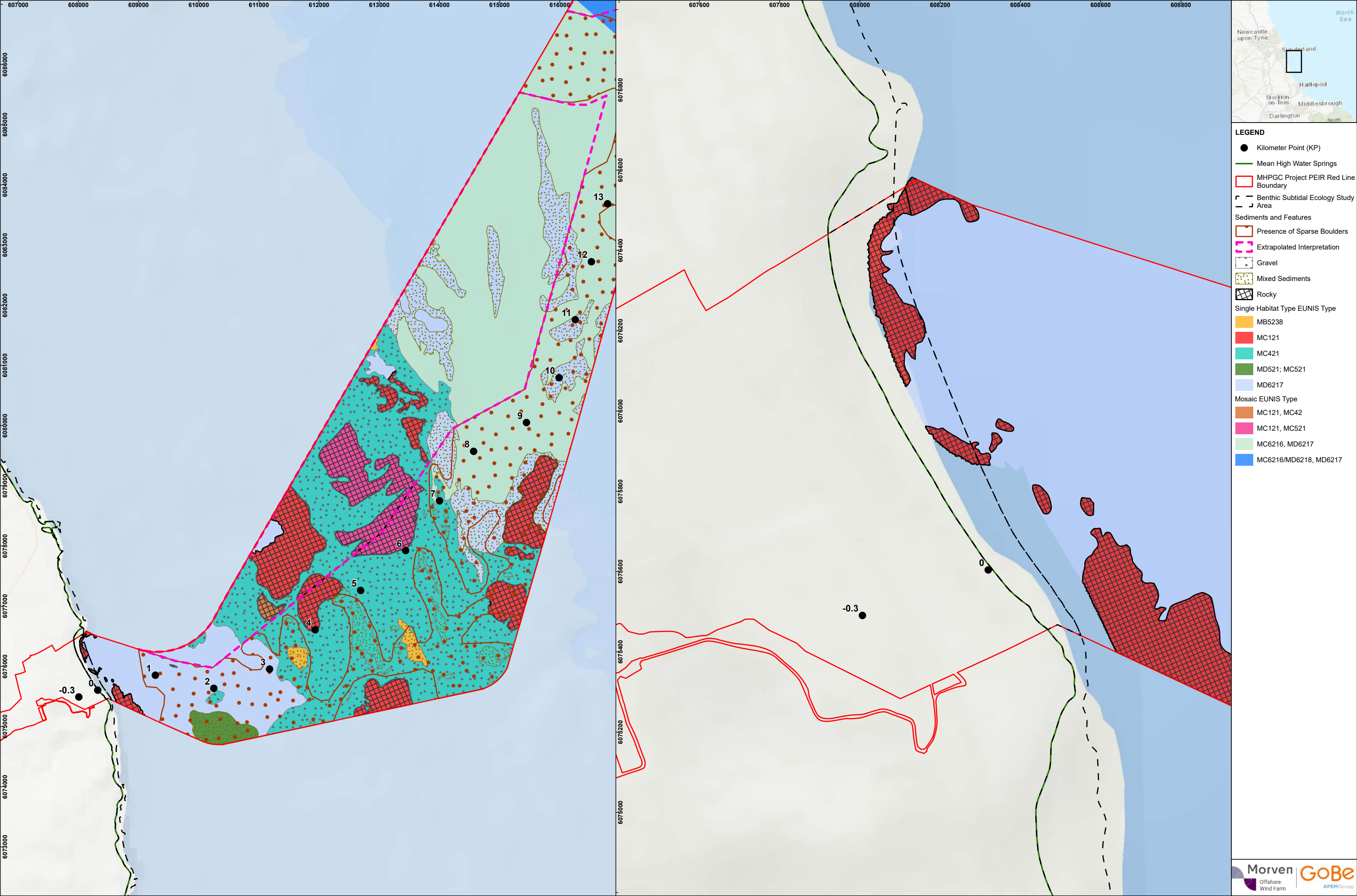
Service Layer Credits:
World Ocean Base: OceanWise, Esri, Garmin, NaturalVue
World Topographic Map: Esri, HERE, Garmin, FAO, NOAA, USGS



- LEGEND**
- Kilometer Point (KP)
 - MHPGC Project PEIR Red Line Boundary
 - ▭ Benthic Subtidal Ecology Study Area
 - Sediments and Features**
 - ▭ Presence of Sparse Boulders
 - ▭ Extrapolated Interpretation
 - ▭ Gravel
 - ▭ Megaripples
 - ▭ Mixed Sediments
 - ▭ Relief
 - ▭ Rocky
 - Single Habitat Type EUNIS Type**
 - MB5238
 - MC421
 - MD6217
 - MD6218
 - Two Habitats EUNIS Type**
 - MC6216, MD6218
 - Mosaic EUNIS Type**
 - MC6216, MD6217
 - MC6216/MD6218, MD6217

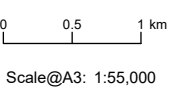


Drawing Number: FIGURE 3-4				
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Project Name:
MORVEN HAWTHORN PIT GRID
CONNECTION PROJECT

Drawing Title:
EUNIS HABITAT CLASSIFICATION AND SEDIMENT TYPE AND FEATURES WITHIN
THE MHPGC PEIR RED LINE BOUNDARY (OWC, 2025) - SHEET 3



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, USGS
World Ocean Base: Esri, Garmin, NaturalVue



Drawing Number:				
FIGURE 3-5				
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Species and habitats of conservation importanceScottish waters

Regional

3.4.5.52 Subtidal species and habitats of conservation importance recorded outside of the Benthic Subtidal Ecology Study Area, within the wider region, included the Scottish PMF 'offshore subtidal sands and gravels', which was identified within the Cambois Connection (0.25km to the west of the MHPGC Project PEIR Red Line Boundary) and Ossian OWF (5.50km to the east of the MHPGC Project PEIR Red Line Boundary) (Natural Power, 2023; Ossian, 2024). NMPi records of 'offshore subtidal sands and gravels' are also present within the Benthic Subtidal Ecology Study Area, although lie outside of the MHPGC Project PEIR Red Line Boundary (Marine Directorate, 2026; **Figure 3.2**).

3.4.5.53 Ocean quahog (*Arctica islandica*), an OSPAR Threatened and/or Declining Species and PMF, was recorded at Ossian OWF and is also a designated feature of the Firth of Forth Banks Complex MPA (Ossian, 2024; Pearce *et al.*, 2014). Live horse mussels and individual sea pens were also recorded at low densities at Ossian OWF, although neither horse mussel reef nor 'sea pen and burrowing megafauna community habitats' were identified (Ossian, 2024). Records of Annex I stony reef, *S. spinulosa* reef and 'sea pen and burrowing megafauna' communities have been reported from parts of the Firth of Forth Banks Complex MPA; however, these features occur outside the Benthic Subtidal Ecology Study Area (Axelsson *et al.*, 2014; Pearce *et al.*, 2014).

MHPGC Project PEIR Red Line Boundary

3.4.5.54 Benthic surveys undertaken for the MHPGC Project determined that the seabed in the southern section of the MHPGC PEIR Red Line Boundary within Scottish waters was dominated by subtidal mud habitat (MD6218) (Gardline, 2024b; 2025b). The MHPGC Project-specific benthic surveys also identified ocean quahog, an OSPAR Threatened and/or Declining Species and PMF, within the MHPGC Project PEIR Red Line Boundary (Gardline, 2024a; 2025a).

3.4.5.55 Surveys undertaken for Morven North and Morven South recorded ocean quahog in the respective survey areas, which extended up to 5-14km around the Morven North and Morven South boundaries. Within the Morven North survey area, 13 juveniles and one adult were identified from grab samples, with two additional adult individuals recorded and returned to the seabed at stations located within the Morven North Boundary. Within the Morven South survey area, 17 juvenile ocean quahog were identified, with records being present within the Morven South Boundary.

3.4.5.56 The scarce tube-dwelling anemone (*Arachnanthus sarsi*), a Scottish PMF and Scottish Biodiversity List species, was recorded at four stations across the area of the MHPGC Project PEIR Red Line Boundary that overlaps with Morven North and Morven South. Sea pens and burrows were also observed within both boundaries. However, densities were insufficient to qualify as either the PMF 'sea pen and burrowing megafauna communities' habitat or the Scottish PMF 'burrowed mud', and neither habitat was therefore identified to be present within the MHPGC Project PEIR Red Line Boundary.

3.4.5.57 Other features of conservation importance identified via the Morven North and Morven South surveys included:

- *S. spinulosa* tube aggregations recorded at a single station outside the Morven North Boundary; however, these were limited in extent and did not meet Annex I reef criteria (Gubbay, 2007);
- Horse mussel, an OSPAR Threatened and/or Declining Species, was recorded as scattered individuals throughout the Morven North and South study areas, including within their respective boundaries. No reef-forming aggregations were present and therefore no PMF or Annex I reef habitat was identified;
- Areas of cobbles and boulders were assessed for Annex I stony reef, but all features were found to be too limited in extent and continuity to qualify as Annex I reef habitat (Irving, 2009);

- Species associated with the PMF 'fragile sponge and anthozoan communities on subtidal rocky habitats', including sponges (Porifera) and sea chervil (*Alcyonidium diaphanum*), were recorded at low abundance and restricted extent and were not considered representative of this habitat.

3.4.5.58 Overall, while species of conservation importance were recorded within the MHPGC Project PEIR Red Line Boundary, no Annex I reef habitats were identified within the Scottish section of the MHPGC Project PEIR Red Line Boundary. Furthermore, no PMFs, including sea pen and burrowing megafauna communities, offshore subtidal sands and gravels, horse mussel beds, were confirmed.

English waters

Regional

3.4.5.59 There is evidence of several habitats and species of conservation importance within the Benthic Subtidal Ecology Study Area and the wider central North Sea. Regional studies undertaken for the Eastern Green Link 2 (which intersects the MHPGC Project PEIR Red Line Boundary; AECOM, 2022a), Eastern Green Link 1 (which also intersects the MHPGC Project PEIR Red Line Boundary; AECOM, 2022b) and Cambois Connection (0.25km west of the MHPGC Project PEIR Red Line Boundary; Natural Power, 2023) recorded habitats and species including *S. spinulosa*, ocean quahog, subtidal sands and gravels, and sea pens. Localised Annex I *S. spinulosa* reef was identified within the Eastern Green Link 2 corridor (AECOM, 2022a), while individual *S. spinulosa* specimens were recorded within the Cambois Connection corridor (Natural Power, 2023). In addition, EMODnet mapping indicates an area of '*S. spinulosa* on stable circalittoral mixed sediment' (MC2211/SS.SBR.PoR.SspiMx) occurs within the Benthic Subtidal Ecology Study Area and the MHPGC Project PEIR Red Line Boundary approximately 2km offshore (**Figure 3.2**).

3.4.5.60 Ocean quahog, an OSPAR-listed threatened and/or declining species, was recorded within both the Eastern Green Link 2 (AECOM, 2022a) and Cambois Connection (Natural Power, 2023) corridors. The species is also a designated feature of Farnes East MCZ (which lies 2.2km west of the MHPGC Project PEIR Red Line Boundary) and North East of Farnes Deep MCZ and HPMA (which lies 4.1km west of the MHPGC Project PEIR Red Line Boundary). It was also recorded during verification surveys of North East of Farnes Deep MCZ and HPMA (Defra, 2015).

3.4.5.61 The OSPAR-listed habitat 'sea pen and burrowing megafauna communities' is designated within Farnes East MCZ. A poor example of the habitat was identified within the Eastern Green Link 2 corridor (AECOM, 2022a), and sea pens were recorded within the Cambois Connection corridor (Natural Power, 2023) and North East of Farnes Deep MCZ (Defra, 2015), the habitat itself is considered widespread throughout the central North Sea (OSPAR, 2022).

3.4.5.62 Subtidal sands and gravels, subtidal mud and subtidal mixed sediment are designated features of both Farnes East MCZ and North East of Farnes Deep MCZ and HPMA. Subtidal sands and gravels were also recorded within both the Eastern Green Link 2 (AECOM, 2022a) and Cambois Connection (Natural Power, 2023) corridors. Stony reef, an Annex I reef habitat, is a further designated feature of Farnes East MCZ.

3.4.5.63 Extensive subtidal kelp beds also occur within the Benthic Subtidal Ecology Study Area, extending from Seaham Beach to South Shields (**Figure 3.2**).

MHPGC Project PEIR Red Line Boundary

3.4.5.64 MHPGC Project-specific surveys identified several habitats and species of conservation importance within the MHPGC Project PEIR Red Line Boundary (Gardline, 2024a,b; 2025a,b). Recorded sand and coarse sediment biotopes are indicative of the Habitats of Principle Importance (HPI) habitat 'subtidal sands and gravels', while mixed sediment biotopes identified near landfall are indicative of the HPI habitat 'subtidal mixed sediments'.

3.4.5.65 Ocean quahog was confirmed within the MHPGC Project PEIR Red Line Boundary through both DDV observations and sediment sampling (Gardline, 2024a,b; 2025a,b). Siphons were observed at four

stations, while juveniles were recorded at 25 stations, demonstrating the species is present and relatively widespread within the survey area.

- 3.4.5.66 MHPGC Project-specific surveys also recorded sea pens (*P. phosphorea* and *Virgularia* sp.), and frequent burrow fields, across multiple locations (Gardline, 2024a,b; 2025a,b). Assessment against established criteria concluded that 'sea pen and burrowing megafauna communities' are present at a number of stations, particularly within the central and southern sections of the MHPGC Project PEIR Red Line Boundary in English waters (see **Volume 2, Annex 3.1: Benthic Ecology Technical Report, of the PEIR** for an assessment of 'sea pen and burrowing megafauna communities'). Burrowing fauna were rarely sighted via DDV (only 37 individuals of *Nephrops norvegicus* were observed across the whole survey area); therefore, burrows could not confidently be attributed to any of the classified 'megafauna' species within the 'sea pen and burrowing megafauna communities' habitat classification.
- 3.4.5.67 Although EMODnet mapping indicates the potential presence of *S. spinulosa* reef approximately 2km seaward of landfall, within the MHPGC Project PEIR Red Line Boundary, (**Figure 3.2**), predictive habitat mapping does not necessarily represent the current distribution or presence of reef-forming *S. spinulosa* habitat at a site-specific scale. Furthermore, *S. spinulosa* reefs can be ephemeral in nature, exhibiting temporal variability in their extent, condition and persistence in response to natural environmental processes. Consistent with this, no *S. spinulosa* individuals or fragments (i.e., no reef structures) were recorded during MHPGC Project-specific surveys (Gardline, 2024a,b; 2025a,b). Similarly, isolated cobbles and boulders were identified in nearshore areas and assessed for stony reef potential; however, no confirmed Annex I stony reef habitat was identified, with only two stations showing a medium resemblance to reef habitat (Gardline, 2024a,b; 2025a,b) (see **Volume 2, Annex 3.1: Benthic Ecology Technical Report, of the PEIR** for an assessment of stony reef).

Invasive Non-Native Species

Scottish waters

Regional

- 3.4.5.68 There were no INNS records present within the Benthic Subtidal Ecology Study Area in Scottish waters, including within the MHPGC Project PEIR Red Line Boundary, based on a review of records available through the National Biodiversity Network (NBN) Atlas (NBN Atlas, 2026). However, the absence of records does not necessarily indicate true absence, as NBN data are subject to sampling bias and recording effort varies spatially. Given the widespread distribution of several marine INNS within UK coastal waters, a precautionary approach has been adopted and INNS are considered capable of occurring within the Benthic Intertidal Ecology Study Area.

MHPGC Project PEIR Red Line Boundary

- 3.4.5.69 No INNS were recorded in the MHPGC Project PEIR Red Line Boundary during the MHPGC Project subtidal benthic surveys in Scottish waters, both in relation to the MHPGC Project-specific surveys (Gardline, 2024a; 2025a) and Morven North and Morven South surveys (Tetra Tech RPS Energy, 2026a).

English waters

Regional

- 3.4.5.70 During a review of NBN Atlas, one INNS record was detected within the Benthic Subtidal Ecology Study Area in English waters, approximately 1km offshore from Seaham. This was a presence record for the orange-tipped sea squirt (*Corella eumyota*) (record year = 2017; data provider = Marine Biological Association; coordinate uncertainty = 70 m), which is on the UK Marine Non-Indigenous Species Priority List, and is listed as invasive by NatureScot (2026). However, it is important to note that the orange-tipped sea squirt is relatively widespread around the coast of England, including the northeast (NBN Atlas, 2026).

MHPGC Project PEIR Red Line Boundary

- 3.4.5.71 No INNS were recorded in the MHPGC Project PEIR Red Line Boundary in English waters during the MHPGC Project subtidal benthic surveys, both in relation to the MHPGC Project-specific surveys (Gardline, 2024a; 2025a).

3.4.6 Overview of intertidal baseline environment

- 3.4.6.1 During the construction of the MHPGC Project, there will be no planned works in the intertidal area. A trenchless solution will be used at landfall, with the exit pit entirely in the subtidal zone (see **Volume 1, Chapter 2: Project Description, of the PEIR**). The intertidal baseline is therefore only relevant to English waters, where landfall will occur.
- 3.4.6.2 As outlined in **Paragraph 3.4.4.14 et seq.**, an intertidal Phase I walkover and UAV survey and a Phase II quantitative sampling survey was completed in August 2026 in relation to the intertidal habitats and communities present to provide baseline information for the landfall at Blast Beach. The results from the intertidal survey will be presented within the ES at DCO submission and will further inform the intertidal baseline characterisation.

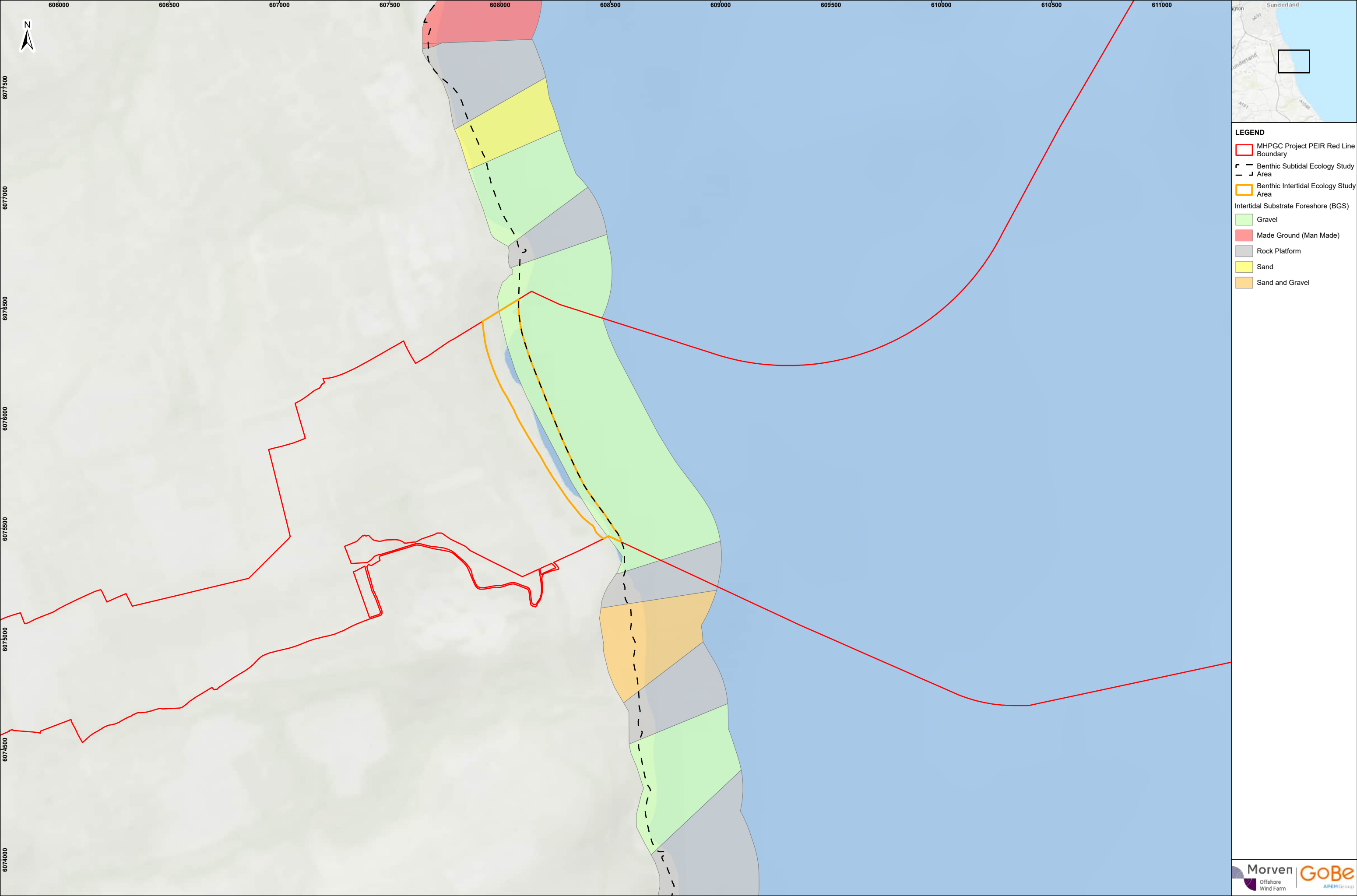
Sediment characteristics

Regional

- 3.4.6.3 The Eastern Green Link 1 landfall in English waters is proposed to be at Hawthorn Pit, Seaham, County Durham, approximately 3.4 km north of the proposed MHPGC Project landfall (AECOM, 2022b). At the English landfall, the foreshore was characterised by sand at the lower shore and coarser sediments, including pebbles and cobbles, at the upper shore. Littoral bedrock outcrops were also present locally. The habitats present were considered typical of a sandy and coarse sediment shore.
- 3.4.6.4 The Durham coastline comprises magnesian limestone cliffs with intertidal and inshore sediments including sands, gravels and silts, often influenced by high exposure, sediment mobility and coastal processes (MCS, 2009; 2016).

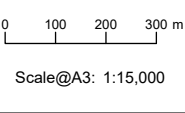
MHPGC Project PEIR Red Line Boundary

- 3.4.6.5 The intertidal area within the MHPGC Project PEIR Red Line Boundary mainly consists of relatively large areas of gravel (BGS, 2015; **Figure 3.6**). Similarly, interpretation of the geophysical data identified areas of rock occurring within the inshore section of the MHPGC Project PEIR Red Line Boundary (**Figure 3.3 to Figure 3.5**).
- 3.4.6.6 Publicly available datasets owned by NECO and Natural England indicate that the landfall location at Blast Beach is characterised by subtidal soft sediment (sand), transitioning to gravel and shingle in the upper shore, and maritime cliffs and slopes rising from the upper shore (NECO, 2023; Royal HaskoningDHV, 2025). The dedicated MHPGC Project-specific intertidal survey has now been undertaken although the survey results are not available to inform PEIR. The results from the intertidal survey will be presented within the ES at DCO submission and will further inform the intertidal baseline characterisation.



Project Name:
MORVEN HAWTHORN PIT GRID
CONNECTION PROJECT

Drawing Title:
INTERTIDAL SEABED SUBSTRATES WITHIN THE BENTHIC INTERTIDAL ECOLOGY
STUDY AREA



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

Data Sources:
BP, Ordnance Survey

Service Layer Credits:
World Ocean Base: Esri, Garmin, NaturalVue
World Topographic Map: DoBH, OS, Esri, HERE, Garmin, USGS, NGA

Drawing Number: FIGURE 3-6				
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Seabed habitat and communities

Regional

- 3.4.6.7 The Eastern Green Link 1 landfall in English waters is proposed to be at Hawthorn Pit, Seaham, County Durham, approximately 3.4 km north of the proposed MHPGC Project landfall (AECOM, 2022b). At the English landfall, habitats comprised sandy and coarse sediment shores with localised bedrock outcrops. These habitats are representative of the coastal environment in the vicinity of the proposed landfall and support benthic communities associated with sandy, coarse sediment and rocky shore habitats (AECOM, 2022b).
- 3.4.6.8 The wider Durham coastline comprises a mosaic of rocky and sedimentary habitats, with rocky shores supporting algal and faunal communities and sedimentary habitats including mudflats and sandflats (MCS, 2009; 2016). Collectively, these habitats provide important foraging resources for qualifying bird species associated with the Northumbria Coast SPA/Ramsar and Teesmouth and Cleveland Coast SPA/Ramsar, located approximately 1.7km north and 6.4km south of the MHPGC landfall area, respectively (Natural England, 2017; Natural England, 2020). Durham Coast SSSI, which overlaps the Northumbria Coast SPA/Ramsar, also supports these bird assemblages (Natural England, 1999).
- 3.4.6.9 The Teesmouth and Cleveland Coast SPA/Ramsar additionally includes saline lagoons and areas of saltmarsh, which occur within the wider coastal system but outside of the Benthic Subtidal and Intertidal Ecology Study Area. Saltmarsh is a feature of the Teesmouth and Cleveland Coast SSSI, which overlaps the SPA/Ramsar but lies further south, whilst saline lagoons are present within the River Tees Estuary, which similarly lies outside of the Benthic Subtidal and Intertidal Ecology Study Area (Natural England, 2018). Although not a dominant feature along the open Durham coastline, a small, isolated saline lagoon (approximately 0.12 ha) is present at the landfall location at Blast Beach (NECO, 2023). However, the lagoon is not designated as an Annex I habitat. This area is otherwise characterised by gravel upper shore habitats and maritime cliffs and slopes rising to approximately 40 m (NECO, 2023; Royal HaskoningDHV, 2018).

MHPGC Project PEIR Red Line Boundary

- 3.4.6.10 Interpretation of the benthic survey data into EUNIS Habitat Classifications (OWC, 2025) identified the rocky areas in the inshore section of the MHPGC Project PEIR Red Line Boundary as 'Faunal turf communities on Atlantic circalittoral rock' (MC121/CR.HCR.FaT). These areas occur within a broader area classified as '*Levinsenia gracilis* and *Heteromastus filiformis* in Atlantic offshore circalittoral mud and sandy mud' (MD6217/SS.SMu.OMu.LevHet) (**Figure 3.3** to **Figure 3.5**). A mix of rocky shore and soft sediment habitats are therefore likely to be present in the intertidal. Project specific data from the intertidal survey completed in August 2026 will be presented within the ES at DCO submission and will further inform the intertidal baseline characterisation.

Invasive Non-Native Species

Regional

- 3.4.6.11 There were no INNS records present within the Benthic Intertidal Ecology Study Area based on a review of records available through the NBN Atlas (NBN Atlas, 2026). However, the absence of records does not necessarily indicate true absence, as NBN data are subject to spatial and temporal sampling bias and many marine INNS are widespread within UK waters. Consequently, for the purposes of this PEIR assessment, it is assumed that INNS have the potential to occur within the Benthic Intertidal Ecology Study Area.

MHPGC Project PEIR Red Line Boundary

- 3.4.6.12 The presence/absence of INNS within the intertidal in English will be confirmed once data from the intertidal Phase I and Phase II surveys undertaken in August 2026 is available (**Paragraph 3.4.4.14**

et seq.). The results from the intertidal survey will be presented within the ES at DCO submission and will further inform the intertidal baseline characterisation. In the absence of site-specific survey data at the PEIR stage, a precautionary approach has been adopted and it is assumed that INNS may be present within the MHPGC Project PEIR Red Line Boundary for the purposes of the PEIR assessment.

3.4.7 Designated sites

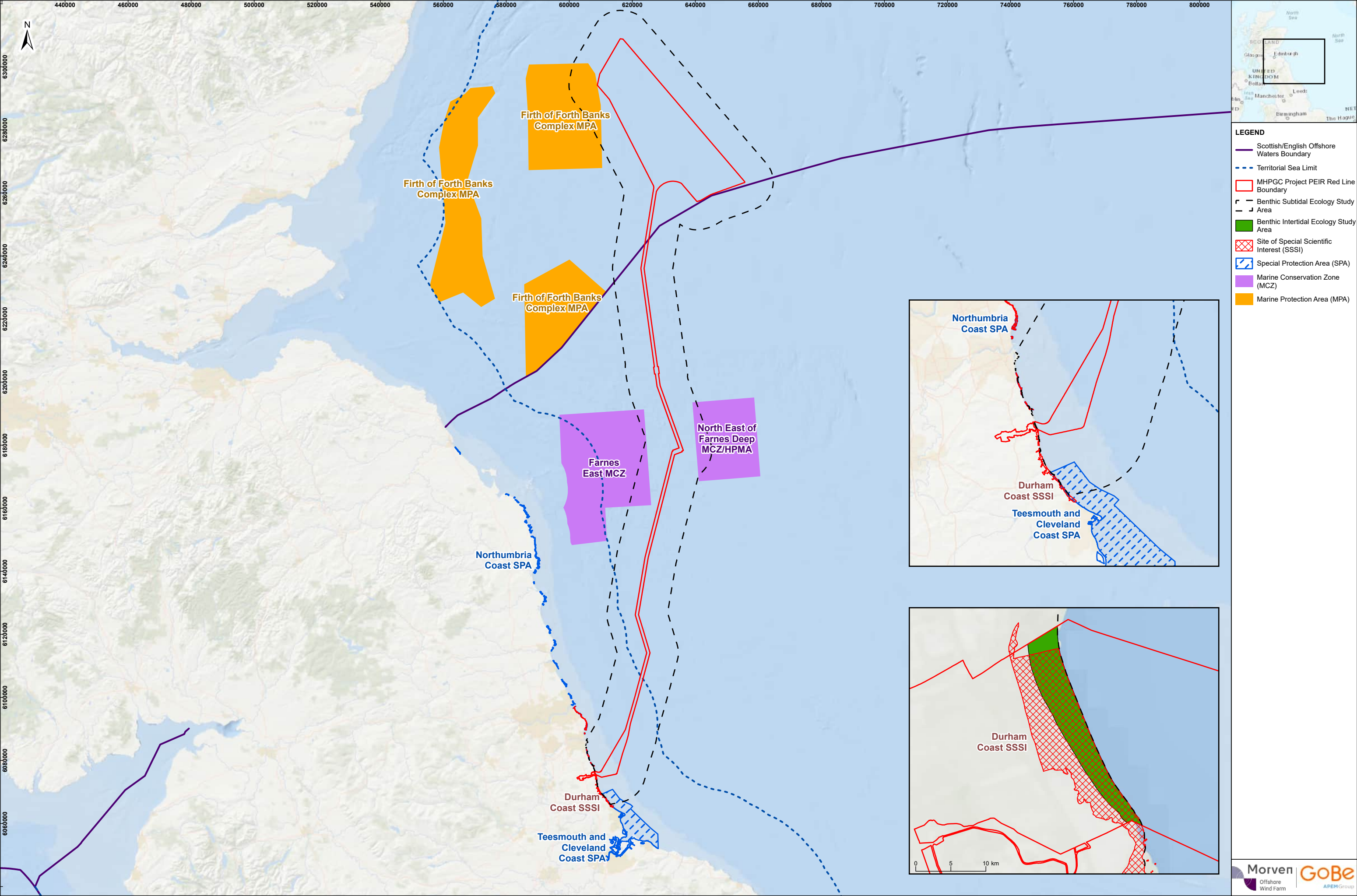
- 3.4.7.1 There are several sites designated for benthic ecology features within the Benthic Subtidal and Intertidal Ecology Study Areas. These sites, and their designating features, are outlined in **Table 3.9** and shown in
- 3.4.7.2 **Figure 3.7.**
- 3.4.7.3 The nature designations which have been included for consideration in the benthic subtidal and intertidal ecology assessment comprise sites within the National Site Network (i.e., SACs and SPAs) or nationally designated sites (i.e., MCZs and SSSIs) with benthic subtidal and intertidal ecology features.
- 3.4.7.4 Designated sites are considered within this chapter where they contain benthic subtidal and intertidal ecology features relevant to the assessment. European sites (SACs and SPAs), MPAs, MCZs and other designated nature conservation sites will also be assessed separately within the relevant project-specific assessments, including **MHPGC Project HRA/Habitats Regulations Appraisal Screening Report, prepared to support the PEIR**; and **MHPGC Project Habitats Regulations Appraisal/HRA RIAA, prepared to support the PEIR**, as appropriate. A detailed MPA/MCZ/HPMA assessment will be provided to support the DCO and Marine Licence applications. Accordingly, this chapter does not replace those assessments but provides supporting information relating to benthic subtidal and intertidal ecology receptors.
- 3.4.7.5 Highly mobile species, particularly birds and fish, may depend on benthic communities through predator–prey relationships, and therefore designated sites for which features may have functional linkages to benthic ecology within the Benthic Subtidal and Intertidal Ecology Study Areas have also been considered. These include Northumbria Coast SPA/Ramsar and Teesmouth and Cleveland Coast SPA/Ramsar. Conservation objectives of these sites that are of relevance to benthic ecology include maintaining or restoring: the extent and distribution of the habitats of the qualifying features; the structure and function of the habitats of the qualifying features; and the supporting processes on which the habitats of the qualifying features rely.
- 3.4.7.6 There were no MHPGC Project specific surveys undertaken within designated sites. However, where survey data and condition assessments of those sites located within the Benthic Subtidal Ecology Study Areas is available (e.g. Pearce *et al.*, 2014; Axelsson *et al.* 2014; Defra, 2015; Allen *et al.*, 2016), these have been used to inform the benthic ecology baseline characterisation in **Section 3.4.5**, for Scottish and English waters.

Table 3.9: Summary of designated sites within the Benthic Subtidal and Intertidal Ecology Study Areas and relevant qualifying features (

Figure 3.7)

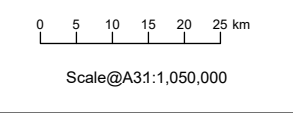
Designated site	Distance from the closest point of the MHPGC Project PEIR Red Line Boundary (km)	Nearest KP	Relevant qualifying benthic features
Designated sites in Scottish waters			
Firth of Forth Banks Complex MPA (UKNCMPA018)	0.04 (the Montrose Bank portion of which is adjacent to MHPGC Project PEIR Red Line Boundary)	258	• Ocean quahog; • Offshore subtidal sands and gravels.
Designated sites in English waters			
Farnes East MCZ (UKMCZ0043)	2.2	91	• Moderate energy circalittoral rock; • Subtidal coarse sediment; • Subtidal sand; • Subtidal mud; • Subtidal mixed sediments; • Sea pen and burrowing megafauna communities; • Ocean quahog.
North East of Farnes Deep MCZ (UKMCZ0023)	4.1	113	• Ocean quahog; • Subtidal mixed sediments; • Subtidal coarse sediment; • Subtidal mud; • Subtidal sand.
North East of Farnes Deep HPMA (UKEHPMA001)	4.1	113	• The marine ecosystem of the area (includes the seabed, water column and sea surface and everything living within).
Northumbria Coast SPA/Ramsar (UK9020325/UK11049)	1.7	0	No benthic features designated. Included due to benthic habitats supporting designated bird species: • Intertidal rocky reefs (bedrock, boulders, cobbles); • Intertidal mudflats and sandflats (including estuarine areas); • Subtidal soft sediments (offshore sand and mud).
Durham Coast SSSI	1.7 (overlaps with Northumbria Coast SPA/Ramsar)	0	No benthic features designated. Included due to benthic habitat supporting designated bird species: • Intertidal rocky reefs (bedrock, boulders, cobbles); • Littoral sediment.

Designated site	Distance from the closest point of the MHPGC Project PEIR Red Line Boundary (km)	Nearest KP	Relevant qualifying benthic features
Teesmouth and Cleveland Coast SPA/Ramsar (UK9006061/UK11068)	6.4	0	No benthic features designated. Included due to benthic habitats supporting designated bird species: • Intertidal rocky habitats (bedrock, boulders, cobbles); • Intertidal mudflats and sandflats (including estuarine areas); • Subtidal soft sediments (sand and mud); • Saline lagoon; • Saltmarsh.



Project Name:
MORVEN HAWTHORN PIT GRID
CONNECTION PROJECT

Drawing Title:
SITES DESIGNATED FOR NATURE CONSERVATION



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

Data Sources:
BP, Ordnance Survey

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

Drawing Number:
FIGURE 3-7

VER	DATE	DETAILS	BY	CHECK
00	04/09/2025	Initial Issue	GB	AdB
-	-	-	-	-

3.4.8 Valued ecological receptors

- 3.4.8.1 The value of ecological features is dependent upon their biodiversity, social, and economic value within a geographic framework of appropriate reference (CIEEM, 2024). Within England and Scotland, the most straightforward context for assessing ecological value is to identify those species and habitats that have a specific biodiversity importance recognised through international agreements, UK-wide frameworks, and relevant national legislation and policy. These include, for example, habitats and species listed by OSPAR, those identified under the UK Post-2010 Biodiversity Framework (which succeeded the UK Biodiversity Action Plan), and habitats and species protected under the Conservation of Habitats and Species Regulations 2017 (as amended following EU Exit), including features forming part of the UK national site network (e.g. SACs and SPAs) (see **Section 3.2.2**).
- 3.4.8.2 At a national level, consideration is also given to habitats and species of principal importance listed under Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006 in England, and the Scottish Biodiversity List established under the Nature Conservation (Scotland) Act 2004, as well as PMFs identified by Scottish Ministers (see **Section 3.2.2**).
- 3.4.8.3 However, only a small proportion of marine habitats and species are afforded protection under the existing legislative or policy framework and therefore evaluation must also assess value according to the functional role of the habitat or species. For example, some features may not have a specific conservation value in themselves but may be functionally linked to a feature of high conservation value.
- 3.4.8.4 **Table 3.10** and **Table 3.11** presents the VERs (in Scottish and English waters respectively), their conservation status and importance within the Benthic Subtidal and Intertidal Ecology Study Area and the justification and regional importance of each receptor.

Table 3.10: Valued Ecological Receptors (VERs) identified within the Project PEIR Red Line Boundary and Benthic Subtidal Ecology Study Area in Scottish waters

VER	Representative biotopes (EUNIS, 2022)	Conservation interest	Distribution within the Benthic Subtidal and Intertidal Ecology Area in Scottish waters	Within the MHPGC Project PEIR Red Line Boundary?	Importance within the Benthic Subtidal and Intertidal Ecology Area and justification
Subtidal biotopes					
Offshore circalittoral fine sand communities dominated by burrowing bivalves and polychaetes	MC5212 MC5211	Associated with the PMF 'Offshore subtidal sands and gravels'.	Present locally, associated with discrete areas of clean to slightly gravelly sand. These biotopes occur within the area of the MHPGC Project PEIR Red Line Boundary that overlaps with Morven North and Morven South, but are not dominant within the Scottish section of the MHPGC Project PEIR Red Line Boundary, where sediments are primarily sandy mud.	✓	Regional – associated with the PMF 'Offshore subtidal sands and gravels' and associated with sandier sediment habitats that are present but not widespread within the Benthic Subtidal and Intertidal Ecology Study Area.
Offshore circalittoral sandy mud communities with burrowing bivalves, polychaetes, and brittlestars	MD6218	Associated with offshore subtidal mud and sandy mud habitats (Scottish Biodiversity List) May be associated with 'offshore deep sea mud' PMF.	Present extensively, reflecting the predominance of sandy mud sediments. This biotope forms the dominant habitat within the Scottish section of the MHPGC Project PEIR Red Line Boundary.	✓	Regional – representative of widespread North Sea sedimentary habitats and characteristic of circalittoral mud and sandy mud environments across the Benthic Subtidal and Intertidal Ecology Study Area.
Offshore circalittoral mixed sediment communities dominated by polychaetes and bivalves	MD4211	May contribute to the PMF 'Offshore subtidal sands and gravels' where associated with coarse and mixed sediment habitats.	Very localised. Recorded at a single location in the northern part of the Benthic Subtidal Ecology Study Area in association with mixed sediment habitats.	X	Local to Regional – representative of offshore mixed sediment communities that occur sporadically within the wider North Sea. The habitat has limited distribution within the Benthic Subtidal Ecology Study

VER	Representative biotopes (EUNIS, 2022)	Conservation interest	Distribution within the Benthic Subtidal and Intertidal Ecology Area in Scottish waters	Within the MHPGC Project PEIR Red Line Boundary?	Importance within the Benthic Subtidal and Intertidal Ecology Area and justification
					Area and is not a dominant component of the Scottish section of the MHPGC Project PEIR Red Line Boundary.
Protected benthic habitats and species					
Stony reef	N/A	Annex I habitat ('Reefs'). Scottish Biodiversity List. UK Biodiversity Action Plan (BAP) priority habitat.	Present locally, associated with areas of coarse sediment including cobbles and boulders. Limited evidence of potential stony reef was recorded within the Scottish section of the MHPGC Project PEIR Red Line Boundary.	X	International – Annex I habitat ('Reefs') and habitat listed on the Scottish Biodiversity List, protected under multiple conservation frameworks.
Offshore subtidal sands and gravels	N/A	PMF. Designated feature of the Firth of Forth Banks Complex MPA.	Present locally, particularly associated with offshore banks and sand/gravel features (e.g. Firth of Forth Banks Complex MPA). Not recorded within the Scottish section of the MHPGC Project PEIR Red Line Boundary, where sediments are predominantly muddy.	X	National – PMF and designated feature of the Firth of Forth Banks Complex MPA, with recognised conservation importance in UK waters despite being regionally widespread.
Ocean quahog (<i>Arctica islandica</i>)	N/A	PMF. OSPAR List of threatened and/or declining species for the Greater North Sea (OSPAR Region II). Designated feature of the Firth of Forth Banks Complex MPA.	Present locally, including within the Firth of Forth Banks Complex MPA. Observed within the Scottish section of the MHPGC Project PEIR Red Line Boundary at a limited number of survey stations.	✓	International – listed on the OSPAR List of Threatened and/or Declining Species and a PMF, and a designated feature of the Firth of Forth Banks Complex MPA, with broad distribution across the North Sea.

VER	Representative biotopes (EUNIS, 2022)	Conservation interest	Distribution within the Benthic Subtidal and Intertidal Ecology Area in Scottish waters	Within the MHPGC Project PEIR Red Line Boundary?	Importance within the Benthic Subtidal and Intertidal Ecology Area and justification
Scarce tube-dwelling anemone (<i>Arachnanthus sarsi</i>)	N/A	PMF. Scottish Biodiversity List.	Present locally. Recorded at a limited number of survey stations within the area of the MHPGC Project PEIR Red Line Boundary that overlaps with Morven North and Morven South.	✓	National – PMF and Scottish Biodiversity listed species. Although recorded at relatively few locations within the Benthic Subtidal and Intertidal Ecology Study Area, the species is of conservation importance in Scottish waters and represents a notable component of the local benthic assemblage.

Table 3.11: Valued Ecological Receptors (VERs) identified within the Project PEIR Red Line Boundary and Benthic Subtidal and Intertidal Ecology Study Area in English waters

VER	Representative biotope (EUNIS, 2022)	Conservation interest	Distribution within the Benthic Subtidal and Intertidal Ecology Study Area in English waters	Within the MHPGC Project PEIR Red Line Boundary?	Importance within the Benthic Subtidal and Intertidal Ecology Study Area and justification
Subtidal biotopes					
Offshore circalittoral mud and sandy mud communities with burrowing infauna	MD6217 MD6218	HPI (Section 41 NERC Act) – ‘Mud habitats in deep water’. UK Biodiversity Action Plan (BAP) priority habitat.	Present extensively, reflecting the widespread occurrence of mud and sandy mud sediments. These biotopes form a large proportion of the MHPGC Project PEIR Red Line Boundary, particularly along offshore sections of the MHPGC Project PEIR Red Line Boundary in English waters.	✓	Regional – representative of widespread North Sea sedimentary habitats and characteristic of circalittoral mud and sandy mud environments.
	MC6212		Present locally within the Benthic Subtidal and Intertidal Ecology Study Area, associated with circalittoral sandy mud sediments.	X	
Offshore infralittoral to circalittoral sand and muddy sand communities	MB5238	HPI (Section 41 NERC Act) – ‘Sublittoral sands and gravels’ (where sand-dominated). UK BAP priority habitat.	Present locally, associated with transitional muddy sand sediments. This biotope occurs intermittently within the MHPGC Project PEIR Red Line Boundary, particularly where sediments become sandier towards inshore areas.	✓	Regional – representative of subtidal sand and muddy sand habitats that are widely distributed across the North Sea.
	MB5236		Present locally within the Benthic Subtidal and Intertidal Ecology Study Area, associated with infralittoral sandy mud sediments.	X	
Offshore circalittoral sediment communities (sand, mixed and coarse sediments)	MC4213 MC5211 MC5212 MD5212 MD4211	HPI (Section 41 NERC Act) – ‘Sublittoral sands and gravels’ (where applicable). UK BAP priority habitat.	Present within the wider Benthic Subtidal Ecology Study Area, representing a mosaic of sand, mixed and coarse sediment habitats. Not recorded within the MHPGC Project PEIR Red Line Boundary.	X	Regional – representative of circalittoral sand, mixed and coarse sediment habitats that are widely distributed across the North Sea
Protected benthic habitats and species					
Sea pen and burrowing	MC6216	OSPAR List of Threatened and/or Declining Species and	Present locally, including within and adjacent to a designated site (Farnes East MCZ).	✓	International – listed on the OSPAR List of

VER	Representative biotope (EUNIS, 2022)	Conservation interest	Distribution within the Benthic Subtidal and Intertidal Ecology Study Area in English waters	Within the MHPGC Project PEIR Red Line Boundary?	Importance within the Benthic Subtidal and Intertidal Ecology Study Area and justification
megafauna communities		Habitats (Region II – Greater North Sea). Designated feature of the Farnes East MCZ (as ‘Sea pen and burrowing megafauna communities’).	Recorded locally within the MHPGC Project PEIR Red Line Boundary, occurring in discrete patches where suitable sediment and faunal densities are present.		Threatened and/or Declining Species and Habitats and a designated feature of the Farnes East MCZ.
<i>Sabellaria spinulosa</i> reef	MC2211	Annex I habitat (‘Reefs’). OSPAR List of Threatened and/or Declining Species and Habitats (Region II – Greater North Sea). HPI (Section 41 NERC Act). UK BAP priority habitat. Features of Conservation Importance (FOCI) under the Marine and Coastal Access Act 2009.	Present locally. No reef habitat was recorded within the MHPGC Project PEIR Red Line Boundary.	X	International – Annex I habitat and OSPAR-listed habitat with recognised conservation importance across the North Sea.
Stony reef	N/A	Annex I habitat (‘Reefs’). HPI (Section 41 NERC Act). UK BAP priority habitat. FOCI under the Marine and Coastal Access Act 2009.	Present within a nearby designated site (Farnes East MCZ), although not a designated feature. Only limited evidence of potential stony reef was recorded within the MHPGC Project PEIR Red Line Boundary, restricted to isolated cobbles and boulders in inshore areas.	✓	International – Annex I habitat and HPI, protected under multiple conservation frameworks.
Ocean quahog	N/A	OSPAR List of Threatened and/or Declining Species and Habitats (Region II – Greater North Sea).	Designated feature of Farnes East MCZ and North East of Farnes Deep MCZ. Present intermittently along the majority of the MHPGC Project PEIR Red Line Boundary, particularly within the northern section.	✓	International – OSPAR listed, and an MCZ feature.
Kelp bed	N/A	HPI (Section 41 NERC Act).	Present along the inshore coastal zone, although it is not present within the MHPGC Project PEIR Red Line Boundary.	X	National – HPI and UK BAP priority habitat, widely distributed along UK coasts.

VER	Representative biotope (EUNIS, 2022)	Conservation interest	Distribution within the Benthic Subtidal and Intertidal Ecology Study Area in English waters	Within the MHPGC Project PEIR Red Line Boundary?	Importance within the Benthic Subtidal and Intertidal Ecology Study Area and justification
		UK BAP priority habitat ('Intertidal and subtidal kelp beds').			
MCZ designated broad habitats					
Moderate energy circalittoral rock	N/A	Designated feature of the Farnes East MCZ.	Present within a nearby designated site. Not recorded within the MHPGC Project PEIR Red Line Boundary.	X	National – designated feature of Farnes East MCZ.
Subtidal coarse sediment	N/A	Designated feature of the North East of Farnes Deep MCZ and Farnes East MCZ.	Present within nearby designated sites and more widely. Recorded at a limited number of locations within the MHPGC Project PEIR Red Line Boundary.	X	National – designated feature of the North East of Farnes Deep MCZ and Farnes East MCZ, and representative of coarse sediment habitats.
Subtidal sand	N/A	Designated feature of the North East of Farnes Deep MCZ and Farnes East MCZ.	Present within nearby designated sites and more widely. Occurs intermittently within the MHPGC Project PEIR Red Line Boundary, particularly along central sections of the MHPGC Project PEIR Red Line Boundary in English waters.	X	National – designated feature of the North East of Farnes Deep MCZ and Farnes East MCZ, and widely distributed across the North Sea.
Subtidal mud	N/A	Designated feature of the North East of Farnes Deep MCZ and Farnes East MCZ.	Present within nearby designated sites and more widely. Forms a dominant habitat within large parts of the MHPGC Project PEIR Red Line Boundary.	X	National – designated feature of the North East of Farnes Deep MCZ and Farnes East MCZ, and characteristic of extensive North Sea sedimentary environments.

VER	Representative biotope (EUNIS, 2022)	Conservation interest	Distribution within the Benthic Subtidal and Intertidal Ecology Study Area in English waters	Within the MHPGC Project PEIR Red Line Boundary?	Importance within the Benthic Subtidal and Intertidal Ecology Study Area and justification
Subtidal mixed sediments	N/A	Designated feature of the North East of Farnes Deep MCZ and Farnes East MCZ.	Present within nearby designated sites and more widely. Recorded locally within the MHPGC Project PEIR Red Line Boundary, particularly towards landfall.	X	National – designated feature of the North East of Farnes Deep MCZ and Farnes East MCZ, and representative of mixed sediment habitats.
Supporting habitat for SPA/Ramsar and SSSI sites within the Benthic Subtidal and Intertidal Ecology Study Area					
Intertidal rocky reefs (bedrock, boulders, cobbles)	N/A	Annex I habitat ('Reefs'). HPI (Section 41 NERC Act). UK BAP priority habitat. FOCI under the Marine and Coastal Access Act 2009. Supporting habitat for the Northumbria Coast SPA/Ramsar, Teesmouth and Cleveland Coast SPA/Ramsar and Durham Coast SSSI.	Present along the coastline. Intertidal surveys within the MHPGC Project PEIR Red Line Boundary are now complete and data will inform the baseline for the ES to be submitted with the DCO and Marine Licence applications.	N/A (at the time of writing, site-specific survey data is not yet available).	International – Annex I habitat and HPI supporting designated SPA/SSSI features.
Intertidal mudflats and sandflats (including estuarine areas)	N/A	Annex I habitat ('Mudflats and sandflats not covered by seawater at low tide'). HPI (Section 41 NERC Act). UK BAP priority habitat. FOCI under the Marine and Coastal Access Act 2009. Supporting habitat for the Northumbria Coast SPA/Ramsar and Teesmouth and Cleveland Coast SPA/Ramsar.	Present locally in sheltered coastal and estuarine environments. Intertidal surveys within the MHPGC Project PEIR Red Line Boundary are now complete and data will inform the baseline for the ES to be submitted with the DCO and Marine Licence applications.	N/A (at the time of writing, site-specific survey data is not yet available).	International – Annex I habitat and HPI supporting SPA features.

VER	Representative biotope (EUNIS, 2022)	Conservation interest	Distribution within the Benthic Subtidal and Intertidal Ecology Study Area in English waters	Within the MHPGC Project PEIR Red Line Boundary?	Importance within the Benthic Subtidal and Intertidal Ecology Study Area and justification
Subtidal soft sediments (offshore sand and mud)	N/A	HPI (Section 41 NERC Act) – ‘Sublittoral sands and gravels’ and sublittoral mud habitats. UK BAP priority habitat. FOCI under the Marine and Coastal Access Act 2009. Supporting habitat for the Northumbria Coast SPA/Ramsar and Teesmouth and Cleveland Coast SPA/Ramsar.	Present extensively. Forms the predominant habitat throughout much of the MHPGC Project PEIR Red Line Boundary.	N/A (at the time of writing, site-specific survey data is not yet available).	National – HPI representing widespread sublittoral sand and mud habitats.
Saline lagoon	N/A	Annex I habitat (‘Coastal lagoons’). HPI (Section 41 NERC Act). UK BAP priority habitat. Supporting habitat for the Teesmouth and Cleveland Coast SPA/Ramsar.	Present locally within the wider study area, associated with coastal and estuarine environments (e.g. Teesmouth). Not recorded within the MHPGC Project PEIR Red Line Boundary.	X	International – Annex I habitat of high conservation value supporting distinct benthic communities and associated with designated SPA/Ramsar features.

3.4.9 Future baseline conditions

- 3.4.9.1 During the anticipated 35-year operational lifetime of the MHPGC Project, the benthic ecology baseline can be expected to evolve both on a natural basis and in response to global trends such as climate change and other anthropogenic activities.
- 3.4.9.2 The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017, the Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017 and the Marine Works (Environmental Impact Assessment) 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.
- 3.4.9.3 Impacts of climate change on benthic habitats and species can be either direct (such as an increase in sea temperature and sea level or a decrease in pH due to ocean acidification) or indirect (such as increased frequency of storm events, hydrodynamic conditions and wave climate e.g. see Wolf *et al.*, 2020), changes in local hydrodynamics and wave climates). These processes may result in short-term fluctuations in species abundance, distribution and community composition, as well as sustained long-term changes in habitat extent, species ranges and ecosystem functioning.
- 3.4.9.4 Direct impacts are considered to be dominant climatic factors in driving shifts in benthic ecology distribution and abundance. However, the degree to which a species or habitat can be affected by climatic shifts is typically dependent on sensitivity and vulnerability, which varies between species, and the magnitude over which climate change effects are considered to occur (Harrison *et al.*, 2001). Benthic species which have a planktonic phase in their life cycle are considered to be the most sensitive to seawater temperature rise (Hiscock *et al.*, 2001; Poloczanska *et al.*, 2016).
- 3.4.9.5 Climate-driven changes in species distributions have already been recorded in UK waters and are expected to continue over the coming decades. Species, such as maerl (*Lithothamnion coralloides*) and some *Sabellaria* species are expected to benefit from warmer sea temperatures leading to an extended range. Others, such as the horse mussel (*Modiolus modiolus*), a boreal species reaching its southern limit in British waters (Holt *et al.*, 1998), are expected to retreat such that species' distributions move further north (Harrison *et al.*, 2001).
- 3.4.9.6 In addition to climate change, the benthic environment around the UK coastline is also being disturbed and affected by other anthropogenic pressures, including dredging and pollution (Harrison *et al.*, 2001). The influence of such anthropogenic impacts could intensify shifting baselines caused by climate change by affecting predator and prey abundance or availability of suitable habitat.
- 3.4.9.7 As benthic habitats and species often experience natural variability due to their dynamic nature (particularly sediment substrates), there is considerable uncertainty regarding potential impacts of climate change on the benthic environment in UK waters. Small detectable changes may be observed during the 35-year operational lifetime of the MHPGC Project. However, these are not expected to be influenced by the construction, operation or decommissioning phases of the MHPGC Project, meaning there is no change to the conclusions of the assessments presented in **Section 3.8**.

3.5 Impact assessment methodology

3.5.1 Overview

- 3.5.1.1 The overarching approach for the impact assessment in the PEIR is set out in **Volume 1, Chapter 4: Approach to Environmental Impact Assessment, of the PEIR**. However, consideration has also been given to CIEEM guidelines for ecological assessment in the UK (CIEEM, 2024), which allows for professional judgement in determining the significance of an effect. This section describes the

technical methods used to determine the sensitivity of the receptors, the magnitude of impacts and sets out the significance criteria that have been used for the benthic ecology assessment.

- 3.5.1.2 The criteria for determining the significance of effects is a two-stage process that involves defining the magnitude of the impacts and the sensitivity of the receptors. This section describes the criteria applied in this chapter to assign the magnitude of potential impacts and values to the sensitivity of receptors.

3.5.2 Magnitude of impact

- 3.5.2.1 The magnitude of an impact is influenced by several key factors, including a combination of the scale of the change, the spatial extent the impact is likely to occur and the duration, frequency and reversibility of the impact.
- 3.5.2.2 Habitats vary and can range from being highly dynamic low diversity systems to stable communities supporting a wide range of infauna and epifauna. Many benthic species are slow-moving or sessile organisms, and thus avoidance of the impact may not be possible, so the effect from a single activity will vary. When defining the magnitude of the impact, criteria detailed in **Volume 1, Chapter 4: Approach to Environmental Impact Assessment, of the PEIR** have been followed (see **Table 3.12**).

Table 3.12: Definition of terms relating to the magnitude of an impact.

Magnitude	Definition
High	Impact would lead to large scale effects on the distribution of habitats and species, with sufficient severity to affect the long-term viability of the population over a generational scale.
Medium	Impact would lead to temporary changes in distribution of habitat and/or species with the potential for reduced population sizes, but not at a scale which would affect the population trajectory over generations. Impact would lead to permanent effects on individuals that may influence individual survival but not at a level that would alter population trajectory over a generational scale.
Low	Impact would result in some measurable change in attributes, quality or vulnerability (e.g. minor population disturbance), minor loss of habitat, or detrimental alteration to species at an individual level but is unlikely to be measurable at a population level.
Negligible	Impact would result in a very minor, temporary loss or detrimental alteration to habitat or individuals which would not affect the population.

3.5.3 Receptor sensitivity

- 3.5.3.1 Sensitivity was determined in accordance with the criteria set out in **Volume 1, Chapter 4: Approach to Environmental Impact Assessment, of the PEIR**. Sensitivity was defined through consideration of the receptor's vulnerability to the relevant impact, including its resistance, resilience and capacity for recovery, together with its importance at an international, national or local scale.
- 3.5.3.2 To support the assessment of benthic ecology receptors, published sensitivity assessments were used where available. For Scottish benthic features, FeAST (NatureScot, 2026) was used where available. Where FeAST assessment were unavailable, and for receptors in English waters, sensitivity information was obtained from the MarESA (MarLIN, 2026). Both tools evaluate sensitivity based on a receptor's tolerance to pressure and its ability to recover following disturbance.
- 3.5.3.3 Sensitivity levels assigned to receptors were informed by these evidence sources, together with professional judgement and the broad sensitivity definitions provided in **Table 3.13**.

Table 3.13: Definition of terms relating to the sensitivity of the receptor.

Sensitivity	Definition
Very high	Effect is very likely to cause a large-scale permanent change in habitat or species population structure and/or survival, with no ability to adapt behaviours. No ability for the habitat or animal to recover from the effect – permanent damage with no resilience. Where adverse effects to multiple key ecological functions for benthic species (e.g. feeding, burrowing etc) could occur with no potential for recovery. May include habitats or species which are a protected feature of an HPMA or SAC in the Benthic Subtidal and Intertidal Ecology Study Area (i.e. very high value)
High	Limited ability to adapt behaviour and/or limited ability for the habitat or animal to recover; effect may cause a change in both habitat/species population structure and survival of individuals. Habitat may not recover or may take several years to return to baseline conditions. Where adverse effects on multiple key ecological functions (e.g. feeding, burrowing etc) could occur with limited potential for recovery. May include habitats or species which are a protected feature of an MPA/MCZ in the Benthic Subtidal and Intertidal Ecology Study Area or represent supporting habitat for a SPA (i.e. high value)
Medium	Ability to adapt behaviour or exhibit some resilience; habitat/species population may be affected but survival rates not likely to be affected. Habitat likely to recover but over a longer period. Where adverse effects on one or more key ecological functions (e.g. feeding, burrowing) could be sustained beyond the duration of the impact, but not at a level that would affect individual survival. May include habitats or species which are of conservation importance (e.g. Annex I or Annex II, PMF, S41 etc.) but are not a qualifying feature of a designated site (i.e. medium value).
Low	Ability to adapt behaviour and/or tolerate the effect without any impact on habitat/species population and survival rates. Habitat likely to recover rapidly with minimal long-lasting change i.e. highly dynamic environment which is regularly subject to changing environmental conditions. Low sensitivity is such that adverse effects on ecological functions (e.g. feeding, burrowing etc) are likely to be very short-term and would not affect individual survival. Habitats or species that are limited in extent/distribution and are not subject to any protected status (i.e. low value).
Negligible	Very little or no effect on existing benthic habitats and species. Habitats or species that are very common and widespread and not subject to any marine conservation status.

3.5.4 Significance of effect

- 3.5.4.1 The matrix used for the assessment of significance is shown in **Table 3.14**. The combination of the magnitude of the impact with the sensitivity of the receptor determines the assessment of significance of effect. For the purposes of this assessment, any effect that is of major or moderate significance is considered to be significant in EIA terms, whether this be adverse or beneficial. Any effect that has a significance of minor or negligible is not considered to be significant in EIA terms. Where the matrix indicates two levels of significance (e.g. minor or moderate significance), professional judgment is used to determine the appropriate level of significance.

Table 3.14: Matrix used for the assessment of the significance of the effect

Sensitivity of receptor	Magnitude of impact			
	Negligible	Low	Medium	High
Negligible	Negligible (Not significant)	Negligible or minor (Not significant)	Negligible or minor (Not significant)	Minor (Not significant)
Low	Negligible or minor (Not significant)	Negligible or minor (Not significant)	Minor (Not significant)	Minor or moderate (Not significant or significant)
Medium	Negligible or minor (Not significant)	Minor (Not significant)	Moderate (Significant)	Moderate or major (Significant)
High	Minor (Not significant)	Minor or moderate (Not significant or significant)	Moderate or major (Significant)	Major (Significant)
Very high	Minor (Not significant)	Moderate or major (Significant)	Major (Significant)	Major (Significant)

3.5.5 Assessment limitations and assumptions

- 3.5.5.1 Data limitations and assumptions relating to the characterisation of the baseline environment are described in **Section 3.4.4**. The assessment has been undertaken with regards to those limitations and assumptions.
- 3.5.5.2 Although the offshore cable placement will be constrained by engineering, environmental and technical considerations, the assessment has adopted a precautionary worst-case approach and considered all habitats and species occurring within the MHPGC Project PEIR Red Line Boundary, including receptors of conservation importance in both Scottish and English waters.
- 3.5.5.3 Habitat and species sensitivities used within the assessment are based on published evidence, including MarESA and FeAST and other relevant guidance and literature. These sensitivity assessments are not site-specific and sensitivity may vary according to local environmental conditions, habitat characteristics and ecological context. Consequently, sensitivities assigned within published assessments may not fully reflect site-specific conditions within the MHPGC Project PEIR Red Line Boundary.
- 3.5.5.4 MarESA and FeAST sensitivity assessments include confidence assessments relating to the quality of the evidence used, the applicability of that evidence to the assessment and the degree of concordance between available evidence sources. A low confidence assessment may result from reliance on expert judgement, the use of proxy evidence, or where available evidence does not demonstrate a consistent response. Where available, confidence information associated with published sensitivity assessments has been considered when applying sensitivities within this assessment.
- 3.5.5.5 To account for this uncertainty and to ensure a precautionary assessment, where a range of sensitivities may apply to a habitat or species, the worst-case sensitivity has been adopted when determining the significance of effects.
- 3.5.5.6 Notwithstanding the limitations associated with published sensitivity evidence and the inherent uncertainties in ecological assessments, the available baseline data, habitat characterisation and evidence base are considered sufficiently robust to support the assessment findings and conclusions presented within this chapter.

3.6 Key parameters for assessment

3.6.1 Scope of the assessment

3.6.1.1 The approach to assessment was presented in the MHPGC Project Scoping Report and has been refined in consultation with relevant statutory and non-statutory consultees as detailed in **Section 3.3** and through the MHPGC Project Scoping Opinions received from the PINS and MD-Lot.

3.6.1.2 **Table 3.15** summarises the impacts considered as part of the assessment, while a summary of the effects scoped out of the assessment is presented in **Table 3.16**.

Table 3.15: Impacts scoped into the assessment

Impact	Phase			Potential effects scoped into the assessment
	C	O&M	D	
Long term habitat loss	X	✓	X	Long term habitat loss effects occur during the O&M phase once infrastructure has been placed on the seabed during construction and will remain in place for the lifetime of the MHPGC Project. Construction activities are only considered to result in temporary habitat loss effects through sandwave levelling and cable trenching for example. Therefore, long term habitat loss is considered during the O&M phase only. Decommissioning may involve removal of infrastructure and the loss of any communities established on hard substrates during operation, however this is considered under its own impact.
Temporary habitat loss/disturbance	✓	✓	✓	Temporary habitat loss and/or disturbance could occur during all phases where activities are occurring on the seabed, including cable installation, maintenance and repairs and removal of infrastructure during decommissioning.
Increased SSCs and associated deposition	✓	X	✓	Increased SSCs and associated deposition are scoped into the construction and decommissioning assessments, where activities involve substantial seabed disturbance. Routine O&M activities are not expected to disturb the seabed to a degree that would cause significant increases in SSCs or sediment deposition. Any maintenance-related disturbance would be infrequent, localised and temporary, and is therefore not considered likely to result in significant effects. Consequently, this impact is scoped out of the O&M assessment.
Disturbance/remobilisation of sediment bound contaminants	✓	X	✓	Disturbance and/or remobilisation of sediment bound contaminants are scoped into the construction and decommissioning assessments, where activities involve substantial seabed disturbance. Routine O&M activities are not expected to disturb contaminated sediments to an extent that would result in significant contaminant remobilisation. Any maintenance-related disturbance would be infrequent, localised and temporary, and is therefore not considered likely to result in significant effects. Consequently, this impact is scoped out of the O&M assessment.
Changes in physical processes	X	✓	X	Changes in physical processes are scoped into the O&M assessment only, as they are associated with the long-term presence of infrastructure on the seabed. Construction and decommissioning activities would result only in temporary and localised disturbance and are not expected to cause significant or persistent changes to physical processes. Therefore, this impact is scoped out of the construction and decommissioning assessments.

Impact	Phase			Potential effects scoped into the assessment
	C	O&M	D	
Increased risk of introduction and spread of INNS	✓	✓	✓	Increased risk of introduction and spread of INNS could occur throughout the MHPGC Project phases where vessels are used (i.e. transfer through ballast water and on hulls) and where hard structures are placed in otherwise soft sediment.
Colonisation of hard structures	✗	✓	✗	Hard structures will be colonised in the O&M phase following placement on the seabed. During decommissioning, the current MDS is to remove hard structures which would prevent further colonisation. If they are left in situ during decommissioning, any change would be considered negligible compared to the O&M phase.
Removal of hard substrates	✗	✗	✓	Removal of hard substrates is scoped in for the decommissioning phase only. During construction, there will be no hard structures to remove. During O&M, project infrastructure will remain in place and, therefore, no removal of hard substrates is anticipated. While repairs may be required during the operational lifetime, these are not expected to involve the large-scale removal of established hard substrate. During decommissioning, the removal of artificial structures may result in the loss of benthic species and communities that have colonised these structures during O&M.
Impacts to benthic invertebrates due to EMF	✗	✓	✗	Effects from EMF will only occur in the marine environment when the MHPGC Project is operational. Therefore, this is not considered for construction or decommissioning phases.
Impacts to benthic invertebrates due to thermal emissions from subsea electrical cables	✗	✓	✗	Thermal emissions from the subsea electrical cables will only occur when the MHPGC Project is operational. Therefore, this is not considered for construction or decommissioning phases.

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

Table 3.16: Impacts scoped out of the assessment

Impact	Justification for scoping out of the assessment
Accidental release of pollutants during construction, O&M and decommissioning phases	There is a risk of pollution being accidentally released during the construction, O&M and decommissioning phases of the MHPGC Project from sources including vessels/vehicles and equipment/machinery. However, the risk of such events is managed by the implementation of measures set out in the Outline Offshore Environmental Management Plan (OEMP) (CoT06/MM-006) which will be submitted as part of the DCO and Marine Licence Applications. The Outline OEMP will include an Outline MPCP (CoT37). These plans include measures for pollution prevention, emergency response and spill management, and address potential contaminant releases, including the provision of emergency contact details, where required. A detailed OEMP, including a detailed MPCP, will be developed post-consent substantially in accordance with the Outline OEMP. These plans will also set out industry good practice and OSPAR, International Maritime Organisation and International Convention for the Prevention of Pollution from Ships (MARPOL) guidelines for preventing pollution at sea. Therefore, the likelihood of an accidental spill occurring is very low following the implementation of these plans and in the unlikely event that such an event did occur, the magnitude of any resulting effect will be reduced through measures outlined in the MPCP. No concerns regarding the proposed management approach and subsequent scoping out of this impact have been raised during consultation. As such, this impact is scoped out of further assessment. Scoping out of this impact has been agreed with PINS, as per their scoping response (ID 3.4.7, Table 3.6). Impacts proposed to be scoped into the assessment were subsequently presented and discussed with stakeholders at EWG1. The Applicant has committed to undertaking a trenchless installation method between the offshore and onshore environment. Landfall feasibility assessments have been undertaken for the proposed landfall options and concluded that both HDD and Direct Pipe installation methods are technically feasible at the preferred landfall location (ARUP, 2025). Geological and

Impact	Justification for scoping out of the assessment
	geotechnical desk studies have also been completed for the nearshore landfall area (Fugro, 2024). No major feasibility constraints to the use of trenchless installation methods have been identified at the proposed landfall location. During HDD, there is the risk for frac-out of drilling fluid (inert) during the construction phase which could result in a decline in water quality in the intertidal and shallow water areas of the MHPGC Project PEIR Red Line Boundary. However, as detailed in Volume 2, Chapter 1: Physical Processes, of the PEIR, net transport at the landfall is southwards and any frac-out drilling muds, which are non-toxic, that cannot be captured, will be dispersed in subtidal waters. A review of the benthic habitat baseline (see Section 3.4.5) also indicates there are no protected habitats or species present which could be affected by frac-out prior to dispersal. Although the Durham Coast SSSI overlaps part of the intertidal landfall area and includes benthic habitats that support its bird interest features, any potential frac-out would be temporary, localised and involve non-toxic drilling mud. Consequently, significant effects on benthic receptors are not anticipated. The risk of frac-out will be managed through the implementation of measures set out in Table 3.18, including the development of an Outline MPCP (CoT37) and a Bentonite Breakout Plan (CoT47). As such, this impact is scoped out of further assessment.

3.6.2 Maximum design scenario

- 3.6.2.1 The MDS for each impact, identified in **Section 3.6.1**, has been selected as those having the potential to result in the greatest effect on an identified receptor or receptor group. The MDS presented in the table below have 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 3-17: MDS relevant for the assessment of potential impacts on benthic ecology

Impact	Maximum Design Scenario	Explanation
Note: The cable length measurements are for the maximum distance between the 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 98km; - 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		
Temporary habitat loss / disturbance	Construction duration: up to four years. UXO Clearance - An estimated 96 UXO within MHPGC Project PEIR Red Line Boundary - Up to 22 UXO require low order clearance - Scottish waters: 8 (for funnel area out with overlap with Morven North and Morven South) - English waters: 14 Up to 1 UXO will be cleared every 24 hours Pre-Lay Grapnel Run (PLGR): <u>Per trench = 3,246,700m²</u> - Scottish waters: 98km length × 10m width = 980,000m² - English waters: 226.67km length × 10m width = 2,266,700m² <u>Total (up to two trenches) = 6,493,400m²</u> - Scottish waters: 1,960,000m² - English waters: 4,533,000m² Boulder clearance: <u>Per trench = 1,380,000m²</u> - Scottish waters: 31km length × 20m width = 620,000m² - English waters: 38km length × 20m width = 760,000m² <u>Total (up to two trenches) = 2,760,000m²</u>	The MDS assumes the maximum footprint of construction phase activities that have the potential to cause temporary habitat loss or disturbance. UXO clearance - Avoidance by micro-routing or relocation will be prioritised over clearance. Where clearance is required, low order detonation will be preferred, dependent on the condition of the UXO. High order clearance detonation is included in the EIA on a precautionary basis only and is not proposed as part of the application for consent. Should low order clearance not be feasible, alternative clearance methods would be considered in consultation with regulators. Boulder clearance and PLGR: - Route preparation activities include boulder and debris clearance and PLGR. - The width of temporary habitat loss or disturbance from route preparation activities, such as PLGR, ploughing/pre-lay trenching and rock carpet, is assumed to be encompassed within the seabed disturbance associated with cable installation. - Boulder and debris clearance is estimated to be required within the offshore export cable corridor and is therefore considered to be the MDS. Site preparation:

Impact	Maximum Design Scenario	Explanation
	- Scottish waters: 1,240,000m² - English waters: 1,520,000m² Sandwave clearance: - Sandwave clearance activities undertaken using Mass Flow Excavator (MFE) over an approximate four month duration - Sediment disturbance rate is 1000kg/s - Surface width of up to 28m per trench and base width of up to 20m per trench <u>Per trench = 1,484,000 m²</u> - Scottish waters: 31km length × 28m width = 868,000m² - English waters: 22km length × 28m width = 616,000m² <u>Total (up to two trenches) = 2,968,000m²</u> - Scottish waters: 1,736,000m² - English waters: 1,232,000m² Cable installation (trenching): - Installation via trenching of up to 324.67km of cable, with a trench width of up to 2.1m and a depth of up to 3m - Trenching rate is 400 m/hr <u>Per trench = 2,045,421m³</u> - Scottish waters: 98km length × 2.1m width × 3m depth = 617,400m³ - English waters: 226.67km length × 2.1m width × 3m depth = 1,428,021m³ <u>Total (up to two trenches) = 4,090,842m³</u> - Scottish waters: 1,234,800m³ - English waters: 2,856,042m³ Trenchless techniques (landfall) (English waters): - Up to four boreholes. Trenchless installation via Horizontal Directional Drilling (HDD), (conduit diameter of 1.6 m, conduit length of 2,000m). Drilling fluid discharge up to 180m³ each and up to 1,083m³ total. - Trenchless drill punchout will be up to approximately 1,660m offshore of MHWS in water depths up to 20m LAT.	- Sandwave clearance activities may be undertaken using a range of techniques (plough and MFE), over an approximate four-month duration in both Scottish and English waters. Releases via both are modelled; - A conservative MFE near-bed sediment release rate of 1000 kg/s conservatively estimated based on the MDS trench cross section dimensions, the speed of progress of the tool and the bulk density of the local sediment type; - Dredge spoil release is simulated as an instantaneous release at the water surface. 10% of 11,000m³ is assumed to form the passive phase of the plume; - Other seabed preparation such as sandwave clearance plough, boulder clearance and PLGR may be used but do not represent the MDS in terms of potential increases in SSC and associated deposition. Cable installation: - Trenching may be carried out by mechanical cutting, jet trenching, ploughing or Controlled Flow Excavation (CFE). Jet trenching is anticipated to generate the highest SSC and has therefore been assumed as the MDS; - Suspension of 100% of material from the trench cross section will give the MDS for sediment disturbance; - Conservatively assumes 100% fluidisation of material expelled from a U-shaped trench. In reality trenching will move a proportion of material rather than bringing it fully into suspension; - Offshore export cable corridor trenching modelling assumes sediment release along the whole offshore export cable corridor; - Cable routes cross a variety of seabed materials, and burial depth may be up to 3m in some areas. The assessment therefore considers this upper bound to define the MDS in terms of sediment disturbance; - Trenching rate will be up to 400m/hr. Trenchless techniques (landfall): - Trenchless installation methods include HDD and Direct Pipe;

Impact	Maximum Design Scenario	Explanation
	- Up to four exit pits (140m long × 50m wide × 5m deep). Area up to 7,000m² each; 28,000m² total. Volume up to 18,667m³ each; 74,668m³ total. - Up to two floatation pits (240m long × 55m wide × 5m deep). Area up to 13,200m² each; 26,400m² total. Volume up to 39,167m³ each; 78,334m³ total. Vessel seabed interactions (English waters): <u>Total = 5,098,259m²</u> - Up to 127,456m² anchor seabed disturbance per vessel movement × 40 full anchor spread movements = 5,098,240m² - Up to six jack-up events (2m diameter spud legs × 4), 3.14m² per events, total disturbance = 18.85m²	- HDD represents the maximum MDS for sediment disturbance due to the potential for drilling fluid release (frac-out); - The MDS for sediment disturbance by trenchless installation is given by applying a conservative Bentonite concentration of 100kg/m³ in drilling mud, the volume of spoil released is equal to the maximum volume of the bore; - Other stages of drilling (pilot hole drilling and stages of reaming) may result in smaller release events separated in time. But the MDS is considered as a release of drilling mud from a single conduit; - Two drills could be operational at one time; however, the timing of drilling will be staggered meaning there will not be an occasion where punch-out occurs simultaneously (or within 6 hours of each other). - Trenchless drill punchout will be up to approximately 1,660m offshore of MHWS in water depths up to - 20m LAT. Vessel seabed interactions: - Vessel activities associated with cable installation in English waters (e.g. anchoring and jack-up operations) may result in temporary, localised seabed disturbance at discrete locations. These impacts are short-term and restricted to the immediate footprint of vessel interactions with the seabed.
Increased SSCs and associated sediment deposition	Construction duration: up to four years. Sandwave clearance: - Sandwave clearance activities undertaken using MFE over an approximate four month duration - Sediment disturbance rate is 1000kg/s - Surface width of up to 28m per trench and base width of up to 20m per trench <u>Per trench = 1,484,000m²</u> - Scottish waters: 31km length × 28m width = 868,000m² - English waters: 22km length × 28m width = 616,000m²	The MDS is defined by the maximum spatial extent of seabed disturbance from cable installation, route preparation, sandwave clearance and landfall works, as these activities are expected to result in the greatest volume and extent of sediment disturbance and therefore the maximum increase in SSCs and associated deposition. Landfall works and vessel interactions are defined by the maximum footprint of exit pits, floatation pits, anchor spreads and jack-up activities. The MDS is inherently precautionary, assuming all maximum parameters occur concurrently with no reduction for overlapping disturbance footprints.

Impact	Maximum Design Scenario	Explanation
	<u>Total (up to two trenches) = 2,968,000m²</u> - Scottish waters: 1,736,000m² - English waters: 1,232,000m² Cable installation (trenching): - Installation via trenching of up to 324.67km of cable, with a trench width of up to 2.1m and a depth of up to 3m - Trenching rate is 400m/hr. <u>Per trench = 2,045,421m³</u> - Scottish waters: 98km length × 2.1m width × 3m depth = 617,400m³ - English waters: 226.67km length × 2.1m width × 3m depth = 1,428,021m³ <u>Total (up to two trenches) = 4,090,842m³</u> - Scottish waters: 1,234,800m³ - English waters: 2,856,042m³ Trenchless techniques (landfall) (English waters): - Up to four boreholes. Trenchless installation via HDD, (conduit diameter of 1.6m, conduit length of 2,000m). Drilling fluid discharge up to 180m³ each and up to 1,083m³ total. - Trenchless drill punchout will be up to approximately 1,660m offshore of MHWS in water depths up to 20m LAT. - Up to four exit pits (140m long × 50m wide × 5m deep). Area up to 7,000m² each; 28,000m² total. Volume up to 18,667m³ each; 74,668m³ total. - Up to two floatation pits (240m long × 55m wide × 5m deep). Area up to 13,200m² each; 26,400m² total. Volume up to 39,167m³ each; 78,334m³ total. - Trenchless drill exit pit protection: backfill, rock placement and mattress protection will be implemented. Maximum height above seabed of 0.35m with intention to restore to original seabed level.	Site preparation: - Sandwave clearance activities may be undertaken using a range of techniques (plough and MFE), over an approximate four-month duration in both Scottish and English waters. Releases via both are modelled; - A conservative MFE near-bed sediment release rate of 1000kg/s conservatively estimated based on the MDS trench cross section dimensions, the speed of progress of the tool and the bulk density of the local sediment type; - Dredge spoil release is simulated as an instantaneous release at the water surface. 10% of 11,000m³ is assumed to form the passive phase of the plume; - Other seabed preparation such as sandwave clearance plough, boulder clearance and PLGR may be used but do not represent the MDS in terms of potential increases in SSC and associated deposition. Cable installation: - Trenching may be carried out by mechanical cutting, jet trenching, ploughing or CFE. Jet trenching is anticipated to generate the highest SSC and has therefore been assumed as the MDS; - Suspension of 100% of material from the trench cross section will give the MDS for sediment disturbance; - Conservatively assumes 100% fluidisation of material expelled from a U-shaped trench. In reality trenching will move a proportion of material rather than bringing it fully into suspension; - Offshore export cable corridor trenching modelling assumes sediment release along the whole offshore export cable corridor; - Cable routes cross a variety of seabed materials, and burial depth may be up to 3m in some areas. The assessment therefore considers this upper bound to define the MDS in terms of sediment disturbance; - Trenching rate will be up to 400m/hr. Trenchless techniques (landfall):

Impact	Maximum Design Scenario	Explanation
		- Trenchless installation methods include HDD and Direct Pipe; - HDD represents the maximum MDS for sediment disturbance due to the potential for drilling fluid release (frac-out); - The MDS for sediment disturbance by trenchless installation is given by applying a conservative Bentonite concentration of 100kg/m³ in drilling mud, the volume of spoil released is equal to the maximum volume of the bore; - Other stages of drilling (pilot hole drilling and stages of reaming) may result in smaller release events separated in time. But the MDS is considered as a release of drilling mud from a single conduit; - Two drills could be operational at one time; however, the timing of drilling will be staggered meaning there will not be an occasion where punch-out occurs simultaneously (or within 6 hours of each other). - Trenchless drill punchout will be up to approximately 1,660m offshore of MHWS in water depths up to 20m LAT.
Disturbance/remobilisation of sediment bound contaminants	The MDS is as described for changes to SSC and associated deposition during the construction phase.	The justification, as described above, for changes to SSC and associated deposition during the construction phases.
Increased risk of introduction and spread of INNS	Construction duration: up to four years. Offshore vessel activity: - There will be up to 550 return trips by installation vessels (including Cable Lay Vessels (CLV), Trenching Support Vessels (TSV), Installation Support Vessel (ISV), Guard Vessels (GV), Survey Vessels, PLGR 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 and return journeys during the construction phase. An increase in vessel numbers and activity within a defined area may elevate the risk of INNS introduction and spread, due to the potential for transfer via hull fouling and/or ballast water (where relevant). The greatest number of vessels present during the construction phase and their associated vessel trips represents the MDS for the risk of the introduction and spread of INNS.

Impact	Maximum Design Scenario	Explanation
	- There will be 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.	
Operations and Maintenance		
Temporary habitat loss / disturbance	O&M duration: up to 35 years - Up to 41 export cable repairs, each with a length of up to 2km and a 20m width. Up to 40,000m² of temporary disturbance each; 1,640,000m² total; - 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. Up to 522,240m² of temporary disturbance per year; total 18,278,400m²	The MDS assumes the maximum habitat disturbance associated with cable repair and remediation activities that have the potential to cause temporary habitat loss or disturbance. During such activities, works would be undertaken using methods similar to installation where required (e.g., excavation and reburial) with the intention of reinstating the seabed to its post-construction condition, such that disturbance is largely confined to areas previously affected by installation.
Long term habitat loss	O&M duration: up to 35 years Cable protection (area of habitat loss / footprint): Rock installation <u>Per trench = 378,980m²</u> 14m width x 27,070m length = 378,980m² <u>Total (up to two trenches) = 757,960m²</u> Cable Protection Systems (CPS): <u>Per trench = 6,400m²</u> 0.8m width x 8,000m length = 6,400m² <u>Total (up to two trenches) = 12,800m²</u> <u>Total Cable Protection (rock, rock bags and CPS)</u> Per trench = 385,380m² Total (up to two trenches) = 770,760m² Export cable crossings: <u>Total = 57,600m²</u> - Up to 16 crossings 200m length x 18m width = 3,600m²	The MDS assumes the maximum footprint of O&M phase activities that have the potential to cause long-term habitat loss. Cable protection: - Cable protection will comprise rock installation, rock bag or concrete mattress. The cable protection type with the largest footprint (rock installation) represents the MDS for long-term habitat loss. - In addition, CPS will be installed. Export cable crossings: - Cable crossing footprint area values are based on the seabed coverage for rock berm design. Exit pit protection: - Exit pits will have external protection using a combination of rock installation, concrete mattresses or backfill of excavated material; - The value presented is therefore considered to be conservative of the disturbed footprint. - Up to 20 concrete mattresses will be used per exit pit resulting in a long-term habitat loss of up to 360m² per exit

Impact	Maximum Design Scenario	Explanation
	Exit pit protection: Rock installation <u>Total = 28,000m²</u> - Up to four exit pits 140m length x 50m width = 7,000m²	pit (1,440m ² in total), however the area covered by concrete mattresses is within the footprint of rock installation so does not represent additional habitat loss.
Increased risk of introduction and spread of INNS	O&M: Operational lifespan of 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 vessel 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 (Unmanned 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: - 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.	The greatest number of vessels present during the O&M phase and their associated vessel trips represents the MDS for the risk of the introduction and spread of INNS. For the O&M phase, the MDS also assumes the maximum surface area of structures exposed to the water column during O&M activities, which may facilitate colonisation of hard substrate. The addition of hard substrate can increase habitat availability for INNS, thereby increasing the likelihood of establishment and subsequent population growth.

Impact	Maximum Design Scenario	Explanation
	- Repair (41 lifetime repairs, for up to two trenches) Vessels on site for REPAIR activities, for up to two 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 Rockdump. 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 Rockdump.	
Colonisation of hard structures	O&M duration: up to 35 years Cable protection (surface area exposed to seawater): Rock installation <u>Per trench = 487,316m²</u> Top surface: 14m width x 27,070m length = 378,980m² Side surfaces: 2 x (27,070m length x 2m height) = 108,280m² 2 x (14m width x 2m height) = 56m² Total surface area (top + sides): 378,980m² + 108,280m² + 56m² = 487,316m² <u>Total (up to two trenches) = 974,632m²</u> CPS: <u>Per trench = 19,201m²</u> Top surface: 0.8m width x 8,000m length = 6,400m² Side surfaces: 2 x (8,000m length x 0.8m height) = 12,800m² 2 x (0.8m width x 0.8m height) = 1.28m² Total surface area (top + sides): 6,400 + 12,800 + 1.28 = 19,201m² <u>Total (up to two trenches) = 38,402m²</u> Export cable crossings:	The MDS assumes the maximum surface area of structures exposed to the water column during O&M phase activities that have the potential to result in the colonisation of hard substrate. For the purposes of this assessment, all structures are assumed to be regular rectangular forms, and surface areas are calculated based on simplified geometry to provide a consistent and precautionary estimate of exposed surface area.

Impact	Maximum Design Scenario	Explanation
	Total = 71,552m² - Up to 16 crossings Top surface (per crossing): 200m length × 18m width = 3,600m² Side surfaces (per crossing): 2 × (200m length × 2m height) = 800m² 2 × (18m width × 2m height) = 72m² Total surface area (per crossing): 3,600m² + 800m² + 72m² = 4,472m² Exit pit protection: - Total = 35,600m² Rock installation - Up to four exit pits Top surface (per pit): 140m length × 50m width = 7,000m² 2 × (140m length × 5m height) = 1,400m² 2 × (50m width × 5m height) = 500m² - Total surface area (per pit): 7,000m² + 1,400m² + 500m² = 8,900m²	

Impact	Maximum Design Scenario	Explanation
Changes in physical processes	The MDS is as described above, for long-term habitat loss during the O&M phase.	The MDS assumes changed to sediment transport associated with: - Submerged structures with the potential to alter physical processes (i.e. cable protection, export cable crossings, and protection associated with trenchless drill exit pits at the landfall) introduce localised increases in seabed elevation and roughness, which may influence near-bed hydrodynamics and sediment transport processes. - Temporary disturbances associated with cable repair and reburial activities during the O&M phase may also modify seabed conditions at a local scale; however, these effects are short-term and spatially limited. Volume 2, Chapter 1: Physical Processes of the PEIR provides a full description of the desk-based analysis underpinning this assessment.
EMFs from subsea electrical cabling	O&M duration: up to 35 years Export cables: - Up to two conductors of 320kV High Voltage Direct Current (HVDC), each of 326,400m in length - Minimum burial depth of 0.5m - Distance between trenches is up to 50m - Maximum magnetic field strength of cable of 440μT Cable protection: - Total (rock installation + CPS) = 770,760m² (see MDS for long term habitat loss). Cable crossings: - Up to 16 crossings 2m height - Total footprint: 57,600m² (see MDS for long term habitat loss)	The MDS assumes the maximum length of cables and the minimum burial depth, representing a conservative worst-case scenario for EMF exposure during the O&M phase. Volume 2, Annex 4.2: Marine EMF Assessment, of the PEIR, concludes that for a cable size of 2,000m² and a burial depth of 0.5m, the measured magnetic flux density at the seabed is 192.42μT for fully bundled cables, 414.06μT for cables separated by 25m and 825.99μT for a separated (single-cable) scenario with no magnetic field cancellation. At 1m above the seabed, these values reduce to 25.68μT, 149.89μT and 299.04μT, respectively. Although these values present the worst-case operational/installation scenarios, it is highly unlikely that these values will be present during operation. Cable protection and crossings may locally increase separation between the cable and the seabed, which would reduce exposure to EMF (and thermal emissions). As such, the highest field strengths are associated with minimum burial depth and absence of magnetic field cancellation, representing a conservative worst-case scenario that is unlikely to occur along the majority of the cable during operation.

Impact	Maximum Design Scenario	Explanation
Thermal emissions from operational cables	O&M duration: up to 35 years Export cables: - Up to two conductors of 320kV HVDC, each of 326,400m in length; - Minimum burial depth of 0.5m; - Distance between trenches is up to 50m; Cable protection: - Total (rock installation + CPS) = 770,760m² (see MDS for long term habitat loss). Cable crossings: - Up to 16 crossings 2m height Total footprint: 57,600 m² (see MDS for long term habitat loss)	The MDS assumes the maximum length of cables across, the minimum burial depth, and maximum extent of cable protection and cable crossings resulting in impacts to benthic invertebrates due to heating during the O&M phase.
Decommissioning		
Temporary habitat loss / disturbance	All offshore export cables and cable protection will be removed.	The removal of cables may be undertaken using similar techniques to those employed during installation, therefore the parameters would be in-line with the construction phase. Whilst the MDS is for all materials to be removed for decommissioning, in many cases it may be less environmentally impactful to leave assets in place. The decommissioning approach will be reviewed at the time of decommissioning following the most up to date and best available guidance.
Increased SSCs and associated sediment deposition	All offshore export cables and cable protection will be removed.	Decommissioning is likely to operate within the parameters identified for the O&M phase. Whilst the MDS is for all materials to be removed for decommissioning, in many cases it may be less environmentally impactful to leave assets in place. The decommissioning approach will be reviewed at the time of decommissioning following the most up to date and best available guidance.

Impact	Maximum Design Scenario	Explanation
Disturbance/remobilisation of sediment bound contaminants	The MDS is as described for changes to SSC and associated deposition during the construction, O&M and decommissioning phases.	The justification, as described above, for changes to SSC and associated deposition during the decommissioning phases.
Increased risk of introduction and spread of INNS	All export cables and cable protection will be removed.	Decommissioning is likely to operate within the parameters identified for construction. Whilst the MDS is for all materials to be removed for decommissioning, in many cases it may be less environmentally impactful to leave assets in place. The decommissioning approach will be reviewed at the time of decommissioning following the most up to date and best available guidance.
Removal of hard substrates	The MDS is as described above, for colonisation of hard substrates during the O&M phase.	The MDS assumes the maximum surface area of structures exposed to the water column during decommissioning phase activities. Decommissioning is likely to operate within the parameters identified for O&M. Whilst the MDS is for all materials to be removed for decommissioning, in many cases it may be less environmentally impactful to leave assets in place. The decommissioning approach will be reviewed at the time of decommissioning following the most up to date and best available guidance.

3.7 Commitments adopted as part of the MHPGC Project

- 3.7.1.1 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, including in relation to benthic ecology.
- 3.7.1.2 Embedded mitigation includes the following measures as identified in ISEP (formally IEMA), Implementing the Mitigation Hierarchy from Concept to Construction (ISEP, 2024):
- Primary mitigation - measures included as part of the project design. ISEP 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”.
- 3.7.1.3 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 3.8** (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.
- 3.7.1.4 Where an assessment identifies likely significant adverse effects, secondary mitigation measures may be applied. These are measures that could further prevent, reduce and, where possible, offset these 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 required, both pre-mitigation and residual effects are presented.
- 3.7.1.5 The measures relevant to benthic ecology are outlined in **Table 3.18**. As there is a secured commitment to implementing these measures, they are considered an inherent part of the design of the MHPGC Project and have therefore been considered in the assessments presented in **Section 3.8**.

Table 3.18: Embedded commitments relevant to benthic ecology implemented as part of the MHPGC Project

Commitment number	Measure adopted	How the measure will be secured via an appropriate consent condition.
CoT06/MM-006	An Outline OEMP will be prepared and submitted with the application for development consent. A Detailed OEMP will be developed in accordance with the Outline OEMP. The Outline OEMP will include: • an Outline Marine Biosecurity Plan; • an Outline Marine Pollution Contingency Plan; • an Outline Marine Mammal Mitigation Protocol; • 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.	Will be secured as a requirement of the DCO, deemed Marine Licence and Marine Licence application(s) to the Scottish Ministers. Associated supporting documentation: Outline OEMP.
CoT07/MM-007	An Outline Offshore Operations and Maintenance Plan will be prepared and submitted as part of the application for development consent. A Detailed Offshore Operations and Maintenance Plan will be produced prior to entering the operations and maintenance phase.	Will be secured as a requirement of the DCO, deemed Marine Licence and Marine Licence application(s) to the Scottish Ministers. Associated supporting documentation: Offshore Operations and Maintenance Plan.
CoT08/MM-010	An Outline Offshore CSIP will be prepared and submitted with the application for development consent. It will include cable burial to be the preferred option for cable protection, where practicable. A Detailed CSIP will be developed prior to construction 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.	Will be secured as a requirement of the DCO, deemed Marine Licence and Marine Licence application(s) to the Scottish Ministers. Associated supporting documentation: Outline Offshore CSIP.
CoT13	The Project Description (Volume 1, Chapter 2 of the PEIR) sets out that the installation of the offshore export cables under Durham Coast SSSI and SAC will be undertaken by trenchless	Will be secured via DCO and deemed Marine Licence.

Commitment number	Measure adopted	How the measure will be secured via an appropriate consent condition.
	technologies. The exit pits associated with the trenchless technologies installation will be at least 100m seaward of the eastern boundary of the Durham Coast SSSI and SAC.	
CoT14/MM-022	An Offshore CMS will be produced and implemented prior to construction.	Will be secured as a requirement of the DCO, deemed Marine Licence and Marine Licence application(s) to the Scottish Ministers. Associated supporting documentation: Outline Offshore CMS.
CoT37	An Outline MPCP will form part of the Outline OEMP, which will be prepared and submitted with the application for development consent. 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.	Will be secured as a requirement of the DCO, deemed Marine Licence and Marine Licence application(s) to the Scottish Ministers. Associated supporting documentation: Outline Offshore MPCP; Outline OEMP.
CoT38	An Outline MBP will form part of the Outline OEMP, which will be prepared and submitted with the application for development consent. The Outline MBP will include (but is not limited to): - follow the latest INNS guidance issued by the Great Britain Non-Native Species Secretariat; - ensure full compliance with the International Marine Organisation (IMO) Ballast Water Management Guidelines; - address biosecurity risks associated with cable installation and any accompanying cable protection measures, acknowledging that materials placed on the seabed could act as new substrates for colonising organisms. A Detailed MBP will be developed in accordance with the Outline MBP.	Will be secured as a requirement of the DCO, deemed Marine Licence and Marine Licence application(s) to the Scottish Ministers. Associated supporting documentation: Outline Marine Biosecurity Plan; Outline OEMP.
CoT47	An Outline Bentonite Breakout Plan will form part of the Outline Code of Construction Practice (CoCP), which will submitted as part of the application for the development consent. A Detailed Bentonite Breakout Plan will be developed substantially in accordance with the outline plan.	Will be secured as a requirement of the DCO and Scottish Marine Licence(s). Associated supporting documentation: Outline CoCP.

3.8 Assessment of impacts

3.8.1 Overview

- 3.8.1.1 This section includes the assessment of the potential impacts to benthic ecology arising from the construction, O&M and decommissioning phases of the MHPGC Project. A summary of the effects is presented in **Section 3.13**.

3.8.2 Construction phase

Temporary habitat loss and disturbance

- 3.8.2.1 Landfall, route preparation and cable installation activities that will occur within the MHPGC Project PEIR Red Line Boundary (described in **Section 3.6.2**) will result in temporary habitat loss and disturbance to subtidal benthic habitats and species. This includes trenchless installation works at the landfall (including trenchless drill exit pits and floatation pits), seabed preparation, sandwave clearance, PLGR, cable installation and trenching activities, anchor placement and anchor spread movements, and the use of jack-up barges. Different benthic habitats and species have varying sensitivities to temporary habitat disturbance which depends on habitat stability, species vulnerability and resilience to the disturbance.
- 3.8.2.2 During the construction phase of the MHPGC Project, there is also the potential for low order clearance of UXO within the MHPGC Project PEIR Red Line Boundary. As part of site selection for the MHPGC Project, areas of known UXO have been avoided where possible. However, where it is not possible to avoid UXO, they will be treated on site. Avoidance by micro-routing or relocation will be prioritised over clearance. Where clearance is required, low order clearance will be preferred, dependent on the condition of the UXO. High order clearance has been assessed on a precautionary basis within the EIA but is not proposed as part of the application for consent and would require separate consideration (The Applicant is only seeking consent for low order clearance and should high order be required will seek a separate Marine Licence from the MMO and/or MD-LOT depending on the location). Low order clearance of UXO may lead to temporary disturbance and loss of benthic habitats with the scale of disturbance relevant to low order clearance techniques. The scale of potential impacts from UXO clearance is further dependent on the location of the UXO and the proximity to sensitive receptors (Cooke and Bardwell, 2025) (see **Volume 2, Annex 5.1: Underwater Sound Technical Report, of the PEIR** for a detailed assessment).

Magnitude of impact

- 3.8.2.1 In Scottish waters, the temporary disturbance of benthic habitats is expected to occur within the footprint of the construction activities along the entire length of the offshore export cable from KP250 to KP180 (**Figure 3.1**). The greatest area of disturbance is expected to result from route preparation activities. PLGR activities may result in up to 1,960,000m² of temporary seabed disturbance, while boulder and debris clearance may result in up to 1,240,000m² of temporary habitat disturbance. Sandwave clearance (swathe width of 28m per trench) may result in up to 1,736,000m² of temporary habitat disturbance. In addition, cable installation and trenching activities are expected to result in up to 1,234,800m³ of temporary seabed disturbance.
- 3.8.2.2 In English waters, temporary habitat disturbance is expected to occur within the footprint of offshore construction activities along the entire offshore export cable from KP180 to the offshore trenchless drilling punchout location. The total area of temporary habitat disturbance in English waters resulting from sandwave clearance (maximum swathe of 28m per trench) is up to 1,232,000m². Boulder and debris clearance and PLGR are also expected to occur in English waters (see **Section 3.6.2**). In addition, at the landfall in English waters up to two floatation pits will be required at the exit pit locations, with a total area of seabed disturbance of up to 26,400m² (13,200m² per floatation pit). The trenchless drill punchout will be located up to approximately 1,660m offshore of MHWS in water depths of up to -20m LAT and therefore all disturbance associated with the floatation pits will occur within the subtidal environment. Accordingly, no direct temporary habitat disturbance of intertidal

habitats is predicted and only subtidal receptors have been considered for this impact. Vessel seabed interactions associated with anchor spread movements are expected to result in up to 5,098,240m² of temporary seabed disturbance from up to 40 full anchor spread movements. A jack-up barge will also be required, with up to six jack-up events, resulting in a total disturbance of up to 18.85m² (3.14m² disturbance per jack-up event, with a spud leg of 2m in diameter). In addition, cable installation and trenching activities are expected to result in up to 1,428,021m² of temporary seabed disturbance.

- 3.8.2.3 However, any temporary disturbance from these activities will be short term. The total duration of each activity is expected to be one to six months for boulder clearance (dependent on vessel speed; see **Volume 1, Chapter 2: Project Description, of the PEIR**), up to four months for sandwave clearance and between one and nine months for PLGR (dependent on towing speed; see **Volume 1, Chapter 2: Project Description, of the PEIR**). However, each activity is only expected to happen once in any location and will not be continuous over the construction period.
- 3.8.2.4 Embedded mitigation has been incorporated into the MHPGC Project design to minimise temporary habitat disturbance during construction (**Table 3.18**). An Offshore CMS (CoT14/MM-022) will be produced and implemented prior to construction and will set out measures to minimise unnecessary seabed disturbance during installation activities. In addition, an Outline Offshore CSIP (CoT08/MM-010) will be prepared and submitted with the application for development consent, which includes cable burial as the preferred option for cable protection, where practicable, and a CBRA to inform installation methods and minimise the requirement for cable protection.
- 3.8.2.5 It is anticipated that up to 22 UXO will require low-order clearance, comprising up to eight UXO in Scottish waters (within the funnel area outside the overlap with the Morven North and Morven South projects) and up to 14 UXO in English waters. Where low order clearance is possible, crater sizes are considered to be small and located within the width of seabed disturbance resulting from route preparation and clearance activities. In many cases, there has been no obvious seabed damage from low order detonation in relation to other offshore infrastructure projects (RPS, 2025c). Therefore, if low order detonation is employed, it is not expected to increase the footprint of habitat disturbance from route preparation and installation (RPS, 2025c). As the MHPGC Project PEIR Red Line Boundary avoids any designated sites, craters caused by low order clearance are not expected to affect any protected features of nearby designated sites (a detailed MPA/MCZ and HPMA assessment will be provided to support the DCO application and Marine Licence application(s)). Any seabed damage caused is expected to be backfilled via natural sediment transport regimes. Therefore, magnitude of impact resulting from low order detonation would be considered negligible when compared to other construction activities causing temporary habitat disturbance (see Section 4.8.2 in **Volume 2, Chapter 4: Fish and Shellfish Ecology, of the PEIR** and **Volume 2, Annex 5.1: Underwater Sound Technical Report, of the PEIR** for further information).
- 3.8.2.6 High order clearance has been assessed on a precautionary basis within the EIA but is not proposed as part of the application for consent and would require separate consideration. In the event that high order UXO clearance is required, this will result in the creation of craters in the seabed (Cooke and Bardwell, 2025). A previous study regarding potential effects has been undertaken for the Norfolk Vanguard OWF (Ordtek, 2018) which included UXO NEQ of 700 kg. The crater resulting from detonation of a 700 kg UXO was calculated as up to 21m in diameter and 5m deep. However, in sandy gravel habitat which is present in areas within the MHPGC Project PEIR Red Line Boundary, craters resulting from UXO clearance have been observed as half of the predicted diameter and a maximum of 1.5m in depth (RPS, 2025c; Ordtek, 2018). Furthermore, crater size is considered to decrease rapidly with increasing water depth due to tamping (Cooke and Bardwell, 2025). Tamping refers to the force which is exposed by the pressure of the water column (acting under gravity) above the source of an explosive event such as UXO. As with low order clearance, any seabed damage caused by high order clearance is expected to be backfilled via natural sediment transport regimes over time. Therefore, magnitude of impact resulting from high order detonation would be considered low.
- 3.8.2.7 Habitats identified in Scottish and English waters within the MHPGC Project PEIR Red Line Boundary are considered widespread across the central and northern North Sea. Additionally, temporary

habitat disturbance is not anticipated to result in any direct impacts on designated sites. Habitats dominated by sandy and soft sediments, including subtidal mud habitats, are expected to recover quickly from temporary disturbance following natural backfill as a consequence of the natural movement of sediment by local hydrodynamics, restoring the seabed characteristics. During natural backfill of craters caused by UXO clearance, it is possible that sediment of different particles size than previously present could settle resulting in slightly different sediment types within crater footprints. Natural collapse of crater sides could also occur during recovery. Due to the small areas expected to be affected, it is expected that over time any area affected by UXO clearance will return to baseline conditions.

- 3.8.2.8 Therefore, taking account of the embedded mitigation measures, including implementation of the Offshore CMS (CoT14/MM-022) and the Offshore CSIP (CoT08/MM-010), and given the localised extent of temporary habitat loss and disturbance and the short, temporary timeframe within which disturbance is expected to occur, it is considered that the overall magnitude of temporary habitat loss and disturbance in both Scottish and English waters (from both route clearance/preparation and UXO low order clearance), during the construction phase is considered to be **low**.

Receptor sensitivity

- 3.8.2.9 The sensitivity of VER's within the MHPGC Project PEIR Red Line Boundary (**Table 3.10** and **Table 3.11**) have been assessed with reference to the MarESA benchmarks for abrasion or disturbance of the surface of the seabed, is summarised in **Table 3.19**. FeAST sensitivity assessments are available for only a subset of VERs and are discussed within the relevant receptor-specific text.
- 3.8.2.10 The VER's are assessed as having sensitivities ranging from low to high with respect to temporary habitat loss and disturbance. This assessment includes representative biotopes of the broadscale habitat features of the Firth of Forth Banks Complex MPA as it lies adjacent to the MHPGC Project PEIR Red Line Boundary (approximately 0.04km to the west), however this is considered precautionary as it still lies outside the area of direct habitat disturbance. No other designated sites are considered due to distance from the PEIR Red Line Boundary.

Scottish Waters

- 3.8.2.11 The biotope MD6218 is associated with the Scottish PMF 'offshore deep-sea mud' habitat. MarESA identifies the biotope as having medium sensitivity to abrasion or disturbance of the seabed (Harris *et al.*, 2025a). The characterising fauna are afforded some protection by their burrowing habit; however, physical disturbance may damage feeding structures, displace individuals and result in mortality of characteristic species. Consequently, sensitivity to temporary habitat loss and disturbance, including from UXO clearance, is considered **medium**.
- 3.8.2.12 The biotopes MC5211 and MC5212 are associated with the Scottish PMF 'offshore subtidal sands and gravels' which is a feature of the Firth of Forth Banks Complex MPA, located immediately adjacent to the western boundary of the MHPGC Project PEIR Red Line Boundary. MarESA identifies these biotopes as having low sensitivity to abrasion or disturbance of the seabed (Tillin and Watson, 2025a; 2025b). These assemblages occur within naturally dynamic sedimentary environments and are characterised by species capable of relatively rapid recovery following disturbance. Consequently, sensitivity to temporary habitat loss and disturbance, including from UXO clearance, is considered **low**.
- 3.8.2.13 Ocean quahog is a PMF, an OSPAR threatened and/or declining species, and a feature of the Firth of Forth Banks Complex MPA. The receptor is therefore considered to be of medium value for the assessment. Both FeAST and MarESA identify ocean quahog as having high sensitivity to physical disturbance of the seabed (NatureScot, 2026; Tyler-Walters and Sabatini, 2017). This reflects the species' longevity, slow recovery rates and susceptibility to damage or mortality following disturbance. Consequently, sensitivity to temporary habitat loss and disturbance, including from UXO clearance, is considered **high**.

3.8.2.14 The scarce tube-dwelling anemone is a Scottish PMF and species on the Scottish Biodiversity List and was recorded at four stations within the area of the MHPGC Project PEIR RLB that overlaps with Morven North and Morven South. No species-specific MarESA or FeAST assessment is available, and sensitivity has therefore been determined through expert judgement. As a sedentary tube-dwelling species (Wilson, 2007), individuals may be damaged, displaced or removed through direct seabed disturbance. However, there is no evidence that it exhibits the exceptionally limited recovery potential that characterises highly sensitive benthic species such as ocean quahog. Applying a precautionary approach, sensitivity to temporary habitat loss and disturbance is considered **medium**.

English waters

3.8.2.15 ‘Sea pen and burrowing megafauna communities’ is an OSPAR-listed habitat. MarESA identifies the representative biotope as having medium sensitivity to abrasion or disturbance of the seabed (Moyse *et al.*, 2026). Sea pen species may be damaged or displaced during disturbance events, while burrow openings created by megafauna may be temporarily lost. Consequently, sensitivity to temporary habitat loss and disturbance is considered **medium**.

3.8.2.16 Stony reef habitats, in the form of isolated or scattered cobbles/boulders, were also identified within the MHPGC Project PEIR Red Line Boundary, noting there is no overlap with designated sites which protect stony reef. However, medium resemblance was only found at two survey stations with low resemblance present elsewhere. Stony reef in the MHPGC Project PEIR Red Line Boundary in English waters has been assessed using the proxy biotope MC1217. MarESA identifies the proxy biotope as having **medium** sensitivity to abrasion or disturbance of the seabed (Readman *et al.*, 2023a). Characteristic sponge, hydroid and bryozoan assemblages are vulnerable to physical damage and removal, although recovery through recolonisation is expected.

3.8.2.17 The biotope MB5238 is associated with the HPI and UK BAP Priority Habitat ‘sublittoral sands and gravels’. MarESA identifies the biotope as having low sensitivity to abrasion or disturbance of the seabed (Tillin *et al.*, 2023). The habitat is characteristic of naturally dynamic sedimentary environments and is expected to recover relatively rapidly following disturbance. Consequently, sensitivity to temporary habitat loss and disturbance, including from UXO clearance, is considered **low**.

3.8.2.18 The biotopes MD6217 and MD6218 are associated with the HPI and UK BAP Priority Habitat ‘mud habitats in deep water’. MarESA identifies these biotopes as having low to medium sensitivity to abrasion or disturbance of the seabed (Harris *et al.*, 2025a; 2025c). Although the characterising fauna are partially protected by their burrowing habit, physical disturbance may damage feeding structures, displace individuals and alter community composition. Consequently, sensitivity to temporary habitat loss and disturbance, including from UXO clearance, is considered **medium**.

3.8.2.19 Ocean quahog was also identified in English waters within the MHPGC Project PEIR Red Line Boundary). Whilst not a feature of a protected site within the area of impact for temporary habitat loss and disturbance in English waters, ocean quahog is an OSPAR threatened and/or declining species. The sensitivity assessment presented for ocean quahog in Scottish waters (**Paragraph 3.8.2.13**) is considered equally applicable. Based on the medium value of the receptor (PMF, an OSPAR threatened and/or declining species, and a feature of the Firth of Forth Banks Complex MPA) and high sensitivity according to MarESA, the ocean quahog is considered to have a **high** sensitivity to temporary habitat loss and disturbance.

Table 3.19: MarESA sensitivity ratings for Scottish and English marine benthic features assessed for abrasion/disturbance of the surface of the seabed

Feature/Habitat type	Associate VER	MarESA Sensitivity rating
Scottish waters		

Feature/Habitat type	Associate VER	MarESA Sensitivity rating
<i>Paramphinoe jeffreysii</i> , <i>Thyasira</i> spp. and <i>Amphiura filiformis</i> in Atlantic offshore circalittoral sandy mud (MD6218)	Offshore deep-sea mud (subtidal mud)	Medium
<i>Echinocyamus pusillus</i> , <i>Ophelia borealis</i> and <i>Abra prismatica</i> in circalittoral fine sand (MC5211)	Offshore subtidal sands and gravels*	Low
<i>Abra prismatica</i> , <i>Bathyporeia elegans</i> and polychaetes in circalittoral fine sand (MC5212)	Offshore subtidal sands and gravels*	Low
Ocean quahog	Ocean quahog*	High
Scarce tube-dwelling anemone	N/A	No MarESA assessment.
English waters		
Sea pen and burrowing megafauna communities in circalittoral fine mud (MC6216)	Sea pen and burrowing megafauna communities	Medium
Sparse sponges, <i>Nemertesia</i> spp. and <i>Alcyonidium diaphanum</i> on circalittoral mixed substrata (MC1217)	Stony reef	Medium
<i>Spisula subtruncata</i> and <i>Nephtys hombergii</i> in Atlantic infralittoral muddy sand (MB5238)	Sublittoral sands and gravels	Low
<i>Levinsonia gracilis</i> and <i>Heteromastus filiformis</i> in Atlantic offshore circalittoral mud and sandy mud (MD6217)	Mud habitats in deep water	Low
<i>Paramphinoe jeffreysii</i> , <i>Thyasira</i> spp. and <i>Amphiura filiformis</i> in Atlantic offshore circalittoral sandy mud (MD6218)	Mud habitats in deep water	Medium
Ocean quahog	Ocean quahog	High
*Feature designated within one or more MPAs, MCZs or HPAs in the respective jurisdiction and overlapping the MHPGC Project PEIR Red Line Boundary.		

Significance of effect

- 3.8.2.20 For both Scottish and English waters, it is considered that the worst-case receptor sensitivity is **high** and the magnitude of temporary habitat loss and disturbance is **low**. Therefore, taking into consideration the high sensitivity of some receptors, the worst-case effect of temporary habitat loss and disturbance, during the construction phase, is considered to be **minor adverse**, which is not significant in EIA terms. This is due to the relatively low area impacted by temporary habitat loss and disturbance compared to the large areas of unimpacted similar habitat regionally, the low numbers of ocean quahog and scarce tube-dwelling anemone recorded across the Benthic Subtidal Ecology Study Area, and the absence of direct impacts on protected features within designated sites, lowering the overall significance from moderate to minor.

Secondary mitigation and residual effect

- 3.8.2.21 At this stage, no secondary mitigation is proposed for temporary habitat loss and disturbance in Scottish or English waters. Therefore, the residual effect of temporary habitat loss and disturbance, during the construction phase, is considered at most to be **minor adverse**, which is not significant in EIA terms.

Increased SSCs and associated deposition

- 3.8.2.22 Several construction activities during pre-installation and installation of the MHPGC Project, which cause disturbance to the seabed, particularly during route preparation (using MFE) and UXO clearance, are consequently likely to result in the suspension of sediment. This can create a sediment plume in the water column which can travel away from the MHPGC Project PEIR Red Line Boundary to later settle out and deposit on habitats elsewhere. This also includes dredge spoil disposal which is likely to occur within the MHPGC Project PEIR Red Line Boundary.
- 3.8.2.23 The level of SSC and deposition will vary along the MHPGC Project PEIR Red Line Boundary, in both Scottish and English waters, depending on local sediment conditions and hydrodynamics. These characteristics are described in **Volume 2, Chapter 1: Physical Processes, of the PEIR**.
- 3.8.2.24 Sediment dispersion modelling has been undertaken, as reported in **Volume 2, Annex 1.2: Model Design and Validation, of the PEIR**, which has informed the assessment for this potential impact pathway. The maximum tidal ellipse used as the Benthic Subtidal Ecology Study Area, and the area which represents the maximum Zol for sediment dispersion, has been defined as 9km (**Section 3.4.2**) which is used as a worst-case scenario for this impact pathway. However, **Volume 2, Annex 1.2: Model Design and Validation, of the PEIR**, has identified that the spring tidal excursion distance varies between offshore and nearshore areas from 5km to 9km, respectively, in English waters, and 6km to 9km in offshore Scottish waters. Therefore, for the purposes of this assessment, habitats and species located within 9km of the MHPGC Project PEIR Red Line Boundary have been conservatively considered. The Benthic Subtidal Ecology Study Area represents this Zol.

Magnitude of impact

- 3.8.2.25 Project-specific modelling has indicated the likely distance over which a sediment plume is likely to travel, based on different sediment types (see **Volume 2, Annex 1.2: Physical Processes Technical Report, of the PEIR** and **Volume 2, Annex 1.2: Model Design, Validation and Results, of the PEIR**). Sandwave clearance, dredge spoil disposal and pre-lay trenching were all included in the modelling in both Scottish and English waters. Based on the modelling, in both Scottish and English waters, the following worst-case SSC levels were estimated:
- 0 to 50m: All gravel and a large proportion of disturbed sand is estimated to deposit back on the seabed within 0 and 50m from the area of disturbance, with suspension lasting for the duration of the disturbance plus an additional 30 minutes following the end of the disturbance (although the majority is likely to redeposit within seconds to a few minutes following the disturbance). The level of SSC during disturbance is expected to be very high (tens to hundreds of thousands of mg/l) within this distance. More than one hour after the disturbance has ended, deposition is expected to be limited and not measurable;
 - 50 to 500m: Mostly sand and some remaining gravel is expected to be deposited, with high levels (hundreds to low thousands of mg/l) of SSC for the duration of the disturbance plus an additional 30 minutes. More than one hour after disturbance, fine sediment is unlikely to deposit in measurable thickness;
 - 500m to the outer margin of the Benthic Subtidal Ecology Study Area: Mainly fine sediments are expected to be deposited with low to intermediate SSC (tens to low hundreds of mg/l) at the time of disturbance with a narrow plume. Between six and 24 hours following the disturbance, deposition of fines is gradually expected to decrease to background levels, with no measurable change following 24 to 48 hours. Finer sediment will have smaller associated deposition thicknesses due to a wider dispersion area.
- 3.8.2.26 The area of seabed in both Scottish and English waters which is likely to be disturbed is dominated by coarse sediments with some small contributions of mud. Based on the project-specific modelling, the majority of disturbed sediment is therefore expected to deposit rapidly and within 50m of the footprint of disturbance, with some finer fractions carried beyond this distance but expected to deposit within a maximum of 48 hours following disturbance up to the 9 km tidal excursion buffer (outer margin of the Benthic Subtidal Ecology Study Area). The modelling indicates that deposition

thicknesses of 5cm may occur up to approximately 100m from the activity location, reducing to 1cm within approximately 200m.

- 3.8.2.27 In Scottish waters, suspended sediment plumes generated at the western extent of the MHPGC Project PEIR Red Line Boundary have the potential to extend into the north-eastern part of the Firth of Forth Banks Complex MPA where the designated site lies within 100m of the corridor boundary. However, modelling indicates that elevated SSCs are restricted to a small area adjacent to the release location and decrease rapidly with distance from the source. Several hours after cessation of release, SSCs within the MPA are predicted to reduce to less than 20mg/l, and to less than 5 mg/l within 24 hours. Although limited deposition may occur within the adjacent Firth of Forth Banks Complex MPA, deposition is predicted to be confined to a relatively small area close to the corridor boundary and is expected to be temporary, with recovery facilitated by natural sediment transport processes.
- 3.8.2.28 In English waters, any deposition within the Farnes East MCZ (2.2 km west of the MHPGC Project PEIR Red Line Boundary) and the North East of Farnes Deep MCZ/HPMA (4.1 km east of the MHPGC Project PEIR Red Line Boundary) is predicted to be negligible, reflecting the separation distance from the Project, the limited extent and volume of deposition predicted, and the temporary nature of the impact. Furthermore, natural sediment redistribution through local hydrodynamic processes is expected to facilitate the rapid recovery of any affected habitats and species, with conditions returning to baseline within a few days of the disturbance.
- 3.8.2.29 Embedded mitigation has been incorporated into the MHPGC Project design to minimise the extent of seabed disturbance and associated sediment suspension during construction activities (**Table 3.18**). An Offshore CMS (CoT14/MM-022) will be produced and implemented prior to construction and will set out measures to minimise unnecessary seabed disturbance during route preparation and cable installation activities. In addition, an Outline Offshore CSIP (CoT08/MM-010) will be prepared and submitted with the application for development consent. This includes cable burial as the preferred option for cable protection, where practicable, and a CBRA within the CSIP (CoT08/MM-010) to inform cable installation methodologies and burial requirements.
- 3.8.2.30 Any increase in SSC at detectable levels is expected to be highly temporary and localised to the area of disturbance. The implementation of the Offshore CMS (CoT14/MM-022) and Offshore CSIP (CoT08/MM-010) will further minimise the extent of seabed disturbance and resulting sediment mobilisation where practicable. Furthermore, as construction and seabed disturbance moves along the length of the MHPGC Project PEIR Red Line Boundary, any measurable change will be short-term in any one location.
- 3.8.2.31 Therefore, taking account of the embedded mitigation measures described above, increases in SSC and associated deposition are predicted to be temporary, localised and reversible. Whilst limited increases in SSC and associated deposition may occur within parts of the Firth of Forth Banks Complex MPA, these effects are predicted to be small in extent and short-lived, and deposition within the Farnes East MCZ and North East of Farnes Deep MCZ/HPMA is considered negligible. Across the wider Benthic Subtidal Ecology Study Area, increases in SSC and associated deposition are expected to occur within and adjacent to the MHPGC Project PEIR Red Line Boundary during construction. The highest SSCs and deposition rates are predicted to occur within 500m of construction activities, with lower concentrations and only minor deposition of fine sediments extending beyond this distance within the Benthic Subtidal Ecology Study Area before returning to background conditions within 24 to 48 hours. Consequently the magnitude of increased SSCs and associated deposition, including within any designated sites in the Benthic Subtidal and Intertidal Ecology Study Area, during the construction phase in both Scottish and English waters is considered to be **low**.

Receptor sensitivity

- 3.8.2.32 The sensitivity of VER's within the Benthic Subtidal and Intertidal Ecology Study Area (including within the MHPGC Project PEIR Red Line Boundary) (**Table 3.10** and **Table 3.11**), with reference to the MarESA benchmarks changes in suspended solids (water clarity), light smothering and heavy

smothering, is summarised in **Table 3.20**. FeAST sensitivity assessments are available for only a subset of VERs and are discussed within the relevant receptor-specific text.

- 3.8.2.33 The VERs are assessed as having sensitivities ranging from negligible to medium with respect to increased SSCs and associated deposition. Most habitats and species are assessed as not sensitive or of low sensitivity to changes in suspended solids and light smothering; however, several receptors exhibit medium sensitivity to heavy smothering. This assessment includes representative biotopes of the broadscale habitat features of the Firth of Forth Banks Complex MPA, Farnes East MCZ and North East of Farnes Deep MCZ/HPMA.

Scottish waters

- 3.8.2.34 The biotope MD6218 dominated the offshore export cable corridor and is associated with the Scottish PMF 'offshore deep-sea mud' habitat. MarESA identifies the biotope as not sensitive to changes in suspended solids (water clarity) and light smothering, but of medium sensitivity to heavy smothering (Harris *et al.*, 2025a). Characteristic infaunal species are adapted to naturally depositional environments and can generally tolerate temporary sediment deposition. However, substantial burial may affect feeding and burrowing behaviour and reduce survival of some individuals. Consequently, sensitivity to increased SSCs and associated deposition is considered **medium**.
- 3.8.2.35 The biotopes MC5211, MC5212 and MD4211 are associated with the PMF 'offshore subtidal sands and gravels', a feature of the Montrose Bank section of the Firth of Forth Banks Complex MPA, located immediately adjacent to the western side of the MHPGC Project PEIR Red Line Boundary. MarESA identifies these biotopes as having low sensitivity to changes in suspended solids and light smothering, and medium sensitivity to heavy smothering (Tillin and Watson, 2023; Tillin and Watson, 2025a; 2025b). These biotopes occur within naturally dynamic sedimentary environments and are characterised by infaunal species adapted to periodic sediment movement and deposition. However, substantial sediment deposition may affect the ability of some species to maintain contact with the sediment surface. Therefore, sensitivity to increased SSCs and associated deposition is considered **medium**.
- 3.8.2.36 Ocean quahog is a PMF, an OSPAR threatened and/or declining species, and a feature of the Firth of Forth Banks Complex MPA. MarESA identifies ocean quahog as not sensitive to changes in suspended solids (water clarity), light smothering or heavy smothering (Tyler-Walters and Sabatini, 2017). This assessment reflects the species' ability to tolerate sediment deposition and re-establish contact with the sediment surface through upward burrowing. Consequently, sensitivity to increased SSCs and associated deposition is considered **negligible**.
- 3.8.2.37 The scarce tube-dwelling anemone, which is a Scottish PMF and a species on the Scottish Biodiversity List, was recorded at four stations across the area of the MHPGC Project PEIR Red Line Boundary that overlaps with Morven North and Morven South. No species-specific assessment is available within MarESA or FeAST and sensitivity has therefore been determined using expert judgement. As a sedentary species inhabiting soft sediments (Wilson, 2007), individuals may be affected by elevated suspended sediments and sediment deposition; however, the species is adapted to sedimentary environments and is expected to tolerate temporary sediment accumulation. Applying a precautionary approach, sensitivity to increased SSCs and associated deposition is considered **medium**.
- 3.8.2.38 Stony reef habitats, in the form of isolated or scattered cobbles/boulders, were also identified within the MHPGC Project PEIR Red Line Boundary, noting there is no overlap with designated sites which protect stony reef. Sensitivity has been assessed using the proxy biotope 'Sparse sponges, *Nemertesia* spp. and *Alcyonidium diaphanum* on circalittoral mixed substrata' (MC1217), as no assessment is available for the representative biotope identified within the Benthic Subtidal Ecology Study Area. MarESA identifies the proxy biotope as not sensitive to changes in suspended solids (water clarity) and light smothering, and of low sensitivity to heavy smothering (Readman *et al.*, 2023b). The characteristic sponge, hydroid and bryozoan assemblages are generally tolerant of short-term increases in suspended sediments, although prolonged sediment deposition may reduce

feeding efficiency. Consequently, sensitivity to increased SSCs and associated deposition is considered **low**.

English waters

Subtidal

- 3.8.2.39 ‘Sea pen and burrowing megafauna communities’ is an OSPAR-listed habitat and a feature of the Farnes East MCZ (2.2km west of the MHPGC Project PEIR Red Line Boundary). MarESA identifies the representative biotope as having medium sensitivity to changes in suspended solids (water clarity), but being not sensitive to light and heavy smothering (Moyse *et al.*, 2026). Characteristic species occur naturally within depositional muddy environments and are generally tolerant of temporary increases in sedimentation. Consequently, sensitivity to increased SSCs and associated deposition is considered **medium**.
- 3.8.2.40 ‘Moderate energy circalittoral rock’ is a designated feature of Farnes East MCZ. The sensitivity assessment presented for stony reef habitats in Scottish waters (**Paragraph 3.8.2.38**) is considered equally applicable to this feature, as both are represented by the proxy biotope MC1217. MarESA identifies the proxy biotope as not sensitive to changes in suspended solids (water clarity) and light smothering, and of low sensitivity to heavy smothering (Readman *et al.*, 2023b). Consequently, sensitivity to increased SSCs and associated deposition is considered **low**.
- 3.8.2.41 Biotopes associated with the HPI and UK BAP Priority Habitat ‘sublittoral sands and gravels’ are present within the offshore export cable corridor and are features of Farnes East MCZ and North East of Farnes Deep MCZ/HPMA (with the latter located 4.1km east of the MHPGC Project PEIR Red Line Boundary). MarESA assessments identify sensitivities ranging from not sensitive to low for changes in suspended solids (water clarity) and light smothering, and medium sensitivity to heavy smothering (De-Bastos *et al.*, 2023; Harris and De-Bastos, 2023; Tillin *et al.*, 2023; Tillin and Rayment, 2023; Tillin and Watson, 2023; 2025a; 2025b). These sedimentary biotopes are naturally exposed to periodic sediment movement; however, substantial deposition may affect the ability of some species to maintain contact with the sediment surface. While heavy smothering is not predicted to extend to the adjacent MCZ/HPMA, the conservation importance of the designated features has been considered, and a precautionary sensitivity of **medium** is applied.
- 3.8.2.42 The biotopes MD6217, MD6218 and MC6212 are associated with the HPI and UK BAP Priority Habitat ‘mud habitats in deep water’ and are features of Farnes East MCZ and North East of Farnes Deep MCZ/HPMA. MarESA identifies these biotopes as not sensitive to changes in suspended solids (water clarity) and light smothering, but of medium sensitivity to heavy smothering (Harris *et al.*, 2025a; 2025b; 2025c). The characterising fauna are adapted to fine sediment habitats and can generally tolerate temporary sediment deposition. However, substantial burial may affect feeding and burrowing behaviour and reduce survival of some individuals. Consequently, sensitivity to increased SSCs and associated deposition is considered **medium**.
- 3.8.2.43 Although *S. spinulosa* reef was not confirmed during project surveys, its potential occurrence within the wider Benthic Subtidal Ecology Study Area has been considered on a precautionary basis. MarESA identifies *S. spinulosa* reef as not sensitive to changes in suspended solids (water clarity) and light smothering, but of medium sensitivity to heavy smothering (Tillin *et al.*, 2025). *S. spinulosa* is naturally adapted to turbid environments and relies on suspended particles for feeding and tube construction, making it generally tolerant of temporary increases in SSCs and moderate burial. However, substantial sediment deposition may clog feeding structures, impair reef function and, in extreme cases, result in loss of reef structure. Recovery is expected through recruitment and recolonisation where suitable conditions persist. Consequently, sensitivity to increased SSCs and associated deposition is considered **medium**.
- 3.8.2.44 Ocean quahog is an OSPAR threatened and/or declining species and a protected feature of Farnes East MCZ and North East of Farnes Deep MCZ/HPMA. The sensitivity assessment present for ocean quahog in Scottish waters (**Paragraph 3.8.2.36**) is considered equally applicable to this feature. Consequently, sensitivity to increased SSCs and associated deposition is considered **negligible**.

3.8.2.45 There is evidence of kelp habitat within the Benthic Subtidal Ecology Study Area in the section approaching landfall, to the northwest of the MHPGC Project PEIR Red Line Boundary. However, neither kelp habitat nor kelp species were identified within the MHPGC Project PEIR Red Line Boundary. Kelp habitat is a HPI and UK BAP Priority Habitat and is therefore of high conservation value and national importance. The representative biotope MB1215 has medium sensitivity to changes in suspended solids (water clarity), is not sensitive to light smothering and has low sensitivity to heavy smothering (Harris *et al.*, 2026). Increased SSCs may temporarily reduce light availability for photosynthesis; however, established kelp plants are generally tolerant of temporary increases in suspended sediments and sediment deposition. Consequently, sensitivity to increased SSCs and associated deposition is considered **medium**.

Intertidal

3.8.2.46 Intertidal surveys for the MHPGC Project were completed in August 2026, however the survey data will not be available to inform PEIR and so intertidal habitats have been determined based on a desktop review (**Section 3.4.6**). Intertidal survey results will inform the ES for DCO submission.

3.8.2.47 Intertidal rocky reef is an Annex I habitat, HPI, UK BAP Priority Habitat and FOCI and is therefore of national importance. As summarised in **Table 3.20**, the proxy biotope MA12232 is assessed as having low sensitivity to changes in suspended solids (water clarity) and medium sensitivity to both light and heavy smothering (Tillin *et al.*, 2024). Temporary increases in suspended sediments may reduce feeding efficiency and light availability, while sediment deposition may affect feeding and respiration of characteristic fauna. Consequently, sensitivity to increased SSCs and associated deposition is considered **medium**.

3.8.2.48 Intertidal mudflats are an Annex I habitat, HPI, UK BAP Priority Habitat and FOCI and are therefore of national importance. The proxy biotope MA6224 is assessed as not sensitive to changes in suspended solids (water clarity), with low sensitivity to light and heavy smothering (Tillin *et al.*, 2026). Characteristic species are adapted to naturally turbid sedimentary environments and are generally tolerant of temporary sediment deposition. Consequently, sensitivity to increased SSCs and associated deposition is considered **low**.

3.8.2.49 Intertidal sandflats are an Annex I habitat, HPI, UK BAP Priority Habitat and FOCI and are therefore of national importance. The proxy biotope MB5237 is assessed as not sensitive to changes in suspended solids (water clarity) and light smothering, and of low sensitivity to heavy smothering (Tillin *et al.*, 2023). Characteristic species such as *Arenicola marina* are adapted to naturally dynamic sedimentary environments and periodic sediment disturbance. Consequently, sensitivity to increased SSCs and associated deposition is considered **low**.

Table 3.20: MarESA sensitivity ratings for Scottish and English marine benthic features assessed for increased SSCs and associated deposition during construction

Feature/Habitat type	Associated VER	MarESA sensitivity rating
Scottish waters		
<i>Paramphionome jeffreysii</i> , <i>Thyasira</i> spp. and <i>Amphiura filiformis</i> in Atlantic offshore circalittoral sandy mud (MD6218)	Offshore deep-sea mud (subtidal mud)	Changes in suspended solids (water clarity): not sensitive Smothering and siltation rate changes (light): not sensitive Smothering and siltation rate changes (heavy): medium
<i>Echinocyamus pusillus</i> , <i>Ophelia borealis</i> and <i>Abra prismatica</i> in circalittoral fine sand (MC5211)	Offshore subtidal sands and gravels*	Changes in suspended solids (water clarity): low Smothering and siltation rate changes (light): low Smothering and siltation rate changes (heavy): medium

Feature/Habitat type	Associated VER	MarESA sensitivity rating
<i>Abra prismatica</i> , <i>Bathyporeia elegans</i> and polychaetes in circalittoral fine sand (MC5212)	Offshore subtidal sands and gravels*	Changes in suspended solids (water clarity): low Smothering and siltation rate changes (light): low Smothering and siltation rate changes (heavy): medium
Polychaete-rich deep <i>Venus</i> community in offshore mixed sediments (MD4211)	Offshore subtidal sands and gravels*	Changes in suspended solids (water clarity): low Smothering and siltation rate changes (light): low Smothering and siltation rate changes (heavy): medium
Ocean quahog	Ocean quahog*	Changes in suspended solids (water clarity): not sensitive Smothering and siltation rate changes (light): not sensitive Smothering and siltation rate changes (heavy): not sensitive
Scarce tube-dwelling anemone	N/A	No MarESA assessment.
Sparse sponges, <i>Nemertesia</i> spp. and <i>Alcyonidium diaphanum</i> on circalittoral mixed substrata' (MC1217)	Stony reef	Changes in suspended solids (water clarity): not sensitive Smothering and siltation rate changes (light): not sensitive Smothering and siltation rate changes (heavy): low
English waters: subtidal		
Sea pen and burrowing megafauna communities in circalittoral fine mud (MC6216)	Sea pen and burrowing megafauna communities*	Changes in suspended solids (water clarity): medium Smothering and siltation rate changes (light): not sensitive Smothering and siltation rate changes (heavy): not sensitive
Sparse sponges, <i>Nemertesia</i> spp. and <i>Alcyonidium diaphanum</i> on circalittoral mixed substrata (MC1217)	Moderate energy circalittoral rock*	Changes in suspended solids (water clarity): not sensitive Smothering and siltation rate changes (light): not sensitive Smothering and siltation rate changes (heavy): low
<i>Spisula subtruncata</i> and <i>Nephtys hombergii</i> in Atlantic infralittoral muddy sand (MB5238)	Sublittoral sands and gravels*	Changes in suspended solids (water clarity): low Smothering and siltation rate changes (light): low Smothering and siltation rate changes (heavy): medium
<i>Kurtiella bidentata</i> and <i>Thyasira</i> spp. in circalittoral muddy mixed sediment (MC4213)	Sublittoral sands and gravels*	Changes in suspended solids (water clarity): not sensitive Smothering and siltation rate changes (light): not sensitive Smothering and siltation rate changes (heavy): low

Feature/Habitat type	Associated VER	MarESA sensitivity rating
<i>Echinocyamus pusillus</i> , <i>Ophelia borealis</i> and <i>Abra prismatica</i> in circalittoral fine sand (MC5211)	Sublittoral sands and gravels*	Changes in suspended solids (water clarity): low Smothering and siltation rate changes (light): low Smothering and siltation rate changes (heavy): medium
<i>Abra prismatica</i> , <i>Bathyporeia elegans</i> and polychaetes in circalittoral fine sand (MC5212)	Sublittoral sands and gravels*	Changes in suspended solids (water clarity): low Smothering and siltation rate changes (light): low Smothering and siltation rate changes (heavy): medium
<i>Owenia fusiformis</i> and <i>Amphiura filiformis</i> in offshore circalittoral sand or muddy sand (MD5212)	Sublittoral sands and gravels*	Changes in suspended solids (water clarity): not sensitive Smothering and siltation rate changes (light): not sensitive Smothering and siltation rate changes (heavy): medium
Polychaete-rich deep <i>Venus</i> community in offshore mixed sediments (MD4211)	Sublittoral sands and gravels*	Changes in suspended solids (water clarity): low Smothering and siltation rate changes (light): low Smothering and siltation rate changes (heavy): medium
<i>Levinsonia gracilis</i> and <i>Heteromastus filiformis</i> in Atlantic offshore circalittoral mud and sandy mud (MD6217)	Mud habitats in deep water*	Changes in suspended solids (water clarity): not sensitive Smothering and siltation rate changes (light): not sensitive Smothering and siltation rate changes (heavy): medium
<i>Paramphinoe jeffreysii</i> , <i>Thyasira</i> spp. and <i>Amphiura filiformis</i> in Atlantic offshore circalittoral sandy mud (MD6218)	Mud habitats in deep water*	Changes in suspended solids (water clarity): not sensitive Smothering and siltation rate changes (light): not sensitive Smothering and siltation rate changes (heavy): medium
<i>Thyasira</i> spp. and <i>Ennucula tenuis</i> in circalittoral sandy mud (MC6212)	Mud habitats in deep water*	Changes in suspended solids (water clarity): not sensitive Smothering and siltation rate changes (light): not sensitive Smothering and siltation rate changes (heavy): medium
<i>Sabellaria spinulosa</i> on stable circalittoral mixed sediment (MC2211)	<i>S. spinulosa</i> reef	Changes in suspended solids (water clarity): not sensitive Smothering and siltation rate changes (light): not sensitive Smothering and siltation rate changes (heavy): medium
Ocean quahog	Ocean quahog*	Changes in suspended solids (water clarity): not sensitive Smothering and siltation rate changes (light): not sensitive

Feature/Habitat type	Associated VER	MarESA sensitivity rating
		Smothering and siltation rate changes (heavy): not sensitive
<i>Laminaria hyperborea</i> with dense foliose red seaweeds on exposed infralittoral rock (MB1215)	Kelp bed	Changes in suspended solids (water clarity): medium Smothering and siltation rate changes (light): not sensitive Smothering and siltation rate changes (heavy): low
English waters: intertidal		
<i>Semibalanus balanoides</i> , <i>Fucus vesiculosus</i> and red seaweeds on exposed to moderately exposed eulittoral rock (MA12232)	Intertidal rocky reef	Changes in suspended solids (water clarity): low Smothering and siltation rate changes (light): medium Smothering and siltation rate changes (heavy): medium
<i>Hediste diversicolor</i> and <i>Macoma balthica</i> in littoral sandy mud (MA6224)	Intertidal mudflats	Changes in suspended solids (water clarity): not sensitive Smothering and siltation rate changes (light): low Smothering and siltation rate changes (heavy): low
<i>Arenicola marina</i> in infralittoral fine sand or muddy sand (MB5237)	Intertidal sandflats	Changes in suspended solids (water clarity): not sensitive Smothering and siltation rate changes (light): not sensitive Smothering and siltation rate changes (heavy): low
*Feature designated within one or more MPAs, MCZs or HPMAs in the respective jurisdiction and overlapping the Benthic Subtidal and Intertidal Ecology Study Area		

Significance of effect

- 3.8.2.50 Overall, it is considered that the worst-case receptor sensitivity is **medium** and the magnitude of increased SSCs and associated deposition is **low** in both Scottish and English waters. Therefore, the worst-case effect of increased SSCs and associated deposition, during the construction phase, is considered to be **minor adverse** in both Scottish and English waters, which is not significant in EIA terms.

Secondary mitigation and residual effect

- 3.8.2.51 At this stage, no secondary mitigation is proposed for increased SSCs and associated deposition in Scottish or English waters. Therefore, the residual effect of increased SSCs and associated deposition, during the construction phase, is considered at most to be **minor adverse**, which is not significant in EIA terms.

Disturbance/remobilisation of sediment bound contaminants

- 3.8.2.52 Indirect effects of sediment disturbance during construction can include the disturbance and/or the remobilisation of sediment bound contaminants into the water column. This can include remobilisation of heavy metals and hydrocarbons resulting in an increase of contaminant concentrations above background levels. Further information can also be found in **Volume 2, Chapter 2: Offshore Water and Sediment Quality, of the PEIR**.

Magnitude of impact

- 3.8.2.53 Disturbance and therefore remobilisation of sediment-bound contaminants is expected to be limited to areas within the MHPGC Project PEIR Red Line Boundary where cable installation activities will be occurring. However, the remobilisation of sediment-bound contaminants could have subsequent effects on benthic habitats and species beyond the MHPGC Project PEIR Red Line Boundary. The distance to which disturbed/remobilised sediment bound contaminants may travel is expected to be in line with the maximum dispersion distances for increased SSC, described in **Paragraph 3.8.2.48** onwards, of 9km (i.e. the maximum tidal excursion distance).
- 3.8.2.54 In Scottish waters, during MHPGC Project-specific subtidal benthic surveys, concentrations of PCBs, PAHs and organotins in sediment samples taken from within the MHPGC Project PEIR Red Line Boundary were all below the limit of detection (Gardline, 2024a; 2025a) (see **Volume 2, Annex 3.1: Benthic Ecology Technical Report, of the PEIR**). Concentrations of heavy metals were also consistent with background conditions in the central North Sea, except for one location (KP183) where arsenic exceeded the ERL value. However, arsenic is also considered to exceed background concentrations within the Firth of Forth Banks Complex MPA and therefore this isn't limited to sediments within the MHPGC Project PEIR Red Line Boundary (JNCC, 2018b).
- 3.8.2.55 In Scottish waters, site-specific subtidal benthic surveys undertaken for Morven North and Morven South identified only one station, located in the northern extent of Morven North, where concentrations exceeded the Marine Scotland AL1 and the CSQG TEL; however, concentrations remained below the Cefas AL2 and the CSQG PEL (Tetra Tech RPS Energy, 2026a). All other sampling stations recorded arsenic and metal concentrations below the relevant Marine Scotland AL1 and CSQG TEL thresholds. Concentrations of PCBs were generally low, with only four stations recording detectable levels, all of which were below Marine Scotland AL1 and CSQG TEL values, while concentrations of all PAHs remained below their respective CSQG TEL and Marine Scotland AL1 thresholds. Organotin compounds were not detected at any sampling station (Tetra Tech RPS Energy, 2026a).
- 3.8.2.56 In English waters, MHPGC Project-specific subtidal benthic surveys identified that concentrations of PCBs and organotins did not exceed EQS (Gardline, 2024a; 2025a). When considering heavy metals, cadmium, copper and mercury were also below EQS. However, some metals did exceed Cefas AL 1 (a level above which chemicals are deemed unacceptable for uncontrolled disposal at sea without special handling). The highest concentrations of heavy metals were identified by the landfall where higher proportions of fine sediment are present. However, the concentrations identified in English waters were considered to be consistent with natural background variation.
- 3.8.2.57 Embedded mitigation has been incorporated into the MHPGC Project design to minimise the potential for contaminant mobilisation and release during construction activities (**Table 3.18**). An Outline OEMP (CoT06/MM-006) will be prepared and submitted with the application for development consent and will include, amongst other measures, a chemical risk assessment, provisions for the handling and disposal of waste, and procedures relating to the use, storage and transport of chemicals in accordance with recognised best practice guidance. In addition, an Offshore CMS (CoT14/MM-022) will be implemented prior to construction to manage construction-related activities that may result in seabed disturbance. An Outline MPCP (CoT37) will also be developed as part of the Outline OEMP and will set out the procedures for managing spills and contaminant releases during construction and operation.
- 3.8.2.58 Based on the chemical analysis results presented in **Volume 2, Annex 3.1: Benthic Ecology Technical Report, of the PEIR**, it is not anticipated that sediment disturbance and deposition during construction will result in detectable changes in sediment bound contaminants above background levels and natural variation, including within the Firth of Forth Banks Complex MPA, Farnes East MCZ and North East of Farnes Deep MCZ/HPMA.
- 3.8.2.59 Sediment bound contaminants are only expected to be disturbed and remobilised for the duration of seabed disturbance along the MHPGC Project PEIR Red Line Boundary, with construction activities lasting for a short period of time in any one place within the MHPGC Project PEIR Red Line Boundary.

Furthermore, sediment bound contaminants are expected to be regularly mobilised by natural disturbance such as currents, waves and storm events, and rapidly dispersed following disturbance due to local hydrodynamic conditions (see **Volume 2, Chapter 1: Physical Processes, of the PEIR**). Therefore, any elevated levels of disturbed contaminants above background conditions during construction activities are expected to return to baseline levels rapidly following disturbance.

- 3.8.2.60 Therefore, taking account of the embedded mitigation measures described above, and given that contaminant concentrations recorded within the MHPGC Project PEIR Red Line Boundary are generally consistent with background conditions and expected to disperse rapidly following disturbance, the magnitude of disturbance/remobilisation of sediment bound contaminants in both Scottish and English waters, during the construction phase is considered to be **negligible**.

Receptor sensitivity

- 3.8.2.61 The sensitivity of VER's within the Benthic Subtidal and Intertidal Ecology Study Area (including within the MHPGC Project PEIR Red Line Boundary) (**Table 3.10** and **Table 3.11**), with reference to the MarESA benchmarks for exposure to transition elements and organometal contamination, and hydrocarbon and PAH contamination, is summarised in **Table 3.21**. Where available, MarESA and FeAST assessments relating to transition elements and organometal contamination, and hydrocarbon and PAH contamination, have been used to inform the assessment. Where published sensitivity assessments are unavailable, sensitivity has been determined using professional judgement.
- 3.8.2.62 The VERs are assessed as having sensitivities ranging from low to high with respect to the disturbance and remobilisation of sediment-bound contaminants. Most habitats and species are assessed as having low sensitivity, reflecting either low MarESA sensitivity ratings or the absence of evidence indicating susceptibility to contaminant concentrations representative of natural background conditions. However, some receptors, including sea pen and burrowing megafauna communities, exhibit higher sensitivity to contaminant pressures. This assessment includes representative biotopes of the broadscale habitat features of the Firth of Forth Banks Complex MPA, Farnes East MCZ and North East of Farnes Deep MCZ/HPMA.

Scottish waters

- 3.8.2.63 The biotope MD6218 is associated with the Scottish PMF 'offshore deep-sea mud' habitat. No published MarESA or FeAST sensitivity assessment is available for contaminant pressures (Harris *et al.*, 2025a; NatureScot, 2026). Characteristic species occur naturally within depositional environments where contaminants may accumulate within sediments. However, elevated contaminant concentrations may adversely affect survival, growth and reproduction. Consequently, sensitivity to the disturbance and remobilisation of sediment-bound contaminants is considered **medium**.
- 3.8.2.64 The biotopes MC5211, MC5212 and MD4211 are associated with the PMF 'offshore subtidal sands and gravels' which is a protected feature of the Firth of Forth banks Complex MPA, located immediately adjacent to the western side of the MHPGC Project PEIR Red Line Boundary. MarESA identifies the representative biotopes MC5211 and MC5212 as having low sensitivity to transition elements and organometal contamination, and hydrocarbon and PAH contamination (Tillin and Watson, 2025a; 2025b). Consequently, sensitivity to the disturbance and remobilisation of sediment-bound contaminants is considered **low**.
- 3.8.2.65 Ocean quahog is a PMF, an OSPAR threatened and/or declining species, and a feature of the Firth of Forth Banks Complex MPA. No published MarESA or FeAST sensitivity assessment is available; however, ocean quahog is considered not sensitive to contaminant concentrations below environmental quality standards, while responses above these thresholds remain uncertain (JNCC, 2018b). Applying a precautionary approach, sensitivity to the disturbance and remobilisation of sediment-bound contaminants is considered **medium**.

- 3.8.2.66 The scarce tube-dwelling anemone is a Scottish PMF and species on the Scottish Biodiversity List. No published MarESA or FeAST sensitivity assessment is available for this species. As a sedentary soft-sediment species, contaminant exposure may affect survival, growth and reproductive success (Wilson, 2007). Applying professional judgement, sensitivity to the disturbance and remobilisation of sediment-bound contaminants is considered **medium**.
- 3.8.2.67 Stony reef habitats, in the form of isolated or scattered cobbles/boulders, were also identified within the MHPGC Project PEIR Red Line Boundary, noting there is no overlap with designated sites which protect stony reef. No species-specific assessment is available within MarESA or FeAST and sensitivity has therefore been determined using expert judgement. Although hard-substrate habitats are not typically associated with the accumulation of contaminated sediments, suspension-feeding fauna may be exposed to contaminants through contact with suspended material and uptake during feeding. Consequently, sensitivity to the disturbance and remobilisation of sediment-bound contaminants is considered **medium**.
- English waters
Subtidal
- 3.8.2.68 ‘Sea pen and burrowing megafauna communities’ is an OSPAR-listed habitat and a feature of the Farnes East MCZ (2.2km west of the MHPGC Project PEIR Red Line Boundary). MarESA identifies the representative biotope as having high sensitivity to transition elements and organometal contamination, and hydrocarbon and PAH contamination (Moyse *et al.*, 2026). Consequently, sensitivity to the disturbance and remobilisation of sediment-bound contaminants is considered **high**.
- 3.8.2.69 ‘Moderate energy circalittoral rock’ is a designated feature of Farnes East MCZ. The sensitivity assessment presented for stony reef habitats in Scottish waters (**Paragraph 3.8.2.67**) is considered equally applicable to this feature. Consequently, sensitivity to the disturbance and remobilisation of sediment-bound contaminants is considered **medium**.
- 3.8.2.70 Biotopes associated with the HPI and UK BAP Priority Habitat ‘sublittoral sands and gravels’ are present within the offshore export cable corridor and are features of Farnes East MCZ and North East of Farnes Deep MCZ/HPMA (with the latter located 4.1km east of the MHPGC Project PEIR Red Line Boundary). MarESA identifies representative biotopes MC5211 and MC5212 as having low sensitivity to transition elements and organometal contamination, and hydrocarbon and PAH contamination (Tillin and Watson, 2025a; 2025b). Consequently, sensitivity to the disturbance and remobilisation of sediment-bound contaminants is considered **low**.
- 3.8.2.71 The biotopes MD6217, MD6218 and MC6212 are associated with the HPI and UK BAP Priority Habitat ‘mud habitats in deep water’ and are features of Farnes East MCZ and North East of Farnes Deep MCZ/HPMA. No published MarESA or FeAST sensitivity assessments are available for these contaminant pressures (Harris *et al.*, 2025a; 2025b; 2025c). Characteristic species occur naturally within depositional environments where contaminants may accumulate within sediments; however, elevated contaminant concentrations may adversely affect survival, growth and reproduction. Consequently, sensitivity to the disturbance and remobilisation of sediment-bound contaminants is considered **low**.
- 3.8.2.72 Although *S. spinulosa* reef was not confirmed during project surveys, its potential occurrence within the wider Benthic Subtidal Ecology Study Area has been considered on a precautionary basis. No published MarESA sensitivity assessment is available for contaminant pressures (Tillin *et al.*, 2025). As a filter-feeding reef-forming polychaete, exposure may occur through direct contact with suspended sediments and uptake during feeding. Consequently, sensitivity to the disturbance and remobilisation of sediment-bound contaminants is considered **medium**.
- 3.8.2.73 Ocean quahog is an OSPAR threatened and/or declining species and a protected feature of Farnes East MCZ and North East of Farnes Deep MCZ/HPMA. The sensitivity assessment present for ocean quahog in Scottish waters (**Paragraph 3.8.2.65**) is considered equally applicable to this feature.

Consequently, sensitivity to the disturbance and remobilisation of sediment-bound contaminants is considered **medium**.

- 3.8.2.74 Kelp habitat is a HPI and UK BAP Priority Habitat and is therefore of national importance. No published sensitivity assessment is available for contaminant pressures. As kelp habitats are not typically associated with the accumulation of contaminated sediments and occur within naturally dynamic coastal environments, sensitivity to the disturbance and remobilisation of sediment-bound contaminants is considered **low**.

Intertidal

- 3.8.2.75 The results of the intertidal surveys undertaken in August 2026 for the MHPGC Project, are not yet available and so intertidal habitats have been determined based on a desktop review (**Section 3.4.6**). The project specific survey results will inform the ES for DCO submission.
- 3.8.2.76 Intertidal rocky reef is an Annex I habitat, HPI, UK BAP Priority Habitat and FOCI. No published contaminant sensitivity assessment is available for the representative proxy biotope (Tillin *et al.*, 2024). As hard-substrate habitats are unlikely to accumulate contaminated sediments to the same extent as muddy habitats, sensitivity to the disturbance and remobilisation of sediment-bound contaminants is considered **low**.
- 3.8.2.77 Intertidal mudflats are an Annex I habitat, HPI, UK BAP Priority Habitat and FOCI. MarESA identifies the representative biotope as having medium sensitivity to transition elements and organometal contamination and low sensitivity to hydrocarbon and PAH contamination (Tillin *et al.*, 2026). Applying a precautionary approach, sensitivity to the disturbance and remobilisation of sediment-bound contaminants is considered **medium**.
- 3.8.2.78 Intertidal sandflats are an Annex I habitat, HPI, UK BAP Priority Habitat and FOCI. No published sensitivity assessment is available for contaminant pressures. As sandy sediments generally exhibit lower contaminant accumulation than muddy habitats, sensitivity to the disturbance and remobilisation of sediment-bound contaminants is considered **low**.

Table 3.21: MarESA sensitivity ratings for Scottish and English marine benthic features assessed for disturbance or remobilisation of sediment bound contaminants

Feature/Habitat type	Associated VER	MarESA sensitivity rating
Scottish waters		
<i>Paramphinoe jeffreysii</i> , <i>Thyasira</i> spp. and <i>Amphiura filiformis</i> in Atlantic offshore circalittoral sandy mud (MD6218)	Offshore deep-sea mud (subtidal mud)	Transition elements and organometal contamination: no assessment available Hydrocarbon and PAH contamination: no assessment available
<i>Echinocyamus pusillus</i> , <i>Ophelia borealis</i> and <i>Abra prismatica</i> in circalittoral fine sand (MC5211)	Offshore subtidal sands and gravels*	Transition elements and organometal contamination: low Hydrocarbon and PAH contamination: low
<i>Abra prismatica</i> , <i>Bathyporeia elegans</i> and polychaetes in circalittoral fine sand (MC5212)	Offshore subtidal sands and gravels*	Transition elements and organometal contamination: low Hydrocarbon and PAH contamination: low
Polychaete-rich deep <i>Venus</i> community in offshore mixed sediments (MD4211)	Offshore subtidal sands and gravels*	Transition elements and organometal contamination: no assessment available Hydrocarbon and PAH contamination: no assessment available
Ocean quahog	Ocean quahog*	Transition elements and organometal contamination: no assessment available Hydrocarbon and PAH contamination: no assessment available

Feature/Habitat type	Associated VER	MarESA sensitivity rating
Scarce tube-dwelling anemone	N/A	No MarESA assessment.
Sparse sponges, <i>Nemertesia</i> spp. and <i>Alcyonidium diaphanum</i> on circalittoral mixed substrata' (MC1217)	Stony reef	Transition elements and organometal contamination: no assessment available Hydrocarbon and PAH contamination: no assessment available
English waters: subtidal		
Sea pen and burrowing megafauna communities in circalittoral fine mud (MC6216)	Sea pen and burrowing megafauna communities*	Transition elements and organometal contamination: high Hydrocarbon and PAH contamination: high
Sparse sponges, <i>Nemertesia</i> spp. and <i>Alcyonidium diaphanum</i> on circalittoral mixed substrata (MC1217)	Moderate energy circalittoral rock*	Transition elements and organometal contamination: no assessment available Hydrocarbon and PAH contamination: no assessment available
<i>Spisula subtruncata</i> and <i>Nephtys hombergii</i> in Atlantic infralittoral muddy sand (MB5238)	Sublittoral sands and gravels*	Transition elements and organometal contamination: no assessment available Hydrocarbon and PAH contamination: no assessment available
<i>Kurtiella bidentata</i> and <i>Thyasira</i> spp. in circalittoral muddy mixed sediment (MC4213)	Sublittoral sands and gravels*	Transition elements and organometal contamination: no assessment available Hydrocarbon and PAH contamination: no assessment available
<i>Echinocyamus pusillus</i> , <i>Ophelia borealis</i> and <i>Abra prismatica</i> in circalittoral fine sand (MC5211)	Sublittoral sands and gravels*	Transition elements and organometal contamination: low Hydrocarbon and PAH contamination: low
<i>Abra prismatica</i> , <i>Bathyporeia elegans</i> and polychaetes in circalittoral fine sand (MC5212)	Sublittoral sands and gravels*	Transition elements and organometal contamination: low Hydrocarbon and PAH contamination: low
<i>Owenia fusiformis</i> and <i>Amphiura filiformis</i> in offshore circalittoral sand or muddy sand (MD5212)	Sublittoral sands and gravels*	Transition elements and organometal contamination: no assessment available Hydrocarbon and PAH contamination: no assessment available
Polychaete-rich deep <i>Venus</i> community in offshore mixed sediments (MD4211)	Sublittoral sands and gravels*	Transition elements and organometal contamination: no assessment available Hydrocarbon and PAH contamination: no assessment available
<i>Levinsenia gracilis</i> and <i>Heteromastus filiformis</i> in Atlantic offshore circalittoral mud and sandy mud (MD6217)	Mud habitats in deep water*	Transition elements and organometal contamination: no assessment available Hydrocarbon and PAH contamination: no assessment available
<i>Paramphinoe jeffreysii</i> , <i>Thyasira</i> spp. and <i>Amphiura filiformis</i> in Atlantic offshore circalittoral sandy mud (MD6218)	Mud habitats in deep water*	Transition elements and organometal contamination: no assessment available Hydrocarbon and PAH contamination: no assessment available
<i>Thyasira</i> spp. and <i>Ennucula tenuis</i> in circalittoral sandy mud (MC6212)	Mud habitats in deep water*	Transition elements and organometal contamination: no assessment available Hydrocarbon and PAH contamination: no assessment available

Feature/Habitat type	Associated VER	MarESA sensitivity rating
<i>Sabellaria spinulosa</i> on stable circalittoral mixed sediment (MC2211)	<i>S. spinulosa</i> reef	Transition elements and organometal contamination: no assessment available Hydrocarbon and PAH contamination: no assessment available
Ocean quahog	Ocean aggregations quahog	Transition elements and organometal contamination: no assessment available Hydrocarbon and PAH contamination: no assessment available
<i>Laminaria hyperborea</i> with dense foliose red seaweeds on exposed infralittoral rock (MB1215)	Kelp bed	Transition elements and organometal contamination: no assessment available Hydrocarbon and PAH contamination: no assessment available
English waters: intertidal		
<i>Semibalanus balanoides</i> , <i>Fucus vesiculosus</i> and red seaweeds on exposed to moderately exposed eulittoral rock (MA12232)	Intertidal rocky reef	Transition elements and organometal contamination: no assessment available Hydrocarbon and PAH contamination: no assessment available
<i>Hediste diversicolor</i> and <i>Macoma balthica</i> in littoral sandy mud (MA6224)	Intertidal mudflats	Transition elements and organometal contamination: medium Hydrocarbon and PAH contamination: low
<i>Arenicola marina</i> in infralittoral fine sand or muddy sand (MB5237)	Intertidal sandflats	Transition elements and organometal contamination: no assessment available Hydrocarbon and PAH contamination: no assessment available
*Feature designated within one or more MPAs, MCZs or HPMAs in the respective jurisdiction and overlapping the Benthic Subtidal and Intertidal Ecology Study Area		

Significance of effect

3.8.2.79 Overall, it is considered that the worst-case receptor sensitivity is **high** and the magnitude of disturbance/remobilisation of sediment bound contaminants is **negligible**. Therefore, the worst-case effect of disturbance/remobilisation of sediment bound contaminants, during the construction phase in both Scottish and English waters, is considered to be **minor adverse**, which is not significant in EIA terms.

Secondary mitigation and residual effect

3.8.2.80 At this stage, no secondary mitigation is proposed for disturbance/remobilisation of sediment bound contaminants in Scottish or English waters. Therefore, the residual effect of disturbance/remobilisation of sediment bound contaminants, during the construction phase, is considered at most to be **minor adverse**, which is not significant in EIA terms.

Increased risk of introduction and spread of invasive non-native species

3.8.2.81 During construction, an increased risk of introduction and spread of INNS in the Benthic Subtidal and Intertidal Ecology Study Areas could result from the use of vessels during construction for route clearance and cable installation within the MHPGC Project PEIR Red Line Boundary. In particular, INNS (including propagules such as eggs and larvae) could be transported via vessel hulls or through the release of ballast water.

3.8.2.82 The introduction of hard infrastructure into the marine environment, such as cable protection and cable crossings, within predominantly sedimentary habitats, could enable the colonisation of marine INNS that would otherwise be unlikely to occur, and increase the availability of hard substrate in

areas where it is already present (thereby potentially increasing INNS abundance). Hard infrastructure may also facilitate marine INNS spread and community connectivity, providing 'stepping stones' that aid dispersal to new locations (Adams *et al.*, 2013; De Mesel *et al.*, 2015; Collen *et al.*, 2020; Dauvin, 2024).

- 3.8.2.83 Sensitivity to the introduction and spread of INNS can vary between habitats and species based on resistance and resilience; however, sensitivity is likely to change depending on the INNS being considered. Marine INNS impacts are wide ranging, including direct effects such as food and space competition, predation and disease (Gallardo *et al.* 2015; Tsirintanis *et al.*, 2022). Indirect impacts may also occur, such as changes in nutrient cycling, ecosystem functioning and trophic interactions, which can have knock-on effects on benthic communities (Gallardo *et al.*, 2015; Dimitriadis *et al.*, 2021). Impacts associated with INNS and receptor sensitivity are therefore inherently difficult to predict and so a precautionary approach has been applied to the sensitivity assessment.

Magnitude of impact

- 3.8.2.84 During construction, an increased risk of introduction of INNS could occur due to the use of vessels in both Scottish and English waters. Offshore, there will be up to 550 return trips by installation vessels. A maximum of 33 vessels may be on site at any one time during the construction phase. At the landfall in English waters, a further 14 vessels could be on site at any one time, with up to 250 return trips by installation vessels. INNS can be introduced and spread through hull fouling and the release of ballast water.
- 3.8.2.85 During MHPGC Project specific subtidal benthic surveys, no INNS were identified in either Scottish or English waters. However, during a wider review (see **Volume 2, Annex 3.1: Benthic Ecology Technical Report, of this PEIR**), a record of orange-tipped sea squirt was found within the wider Benthic Subtidal Ecology Study Area in English waters. However, it is important to note that it is an established and a relatively widespread species around the coast of England, including the northeast. Furthermore, it is possible that other INNS are present within the Benthic Subtidal and Intertidal Ecology Study Area. INNS are difficult to detect, and the absence of records does not necessarily equate to true absence.
- 3.8.2.86 Embedded mitigation has been incorporated into the MHPGC Project design to minimise the risk of introducing and spreading INNS during construction (**Table 3.18**). An Outline MBP (CoT38) will form part of the Outline OEMP (CoT06/MM-006) submitted with the application for development consent and Marine Licence to the Scottish Ministers. The Outline MBP will include measures to follow the latest INNS guidance issued by the Great Britain Non-Native Species Secretariat, ensure compliance with the IMO Ballast Water Management Guidelines, and address biosecurity risks associated with offshore installation activities and any cable protection measures. A Detailed MBP will be developed substantially in accordance with the Outline MBP and implemented throughout construction activities.
- 3.8.2.87 The development and implementation of an Outline MBP (CoT38), secured through the Outline OEMP (CoT06/MM-006), will reduce the risk of INNS introduction and/or spread during construction activities. The measures contained within the MBP will minimise risks associated with vessel movements, ballast water management and biofouling, and will reduce the likelihood of construction activities acting as a pathway for the introduction or spread of INNS. Furthermore, no INNS were identified during the MHPGC Project-specific benthic surveys and only a single established INNS record was identified during the wider desktop review.
- 3.8.2.88 Therefore, taking account of the embedded mitigation measures described above, the likelihood of introduction and spread of INNS during the construction phase is considered to be very low. Consequently, the magnitude of increased risk of introduction and spread of INNS, during the construction phase in both Scottish and English waters is considered to be **negligible**.

Receptor sensitivity

- 3.8.2.89 In order to determine the sensitivity of each benthic subtidal and intertidal ecology receptor to the impacts of marine INNS, the following would need to be known: what marine INNS are present

(including species that may be introduced or become invasive in the future / during the lifetime of the project), their distribution and abundance, the full range of direct and indirect impacts associated with those species, and the influence of those impacts on each receptor. This is not considered realistic given the difficulties associated with detecting marine INNS and the complexity of their impacts (e.g., Gallardo *et al.*, 2015; Dimitriadis *et al.*, 2021).

3.8.2.90 Therefore, on a precautionary basis, a resistance value of low has been assigned to all benthic subtidal and intertidal ecology receptors, acknowledging that some species and habitats may be more tolerant than others. Similarly, resilience is considered low for all benthic subtidal and intertidal ecology receptors, since recovery to baseline conditions may be prolonged or unlikely following successful introduction of a marine INNS.

3.8.2.91 The sensitivity of all receptors within the Benthic Subtidal and Intertidal Ecology Area, to an introduction or spread of marine INNS is deemed to be at worst-case **high**. Whilst the successful introduction of a marine INNS could result in adverse ecological effects, these effects would depend on the species introduced and its ability to establish, spread and cause impacts.

Significance of effect

3.8.2.92 For both Scottish and English waters, it is considered that the receptor sensitivity is at worst-case **high** and the magnitude of increased risk of introduction and spread of INNS is **negligible**. Therefore, the worst-case effect of increased risk of introduction and spread of INNS, during the construction phase, is considered to be **minor adverse**, which is not significant in EIA terms.

Secondary mitigation and residual effect

3.8.2.93 At this stage, no secondary mitigation is proposed in relation to the increased risk of introduction and spread of INNS in Scottish or English waters. Therefore, the residual effect of increased risk of introduction and spread of INNS, during the construction phase, is considered at most to be **minor adverse**, which is not significant in EIA terms.

3.8.3 O&M phase

Long term habitat loss

3.8.3.1 Cable installation and repair during the O&M phase could both require the placement of protective hard substrates, such as concrete mattresses, rock bags and CPS and rock installation/backfill where minimum burial depth cannot be achieved and at exit pits. Rock protection could also be required at locations where cable crossings with third-party infrastructure occur.

3.8.3.2 At this stage of the assessment, the exact locations of cable protection placement and therefore the habitats directly affected by long term habitat loss are unknown. However, long term habitat loss as a result of cable protection would be restricted to the footprint of the cable protection materials (including cable protection, cable crossings and exit pit protection) and would also be limited to the MHPGC Project PEIR Red Line Boundary. As the landfall will be installed using trenchless techniques, long-term habitat loss associated with cable protection is not anticipated within intertidal habitats. Therefore, it has been assumed that hard structures such as cable protection could be placed within any subtidal habitat located in the MHPGC Project PEIR Red Line Boundary.

Magnitude of impact

3.8.3.3 Long-term habitat loss is expected to occur for the duration of the 35-year O&M phase of the MHPGC Project, for as long as cable protection is present.

3.8.3.4 Total habitat loss for cable protection is expected to be up to 770,760m² and will be localised to within the MHPGC Project PEIR Red Line Boundary. Up to 16 cable crossings will occur along the MHPGC Project PEIR Red Line Boundary which will require either concrete mattresses or rock installation, with a total habitat loss of 57,600m².

- 3.8.3.5 Exit pits at the landfall in English waters will also be filled with protection material, resulting in a maximum habitat loss of 28,000m². The protection would be installed within the footprint of the excavated exit pits. The landfall is located in predominantly muddy sediments which are widespread in the central and northern North Sea, with areas of rock and boulders.
- 3.8.3.6 Taking account of cable protection, cable crossings and exit pit protection, the maximum footprint of long-term habitat loss would be up to approximately 828,360m² within the MHPGC Project PEIR Red Line Boundary. The majority of cable crossings and placement of cable protection are expected to predominantly occur within soft sediment habitats which are widespread in the central and northern North Sea in both Scottish and English waters. The placement of cable protection will result in a change in habitat type from soft sediment to hard substrate. Long-term habitat loss will not affect any protected features of designated sites.
- 3.8.3.7 Cable protection will be reduced as far as possible through implementation of the Offshore CSIP (CoT08/MM-010), which includes cable burial as the preferred option for cable protection, where practicable (**Table 3.18**). Cable installation requirements will be informed by a CBRA and cable protection will only be used where burial cannot be achieved.
- 3.8.3.8 Therefore, taking account of the embedded mitigation measures described above it is considered that the overall magnitude of long-term habitat loss in both Scottish and English waters during the O&M phase is considered to be **low**.

Receptor sensitivity

- 3.8.3.9 All benthic receptors identified within the MHPGC Project PEIR Red Line Boundary have been assessed according to the MarESA sensitivity assessment as having no resistance to long-term or permanent habitat loss/change, with recovery in all receptors assessed as very low as the change at the pressure benchmark is at worst case permanent. Long-term habitat loss will not affect any protected features within designated sites. The sensitivity of subtidal receptors is therefore considered to be at worst-case **high**. A very high sensitivity rating has not been assigned because internationally designated features are located outside of the MHPGC Project PEIR Red Line Boundary and would not be subject to direct habitat loss resulting from the impact pathway.

Significance of effect

- 3.8.3.10 For both Scottish and English waters, it is considered that the worst-case receptor sensitivity is **high** and the magnitude of long-term habitat loss is **low**. Therefore, the worst-case effect of long-term habitat loss, during the O&M phase, is considered to be **minor adverse**, which is not significant in EIA terms. This is due to the relatively low area impacted by long term habitat loss compared to the large areas of unimpacted similar habitat regionally, the low numbers of ocean quahog and scarce tube-dwelling anemone recorded across the Benthic Subtidal Ecology Study Area, and the absence of direct impacts on protected features within designated sites, lowering the overall significance from moderate to minor.

Secondary mitigation and residual effect

- 3.8.3.11 At this stage, no secondary mitigation is proposed for long term habitat loss in Scottish or English waters. Therefore, the residual effect of long-term habitat loss, during the O&M phase, is considered at most to be **minor adverse**, which is not significant in EIA terms.

Temporary habitat loss and disturbance

- 3.8.3.12 During the O&M phase, temporary habitat loss and disturbance may occur as a result of maintenance and repair activities associated with the offshore export cables. These activities may include vessel anchoring, seabed preparation, cable inspection, maintenance, repair or replacement activities requiring localised seabed intervention. Different benthic habitats and species have varying sensitivities to temporary habitat disturbance depending on habitat stability, species vulnerability and resilience to disturbance.

Magnitude of impact

- 3.8.3.13 During the 35-year O&M phase of the MHPGC Project, up to 41 cable repairs are considered likely, resulting in a temporary habitat loss of up to 40,000m² per repair and up to 1,640,00m² in total. Up to 35 cable remediation events are also anticipated, with a total area of disturbance of up to 18,278,400m² over the total O&M phase (522,240m² per year). This disturbance will be limited to within the MHPGC Project PEIR Red Line Boundary and therefore any habitat loss will be localised.
- 3.8.3.14 Embedded mitigation has been incorporated into the MHPGC Project design to minimise habitat disturbance during O&M activities. An Outline Offshore Operations and Maintenance Plan (CoT07/MM-007) will be prepared and submitted with the application for development consent and Marine Licence(s) and a Detailed Offshore Operations and Maintenance Plan will be produced prior to entering the O&M phase. In addition, an Outline Offshore CSIP (CoT08/MM-010) will be prepared and submitted with the application for development consent and Marine Licence(s), which includes cable burial as the preferred option for cable protection, where practicable.
- 3.8.3.15 The magnitude of temporary habitat loss and disturbance during the O&M phase is considered to be no greater than during the construction phase. Therefore, it is considered that the magnitude of temporary habitat loss and disturbance in Scottish and English waters, during the O&M phase will be **low**.

Receptor sensitivity

- 3.8.3.16 The sensitivity of receptors is considered to be no greater than during the construction phase (**Paragraph 3.8.2.1 et seq.**). For Scottish and English waters, the sensitivities of habitats and species to temporary habitat loss and disturbance are detailed in **Table 3.19**.
- 3.8.3.17 The sensitivity of benthic subtidal features within the MHPGC Project PEIR Red Line Boundary is at worst-case **high**, with the sensitivity of the majority of the receptors medium or less, reflecting that the receptors have some ability to tolerate temporary habitat loss and disturbance.

Significance of effect

- 3.8.3.18 For both Scottish and English waters, it is considered that the worst-case receptor sensitivity is **high** and the magnitude of temporary habitat loss and disturbance is **low**. Therefore, taking into consideration the high sensitivity of some receptors, the worst-case effect of temporary habitat loss and disturbance, during the construction phase, is considered to be **minor adverse**, which is not significant in EIA terms. This is due to the relatively low area impacted by temporary habitat loss and disturbance compared to the large areas of unimpacted similar habitat regionally, the low numbers of ocean quahog and scarce tube-dwelling anemone recorded across the Benthic Subtidal Ecology Study Area, and the absence of direct impacts on protected features within designated sites, lowering the overall significance from moderate to minor.

Secondary mitigation and residual effect

- 3.8.3.19 At this stage, no secondary mitigation is proposed for temporary habitat loss and disturbance during O&M in Scottish and English waters. Therefore, the residual effect of temporary habitat loss and disturbance, during the O&M phase, is considered at most to be **minor adverse**, which is not significant in EIA terms.

Changes in physical processes

- 3.8.3.20 During O&M, the presence of installed marine infrastructure, including cable protection and cable crossings, may result in localised changes to physical processes within the footprint as described for long-term habitat loss (see **Paragraph 3.8.3.3 et seq.**). The addition of infrastructure to the marine environment may introduce changes to the local hydrodynamic and wave regime. A detailed assessment of physical processes is provided in **Volume 2, Chapter 1: Physical Processes, of the PEIR**. The physical processes assessment concludes that predicted effects are limited to localised changes associated with the infrastructure footprint.

- 3.8.3.21 The Zol for changes in physical processes is expected to be limited to within the MHPGC Project PEIR Red Line Boundary.

Magnitude of impact

- 3.8.3.22 Based on information presented in **Volume 2, Chapter 1: Physical Processes, of the PEIR**, the main pathway assessed in relation to changes in physical processes on the benthic environment is through changes to seabed morphology. Impacts associated with increased SSCs and associated deposition are assessed separately within this PEIR chapter (see **Paragraph 3.8.2.22 et seq.**).
- 3.8.3.23 Changes in physical processes may occur as a result of cable protection, export cable crossings and protection associated with trenchless drill exit pits, which may introduce localised increases in seabed elevation and roughness and influence near-bed hydrodynamics and sediment transport processes.
- 3.8.3.24 Embedded mitigation has been incorporated into the MHPGC Project design to minimise potential changes to physical processes (**Table 3.18**). An Outline Offshore CSIP (CoT08/MM-010) will be prepared and submitted with the application for development consent and Marine Licence to the Scottish Ministers. This includes cable burial as the preferred option for cable protection, where practicable, and a CBRA to inform cable installation methodologies, burial requirements and cable protection needs. The use of cable burial as the preferred option for cable protection will reduce the extent of cable protection required and therefore reduce the potential for localised scour, seabed morphology change and hydrodynamic alteration.
- 3.8.3.25 The physical processes assessment concludes that any changes to hydrodynamic conditions, wave climate and sediment transport processes would be highly localised and confined to the immediate vicinity of installed infrastructure (**Section 1.8.2 in Volume 2, Chapter 1: Physical Processes, of the PEIR**).
- 3.8.3.26 Given the limited spatial extent of the predicted changes, effects on benthic receptors would be restricted to the immediate vicinity of installed infrastructure and would not be expected to result in measurable changes to benthic habitat extent, distribution or condition within the MHPGC Project PEIR Red Line Boundary. Taking account of the embedded mitigation measures described above, the magnitude of impact is therefore assessed as **negligible**.

Receptor sensitivity

- 3.8.3.27 The benthic habitats and species identified within the MHPGC Project PEIR Red Line Boundary comprise receptors that exhibit varying levels of tolerance to changes in seabed conditions and physical processes. As described in the assessments of temporary habitat disturbance and increased SSC and sediment deposition, some receptors, including 'sea pen and burrowing megafauna communities', are considered to have relatively low resistance and recoverability to environmental change, with a maximum sensitivity of high assigned. Consequently, and on a precautionary basis, the worst-case receptor sensitivity for this impact is assessed as **high**. A very high sensitivity rating has not been assigned because, whilst some receptors may be sensitive to changes in seabed conditions and physical processes, the predicted changes are highly localised and are not expected to result in effects at the population or feature level.

Significance of effect

- 3.8.3.28 Considering both Scottish and English waters, it is considered that the worst-case receptor sensitivity is **high** and the magnitude of changes in physical processes is **negligible**. Therefore, the effect of changes in physical processes, during the O&M phase, is considered to be **minor adverse**, which is not significant in EIA terms.

Secondary mitigation and residual effect

- 3.8.3.29 At this stage, no secondary mitigation is proposed for changes in physical processes in Scottish or English waters. Therefore, the residual effect of changes in physical processes, during the O&M phase, is considered at most to be **minor adverse**, which is not significant in EIA terms.

Increased risk of introduction and spread of invasive non-native species

- 3.8.3.30 During O&M, an increased risk of introduction and spread of INNS in the Benthic Subtidal and Intertidal Ecology Study Area could result from the use of vessels during construction for route clearance and cable installation within the MHPGC Project PEIR Red Line Boundary. In particular, INNS (including propagules such as eggs and larvae) could be transported via vessel hulls or through the release of ballast water.
- 3.8.3.31 The presence of hard infrastructure into the marine environment, such as scour and cable protection, within predominantly sedimentary habitats, could enable the colonisation of marine INNS that would otherwise be unlikely to occur, and the increase in extent of INNS that are already present (thereby potentially increasing INNS abundance). Hard infrastructure may also facilitate marine INNS spread and community connectivity, providing 'stepping stones' that aid dispersal to new locations (Adams *et al.*, 2013; De Mesel *et al.*, 2015; Collen *et al.*, 2020; Dauvin, 2024).
- 3.8.3.32 Sensitivity to the introduction and spread of INNS can vary between habitats and species based on resistance and resilience; however, sensitivity is likely to change depending on the INNS being considered. Marine INNS impacts are wide ranging, including direct effects such as food and space competition, predation and disease (Gallardo *et al.*, 2015; Tsirintanis *et al.*, 2022). Indirect impacts may also occur, such as changes in nutrient cycling, ecosystem functioning and trophic interactions, which can have knock-on effects on benthic communities (Gallardo *et al.*, 2015; Dimitriadis *et al.*, 2021). Impacts associated with INNS and receptor sensitivity are therefore inherently difficult to predict.

Magnitude of impact

- 3.8.3.33 During O&M, an increased risk of introduction and spread of INNS could occur due to the use of vessels in both Scottish and English waters and the presence of marine infrastructure including cable protection and cable crossings that INNS could colonise.
- 3.8.3.34 The O&M phase may require the use of vessels in both Scottish and English waters to carry out inspection, maintenance, remediation and repair of the offshore export cables. Based on the MDS, there could be up to 294 O&M vessel return trips per year, comprising up to 12 return trips associated with survey vessel inspections, up to 220 return trips associated with USV inspections, and up to 62 return trips associated with remediation activities. In addition, there could be up to 245 vessel return trips associated with repair activities over the 35-year operational lifetime. A maximum of five vessels will be on site at any one time during the O&M phase.
- 3.8.3.35 Embedded mitigation has been incorporated into the MHPGC Project design to minimise the risk of introduction and spread of INNS during the O&M phase. An Outline MBP (CoT38) will form part of the Outline OEMP (CoT06/MM-006) submitted with the application for development consent and Marine Licence(s). The Outline MBP will include measures to follow the latest INNS guidance issued by the Great Britain Non-Native Species Secretariat, ensure compliance with IMO Ballast Water Management Guidelines, and address biosecurity risks associated with offshore infrastructure and any cable protection measures. A Detailed MBP will be developed in accordance with the Outline MBP and implemented throughout the operational lifetime of the MHPGC Project.
- 3.8.3.36 The magnitude of increased risk of introduction and spread of INNS during the O&M phase is considered to be no greater than during the construction phase. Therefore it is considered that the magnitude of increased risk of introduction and spread of INNS in Scottish and English waters during the O&M phase will be **negligible**.

Receptor sensitivity

- 3.8.3.37 Sensitives to increased risk of introduction and spread of INNS will be similar to that for construction (**Paragraph 3.8.2.89 et seq.**). For Scottish and English waters, the sensitivity of benthic subtidal and intertidal features within the MHPGC Project PEIR Red Line Boundary and wider Benthic Subtidal and Intertidal Ecology Study Area is at worst case **high**.

Significance of effect

- 3.8.3.38 For both Scottish and English waters, it is considered that the receptor sensitivity is at worst-case **high** and the magnitude of increased risk of introduction and spread of INNS is **negligible**. Therefore, the effect of increased risk of introduction and spread of INNS, during the O&M phase, is considered to be **minor adverse**, which is not significant in EIA terms.

Secondary mitigation and residual effect

- 3.8.3.39 At this stage, no secondary mitigation is proposed for increased risk of introduction and spread of INNS in Scottish or English waters. Therefore, the residual effect of increased risk of introduction and spread of INNS, during the O&M phase, is considered at most to be **minor adverse**, which is not significant in EIA terms.

Colonisation of hard structures

- 3.8.3.40 The presence of hard artificial structures in the benthic environment during operation (cable protection, cable crossings and protection for exit pits at landfall) may encourage colonisation by new communities which were not previously present, as well as the expansion of existing hard-substrate communities.
- 3.8.3.41 At this stage of the assessment, the exact locations of cable protection placement and therefore the habitats directly affected are unknown. However, all cable protection will be placed within the MHPGC Project PEIR Red Line Boundary. Therefore, it has been assumed that hard structures such as cable protection could be placed within any habitat located in the MHPGC Project PEIR Red Line Boundary.

Magnitude of impact

- 3.8.3.42 The majority of hard substrate is expected to be placed within soft sediment habitat as this forms a large proportion of the benthic environment in the MHPGC Project PEIR Red Line Boundary (see **Section 3.4.5**). Therefore, placement of hard substrate could result in the introduction of communities not previously present, resulting in changes to community structure and biotope. Any changes are expected to occur for the duration of the O&M phase and therefore could be long-term, continuing into the decommissioning phase if infrastructure is left *in situ*. Placement of hard structures on the seabed have been known to previously result in halo effects, an ecological effect where potential changes to biological structure occur beyond the footprint of planned infrastructure. However, halo effects are not considered relevant for subsea cables as cable protection typically has a maximum height of around 2m from the seabed. Although cable protection may provide a localised hard substrate for colonising organisms, it represents a relatively low-relief seabed feature compared with larger offshore structures for which halo effects have been documented (Degraer et al., 2020). Consequently, cable protection is unlikely to support the extensive fouling communities or biomass accumulation typically associated with halo-effect formation. Therefore, cable protection is therefore not considered to create the ideal ecological conditions for halo effects to occur.
- 3.8.3.43 The installation of cable protection and cable crossing structures will introduce additional hard substrate into the marine environment, increasing the area available for colonisation by epibenthic species. Cable protection is predicted to add up to 1,013,034m² of hard substrate surface area, while cable crossing structures are predicted to add up to 71,552m², and protection for export cable pits at landfall are predicted to add up to 35,600m², resulting in a total addition of 1,120,186m². Suitable hard substrate is already present within the MHPGC Project PEIR Red Line Boundary in the form of sparse boulders. Consequently, the introduction of these structures is expected to result in only a localised increase in available hard substrate habitat.
- 3.8.3.44 Embedded mitigation has been incorporated into the MHPGC Project design to minimise the extent of hard substrate introduced to the seabed. An Outline Offshore CSIP (CoT08/MM-010) will be prepared and submitted with the application for development consent and Marine Licence(s). This includes cable burial as the preferred option for cable protection, where practicable, and a CBRA to inform burial requirements and minimise the need for cable protection.

- 3.8.3.45 While the presence of these hard structures may facilitate some colonisation by epifaunal communities, implementation of the Offshore CSIP (CoT08/MM-010) will minimise the extent of cable protection required where practicable. Consequently, any associated change in benthic community composition is expected to be limited and restricted to the immediate vicinity of the installed infrastructure.
- 3.8.3.46 Any small colonisation of hard structures is considered reversible once hard structures and therefore colonised organisms are removed or replaced, either during maintenance and repair or at the end of the O&M phase. However, colonisation of hard structures may also present positive alterations to habitat, allowing for increased habitat complexity and heterogeneity to occur which could increase biodiversity.
- 3.8.3.47 Therefore, taking account of the embedded mitigation measures described above, it is considered that the magnitude of colonisation of hard substrates during the O&M phase in both Scottish and English waters is considered to be **low**.

Receptor sensitivity

- 3.8.3.48 In Scottish and English waters, the seabed within the MHPGC Project PEIR Red Line Boundary is dominated by predominantly sedimentary habitats. The introduction of hard substrate, and associated increases in biodiversity, will alter the biotopes that characterise the area at the location of the introduction of marine infrastructure and will be long-term, lasting for the duration of the development. Any effects on benthic subtidal and intertidal ecology, arising from the introduction of hard substrates will likely be localised to where cable protection and cable crossings occur.
- 3.8.3.49 The introduction of new hard substrate will represent a potential shift in the baseline condition within a small proportion of the MHPGC Project PEIR Red Line Boundary. Potential beneficial effects that may occur are associated with the likely increase in biodiversity and biomass, as has been observed at the Egmond aan Zee Offshore Windfarm (Lindeboom *et al.*, 2011). Individual species with the potential to benefit from the introduction of hard substrate due to increased substrate for attachment are those which are typical of rocky habitats and intertidal environments.
- 3.8.3.50 The species potentially introduced may also have indirect and adverse effects through increased predation on, or competition with, neighbouring soft sediment species. However, such effects are difficult to predict. The increased biodiversity associated with the structures could provide benefits at higher trophic levels as the benthic organisms colonising the structures provide an additional food source. Studies at the Horns Rev Offshore Windfarm in Denmark provided evidence that OWF structures are used as successful nursery habitats for *Cancer pagurus* (BioConsult 2006). However, any direct benefits are only likely to occur on a very localised basis (i.e., near the infrastructure).
- 3.8.3.51 Given the presence of epifaunal species and colonising fauna within discrete parts of the MHPGC Project PEIR Red Line Boundary (i.e., associated with coarser sediment habitats and sparse boulders), it is predicted that colonisation of hard substrates by common species such as bryozoans and ascidians will occur.
- 3.8.3.52 There is also potential for the introduction of INNS to the area due to the introduction of new hard substrate habitats, however, this is discussed in more detail from **Paragraph 3.8.3.30 et seq.**

Scottish waters

- 3.8.3.53 All the biotopes present are characterised by a muddy or sedimentary habitat. A change of seabed type to an artificial or rock substratum would alter the character of the biotopes leading to loss of the sedimentary community including bivalves, polychaetes and echinoderms living buried within the sediment. Based on the loss of the biotopes, the assessment has concluded no resistance, very low resilience and, therefore, sensitivity has been assessed to be **high**.

- 3.8.3.54 A change to artificial hard substratum would remove the sedimentary habitat required by ocean quahog. Based on the loss of suitable habitat, there is no resistance of these species to this pressure and resilience is assessed as very low. Therefore, sensitivity is assessed to be **high**.
- 3.8.3.55 In addition to muddy and sedimentary biotopes, and ocean quahog, 'sea pen and burrowing megafauna communities' were identified by the MHPGC Project-specific benthic surveys. A change to artificial hard substratum would remove the muddy habitat required by sea pens and burrowing megafauna. Because of the loss of suitable habitat, there is no resistance of this species to this pressure and resilience is assessed as very low (Moyse *et al.*, 2026). Therefore, sensitivity is assessed to be **high**.
- 3.8.3.56 Similarly, the scarce tube-dwelling anemone, identified by the Morven North and Morven South benthic surveys, would be impacted by a removal of the muddy or sandy substrate that this species is associated with (Wilson, 2007). Because of the loss of suitable habitat, there is no resistance of this species to this pressure and resilience is assessed as very low. Therefore, sensitivity is assessed to be **high**.

English waters

- 3.8.3.57 All the biotopes present are characterised by a muddy or sedimentary habitat. A change of seabed type to an artificial or rock substratum would alter the character of the biotopes leading to loss of the sedimentary community including bivalves, polychaetes and echinoderms living buried within the sediment. Based on the loss of the biotopes, the assessment has concluded no resistance, very low resilience and, therefore, sensitivity has been assessed to be **high**.
- 3.8.3.58 A change to artificial hard substratum would remove the sedimentary habitat required by ocean quahog. Based on the loss of suitable habitat, there is no resistance of these species to this pressure and resilience is assessed as very low. Therefore, sensitivity is assessed to be **high**.
- 3.8.3.59 Stony reef in the form of isolated or scattered cobbles/boulders were also identified within the MHPGC Project PEIR Red Line Boundary. Stony reef supports a characteristic benthic community which may be altered by the introduction of artificial hard substrata. As artificial hard substrate is not directly equivalent to natural stony reef habitat (Irving, 2009), localised changes in community composition may occur. Resistance is assessed as medium and resilience as high. Therefore, sensitivity is assessed to be **medium**.

Significance of effect

- 3.8.3.60 For both Scottish and English waters, it is considered that the worst-case receptor sensitivity is **high** and the magnitude of colonisation of hard substrates is **low**. Whilst some receptors are highly sensitive to changes in habitat character and community composition, a very high sensitivity rating has not been assigned as the affected habitats and species are not considered exceptionally vulnerable to this pressure at the population or feature level. Therefore, the effect of colonisation of hard substrates, during the operation phase, is considered at most to be **minor adverse**, which is not significant in EIA terms. This is due to the localised extent of the impact, the restriction of changes to the immediate vicinity of installed infrastructure, the absence of effects at the population or feature level, and the potential for increased habitat complexity, heterogeneity and biodiversity at a local scale, lowering the overall significance from moderate to minor.

Secondary mitigation and residual effect

- 3.8.3.61 At this stage, no secondary mitigation is proposed for colonisation of hard structures in Scottish or English waters. Therefore, the residual effect of colonisation of hard structures, during the operation phase, is considered to be **minor adverse**, which is not significant in EIA terms.

Electromagnetic fields

- 3.8.3.62 EMF are generated by the current that passes through an electric cable. It is known that EMF can be detected by fish and elasmobranchs, and it is thought that any benthic invertebrates can also detect

EMF. Three types of fields are generated by underwater electric cables: electric fields (E-fields), magnetic fields (B-fields) and induced electric fields (iE-fields) (Gill *et al.*, 2025). Standard industry practice is for the cables used to have sufficient shielding to contain the E-fields generated and the cable system descriptions for the inter-array and export cables have abided by this. Shielding and/or burial does not reduce the B-fields and it is these fields that allow the formation of iE-fields. As such, further reference here to EMF is limited to B-fields and associated iE-fields.

3.8.3.63 Several factors should be considered when assessing potential effects from EMF, including cable design, the depth of burial of the cable, sensitivity of surrounding species and local environmental conditions. EMF will be emitted for the duration of the O&M phase from the export cables. However, any potential impacts are considered to be limited to habitats which fall within the MHPGC Project PEIR Red Line Boundary because EMF effects are highly localised around the cable and field strengths decrease rapidly with increasing distance from the source, particularly where cables are buried below the seabed.

3.8.3.64 FeAST only consider impacts on electromagnetic changes on elasmobranchs (NatureScot, 2026). Furthermore, MarESA sensitivity assessments conclude that there is insufficient evidence to determine sensitivity ratings for benthic receptors in response to EMF changes against the pressure benchmark. Therefore, no confirmed sensitivity rating is available for benthic features, and this has instead been assessed in this report qualitatively and based on appraisals provided for other similar projects.

3.8.3.65 A detailed appraisal of EMF impacts to fish and shellfish is provided in **Volume 2, Chapter 4, Fish and Shellfish, of the PEIR**.

Magnitude of impact

3.8.3.66 During the O&M phase, there will be four cables consisting of two conductors and two fibre optics. Only the conductors are considered capable of producing EMF. The cables will have a voltage of 320kV HVDC, each running a total 326,400m in length through Scottish and English waters. The cables will be placed in separate trenches with a distance of up to 50m between trenches. The cables will have a target burial depth of 0.5m where possible.

3.8.3.67 Embedded mitigation has been incorporated into the MHPGC Project design to reduce potential EMF exposure. An Outline Offshore CSIP (CoT08/MM-010) will be prepared and submitted with the application for development consent and Marine Licence(s). This includes cable burial as the preferred option for cable protection, where practicable, informed by a CBRA.

3.8.3.68 Impacts from changes in EMFs arising from cables, are not considered to result in any appreciable effects on benthic subtidal and intertidal ecology receptors. EMFs are likely to be generated by subsea cables and detectable above background levels in close proximity to the cables. Recent field measurements indicate that magnetic fields associated with operational subsea power cables may remain detectable for tens of metres from the cable and may extend further than predicted by simple modelling approaches, particularly where multiple cables occur within a cable corridor (Gill *et al.*, 2025).

3.8.3.69 Although burial does not mask EMFs it increases the distance between species that may be affected by EMFs and the source. Burial of the cables and protection with cable protection where shallow buried or surface laid will not reduce the strength of the fields, however, it moves the cables further from some receptors, and as such the receptors will be subject to reduced field strengths. The available evidence indicates that burial reduces exposure intensity through increased separation between the cable and receptor rather than through attenuation of the magnetic field itself (Gill *et al.*, 2021). While benthic receptors may therefore encounter EMFs generated by the offshore export cables during the O&M phase, current evidence suggests that the principal consequence is an increased likelihood of encounter rather than a demonstrated ecological effect. Any behavioural responses are expected to be localised to the vicinity of the offshore export cable corridor (Gill *et al.*, 2025).

- 3.8.3.70 EMF comprise electrical fields, measured in V/m, and magnetic fields, measured in μT or milligauss (mG) (RPS, 2025c). MHPGC Project specific EMF modelling provided in **Volume 2, Annex 4.2: EMF Assessment, of the PEIR** indicates that when considering a separation distance of 25m between cables and a burial depth of 0.5m, magnetic flux density at the seabed is predicted to be $192.42\mu\text{T}$ for fully bundled cables, $414.06\mu\text{T}$ for cables separated by 25m and $825.99\mu\text{T}$ for a fully separated (single-cable) scenario. At 1m above the seabed, these values reduce to $25.68\mu\text{T}$, $149.89\mu\text{T}$ and $299.04\mu\text{T}$, respectively. The assessment demonstrates that magnetic field strength increases as separation between cable pairs increases due to a reduction in cancellation effects. As the MHPGC Project MDS allows cable separation distances of up to 50m, both the 25m separation and fully separated scenarios are considered relevant to the assessment. The assessment also demonstrates that magnetic field strength decreases rapidly with increasing burial depth. Under the fully separated scenario, increasing burial depth from 0.5m to 3.0m reduces magnetic flux density at the seabed from $825.99\mu\text{T}$ to $152.81\mu\text{T}$. These results indicate that EMF effects are highly localised around the cable and diminish rapidly with increasing distance from the source.
- 3.8.3.71 It is considered unlikely that EMFs will result in a behavioural response that will cause a change in benthic communities within the MHPGC Project PEIR Red Line Boundary and that any potential negative effects will be confined to a localised area surrounding the cables. Although the magnetic field intensities associated with subsea power cables overlap with ranges known to be detectable by a variety of marine organisms, detection or encounter with EMFs should not be interpreted as evidence of ecological impact (Gill *et al.*, 2025). Furthermore, there remains limited evidence that behavioural responses observed at an individual level translate into biologically significant effects at population or community levels (Gill *et al.*, 2025). Therefore, the magnitude of the impact is considered to be negligible, indicating that any behavioural response of benthic fauna is likely to be discernible or barely discernible over a very small area, that does not threaten benthic subtidal ecology features, undermine regional ecosystem functions or diminish biodiversity.
- 3.8.3.72 Therefore, taking account of the embedded mitigation measures described above, and given that the EMF effects are predicted to be localised, it is considered that the magnitude of impacts to benthic invertebrates due to EMF in both Scottish and English waters, during the O&M phase is **negligible**.

Receptor sensitivity

- 3.8.3.73 Evidence determining the effects of EMF on benthic habitats and species is limited. Typically, the impacts of EMF on marine organisms have focused on electrically sensitive fish and elasmobranchs, with little research focusing on benthic invertebrates, with the few studies using invertebrates focusing on crustaceans (e.g., Woodruff *et al.*, 2012). Furthermore, many studies contradict each other or provide inconclusive results (Switzer and Meggitt, 2010), further reducing the available evidence.
- 3.8.3.74 EMF has the potential to affect the foraging and migratory success and behaviour of some marine species, particularly fish, but responses in some invertebrates have also been observed. For example, in crustacean species, such as the edible crab, which have a high association with the seabed, physiological and behavioural effects when exposed to an EMF strength of $250\mu\text{T}$ (compared to an ambient geomagnetic field in the UK is around $50\mu\text{T}$) were limited (Scott *et al.*, 2018). While physiological stress responses and behavioural changes, including attraction to EMF, were observed at EMF strengths of $500\mu\text{T}$ and above, these exposure levels are substantially greater than those expected to occur around offshore export cables. Similarly, when considering behavioural changes in the common rag worm (*H. diversicolor*) at an EMF strength of $1000\mu\text{T}$ no avoidance or attraction behaviours were observed (Jakubowska *et al.*, 2019). Although enhanced burrowing activity was observed, the ecological significance of this response remains uncertain. Recent reviews indicate that a wide range of marine taxa may be capable of detecting magnetic field changes within the range produced by operational subsea power cables. However, the sensitivity thresholds, mechanisms of detection and ecological significance of such responses remain uncertain for most benthic invertebrate taxa, and occurrence of detection or behavioural response does not necessarily imply an adverse ecological effect (Gill *et al.*, 2025). The EMF strengths used in these studies are considered to be similar to, or greater than, those produced by the MHPGC Project.

- 3.8.3.75 When considering the potential effects from EMF, several factors should be taken into consideration including the true buried depth of the cable, cable design and surrounding environment including water conditions (Gill *et al.*, 2023). For burrowing species, exposure to EMF emissions from the cable may be increased compared to surface-dwelling species. However, available evidence indicates that benthic habitats and invertebrate communities are unlikely to be significantly affected by EMF from subsea cables, with the greatest uncertainties relating to electro-sensitive fish species rather than benthic receptors (Gill *et al.*, 2023). This is supported by the MarESA conclusion that no evidence was found for EMF effects in species such as the ocean quahog (Tyler-Walters and Sabatini, 2017). Furthermore, Love *et al.* (2016) found no functional differences in benthic invertebrate communities associated with an energised cable compared with a nearby reference cable. Recent field studies indicate that magnetic fields may propagate further than predicted by simple modelling approaches and may remain within known detection ranges for some organisms over distances of tens of metres from a cable (Gill *et al.*, 2025). Nevertheless, there remains limited evidence that such exposure results in biologically significant effects on benthic populations or communities (Gill *et al.*, 2025). Current uncertainty therefore relates principally to the frequency and nature of receptor encounters with EMFs, rather than the existence of EMFs themselves. Consequently, any EMF-related effects on benthic invertebrates are expected to be highly localised to the immediate vicinity of the offshore export cable corridor.
- 3.8.3.76 Although some individual-level behavioural and physiological responses have been reported in laboratory studies, there is limited evidence that these responses translate into biologically significant effects at population or community levels (Boehlert and Gill, 2010). Thus, for all invertebrate species throughout the MHPGC PIER Red Line Boundary, in Scottish and English waters, sensitivity is considered to be low, reflecting the high resistance and tolerance of benthic receptors to EMF exposure over the operational lifetime of the MHPGC Project.
- 3.8.3.77 Therefore, it is considered that the sensitivity of benthic invertebrates due to EMFs, in both Scottish and English waters, during the O&M phase is considered to be **low**.

Significance of effect

- 3.8.3.78 For both Scottish and English, it is considered that the receptor sensitivity is **low** and the magnitude of impacts to benthic invertebrates due to EMF is **negligible**. Therefore, the effect of impacts to benthic invertebrates due to EMF, during the O&M phase, is considered to be **negligible** which is not significant in EIA terms.

Secondary mitigation and residual effect

- 3.8.3.79 At this stage, no secondary mitigation is proposed for impacts to benthic invertebrates due to EMF in Scottish or English waters. Therefore, the residual effect of impacts to benthic invertebrates due to EMF, during the O&M phase, is considered to be **negligible**, which is not significant in EIA terms.

Thermal emissions from subsea electrical cables

- 3.8.3.80 Submarine power cables produce heat during operation which, when buried, can increase the temperature of the surrounding seabed sediments (Emeana *et al.*, 2016). Increasing the temperature of surrounding seabed sediments can result in infaunal organisms to move away from the affected area. Temperature changes can also lead to shifts in bacterial activity and alterations in physio-chemical conditions, altering faunal composition and resulting in ecological shifts (Meissner *et al.*, 2006; Hicks *et al.*, 2018). Sensitivity to thermal emissions can vary between habitats depending on which species are present.
- 3.8.3.81 However, whilst the sediment surrounding the cable may be heated, there is negligible capability to heat the overlying water column because of the very high heat capacity of water, meaning there would be no effects on epibenthic communities.

Magnitude of impact

- 3.8.3.82 The release of thermal emissions from a cable has the potential to increase sediment temperature and have direct effects on infaunal species. However, there is negligible capacity for thermal emissions from a cable to heat the overlying water column, meaning effects on epibenthic species and communities are negligible.
- 3.8.3.83 During the O&M phase, there will be up to two conductors of 320kV HVDC, each running 326,400m in length. The cables will have a target burial depth of 0.5m with a distance of up to 50m between the trenches. At this stage, MHPGC Project-specific thermal modelling has not been conducted. However, based on similar projects, the MHPGC Project offshore export cables are expected to result in small temperature increases.
- 3.8.3.84 Embedded mitigation has been incorporated into the MHPGC Project design to reduce thermal emissions and associated exposure of benthic receptors. An Outline Offshore CSIP (CoT08/MM-010) will be prepared and submitted with the application for development consent and Marine Licence(s). This includes cable burial as the preferred option for cable protection, where practicable, informed by a CBRA.
- 3.8.3.85 A large proportion of the offshore cables will be buried under sediment to a target burial depth of 0.5m. Burial increases the separation between the cable and benthic receptors and assists in dissipating heat through surrounding sediments, thereby reducing direct exposure of benthic invertebrates to elevated temperatures. Heat transfer in sediments is known to vary with sediment particle size composition with coarser sediment experiencing the greatest temperature change to a short distance from the heat source (Emeana *et al.*, 2016). In comparison, finer sediments and sands experience a lower temperature but to a greater distance from the source. The MHPGC Project PEIR Red Line Boundary has a mixed of sandy and muddy sediments with some areas of gravel. Therefore, although thermal effects would be long-term, heat transfer is expected to vary along the route.
- 3.8.3.86 Temperature increases in sediments are expected to be marginal in comparison to ambient temperatures. According to OSPAR (2023), subsea cable thermal emissions will only exceed the threshold of 2°C temperature increase at a sediment depth of 0.2m in rare cases and for limited amounts of time. Similar offshore wind projects including Mona and Morecambe concluded that any thermal increase in surrounding sediment from export cables would be highly localised to a very small area within the immediate vicinity of the cable (RPS, 2024; Royal Haskoning DHV, 2025).
- 3.8.3.87 For sections of the offshore export cable route where target burial depth cannot be achieved and the offshore export cable will be protected by rock protection, exposure to thermal emissions by benthic habitats and invertebrates may be increased. However, implementation of the Offshore CSIP (CoT08/MM-010) will ensure that cable burial remains the preferred option where practicable, reducing the extent of seabed where benthic receptors may be exposed to higher thermal emissions. Additionally, where rock protection is placed, water ingress around the cable will increase and rapidly reduce thermal effects due to the high heat capacity of water.
- 3.8.3.88 Therefore, taking account of the embedded mitigation measures described above, and given that thermal effects are predicted to be highly localised and restricted to the immediate vicinity of the export cables, it is considered that the magnitude of impacts to benthic invertebrates due to thermal emissions from subsea electrical cables in both Scottish and English waters, during the O&M phase is considered to be **low**.

Receptor sensitivity

- 3.8.3.89 Sensitivity to thermal emissions can vary depending on habitat composition and species present, particularly including the type of sediment present. Coarser sediment such as gravel is considered to experience a greater heat increase in response to changes in thermal emissions, whereas finer sediments experience a lower temperature change in response to thermal emissions (Emeana *et al.*, 2016).

3.8.3.90 Considering sensitivity assessments completed by FeAST and MarESA, higher sensitivities to changes in thermal emissions are attributed to long-term greater changes in temperature across a large area, rather than localised, smaller changes in temperature which would occur as a result of the MHPGC Project thermal emissions. For example, the pressure benchmark for sensitivity of ocean quahog provided by FeAST (NatureScot, 2026) and MarESA (Tyler-Walters and Sabatini, 2017) states that effects on ocean quahog could occur at a 5°C temperature increase for a period of one month or more, but this excludes heat from power cables as they are unlikely to reach the benchmark.

3.8.3.91 Thermal effects on benthic habitats and species would occur continuously over the operational lifetime of the MHPGC Project. However, available evidence indicates that benthic invertebrates generally exhibit a high tolerance to the small, localised temperature increases associated with subsea power cables. Also sensitivity assessments undertaken by FeAST and MarESA are based on substantially greater and more widespread temperature increases than those expected. Thus, for all invertebrate species throughout the MHPGC PIER Red Line Boundary sensitivity is considered to be **low**.

Significance of effect

3.8.3.92 Overall, it is considered that the receptor sensitivity is **low** and the magnitude of impacts to benthic invertebrates due to thermal emissions from subsea electrical cables is **low**. Therefore, the effect of impacts to benthic invertebrates due to thermal emissions from subsea electrical cables, during the O&M phase in Scottish and English waters, is considered at most to be **negligible**, which is not significant in EIA terms.

Additional mitigation and residual effect

3.8.3.93 At this stage, no additional mitigation is proposed for impacts to benthic invertebrates due to thermal emissions in Scottish or English waters. Therefore, the residual effect of impacts to benthic invertebrates due to thermal emissions from subsea electrical cables, during the O&M phase, is considered to be **negligible**, which is not significant in EIA terms.

3.8.4 Decommissioning phase

3.8.4.1 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 unknown, though it will be based on the best available technology available at the time.

3.8.4.2 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 reduce short- and long-term effects on the environment, whilst ensuring the sea is safe for other users to navigate.

3.8.4.3 The current approach and MDS which has been assessed for decommissioning is the full removal of the cable and associated structures and cable protection where it is practicable and environmentally appropriate. However, in many cases it may be more environmentally beneficial to leave the cable buried *in situ*.

3.8.4.4 In the event of the full removal of the cable and cable protection, this would likely have similar impacts as the construction phase and/or the O&M phase. Should the cable be left *in situ*, there would likely be no further impacts to benthic ecology. 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.

Temporary habitat loss and disturbance

Magnitude of impact

3.8.4.5 During the complete removal of the cable infrastructure, the activities used to install the cable will be reversed. Therefore, temporary habitat loss/disturbance is expected to occur over the same area

and to the same extent as assessed during the construction phase (**Paragraph 3.8.2.1 et seq.**). However, UXO clearance is not expected to be required. The habitats present within the MHPGC Project PEIR Red Line Boundary are widespread and mobile, and therefore are expected to recover quickly following disturbance, infilling any areas that have been lost.

- 3.8.4.6 The magnitude of temporary habitat loss and disturbance during the decommissioning phase is considered to be no greater than during the construction phase. Therefore, it is considered that the magnitude of temporary habitat loss and disturbance in Scottish and English waters, during the decommissioning phase will be **low**.

Receptor sensitivity

- 3.8.4.7 During the complete removal of the cable infrastructure, temporary habitat loss/disturbance is expected to occur within the same habitats as assessed in **Section 3.8.2 (Paragraph 3.8.2.9 et seq.)**. Over the 35-year operational lifetime of the MHPGC Project, the habitats present within the MHPGC Project PEIR Red Line Boundary are not expected to experience much change. Therefore, it is considered that the sensitivity ratings provided in **Table 3.19** are applicable to the decommissioning phase for Scottish and English waters.

Significance of effect

- 3.8.4.8 For both Scottish and English waters, it is considered that the receptor sensitivity is **high** and the magnitude of temporary habitat loss/disturbance is **low**. Therefore, the effect of temporary habitat loss/disturbance, during the decommissioning phase, is considered to be **minor adverse**, which is not significant in EIA terms. This is due to the relatively low area impacted by temporary habitat loss and disturbance compared to the large areas of unimpacted similar habitat regionally and due to the low numbers of ocean quahog recorded across the Benthic Ecology Study Area lowering the overall significance from moderate to minor.

Secondary mitigation and residual effect

- 3.8.4.9 At this stage, no secondary mitigation is proposed for temporary habitat loss/disturbance during decommissioning in Scottish or English waters, in the event that the cable is completely removed. This may be reviewed at the time of decommissioning. Therefore, the residual effect of temporary habitat loss/disturbance, during the decommissioning phase, is considered to be **minor adverse**, which is not significant in EIA terms.

Increased SSCs and associated deposition

Magnitude of impact

- 3.8.4.10 The magnitude of increased SSCs and associated deposition during the decommissioning phase is considered to be similar to that during the construction phase (**Paragraph 3.8.2.25 et seq.**). Therefore, it is considered that the magnitude of increased SSCs and associated deposition in Scottish and English waters, during the decommissioning phase will be **low**.

Receptor sensitivity

- 3.8.4.11 The sensitivity of receptors is considered to be similar to that during the construction phase (**Paragraph 3.8.2.32 et seq.**). For Scottish and English waters, the sensitivities of habitats and species to increased SSCs and associated deposition are detailed in **Table 3.20**.
- 3.8.4.12 For Scottish and English waters, the sensitivity of benthic subtidal features within the MHPGC Project PEIR Red Line Boundary and wider Benthic Subtidal Ecology Study Area is at worst-case **medium**, with the sensitivity of the majority of the receptors low or negligible, reflecting that the receptors have some ability to tolerate increases SSCs and associated deposition.
- 3.8.4.13 For English waters, the sensitivity of benthic intertidal features within the Benthic Intertidal Ecology Study Area is at worst-case **medium**.

Significance of effect

- 3.8.4.14 For both Scottish and English waters, it is considered that the worst-case receptor sensitivity is **medium** and the magnitude of increased SSCs and associated deposition is **low**. Therefore, the effect of increased SSCs and associated deposition, during the decommissioning phase, is considered to be **minor adverse**, which is not significant in EIA terms.

Secondary mitigation and residual effect

- 3.8.4.15 At this stage, no secondary mitigation is proposed for temporary habitat loss/disturbance during decommissioning in Scottish or English waters, in the event that the cable is completely removed. This may be reviewed at the time of decommissioning. Therefore, the residual effect of temporary habitat loss/disturbance, during the decommissioning phase, is considered to be **minor adverse**, which is not significant in EIA terms.

Disturbance/remobilisation of sediment bound contaminants

Magnitude of impact

- 3.8.4.16 The magnitude of disturbance and remobilisation of sediment-bound contaminants during the decommissioning phase is considered to be no greater than during the construction phase (**Paragraph 3.8.2.53 et seq.**). Therefore, it is considered that the magnitude of disturbance and remobilisation of sediment bound contaminants in Scottish and English waters, during the decommissioning phase will be **negligible**.

Receptor sensitivity

- 3.8.4.17 The sensitivity of receptors is considered to be no greater than during the construction phase (**Paragraph 3.8.2.61 et seq.**). For Scottish and English waters, the sensitivities of habitats and species to increased SSCs and associated deposition are detailed in **Table 3.21**.
- 3.8.4.18 For Scottish waters, the sensitivity of benthic subtidal features within the MHPGC Project PEIR Red Line Boundary and wider Benthic Subtidal Ecology Study Area is at worst-case **medium**.
- 3.8.4.19 For English waters, the sensitivity of benthic subtidal features within the MHPGC Project PEIR Red Line Boundary and wider Benthic Subtidal Ecology Study Area is at worst-case **high**, with the sensitivity of the majority of the receptors medium or low, reflecting that the receptors have some ability to tolerate disturbance and remobilisation of sediment bound contaminants.
- 3.8.4.20 For English waters, the sensitivity of benthic intertidal features within the Benthic Intertidal Ecology Study Area is at worst-case **medium** with the sensitivity of the majority of the receptors low, reflecting that the receptors have some ability to tolerate disturbance and remobilisation of sediment bound contaminants.

Significance of effect

- 3.8.4.21 For both Scottish and English waters, it is considered that the worst-case receptor sensitivity is **high** and the magnitude of disturbance and remobilisation of sediment bound contaminants is **negligible**. Therefore, the effect of disturbance and remobilisation of sediment bound contaminants, during the decommissioning phase, is considered to be **minor adverse**, which is not significant in EIA terms.

Secondary mitigation and residual effect

- 3.8.4.22 At this stage, no secondary mitigation is proposed for disturbance and remobilisation of sediment bound contaminants during decommissioning in Scottish or English waters, in the event that the cable is completely removed. This may be reviewed at the time of decommissioning. Therefore, the residual effect of disturbance/remobilisation of sediment bound contaminants, during the decommissioning phase, is considered to be **minor adverse**, which is not significant in EIA terms.

Increased risk of introduction and spread of invasive non-native species

Magnitude of impact

- 3.8.4.23 During the complete removal of the cable infrastructure, the activities used to install the cable will be reversed. Therefore, it is assumed that the same number of vessels will be required as during construction (**Paragraph 3.8.2.84 et seq.**).
- 3.8.4.24 The magnitude of increased risk of introduction and spread of INNS during the decommissioning phase is considered to be no greater than during the construction phase. There it is considered that the magnitude of introduction and spread of INNS in Scottish and English waters during the decommissioning phase will be **negligible**.

Receptor sensitivity

- 3.8.4.25 Sensitives to increased risk of introduction and spread of INNS will be similar to that for construction (**Paragraph 3.8.2.89 et seq.**). For Scottish and English waters, the sensitivity of benthic subtidal and intertidal features within the MHPGC Project PEIR Red Line Boundary and wider Benthic Subtidal and Intertidal Ecology Study Area is at worst case **high**.

Significance of effect

- 3.8.4.26 For both Scottish and English waters, it is considered that the worst-case receptor sensitivity is **high** and the magnitude of increased risk of introduction and spread of INNS is **negligible**. Therefore, the effect of increased risk of introduction and spread of INNS, during the decommissioning phase, is considered to be **minor adverse**, which is not significant in EIA terms.

Secondary mitigation and residual effect

- 3.8.4.27 At this stage, no secondary mitigation is proposed for increased risk of introduction and spread of INNS during decommissioning in Scottish or English waters, in the event that the cable is completely removed. This may be reviewed at the time of decommissioning.
- 3.8.4.28 Therefore, the residual effect of increased risk of introduction and spread of INNS, during the decommissioning phase, is considered to be **minor adverse**, which is not significant in EIA terms.

Removal of hard substrate

- 3.8.4.29 During decommissioning, all marine infrastructure may be removed. This could have a direct effect on the benthic environment through the removal of colonised structures and the return of the seabed to predominantly soft sediment in localised areas.

Magnitude of impact

- 3.8.4.30 In the event that the cable is completely removed, it is assumed that all cable protection and other hard structures will also be removed, including at all cable crossings and at the landfall. Therefore, the magnitude for the removal of hard substrate is considered to be similar to that associated with the colonisation of hard structures during the O&M phase (see **Paragraph 3.8.3.42 et seq.**). The total removal of some or all hard structures during decommissioning could result in an irreversible change to the local benthic community structure which has formed on hard substrate over the 35-year operational lifeline. However, any removal of hard structures is expected to be highly localised, and the surrounding sandy and muddy widespread habitat is expected to recover rapidly. Therefore, the magnitude of this impact is **low**.

Receptor sensitivity

- 3.8.4.31 While the permanent removal of the hard substrate will result in local declines in biodiversity, areas of bare sedimentary habitat which was lost during decommissioning will be exposed and will be open to recolonisation by the original benthic community. It is expected that the baseline benthic communities in these areas will recover to their pre-construction state based on the recovery rates

for disturbed sediment, which would equate to a maximum sensitivity for the baseline habitats of **medium**.

Significance of effect

- 3.8.4.32 For both Scottish and English waters, it is considered that the worst-case receptor sensitivity is **medium** and the magnitude of removal of hard substrate is **low**. Therefore, the effect of removal of hard substrate, during the decommissioning phase, is considered at most to be **minor adverse**, which is not significant in EIA terms.

Secondary mitigation and residual effect

- 3.8.4.33 At this stage, no secondary mitigation is proposed for removal of hard substrate during decommissioning in Scottish or English waters, in the event that the cable is completely removed. This may be reviewed at the time of decommissioning. Therefore, the residual effect of removal of hard substrate, during the decommissioning phase, is considered to be **minor adverse**, which is not significant in EIA terms.

3.9 Whole project assessment and Cumulative Effects Assessment methodology

3.9.1 Methodology

- 3.9.1.1 The Morven Programme comprises four distinct projects: Morven North, Morven South, MHPGC Project, and Morven Branxton Area Grid Connection Project (MBAGC Project).
- 3.9.1.2 The following assessment scenarios have been considered to identify the Likely Significant Effects (LSE) of MHPGC Project in combination with other projects on the same receptor, as follows (and summarised in **Table 3.22**):
- 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) together with other relevant projects, plans and activities (Scenario 3);
 - 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).
- 3.9.1.3 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**.

Table 3.22: Scenarios to be considered in the MHPGC Project whole project assessment and Cumulative Effects Assessment for benthic ecology

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	

- 3.9.1.4 For the purposes of this benthic ecology 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. The approach to the CEA presented in this benthic ecology chapter complies with the requirements under the EIA Regulations to assess the LSE on the environment arising from a 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 benthic ecology.
- 3.9.1.5 The projects and plans selected as relevant to the CEA presented within this chapter are based upon the results of a screening exercise (see **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 of this chapter's assessment based upon data confidence, effect-receptor pathways and the spatial/temporal scales involved.

- 3.9.1.6 In undertaking the CEA for the 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 construction³; approved developments awaiting implementation; and permitted/submitted application(s), but not yet determined, plus 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).
- 3.9.1.7 The study area for the CEA is defined by the 9km buffer surrounding the MHPGC Project PEIR Red Line Boundary seaward of the MLWS, to incorporate the maximum distance suspended sediments will travel in one tidal cycle and therefore the indirect impacts on benthic subtidal ecology arising from the MHPGC Project that could interact cumulatively with impacts from other plans or projects. The specific projects and plans screened into the CEA for benthic ecology are outlined in **Table 3.23**.
- 3.9.1.8 All potential impacts from the MHPGC Project alone assessment that have been considered in the CEA are outlined in **Table 3.24**.
- 3.9.1.9 Similarly, some of the potential impacts considered within the MHPGC Project alone assessment are specific to a particular phase of development (e.g. construction, O&M or decommissioning). Where cumulative effects with other plans or projects only have potential to occur where there is spatial or temporal overlap with MHPGC Project during certain phases of development, impacts associated with a certain phase may be omitted from further consideration where no plans or projects have been identified that have the potential for cumulative effects during this period.

³ 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).

Table 3.23: List of other projects and plans considered within the Cumulative Effects Assessment for benthic ecology

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
Tier 1						
Offshore wind projects and associated cables						
Morven North	Application submitted, awaiting decision	0	Proposed for up to 96 turbines.	2033-2037	2038 to 2073-2077	Yes. Overlap of construction phase or operational phase with the construction or operational phases of the MHPGC Project.
Morven South	Application submitted, awaiting decision	0	Proposed for up to 95 turbines.	2033-2037	2038 to 2073-2077	Yes. Overlap of construction phase or operational phase with the construction or operational phases of the MHPGC Project.
Berwick Bank Export Cables (Cambois Connection - Northumberland)	Consented	0.25	OWF export cable.	2028-2031	2032 onwards	Yes. Overlap of operational phase with the construction or operational phases of the MHPGC Project.
Ossian	Consented	5.5	Ossian Floating Wind project is proposed for up to 3,610MW capacity.	2026-2030	2030-2054	Yes. Potential for construction phase or operational phase to interact with the construction or operational phases of the MHPGC Project.
Other cables and pipelines						

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
Eastern Green Link 1 subsea cable	Under Construction	0.50	Eastern Green Link 1 is a 196km long HVDC link between Torness in East Lothian, Scotland and Hawthorn Pit in County Durham.	2026-2029	2029 onwards	Yes. Overlap of operational phase with the construction or operational phases of the MHPGC Project.
Eastern Green Link 2 subsea cable	Under Construction	0	Eastern Green Link 2 is a 505km HVDC cable is connecting Peterhead in Aberdeenshire and Drax in North Yorkshire.	2026-2028	2028 onwards	Yes. Overlap of operational phase with the construction or operational phases of the MHPGC Project.
NO UK Telecom cable	Operational	0	700-km subsea tele-communications between Stavanger in Norway to Newcastle in the UK,	N/A	N/A	Yes. Overlap of operational phase with the construction or operational phases of the MHPGC Project.
Havhingsten Seg 2 Telecom Cable	Operational	0	940 km subsea and terrestrial tele-communications cable linking Ireland, the UK and Denmark	N/A	N/A	Yes. Overlap of operational phase with the construction or operational phases of the MHPGC Project.
North Sea Link North Power Cable	Operational	0	700-km subsea tele-power cable between Kvilldal in Norway to Cambois near Blyth in the UK,	N/A	N/A	Yes. Overlap of operational phase with the construction or operational phases of the 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
Disposal sites						
Noses Point disposal site TY130	Operational	0.16	Dredge disposal site	N/A	Unknown	Yes. Overlap of operational phase with the construction, operational and decommissioning phases of the MHPGC Project.
Souter Point (Outer) disposal site YY081	Operational	4.50	Dredge disposal site	N/A	Unknown	Yes. Overlap of operational phase with the construction, operational and decommissioning phases of the MHPGC Project.
Sunderland (Outer) disposal site TY090	Operational	5.43	Dredge disposal site	N/A	Unknown	Yes. Overlap of operational phase with the construction, operational and decommissioning phases of the MHPGC Project.
Tier 2						
Other cables and pipelines						
Eastern Green Link 3 subsea cable	Scoping Report Published	2.33	Eastern Green Link 3 is a HVDC connecting Westfield in Scotland to Lincolnshire in England	2029-2032	2032 onwards	Yes. Potential for operational phase to interact with the construction or operational phases of the MHPGC Project.
Eastern Green Link 4 subsea cable	Scoping Report Published	0	Eastern Green Link 4 is a HVDC cable linking Fife in Scotland with Norfolk in England	2028-2032	2032 onwards	Yes. Potential for operational phase to interact with the construction or operational phases of the MHPGC Project.
Tier 3						

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
Offshore wind projects and associated cables						
MBAGC Project	Pre-application	0	Potential transmission for Morven North or Morven South	Unknown	Unknown	Unknown. Construction, O&M and decommissioning phases may overlap with the MHPGC Project construction, O&M and decommissioning phases.
Other cables and pipelines						
Eastern Green Link 5	Scoping Report published	0	Eastern Green Link 5 is a HVDC cable linking Scotland to Lincolnshire in England	Unknown	Unknown	Yes. Potential for operational phase to interact with the construction or operational phases of the MHPGC Project.

3.9.2 Maximum Design Scenario – Whole project assessment and Cumulative Effects Assessment

- 3.9.2.1 The MDSs identified in **Table 3.24** 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 MDSs have been based on the MHPGC Project alone assessment MDS (**Section 3.6.2**), as well as publicly available information on other third-party projects and plans that have been screened into the CEA (**Table 3.23**). 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 3.24**.

Table 3.24: Maximum Design Scenario considered for the assessment of potential whole project and cumulative effects on benthic ecology

Potential Effect	Phase ^{4,5}			Maximum Design Scenario	Justification
	C	O&M	D		
Long term habitat loss	x	✓	x	Scenario 1 MDS as described for the MHPGC Project (Section 3.6.2), assessed cumulatively with Morven North. Scenario 2 MDS as described for the MHPGC Project (Section 3.6.2), assessed cumulatively with Morven South. Scenario 4 MDS as described for the MHPGC Project (Section 3.6.2), assessed cumulatively with the following other projects and plans: Tier 1 - OWF projects: - Morven North (O&M phase); - Morven South (O&M phase). - Ossian OWF (O&M phase). - Cables - Eastern Green Link 1 (O&M phase); - Eastern Green Link 2 (O&M phase); - Berwick Bank OWF ECC (O&M phase); Tier 2 - Cables - Eastern Green Link 3 (O&M phase); - Eastern Green Link 4 (O&M phase) Tier 3 - Cables - MBAGC Project (O&M phase);	Long term habitat loss may occur during the O&M phase where infrastructure installed during construction, such as cable protection and cable crossings, remains on the seabed for the lifetime of the MHPGC Project. Although the infrastructure is installed during construction, habitat loss is only considered to occur once the infrastructure is in place and occupying seabed habitat over the longer term. Construction activities therefore do not result in long-term habitat loss and are scoped out of the assessment. Decommissioning activities are assumed to involve the removal of infrastructure and therefore are not expected to contribute to long-term habitat loss. The presence of infrastructure may result in the permanent loss or alteration of benthic habitat within its footprint, giving rise to potential cumulative effects on benthic receptors. The projects and plans within the Benthic Ecology CEA Study Area are considered to capture the potential overlap of impacts during the O&M phase. Activities from projects and plans that involve the installation and presence of infrastructure on the seabed have been included in the CEA, as these may contribute to a cumulative loss or alteration of benthic

⁴ C= Construction, O= Operations and maintenance, D= Decommissioning phases

⁵ “✓” is used to denote the phase the potential impact can occur, “X” outlines there is no impact within this project phase

Potential Effect	Phase ^{4,5}			Maximum Design Scenario	Justification
	C	O&M	D		
				Eastern Green Link 5 (O&M phase).	habitat and associated cumulative effects on benthic receptors. Where spatial and/or temporal overlap occurs with MHPGC Project, these activities may act cumulatively and are therefore considered to represent a precautionary MDS.
Temporary habitat disturbance/loss	✓	✓	✓	Scenario 1 MDS as described for the MHPGC Project (Section 3.6.2), assessed cumulatively with Morven North. Scenario 2 MDS as described for the MHPGC Project (Section 3.6.2), assessed cumulatively with Morven South. Scenario 4 MDS as described for the MHPGC Project (Section 3.6.2), assessed cumulatively with the following other projects and plans: Tier 1 - OWF projects: - Morven North (Construction, O&M and decommissioning phases); - Morven South (Construction, O&M and decommissioning phases); - Ossian OWF (Construction, O&M and decommissioning phases). - Cables - Eastern Green Link 1 (Construction, O&M and decommissioning phases); - Eastern Green Link 2 (Construction, O&M and decommissioning phases); - Berwick Bank OWF ECC (Construction, O&M and decommissioning phases) - NO UK Telecom Cable (Construction, O&M and decommissioning phases); - Havhingsten Seg 2 Telecom Cable (Construction, O&M and decommissioning phases); - North Sea Link North Power Cable (Construction, O&M and decommissioning phases).	Temporary habitat loss and/or disturbance could occur where seabed-disturbing activities associated with the MHPGC Project overlap spatially and temporally with comparable activities from other plans and projects. Such activities may occur during construction (e.g. cable installation and seabed preparation), O&M (e.g. maintenance and repair activities) and decommissioning (e.g. infrastructure removal), resulting in the potential for cumulative effects on benthic receptors. The projects and plans within the Benthic Ecology CEA Study Area are considered to capture the potential overlap of impacts during the construction, O&M and decommissioning phases. Activities from projects and plans that have the potential to result in temporary habitat loss and/or disturbance during periods of overlap with the MHPGC Project have been included in the CEA, as these may contribute to a cumulative impact on benthic receptors. Where spatial and/or temporal overlap occurs with the MHPGC Project, these activities may act cumulatively and are therefore considered to represent a precautionary MDS.

Potential Effect	Phase ^{4,5}			Maximum Design Scenario	Justification
	C	O&M	D		
				Tier 2 – Cables – Eastern Green Link 3 (Construction, O&M and decommissioning phases); – Eastern Green Link 4 (Construction, O&M and decommissioning phases) Tier 3 • Cables – MBAGC Project (Construction, O&M and decommissioning phases); – Eastern Green Link 5 (Construction, O&M and decommissioning phase).	
Increased SSCs and associated deposition	✓	×	✓	Scenario 1 MDS as described for the MHPGC Project (Section 3.6.2), assessed cumulatively with Morven North. Scenario 2 MDS as described for the MHPGC Project (Section 3.6.2), assessed cumulatively with Morven South. Scenario 4 MDS as described for the MHPGC Project (Section 3.6.2), assessed cumulatively with the following other projects and plans: Tier 1 • OWF projects: – Morven North (Construction, O&M and decommissioning phases); – Morven South (Construction, O&M and decommissioning phases); – Ossian OWF (Construction, O&M and decommissioning phases).. • Cables – Eastern Green Link 1 (Construction, O&M and decommissioning phases).; – Eastern Green Link 2 (Construction, O&M and decommissioning phases); – Berwick Bank OWF ECC (Construction, O&M and decommissioning phases);	Increased SSCs and associated deposition could occur where seabed-disturbing activities associated with the MHPGC Project overlap spatially and temporally with comparable activities from other plans and projects. Such activities may occur during construction (e.g., cable installation and seabed preparation) and decommissioning (e.g. infrastructure removal), resulting in the potential for cumulative effects on benthic receptors. Routine O&M activities are not expected to result in substantial increases in SSCs or associated sediment deposition. Any seabed disturbance associated with maintenance activities would be infrequent, localised and temporary, and is therefore not considered likely to result in significant effects on benthic receptors. As such, cumulative effects during O&M are scoped out of the assessment. The projects and plans within the Benthic Ecology CEA Study Area are considered to capture the potential overlap of impacts during the construction and decommissioning phases. Activities from

Potential Effect	Phase ^{4,5}			Maximum Design Scenario	Justification
	C	O&M	D		
				– NO UK Telecom Cable (Construction, O&M and decommissioning phases); – Havhingsten Seg 2 Telecom Cable (Construction, O&M and decommissioning phases); – North Sea Link North Power Cable (Construction, O&M and decommissioning phases). • Dredge disposal – Noses Point (Construction, O&M and decommissioning phases); – Souter Point Outer (Construction, O&M and decommissioning phases); – Sunderland (Construction, O&M and decommissioning phases) Tier 2 • Cables – Eastern Green Link 3 (Construction, O&M and decommissioning phases); – Eastern Green Link 4 (Construction, O&M and decommissioning phases) Tier 3 • Cables – MBAGC Project (Construction, O&M and decommissioning phases); – Eastern Green Link 5 (Construction, O&M and decommissioning phases).	projects and plans that have the potential to increase SSCs during periods of overlap with the MHPGC Project construction and decommissioning phases have been included in the CEA, as these may contribute to a cumulative impact on benthic receptors. Where spatial and/or temporal overlap occurs with MHPGC Project, these activities may act cumulatively and are therefore considered to represent a precautionary MDS.
Disturbance/remobilisation of sediment bound contaminants	✓	×	✓	Scenario 1 MDS as described for the MHPGC Project (Section 3.6.2), assessed cumulatively with Morven North. Scenario 2 MDS as described for the MHPGC Project (Section 3.6.2), assessed cumulatively with Morven South. Scenario 4 MDS as described for the MHPGC Project (Section 3.6.2), assessed cumulatively with the following other projects and plans: Tier 1 • OWF projects: – Morven North (Construction, O&M and decommissioning phases);	Disturbance and/or remobilisation of sediment-bound contaminants could occur where seabed-disturbing activities associated with the MHPGC Project overlap spatially and temporally with comparable activities from other plans and projects. Such activities may occur during construction (e.g. cable installation and seabed preparation) and decommissioning (e.g. infrastructure removal), resulting in the potential for cumulative effects on benthic receptors. Routine O&M activities are not expected to result in substantial disturbance or remobilisation of sediment-bound contaminants. Any seabed

Potential Effect	Phase ^{4,5}			Maximum Design Scenario	Justification
	C	O&M	D		
				– Morven South (Construction, O&M and decommissioning phases); – Ossian OWF (Construction, O&M and decommissioning phases).. • Cables – Eastern Green Link 1 (Construction, O&M and decommissioning phases).; – Eastern Green Link 2 (Construction, O&M and decommissioning phases); – Berwick Bank OWF ECC (Construction, O&M and decommissioning phases); – NO UK Telecom Cable (Construction, O&M and decommissioning phases); – Havhingsten Seg 2 Telecom Cable (Construction, O&M and decommissioning phases); – North Sea Link North Power Cable (Construction, O&M and decommissioning phases). • Dredge disposal – Noses Point (Construction, O&M and decommissioning phases); – Souter Point Outer (Construction, O&M and decommissioning phases); – Sunderland (Construction, O&M and decommissioning phases) Tier 2 • Cables – Eastern Green Link 3 (Construction, O&M and decommissioning phases); – Eastern Green Link 4 (Construction, O&M and decommissioning phases) Tier 3 • Cables – MBAGC Project (Construction, O&M and decommissioning phases); – Eastern Green Link 5 (Construction, O&M and decommissioning phases).	disturbance associated with maintenance activities would be infrequent, localised and temporary, and is therefore not considered likely to result in significant effects on benthic receptors. As such, cumulative effects during O&M are scoped out of the assessment. The projects and plans within the Benthic Ecology CEA Study Area are considered to capture the potential overlap of impacts during the construction and decommissioning phases. Activities from projects and plans that have the potential to result in the disturbance and/or remobilisation of sediment-bound contaminants during periods of overlap with the MHPGC Project construction and decommissioning phases have been included in the CEA, as these may contribute to a cumulative impact on benthic receptors. Where spatial and/or temporal overlap occurs with the MHPGC Project, these activities may act cumulatively and are therefore considered to represent a precautionary MDS.

Potential Effect	Phase ^{4,5}			Maximum Design Scenario	Justification
	C	O&M	D		
Changes in physical processes	✗	✓	✗	Scenario 1 MDS as described for the MHPGC Project (Section 3.6.2), assessed cumulatively with Morven North. Scenario 2 MDS as described for the MHPGC Project (Section 3.6.2), assessed cumulatively with Morven South. Scenario 4 MDS as described for the MHPGC Project (Section 3.6.2), assessed cumulatively with the following other projects and plans: Tier 1 - OWF projects: - Morven North (O&M phase); - Morven South (O&M phase); - Ossian OWF (O&M phase).. - Cables - Eastern Green Link 1 (O&M phase); - Eastern Green Link 2 (O&M phase); - Berwick Bank OWF ECC (O&M phase); - NO UK Telecom Cable (O&M phase); - Havhingsten Seg 2 Telecom Cable (O&M phase); - North Sea Link North Power Cable (O&M phase). Tier 2 - Cables - Eastern Green Link 3 (O&M phase); - Eastern Green Link 4 (O&M phase). Tier 3 - Cables - MBAGC Project (O&M phase); - Eastern Green Link 5 (O&M phase).	Changes in physical processes may occur during the O&M phase of the MHPGC Project as a result of the presence of offshore infrastructure on the seabed and within the water column. Infrastructure associated with other projects, such as foundations, scour protection, cable protection and cable crossings, may contribute to these changes and result in cumulative effects on benthic receptors. Construction and decommissioning activities are not expected to result in long-term changes to physical processes, as any effects associated with seabed disturbance are temporary and reversible. As such, cumulative effects during construction and decommissioning are scoped out of the assessment. The projects and plans within the Benthic Ecology CEA Study Area are considered to capture the potential overlap of impacts during the O&M phase. Existing and consented infrastructure from other projects that may contribute to changes in physical processes have been included in the CEA, as these may contribute to a cumulative impact on benthic receptors. Where overlap occurs between the physical presence of MHPGC Project infrastructure and infrastructure associated with other projects and plans, these effects may act cumulatively and are therefore considered to represent a precautionary MDS.

Potential Effect	Phase ^{4,5}			Maximum Design Scenario	Justification
	C	O&M	D		
Increased risk of introduction and spread of INNS	✓	✓	✓	Scenario 1 MDS as described for the MHPGC Project (Section 3.6.2), assessed cumulatively with Morven North. Scenario 2 MDS as described for the MHPGC Project (Section 3.6.2), assessed cumulatively with Morven South. Scenario 4 MDS as described for the MHPGC Project (Section 3.6.2), assessed cumulatively with the following other projects and plans: Tier 1 – OWF projects: – Morven North (Construction, O&M and decommissioning phases); – Morven South (Construction, O&M and decommissioning phases); – Ossian OWF (Construction, O&M and decommissioning phases).. – Cables – Eastern Green Link 1 (Construction, O&M and decommissioning phases).; – Eastern Green Link 2 (Construction, O&M and decommissioning phases); – Berwick Bank OWF ECC (Construction, O&M and decommissioning phases). – NO UK Telecom Cable (Construction, O&M and decommissioning phases); – Havhingsten Seg 2 Telecom Cable (Construction, O&M and decommissioning phases); – North Sea Link North Power Cable (Construction, O&M and decommissioning phases). Tier 2 – Cables – Eastern Green Link 3 (Construction, O&M and decommissioning phases); – Eastern Green Link 4 (Construction, O&M and decommissioning phases).	Increased risk of introduction and spread of INNS could occur throughout the MHPGC Project phases as a result of vessel movements (e.g. transfer via ballast water and hull fouling) and the installation of hard structures in areas of predominantly soft sediment. Projects and plans included within the CEA may also involve vessel movements and the installation of hard structures that could facilitate the introduction, establishment and spread of INNS. These activities have the potential to act cumulatively with those associated with the MHPGC Project, resulting in cumulative effects on benthic receptors. The projects and plans within the Benthic Ecology CEA Study Area are considered to capture the potential overlap of impacts during the construction, O&M and decommissioning phases. Activities from projects and plans that may increase the risk of INNS introduction and spread have been included in the CEA, as these may contribute to a cumulative impact on benthic receptors. Where spatial and/or temporal overlap occurs with the MHPGC Project, these activities may act cumulatively and are therefore considered to represent a precautionary MDS.

Potential Effect	Phase ^{4,5}			Maximum Design Scenario	Justification
	C	O&M	D		
				Tier 3 – Cables – MBAGC Project; – Eastern Green Link 5 (Construction, O&M and decommissioning phases).	
Colonisation of hard structures	×	✓	×	Scenario 1 MDS as described for the MHPGC Project (Section 3.6.2), assessed cumulatively with Morven North. Scenario 2 MDS as described for the MHPGC Project (Section 3.6.2), assessed cumulatively with Morven South. Scenario 4 MDS as described for the MHPGC Project (Section 3.6.2), assessed cumulatively with the following other projects and plans: Tier 1 • OWF projects: – Morven North (O&M phase); – Morven South (O&M phase); – Ossian OWF (O&M phase). • Cables – Eastern Green Link 1 (O&M phase).; – Eastern Green Link 2 (O&M phase); – Berwick Bank OWF ECC (O&M phase). Tier 2 • Cables – Eastern Green Link 3 (O&M phase); – Eastern Green Link 4 (O&M phase). Tier 3 • Cables – MBAGC Project (O&M phase); – Eastern Green Link 5 (O&M phase).	Colonisation of hard structures may occur during the O&M phase following the installation of infrastructure on the seabed during construction. The establishment of epifaunal and benthic communities on artificial hard substrate is expected to develop over time during the operational life of the MHPGC Project. Decommissioning activities are assumed to involve the removal of hard structures and therefore would not result in additional colonisation. As such, cumulative effects during decommissioning are scoped out of the assessment. The projects and plans within the Benthic Ecology CEA Study Area are considered to capture the potential overlap of impacts during the O&M phase. Activities from projects and plans that involve the installation and presence of artificial hard substrate on the seabed have been included in the CEA, as these may contribute to a cumulative increase in habitat available for colonisation and associated cumulative effects on benthic receptors. Where overlap occurs between artificial hard substrates associated with the MHPGC Project and other projects and plans, these effects may act cumulatively and are therefore considered to represent a precautionary MDS.

Potential Effect	Phase ^{4,5}			Maximum Design Scenario	Justification
	C	O&M	D		
Removal of hard substrates	×	×	✓	Scenario 1 MDS as described for the MHPGC Project (Section 3.6.2), assessed cumulatively with Morven North. Scenario 2 MDS as described for the MHPGC Project (Section 3.6.2), assessed cumulatively with Morven South. Scenario 4 MDS as described for the MHPGC Project (Section 3.6.2), assessed cumulatively with the following other projects and plans: Tier 1 - OWF projects: - Morven North (Decommissioning phase); - Morven South (Decommissioning phase); - Ossian OWF (Decommissioning phase). - Cables - Eastern Green Link 1 (Decommissioning phase); - Eastern Green Link 2 (Decommissioning phase); - Berwick Bank OWF ECC (Decommissioning phase); - Berwick Bank OWF ECC (Decommissioning phase); - NO UK Telecom Cable (Decommissioning phase); - Havhingsten Seg 2 Telecom Cable (Decommissioning phase); - North Sea Link North Power Cable (Decommissioning phase). Tier 2 - Cables - Eastern Green Link 3 (Decommissioning phase); - Eastern Green Link 4 (Decommissioning phase). Tier 3 - Cables - MBAGC Project (Decommissioning phase); - Estern Green Link 5 (Decommissioning phase).	Removal of hard substrates may occur during the decommissioning phase of the MHPGC Project, resulting in the loss of artificial habitat that may have been colonised by benthic species. Routine O&M activities are not expected to result in the removal of substantial areas of hard substrate. Any removal associated with maintenance or repair activities would be infrequent, localised and temporary, and is therefore not considered likely to result in significant effects on benthic receptors. As such, cumulative effects during O&M are scoped out of the assessment. The projects and plans within the Benthic Ecology CEA Study Area are considered to capture the potential overlap of impacts during the decommissioning phase. Activities associated with the removal of artificial hard substrates from other projects and plans have been included in the CEA, as these may contribute to a cumulative impact on benthic receptors through the loss of habitat available for colonisation. Where temporal overlap occurs between decommissioning activities associated with the MHPGC Project and other projects and plans, these effects may act cumulatively and are therefore considered to represent a precautionary MDS.

Potential Effect	Phase ^{4,5}			Maximum Design Scenario	Justification
	C	O&M	D		
Impacts to benthic invertebrates due to EMF	✗	✓	✗	Scenario 1 MDS as described for the MHPGC Project (Section 3.6.2), assessed cumulatively with Morven North. Scenario 2 MDS as described for the MHPGC Project (Section 3.6.2), assessed cumulatively with Morven South. Scenario 4 MDS as described for the MHPGC Project (Section 3.6.2), assessed cumulatively with the following other projects and plans: Tier 1 - OWF projects: - Morven North (O&M phase); - Morven South (O&M phase); - Ossian OWF (O&M phase).. - Cables - Eastern Green Link 1 (O&M phase).; - Eastern Green Link 2 (O&M phase); - Berwick Bank OWF ECC (O&M phase); - NO UK Telecom Cable (O&M phase); - Havhingsten Seg 2 Telecom Cable (O&M - North Sea Link North Power Cable (O&M). Tier 2 - Cables - Eastern Green Link 3 (O&M phase); - Eastern Green Link 4 (O&M phase). - Tier 3 Cables - MBAGC Project (O&M phase); - Eastern Green Link 5 (O&M phase).	Impacts to benthic invertebrates from EMF may occur during the O&M phase of the MHPGC Project as a result of electricity transmission through subsea cables. Therefore, this impact is not considered for construction or decommissioning phases. The projects and plans within the Benthic Ecology CEA Study Area are considered to capture the potential overlap of impacts during the O&M phase. Existing and consented subsea electrical infrastructure associated with other projects and plans that may generate EMF have been included in the CEA, as these may contribute to a cumulative impact on benthic receptors. Where overlap occurs between EMF generated by the MHPGC Project and other projects and plans, these effects may act cumulatively and are therefore considered to represent a precautionary MDS.

Potential Effect	Phase ^{4,5}			Maximum Design Scenario	Justification
	C	O&M	D		
Impacts to benthic invertebrates due to thermal emissions from subsea electrical cables	✗	✓	✗	Scenario 1 MDS as described for the MHPGC Project (Section 3.6.2), assessed cumulatively with Morven North. Scenario 2 MDS as described for the MHPGC Project (Section 3.6.2), assessed cumulatively with Morven South. Scenario 4 MDS as described for the MHPGC Project (Section 3.6.2), assessed cumulatively with the following other projects and plans: Tier 1 - OWF projects: - Morven North (O&M phase); - Morven South (O&M phase). - Cables - Eastern Green Link 1 (O&M phase); - Eastern Green Link 2 (O&M phase); - Berwick Bank OWF ECC (O&M phase); - NO UK Telecom Cable (O&M phase); - Havhingsten Seg 2 Telecom Cable (O&M phase) - North Sea Link North Power Cable (O&M phase). Tier 2 - OWF project: - Ossian OWF (O&M phase). - Cables - Eastern Green Link 3 (O&M phase); - Eastern Green Link 4 (O&M phase). Tier 3 - Cables - MBAGC Project (O&M phase); - Eastern Green Link 5 (O&M phase).	Impacts to benthic receptors from thermal emissions may occur during the O&M phase of the MHPGC Project as a result of electricity transmissions through subsea cables. Therefore, this impact is not considered for construction or decommissioning phases. The projects and plans within the Benthic Ecology CEA Study Area are considered to capture the potential overlap of impacts during the O&M phase. Existing and consented subsea electrical infrastructure associated with other projects and plans that may generate thermal emissions have been included in the CEA, as these may contribute to a cumulative impact on benthic receptors. Where overlap occurs between thermal emissions generated by the MHPGC Project and other projects and plans, these effects may act cumulatively and are therefore considered to represent a precautionary MDS.

3.10 Whole project assessment and Cumulative Effects Assessment

3.10.1 Overview

- 3.10.1.1 A description of the significance of whole project and cumulative effects upon benthic ecology receptors arising from each identified impact is given below. The whole project assessment and CEA for the MHPGC Project is presented in **Table 3.25** to **Table 3.44**.
- 3.10.1.2 The Benthic Ecology CEA Study Area comprises the Benthic Subtidal Ecology Study Area, as defined in **Paragraph 3.4.2 et seq.**; a 9km buffer around the MHPGC Project PEIR Red Line Boundary seaward of MLWS, representing the maximum spring tidal excursion distance and the likely maximum spatial extent of potential indirect impacts. Intertidal receptors are restricted to habitats between MLWS and MHWS within the MHPGC Project PEIR Red Line Boundary. As impacts to intertidal habitats are localised to the MHPGC Project footprint and no pathway for cumulative interaction with other plans or projects has been identified, cumulative effects on intertidal receptors have not been assessed further.

3.10.2 Long term habitat loss

- 3.10.2.1 There is potential for long-term habitat loss resulting from the presence of MHPGC Project infrastructure throughout the O&M phase, alongside OWFs and associated export cables, interconnectors or other subsea cables within the Benthic Ecology CEA Study Area. Long-term habitat loss may result from the presence of cable protection, export cable crossings and trenchless drill exit pit protection, which may result in the permanent alteration or loss of benthic habitat. Where these features overlap spatially with those associated with other OWF and cable projects, there is potential for cumulative long-term habitat loss.
- 3.10.2.2 The summary of the Whole Project assessment for long-term habitat loss is presented in **Table 3.25**, and cumulative effects assessment for long-term habitat loss is presented in **Table 3.26**.

Table 3.25: MHPGC Project whole project assessment for long-term habitat loss

	Whole project assessment	
	Scenario 1: MHPGC Project and Morven North	Scenario 2: MHPGC Project and Morven South
Operations and Maintenance phase		
Magnitude of impact	The presence of Morven North infrastructure will result in up to 2,052,797m² of long-term habitat loss due to the installation of foundations and associated scour protection, cable protection on inter-array and interconnector cables, and cable crossing protection. In combination with the MHPGC Project this equates to a combined area of 3,679,197 m² of long term habitat loss. The impact is predicted to be of local spatial extent, long-term duration, continuous and low reversibility and it is predicted that the impact will affect receptors directly and will only represent a small area of long-term habitat loss compared to similar nearby habitats which will remain unimpacted. The magnitude is therefore considered to be low.	The presence of Morven South infrastructure will result in up to 1,820,664m² of long-term habitat loss due to the installation of foundations and associated scour protection, cable protection on inter-array and interconnector cables, and cable crossing protection. In combination with the MHPGC Project this equates to a combined area of 3,447,784 m² of long term habitat loss. The impact is predicted to be of local spatial extent, long-term duration, continuous and low reversibility and it is predicted that the impact will affect receptors directly and will only represent a small area of long-term habitat loss compared to similar nearby habitats which will remain unimpacted. The magnitude is therefore considered to be low.
Sensitivity of receptor	The sensitivity of the benthic subtidal ecology VERs to long-term habitat loss is summarised in Paragraph 3.8.3.9 et seq. In Scottish waters, offshore deep-sea mud, offshore subtidal sands and gravels, ocean quahog and scarce tube-dwelling anemone are considered to have no resistance to long-term habitat loss, with recoverability assessed as very low. The sensitivity of these receptors is therefore considered to be high. Similarly, in English waters, sea pen and burrowing megafauna communities, mud habitats in deep water, sublittoral sands and gravels and ocean quahog are considered to have no resistance to long-term habitat loss, with recoverability assessed as very low. The sensitivity of receptors in English waters is therefore considered to be at worst-case high.	
Significance of effect	Overall, for the VERs in both Scottish and English waters the magnitude of the Whole Project impact is deemed to be low and the sensitivity of the receptor is considered to be at worst-case high. The Whole Project effect will, therefore, be of minor to moderate significance, with an overall conclusion for all VERs of minor adverse significance, which is not significant in EIA terms. This is due to the relatively low area impacted by long-term habitat loss compared to the large areas of unimpacted similar habitat regionally and due to the low numbers of ocean quahog recorded across the Benthic Ecology Study Area lowering the overall significance from moderate to minor.	
Further mitigation and residual significance	No mitigation measures for benthic ecology are considered necessary because the likely effect in the absence of further mitigation, beyond the designed in measures outlined in Table 3.18, is not significant in EIA terms.	

Table 3.26: MHPGC Project CEA for long-term habitat loss

	Cumulative Effects Assessment
	Scenario 4: MHPGC Project, Tier 1 (including Morven North and Morven South), Tier 2, and Tier 3 (including MBAGC Project) Projects
Operations and maintenance phase	
Magnitude of impact	The cumulative effects assessment for Scenario 4 considers the MHPGC Project together with the Tier 1, Tier 2 and Tier 3 projects below. <u>Tier 1</u> Tier 1 includes the following OWF projects which have O&M phases overlapping with the construction of the MHPGC Project, with area of habitat loss/disturbance: • Morven North (2,052,797m²); • Morven South (1,820,664m²). • Ossian OWF (19,270,958m²) Tier 1 includes the following cable projects: • Berwick Bank ECC (2,177,214m²); • Eastern Green Link 1 (779,000m²); • Eastern Green Link 2 (1,110,000m²); In total cumulative hard structures associated with the MHPGC Project (1,627,120m²) and Tier 1 projects is up to 28,837,753m² which, in comparison to the surface area of the North Sea (750,000km²), equates to 0.004%. The cable projects are also likely to install hard structures such as cable protection and cable crossings. The distances separating projects and lack of connectivity between the long-term habitat loss introduced for each project reduces the potential of this increasing the magnitude overall. The cumulative effect is predicted to be of regional spatial extent, long-term duration, continuous, and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is, therefore, considered to be low. <u>Tier 2</u> Tier 2 includes the following cable projects: • Eastern Green Link 3; • Eastern Green Link 4. In total cumulative hard structures associated with the MHPGC Project (1,627,120m²) and Tier 2 projects is up to 1,627,120m² (area data not available for Eastern Green Link 3 or Eastern Green Link 4). The cable projects are also likely to install hard structures such as cable protection and cable crossings. The distances separating projects and lack of connectivity between the long-term habitat loss introduced for each project reduces the potential of this increasing the magnitude overall. The cumulative effect is predicted to be of regional spatial extent, long-term duration, continuous, and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore considered to be low. <u>Tier 3</u> Tier 3 includes the following cable projects:

	Cumulative Effects Assessment
	- MBAGC Project - Eastern Green Link 5. The programmes for these projects are unknown and therefore there is potential for the project to install hard substrate within the MHPGC Project construction and O&M phases. It is currently not possible to quantify this impact, but it is likely to be of a similar or reduced magnitude compared to the MHPGC Project. The cumulative effect of all projects in Scenario 4 is predicted to be of regional spatial extent, long-term duration, continuous, and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is, therefore, considered to be low.
Sensitivity of receptor	The sensitivity of the benthic subtidal ecology VERs to long-term habitat loss is summarised in Paragraph 3.8.3.9 et seq. In Scottish waters, offshore deep-sea mud, offshore subtidal sands and gravels, ocean quahog and scarce tube-dwelling anemone are considered to have no resistance to long-term habitat loss, with recoverability assessed as very low. The sensitivity of these receptors is therefore considered to be high. Similarly, in English waters, sea pen and burrowing megafauna communities, mud habitats in deep water, sublittoral sands and gravels and ocean quahog are considered to have no resistance to long-term habitat loss, with recoverability assessed as very low. The sensitivity of receptors in English waters is therefore considered to be at worst-case high.
Significance of effect	<u>Tier 1</u> Overall, for the VERs in both Scottish and English waters the magnitude is deemed to be low and the sensitivity of the receptor is considered to be at worst-case high. The cumulative effect will, therefore, be of minor to moderate significance, with an overall conclusion for both VERs of minor adverse significance, which is not significant in EIA terms. This is due to the relatively low area impacted by long-term habitat loss compared to the large areas of unimpacted similar habitat regionally and due to the low numbers of ocean quahog recorded across the Benthic Subtidal Ecology Study Area lowering the overall significance from moderate to minor. <u>Tier 2</u> Overall, for the VERs in both Scottish and English waters the magnitude is deemed to be low and the sensitivity of the receptor is considered to be at worst-case high. The cumulative effect will, therefore, be of minor to moderate significance, with an overall conclusion for both VERs of minor adverse significance, which is not significant in EIA terms. This is due to the relatively low area impacted by long-term habitat loss compared to the large areas of unimpacted similar habitat regionally and due to the low numbers of ocean quahog recorded across the Benthic Subtidal Ecology Study Area lowering the overall significance from moderate to minor. <u>Tier 3 and all of Scenario 4</u> Overall, for the VERs in both Scottish and English waters the magnitude is deemed to be low and the sensitivity of the receptor is considered to be at worst-case high. The cumulative effect will, therefore, be of minor to moderate significance, with an overall conclusion for both VERs of minor adverse significance, which is not significant in EIA terms. This is due to the relatively low area impacted by long-term habitat loss compared to the large areas of unimpacted similar habitat regionally and due to the low numbers of ocean quahog recorded across the Benthic Subtidal Ecology Study Area lowering the overall significance from moderate to minor.
Further mitigation and residual significance	No mitigation measures for benthic ecology are considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 3.18, is not significant in EIA terms.

3.10.3 Temporary habitat loss and disturbance

- 3.10.3.1 There is potential for temporary habitat loss and disturbance as a result of the MHPGC Project's construction, O&M and decommissioning activities within the Ecology CEA Study Area. Temporary habitat loss and disturbance may arise from seabed-disturbing activities including route preparation (e.g. pre-lay grapnel runs, boulder clearance and sandwave clearance), low order UXO clearance, cable installation, trenchless techniques at the landfall, cable repair and remediation activities, vessel seabed interactions (e.g. anchoring and jack-up activities), and the removal of infrastructure during decommissioning. Where these activities overlap spatially and temporally with those associated with other OWF and cable projects, there is potential for cumulative temporary habitat loss and disturbance.
- 3.10.3.2 The summary of the Whole Project assessment for temporary habitat loss and disturbance is presented in **Table 3.27**, and cumulative effects assessment for temporary habitat loss and disturbance is presented in **Table 3.28**.

Table 3.27: MHPGC Project whole project assessment for temporary habitat loss and disturbance

	Whole project assessment	
	Scenario 1: MHPGC Project and Morven North	Scenario 2: MHPGC Project and Morven South
Construction phase		
Magnitude of impact	The construction of Morven North may occur simultaneously with the construction phase of the MHPGC Project, with site preparation activities, foundation installation, and inter-array cable installation associated with Morven North, alongside offshore export cable installation associated with the MHPGC Project, being undertaken in close proximity. The construction of the Morven North infrastructure will result in up to 74,055,400m² of temporary subtidal habitat loss/disturbance due to sandwave clearance, boulder clearance, IAC installation, UXO removal and jack-up and anchoring activities. In combination with the MHPGC project this equates to a combined area of 96,857,515 m² of temporary habitat loss/disturbance. The Whole Project impact is predicted to be of local spatial extent, medium term duration, intermittent and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is, therefore, considered to be low.	The construction of Morven South may occur simultaneously with the construction phase of the MHPGC Project, with site preparation activities, foundation installation, and inter-array cable installation associated with Morven South, alongside offshore export cable installation associated with the MHPGC Project, being undertaken in close proximity. The construction of the Morven South infrastructure will result in up to 62,596,300m² of temporary subtidal habitat loss/disturbance due to sandwave clearance, boulder clearance, IAC installation, UXO removal and jack-up and anchoring activities. In combination with the MHPGC Project this equates to a combined area of 85,398,415 m² of temporary habitat loss/disturbance. The Whole Project impact is predicted to be of local spatial extent, medium term duration, intermittent and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is, therefore, considered to be low.
Sensitivity of receptor	The sensitivity of the benthic subtidal ecology VERs to temporary habitat loss and disturbance are summarised in Paragraph 3.8.2.9 et seq. In Scottish waters, offshore deep-sea mud, offshore subtidal sands and gravels, ocean quahog and scarce tube-dwelling anemone are assessed as having sensitivities ranging from low to high, with ocean quahog representing the highest sensitivity receptor. The sensitivity of receptors in Scottish waters is therefore considered to be at worst-case high. Similarly, in English waters, sea pen and burrowing megafauna communities, stony reef, sublittoral sands and gravels, mud habitats in deep water and ocean quahog are assessed as having sensitivities ranging from low to high, with ocean quahog representing the highest sensitivity receptor. The sensitivity of receptors in English waters is therefore considered to be at worst-case high.	
Significance of effect	Overall, for the VERs in both Scottish and English waters the magnitude of the Whole Project impact is deemed to be low and the sensitivity of the receptor is considered to be at worst-case high. The Whole Project effect will, therefore, be of minor to moderate significance, with an overall conclusion for all VERs of minor adverse significance, which is not significant in EIA terms. This is due to the relatively low area impacted by temporary habitat loss/disturbance compared to the large areas of unimpacted similar habitat regionally and due to the low numbers of ocean quahog recorded across the Benthic Subtidal Ecology Study Area lowering the overall significance from moderate to minor.	
Further mitigation and residual significance	No mitigation measures for benthic ecology are considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 3.18, is not significant in EIA terms.	
Operations and maintenance phase		

	Whole project assessment	
	Scenario 1: MHPGC Project and Morven North	Scenario 2: MHPGC Project and Morven South
Magnitude of impact	Whole Project assessment for Scenario 1 considers the MHPGC Project together with Morven North. The O&M phase of Morven North may occur simultaneously with the O&M phase of the MHPGC Project and includes cable repair and reburial events. Inter-array and inter-connector cable maintenance activities for Morven North will be undertaken in close proximity to the MHPGC Project using similar parameters and techniques to those associated with the MHPGC Project maintenance activities. The maintenance activities, therefore, are likely to result in a similar level of temporary habitat disturbance and loss, with a limited and localised spatial extent and as well occurring highly intermittently across the operational lifetime of the project, and therefore the overall magnitude would be unlikely to increase above that assessed for the MHPGC Project alone at any one time. The Whole Project impact is predicted to be of local spatial extent, medium term duration, intermittent and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be low .	Whole Project assessment for Scenario 1 considers the MHPGC Project together with Morven South. The O&M phase of Morven South may occur simultaneously with the O&M phase of the MHPGC Project and includes cable repair and reburial events. Inter-array and inter-connector cable maintenance activities for Morven South will be undertaken in close proximity to the MHPGC Project using similar parameters and techniques to those associated with the MHPGC Project maintenance activities. The maintenance activities, therefore, are likely to result in a similar level of temporary habitat loss/disturbance, with a limited and localised spatial extent and as well occurring highly intermittently across the operational lifetime of the project, and therefore the overall magnitude would be unlikely to increase above that assessed for the MHPGC Project alone at any one time. The Whole Project impact is predicted to be of local spatial extent, medium term duration, intermittent and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be low .
Sensitivity of receptor	The sensitivity of receptors to temporary habitat loss and disturbance is considered to be no greater than during the construction phase and are summarised in Paragraph 3.8.2.9 et seq. In Scottish waters, offshore deep-sea mud, offshore subtidal sands and gravels, ocean quahog and scarce tube-dwelling anemone are assessed as having sensitivities ranging from low to high, with ocean quahog representing the highest sensitivity receptor. The sensitivity of receptors in Scottish waters is therefore considered to be at worst-case high . Similarly, in English waters, sea pen and burrowing megafauna communities, stony reef, sublittoral sands and gravels, mud habitats in deep water and ocean quahog are assessed as having sensitivities ranging from low to high, with ocean quahog representing the highest sensitivity receptor. The sensitivity of receptors in English waters is therefore considered to be at worst-case high .	
Significance of effect	Overall, for the VERs in both Scottish and English waters the magnitude of the Whole Project impact is deemed to be low and the sensitivity of the receptor is considered to be at worst-case high. The Whole Project effect will, therefore, be of minor to moderate significance, with an overall conclusion for all VERs of minor adverse significance, which is not significant in EIA terms. This is due to the relatively low area impacted by temporary habitat loss and disturbance compared to the large areas of unimpacted similar habitat regionally and due to the low numbers of ocean quahog recorded across the Benthic Subtidal Ecology Study Area lowering the overall significance from moderate to minor.	
Further mitigation and residual significance	No mitigation measures for benthic ecology are considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 3.18 , is not significant in EIA terms.	
Decommissioning phase		
Magnitude of impact	The Whole Project assessment for Scenario 1 considers Morven North together with the MHPGC Project.	The Whole Project assessment for Scenario 1 considers Morven South together with the MHPGC Project.

	Whole project assessment	
	Scenario 1: MHPGC Project and Morven North	Scenario 2: MHPGC Project and Morven South
	The decommissioning phase of Morven North may occur simultaneously with the decommissioning phase of the MHPGC Project. Due to the relationship of the projects, it is assumed the O&M phase of Morven North will not occur during the decommissioning phase of the MHPGC Project. There is the potential for Morven North decommissioning activities to include cable removal, although it is anticipated that offshore cables and any offshore cable protection may be left <i>in-situ</i>. Any direct impacts from jack-up vessels and anchor placements will be similar to the construction phase, with similar recovery periods, and therefore the overall magnitude would not be expected to significantly increase compared to just the MHPGC Project. The Whole Project impact is predicted to be of local spatial extent, medium term duration, intermittent and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is, therefore, considered to be low.	The decommissioning phase of Morven South may occur simultaneously with the decommissioning phase of the MHPGC Project. Due to the relationship of the projects, it is assumed the O&M phase of Morven South will not occur during the decommissioning phase of the MHPGC Project. There is the potential for Morven South decommissioning activities to include cable removal, although it is anticipated that offshore cables and any offshore cable protection may be left <i>in-situ</i>. Any direct impacts from jack-up vessels and anchor placements will be similar to the construction phase, with similar recovery periods, and therefore the overall magnitude would not be expected to significantly increase compared to just the MHPGC Project. The Whole Project impact is predicted to be of local spatial extent, medium term duration, intermittent and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is, therefore, considered to be low.
Sensitivity of receptor	The sensitivity of receptors to temporary habitat loss and disturbance is considered to be no greater than during the construction phase and are summarised in Paragraph 3.8.2.9 et seq. In Scottish waters, offshore deep-sea mud, offshore subtidal sands and gravels, ocean quahog and scarce tube-dwelling anemone are assessed as having sensitivities ranging from low to high, with ocean quahog representing the highest sensitivity receptor. The sensitivity of receptors in Scottish waters is therefore considered to be at worst-case high. Similarly, in English waters, sea pen and burrowing megafauna communities, stony reef, sublittoral sands and gravels, mud habitats in deep water and ocean quahog are assessed as having sensitivities ranging from low to high, with ocean quahog representing the highest sensitivity receptor. The sensitivity of receptors in English waters is therefore considered to be at worst-case high.	
Significance of effect	Overall, for the VERs in both Scottish and English waters the magnitude of the Whole Project impact is deemed to be low and the sensitivity of the receptor is considered to be at worst-case high. The Whole Project effect will, therefore, be of minor to moderate significance, with an overall conclusion for all VERs of minor adverse significance, which is not significant in EIA terms. This is due to the relatively low area impacted by temporary habitat loss/disturbance compared to the large areas of unimpacted similar habitat regionally and due to the low numbers of ocean quahog recorded across the Benthic Subtidal Ecology Study Area lowering the overall significance from moderate to minor.	
Further mitigation and residual significance	No mitigation measures for benthic ecology are considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 3.18, is not significant in EIA terms.	

Table 3.28: MHPGC Project CEA for of temporary habitat loss and disturbance

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 cumulative effects assessment for Scenario 4 considers the MHPGC Project together with the Tier 1, Tier 2 and Tier 3 projects below. <u>Tier 1</u> Tier 1 includes the following OWF projects which have construction phases overlapping with the construction of the MHPGC Project with area of habitat loss/disturbance indicated • Morven North (74,055,400m²); • Morven South (62,596,300m²); • Ossian OWF (49,948,548m²). Tier 1 includes the following cable projects: • Berwick Bank ECC ; • Eastern Green Link 1; • Eastern Green Link 2; • NO UK Telecom; • Havihingsten Seg 2; • North Sea Link. These cable projects will be primarily in their O&M phase, and therefore may result in low levels of temporary habitat disturbance and loss due to maintenance. Due to the spatially limited and intermittent nature of this work, these projects have not quantified this impact and therefore have not contributed to the overall cumulative temporary habitat loss/disturbance value. In total cumulative temporary habitat loss/disturbance hard structures associated with the MHPGC Project (22,802,115m²) and Tier 1 projects is up to 209,402,363m² which, in comparison to the surface area of the North Sea (750,000km²), equates to 0.03%. The cumulative effect is predicted to be of regional spatial extent, short-term duration, intermittent and medium reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is, therefore, considered to be low. Tier 2 includes the following cable projects: • Eastern Green Link 3; • Eastern Green Link 4. These cable projects will be primarily in their O&M phase and therefore may result in low levels of temporary habitat loss/disturbance due to maintenance. Due to the spatially limited and intermittent nature of this work, these projects have not quantified this impact and therefore have not contributed to the overall cumulative temporary habitat loss/disturbance value. In total cumulative temporary habitat loss/disturbance hard structures associated with the MHPGC Project (22,802,115m²) and Tier 2 projects is up to 22,802,115m² which, in comparison to the surface area of the North Sea (750,000km²), equates to 0.01%.

Cumulative Effects Assessment	
	The cumulative effect is predicted to be of regional spatial extent, long-term duration, continuous, and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore considered to be low. <u>Tier 3</u> Tier 3 includes the following OWF project and the following cable project: • MBAGC Project; • Eastern Green Link 5. These projects are yet to submit any documents as part of an application therefore the scale and specific impacts of these projects are unknown but are likely to be similar, if not much smaller than the MHPGC Project. The cumulative effect of all projects in Scenario 4 is predicted to be of regional spatial extent, long-term duration, continuous, and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is, therefore, considered to be low.
Sensitivity of receptor	The sensitivity of the benthic subtidal ecology VERs to temporary habitat loss and disturbance are summarised in Paragraph 3.8.2.9 et seq. In Scottish waters, offshore deep-sea mud, offshore subtidal sands and gravels, ocean quahog and scarce tube-dwelling anemone are assessed as having sensitivities ranging from low to high, with ocean quahog representing the highest sensitivity receptor. The sensitivity of receptors in Scottish waters is therefore considered to be at worst-case high. Similarly, in English waters, sea pen and burrowing megafauna communities, stony reef, sublittoral sands and gravels, mud habitats in deep water and ocean quahog are assessed as having sensitivities ranging from low to high, with ocean quahog representing the highest sensitivity receptor. The sensitivity of receptors in English waters is therefore considered to be at worst-case high.
Significance of effect	<u>Tier 1</u> Overall, for the VERs in both Scottish and English waters the magnitude is deemed to be low and the sensitivity of the receptor is considered to be at worst-case high. The cumulative effect will, therefore, be of minor to moderate significance, with an overall conclusion for both VERs of minor adverse significance, which is not significant in EIA terms. This is due to the relatively low area impacted by long-term habitat loss compared to the large areas of unimpacted similar habitat regionally and due to the low numbers of ocean quahog recorded across the Regional Benthic Subtidal Ecology Study Area lowering the overall significance from moderate to minor. <u>Tier 2</u> Overall, for the VERs in both Scottish and English waters the magnitude is deemed to be low and the sensitivity of the receptor is considered to be at worst-case high. The cumulative effect will, therefore, be of minor to moderate significance, with an overall conclusion for both VERs of minor adverse significance, which is not significant in EIA terms. This is due to the relatively low area impacted by long-term habitat loss compared to the large areas of unimpacted similar habitat regionally and due to the low numbers of ocean quahog recorded across the Benthic Subtidal Ecology Study Area lowering the overall significance from moderate to minor. <u>Tier 3 and all of Scenario 4</u> Overall, for the VERs in both Scottish and English waters the magnitude is deemed to be low and the sensitivity of the receptor is considered to be at worst-case high. The cumulative effect will, therefore, be of minor to moderate significance, with an overall conclusion for both VERs of minor adverse significance, which is not significant in EIA terms. This is due to the relatively low area impacted by long-term habitat loss compared to the large areas of unimpacted similar habitat regionally and due to the low numbers of ocean quahog recorded across the Benthic Subtidal Ecology Study Area lowering the overall significance from moderate to minor.

Cumulative Effects Assessment	
Further mitigation and residual significance	No mitigation measures for benthic ecology are considered necessary because the likely effect in the absence of further mitigation, beyond the designed in measures outlined in Table 3.18 , is not significant in EIA terms.
Operations and maintenance phase	
Magnitude of impact	The cumulative effects assessment for Scenario 4 considers the MHPGC Project together with the Tier 1, Tier 2 and Tier 3 projects below. <u>Tier 1</u> Tier 1 includes the following OWF projects which have construction phases overlapping with the construction of the MHPGC Project with area of habitat loss/disturbance indicated • Morven North (9,221,800m²); • Morven South (7,967,400m²) • Ossian OWF (51,411,500m²). These projects will be in their O&M phase when the MHPGC Project is in its O&M phase, which will result in temporary habitat loss/disturbance as a result of cable and turbine foundation maintenance. Overall, these projects will contribute 68,600,00m² to the cumulative temporary habitat disturbance/loss. Tier 1 includes the following cable projects: • Berwick Bank ECC (120,000m²); • Eastern Green Link 1; • Eastern Green Link 2; • NO UK Telecom; • Havihingsten Seg 2; • North Sea Link. These cable projects will be primarily in their O&M phase and therefore may result in low levels of temporary habitat loss/disturbance due to maintenance. However, it should be noted that for Eastern Green Link 1 and 2 due to the spatially limited and intermittent nature of this work, these projects have not quantified this impact and therefore have not contributed to the overall cumulative temporary habitat loss/disturbance value. In total cumulative temporary habitat loss/disturbance hard structures associated with the MHPGC Project (19,918,400m²) and Tier 1 projects is up to 87,799,100m² which, in comparison to the surface area of the North Sea (750,000km²), equates to 0.012%. The cumulative effect is predicted to be of regional spatial extent, short-term duration, intermittent and medium reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is, therefore, considered to be low. <u>Tier 2</u> Tier 2 includes the following cable projects: • Eastern Green Link 3; • Eastern Green Link 4.

Cumulative Effects Assessment	
	It should be noted that for Eastern Green Link 3 and 4 due to the spatially limited and intermittent nature of this work, these projects have not quantified this impact and therefore have not contributed to the overall cumulative temporary habitat loss/disturbance value. In total cumulative temporary habitat loss/disturbance hard structures associated with the MHPGC Project (19,918,400m²) and Tier 2 projects is up to 19,918,400m² which, in comparison to the surface area of the North Sea (750,000km²), equates to 0.003%. The cumulative effect is predicted to be of regional spatial extent, long-term duration, continuous, and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore considered to be low. <u>Tier 3</u> Tier 3 includes the following OWF project and the following cable project: • MBAGC Project; • Eastern Green Link 5. These projects are yet to submit any documents as part of an application therefore the scale and specific impact of these projects are unknown but are likely to be similar, if not much smaller than the MHPGC Project. The cumulative effect of all projects in Scenario 4 is predicted to be of regional spatial extent, long-term duration, continuous, and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is, therefore, considered to be low.
Sensitivity of receptor	The sensitivity of receptors to temporary habitat loss and disturbance is considered to be no greater than during the construction phase and are summarised in Paragraph 3.8.2.9 et seq. In Scottish waters, offshore deep-sea mud, offshore subtidal sands and gravels, ocean quahog and scarce tube-dwelling anemone are assessed as having sensitivities ranging from low to high, with ocean quahog representing the highest sensitivity receptor. The sensitivity of receptors in Scottish waters is therefore considered to be at worst-case high. Similarly, in English waters, sea pen and burrowing megafauna communities, stony reef, sublittoral sands and gravels, mud habitats in deep water and ocean quahog are assessed as having sensitivities ranging from low to high, with ocean quahog representing the highest sensitivity receptor. The sensitivity of receptors in English waters is therefore considered to be at worst-case high.
Significance of effect	<u>Tier 1</u> Overall, for the VERs in both Scottish and English waters the magnitude is deemed to be low and the sensitivity of the receptor is considered to be at worst-case high. The cumulative effect will, therefore, be of minor to moderate significance, with an overall conclusion for both VERs of minor adverse significance, which is not significant in EIA terms. This is due to the relatively low area impacted by long-term habitat loss compared to the large areas of unimpacted similar habitat regionally and due to the low numbers of ocean quahog recorded across the Regional Benthic Subtidal Ecology Study Area lowering the overall significance from moderate to minor. <u>Tier 2</u> Overall, for the VERs in both Scottish and English waters the magnitude is deemed to be low and the sensitivity of the receptor is considered to be at worst-case high. The cumulative effect will, therefore, be of minor to moderate significance, with an overall conclusion for both VERs of minor adverse significance, which is not significant in EIA terms. This is due to the relatively low area impacted by long-term habitat loss compared to the large areas of unimpacted similar habitat regionally and due to the low numbers of ocean quahog recorded across the Regional Benthic Subtidal Ecology Study Area lowering the overall significance from moderate to minor. <u>Tier 3 and all of Scenario 4</u>

Cumulative Effects Assessment	
	Overall, for the VERs in both Scottish and English waters the magnitude is deemed to be low and the sensitivity of the receptor is considered to be at worst-case high. The cumulative effect will, therefore, be of minor to moderate significance, with an overall conclusion for both VERs of minor adverse significance, which is not significant in EIA terms. This is due to the relatively low area impacted by long-term habitat loss compared to the large areas of unimpacted similar habitat regionally and due to the low numbers of ocean quahog recorded across the Regional Benthic Subtidal Ecology Study Area lowering the overall significance from moderate to minor
Further mitigation and residual significance	No mitigation measures for benthic ecology are considered necessary because the likely effect in the absence of further mitigation, beyond the designed in measures outlined in Table 3.18 , is not significant in EIA terms.
Decommissioning phase	
Magnitude of impact	During decommissioning, infrastructure associated with the MHPGC Project and relevant cumulative projects may be removed, either wholly or partially. As decommissioning methodologies are not yet defined, a precautionary assessment has been undertaken assuming activities and associated temporary habitat loss/disturbance. Therefore, the magnitude of impact, receptor sensitivity, significance of effect, mitigation requirements and residual effects associated with the MHPGC Project and cumulative projects are considered to be comparable to those predicted during construction.
Sensitivity of receptor	
Significance of effect	
Further mitigation and residual significance	

3.10.4 Increased SSCs and associated deposition

- 3.10.4.1 There is potential for increased SSC and associated deposition as a result of construction, O&M and decommissioning activities associated with the MHPGC Project within the Benthic Ecology CEA Study Area. Increased SSCs and deposition may result from seabed-disturbing activities, including seabed preparation, cable installation, maintenance and repair activities and the removal of infrastructure during decommissioning. Where these activities occur concurrently with those associated with other OWF, cable and dredge disposal projects, there is potential for cumulative increases in SSCs and associated deposition.
- 3.10.4.2 The summary of the Whole Project assessment for SSC and associated deposition is presented in **Table 3.29**, and cumulative effects assessment for SSC and associated deposition is presented in **Table 3.30**.

Table 3.29: MHPGC Project whole project assessment for increased SSC and associated deposition

	Whole project assessment	
	Scenario 1: MHPGC Project and Morven North	Scenario 2: MHPGC Project and Morven South
Construction phase		
Magnitude of impact	The construction of Morven North may occur simultaneously with the construction phase of the MHPGC Project with site preparation and offshore cable installation being undertaken in close proximity to the MHPGC Project. The construction of the Morven North infrastructure will result in the disturbance of up to 28,974,207m³ of sediment due to sandwave clearance, boulder clearance, monopile installation, IAC installation, UXO removal and jack-up and anchoring activities. In combination with the MHPGC project this equates to 36,187,134 m³ of sediment. The Whole Project impact is predicted to be of local spatial extent, medium term duration, intermittent and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is, therefore, considered to be minor adverse.	The construction of Morven South may occur simultaneously with the construction phase of the MHPGC Project with site preparation and offshore cable installation being undertaken in close proximity to the MHPGC Project. The construction of the Morven South infrastructure will result in the disturbance of up to 23, 675,007m³ of sediment due to sandwave clearance, boulder clearance, monopile installation, IAC installation, UXO removal and jack-up and anchoring activities. In combination with the MHPGC project this equates to 30,887,934 m³ of sediment. The Whole Project impact is predicted to be of local spatial extent, medium term duration, intermittent and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is, therefore, considered to be minor adverse.
Sensitivity of receptor	The sensitivity of the benthic subtidal ecology VERs to increased SSC and associated deposition are summarised from Paragraph 3.8.2.32 et seq. In Scottish waters, offshore deep-sea mud, offshore subtidal sands and gravels, ocean quahog, scarce tube-dwelling anemone and stony reef are assessed as having sensitivities ranging from negligible to medium, with offshore deep-sea mud, offshore subtidal sands and gravels and scarce tube-dwelling anemone representing the highest sensitivity receptors. The sensitivity of receptors in Scottish waters is therefore considered to be at worst-case medium. Similarly, in English waters, sea pen and burrowing megafauna communities, moderate energy circalittoral rock, sublittoral sands and gravels, mud habitats in deep water, <i>S. spinulosa</i> reef, ocean quahog, kelp beds and intertidal habitats are assessed as having sensitivities ranging from negligible to medium, with sea pen and burrowing megafauna communities, sublittoral sands and gravels, mud habitats in deep water, <i>S. spinulosa</i> reef, kelp beds and intertidal rocky reef representing the highest sensitivity receptors. The sensitivity of receptors in English waters is therefore considered to be at worst-case medium.	
Significance of effect	Overall, for the VERs in both Scottish and English waters the magnitude of the Whole Project impact is deemed to be minor adverse and the sensitivity of the receptor is considered to be at worst-case medium. The Whole Project effect will, therefore, be of minor to moderate significance, with an overall conclusion for all VERs of minor adverse significance, which is not significant in EIA terms. Overall, for the ocean quahog VER, the magnitude of the Whole Project impact is deemed to be low and the sensitivity of the receptor is considered to be negligible. The Whole Project effect will, therefore, be of negligible to minor adverse significance, with an overall minor adverse significance due to the international importance of this species, which is not significant in EIA terms. This minor adverse conclusion is due to the international importance of ocean quahog and classification as a PMF.	

	Whole project assessment	
	Scenario 1: MHPGC Project and Morven North	Scenario 2: MHPGC Project and Morven South
Further mitigation and residual significance	No mitigation measures for benthic ecology are considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 3.18 , is not significant in EIA terms.	
Decommissioning phase		
Magnitude of impact	The decommissioning of Morven North may occur simultaneously with the decommissioning phase of the MHPGC Project with site preparation and offshore cable installation being undertaken in close proximity to the MHPGC Project. The decommissioning of the Morven North infrastructure will result in the disturbance of sediment due to the removal of offshore cables and foundations, together with associated jack-up vessel activities and anchor placements. The Whole Project impact is predicted to be of local spatial extent, medium term duration, intermittent and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is, therefore, considered to be low.	The decommissioning of Morven South may occur simultaneously with the decommissioning phase of the MHPGC Project with site preparation and offshore cable installation being undertaken in close proximity to the MHPGC Project. The decommissioning of the Morven South infrastructure will result in the disturbance of sediment due to the removal of offshore cables and foundations, together with associated jack-up vessel activities and anchor placements. The Whole Project impact is predicted to be of local spatial extent, medium term duration, intermittent and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is, therefore, considered to be low.
Sensitivity of receptor	The sensitivity of receptors is considered to be similar to that during the construction phase and are summarised from Paragraph 3.8.2.34 et seq. In Scottish waters, offshore deep-sea mud, offshore subtidal sands and gravels, ocean quahog, scarce tube-dwelling anemone and stony reef are assessed as having sensitivities ranging from negligible to medium, with offshore deep-sea mud, offshore subtidal sands and gravels and scarce tube-dwelling anemone representing the highest sensitivity receptors. The sensitivity of receptors in Scottish waters is therefore considered to be at worst-case medium. Similarly, in English waters, sea pen and burrowing megafauna communities, moderate energy circalittoral rock, sublittoral sands and gravels, mud habitats in deep water, <i>S. spinulosa</i> reef, ocean quahog, kelp beds and intertidal habitats are assessed as having sensitivities ranging from negligible to medium, with sea pen and burrowing megafauna communities, sublittoral sands and gravels, mud habitats in deep water, <i>S. spinulosa</i> reef, kelp beds and intertidal rocky reef representing the highest sensitivity receptors. The sensitivity of receptors in English waters is therefore considered to be at worst-case medium.	
Significance of effect	Overall, for the VERs in both Scottish and English waters the magnitude of the Whole Project impact is deemed to be low and the sensitivity of the receptor is considered to be at worst-case medium. The Whole Project effect will, therefore, be of minor to moderate significance, with an overall conclusion for all VERs of minor adverse significance, which is not significant in EIA terms. Overall, for the ocean quahog VER, the magnitude of the Whole Project impact is deemed to be low and the sensitivity of the receptor is considered to be negligible. The Whole Project effect will, therefore, be of negligible to minor adverse significance, with an overall minor adverse significance due to the international importance of this species, which is not significant in EIA terms. This minor adverse conclusion is due to the international importance of ocean quahog and classification as a PMF.	
Further mitigation and residual significance	No mitigation measures for benthic ecology are considered necessary because the likely effect in the absence of further mitigation, beyond the designed in measures outlined in Table 3.18 , is not significant in EIA terms.	

Table 3.30: MHPGC Project CEA for increased SSC and associated deposition

	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 cumulative effects assessment for Scenario 4 considers the MHPGC Project together with the Tier 1, Tier 2 and Tier 3 projects below. <u>Tier 1</u> Tier 1 includes the following OWF projects which have construction phases overlapping with the construction of the MHPGC Project with volume of disturbed sediment indicated • Morven North (28,974,207m³); • Morven South (23,675,007m³) • Ossian OWF (11,841,602m³). Morven North and Morven South lie within the northern section of the MHPGC Project PEIR Red Line Boundary, in Scottish waters. Therefore, construction activities for Morven North and Morven South may be undertaken in close proximity to those of the MHPGC Project, and should they be undertaken concurrently, there is potential for plumes to interact, however these activities would be of limited spatial extent and frequency and plume interactions likely of a low magnitude and short duration. The majority of sedimentation would occur within close proximity to each activity due to the low sediment transport rates in the area. Ossian OWF is located 5km from the Morven South Boundary directly to the east and southeast and is proposed for up to 265 wind turbines. There will be limited opportunity for the amalgamation of sediment plumes from this project, given the orientation of the tides in a predominantly north northeast to south southwest direction, as evidenced from modelling of sediment plumes Tier 1 includes the following cable projects: • Berwick Bank ECC ; • Eastern Green Link 1; • Eastern Green Link 2; • NO UK Telecom; • Havihingsten Seg 2; • North Sea Link. Tier 1 also includes the following dredge disposal sites: • Noses Point; • Souter Point Outer; • Sunderland. The cable projects will be primarily in their O&M phase and therefore may result in low levels of SSC and associated deposition due to maintenance. Due to the spatially limited and intermittent nature of this work, these projects have not quantified this impact and therefore have not contributed to the overall cumulative increase in SSC and associated deposition value. Similarly, due to the intermittent nature of dredging

	Cumulative Effects Assessment
	work, the dredge disposal projects have not quantified this impact and therefore have not contributed to the overall cumulative increase in SSC and associated deposition value. In total cumulative increase in SSC and associated deposition associated with the MHPGC Project (7,212,927m³) and Tier 1 projects is up to 71,703,743m³. The cumulative effect is predicted to be of local spatial extent, short term duration, intermittent and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is, therefore, considered to be low. <u>Tier 2</u> Tier 2 includes the following cable projects: • Eastern Green Link 3; • Eastern Green Link 4. These cable projects will be primarily in their O&M phase and therefore may result in low levels of temporary habitat loss/disturbance due to maintenance. Due to the spatially limited and intermittent nature of this work, these projects have not quantified this impact and therefore have not contributed to the overall cumulative temporary habitat loss/disturbance value. In total cumulative temporary habitat loss/disturbance hard structures associated with the MHPGC Project (7,212,927m³) and Tier 2 projects is up to 7,212,927m³. The cumulative effect is predicted to be of regional spatial extent, short-term duration, continuous, and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore considered to be low. <u>Tier 3</u> Tier 3 includes the following OWF project and the following cable project: • MBAGC Project; • Eastern Green Link 5 These projects are yet to submit any documents as part of an application therefore the scale and specific impact of these projects are unknown but are likely to be similar, if not much smaller than the MHPGC Project. The cumulative effect of all projects in Scenario 4 is predicted to be of regional spatial extent, short-term duration, continuous, and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is, therefore, considered to be low.
Sensitivity of receptor	The sensitivity of the benthic subtidal ecology VERs to increased SSC and associated deposition are summarised from Paragraph 3.8.2.32 et seq. In Scottish waters, offshore deep-sea mud, offshore subtidal sands and gravels, ocean quahog, scarce tube-dwelling anemone and stony reef are assessed as having sensitivities ranging from negligible to medium, with offshore deep-sea mud, offshore subtidal sands and gravels and scarce tube-dwelling anemone representing the highest sensitivity receptors. The sensitivity of receptors in Scottish waters is therefore considered to be at worst-case medium. Similarly, in English waters, sea pen and burrowing megafauna communities, moderate energy circalittoral rock, sublittoral sands and gravels, mud habitats in deep water, <i>S. spinulosa</i> reef, ocean quahog, kelp beds and intertidal habitats are assessed as having sensitivities ranging from negligible to medium, with sea pen and burrowing megafauna communities, sublittoral sands and gravels, mud habitats in deep water, <i>S. spinulosa</i> reef, kelp beds and intertidal rocky reef representing the highest sensitivity receptors. The sensitivity of receptors in English waters is therefore considered to be at worst-case medium.

Cumulative Effects Assessment	
Significance of effect	<u>Tier 1</u> Overall, for the VERs in both Scottish and English waters, the magnitude of the cumulative impact is deemed to be low and the sensitivity of the receptor is considered to be at worst-case medium. The cumulative effect will, therefore, be of minor adverse significance, which is not significant in EIA terms. Overall, for the ocean quahog VER, the magnitude of the cumulative impact is deemed to be low and the sensitivity of the receptor is considered to be negligible. The cumulative effect will, therefore, be of negligible to minor adverse significance, with an overall minor adverse significance, due to the international importance of this species and classification as a PMF, which is not significant in EIA terms. <u>Tier 2</u> Overall, for the VERs in both Scottish and English waters, the magnitude of the cumulative impact is deemed to be low and the sensitivity of the receptor is considered to be at worst-case medium. The cumulative effect will, therefore, be of minor adverse significance, which is not significant in EIA terms. Overall, for the ocean quahog VER, the magnitude of the cumulative impact is deemed to be low and the sensitivity of the receptor is considered to be negligible. The cumulative effect will, therefore, be of negligible to minor adverse significance, with an overall minor adverse significance, due to the international importance of this species and classification as a PMF, which is not significant in EIA terms. <u>Tier 3 and all of Scenario 4</u> Overall, for the VERs in both Scottish and English waters, the magnitude of the cumulative impact is deemed to be low and the sensitivity of the receptor is considered to be at worst-case medium. The cumulative effect will, therefore, be of minor adverse significance, which is not significant in EIA terms. Overall, for the ocean quahog VER, the magnitude of the cumulative impact is deemed to be low and the sensitivity of the receptor is considered to be negligible. The cumulative effect will, therefore, be of negligible to minor adverse significance, with an overall minor adverse significance, due to the international importance of this species and classification as a PMF, which is not significant in EIA terms.
Further mitigation and residual significance	No mitigation measures for benthic ecology are considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 3.18 , is not significant in EIA terms.
Decommissioning phase	
Magnitude of impact	During decommissioning, infrastructure associated with the MHPGC Project and relevant cumulative projects may be removed, either wholly or partially. As decommissioning methodologies have not yet been defined, a precautionary assessment has been undertaken, assuming that decommissioning activities and the resultant increases in SSCs and sediment deposition are comparable to those predicted during construction, representing a worst-case scenario. Accordingly, the magnitude of impact, receptor sensitivity, significance of effect, mitigation requirements, and residual effects for the MHPGC Project alone and cumulatively are considered to be equivalent to those assessed for the construction phase.
Sensitivity of receptor	
Significance of effect	
Further mitigation and residual significance	

3.10.5 Disturbance/remobilisation of sediment bound contaminants

- 3.10.5.1 Seabed disturbance associated with activities such as cable installation or repair/replacement in all phases could lead to the remobilisation of sediment-bound contaminants that may result in harmful and adverse effects on benthic communities. There is potential for the disturbance/remobilisation of sediment bound contaminants as a result of seabed-disturbing activities associated with the MHPGC Project and other projects and plans within the Benthic Ecology CEA Study Area. Such activities may include seabed preparation, cable installation, cable maintenance and repair, dredging and disposal activities, and the removal of infrastructure during decommissioning. Where these activities overlap spatially and temporally, there is potential for cumulative disturbance and remobilisation of sediment-bound contaminants.
- 3.10.5.2 The summary of the Whole Project assessment for disturbance/remobilisation of sediment bound contaminants is presented in **Table 3.31** and the cumulative effects assessment is presented in **Table 3.32**.

Table 3.31: MHPGC Project whole project assessment for disturbance/redistribution of sediment bound contaminants

Whole project assessment		
Scenario 1: MHPGC Project and Morven North		Scenario 2: MHPGC Project and Morven South
Construction phase		
Magnitude of impact	While the construction of Morven North may occur simultaneously with the construction phase of the MHPGC Project’s sediment bound contaminants are only expected to be disturbed and remobilised for the duration of activities resulting in seabed disturbance, with construction activities lasting for a short period of time in any one place. Furthermore, sediment bound contaminants are expected to be regularly mobilised by natural disturbance such as currents, waves and storm events, and rapidly dispersed following disturbance due to local hydrodynamic conditions. Therefore, any elevated levels of disturbed contaminants above background conditions during construction activities are expected to return to baseline levels rapidly following disturbance. The Whole Project impact is predicted to be of local spatial extent, medium term duration, intermittent and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is, therefore, considered to be negligible.	While the construction of Morven South may occur simultaneously with the construction phase of the MHPGC Project’s sediment bound contaminants are only expected to be disturbed and remobilised for the duration of activities resulting in seabed disturbance, with construction activities lasting for a short period of time in any one place. Furthermore, sediment bound contaminants are expected to be regularly mobilised by natural disturbance such as currents, waves and storm events, and rapidly dispersed following disturbance due to local hydrodynamic conditions. Therefore, any elevated levels of disturbed contaminants above background conditions during construction activities are expected to return to baseline levels rapidly following disturbance. The Whole Project impact is predicted to be of local spatial extent, medium term duration, intermittent and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is, therefore, considered to be negligible.
Sensitivity of receptor	The sensitivity of the benthic subtidal ecology VERs to impacts of disturbance/redistribution of sediment bound contaminants are summarised from Paragraph 3.8.2.61 et seq. In Scottish waters, offshore deep-sea mud, offshore subtidal sands and gravels, ocean quahog, scarce tube-dwelling anemone and stony reef are assessed as having sensitivities ranging from low to medium, with offshore deep-sea mud, ocean quahog, scarce tube-dwelling anemone and stony reef representing the highest sensitivity receptors. The sensitivity of receptors in Scottish waters is therefore considered to be at worst-case medium. Similarly, in English waters, sea pen and burrowing megafauna communities, moderate energy circalittoral rock, sublittoral sands and gravels, mud habitats in deep water, <i>Sabellaria spinulosa</i> reef, ocean quahog, kelp beds and intertidal habitats are assessed as having sensitivities ranging from low to high, with sea pen and burrowing megafauna communities representing the highest sensitivity receptor. The sensitivity of receptors in English waters is therefore considered to be at worst-case high.	
Significance of effect	Overall, for the VERs in both Scottish and English waters the magnitude of the Whole Project impact is deemed to be negligible and the sensitivity of the receptor is considered to be at worst-case high. The Whole Project effect will, therefore, be of minor significance, with an overall conclusion for all VERs of minor adverse significance, which is not significant in EIA terms.	
Further mitigation and residual significance	No mitigation measures for benthic ecology are considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 3.18, is not significant in EIA terms.	
Operations and maintenance phase		

Whole project assessment		
Scenario 1: MHPGC Project and Morven North		Scenario 2: MHPGC Project and Morven South
Magnitude of impact	The O&M phase of Morven North may occur simultaneously with the O&M phase of the MHPGC Project and includes cable repair and reburial events with potential disturbance/remobilisation of sediment bound contaminants. The impacts are expected to be minimal, with much smaller levels of disturbance/remobilisation of sediment bound contaminants expected than during the construction and decommissioning phases, and the overall magnitude is therefore unlikely to be significantly greater than the alone assessment at any one point. The Whole Project impact is predicted to be of local spatial extent, medium term duration, intermittent and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is, therefore, considered to be negligible.	The O&M phase of Morven South may occur simultaneously with the O&M phase of the MHPGC Project and includes cable repair and reburial events with potential disturbance/remobilisation of sediment bound contaminants. The impacts are expected to be minimal, with much smaller levels of disturbance/remobilisation of sediment bound contaminants expected than during the construction and decommissioning phases, and the overall magnitude is therefore unlikely to be significantly greater than the alone assessment at any one point. The Whole Project impact is predicted to be of local spatial extent, medium term duration, intermittent and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is, therefore, considered to be negligible.
Sensitivity of receptor	The sensitivity of the benthic subtidal ecology VERs to impacts of disturbance/redistribution of sediment bound contaminants are summarised from Paragraph 3.8.2.61 et seq. In Scottish waters, offshore deep-sea mud, offshore subtidal sands and gravels, ocean quahog, scarce tube-dwelling anemone and stony reef are assessed as having sensitivities ranging from low to medium, with offshore deep-sea mud, ocean quahog, scarce tube-dwelling anemone and stony reef representing the highest sensitivity receptors. The sensitivity of receptors in Scottish waters is therefore considered to be at worst-case medium. Similarly, in English waters, sea pen and burrowing megafauna communities, moderate energy circalittoral rock, sublittoral sands and gravels, mud habitats in deep water, <i>S. spinulosa</i> reef, ocean quahog, kelp beds and intertidal habitats are assessed as having sensitivities ranging from low to high, with sea pen and burrowing megafauna communities representing the highest sensitivity receptor. The sensitivity of receptors in English waters is therefore considered to be at worst-case high. Overall, the sensitivity of benthic subtidal ecology receptors to the disturbance and remobilisation of sediment-bound contaminants is considered to be at worst-case high.	
Significance of effect	Overall, for the VERs in both Scottish and English waters the magnitude of the Whole Project impact is deemed to be negligible and the sensitivity of the receptor is considered to be at worst case high. The Whole Project effect will, therefore, be of minor significance, with an overall conclusion for all VERs of minor adverse significance, which is not significant in EIA terms.	
Further mitigation and residual significance	No mitigation measures for benthic ecology are considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 3.18, is not significant in EIA terms.	
Decommissioning phase		
Magnitude of impact	While the decommissioning of Morven North may occur simultaneously with the decommissioning phase of the MHPGC Project's sediment bound contaminants are only expected to be disturbed and remobilised for the duration of activities resulting in	While the decommissioning of Morven South may occur simultaneously with the decommissioning phase of the MHPGC Project's sediment bound contaminants are only expected to be disturbed and remobilised for the duration of activities resulting in

Whole project assessment		
Scenario 1: MHPGC Project and Morven North		Scenario 2: MHPGC Project and Morven South
	seabed disturbance, with decommissioning activities lasting for a short period of time in any one place. Furthermore, sediment bound contaminants are expected to be regularly mobilised by natural disturbance such as currents, waves and storm events, and rapidly dispersed following disturbance due to local hydrodynamic conditions. Therefore, any elevated levels of disturbed contaminants above background conditions during decommissioning activities are expected to return to baseline levels rapidly following disturbance. The Whole Project impact is predicted to be of local spatial extent, medium term duration, intermittent and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is, therefore, considered to be negligible.	seabed disturbance, with decommissioning activities lasting for a short period of time in any one place. Furthermore, sediment bound contaminants are expected to be regularly mobilised by natural disturbance such as currents, waves and storm events, and rapidly dispersed following disturbance due to local hydrodynamic conditions. Therefore, any elevated levels of disturbed contaminants above background conditions during decommissioning activities are expected to return to baseline levels rapidly following disturbance. The Whole Project impact is predicted to be of local spatial extent, medium term duration, intermittent and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is, therefore, considered to be negligible.
Sensitivity of receptor	The sensitivity of receptors is considered to be similar to that during the construction phase and are summarised from Paragraph 3.8.2.61 et seq. In Scottish waters, offshore deep-sea mud, offshore subtidal sands and gravels, ocean quahog, scarce tube-dwelling anemone and stony reef are assessed as having sensitivities ranging from low to medium, with offshore deep-sea mud, ocean quahog, scarce tube-dwelling anemone and stony reef representing the highest sensitivity receptors. The sensitivity of receptors in Scottish waters is therefore considered to be at worst-case medium. Similarly, in English waters, sea pen and burrowing megafauna communities, moderate energy circalittoral rock, sublittoral sands and gravels, mud habitats in deep water, <i>S. spinulosa</i> reef, ocean quahog, kelp beds and intertidal habitats are assessed as having sensitivities ranging from low to high, with sea pen and burrowing megafauna communities representing the highest sensitivity receptor. The sensitivity of receptors in English waters is therefore considered to be at worst-case high.	
Significance of effect	Overall, for the VERs in both Scottish and English waters the magnitude of the Whole Project impact is deemed to be negligible and the sensitivity of the receptor is considered to be at worst-case high. The Whole Project effect will, therefore, be of minor significance, with an overall conclusion for all VERs of minor adverse significance, which is not significant in EIA terms.	
Further mitigation and residual significance	No mitigation measures for benthic ecology are considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 3.18, is not significant in EIA terms.	

Table 3.32: MHPGC Project CEA for disturbance/redistribution of sediment bound contaminants

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	of	The cumulative effects assessment for Scenario 4 considers the MHPGC Project together with the Tier 1, Tier 2 and Tier 3 projects below. <u>Tier 1</u> Tier 1 includes the following OWF projects which have construction phases overlapping with the construction of the MHPGC Project with volume of disturbed sediment indicated • Morven North (28,974,207m³); • Morven South (23,675,007m³); • Ossian OWF (11,841,602m³). Morven North and Morven South lie within the northern section of the MHPGC Project PIER Red Line Boundary, in Scottish waters. Therefore, construction activities for Morven North and Morven South may be undertaken in close proximity to those of the MHPGC Project, and should they be undertaken concurrently, there is potential for sediment plumes with associated sediment bound contaminants to interact, however these activities would be of limited spatial extent and frequency and plume interactions likely of a low magnitude and short duration. The majority of redistribution of sediments would occur within close proximity to each activity due to the low sediment transport rates in the area. Ossian OWF is located 5km from the Morven South Boundary directly to the east and southeast and is proposed for up to 265 wind turbines. There will be limited opportunity for the amalgamation of sediment plumes and associated sediment bound contaminants from this project, given the orientation of the tides in a predominantly north northeast to south southwest direction, as evidenced from modelling of sediment plumes Tier 1 includes the following cable projects: • Berwick Bank ECC ; • Eastern Green Link 1; • Eastern Green Link 2; • NO UK Telecom; • Havihingsten Seg 2; • North Sea Link. Tier 1 also includes the following dredge disposal sites: • Noses Point; • Souter Point Outer; • Sunderland. These cable and projects will be primarily in their O&M phase and therefore may result in low levels of SSC and associated sediment bound contaminants due to maintenance. Due to the spatially limited and intermittent nature of this work, these projects have not quantified this impact and therefore have not contributed to the overall cumulative increase in SSC and associated deposition value. Similarly, due to the intermittent nature of dredging work, the

Cumulative Effects Assessment

	dredge disposal projects have not quantified this impact and therefore have not contributed to the overall cumulative increase in SSC and associated deposition value. In total cumulative increase in SSC and associated deposition of potentially contaminated sediment associated with the MHPGC Project (7,212,927m³) and Tier 1 projects is up to 71,703,743m³. The cumulative effect is predicted to be of local spatial extent, short term duration, intermittent and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is, therefore, considered to be negligible. <u>Tier 2</u> Tier 2 includes the following cable projects: • Eastern Green Link 3; • Eastern Green Link 4. These cable projects will be primarily in their O&M phase and therefore may result in low levels of SSC and potential sediment bound contaminants due to maintenance. Due to the spatially limited and intermittent nature of this work, these projects have not quantified this impact and therefore have not contributed to the overall cumulative temporary habitat loss/disturbance value. In total cumulative increase in SSC and associated deposition of potentially contaminated sediment associated with the MHPGC Project (7,212,927m³) and Tier 2 projects is up to 7,217,927m³. The cumulative effect is predicted to be of regional spatial extent, short-term duration, continuous, and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore considered to be negligible. <u>Tier 3</u> Tier 3 includes the following cables: • MBAGC Project; • Eastern Green Link 5. These projects are yet to submit any documents as part of an application therefore the scale and specific impact of these projects are unknown but are likely to be similar, if not much smaller than the MHPGC Project. The cumulative effect of all projects in Scenario 4 is predicted to be of regional spatial extent, short-term duration, continuous, and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is, therefore, considered to be negligible.
Sensitivity of receptor	The sensitivity of the benthic subtidal ecology VERs to impacts of disturbance/redistribution of sediment bound contaminants are summarised from Paragraph 3.8.2.61 et seq. In Scottish waters, offshore deep-sea mud, offshore subtidal sands and gravels, ocean quahog, scarce tube-dwelling anemone and stony reef are assessed as having sensitivities ranging from low to medium, with offshore deep-sea mud, ocean quahog, scarce tube-dwelling anemone and stony reef representing the highest sensitivity receptors. The sensitivity of receptors in Scottish waters is therefore considered to be at worst-case medium. Similarly, in English waters, sea pen and burrowing megafauna communities, moderate energy circalittoral rock, sublittoral sands and gravels, mud habitats in deep water, <i>S. spinulosa</i> reef, ocean quahog, kelp beds and intertidal habitats are assessed as having sensitivities ranging from low to high, with sea pen and burrowing megafauna communities representing the highest sensitivity receptor. The sensitivity of receptors in English waters is therefore considered to be at worst-case high.

Cumulative Effects Assessment	
	Overall, the sensitivity of benthic subtidal ecology receptors to the disturbance and remobilisation of sediment-bound contaminants is considered to be at worst-case high .
Significance of effect	<u>Tier 1</u> Overall, for the VERs in both Scottish and English waters, the magnitude of the cumulative impact is deemed to be negligible and the sensitivity of the receptor is considered to be at worst-case high. The cumulative effect will, therefore, be of minor adverse significance, which is not significant in EIA terms. <u>Tier 2</u> Overall, for the VERs in both Scottish and English waters, the magnitude of the cumulative impact is deemed to be negligible and the sensitivity of the receptor is considered to be at worst-case high. The cumulative effect will, therefore, be of minor adverse significance, which is not significant in EIA terms. <u>Tier 3 and all of Scenario 4</u> Overall, for the VERs in both Scottish and English waters, the magnitude of the cumulative impact is deemed to be negligible and the sensitivity of the receptor is considered to be at worst-case high. The cumulative effect will, therefore, be of minor adverse significance, which is not significant in EIA terms.
Further mitigation and residual significance	No mitigation measures for benthic ecology are considered necessary because the likely effect in the absence of further mitigation, beyond the designed in measures outlined in Table 3.18 , is not significant in EIA terms.
Decommissioning phase	
Magnitude of impact	During decommissioning, infrastructure associated with the MHPGC Project and relevant cumulative projects may be removed, either wholly or partially. As decommissioning methodologies are not yet defined, a precautionary assessment has been undertaken assuming activities and associated disturbance/remobilisation of sediment bound contaminants. Therefore, the magnitude of impact, receptor sensitivity, significance of effect, mitigation requirements and residual effects associated with the MHPGC Project and cumulative projects are considered to be comparable to those predicted during construction.
Sensitivity of receptor	
Significance of effect	
Further mitigation and residual significance	

3.10.6 Changes in physical processes

- 3.10.6.1 There is potential for changes in physical processes as a result of the MHPGC Project O&M activities within the Benthic Ecology CEA Study Area. Changes in physical processes may arise from the presence of cable protection, export cable crossings and protection associated with trenchless drill exit pits at the landfall, which may result in localised changes to seabed elevation, seabed roughness, near-bed hydrodynamics and sediment transport processes. Where these features occur in combination with infrastructure associated with other OWF and cable projects, there is potential for cumulative changes in physical processes.
- 3.10.6.2 The summary of the Whole Project assessment for changes in physical processes is presented in **Table 3.33** and cumulative effects assessment for changes in physical processes is presented in **Table 3.34**.

Table 3.33: MHPGC Project whole project assessment for changes in physical processes

	Whole project assessment	
	Scenario 1: MHPGC Project and Morven North	Scenario 2: MHPGC Project and Morven South
Operations and maintenance phase		
Magnitude of impact	The O&M phase of Morven North may occur simultaneously with the O&M phase of the MHPGC Project and involves the presence of cable protection and foundations, and associated repairs and reburials where required. Morven North overlaps with the northern section of the MHPGC Project PEIR Red Line Boundary; however due to the deepwater location of both projects, the impact of cable protection and foundation infrastructure in this area on wave climate or tidal regime is predicted to be negligible. Consequently, the cumulative changes in physical processes arising from the MHPGC Project in combination with Morven North are not anticipated to increase the magnitude of impact beyond that predicted for the MHPGC Project alone. The Whole Project impact is predicted to be of local spatial extent, long-term duration, continuous and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be low .	The O&M phase of Morven South may occur simultaneously with the O&M phase of the MHPGC Project and involves the presence of cable protection and foundations, and associated repairs and reburials where required. Morven South overlaps with the northern section of the MHPGC Project PEIR Red Line Boundary; however due to the deepwater location of both projects, the impact of cable protection and foundation infrastructure in this area on wave climate or tidal regime is predicted to be negligible. Consequently, the cumulative changes in physical processes arising from the MHPGC Project in combination with Morven South are not anticipated to increase the magnitude of impact beyond that predicted for the MHPGC Project alone. The Whole Project impact is predicted to be of local spatial extent, long-term duration, continuous and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be low .
Sensitivity of receptor	The sensitivity of the benthic subtidal ecology VERs in Scottish and English waters to changes in physical processes is as described in Paragraph 3.8.3.27 et seq. In Scottish waters, offshore deep-sea mud, offshore subtidal sands and gravels, ocean quahog and scarce tube-dwelling anemone may exhibit varying tolerances to changes in seabed conditions and physical processes. On a precautionary basis, the sensitivity of receptors in Scottish waters is therefore considered to be at worst-case high. Similarly, in English waters, sea pen and burrowing megafauna communities, stony reef, sublittoral sands and gravels, mud habitats in deep water and ocean quahog may exhibit varying tolerances to changes in seabed conditions and physical processes. On a precautionary basis, the sensitivity of receptors in English waters is therefore considered to be at worst-case high.	
Significance of effect	Overall, for the VERs in both Scottish and English waters the magnitude of the Whole Project impact is deemed to be low and the sensitivity of the receptor is considered to be at worst-case high. The Whole Project effect will, therefore, be of minor to moderate significance, with an overall conclusion for all VERs of minor adverse significance, which is not significant in EIA terms. This conclusion reflects the negligible contribution of the MHPGC Project to changes in physical processes, with the Project not anticipated to materially increase the physical process changes predicted for Morven North or Morven South.	
Further mitigation and residual significance	No mitigation measures for benthic ecology are considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 3.18 , is not significant in EIA terms.	

Table 3.34: MHPGC Project CEA for changes to physical processes

Cumulative Effects Assessment	
Scenario 4: MHPGC Project, Tier 1 (including Morven North and Morven South), Tier 2, and Tier 3 (including MBAGC Project) Projects	
Operations and maintenance phase	
Magnitude of impact	The cumulative effects assessment for Scenario 4 considers the MHPGC Project together with the Tier 1, Tier 2 and Tier 3 projects below. <u>Tier 1</u> Tier 1 includes the following OWF projects which have O&M phases overlapping with the construction of the MHPGC Project: • Morven North; • Morven South; • Ossian OWF. Changes in physical processes in relation to the MHPGC Project are expected to be localised to areas where there is of cable protection, cable crossings, and protection associated with trenchless drill exit pits and will be no greater than during the construction phase. Similarly, physical processes modelling of the combined presence of Morven North, Morven South and Ossian indicate that any changes to physical processes will be limited to the locality of the structures. Tier 1 includes the following cable projects: • Berwick Bank ECC; • Eastern Green Link 1; • Eastern Green Link 2; • NO UK Telecom; • Havihingsten Seg 2; • North Sea Link. Changes in physical processes in relation to these cables are expected to be localised to areas where there is cable protection. However, any effects will be highly localised and will not overlap with any influence of the MHPGC Project. As a result, any overlap of potential effects will be minimum, and consequently, the cumulative effect is predicted to be of local spatial extent, long-term duration, continuous and high reversibility. It is predicted that the impact will affect the receptor directly and indirectly. The magnitude is therefore, considered to be negligible. <u>Tier 2</u> Tier 2 includes the following cable projects: • Eastern Green Link 1; • Eastern Green Link 2. Changes in physical processes in relation to these cables are expected to be localised to areas where there is cable protection. However, the any effects will be highly localised and will not overlap with any influence of the MHPGC Project.

Cumulative Effects Assessment	
	As a result, any overlap of potential effects will be minimum, and consequently, the cumulative effect is predicted to be of local spatial extent, long-term duration, continuous and high reversibility. It is predicted that the impact will affect the receptor directly and indirectly. The magnitude is therefore, considered to be negligible. <u>Tier 3</u> Tier 3 includes the following cable projects: • MBAGC Project; • Eastern Green Link 5. Changes in physical processes in relation to the MBAGC project are expected to be localised to areas where there is cable protection. However, any effects will be highly localised and will not overlap with any influence of the MHPGC Project. As a result, any overlap of potential effects will be minimum, and consequently, the cumulative effect is predicted to be of local spatial extent, long-term duration, continuous and high reversibility. It is predicted that the impact will affect the receptor directly and indirectly. The magnitude is therefore, considered to be negligible.
Sensitivity of receptor	The sensitivity of the benthic subtidal ecology VERs in Scottish and English waters to changes in physical processes is as described in Paragraph 3.8.3.27 et seq. In Scottish waters, offshore deep-sea mud, offshore subtidal sands and gravels, ocean quahog and scarce tube-dwelling anemone may exhibit varying tolerances to changes in seabed conditions and physical processes. On a precautionary basis, the sensitivity of receptors in Scottish waters is therefore considered to be at worst-case high. Similarly, in English waters, sea pen and burrowing megafauna communities, stony reef, sublittoral sands and gravels, mud habitats in deep water and ocean quahog may exhibit varying tolerances to changes in seabed conditions and physical processes. On a precautionary basis, the sensitivity of receptors in English waters is therefore considered to be at worst-case high.
Significance of effect	<u>Tier 1</u> Overall, for the VERs in both Scottish and English waters the magnitude is deemed to be negligible and the sensitivity of the receptor is considered to be at worst-case high. The cumulative effect will, therefore, be minor adverse significance, which is not significant in EIA terms. <u>Tier 2</u> Overall, for the VERs in both Scottish and English waters the magnitude is deemed to be negligible and the sensitivity of the receptor is considered to be at worst-case high. The cumulative effect will, therefore, be minor adverse significance, which is not significant in EIA terms. <u>Tier 3 and all of Scenario 4</u> Overall, for the VERs in both Scottish and English waters the magnitude is deemed to be negligible and the sensitivity of the receptor is considered to be at worst-case high. The cumulative effect will, therefore, be minor adverse significance, which is not significant in EIA terms.
Further mitigation and residual significance	No mitigation measures for benthic ecology are considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 3.18, is not significant in EIA terms.

3.10.7 Increased risk of introduction and spread of INNS

- 3.10.7.1 There is potential for an increased risk of introduction and spread of INNS as a result of the MHPGC Project's construction, O&M and decommissioning activities within the Benthic Ecology CEA Study Area. An increased risk of introduction and spread of INNS may arise from increased vessel movements and activity associated with the MHPGC Project, which may facilitate the transfer of INNS via hull fouling and ballast water (where relevant). During the O&M phase, cable protection, export cable crossings and protection associated with trenchless drill exit pits may also provide hard substrate that could facilitate the establishment and spread of INNS. Where these pathways occur in combination with those associated with other OWF and cable projects, there is potential for cumulative effects. The wider colonisation of such structures by benthic communities is considered separately under the "Colonisation of hard structures" impact (**Section 3.10.8**).
- 3.10.7.2 The summary of the Whole Project assessment for an increased risk of introduction and spread of INNS is presented in **Table 3.35** and cumulative effects assessment for an increased risk of introduction and spread of INNS is presented in **Table 3.36**.

Table 3.35: MHPGC Project whole project assessment for increased risk of introduction and spread of INNS

	Whole project assessment	
	Scenario 1: MHPGC Project and Morven North	Scenario 2: MHPGC Project and Morven South
Construction phase		
Magnitude of impact	The Whole Project assessment for Scenario 1 considers the MHPGC Project together with Morven North. The construction phase of Morven North may occur simultaneously with the construction phase of the MHPGC Project. This may contribute to an increased risk of introduction and spread of INNS through the installation of hard structures, such as cable protection, as well as vessel movement which may occur in all phases of the MHPGC Project. The presence of Morven North infrastructure will result in the installation of up to 3,139,162m² of hard structures while up to 3,060 vessel round trips will be required. In combination with the MHPGC project this equates to 4,259,346m² of hard substrate and 3,610 vessel movements. The Whole Project impact is predicted to be of local spatial extent, long-term duration (across all phases), intermittent and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be low. This is due to the development of an Outline MBP for the MHPGC Project which will reduce the risk of INNS introduction and/or spread (CoT38).	The Whole Project assessment for Scenario 1 considers the MHPGC Project together with Morven South. The construction phase of Morven South may occur simultaneously with the construction phase of the MHPGC Project. This may contribute to an increased risk of introduction and spread of INNS through the installation of hard structures, such as cable protection, as well as vessel movement which may occur in all phases of the MHPGC Project. The presence of Morven South infrastructure will result in the installation of up to 3,074,239m² of hard structures while up to 2,979 vessel round trips will be required. In combination with the MHPGC project this equates to 4,194,423m² of hard substrate and 3,529 vessel movements. The Whole Project impact is predicted to be of local spatial extent, long-term duration (across all phases), intermittent and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be low. This is due to the development of an Outline MBP for the MHPGC Project which will reduce the risk of INNS introduction and/or spread (CoT38).
Sensitivity of receptor	The sensitivity of benthic subtidal and intertidal ecology VERs to the introduction and spread of INNS is summarised in Paragraph 3.8.2.89 <i>et seq.</i> In Scottish waters, all benthic subtidal and intertidal ecology receptors are precautionarily assessed as having low resistance and low resilience to the introduction and spread of marine INNS. The sensitivity of receptors in Scottish waters is therefore considered to be at worst-case high. Similarly, in English waters, all benthic subtidal and intertidal ecology receptors are precautionarily assessed as having low resistance and low resilience to the introduction and spread of marine INNS. The sensitivity of receptors in English waters is therefore considered to be at worst-case high.	
Significance of effect	Overall, for the VERs in both Scottish and English waters the magnitude of the Whole Project impact is deemed to be low and the sensitivity of the receptor is considered to be at worst-case high. The Whole Project effect will, therefore, be of minor to moderate significance, with an overall conclusion for all VERs of minor adverse significance, which is not significant in EIA terms. This is because embedded biosecurity measures of all projects within the Benthic Ecology CEA Study Area are expected to substantially reduce the likelihood of INNS introduction and spread. Furthermore, no INNS were identified during the MHPGC Project-specific benthic surveys.	

	Whole project assessment	
	Scenario 1: MHPGC Project and Morven North	Scenario 2: MHPGC Project and Morven South
Further mitigation and residual significance	No mitigation measures for benthic ecology are considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 3.18 , is not significant in EIA terms.	
O&M phase		
Magnitude of impact	The O&M phase of Morven North may occur simultaneously with the O&M phase of the MHPGC Project. This may contribute to an increased risk of introduction and spread of INNS through the presence of hard structures, such as cable protection, during O&M, as well as vessel movement which may occur in all phases of the MHPGC Project. The installation of the Morven North infrastructure will result in the presence of up to 3,139,162m² of hard structures during the O&M phase, while up to 293 vessel round trips per year will be required. In combination with the MHPGC Project this equates to 4,259,346m² of hard substrate and 595 vessel movements per year. The Whole Project impact is predicted to be of local spatial extent, long-term duration (across all phases), intermittent and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be low. This is due to the development of an Outline MBP for the MHPGC Project which will reduce the risk of INNS introduction and/or spread (CoT38).	The O&M phase of Morven South may occur simultaneously with the O&M phase of the MHPGC Project. This may contribute to an increased risk of introduction and spread of INNS through the installation of hard structures, such as cable protection, during O&M, as well as vessel movement which may occur in all phases of the MHPGC Project. The installation of the Morven South infrastructure will result in the presence of up to 3,074,239m² of hard structures during the O&M phase, while up to 293 vessel round trips per year will be required. In combination with the MHPGC Project this equates to 3,074,239m² of hard substrate and 595 vessel movements per year. The Whole Project impact is predicted to be of local spatial extent, long-term duration (across all phases), intermittent and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be low. T This is due to the development of an Outline MBP for the MHPGC Project which will reduce the risk of INNS introduction and/or spread (CoT38).
Sensitivity of receptor	Sensitives to increased risk of introduction and spread of INNS will be no greater than that for construction and are summarised in Paragraph 3.8.2.89 et seq. In Scottish waters, all benthic subtidal and intertidal ecology receptors are precautionarily assessed as having low resistance and low resilience to the introduction and spread of marine INNS. The sensitivity of receptors in Scottish waters is therefore considered to be at worst-case high. Similarly, in English waters, all benthic subtidal and intertidal ecology receptors are precautionarily assessed as having low resistance and low resilience to the introduction and spread of marine INNS. The sensitivity of receptors in English waters is therefore considered to be at worst-case high.	
Significance of effect	Overall, for the VERs in both Scottish and English waters the magnitude of the Whole Project impact is deemed to be low and the sensitivity of the receptor is considered to be at worst-case high. The Whole Project effect will, therefore, be of minor to moderate significance, with an overall conclusion for all VERs of minor adverse significance, which is not significant in EIA terms. This is because embedded biosecurity measures of all projects within the Benthic Ecology CEA Study Area are expected to substantially reduce the likelihood of INNS introduction and spread. Furthermore, no INNS were identified during the MHPGC Project-specific benthic surveys.	
Further mitigation and residual significance	No mitigation measures for benthic ecology are considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 3.18 , is not significant in EIA terms.	
Decommissioning phase		

	Whole project assessment	
	Scenario 1: MHPGC Project and Morven North	Scenario 2: MHPGC Project and Morven South
Magnitude of impact	The decommissioning phase of Morven North may occur simultaneously with the decommissioning phase of the MHPGC Project. This may contribute to an increased risk of introduction and spread of INNS through by the continued presence of artificial structures as well as vessel movement which may occur in all phases of the MHPGC Project. The presence of Morven North hard structures left <i>in situ</i> of up to 1,785,234m² while up to 3,060 vessel round trips per year will be required. The Whole Project impact is predicted to be of local spatial extent, long-term duration (across all phases), intermittent and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be low. This is due to the development of an Outline MBP for the MHPGC Project which will reduce the risk of INNS introduction and/or spread (CoT38).	The decommissioning phase of Morven South may occur simultaneously with the decommissioning phase of the MHPGC Project. This may contribute to an increased risk of introduction and spread of INNS through by the continued presence of artificial structures as well as vessel movement which may occur in all phases of the MHPGC Project. The presence of Morven North hard structures left <i>in situ</i> of up to 1,554,704m² while up to 2,979 vessel round trips per year will be required. The Whole Project impact is predicted to be of local spatial extent, long-term duration (across all phases), intermittent and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be low. This is due to the development of an Outline MBP for the MHPGC Project which will reduce the risk of INNS introduction and/or spread (CoT38).
Sensitivity of receptor	Sensitivities to increased risk of introduction and spread of INNS will be similar to that for construction and are summarised in Paragraph 3.8.2.89 et seq. In Scottish waters, all benthic subtidal and intertidal ecology receptors are precautionarily assessed as having low resistance and low resilience to the introduction and spread of marine INNS. The sensitivity of receptors in Scottish waters is therefore considered to be at worst-case high. Similarly, in English waters, all benthic subtidal and intertidal ecology receptors are precautionarily assessed as having low resistance and low resilience to the introduction and spread of marine INNS. The sensitivity of receptors in English waters is therefore considered to be at worst-case high.	
Significance of effect	Overall, for the VERs in both Scottish and English waters the magnitude of the Whole Project impact is deemed to be low and the sensitivity of the receptor is considered to be at worst-case high. The Whole Project effect will, therefore, be of minor to moderate significance, with an overall conclusion for all VERs of minor adverse significance, which is not significant in EIA terms. This is because embedded biosecurity measures of all projects within the Benthic Ecology CEA Study Area are expected to substantially reduce the likelihood of INNS introduction and spread. Furthermore, no INNS were identified during the MHPGC Project-specific benthic surveys.	
Further mitigation and residual significance	No mitigation measures for benthic ecology are considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 3.18, is not significant in EIA terms.	

Table 3.36: MHPGC Project CEA for increased risk of introduction and spread of INNS

	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 cumulative effects assessment for Scenario 4 considers the MHPGC Project together with the Tier 1, Tier 2 and Tier 3 projects below. <u>Tier 1</u> Tier 1 includes the following OWF projects which have construction phases overlapping with the construction of the MHPGC Project, with area of hard substrate indicated: • Morven North (3,139,162m²); • Morven South (3,074,239m²); • Ossian OWF (19,270,958m²). Tier 1 includes the following cable projects: • Berwick Bank ECC (2,177,214m²); • Eastern Green Link 1 (779,000m²); • Eastern Green Link 2 (1,110,000m²); • NO UK Telecom; • Havihingsten Seg 2; • North Sea Link. NO UK Telecom, Havihingsten Seg 2 and North Sea Link cable are operational and as such any changes to areas of hard substrate will be negligible over the construction phase of the MHPGC Project. In total cumulative hard structures associated with the MHPGC Project (1,120,184m²) and Tier 1 projects is up to 30,670,757m² which, in comparison to the surface area of the North Sea (750,000km²), equates to 0.004%. The cumulative effect is predicted to be of regional spatial extent, long-term duration, intermittent and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be low. This is also due to the implementation of an MBP which will reduce the risk of this impact occurring (CoT38). <u>Tier 2</u> Tier 2 includes the following cable projects: • Eastern Green Link 1; • Eastern Green Link 2. In total cumulative hard structures associated with the MHPGC Project (1,120,184m²) and Tier 1 projects is up to 1, (area data not available for Eastern Green Link 3 or Eastern Green Link 4).

	Cumulative Effects Assessment
	The cable projects are also likely to install hard structures such as cable protection and cable crossings. The distances separating projects and lack of connectivity between the long-term habitat loss introduced for each project reduces the potential of this increasing the magnitude overall. The cumulative effect is predicted to be of regional spatial extent, long-term duration, intermittent and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be low. This is also due to the implementation of an MBP which will reduce the risk of this impact occurring (CoT38). <u>Tier 3</u> Tier 3 includes the following OWF project and the following cable projects: • MBAGC Project; • Eastern Green Link 5. These projects are yet to submit any documents as part of an application therefore the scale and specific impact of these projects are unknown but are likely to be similar, if not much smaller than the MHPGC Project. The cumulative effect of all projects in Scenario 4 is predicted to be of regional spatial extent, long-term duration, continuous, and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is, therefore, considered to be low. This conclusion also reflects the implementation of the MBP (CoT38), which will reduce the likelihood of the impact occurring.
Sensitivity of receptor	The sensitivity of benthic subtidal and intertidal ecology VERs to the introduction and spread of INNS is summarised in Paragraph 3.8.2.89 et seq. In Scottish waters, all benthic subtidal and intertidal ecology receptors are precautionarily assessed as having low resistance and low resilience to the introduction and spread of marine INNS. The sensitivity of receptors in Scottish waters is therefore considered to be at worst-case high. Similarly, in English waters, all benthic subtidal and intertidal ecology receptors are precautionarily assessed as having low resistance and low resilience to the introduction and spread of marine INNS. The sensitivity of receptors in English waters is therefore considered to be at worst-case high.
Significance of effect	Overall, for the VERs in both Scottish and English waters the magnitude of the cumulative impact is deemed to be low and the sensitivity of the receptor is considered to be at worst-case high. The Whole Project effect will, therefore, be of minor to moderate significance, with an overall conclusion for all VERs of minor adverse significance, which is not significant in EIA terms. This is because embedded biosecurity measures of all projects within the Benthic Ecology CEA Study Area are expected to substantially reduce the likelihood of INNS introduction and spread. Furthermore, no INNS were identified during the MHPGC Project-specific benthic surveys.
Further mitigation and residual significance	No mitigation measures for benthic ecology are considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 3.18, is not significant in EIA terms.
Operations and maintenance phase	
Magnitude of impact	The cumulative effects assessment for Scenario 4 considers the MHPGC Project together with the Tier 1, Tier 2 and Tier 3 projects below. <u>Tier 1</u> Tier 1 includes the following OWF projects which have construction phases overlapping with the O&M of the MHPGC Project, with area of hard substrate indicated: • Morven North (3,139,162m²);

	Cumulative Effects Assessment
	• Morven South (3,074,239m²); • Ossian OWF (19,270,958m²). Tier 1 includes the following cable projects: • Berwick Bank ECC (2,177,214m²); • Eastern Green Link 1 (779,000m²); • Eastern Green Link 2 (1,110,000m²); • NO UK Telecom; • Havihingsten Seg 2; • North Sea Link. NO UK Telecom, Havihingsten Seg 2 and North Sea Link cable are operational and as such any changes to areas of hard substrate will be negligible over the construction phase of the MHPGC Project. In total cumulative hard structures associated with the MHPGC Project (1,120,184m²) and Tier 1 projects is up to 30,670,757m² which, in comparison to the surface area of the North Sea (750,000km²), equates to 0.004%. The cumulative effect is predicted to be of regional spatial extent, long-term duration, intermittent and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be low. This is also due to the implementation of an MBP which will reduce the risk of this impact occurring (CoT38). <u>Tier 2</u> Tier 2 includes the following cable projects: • Eastern Green Link 1; • Eastern Green Link 2. In total cumulative hard structures associated with the MHPGC Project (1,120,184m²) and Tier 2 projects is up to 1,120,184m² which, in comparison to the surface area of the North Sea (750,000km²), equates to 0.0001%. The cable projects are also likely to install hard structures such as cable protection and cable crossings. The distances separating projects and lack of connectivity between the long-term habitat loss introduced for each project reduces the potential of this increasing the magnitude overall. The cumulative effect is predicted to be of regional spatial extent, long-term duration, intermittent and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be low. This is also due to the implementation of an MBP which will reduce the risk of this impact occurring (CoT38). <u>Tier 3</u> Tier 3 includes the following OWF project and the following cable projects: • MBAGC Project. • Eastern Green Link 5

	Cumulative Effects Assessment
	The programmes for these projects are unknown and therefore there is potential for the project to install hard substrate within the MHPGC Project's construction and O&M phases. It is currently not possible to quantify this impact but it is likely to be of a similar or reduced magnitude compared to the MHPGC Project. The cumulative effect of all projects in Scenario 4 is predicted to be of regional spatial extent, long-term duration, continuous, and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is, therefore, considered to be low.
Sensitivity of receptor	Sensitivities to increased risk of introduction and spread of INNS will be no greater than that for construction and are summarised in Paragraph 3.8.2.89 et seq. In Scottish waters, all benthic subtidal and intertidal ecology receptors are precautionarily assessed as having low resistance and low resilience to the introduction and spread of marine INNS. The sensitivity of receptors in Scottish waters is therefore considered to be at worst-case high. Similarly, in English waters, all benthic subtidal and intertidal ecology receptors are precautionarily assessed as having low resistance and low resilience to the introduction and spread of marine INNS. The sensitivity of receptors in English waters is therefore considered to be at worst-case high.
Significance of effect	Overall, for the VERs in both Scottish and English waters the magnitude of the cumulative impact is deemed to be low and the sensitivity of the receptor is considered to be at worst-case high. The Whole Project effect will, therefore, be of minor to moderate significance, with an overall conclusion for all VERs of minor adverse significance, which is not significant in EIA terms. This is because embedded biosecurity measures of all projects within the Benthic Ecology CEA Study Area are expected to substantially reduce the likelihood of INNS introduction and spread. Furthermore, no INNS were identified during the MHPGC Project-specific benthic surveys.
Further mitigation and residual significance	No mitigation measures for benthic ecology are considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 3.18, is not significant in EIA terms.
Decommissioning phase	
Magnitude of impact	During decommissioning, infrastructure associated with the MHPGC Project and relevant cumulative projects may be removed, either wholly or partially. As decommissioning methodologies are not yet defined, a precautionary assessment has been undertaken assuming activities and associated increased risk of introduction and spread of INNS. Therefore, the magnitude of impact, receptor sensitivity, significance of effect, mitigation requirements and residual effects associated with the MHPGC Project and cumulative projects are considered to be comparable to those predicted during construction.
Sensitivity of receptor	
Significance of effect	
Further mitigation and residual significance	

3.10.8 Colonisation of hard structures

- 3.10.8.1 There is potential for the colonisation of hard structures as a result of the MHPGC Project's O&M phase alongside OWFs, and cables within the Benthic Ecology CEA Study Area. Colonisation of hard structures may occur as a result of the introduction of artificial hard substrate, including cable protection, export cable crossings and protection associated with trenchless drill exit pits, which may provide habitat for epifaunal communities. Where these structures occur in combination with hard substrate associated with other OWF and cable projects, there is potential for cumulative effects.
- 3.10.8.2 The summary of the Whole Project assessment for the colonisation of hard structure is presented in **Table 3.37** and cumulative effects assessment for the colonisation of hard structures is presented in **Table 3.38**.

Table 3.37: MHPGC Project whole project assessment for colonisation of hard substrates

Whole project assessment		
Scenario 1: MHPGC Project and Morven North		Scenario 2: MHPGC Project and Morven South
Operations and maintenance phase		
Magnitude of impact	The Whole Project assessment for Scenario 1 considers the MHPGC Project together with Morven North. The O&M phase of Morven North may occur simultaneously with the O&M phase of the MHPGC Project. The presence of Morven North infrastructure will result in the installation of up to 3,139,162m² of hard structures available for colonisation. In combination with the MHPGC Project this equates to 4,259,346m² of hard substrate available for colonisation. The Whole Project impact is predicted to be of local spatial extent, long-term duration (across all phases), intermittent and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be low.	The Whole Project assessment for Scenario 1 considers the MHPGC Project together with Morven South. The O&M phase of Morven South may occur simultaneously with the O&M phase of the MHPGC Project. The presence of Morven South infrastructure will result in the installation of up to 3,074,239m² of hard structures available for colonisation. In combination with the MHPGC Project this equates to 4,194,423m² of hard substrate available for colonisation. The Whole Project impact is predicted to be of local spatial extent, long-term duration (across all phases), intermittent and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be low.
Sensitivity of receptor	The sensitivity of the benthic subtidal ecology VERs to colonisation of hard structures is summarised in Paragraph 3.8.3.48 et seq. In Scottish waters, offshore deep-sea mud, offshore subtidal sands and gravels, sea pen and burrowing megafauna communities, ocean quahog and scarce tube-dwelling anemone are considered to have no resistance to a change from sedimentary habitat to artificial hard substrate, with recoverability assessed as very low. The sensitivity of receptors in Scottish waters is therefore considered to be at worst-case high. Similarly, in English waters, mud habitats in deep water, sublittoral sands and gravels and ocean quahog are considered to have no resistance to a change from sedimentary habitat to artificial hard substrate, with recoverability assessed as very low. Stony reef is assessed as having medium sensitivity. The sensitivity of receptors in English waters is therefore considered to be at worst-case high.	
Significance of effect	Overall, for the VERs in both Scottish and English waters the magnitude of the Whole Project impact is deemed to be low and the sensitivity of the receptor is considered to be at worst-case high. The Whole Project effect will, therefore, be of minor to moderate significance, with an overall conclusion for all VERs of minor adverse significance, which is not significant in EIA terms. This is because effects would be highly localised and restricted to the footprint of the installed infrastructure, with no anticipated effects at the population or feature level. Any changes in community composition would occur alongside a localised increase in habitat complexity and biodiversity and are therefore considered to result in a minor adverse effect overall.	
Further mitigation and residual significance	No mitigation measures for benthic ecology are considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 3.18, is not significant in EIA terms.	

Table 3.38: MHPGC Project CEA for colonisation of hard substrates

	Cumulative Effects Assessment
	Scenario 4: MHPGC Project, Tier 1 (including Morven North and Morven South), Tier 2, and Tier 3 (including MBAGC Project) Projects
Operations and maintenance phase	
Magnitude of impact	The cumulative effects assessment for Scenario 4 considers the MHPGC Project together with the Tier 1, Tier 2 and Tier 3 projects below. <u>Tier 1</u> Tier 1 includes the following OWF projects which may have O&M phases overlapping with the O&M phase of the MHPGC Project, with area of hard substrate indicated: • Morven North (3,139,162 m²); • Morven South (3,074,239 m²), • Ossian OWF (19,270,958 m²). Tier 1 includes the following cable projects: • Berwick Bank ECC (2,177,214m²); • Eastern Green Link 1 (779,000m²); • Eastern Green Link 2 (1,110,000m²); • NO UK Telecom; • Havihingsten Seg 2; • North Sea Link. NO UK Telecom, Havihingsten Seg 2 and North Sea Link cable are operational and as such any changes to areas of hard substrate available for colonisation will be negligible over the construction phase of the MHPGC Project. In total cumulative hard structures associated with the MHPGC Project (1,120,184m²) and Tier 1 projects is up to 30,670,757m² which, in comparison to the surface area of the North Sea (750,000km²), equates to 0.004%. The cumulative effect is predicted to be of local spatial extent, long-term duration, continuous and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be low. <u>Tier 2</u> Tier 2 includes the following cable projects: • Eastern Green Link 3; • Eastern Green Link 4. In total cumulative hard structures associated with the MHPGC Project (1,627,120m²) and Tier 2 projects is up to 1,627,120m² (area data not available for Eastern Green Link 3 or Eastern Green Link 4). The cumulative effect is predicted to be of local spatial extent, long-term duration, continuous and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be low. This is also due to the implementation of an MBP which will reduce the risk of this impact occurring (CoT38).

	Cumulative Effects Assessment
	<u>Tier 3</u> Tier 3 includes the following OWF project and the following cable projects: • MBAGC Project; • Eastern Green Link 5. The programmes for these projects are unknown and therefore there is potential for the project to install hard substrate available for colonisation within the MHPGC Project's O&M phase. It is currently not possible to quantify this impact but it is likely to be of a similar or reduced magnitude compared to the MHPGC Project. The cumulative effect of all projects in Scenario 4 is predicted to be of local spatial extent, long-term duration, continuous and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is, therefore, considered to be low.
Sensitivity of receptor	The sensitivity of the benthic subtidal ecology VERs to colonisation of hard structures is summarised in Paragraph 3.8.3.48 et seq. In Scottish waters, offshore deep-sea mud, offshore subtidal sands and gravels, sea pen and burrowing megafauna communities, ocean quahog and scarce tube-dwelling anemone are considered to have no resistance to a change from sedimentary habitat to artificial hard substrate, with recoverability assessed as very low. The sensitivity of receptors in Scottish waters is therefore considered to be at worst-case high. Similarly, in English waters, mud habitats in deep water, sublittoral sands and gravels and ocean quahog are considered to have no resistance to a change from sedimentary habitat to artificial hard substrate, with recoverability assessed as very low. Stony reef is assessed as having medium sensitivity. The sensitivity of receptors in English waters is therefore considered to be at worst-case high.
Significance of effect	Overall, for the VERs in both Scottish and English waters the magnitude of the cumulative impact is deemed to be low and the sensitivity of the receptor is considered to be at worst-case medium. The Whole Project effect will, therefore, be of minor adverse significance, which is not significant in EIA terms.
Further mitigation and residual significance	No mitigation measures for benthic ecology are considered necessary because the likely effect in the absence of further mitigation, beyond the designed in measures outlined in Table 3.18, is not significant in EIA terms.

3.10.9 Electromagnetic fields

- 3.10.9.1 There may be impacts to benthic invertebrates due to EMF during the MHPGC Project's O&M phase within the Benthic Ecology CEA Study Area. Potential impacts may arise from the presence and operation of active subsea electrical cables. Where operational electrical infrastructure associated with other OWF and subsea cable projects occurs within the Benthic Ecology CEA Study Area, there is potential for cumulative effects.
- 3.10.9.2 The summary of the Whole Project assessment for EMF is presented in **Table 3.39** and cumulative effects assessment for EMFs is presented in **Table 3.40**.

Table 3.39: MHPGC Project whole project assessment for impacts on benthic invertebrates due to EMF

Whole project assessment		
Scenario 1: MHPGC Project and Morven North		Scenario 2: MHPGC Project and Morven South
O&M phase		
Magnitude of impact	The Whole Project assessment for Scenario 1 considers the MHPGC Project together with Morven North. The O&M phase of Morven North may occur simultaneously with the O&M phase of the MHPGC Project and contribute to the cumulative effect of impacts on benthic invertebrates due to EMF. It is considered unlikely that EMFs will result in a behavioural response that will cause a change in benthic species and communities and that any potential negative effects will be confined to a localised area surrounding the cables. The Whole Project impact is predicted to be of local spatial extent, long-term duration, continuous and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be low.	The Whole Project assessment for Scenario 1 considers the MHPGC Project together with Morven South. The O&M phase of Morven South may occur simultaneously with the O&M phase of the MHPGC Project and contribute to the cumulative effect of impacts on benthic invertebrates due to EMF. It is considered unlikely that EMFs will result in a behavioural response that will cause a change in benthic species and communities and that any potential negative effects will be confined to a localised area surrounding the cables. The Whole Project impact is predicted to be of local spatial extent, long-term duration, continuous and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be low.
Sensitivity of receptor	The sensitivity of the benthic subtidal ecology VERs to EMF is summarised in Paragraph 3.8.3.73 et seq. In Scottish waters, offshore deep-sea mud, offshore subtidal sands and gravels, ocean quahog and scarce tube-dwelling anemone are considered to have a generally high tolerance to EMF exposure, reflecting the limited evidence for biologically significant effects on benthic receptors. The sensitivity of receptors in Scottish waters is therefore considered to be low. Similarly, in English waters, sea pen and burrowing megafauna communities, stony reef, sublittoral sands and gravels, mud habitats in deep water and ocean quahog are considered to have a generally high tolerance to EMF exposure, reflecting the limited evidence for biologically significant effects on benthic receptors. The sensitivity of receptors in English waters is therefore considered to be low.	
Significance of effect	Overall, for the VERs in both Scottish and English waters the magnitude of the Whole Project impact is deemed to be low and the sensitivity of the receptor is considered to be at worst-case low. The Whole Project effect will, therefore, be of negligible to minor adverse significance, with an overall conclusion of all VERs of minor adverse significance, which is not significant in EIA terms. The upper end of the significance range has been adopted as a precautionary approach, reflecting the limited evidence available on benthic invertebrate responses to EMF. Whilst effects are expected to be highly localised and no measurable ecological effects are predicted, some uncertainty remains regarding potential behavioural responses and cumulative exposure. The addition of other projects is not anticipated to materially increase effects beyond those predicted for the MHPGC Project alone.	
Further mitigation and residual significance	No mitigation measures for benthic ecology are considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 3.18, is not significant in EIA terms.	

Table 3.40: MHPGC Project CEA for impact on benthic invertebrates due to EMF

	Cumulative Effects Assessment
	Scenario 4: MHPGC Project, Tier 1 (including Morven North and Morven South), Tier 2, and Tier 3 (including MBAGC Project) Projects
Operations and maintenance phase	
Magnitude of impact	The cumulative effects assessment for Scenario 4 considers the MHPGC Project together with the Tier 1, Tier 2 and Tier 3 projects below. <u>Tier 1</u> Tier 1 includes the following OWF projects which may have O&M phase overlapping with the O&M phase of the MHPGC Project: • Morven North (424km IAC, 484km ECC); • Morven South (420km IAC, 420km ECC). • Ossian OWF (1,261km IAC, 236km ECC). Tier 1 includes the following cable projects: • Berwick Bank ECC (872km); • Eastern Green Link 1 (196km); • Eastern Green Link 2 (436km); • NO UK Telecom (700km); • Havihingsten Seg 2 (940km); • North Sea Link (700km). In total cumulative cabling associated with the MHPGC Project (326km) and Tier 1 projects is up to 7,415km. The cumulative effect is predicted to be of local spatial extent, long-term duration, continuous and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be low. <u>Tier 2</u> Tier 2 includes the following cable projects: • Eastern Green Link 3 (575km); • Eastern Green Link 4 (530km). In total cumulative cabling associated with the MHPGC Project (326km) and Tier 2 projects is up to 1,431 km. The cumulative effect is predicted to be of local spatial extent, long-term duration, continuous and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be low. <u>Tier 3</u> Tier 3 includes the following OWF project and the following cable projects: • MBAGC Project; • Eastern Green Link 5.

	Cumulative Effects Assessment
	The programmes for these projects are unknown and therefore there is potential for the project to remove hard substrate within the MHPGC Project's decommissioning phase. It is currently not possible to quantify this impact but it is likely to be of a similar or reduced magnitude compared to the MHPGC Project. The cumulative effect of all projects in Scenario 4 is predicted to be of local spatial extent, long-term duration, continuous and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is, therefore, considered to be low.
Sensitivity of receptor	The sensitivity of the benthic subtidal ecology VERs to EMF is summarised in Paragraph 3.8.3.73 et seq. In Scottish waters, offshore deep-sea mud, offshore subtidal sands and gravels, ocean quahog and scarce tube-dwelling anemone are considered to have a generally high tolerance to EMF exposure, reflecting the limited evidence for biologically significant effects on benthic receptors. The sensitivity of receptors in Scottish waters is therefore considered to be low. Similarly, in English waters, sea pen and burrowing megafauna communities, stony reef, sublittoral sands and gravels, mud habitats in deep water and ocean quahog are considered to have a generally high tolerance to EMF exposure, reflecting the limited evidence for biologically significant effects on benthic receptors. The sensitivity of receptors in English waters is therefore considered to be low.
Significance of effect	Overall, for the VERs in both Scottish and English waters the magnitude of the cumulative impact is deemed to be low and the sensitivity of the receptor is considered to be at worst-case low. The Whole Project effect will, therefore, be of negligible to minor adverse significance, with an overall conclusion for all VERs of negligible significance, which is not significant in EIA terms. The lower end of the significance range has been adopted as any EMF effects would be highly localised, no measurable behavioural or ecological effects on benthic receptors are predicted, and the addition of other projects is not anticipated to materially increase effects beyond those predicted for the MHPGC Project alone.
Further mitigation and residual significance	No mitigation measures for benthic ecology are considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 3.18, is not significant in EIA terms.

3.10.10 Thermal emissions from subsea electrical cables

- 3.10.10.1 Submarine power cables produce heat during operation which, when buried, can increase the temperature of the surrounding seabed sediments. Consequently, there may be impacts to benthic invertebrates due to thermal emissions from the MHPGC Project's subsea electrical cables during the O&M phase within the Benthic Ecology CEA Study Area. Potential impacts may arise from the presence and operation of active subsea electrical cables. Where operational electrical infrastructure associated with other OWF and subsea cable projects occurs within the Benthic Ecology CEA Study Area, there is potential for cumulative effects.
- 3.10.10.2 The summary of the Whole Project assessment for thermal emissions from subsea cables is presented in **Table 3.41** and the cumulative effects assessment is presented in **Table 3.42**.

Table 3.41: MHPGC Project whole project assessment for thermal emissions from subsea electrical cables

Whole project assessment		
	Scenario 1: MHPGC Project and Morven North	Scenario 2: MHPGC Project and Morven South
O&M phase		
Magnitude of impact	The Whole Project assessment for Scenario 1 considers the MHPGC Project together with Morven North. The O&M phase of Morven North may occur simultaneously with the O&M phase of the MHPGC Project and contribute to the cumulative effect of thermal emissions from subsea electrical cables. The release of thermal emissions from a cable has the potential to increase sediment temperature and have direct effects on infaunal species, although thermal increase in surrounding sediment would be highly localised to a very small area within the immediate vicinity of the cable. However, there is negligible capacity for thermal emissions from a cable to heat the overlying water column, meaning effects on epibenthic species and communities are negligible. The Whole Project impact is predicted to be of local spatial extent, long-term duration, continuous and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be low.	The Whole Project assessment for Scenario 1 considers the MHPGC Project together with Morven South. The O&M phase of Morven South may occur simultaneously with the O&M phase of the MHPGC Project and contribute to the cumulative effect of thermal emissions from subsea electrical cables. The release of thermal emissions from a cable has the potential to increase sediment temperature and have direct effects on infaunal species, although thermal increase in surrounding sediment would be highly localised to a very small area within the immediate vicinity of the cable. However, there is negligible capacity for thermal emissions from a cable to heat the overlying water column, meaning effects on epibenthic species and communities are negligible. The Whole Project impact is predicted to be of local spatial extent, long-term duration, continuous and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be low.
Sensitivity of receptor	The sensitivity of the benthic subtidal ecology VERs to thermal emissions from subsea electrical cables is summarised in Paragraph 3.8.3.89 et seq. In Scottish waters, offshore deep-sea mud, offshore subtidal sands and gravels, ocean quahog and scarce tube-dwelling anemone are considered to have a generally high tolerance to the small, localised temperature increases associated with subsea electrical cables. The sensitivity of receptors in Scottish waters is therefore considered to be low. Similarly, in English waters, sea pen and burrowing megafauna communities, stony reef, sublittoral sands and gravels, mud habitats in deep water and ocean quahog are considered to have a generally high tolerance to the small, localised temperature increases associated with subsea electrical cables. The sensitivity of receptors in English waters is therefore considered to be low.	
Significance of effect	Overall, for the VERs in both Scottish and English waters the magnitude of the Whole Project impact is deemed to be low and the sensitivity of the receptor is considered to be at worst-case low. The Whole Project effect will, therefore, be of negligible to minor adverse significance, with an overall conclusion of all VERs of negligible significance, which is not significant in EIA terms. The lower end of the significance range has been adopted as any increases in sediment temperature associated with thermal emissions from subsea cables would be highly localised. Furthermore, no measurable changes to benthic communities or ecological functioning are predicted, and the addition of other projects is not anticipated to materially increase effects beyond those predicted for the MHPGC Project alone.	
Further mitigation and residual significance	No mitigation measures for benthic ecology are considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 3.18, is not significant in EIA terms.	

Table 3.42: MHPGC Project CEA for thermal emissions from subsea electrical cables

	Cumulative Effects Assessment
	Scenario 4: MHPGC Project, Tier 1 (including Morven North and Morven South), Tier 2, and Tier 3 (including MBAGC Project) Projects
Operations and maintenance phase	
Magnitude of impact	The cumulative effects assessment for Scenario 4 considers the MHPGC Project together with the Tier 1, Tier 2 and Tier 3 projects below. <u>Tier 1</u> Tier 1 includes the following OWF projects which may have O&M phase overlapping with the O&M phase of the MHPGC Project: • Morven North (424km IAC, 484km ECC); • Morven South (420km IAC, 420km ECC). • Ossian OWF (1,261km IAC, 236km ECC). Tier 1 includes the following cable projects: • Berwick Bank ECC (872km); • Eastern Green Link 1 (196km); • Eastern Green Link 2 (436km); • NO UK Telecom (700km); • Havihingsten Seg 2 (940km); • North Sea Link (700km). In total cumulative cabling associated with the MHPGC Project (326 km) and Tier 1 projects is up to 7,415 km. The cumulative effect is predicted to be of local spatial extent, long-term duration, continuous and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be low. <u>Tier 2</u> Tier 2 includes the following cable projects: • Eastern Green Link 3 (575km); • Eastern Green Link 4 (530km). In total cumulative cabling associated with the MHPGC Project (326km) and Tier 2 projects is up to 1,431 km. The cumulative effect is predicted to be of local spatial extent, long-term duration, continuous and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be low. <u>Tier 3</u> Tier 3 includes the following OWF project and the following cable projects: • MBAGC Project; • Eastern Green Link 5.

	Cumulative Effects Assessment
	The programmes for these projects are unknown and therefore there is potential for the project to remove hard substrate within the MHPGC Project's decommissioning phase. It is currently not possible to quantify this impact but it is likely to be of a similar or reduced magnitude compared to the MHPGC Project. The cumulative effect of all projects in Scenario 4 is predicted to be of local spatial extent, long-term duration, continuous and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is, therefore, considered to be low.
Sensitivity of receptor	The sensitivity of the benthic subtidal ecology VERs to thermal emissions from subsea electrical cables is summarised in Paragraph 3.8.3.89 et seq. In Scottish waters, offshore deep-sea mud, offshore subtidal sands and gravels, ocean quahog and scarce tube-dwelling anemone are considered to have a generally high tolerance to the small, localised temperature increases associated with subsea electrical cables. The sensitivity of receptors in Scottish waters is therefore considered to be low. Similarly, in English waters, sea pen and burrowing megafauna communities, stony reef, sublittoral sands and gravels, mud habitats in deep water and ocean quahog are considered to have a generally high tolerance to the small, localised temperature increases associated with subsea electrical cables. The sensitivity of receptors in English waters is therefore considered to be low.
Significance of effect	Overall, for the VERs in both Scottish and English waters the magnitude of the cumulative impact is deemed to be low and the sensitivity of the receptor is considered to be at worst-case low. The Whole Project effect will, therefore, be of negligible to minor adverse significance, with an overall conclusion for all VERs of negligible significance, which is not significant in EIA terms. The lower end of the significance range has been adopted as any increases in sediment temperature associated with thermal emissions from subsea cables would be highly localised. Furthermore, no measurable changes to benthic communities or ecological functioning are predicted, and the addition of other projects is not anticipated to materially increase effects beyond those predicted for the MHPGC Project alone.
Further mitigation and residual significance	No mitigation measures for benthic ecology are considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 3.18, is not significant in EIA terms.

3.10.11 Removal of hard substrate

- 3.10.11.1 There is potential for the removal of hard substrate as a result of the MHPGC Project's decommissioning activities within the Benthic Ecology CEA Study Area. Removal of hard substrate may result from the decommissioning of hard structures: cable protection, export cable crossings and protection associated with trenchless drill exit pits. Where these structures occur in combination with hard structures associated with other OWF, cable and pipeline projects, there is potential for cumulative effects.
- 3.10.11.2 The summary of the Whole Project assessment for the removal of hard substrate is presented in **Table 3.43** and cumulative effects assessment for the removal of hard substrate is presented in **Table 3.44**.

Table 3.43: MHPGC Project whole project assessment for removal of hard substrate

	Whole project assessment	
	Scenario 1: MHPGC Project and Morven North	Scenario 2: MHPGC Project and Morven South
Decommissioning phase		
Magnitude of impact	The Whole Project assessment for Scenario 1 considers the MHPGC Project together with Morven North. The decommissioning phase of Morven North may occur simultaneously with the decommissioning phase of the MHPGC Project and contribute to the cumulative effect of hard substrate removal through the removal of artificial structures, such as cable protection. Decommissioning of Morven North may result in the removal of up to 3,139,162m² of hard substrate. In combination with the MHPGC project this equates to the removal of 4,259,346m² of hard substrate. The Whole Project impact is predicted to be of local spatial extent, long-term duration, continuous and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be low.	The Whole Project assessment for Scenario 1 considers the MHPGC Project together with Morven North. The decommissioning phase of Morven South may occur simultaneously with the decommissioning phase of the MHPGC Project and contribute to the cumulative effect of hard substrate removal through the removal of artificial structures, such as cable protection. Decommissioning of Morven South may result in the removal of up to 3,074,239m² of hard substrate. In combination with the MHPGC project this equates to the removal of 4,194,423m² of hard substrate. The Whole Project impact is predicted to be of local spatial extent, long-term duration, continuous and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be low.
Sensitivity of receptor	The sensitivity of the benthic subtidal ecology VERs to removal of hard substrate is summarised from Paragraph 3.8.4.30 et seq. In Scottish waters, offshore deep-sea mud, offshore subtidal sands and gravels, ocean quahog and scarce tube-dwelling anemone are expected to recolonise areas from which hard substrate has been removed, with recovery anticipated to reflect the recovery rates associated with temporary habitat disturbance. The sensitivity of receptors in Scottish waters is therefore considered to be at worst-case medium. Similarly, in English waters, sea pen and burrowing megafauna communities, stony reef, sublittoral sands and gravels, mud habitats in deep water and ocean quahog are expected to recolonise areas from which hard substrate has been removed, with recovery anticipated to reflect the recovery rates associated with temporary habitat disturbance. The sensitivity of receptors in English waters is therefore considered to be at worst-case medium.	
Significance of effect	Overall, for the VERs in both Scottish and English waters the magnitude of the Whole Project impact is deemed to be low and the sensitivity of the receptor is considered to be at worst-case medium. The Whole Project effect will, therefore, be of minor adverse significance, which is not significant in EIA terms.	
Further mitigation and residual significance	No mitigation measures for benthic ecology are considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 3.18, is not significant in EIA terms.	

Table 3.44: MHPGC Project CEA for removal of hard substrates

	Cumulative Effects Assessment
	Scenario 4: MHPGC Project, Tier 1 (including Morven North and Morven South), Tier 2, and Tier 3 (including MBAGC Project) Projects
Decommissioning phase	
Magnitude of impact	The cumulative effects assessment for Scenario 4 considers the MHPGC Project together with the Tier 1, Tier 2 and Tier 3 projects below. <u>Tier 1</u> Tier 1 includes the following OWF projects which may have decommissioning phases overlapping with the decommissioning of the MHPGC Project, with area of hard substrate indicated: • Morven North (3,139,162m²); • Morven South (3,074,239m²). • Ossian OWF (19,270,958m²) Tier 1 includes the following cable projects: • Berwick Bank ECC (2,177,214m²); • Eastern Green Link 1 (779,000m²); • Eastern Green Link 2 (1,110,000m²); • NO UK Telecom; • Havihingsten Seg 2; • North Sea Link. The extent of hard substrates associated with the NO UK Telecom, Havihingsten Seg 2 and North Sea Link cables is unknown and therefore there is potential for the project to remove hard substrate within the MHPGC Project's decommissioning phase. It is currently not possible to quantify this impact but it is likely to be of a similar or reduced magnitude compared to the MHPGC Project. In total cumulative hard structures associated with the MHPGC Project (1,120,184m²) and Tier 1 projects is up to 30,670,757m² which, in comparison to the surface area of the North Sea (750,000km²), equates to 0.004%. The cumulative effect is predicted to be of local spatial extent, long-term duration, continuous and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be low. <u>Tier 2</u> Tier 2 includes the following cable projects: • Eastern Green Link 3; • Eastern Green Link 4. In total cumulative hard structures associated with the MHPGC Project (1,627,120m²) and Tier 2 projects is up to 1,627,120m² (area data not available for Eastern Green Link 3 or Eastern Green Link 4).

	Cumulative Effects Assessment
	The cable projects are also likely to remove hard structures during decommissioning such as cable protection and cable crossings. The distances separating projects and lack of connectivity between the long-term habitat change introduced for each project reduces the potential of this increasing the magnitude overall. The cumulative effect is predicted to be of local spatial extent, long-term duration, continuous and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be low. This is also due to the implementation of an MBP which will reduce the risk of this impact occurring (CoT38). <u>Tier 3</u> Tier 3 includes the following OWF project and the following cable projects: • MBAGC Project; • Eastern Green Link 5. The programmes for these projects are unknown and therefore there is potential for the project to remove hard substrate within the MHPGC Project's decommissioning phase. It is currently not possible to quantify this impact but it is likely to be of a similar or reduced magnitude compared to the MHPGC Project. The cumulative effect of all projects in Scenario 4 is predicted to be of local spatial extent, long-term duration, continuous and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is, therefore, considered to be low.
Sensitivity of receptor	The sensitivity of the benthic subtidal ecology VERs in Scottish and English waters to removal of hard substrate is as described in Paragraph 3.8.4.32. Following removal of hard substrate it is expected that the baseline benthic communities in these areas will recover to their pre-construction based on the recovery rates for disturbed sediment, which would equate to a maximum sensitivity for the baseline habitats of medium.
Significance of effect	Overall, for the VERs in both Scottish and English waters the magnitude of the cumulative impact is deemed to be low and the sensitivity of the receptor is considered to be at worst-case medium. The Whole Project effect will, therefore, be of minor adverse significance, which is not significant in EIA terms.
Further mitigation and residual significance	No mitigation measures for benthic ecology are considered necessary because the likely effect in the absence of further mitigation (beyond the designed in measures outlined in Table 3.18 is not significant in EIA terms.

3.11 Transboundary effects

- 3.11.1.1 A screening of transboundary impacts has been carried out and any potential for significant transboundary effects with regard to benthic ecology from the construction, O&M and decommissioning phases of the MHPGC Project upon interests of other states has been assessed to support the PEIR. The potential transboundary impacts are screened within **Volume 1, Annex 4.3: Transboundary Screening, of the PEIR**.
- 3.11.1.2 In its Scoping Opinion, MD-LOT (on behalf of the Scottish Ministers) agreed that transboundary effects for benthic ecology could be scoped out from further assessment (see **Table 3.6**). No transboundary-specific concerns relating to benthic ecology were subsequently raised by PINS following its transboundary screening process.
- 3.11.1.3 The offshore components of the MHPGC Project and the Benthic Subtidal Ecology Study Area are located within UK territorial waters, which were considered as part of the baseline assessment (see **Section 3.4.5**). Any impacts on benthic subtidal and intertidal ecology receptors due to construction, O&M and decommissioning activities are likely to be confined to 9km from the MHPGC Project PEIR Red Line Boundary (as a worst-case scenario). Therefore, no transboundary impacts with regards to benthic subtidal and intertidal ecology are anticipated and no significant effects would arise.
- 3.11.1.4 Any disturbance expected as a result of the MHPGC Project is short term and highly localised. Therefore, any potential impacts are not considered sufficient to influence benthic ecology receptors beyond UK waters (Scottish and English) which would cause transboundary effects.

3.12 Inter-related effects

- 3.12.1.1 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), that 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.
- 3.12.1.2 For Benthic Subtidal and Intertidal Ecology, all pathways have been scoped out for inter-related effects.
- 3.12.1.3 There may be the small potential for inter-related effects on benthic ecology features during the construction, O&M and decommissioning phases of the MHPGC Project. However, inter-related effects on benthic ecology features are expected to be no more significant than individual impacts assessed in isolation in **Section 3.8** due to the highly localised and limited effects expected to occur in the benthic environment. Therefore, these have not been considered further.

3.13 Summary

3.13.1 Summary of effects

- 3.13.1.1 This chapter has assessed the potential impacts on benthic ecology from the construction, O&M and decommissioning phases of the MHPGC Project. **Table 3.45** presents a summary of impacts and confirms the residual effects.

3.13.2 Summary of secondary mitigation and monitoring

- 3.13.2.1 No additional mitigation or monitoring is proposed at this stage of the MHPGC Project further to the embedded commitments provided in **Table 3.18** as no significant residual effects have been identified. **Table 3.45** presents a summary of the secondary mitigation and monitoring proposed.

Table 3.45: Summary of impacts and residual effects

Impact	Jurisdiction	Sensitivity of receptor	Magnitude of impact	Significance of impact	Secondary mitigation and monitoring	Residual effect
Construction phase						
Temporary habitat loss and disturbance	Scotland	High	Low	Minor adverse	N/A	Minor
	England	High				
Increased SSCs and associated deposition	Scotland	Medium	Negligible	Minor adverse	N/A	Minor
	England	Medium				
Disturbance/ remobilisation of sediment bound contaminants	Scotland	Medium	Negligible	Minor adverse	N/A	Minor
	England	High				
Increased risk of introduction and spread of INNS	Scotland	High	Negligible	Minor adverse	N/A	Minor
	England	High				
O&M phase						
Long term habitat loss	Scotland	High	Low	Minor adverse	N/A	Minor
	England	High				
Temporary habitat loss and disturbance	Scotland	High	Low	Minor adverse	N/A	Minor
	England	High				
	England	High				
Changes in physical processes	Scotland	High	Negligible	Minor adverse	N/A	Minor
	England	High				
Increased risk of introduction and spread of INNS	Scotland	High	Negligible	Minor adverse	N/A	Minor
	England	High				
Colonisation of hard structures	Scotland	High	Low	Minor adverse	N/A	Minor adverse
	England	High				
Electromagnetic fields	Scotland	Low	Negligible	Minor adverse	N/A	Negligible
	England	Low				

Impact	Jurisdiction	Sensitivity of receptor	Magnitude of impact	Significance of impact	Secondary mitigation and monitoring	Residual effect
Thermal emissions from subsea electrical cables	Scotland	Low	Low	Minor adverse	N/A	Negligible
	England	Low				
Decommissioning phase						
Long term habitat loss	Scotland	High	Low	Minor adverse	N/A	Minor
	England	High				
Temporary habitat loss and disturbance	Scotland	High	Low	Minor adverse	N/A	Minor
	England	High				
Increased SSCs and associated deposition	Scotland	Medium	Low	Minor adverse	N/A	Minor
	England	Medium				
Disturbance/remobilisation of sediment bound contaminants	Scotland	Medium	Negligible	Minor adverse	N/A	Minor
	England	High				
	England	High				
Increased risk of introduction and spread of INNS	Scotland	High	Negligible	Minor adverse	N/A	Minor
	England	High				
Removal of hard substrates	Scotland	Medium	Low	Minor adverse	N/A	Negligible
	England	Medium				

3.14 References

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