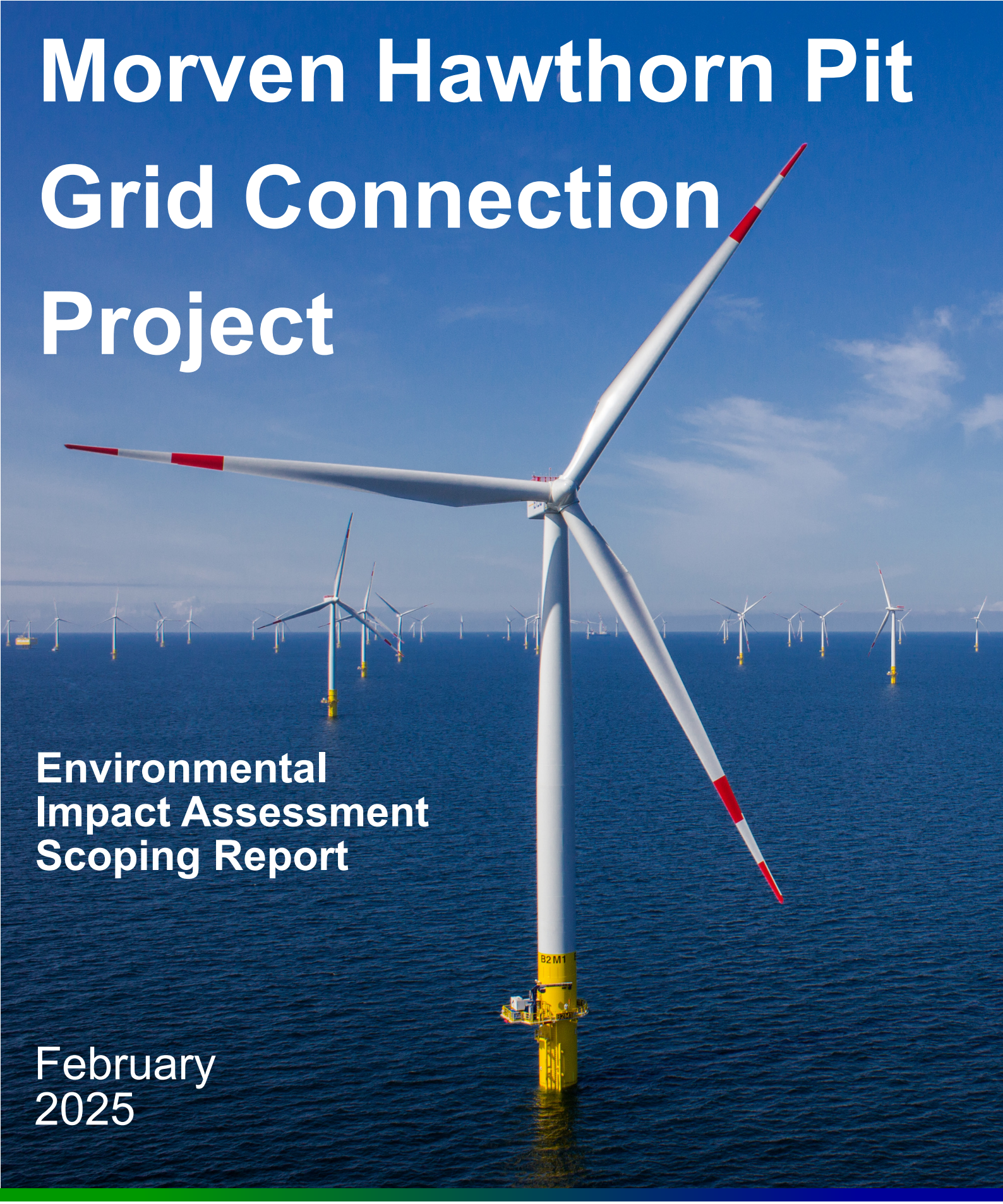
Morven Hawthorn Pit Grid Connection Project



Environmental Impact Assessment Scoping Report

February 2025

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Executive Summary

1.1.1.1 Morven Offshore Wind Limited ((MvOWL), hereafter referred to as 'the Applicant'), a joint venture between bp and EnBW Energie Baden-Württemberg AG, has been awarded a seabed option, under the 2021/22 ScotWind leasing round. The bp/EnBW collaboration is jointly developing the Morven Offshore Wind Project (hereafter referred to as 'the Project'); an offshore wind farm within Plan Option (PO) area E1 identified in the Scottish Government's Sectoral Marine Plan for Offshore Wind (Scottish Government, 2020).

1.1.1.2 The Project was scoped into the Pathway to 2030 Holistic Network Design (HND) workstream of the UK Government Offshore Transmission Network Review (OTNR). As part of this review, National Grid assessed options to improve the coordination of offshore wind farm connections and associated transmission networks. In July 2022, National Grid ESO published the 'Pathway to 2030 Holistic Network Design Report' which set out the approach to connecting 50GW of offshore wind to the grid (National Grid ESO, 2022). This concluded that the Project should connect the wind farm to the National Grid substation at Hawthorn Pit.

1.1.1.3 In March 2024, National Grid ESO published the 'Beyond 2030' report. This builds on the HND and makes a set of network recommendations to be implemented throughout the 2030s (National Grid ESO, 2024). This report recommends a second grid connection from the Project, connecting to a substation in the Branxton area, Southeast Scotland.

1.1.1.4 As a result of the HND process and in order to progress the Project, the Applicant will seek to consent the Project's generation and grid connection aspects separately.

1.1.1.5 Environmental Impact Assessments (EIA) are being progressed for each aspect to understand the likely significant environmental effects of the respective proposals, supported by environmental and survey information. The cumulative effects of the Project's generation and transmission aspects will be considered in each EIA.

1.1.1.6 This Scoping Report has been produced with respect to the Morven Hawthorn Pit Grid Connection Project (hereafter referred to as the 'MHPGC Project').

1.1.1.7 The components of the MHPGC Project (hereafter referred to as 'MHPGC Project Assets') will include:

- Offshore:
  - maximum length of cable corridor up to 341km;
  - maximum length of cable corridor in Scottish waters up to 80km;
  - maximum length of cable corridor in English waters up to 261km;
  - maximum external cable diameter up to 300mm per cable;
  - maximum width of cable corridor up to 1.5km.
- Onshore high voltage direct current (HDVC) section from transition joint bays (TJBs) to land sub-station (LSS):
  - indicative length of cable corridor up to 16.8km;
  - indicative width of cable corridor up to 50m.

- Onshore high voltage alternating current (HVAC) section from TJBs to LSS:
  - maximum length of cable corridor up to 100m;
  - maximum width of cable corridor up to 100m.

1.1.1.8 The following consents are required for the MHPGC Project:

- marine licences under the Marine and Coastal Access Act 2009 for works in English and Scottish waters;
- a Development Consent Order (DCO) under the Planning Act 2008.

1.1.1.9 The MHPGC Project will be considered under the appropriate EIA Regulations, which differ slightly depending on the consent being sought:

- for the marine licences under the Marine and Coastal Access Act 2009, The Marine Works (Environmental Impact Assessment) Regulations 2007;
- for the DCO, The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the 2017 EIA Regulations).

1.1.1.10 The MHPGC Project is subject to the EIA Regulations. As part of the EIA process, this Scoping Report, whilst not mandatory, has been undertaken to support a request for a formal Scoping Opinion on the MHPGC Project from Scottish Minsters, via the Marine Directorate: Licencing Operations Team (MD-LOT) and the Secretary of State via the Planning Inspectorate in England. The objective of this Scoping Report is to provide all stakeholders with sufficient information on the proposals specific to the MHPGC Project, to enable meaningful engagement within the pre-application consultation process.

1.1.1.11 This Scoping Report describes; the characteristics of the MHPGC Project, the environmental and social factors likely to be affected by the proposals, the topics to be addressed in the EIA, as well as baseline data sources and assessment methodologies used to inform the assessments. Potential likely significant effects on environmental and social receptors are identified within this Scoping Report and impacts that are proposed to be scoped out of the EIA process are also identified, e.g. on the basis no likely significant effects or receptor pathways were identified. The following topics have been considered:

- Environmental topics and potential impacts - offshore:
  - physical processes;
  - underwater sound;
  - water quality;
  - benthic subtidal and intertidal ecology;
  - Fish and Shellfish Ecology;
  - marine mammals
  - offshore and intertidal ornithology;
  - commercial fisheries;
  - shipping and navigation;
  - marine archaeology;
  - other sea users, marine infrastructure and communications.
- Environmental topics and potential impacts - onshore:
  - ground conditions and contamination;

  - water resources and flood risk;
  - terrestrial Ecology and ornithology;
  - archaeology and cultural heritage;
  - traffic and transport;
  - onshore noise and vibration;
  - onshore air quality;
  - land use, tourism and recreation.

- Environmental topics and potential impacts - combined:
  - landscape and visual impact assessment (LVIA);
  - human health;
  - aviation (military and civil) and radar;
  - socio economics;
  - climate change.

1.1.1.12 The Applicant requests a formal opinion on the key impacts identified, the data sources used, and the methodology proposed.

1.1.1.13 Following receipt of the Scoping Opinion from the Secretary of State and MD-LOT, a Preliminary Environmental Information Report (PEIR) is planned to be produced and consulted on during Q3/Q4 2025. The PEIR will provide an initial statement of the environmental information available for the MHPGC Project, including descriptions of the likely environmental effects, measures adopted as part of the project, and relevant enhancement, mitigation and monitoring commitments. The PEIR is intended to allow those taking part in the consultation to understand the nature, scale, location and likely significant environmental effects of the MHPGC Project, such that they can make an informed contribution to the process of pre-application consultation under the Planning Act 2008 and to the EIA process. In parallel to the EIA process, the Habitats Regulations Assessment (HRA), including the HRA Screening Report and subsequent Report to Inform Appropriate Assessment (RIAA), will be consulted upon during the pre-application consultation process.

1.1.1.14 The Applicant expects it will further refine the design of the MHPGC Project in response to the consultation responses received from the pre-application consultation in addition to environmental constraints identified during the EIA process. The final results of the EIA will be presented in an EIA Report/Environmental Statement and a summary of all consultation responses received will be presented in a Consultation Report, both of which will accompany the applications for development consent and marine licence which are planned to be submitted in 2026.

Glossary

Term	Meaning
Accidents and safety.	In the context of traffic and transport, the risk of accidents occurring where the Onshore GC1 Project is expected to produce a change in the character of traffic.
ADMS.	A software tool dispersion modelling marketed by Cambridge Environmental Research Consultants.
Aerodromes.	The term aerodrome refers to an area set aside for the departure, landing and maintenance of aircraft and for the purpose of this document includes airports, helicopter landing areas, airfields, airstrips and aerodromes.
Agricultural Land Classification.	ALC uses a grading system to compare the quality of agricultural land in England and Wales. This considers climate, topography and soil characteristics and their unique interaction to determine the limitation and grade of the land. The ALC grade provides information on the range of crops that can be grown, expected yield of crop and consistency of yield, and the cost of producing the crop.
Ambient sound level, LAeq,T.	Equivalent continuous A-weighted sound pressure level of the totally encompassing sound in a given situation at a given time, usually from many sources near and far, at the assessment location over a given time interval, T.
Ambient sound.	Totally encompassing sound in a given situation at a given time, usually composed of sound from many sources near and far.
Amphipod.	An order of malacostracan crustaceans with no carapace and generally with laterally compressed bodies.
Anadromous fish.	Fish species which migrate from sea to fresh water to spawn.
Anthrophonic sound.	Sound that is generated by humans or human activity.
Anthropogenic.	Something that is human made.
AQMA.	If a Local Authority identifies any locations within its boundaries where the Air Quality Objectives are not likely to be achieved, it must declare the area as an AQMA. The area may encompass just one or two streets, or it could be much bigger. The Local Authority is subsequently required to put together a plan to improve air quality in that area — a Local Air Quality Action Plan.

Term	Meaning
Array Project.	The Morven Offshore Wind Array Project which includes the wind turbines, Offshore Substation Platforms, foundations, inter-array and inter-connector cables and associated infrastructure.
Attenuation.	Gradual loss of acoustic energy.
Automatic Identification System (AIS).	A system by which vessels automatically broadcast their identity, key statistics including location, destination, length, speed and current status. Most commercial vessels and European Union (EU) fishing vessels over 15m length overall (LOA) are required to carry AIS.
A-weighting.	Frequency weighting filter which takes into account the frequency selective nature of human hearing.
Background sound level, LA90,T.	The A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using time fast time-weighting (F).
Background sound.	Underlying level of sound over a period, T, which might in part be an indication of relative quietness at a given location.
Bathing Waters.	Designated Bathing Waters are the only places in the UK where bacteria levels in open water are monitored and the data published.
Bathymetry.	The measurement of water depth in oceans, seas and lakes.
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.
Berwick Bank Offshore Wind Farm.	Berwick Bank OWF is an offshore wind farm within the same region as Morven Offshore Wind Project, northeast of Scotland.
Biodiversity Net Gain.	A way of creating and improving natural habitats to provide a measuredly positive impact.
Biophonic sound.	Sound generated by non-human living organisms.
Biotope.	The combination of physical environment (habitat) and its distinctive assemblage of characterising species.
Bivalve.	A large class of molluscs, also known as pelecypods. They have a hard calcareous shell made of two parts or 'valves'.

Term	Meaning
Blue carbon.	Organic carbon that has been captured and stored through biological processes in the coastal and marine environment.
Bryozoan.	A phylum of filter feeding aquatic invertebrate animals, nearly all living in sedentary colonies.
Cetacean.	Aquatic mammals constituting the infraorder Cetacea (whales, dolphins, porpoises).
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 largely to the increased levels of atmospheric carbon dioxide produced by the use of fossil fuels.
Cnidarian.	Invertebrates characterised by a decentralised nervous system distributed throughout a gelatinous body.
CO2e.	'Carbon dioxide equivalent.' Used to measure and compare emissions from greenhouse gases based on how severely they contribute to global warming.
Collision.	The act or process of one moving object striking another moving object.
Compressional wave.	Vibration wave where direction of particle motion is parallel to direction of propagation.
Conceptual Site Model.	A conceptual model represents the characteristics of the site in diagrammatic or written form that shows the possible relationships between sources of contamination (contaminants), pathways and receptors. See Source-pathway-Receptor (SPR) linkage, which is defined below.
Conservation Area.	An area of special architectural or historic interest, the character, appearance or setting of which it is desirable to preserve or enhance.
Construction Effects.	Used to describe both temporary effects that arise during the construction phases as well as permanent existence effects that arise from the physical existence of development (for example new buildings).
Construction.	Used both to refer to the whole construction phase of a project, and more specifically to refer to an activity involved in the provision of a new structure (building, road, etc.).

Term	Meaning
Context.	The circumstances that form the setting for an event, statement, or idea, and in terms of which it can be fully understood. When considering context, pertinent factors include: the absolute level of sound; the character and level of the residual sound compared to the character and level of the specific sound; evidence on human response to the sound; and the sensitivity of the receptor and whether dwellings or other premises used for residential purposes will already incorporate design measures that secure good internal and/or outdoor acoustic conditions.
Controlled airspace.	Airspace in which Air Traffic Control exercises authority. In the UK, Class A, C, D and E airspace is controlled. Within controlled airspace flights are subject to air traffic control service with standard separation maintained between aircraft.
Controlled Waters.	Controlled waters as defined by Defra as follows: • Relevant territorial waters which extend seaward for three miles from the low-tide limit from which the territorial sea adjacent to England and Wales is measured: - coastal waters from the low-tide limit to the high-tide limit or fresh-water limit of a river or watercourse; - inland freshwaters; - natural and artificial lakes, ponds, reservoirs, rivers or watercourses above the fresh-water limit. • natural and artificial underground rivers and watercourses; • surface water sewers, ditches and soakaways that discharge to surface or groundwater. It also includes those that may be currently dry; • groundwaters - any waters contained in underground strata. Controlled waters do not include any public sewer or any drain that enters into a public sewer (foul sewer).
COVID-19 pandemic.	The COVID-19 pandemic is a global outbreak of coronavirus, an infectious disease caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) virus.

Term	Meaning
Crustacean.	An invertebrate belonging to the subphylum of Crustacea, of the phylum Arthropoda. Includes crabs, lobsters, shrimps, barnacles and sand hoppers.
Cumulative effects.	The effect of the Morven Hawthorn Pit Grid Connection Project assessed together with effects from one or more different projects and plans on the same receptor/resource.
Decibel (dB).	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in sound pressure level between two sounds (s1 and s2) is given by 20 log10 (s1/s2). The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is 20 µPa.
Decidacade.	One tenth of a decade. A decade is a logarithmic frequency interval whose upper bound is ten times larger than its lower bound. Also referred to as one-third octave.
Demersal Fish Species.	Fish species that live near or on the seabed. Includes species such as haddock, cod, whiting and flatfish.
Demolition.	An activity involved with the removal of an existing structure or structures.
Dene.	Narrow, steep sided valley.
Deserted Medieval Village.	An area defining the former extent of a medieval village which is no longer occupied, often characterised by earthworks. Can also relate to the former extent of an existing settlement.
Designated Heritage Asset.	Heritage assets designated nationally under the relevant legislation. Planning Practice Guidance paragraph 022 identifies designated heritage assets as including scheduled monuments, listed buildings, registered parks and gardens, registered battlefields, word heritage sites, conservation areas and protected wreck sites.
Designed in measures.	For the purposes of the EIA process and in line with Institute of Environmental Management and Assessment (IEMA) (2016) guidance, designed in measures include Primary and Tertiary measures which refer to measures developed as part of the Project design, or measures implemented to comply with standard industry practices, or those required by law.

Term	Meaning
Development High Risk Area.	Part of a coal mining reporting area that contains one or more recorded coal mining-related features that have the potential for instability or a degree of risk to the surface from the legacy of coal mining operations.
Diadromous fish species.	Fish species which migrate between sea and freshwater.
Direct impact.	This is associated with the direct activities of the Applicant as well as the activities of primary suppliers.
Dispersion modelling.	Dispersion modelling is a means of calculating air pollution concentrations using information about the pollutant emissions and the nature of the atmosphere.
Driver delay.	Traffic delays to non-development traffic.
Dwelling.	A building used for living purposes. A mobile home used for permanent living should be included in an assessment. If calculations are being conducted for compensation purposes, then some mobile homes are dealt with under the Highways Noise Payments and Moveable Homes Regulations.
Echinoderm.	An invertebrate animal belonging to the phylum Echinodermata that includes sea stars, brittle stars, feather stars, sea urchins and sea cucumbers.
Ecological Clerk of Works.	Monitoring to ensure that a project's activities are delivered in accordance with wildlife law.
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.
Elasmobranchs.	Fish species that have a skeleton composed entirely of cartilage. Like sharks, rays and skates.
Emissions.	An amount of a substance that is produced and sent out into the air that is harmful to the environment, especially carbon dioxide.
Employment (Jobs).	A measure of employment which considers the headcount employment in an organisation or industry.
Environmental DNA.	Genetic material obtained directly from environmental samples (soil, sediment, water, etc.) without any obvious signs of biological source material.

Term	Meaning
Environmental Impact Assessment.	Assessment of the potential likely significant effects of the proposed Morven Hawthorn Pit Grid Connection Project on the physical, biological, and human environment during construction, Operations and Maintenance (O&M) and decommissioning.
Epifauna.	Animals living on the surface of the seabed.
European Site.	A Special Area of Conservation, (SAC), or candidate SAC (cSAC), a Special Protection Area (SPA), a site listed as a Site of Community Importance (SCI), a Ramsar site or, as per Scottish Planning Policy (SPP), a possible SAC (pSAC) or potential SPA (pSPA).
Exceedance.	An exceedance defines a period of time during which the concentration of a pollutant is greater than, or equal to, the appropriate air quality criterion. For AQOs, an exceedance is a concentration greater than the AQO value.
Exception Test.	Environment Agency test to be carried out where the Sequential Test indicates that suitable sites of lower flood risk are not available for the proposed development.
Export cables.	Cables that connect the offshore substation to the onshore network.
Fast time-weighting, F.	Averaging time used in sound level meters. Defined in BS EN 61672-2:2013 *Electroacoustics. Sound level meters. Pattern evaluation tests.*
Fear and intimidation.	In the context of traffic and transport, these may be experienced by people as a result of an increase in traffic volume and its proximity or the lack of protection caused by such factors as narrow pavement widths.
Formal Safety Assessment.	A structured and systematic process for assessing the risks and costs (if applicable) associated with shipping activity.
Future Baseline.	Refers to the situation in future years without the Proposed Development.
Gateways.	Notable transition points between landscapes.
Geoacoustic.	Relating to the acoustic properties of the seabed.

Term	Meaning
Geodiversity.	Geodiversity is defined as 'the range of rocks, minerals, fossils, soils and landforms' and is the variety of rocks, fossils, minerals, landforms, soils and natural processes, such as weathering, erosion and sedimentation, that underlie and determine the character of our natural landscape and environment.
Geophonic sound.	Naturally generated, non-biological sound.
Good Ecological Potential.	Is the status of a heavily modified or artificial body of water as defined by the Water Framework Directive.
Good Ecological Status.	Is the status of a body of surface water and is defined as a slight variation from undisturbed conditions.
Grade I listed building.	A building of exceptional special historic and architectural interest.
Grade II listed building.	Buildings of special historic and architectural interest.
Grade II* listed building.	Particularly important buildings of more than special historic and architectural interest.
Greenhouse Gas.	A gas that absorbs and emits radiant energy within the thermal infrared range, causing the greenhouse impact. Examples include carbon dioxide and methane.
Ground Truthed.	The process of validating data or information through direct observation or measurement, as opposed to relying on inference
Groundwater.	Water found below the surface.
Groundwater Dependent Terrestrial Ecosystem.	Ecosystems which are sensitive to hydrological changes and particularly dependent upon groundwater support.
Gypsum-stone.	A sedimentary rock consisting mostly of the very soft mineral, gypsum.
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 Morven Hawthorn Pit Grid Connection Project upon European sites and sites designated within the National Site Network is derived.
Habitats Regulation Assessment.	A process that determines whether development plans could impact protected European sites.

Term	Meaning
Habitats Regulations.	A term that refers to the collective legislation that translates the Habitats Directive into specific legal obligations in Scotland. namely: the Conservation (Natural Habitats, &c.) Regulations 1994; the Conservation of Habitats and Species Regulations 2017; and the Conservation of Offshore Marine Habitats and Species Regulations 2017 (in each case as amended).
Hard Water.	Water that contains salts of calcium and magnesium principally as bicarbonates, chlorides, and sulphates.
Health.	State of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity.
Highly Protected Marine Area.	Highly Protected Marine Areas (HPMAs) are areas of the sea (including the shoreline) that allow the protection and full recovery of marine ecosystems. HPMAs protect all species and habitats and associated ecosystem processes within the site boundary, including the seabed and water column.
Historic Landscape Character.	A framework for broadening our understanding of the whole landscape and for contributing to decisions affecting tomorrow's landscape.
Historical Landfill.	Historical Landfill sites are former facilities that local authorities and industry took waste to be disposed of in the ground. The sites are now closed and there are no waste management or environmental permits in force.
Holocene.	Current geological epoch, beginning approximately 11,650 years ago.
Hominin.	A taxonomic group consisting of modern humans, extinct human species, and all immediate ancestors.
Hydromorphology.	Geomorphology as a result of water, namely the water content and physical characteristics of a waterbody.
ICES Division VIb.	International Council for the Exploration of the Seas (ICES) standardise the division of sea areas for statistical analysis. A number of ICES rectangles are amalgamated to create ICES areas and divisions. ICES division Vib comprises the central North Sea.
ICES Rectangle.	ICES standardise the division of sea areas for statistical analysis. Each ICES statistical rectangle is '30 min latitude by 1 degree longitude' in size which is approximately 30 nautical miles by 30 nautical miles. A number of rectangles are amalgamated to create ICES areas.

Term	Meaning
Impact.	A change caused by an action that occurs during a project's lifetime.
Important Ecological Features.	Species, biotopes, or habitats requiring specific consideration in the environmental assessment.
Impulsive sound.	Sound which is typically transient, and brief with rapid rise time and rapid decay.
Inch Cape Offshore Wind Farm.	Inch Cape OWF is an offshore wind farm within the same region as Morven Offshore Wind Project, northeast of Scotland.
Indirect impact (Socio-economic).	This is associated with spending in the wider supply chain of primary supplier, e.g. secondary suppliers.
Induced impact (Socio-economic).	This is associated with staff spending their wages and creating impacts in the wider economy.
Infauna.	The animals living in the sediments of the seabed.
Instrument Meteorological Conditions.	Weather conditions which would preclude flight by the Visual Flight Rules (VFR) (i.e. conditions where the aircraft is in or close to cloud or flying in visibility less than a specified minimum).
Intertidal.	The area of a seashore which is covered at high tide and uncovered at low tide
Lithic Scatters.	Fragments of flint tools of prehistoric date.
Littoral.	The littoral zone extends from the high water mark, which is rarely inundated, to shoreline areas that are permanently submerged.
Local Road Network.	Roads not falling within the SRN and typically comprising 'A', 'B', 'C' class roads and 'unclassified' roads.
Lowest Astronomical Tide.	The lowest level that can be expected to occur under average meteorological conditions and under any combination of astronomical conditions.
Macrofauna.	Animals retained in a sieve with a mesh size of at least 1mm.
Magnitude.	A combination of the spatial extent, duration, frequency and reversibility of an impact.
Marine Guidance Note.	A system of guidance notes issued by the Maritime and Coastguard Agency (MCA) which provide significant advice relating to the improvement of the safety of shipping at sea, and to prevent or minimise pollution from shipping.

Term	Meaning
Mean High Water Springs (MHWS).	The height of mean high water during spring tides in a year.
Mean tidal range.	Difference in height between average high tide and average low tide.
Mental health.	State in which every individual realises his or her own potential, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to her or his community.
Mitigation.	Mitigation measures to eliminate, reduce or control adverse effects of the Project that are embedded within the assessment at the relevant point in the Environmental Impact Assessment (e.g. at Scoping).
Mollusc.	Invertebrate animal belonging to the phylum Mollusca that includes snails, clams, chitons, tooth shells, and octopi.
Morven Hawthorn Pit Grid Connection Project.	The Morven Hawthorn Pit Grid Connection Project is comprised of the offshore export cable, the onshore export cable and onshore land substation (LSS).
Mudstone.	A fine grained sedimentary rock whose original constituents were clays or muds.
Navigational Risk Assessment.	A document which assesses the overall impact to shipping and navigation of a proposed Offshore Renewable Energy Installation (OREI) based on Formal Safety Assessment (FSA).
Neap tide.	Tide that occurs when the sun and moon are at right angles to each other, and the gravitational pull of the sun partially cancels out the pull of the moon on the ocean.
Neart na Gaoithe Offshore Wind Farm.	Neart na Gaolthe OWF is an offshore wind farm within the same region as Morven Offshore Wind Project, northeast of Scotland.
Net zero.	A target of completely negating the amount of greenhouse gases produced by human activity either worldwide or by a country or organisation, to be achieved by reducing emissions and implementing methods of absorbing carbon dioxide from the atmosphere.

Term	Meaning
Non-designated heritage asset.	Locally-identified buildings, monuments, sites, places, areas or landscapes identified by planmaking bodies as having a degree of heritage significance meriting consideration in planning decisions but which do not meet the criteria for designated heritage assets.
Non-motorised User Amenity.	The relative pleasantness of a journey undertaken by a non-vehicular transport user, for example pedestrians and cyclists.
Non-motorised User delay.	The ability of people to cross roads as a result of changes in traffic volume, composition and speed, the level of pedestrian activity, visibility and general physical conditions.
Norfolk Vanguard Offshore Wind Farm.	Norfolk Vanguard West Offshore wind Farm is located 47km from the Norfolk Coast.
Notice to Mariners.	A release of navigational information and advice to assist mariners navigating in a particular region.
Nursery habitat.	A habitat where juveniles of a species regularly occur and grow as a population.
Open Fields.	A system dating to the medieval period whereby the agricultural land of a parish was farmed in large fields which were divided into strips.
Ossian Offshore Transmission.	Transmission infrastructure project for Ossian OWF.
Ossian Offshore Wind Farm.	Ossian OWF is an offshore wind farm within the same region as Morven Offshore Wind Project, northeast of Scotland.
Palaeochannel.	A remnant of an inactive river or stream channel that has been filled or buried by younger sediment.
Palaeocoastline.	A coastline which existed in the geologic past.
Palaeoenvironment.	The environment of the geologic past.
Peak sound pressure level.	20 times the logarithm to the base 10 of the ratio of the maximum sound pressure magnitude within a specified time interval to the specified reference value in decibels. The reference value in underwater acoustics is 1 µPa.
Pelagic Fish Species.	Fish species that inhabit open water. Examples include herring, mackerel and sprat.
Permanent Threshold Shift.	An irreversible loss of hearing sensitivity.

Term	Meaning
Permian.	The Permian is a geologic period and stratigraphic system spanning from the end of the Carboniferous Period (298.9 million years ago) to the beginning of the Triassic Period (251.902 million years ago).
Pinnipeds.	Infraorder of marine mammals including true and eared seals, sealions and walrus.
Polyaromatic hydrocarbons.	A class of chemicals that occur naturally in coal, crude oil, and gasoline.
Polychlorinated biphenyls.	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.
Ramsar.	Ramsar Site Wetlands that have been designated under the Convention of Wetlands of International Importance, signed in Ramsar, Iran, in 1971.
Rating level, LAr,Tr.	The specific sound level plus any adjustment for the characteristic features of the sound.
Receptor.	These are as defined in Regulation 5(2) of The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 and include population and human health, biodiversity, land, soil, water, air, climate, material assets, cultural heritage and landscape that may be at risk from exposure to direct and indirect impacts as a result of the Proposed Development.
Reference time interval, Tr.	Specified interval over which the specific sound level is determined. This is 1 hour during the day from 07:00 to 23:00 and 15 minutes at night from 23:00 to 07:00.
Representative Concentration Pathway.	RCPs specify concentrations of greenhouse gases that will result in total radiative forcing increasing by a target amount by 2100, relative to pre-industrial levels. Total radiative forcing is the difference between the incoming and outgoing radiation at the top of the atmosphere. Each pathway results in a different range of global mean temperature increases over the 21st century.
Residual sound.	Ambient sound remaining at the assessment location when the specific sound source is suppressed (or absent) to such a degree that it does not contribute to the ambient sound.
Residual sound level, Lr = LAeq,T.	Equivalent continuous A-weighted sound pressure level of the residual sound at the assessment location over a given time interval, T.

Term	Meaning
Ridge and furrow.	A ploughing technique commonly dated to the medieval and post medieval periods. Often survives as upstanding earthworks and buried remains visible as cropmarks on aerial photography.
River Basin Management Plan.	River basin management plans set the legally binding locally specific environmental objectives that underpin water regulation and planning activities.
Root-mean-square (rms) sound pressure.	Square root of the integral over a specified time interval of squared sound pressure, divided by the duration of the time interval, for a specified frequency range.
Round barrow.	A roughly circular mound covering a central burial. Commonly dated to the Bronze Age (2,600 BC to 700 BC).
Safety Zones.	An area around a structure or vessel which should be avoided
Sandstone.	Sedimentary rocks which are formed of cemented sand sized silicate grains.
Scheduled Monument.	Nationally important archaeological site.
Seagreen 1 Offshore Wind Farm.	Seagreen 1 OWF is an offshore wind farm within the same region as Morven Offshore Wind Project, northeast of Scotland.
Seagreen 1A Offshore Wind Farm.	Seagreen 1A OWF is an offshore wind farm within the same region as Morven Offshore Wind Project, northeast of Scotland.
Setting.	The surroundings in which a heritage asset, e.g. Listed Building, is experienced.
Shear wave.	Vibration wave where the direction of particle motion is perpendicular to the direction of propagation.
Shellfish.	For the purposes of this assessment, shellfish is considered a generic term to define molluscs and crustaceans.
Significance.	Effect factor that is determined by the magnitude of impact along with the sensitivity of the receptor.
Siliciclastic argillaceous.	Sedimentary rocks which are composed primarily of silicate minerals, such as quartz or clay.
Sites of Special Scientific Interest.	Designated areas which feature rare flora or fauna or are host to important features (physiological or geological) which are of scientific interest.

Term	Meaning
Sound exposure.	Time integral of squared sound pressure over a stated time interval in a stated frequency band.
Sound exposure level.	Ten times the logarithm to the base 10 of the ratio of sound exposure to the specified reference value in decibels. The reference value in underwater acoustics is 1 μPa^2s.
Sound power level, LW.	Sound power measured on a decibel scale, relative to a reference value of 10^{-12} W.
Sound power.	The sound energy radiated per unit time by a sound source. Measured in Watts (W).
Sound pressure.	Sound, or sound pressure, is a fluctuation in air pressure around the static ambient pressure.
Sound pressure level.	20 times the logarithm to the base 10 of the ratio of rms sound pressure to the specified reference value in decibels. The reference value in underwater acoustics is 1 µPa.
Source Protection Zones.	Groundwater protection zones defined by the Environment Agency and used to assess the level of contamination risk for groundwater sources.
Source-Pathway-Receptor Linkage.	The linkage of a source of contamination on or under the land which has the potential to cause harm or pollution (such as a landfill) and a receptor (something that could be adversely affected by contamination such as groundwater or people) by means of a pathway (a route by which the receptor is exposed to, or affected by, the contamination such as direct contact).
Spawning grounds.	The areas of water or seabed where fish/shellfish spawn or produce their eggs.
Special Area of Conservation.	A site designation specified in the Habitats Directive (Council Directive 92/43/EEC) and protected in the UK under Conservation of Habitats and Species Regulations 2017 and Conservation of Offshore Marine Habitats and Species Regulations 2017 in England. Each site is designated for one or more of the habitats and species listed in the Directive. The Directive requires that a management plan be prepared and implemented for each SAC to ensure the favourable conservation status of the habitats or species for which it was designated.
Special Protection Areas.	Locations within the UK protected for birds, as classified by the Conservation of Habitats and Species Regulations 2017 and Conservation of Offshore Marine Habitats and Species Regulations 2017 in England.

Term	Meaning
Specific sound level, Ls = LAeq,Tr.	Equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, T_r.
Spring tide.	Tides that occur when the sun and moon are directly in line with the Earth and their gravitational pulls on the ocean reinforce each other. This creates a higher water level relative to normal tidal periods.
Strategic Road Network.	The SRN is made up of motorways and trunk roads (the most significant 'A' roads).
Subaerial.	Terrestrial; either currently or formerly exposed to air.
Sublittoral.	Area extending seaward of low tide to the edge of the continental shelf.
Subtidal.	Area extending from below low tide to the edge of the continental shelf.
Surface water.	Surface waters includes rivers, lakes, transitional and coastal waters.
Teleost.	Typically, ray-finned fish.
Temporary Threshold Shift.	A temporary reduction in hearing sensitivity.
Tidal cycle.	One high tide plus a successive low tide.
Trackout.	The transport of dust and dirt from the site onto the public road network. This arises when vehicles leave site with dusty materials or transfer dust and dirt onto the road having travelled over muddy ground on-site.
Tree Protection Order.	An order made by a local planning authority in England to protect specific trees, groups of trees or woodlands in the interests of amenity.
Triassic.	The Triassic is a geologic period and system which spans from the end of the Permian Period (251.902 million years ago) to the beginning of the Jurassic Period (201.4 million years ago).
Uncontrolled airspace.	Airspace in which Air Traffic Control does not exercise any executive authority but may provide basic information services to aircraft in radio contact. In the UK, Class G airspace is uncontrolled. Aircraft operating in uncontrolled airspace may be in receipt of an air traffic service; however, within this classification of airspace, pilots are ultimately responsible for their own terrain and obstacle clearance.

Term	Meaning
Unexploded Ordnance.	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.
Vessel route.	Defined transit route (mean position) of commercial vessels identified within the specified Study Area.
Visual Meteorological Conditions.	A flight category which allows flight to be conducted under Visual Flight Rules (VFR) defined by in flight visibility and clearance from cloud.
Water bodies.	The Water Framework Directive 'water environment' includes rivers, lakes, transitional waters, groundwater and coastal waters out to 1 nautical mile (12 nautical miles for chemical status, i.e. for territorial waters). These waters are divided into units called water bodies.
Water Framework Directive.	The Water Framework Directive provides rules to protect water in Europe with the aim of achieving 'Good' status for lakes, rivers and groundwater.
Wider determinants of health.	Biological, behavioural, socio-economic, cultural or environmental factors which contribute to the health status of individuals or populations.
Years of Employment.	This is a measure of employment which is equivalent to one person being employed for a year and is typically used when considering short-term employment impacts, such as those associated with construction activity.

Abbreviations

Acronym	Meaning
AA.	Appropriate Assessment.
AADF.	Annual Average Daily Flow.
AADT.	Annual Average Daily Traffic.
ABPmer.	ABP marine environmental research.
AD.	*Anno domini.*
ADD.	Acoustic Deterrent Device.
AEoI.	Adverse Effects on the Integrity.
AEZ.	Archaeological Exclusion Zone.
AGL.	Above Ground Level.
AHLV.	Areas of Higher Landscape Value.
AIL.	Abnormal Indivisible Loads.
AIS.	Automatic Identification System.
AL1/AL2.	Action Level 1/2.
ALC.	Agricultural Land Classification.
AMSL.	Above Mean Sea Level.
ANO.	Air Navigation Order (CAP393).
AOD.	Above Ordnance Datum.
AONB.	Area of Outstanding Natural Beauty.
AQAL.	Air Quality Assessment Level.
AQMA.	Air Quality Management Area.
AQO.	Air Quality Objective.
AQS.	Air Quality Standard.
ASR.	Annual Status Report.
AStGWF.	Areas Susceptible to Groundwater Flooding.
ATC.	Air Traffic Control.
ATI.	Ancient Tree Inventory.
ATS.	Air Traffic Service.
AWI.	Ancient Woodland Inventory.
BAP.	Biodiversity Action Plan.
BAT.	Best Available Technique.

Acronym	Meaning
BC.	Before Christ.
BGL.	Below Ground Level.
BGR.	Bundesanstalt für Geowissenschaften und Rohstoffe.
BGS.	British Geological Survey.
BGSo.	British geographical society.
BMAPA.	British Marine Aggregate Producers Association.
BMM.	Brown & May's.
BMV.	Best and Most Versatile.
BNG.	Biodiversity Net Gain.
BoCC.	Board of County Commissioners.
BP.	Before Present.
BPM.	Best Practicable Means.
BTEX.	Benzene, Toluene, Ethylbenzene, Xylenes.
C.	Construction.
C_6H_6.	Benzene.
CAA.	Civil Aviation Authority.
CAP.	Civil Aviation Publication.
CAS.	Controlled Airspace.
CBC.	Common Bird Census.
CBRA.	Cable Burial Risk Assessment.
CBRN.	Chemical, biological, radiological, and nuclear.
CCL.	Central Cable Landfall.
CCRA.	Climate Change Risk Assessment.
CCS.	Carbon Capture and Storage.
CDM.	Construction Design and Management.
CEA.	Cumulative Effects Assessment.
Cefas.	Centre for environment, fisheries and aquaculture.
CEMP.	Construction Environmental Management Plan.
CES.	Crown Estate Scotland.
Cfd.	Contracts for Difference.
CI.	Confidence Interval.

Acronym	Meaning
CIEEM.	Chartered Institute of Ecology and Environmental Management.
CIfA.	Chartered Institute for Archaeologists.
CIRIA.	Construction Industry Research and Information Association.
CITES.	Convention on International Trade in Endangered Species of Wild Fauna and Flora.
CITiZAN.	Coastal and Intertidal Zone Archaeological Network.
CMS.	Construction Method Statement.
CNMP.	Construction Noise Management Plan.
CO.	Carbon Monoxide.
CoCP.	Code of Construction Practice.
CODA.	Cetacean Offshore Distribution and Abundance in the European Atlantic.
COLREGs.	International Regulations for Preventing Collisions at Sea.
COP28.	28th Conference Of the Parties to the United Nations Framework Convention on Climate Change.
COWRIE.	Collaborative Offshore Wind Research into the Environment.
CR.	Circalittoral Rock.
CRoW.	Countryside and Rights of Way.
CSIP.	Cable Specification and Installation Plan.
CSO.	Combined Sewer Overflow.
CSQG.	Canadian Sediment Quality Guidelines.
CTA.	Control Area.
CTMP.	Construction Traffic Management Plan.
CV.	Coefficient of Variation.
CWS.	County Wildlife Site.
D.	Decomissioning.
DAS.	Digital Aerial Survey.
DBA.	Desk Based Assessment.
DCC.	Durham County Council.
DCO.	Development Consent Order.
DDV.	Drop Down Video.

Acronym	Meaning
DECC.	Department of Energy and Climate Change.
Defra.	Department for Environment, Food & Rural Affairs.
DESNZ.	Department for Energy Security and Net Zero.
DfT.	Department for Transport.
DHRA.	Development High Risk Area.
DMRB.	Design Manual for Roads and Bridges.
DMV.	Deserted Medieval Village.
DTM.	Digital Terrain Model.
EA.	Environment Agency.
EATM.	Environmental Assessment of Traffic and Movement.
EC.	European Commission.
EcIA.	Ecological Impact Assessments.
ECOMMAS.	East Coast Marine Mammal Acoustic Study.
ECoW.	Ecological Clerk of Works.
eDNA.	Environmental DNA.
EEA.	European Economic Area.
EEZ.	Exclusive Economic Zone.
EGL3.	Eastern Green Link 3.
EGL4.	Eastern Green Link 4.
EIA.	Environmental impact assessment.
ELC.	European Landscape Convention.
EMF.	Electromagnetic Fields.
EMF.	Electric and magnetic fields.
EMODnet.	European marine observation and data network.
EMP.	Environmental Management Plan.
EPD.	Environmental Product Declaration.
EPR.	Environmental Permitting Regulations.
EPS.	European Protected Species.
EPSL.	European Protected Species Licence.
EPUK.	Environmental Protection UK.
EQR.	Ecological Quality Ratio.
EQSD.	Environmental Quality Standards Directive.

Acronym	Meaning
ERIC.	Environmental Records Centre North East.
ES.	Environmental Statement.
ESCA.	European Subsea Cables UK Association.
EU.	European Union.
EUNIS.	European Nnature Iinformation Ssystem.
EUSeaMap.	EMODnet broad scale seabed habitat map for Europe.
FCS.	Favourable Conservation Status.
FeAST.	Feature Activity Sensitivity Tool.
FIR.	Fisheries Industry Representatives.
FLCP.	Fisheries Liaison and Coexistence Plan.
FLO.	Fisheries Liaison Officer.
FLOWW.	Fishing Liaison with Offshore Wind and Wet Renewables.
FMMS.	Fisheries Management and Mitigation Strategy.
FoV.	Field of View.
FPSO.	Floating Production Storage and Offloading.
FRA.	Flood Risk Assessment.
FSA.	Formal Safety Assessment.
FTCFWG.	Forth and Taya Commercial Fisheries Working Group.
FTOWDG.	Forth and Tay Offshore Wind Developers Group.
GB.	Great Britain.
GCN.	Great Crested Newt.
GES.	Good Environmental Status.
GFW.	Global Fishing Map.
GHG.	Greenhouse Gas.
GIA.	Gross Internal Area.
GLVIA3.	Guidelines for Landscape and Visual Impact Assessment, 3rd Edition.
GVA.	Gross Value Added.
GWDTE.	Groundwater Dependent Terrestrial Ecosystem.
GWMU.	Groundwater Management Unit.
HCA.	Habitat Condition Assessment.
HDD.	Horizontal Directional Drilling.

Acronym	Meaning
HDV.	Heavy Duty Vehicle.
HE.	Historic England.
HER.	Historic Environment Record.
HES.	Historic Environment Scotland.
HGV.	Heavy Goods Vehicle.
HLC.	Historic Landscape Character.
HMPA.	Historic Marine Protected Area.
HMWB.	Heavily Modified Water Bodies.
HPI.	Habitat of Principal Importance.
HPMA.	Highly protected marine area.
HRA.	Habitats Regulations Assessment.
HRA.	Habitats Regulations Appraisal.
HSI.	Habitat Suitability Index.
HV.	High Voltage.
HVDC.	High Voltage Direct Current.
IAIA.	International Association for Impact Assessment.
IAMMWG.	Inter-Agency Marine Mammal Working Group.
IAQM.	Institute of Air Quality Management.
IBTS.	International Bottom Trawl Survey.
ICAO.	International Civil Aviation Authority.
ICE.	Inventory of Carbon.
ICES.	International Council for the Exploration of the Sea.
ICNIR.P	International Commission on Non-ionizing Radiation Protection.
ICPC.	International Cable Protection Committee.
ID.	Identification.
IEF.	Important Ecological Feature.
IEMA.	Institute of Environmental Management and Assessment.
IFCA.	Inshore Fisheries and Conservation Authority.
IFG.	Inshore Fisheries Group.
IHLS.	International Herring Larvae Survey.
ILVO.	Institute Agricultural, Fisheries and Food Research.

Acronym	Meaning
IMARES.	Institute for Marine Resources and Ecosystem Studies.
IMC.	Instrument Meteorological Conditions.
IMO.	International Maritime Organization.
INNS.	Invasive Non-Native Species.
INNSMP.	Invasive Non-Native Species Management Plan.
IPC.	Infrastructure Planning Commission.
IPH.	Institute of Public Health.
IUCN.	International Union for Conservation of Nature.
JCDP.	Joint Cetacean Data Programme.
JCP.	Joint Cetacean Protocol.
JNAPC.	Joint Nautical Archaeology Policy Committee.
JNCC.	Joint nature conservation committee.
KISORCA.	Kingfisher Information Service, Offshore Renewable and Cable Awareness project.
LAQM.	Local Air Quality Management.
LAS.	Lifecycle Analysis Studie.
LAT.	Lowest astronomical tide.
LBAP.	Local Biodiversity Action Plan.
LCA.	Landscape Character Area.
LCRM.	Land Contamination Risk Management.
LDV.	Light Duty Vehicle.
LEMP.	Landscape Ecological Management Plan.
LFA.	Low Flying Areas.
LGM.	Last Glacial Maximum.
LGS.	Local Geological Site.
LIDAR.	Light Detection and Ranging.
LIGS.	Locally Important Geological/Geomorphological Sites.
LLFA.	Lead Local Flood Authority.
LNR.	Local Nature Reserve.
LPA.	Local Planning Authority.
LRN.	Local Road Network.
LSE.	Likely Significant Effects.

Acronym	Meaning
LSOA.	Lower Super Output Area.
LSS.	Local Sub-Station.
Ltd.	Limited.
LUP.	Late Upper Palaeolithic.
LVIA.	Landscape and Visual Impact Assessment.
LWS.	Local Wildlife Site.
MAFF.	Ministry of Agriculture Fisheries and Food.
MAGIC.	Multi-Agency Geographic Information for the Countryside.
MAIB.	Marine Accident Investigation Branch.
mAOD.	Metres Above Ordnance Datum.
MarESA.	Marine Evidence based Sensitivity Assessment.
MarLIN.	Marine Life Information Network.
MARPOL.	Marine Pollution (refers to the International Convention for the Prevention of Pollution from Ships, 1973 as modified by the Protocol of 1978, or “MARPOL 73/78”).
MCA.	Maritime and Coastguard Agency.
MCAA.	Marine and Coastal Access Act.
MCZ.	Marine Conservation Zone.
MD-LOT.	Marine Directorate: Licencing and Operations Team.
MDS.	Maximum Design Scenario.
MEDIN.	Marine Environmental Data and Information Network.
Met Office.	Meteorological Office.
MGN.	Marine Guidance Note.
MHPGC.	Morven Hawthorn Pit Grid Connection.
MHWS.	Mean High Water Springs.
MLWS.	Mean Low Water Springs.
MMMP.	Marine Mammal Mitigation Protocol.
MMO.	Marine Management Organisation.
MNCR.	Marine Nature Conservation Review.
MoD.	Ministry of Defence.
MOHC.	Met Office Hadley Centre.
MPA.	Marine protected area.

Acronym	Meaning
MPCP.	Marine Pollution Contingency Plan.
MPS.	Marine Policy Statement
MRSea.	Marine Renewables Strategic environmental assessment.
MSA.	Mineral Safeguarded Area.
MSFD.	Marine Strategy Framework Directive.
MSS.	Marine Scotland Science.
MU.	Management Unit.
MZ.	Mitigation Zone.
NATS.	National Air Traffic Service.
NAVTEX.	Navigational Telex.
NBN.	National Biodiversity Network.
NCA.	National Character Area.
NCL.	Northern Cable Landfall.
ncMPA.	Nature Conservation Marine Protected Area.
NCN.	National Cycling Network.
NDC.	Nationally Determined Contribution.
NE.	Natural England.
NEC RIFG.	North and East Coast Regional Inshore Fisheries Group.
NEIFCA.	North Eastern Inshore Fisheries and Conservation Authority.
NERC.	Natural Environment and Rural Communities.
NGR.	National Grid Reference.
NHBC.	National House Building Council.
NHLE.	National Heritage List for England.
NIFCA.	Northumberland Inshore Fisheries and Conservation Authority.
NLB.	Northern Lighthouse Board.
NLS.	National Library of Scotland.
NMBAQC.	Northeast Atlantic Marine Biological Analytical Quality Control.
NMP.	National Marine Plan.
NMPi.	Marine Scotland National Marine Interactive.
NMU.	Non-Motorised Users.

Acronym	Meaning
NnG.	Neart na Gaoithe .
NNR.	National Nature Reserve.
NO_2.	Nitrogen Dioxide.
NOTAM.	Notice to Aviators.
NPPF.	National Planning Policy Framework.
NPS.	National Policy Statement.
NPSE.	Noise Policy Statement for England.
NRA.	Navigational Risk Assessment.
NRFA.	National River Flow Archive.
NRHE.	National Record of the Historic Environment.
NRMM.	Non-Road Mobile Machinery.
NRW.	Natural Resources Wales.
NS.	North Sea.
NSIP.	Nationally Significant Infrastructure Project.
NSP.	Navigational Safety Plan.
NSTA.	North Sea Transition Authority.
NtM.	Notice to Mariners.
NVZ.	Nitrate Vulnerable Zone.
O&M.	Operations and Maintenance.
OFLO.	Offshore Fisheries Liaison Officer.
OM.	Operations and Maintenance.
OREI.	Offshore Renewable Energy Installation.
OS.	Ordnance Survey.
OSP.	Offshore Substation Platform.
OSPAR.	Oslo and Paris Commissions.
OWEPS.	Offshore Wind Energy Policy Statement.
OWF.	Offshore Wind Farm.
PAC.	Pre-Application Consultation.
PAD.	Protocol for Archaeological Discoveries.
PAH.	Polycyclic Aromatic Hydrocarbon.
PAM.	Passive Acoustic Monitoring.
PBDE.	Polybrominated Diphenyl Ethers.

Acronym	Meaning
PC.	Process Contribution.
PCB.	Polychlorinated Biphenyls.
PCM.	Pollution Climate Mapping.
PDE.	Project Design Envelope.
PDN.	Project Document Number.
PEC.	Predicted Environmental Contribution.
PEIR.	Preliminary Environmental Information Report.
PEL.	Probable Effect Level.
PET.	Potential Evapotranspiration.
PEXA.	Practice and Exercise Areas.
PFRA.	Preliminary Flood Risk Assessment.
PINS.	Planning Inspectorate.
PM_{10}.	Particulate Matter (10µm diameter).
PM_{25}.	Particulate Matter (25µm diameter).
PMF.	Priority Marine Features.
PPE.	Personal Protective Equipment.
PPG.	Pollution Prevention Guidelines.
PPGN.	Planning Practice Guidance: Noise.
PPP.	Pollution Prevention Plan.
PRoW.	Public Rights of Way.
PRoWMP.	Public Right of Way Management Plan.
PSA.	Particle Size Analysis.
PSR.	Primary Surveillance Radar.
PSYM.	Predictive Systems for Multimetrics.
PTS.	Permanent Threshold Shift.
PWS.	Private Water Supplies.
RAF.	Royal Air Force.
RBMP.	River Basin Management Plan.
RCP.	Representative Concentration Pathway.
REWS.	Radar Early Warning Systems.
RIAA.	Report to Inform the Appropriate Assessment.
RICS.	Royal Institution of Chartered Surveyors.

Acronym	Meaning
RIFG.	Regional Inshore Fisheries Group.
RIGS.	Regionally Important Geological/Geomorphological Sites.
RMS.	Root mean square.
RNLI.	Royal National Lifeboat Institution.
RoPax.	Roll-on/Roll-off Passenger.
RoRo.	Roll-on/Roll-off Cargo.
ROV.	Remotely Operated Vehicle.
RSPB.	Royal Society for the Protection of Birds.
RYA.	Royal Yachting Association.
SAC.	Special Area of Conservation.
SAFFA.	Salmon and Freshwater Fisheries Act 1975.
SAR.	Search and Rescue.
SCANS.	Small Cetaceans in European Atlantic Waters and the North Sea.
ScARF.	Scottish Archaeological Research Framework.
SCC.	Sunderland City Council.
SCDS.	Supply Chain Development Statement.
SCOS.	Special Committee on Seals.
ScotMER.	Scottish Marine Energy Research.
SEA.	Strategic Environmental Assessment.
SEGL1.	Scotland to England Green Link 1.
SEGL2.	Scotland to England Green Link 2.
SEL_{cum}.	Cumulative Sound Exposure Level.
SEPA.	Scottish Environment Protection Agency.
SFF.	Scottish Fishermen's Federation.
SFRA.	Strategic Flood Risk Assessment.
SMP.	Sectoral Marine Plan.
SMR.	Scottish Marine Region.
SMRU.	Sea Mammal Research Unit.
SNCB.	Statutory Nature Conservation Body.
SNCI.	Site of Nature Conservation Importance.
SNH.	Scottish Natural Heritage.

Acronym	Meaning
SNMP.	Scottish National Marine Plan.
SO_2.	Sulphur Dioxide.
SoCC.	Statement of Community Consultation.
SOLAS.	International Convention for the Safety of Life at Sea.
SoS.	Secretary of State.
SPA.	Special Protection Area.
SPI.	Species of Principal Importance.
SPL.	Sound Pressure Level.
SPLASHCOS.	Submerged Prehistoric Archaeology and Landscapes of the Continental Shelf.
SPL_{peak}.	Peak Sound Pressure Level.
SPM.	Suspended particulate matter.
SPZ.	Source Protection Zone.
SRN.	Strategic Road Network.
SSC.	Suspended Sediment Concentration.
SSER.	SSE Renewables.
SSSI.	Site of Special Scientific Interest.
STECF.	Scientific, Economic and Technical Committee on Fishing.
SuDS.	Sustainable Drainage Systems.
SVOC.	Semi-Volatile Organic Compounds.
SWFPA.	Scottish Whitefish Producers Association.
SWMP.	Surface Water Management Plan.
SWRA.	Surface Water Risk Area.
TAEZ.	Temporary Archaeological Exclusion Zone.
TCA.	Trade and Cooperation Agreement.
TCE.	The Crown Estate.
TEL.	Threshold Effect Level.
TEMPro.	Trip End Model Presentation Program.
THC.	Total Hydrocarbons.
TJBs.	Transition Joint Bays.
TOC.	Total Organic Carbon.
TPH.	Total Petroleum Hydrocarbons.

Acronym	Meaning
TPO.	Tree Preservation Orders.
TSS.	Total suspended solids.
TTS.	Temporary Threshold Shift.
UK.	United Kingdom.
UKCP18.	UK Climate Projections 2018.
UKCS.	United Kingdom Continental Shelf (UKCS) block.
UKFEN.	UK Fisheries Economics Network.
UKHO.	United Kingdom Hydrographic Office.
UNCLOS.	United Nations Convention on the Law of the Sea.
UNESCO.	United Nations Educational, Scientific and Cultural Organization.
UNFCCC.	United Nations Framework Convention on Climate Change.
UST.	Underground Storage Tanks.
UXO.	Unexploded Ordnance.
VFR.	Visual Flight Rules.
VHF.	Very High Frequency.
VMC.	Visual Meteorological Conditions.
VMP.	Vessel Management Plan.
VMS.	Vessel Monitoring System.
VOC.	Volatile Organic Compounds.
VOR.	Valued Ornithological Receptors.
WeBS.	Wetland Bird Survey.
WFD.	Water Framework Directive.
WHO.	World Health Organization.
WMP.	Waste Management Plan.
WSI.	Written Scheme of Investigation.
WUR.	Wageningen University and Research.
WWII.	World War II.
WWTW.	Waste Water Treatment Works.
ZoI.	Zone of Influence.
ZTV.	Zone of Theoretical Visibility.

Units

Unit	Description
%.	Percentage.
°C.	Degrees Celsius.
µg m^3.	Micrograms per cubic meter.
µm.	Micron/Micrometer.
cm.	Centimetre.
CO_2e.	Carbon Dioxide Equivalent.
dB(A).	A-weighted decibels.
ft.	Feet.
GW.	Gigawatt.
Ha.	Hectares.
Hr.	Hour.
Km.	Kilometre.
km^2.	Square kilometre.
kV.	Kilovolt.
kW/m.	Kilowatts per metre.
l/s.	Litres per second.
m.	Metre.
m/s.	Metres per second.
m^2.	Square metre.
m^2/d.	Metres squared per day.
mg/l.	Milligrams per Litre.
mm/a.	Millimetre per annum.
nm.	Nautical mile.
µPa.	Micropascal.

1 Introduction

1.1 Background

1.1.1.1 Morven Offshore Wind Limited (MvOWL), (hereafter, 'the Applicant'), a joint venture between bp and EnBW Energie Baden-Württemberg AG, has been awarded a seabed option, under the 2021/22 ScotWind leasing round. The bp and EnBW collaboration is jointly developing the Morven Offshore Wind Project (hereafter 'the Project'); an offshore wind farm within Plan Option (PO) area E1 identified in the Scottish Government's Sectoral Marine Plan for Offshore Wind (the SMP) (Scottish Government, 2020).

1.1.1.2 The Project was scoped into the Pathway to 2030 Holistic Network Design workstream of the UK Government Offshore Transmission Network Review (OTNR). As part of this review, National Grid assessed options to improve the coordination of offshore wind farm connections and associated transmission networks. In July 2022, National Grid ESO published the 'Pathway to 2030 Holistic Network Design Report' which set out the approach to connecting 50GW of offshore wind to the grid (National Grid ESO, 2022). This concluded that the Project should connect the wind farm to the National Grid substation at Hawthorn Pit.

1.1.1.3 In March 2024, National Grid ESO published the 'Beyond 2030' report. This builds on the Holistic Network Design and makes a set of network recommendations to be implemented throughout the 2030s (National Grid ESO, 2024). This report recommends a second grid connection from the Project, connecting to a substation in the Branxton area, Southeast Scotland.

1.1.1.4 As a result of the Holistic Network Design process, and in order to progress the Project, the Applicant will seek to consent the Project's generation and grid connection aspects separately.

1.1.2 Summary of Consents Required

1.1.2.1 The consenting strategy for the Project is to seek consent for the generation and grid connection aspects separately, each supported by appropriate environmental assessments, as follows:

- **The Morven Offshore Wind Array Project**: Marine licences under the Marine and Coastal Access Act 2009 (separate marine licences will be sought from the Scottish Ministers for the generating assets and the Offshore Substation Platforms (OSP) and section 36 consents under the Electricity Act 1989 for the generating assets;
- **Morven Hawthorn Pit Grid Connection Project (MHPGC Project)**: A marine licence will be sought from the Scottish Ministers under the Marine and Coastal Access Act 2009 for the offshore assets beyond 12nm in Scottish waters. No elements of the MHPGC Project are within the 12nm limit in Scottish waters and for this reason, the Applicant will not be seeking consents under the Marine (Scotland) Act 2010;
- For assets located in England, the Applicant sought a direction from the Secretary of State under section 35 of the Planning Act to confirm that the onshore and offshore assets in England (including English waters) should be

treated as development for which development consent is required under the Planning Act 2008, as amended. A direction was duly made on 5 March 2024 and the Applicant is now pursuing a single development consent for the onshore and offshore assets in England;

- **Morven Branxton Area Connection Project**: - A marine licence will be sought from the Scottish Ministers under the Marine and Coastal Access Act 2009 for the offshore assets and associated activities. Planning permission will be sought from the local authority under the Town and Country Planning Act 1990 (TCPA) for the onshore transmission assets, land substation and associated activities.

1.1.2.2 The cumulative effects of the Project's generation and transmission aspects will be considered in each respective Environmental Impact Assessment (EIA).

1.1.2.3 This Scoping Report has been produced with respect to the MHPGC Project. This Report supports the Applicant's request for a Scoping Opinion from the Scottish Ministers for the assets in Scottish waters, and the Planning Inspectorate on behalf of the Secretary of State for the assets in England. A separate Habitats Regulations Appraisal/Assessment (HRA) screening exercise will be undertaken at the Preliminary Environmental Information Report (PEIR) stage.

1.1.2.4 A Scoping Opinion for the generation assets, including the OSPs, was received from the Scottish Ministers in November 2023 (MD-LOT, 2023). A request for a Scoping Opinion for the Morven Branxton Area Connection Project will be submitted to the Scottish Ministers in due course.

1.2 The Applicant and the EIA Team

1.2.1 The Applicant

1.2.1.1 The Applicant is a 50:50 joint venture between bp and EnBW. Both bp and EnBW have growing track records in the development of offshore wind, which include the introduction of new technologies to the sector. Both entities are working to progress the Morgan and Mona Offshore Wind Projects in the Irish Sea. These projects have a combined potential generating capacity of 5.9 GW, sufficient to power the equivalent of around 6 million UK households.

1.2.1.2 EnBW is one of the largest energy supply companies in Germany and supplies electricity, gas, water and energy solutions, and energy industry services to around 5.5 million customers with a workforce of more than 27,000 employees. It aims to strengthen its position as a sustainable and innovative infrastructure partner for customers, citizens and local authorities to an even greater extent. The repositioning of EnBW with a focus on renewable energies and smart infrastructure solutions is a key component of its strategy. With a focus on renewable energy and smart infrastructure solutions, EnBW's objective is for half of the electricity it supplies to be from renewable sources by the end of 2025. This is already having a noticeable effect on the reduction of CO2 emissions, which EnBW aims to halve by 2030 and to be climate neutral by 2035. EnBW has been involved in the operation of hydro power plants in the Black Forest for more than 100 years and has a large and continuously growing number of onshore wind farms and solar photovoltaics in Germany, France and Sweden. In addition, EnBW developed, constructed, and operates four offshore wind farms in Germany (EnBW Baltic 1, Baltic 2, Hohe See and Albatros) with a total

installed capacity of 945 MW, commissioned between 2011 and 2020. A further 900 MW to 960 MW capacity offshore wind farm, He Dreiht, is currently under construction in Germany.

1.2.1.3 bp has set out an ambition to be a net-zero company by 2050 or sooner, and to help the world get to net zero. bp has set out a strategy for delivering this ambition. bp is focused on delivering its transformation into an integrated energy company, helping to provide the energy the world needs today – which is mainly oil and gas - and investing in the energy transition. bp is investing in offshore wind and is working towards safely developing and operating a multi-gigawatt global pipeline over the next decade. bp has an offshore wind pipeline of 9.6GW net with planned projects in the US, the UK, Germany as well as partnerships in Asia.

1.2.2 The EIA Team

1.2.2.1 RPS has been commissioned by the Applicant to lead the environmental assessments (EIA and Habitats Regulations Appraisal (HRA)) for the MHPGC Project. This includes the initial review of the environmental issues associated with the construction, operation and maintenance (O&M), and decommissioning phases of the MHPGC Project, which are the subject of this Scoping Report. RPS has a 20-year history of delivering renewables projects in the UK, including leading the offshore consenting and licence activities for the 4.1GW Berwick Bank Wind Farm being progressed by SSE Renewables in the Firth of Forth and the 3.6GW Ossian Offshore Wind Farm being progressed by SSE Renewables, Marubeni and Copenhagen Infrastructure Partners (CIP), being developed to the east of the Morven Offshore Wind Array Project. The qualifications and experience of the competent experts involved will be detailed in the EIA Report/Environmental Statement provided for the MHPGC Project.

2 Policy and Legislation

2.1 Introduction

2.1.1.1 This section will provide a high-level overview of the policy and legislative background relevant to the Morven Hawthorn Pit Grid Connection (hereafter referred to as 'MHPGC Project') Project. These will be considered in this chapter in the wider context of the consent process and development of offshore wind farms (OWFs) in English and in Scottish waters. Further detail of the policy and legislation will be provided in the Environmental Statement (ES) and Marine License and Development Consent Order (DCO) Applications prepared for Marine Directorate: Licencing and Operations Team (MD-LOT) and the Planning Inspectorate respectively. Since the MHPGC Project is located in both Scottish and English waters, it will be subject to both Scottish and English consenting regimes, which are set out below.

2.2 Climate Change and Energy Policy and Need for the Morven Hawthorn Pit Grid Connection Project

2.2.1 International Commitments

2.2.1.1 The Climate Change Act 2008 transposes into United Kingdom (UK) law the commitments made following signature of the Kyoto Protocol, which came into effect in 2005. This protocol sets international binding greenhouse gas (GHG) emission reduction targets and was transcribed into UK law by the Climate Change Act 2008, and into Scottish law by the Climate Change (Scotland) Act 2009.

2.2.1.2 The Climate Change Act 2008 was revised in 2019 through the Climate Change Act (2050 Target Amendment) Order 2019. This revision sets a "net zero target" of GHG emissions for the year 2050 to be 100% lower than the levels in 1990. Under the Climate Change (Scotland) Act 2009, for Scotland, the net zero (GHG emission) target must be delivered by 2045.

2.2.1.3 The Paris Agreement 2016 (Paris Agreement Under the United Nations Framework Convention on Climate Change) is a legally binding global climate deal, agreed at the Paris Climate Conference, which came into force on 4 November 2016. Generally, this agreement aims to improve resilience to climate change impacts and provide support to developing countries to implement climate change mitigation. The targets in this agreement supersede those made in the Kyoto Protocol, aiming to keep the global temperature to below 2°C above pre-industrial levels, and limit global warming to 1.5°C.

2.2.2 Scottish Climate Change and Energy Legislation and Policy

2.2.2.1 The Climate Change (Scotland) Act 2009 by the Climate Change (Emission Reduction Targets) (Scotland) Act 2019 provides the legal framework for reducing GHG emissions in Scotland, and places duties on Scottish Ministers and public bodies to act within sustainable development parameters (see section 2.2.1.2). Furthermore, it introduced binding targets on the Scottish Government to achieve net zero Scottish GHG emissions by 2045. This included interim targets of a reduction in GHG emissions of 56% by 2020, 75% by 2030, and 90% by 2040 (HM Government, 2009).

2.2.2.2 The Scottish Energy Strategy: The Future of Energy in Scotland (Scottish Government, 2017) aims to significantly scale up renewable energy production, to secure continued and increased investment in the net zero energy economy, and to deliver a more secure energy system. The targets aim to have the equivalent of 50% of the energy for Scotland's heat, transport, and electricity consumption to be supplied by renewable sources, by 2045. The strategy highlights the success of Scottish projects in offshore wind in recent Contracts for Difference (CfD) auctions and highlights the great potential for future development, particularly within deeper waters. This is due to be replaced by 'The Energy Strategy and Just Transition Plan', which was published for consultation on 10 January 2023. Consultation on the draft Energy Strategy and Just Transition Plan closed on 22 May 2023 (Scottish Government, 2023).

2.2.2.3 The draft Sectoral Marine Plan (SMP) for Offshore Wind, and the SMP for wind, wave and tidal, was published by the Scottish Government in 2013 and builds on technological, policy, regulatory and market developments to form a new strategic planning process (Scottish Government, 2013). A key aim of this plan is to create a spatial strategy for seabed leasing in Scottish waters for OWFs which minimises adverse environmental, economic and social impacts, whilst maximising the opportunity for development. These plans were not formally adopted by the Scottish Government, but the draft options were included in the Scottish National Marine Plan (NMP) (Marine Scotland, 2020). The NMP has been prepared in accordance with, and gives consideration to, the European Union (EU) Directive 2014/89/EU, which introduces a framework for marine spatial planning and aims to promote the sustainable development of marine areas and the sustainable use of marine resources.

2.2.2.4 The Offshore Wind Energy Policy Statement (OWEPS) builds on the Scottish Energy Strategy, setting goals to meet net zero, which are specific to the development of offshore wind (Scottish Government, 2020a). The OWEPS builds upon the ambitions outlined in Scotland's Energy Strategy (Scottish Government, 2017). It also refers to the Offshore wind Sector Deal published in 2019 (HM Government, 2019) which details specific actions to be undertaken by governments and industry, designed to promote and grow the sector. Scotland's Energy Strategy forms a key component of the implementation of The OWEPS through the identification of suitable OWF development areas.

2.2.2.5 Notably, within the projects timeframe, it is likely that the SMP and the NMP will be reviewed, and the content of the plans updated, which could impact the policy basis for offshore renewable energy, and more specifically the MHPGC Project.

2.2.3 UK Climate Change and Energy Legislation and Policy

2.2.3.1 The Climate Change Act 2008 by the Climate Change Act (2050 Target Amendment) Order 2019 provides a legal framework to tackle climate change in the UK (see section 2.2.1.2). The order outlines emission reduction targets and establishes the UK as the first Group of Seven nations to set such a climate change goal.

2.2.3.2 In 2008, the European Parliament and Council agreed to a set of climate and energy targets known as The 2020 ('20-20-20') targets. These targets sought to reduce the emissions of GHG's by 20%, compared to 1990 levels, to increase the energy

efficiency in the EU by 20% and for renewables to account for 20% of total energy consumption in the EU by 2020. Based on this, the UK was subject to a mandatory national target of achieving 15% of gross final energy consumption from renewable sources by 2020 (HM Government, 2009).

2.2.3.3 The 2030 targets, including those associated with the EU Renewable Energy Directive, establish binding renewable energy targets for the EU. These targets build on the 2020 climate and energy framework, setting new goals including at least 40% cuts in GHG emissions compared to 1990 levels, at least a 27% improvement in energy efficiency and at least 27% of energy used in European Commission (EC) countries to be from renewable sources, by 2030 (European Commission, 2020).

2.2.3.4 The 2050 low carbon economy aims for the EU to be an economy with net-zero GHG emissions by 2050. The roadmap for transforming the EU into a competitive, low-carbon economy by 2050 was presented by the EC on March 2011, setting out goals for domestic EU action to keep global warming below 2°C. These included reducing GHG emissions by 40% in 2030 when compared to 1990 levels, by 60% in 2040, and by 80% in 2050. In order to achieve these, the roadmap suggests the need for all economic sectors to contribution to reducing GHG emissions (European Commission, 2011).

2.2.3.5 The UK Offshore Wind Sector Deal was published by the UK Government in 2019, setting out key commitments and actions from the UK Government to support offshore wind energy development (HM Government, 2019). The Sector Deal is divided in terms of ideas, people, infrastructure and places. In relation to infrastructure, it describes how clean affordable energy is essential for economic prosperity, the need for reducing energy costs for consumers, how to deliver up to 30GW of energy in a sustainable way and the plans for offshore wind energy beyond 2030 (HM Government, 2019).

2.2.3.6 The Energy Act 2013 focuses on setting decarbonisation targets for the UK. It sets out a commitment by the UK to a low carbon industry and also to investments in low carbon electricity generation. The act provides a legislative framework for the setting of a 2030 decarbonisation target range for electricity (in secondary legislation) and also for electricity market reforms consisting of measures which seek to secure investment towards a low carbon transmission of the electricity market. This includes CfD which are essentially long-term low carbon electricity generation contracts designed to encourage investment.

2.2.3.7 The 'Powering Up Britain: Energy Security Plan', was released by the Department for Energy Security and Net Zero (DESNZ) in 2023, building on previous strategies, including the 'British Energy Security Strategy' and 'Net Zero Strategy'. It supports the development of OWFs, other renewable energy sources, and new technologies to reduce the UK's emissions and energy reliance on foreign sources. The strategy aims to create new jobs in the offshore wind sector, reduce carbon emissions and support the creation of a low-carbon economy. On offshore wind capacity, the Energy Security Strategy announced updated targets for offshore wind, increasing them to 50GW (previously 40GW in the Net Zero Strategy), and up to 5GW floating offshore wind (previously 1GW) by 2030 (UK Government, 2022).

2.3 Consenting Process

2.3.1 Introduction

2.3.1.1 This section provides a summary of the consenting process and the legislation and policy relevant to the determination of those consents.

2.3.1.2 The MHPGC Project will be located within the offshore waters (i.e. beyond 12nm from the coast) of both Scotland and England, and within the 12nm inshore area and landward in England. In Scotland, the primary consent will be a marine license as required under the Marine and Coastal Access Act (MCAA) 2009, however in England and English waters, the primary consent will be a Development Consent Order under the Planning Act 2008. The consenting processes are set out below.

2.3.2 The Planning Act

2.3.2.1 The Planning Act 2008 is the primary legislation that establishes the legal framework for the application, examination and determination of applications for DCOs for Nationally Significant Infrastructure Projects (NSIPs). It sets out the consenting system for all NSIPs, including those in the energy sector.

2.3.2.2 Amendments have been made to the planning system that are applicable to the Planning Act 2008. Under the Localism Act 2011, the Planning Inspectorate became the executive agency responsible for the NSIP consenting process. Any developer wishing to construct a project that is classified as an NSIP must apply for a DCO. The Planning Inspectorate will examine the application submissions and make a recommendation to the Secretary of State (SoS) for the Department for Business, Energy and Industrial Strategy (BEIS) (in the case of energy projects) to grant or refuse consent.

2.3.3 Marine and Coastal Access Act 2009

2.3.3.1 The MCAA 2009 makes provisions in relation to marine functions and activities, including the rights of access to land near the coast in England. It applies to all UK offshore waters out to 200nm, with the exception of Scottish waters between 0 and 12nm, which are covered instead by the Marine (Scotland) Act 2010 (which are not of relevance to this project).

2.3.3.2 This act sets out the requirement for any works which take place in or over the sea, or on or under the seabed, to apply for a marine licence, which should be obtained prior to the construction or alteration of any works.

2.3.3.3 Section 149A of the Planning Act 2008 allows an applicant for a DCO to apply for 'deemed marine licences' as part of the DCO process. The SoS is the responsible authority for deemed marine licences in English waters included within a DCO. The Marine Management Organisation (MMO) are a key consultee and remain the monitoring and enforcement bodies in respect of the conditions and restrictions contained within the deemed marine licences once granted.

2.3.3.4 Relevant to the MHPGC Project, the MCAA covers the consent for offshore export cables beyond the 12nm in Scotland; for offshore export cables which will require a marine licence from MD-LOT (see sections 2.3.1).

2.3.3.5 As an authorisation decision taken by a public authority (i.e. the MD-LOT) a Marine Licence decision must be taken in accordance with the appropriate marine policy documents, unless material considerations indicate otherwise.

2.3.3.6 Marine policy documents comprise of any adopted Marine Plan for the relevant marine plan area, and any Marine Policy Statement (MPS).

2.3.3.7 In addition, in determining an application for a Marine Licence, MD-LOT must also have regard to:

- the need to protect the environment;
- the need to protect human health;
- the need to prevent interference with legitimate uses of the sea;
- such other matters as the authority thinks relevant.

2.3.3.8 This Environmental Impact Assessment (EIA) Scoping Report has been prepared in support of both the DCO and marine licence applications.

2.3.4 The Environmental Impact Assessment Process

2.3.4.1 The EIA directive (85/337/EEC codified by EIA Directive 2011/92/EU and then amended by EU Directive 2014/52/EU) defines the requirements of EIA for projects, including the development of transmission assets for OWFs. As relevant to MHPGC Project this directive has been transposed into UK law through The Marine Works (Environmental Impact Assessment) Regulations 2007, and The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017. These are collectively termed The EIA regulations.

2.3.4.2 In compliance with the relevant EIA regulations, when applying for a marine licence and/or a DCO, an EIA Report is required to be prepared and submitted to support these applications if the development applied for is likely to have a significant effect on the environment due to factors such as its size, nature or location. The results presented in the EIA should be provided to the decision maker by the applicant in the form of an ES.

2.3.4.3 The EIA regulations set out the requirements of an EIA and the statutory process which the MHPGC Project must follow to adhere to law. The EIA regulations apply independently from other regulatory assessments, such as Habitats Regulations Assessment (HRA; see section 2.4.1) but are often applied in parallel.

2.3.5 Consenting Process for Infrastructure in Scottish Waters

2.3.5.1 The section of the MHPGC Project located in Scottish waters is entirely within offshore waters (i.e. between the 12nm limit and the Scottish Exclusive Economic Zone (EEZ)).

2.3.5.2 In line with The MCAA 2009 (see section 2.1), for activities taking place between 12nm and the boundary of the Scottish EEZ, a marine licence is required for the MHPGC Project. The application for the licence must be made to MD-LOT.

2.3.5.3 Therefore, the primary consent which will be sought for the MHPGC Project, in respect of the assets located within Scottish waters, is a marine licence from MD-LOT in accordance with the provisions of the MCAA.

2.3.5.4 Since in Scottish waters, no section of the MHPGC Project is within the 12nm limit, the applicant will not require consent under the Marine (Scotland) Act 2010.

2.3.5.5 Similarly, as located in Scottish Offshore Waters, there is no statutory requirement for Pre-Application Consultation (PAC) to be undertaken, as this requirement only specifically applies to development within the Scottish Inshore Region and is not covered under the MCAA 2009.

2.3.5.6 The supporting EIA (if required) will be carried out in accordance with the Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2007; this is discussed further in section 2.1.1.1.

2.3.6 Consenting Process for Infrastructure in English Waters

2.3.6.1 The majority of the cable corridor for the MHPGC Project will be located in English waters (within and beyond the 12nm inshore limit) and the inshore infrastructure will be located wholly in England.

2.3.6.2 The MHPGC Project received a section 35 direction from the SoS for Energy and Net Zero that it should be treated as a development for which development consent is required. The application for development consent for the MHPGC Project will cover all offshore aspects of the project located within English waters as well as all onshore aspects of the project.

2.3.6.3 An EIA will be required as part of the application for a DCO. As such, an ES will be prepared, which is the report documenting the EIA process. The ES will be prepared in accordance with the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017. These Regulations implement the EIA Directive (2011/92/EU, by Directive 2014/52/EU) for consent applications made under the Planning Act 2008. The aim of the EIA Directive is to ensure that when a relevant authority giving consent for a particular project makes its decision, it does so in the knowledge of any likely significant effects (LSE) on the environment.

2.3.6.4 The process for obtaining a DCO is divided into the following phases: pre-application, acceptance, pre-examination, examination, decision and post decision.

2.3.6.5 During the pre-application phase, Part 5 of the Planning Act 2008 requires promoters of a DCO application to engage in PAC with local communities, local authorities and those who would be directly affected by the proposals. The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 make provisions for various matters in connection with making an application for a DCO, including publicising a proposed application and consulting with local and statutory stakeholders. Further details regarding the consultation process are included in Chapter 5: Consultation process, of the Scoping Report.

2.3.6.6 The MHPGC Project application will be submitted to the Planning Inspectorate with the prescribed forms and documents as required by the Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009. Regulation 5(2)(a) requires that, where applicable, an application must be accompanied by 'the environmental statement required pursuant to the Infrastructure Planning (Environmental Impact Assessment) Regulations [2017] and any scoping or screening opinions or directions'. Other supporting documents required to be submitted include:

- Consultation Report;
- Draft DCO and Explanatory Memorandum;
- a HRA Report.

2.3.7 National Policy Statements

2.3.7.1 National Policy Statements (NPSs) are designated under the Planning Act 2008. They describe the national case and establish the need for certain types of infrastructure development, including OWFs. Whilst designated under the Planning Act 2008, they may also be a relevant consideration for the competent authority when determining applications relevant to the NPS.

2.3.7.2 There are six energy NPSs, three of which contain policy relevant to offshore wind development and associated transmission infrastructure, specifically:

- Overarching NPS for Energy (NPS EN-1) which sets out the UK Government's policy for the delivery of major energy infrastructure (Department for Energy Security and Net Zero, 2024a).
- NPS for Renewable Energy Infrastructure (NPS EN-3) (Department for Energy Security and Net Zero, 2024b).
- NPS for Electricity Networks Infrastructure (NPS EN-5) (Department for Energy Security and Net Zero, 2024c).

2.3.7.3 The policy provisions within the NPS relevant to each physical, biological and human environment topic of the EIA will be presented and addressed in the individual technical topic chapters of the ES.

2.3.8 National Planning Policy Framework (2021)

2.3.8.1 The National Planning Policy Framework (NPPF) was first published in 2012 and subsequently revised in 2018, 2019, 2021 and 2023. This sets out the Government's planning policies for England and how these are expected to be applied. Within NPPF, national policies are set out with a "presumption in favour of sustainable development" as a key central component guiding the remainder of the content. This overarching principle is set out as meaning that proposals which accord with development plan policies should be approved without delay or where there are no relevant development plan policies or the policies which are most important for determining the application are out of date permission should be granted unless 1) the application of policies in the NPPF that protect areas or assets of particular importance provide a clear reason for refusal; or 2) any adverse impacts of doing so would significantly and demonstrably outweigh the benefits when assessed against the policies of the NPPF taken as a whole.

2.3.8.2 Policy within the NPPF is geared towards meeting wider objectives such as the challenges of climate change, with specific statements to the effect that the planning system and its policies should support the transition to a low carbon future and support renewable and low carbon energy and associated infrastructure. Specifically with regard to renewable energy proposals, direction is given to planning authorities that it should not be necessary to demonstrate the overall need for the project and

that the application should be approved if any impacts are or can be made acceptable. Some key extracts are included for completeness below.

2.3.8.3 Paragraph 2 of the NPPF confirms that 'planning law requires that applications for planning permissions must be determined in accordance with the development plan, unless material considerations indicate otherwise. The National Planning Policy Framework must be taken into account in preparing the development plan and is a material consideration in planning decisions.'

2.3.8.4 Section 14, 'Meeting the challenge of climate change, flooding and coastal change' includes Paragraph 157 which states that the planning system should 'support the transition to a low carbon future in a changing climate, taking full account of flood risk and coastal change. It should help to: shape places in ways that contribute to radical reductions in greenhouse gas emissions, minimise vulnerability and improve resilience; encourage the reuse of existing resources, including the conversion of existing buildings; and support renewable and low carbon energy and associated infrastructure.'

2.3.8.5 Paragraph 160 thereafter states:

- 'To help increase the use and supply of renewable and low carbon energy and heat, plans should:

    a. provide a positive strategy for energy from these sources, that maximises the potential for suitable development, whilst ensuring that adverse impacts are addressed satisfactorily (including cumulative landscape and visual impacts);

    b. consider identifying suitable areas for renewable and low carbon energy sources, and supporting infrastructure, where this would help secure their development;

    c. identify opportunities for development to draw its energy supply from decentralised, renewable or low carbon energy supply systems and for co-locating potential heat customers and suppliers.'

2.3.8.6 As outlined above, Paragraph 163 is clear that when determining planning applications for renewable energy and low carbon development, there is no requirement for applicants to demonstrate the overall need for such developments and recognises that even small-scale projects provide valuable contributions to cutting greenhouse gas emissions and such applications should be approved in the impacts are or can be made acceptable.

2.3.8.7 The NPPF also covers topic specific direction including that on sustainable development, sustainable economies, sustainable transport, effective use of land, achieving well designed places, flood risk, conserving the natural environment, habitats and biodiversity, cultural heritage and ground contamination. All of these will be addressed fully through the MHPGC Project EIA Report/ES.

2.3.8.8 Alongside the NPPF, the National Planning Practice Guidance (NPPG) provides further context of Government policy as set out in the NPPF. It sets out what the Government expects from local authorities covering a number of topics, including but not limited to Renewable and Low Carbon Energy, Climate Change and then

environmental topics such as Air Quality, Noise, Natural Environment, Historic Environment and Flood Risk.

2.3.8.9 In terms of renewable and low carbon energy, the NPPG states: 'Increasing the amount of energy from renewable and low carbon technologies will help to make sure the UK has a secure energy supply, reduce greenhouse gas emissions to slow down climate change and stimulate investment in new jobs and businesses. Planning has an important role in the delivery of new renewable and low carbon energy infrastructure in locations where the local environmental impact is acceptable' (Paragraph: 001 Reference ID: 5-001-20140306).

2.3.8.10 A common theme through the above policy is the wider commitment to achieve net zero and tackle climate change. This aspect is specifically addressed through the Government's Energy White Paper – Powering Our Net Zero Future (EWP; UK Government, 2020) which seeks to set out a strategy to address these challenges with specific reference to utilising electricity to enable the transition away from fossil fuels and decarbonise the economy by the year 2050. The EWP importantly also commits to updating NPSs in order to achieve the aforementioned.

2.3.9 Marine Policy Documents

2.3.9.1 The MCAA requires all public authorities taking authorisation or enforcement decisions that affect or might affect the UK marine area to do so in accordance with the MPS and the relevant Marine Plans.

2.3.9.2 The UK-wide MPS was published in March 2011, under the MCAA 2009, in order to provide a framework for marine spatial planning (Department for the Environment, Food and Rural Affairs (DEFRA), 2011).

2.3.9.3 The Marine Plans relevant to the marine licences required for the MHPGC Project are as follows:

- The Scottish Marine Plan published March 2015 (Scottish Government, 2015).
- The North East Inshore and North East Offshore Marine Plan adopted June 2021 (UK Government, 2021).

2.3.9.4 The policy provisions set out in the MPS and the Marine Plans as relevant to each physical, biological and human environment topic of the EIA will be presented and addressed in the individual technical topic chapters of the EIA Report/ES.

2.3.10 Local Planning Policy

2.3.10.1 The majority of the project would be located in County Durham, which means that the County Durham Plan 2020-2035 (Durham Local Plan) (Durham Country Council, 2020a) is the relevant statutory development plan which must be considered alongside the Saved Policies of the County Durham Minerals Local Plan (2000b) and the Saved Policies of the County Durham Waste Local Plan (2005). The provisions of the emerging Minerals and Waste Policies and Allocation Document which is currently being prepared will also be a material consideration.

2.3.10.2 In addition, parts of the proposed cable route corridors are located in the Sunderland Local Plan (2020) area and as such, this Policy document will form part of the statutory development for determination purposes, where relevant.

2.3.10.3 In addition to Local Plans as noted, should the Onshore MHPGC Project footprint interact with any Neighbourhood Plans, these will be appropriately addressed.

2.3.10.4 The Durham Local Plan is aimed at creating a successful and sustainable place and environment. There are Policy Objectives including 4 (Infrastructure), 9 (Natural Environment), 16 (Adaption to Climate Change) and 17 (Low Carbon) and these will be key alongside cognisance of the others. These will be considered alongside relevant policies, which would include Policy 33 (Renewables and Low Carbon Energy) alongside a number of other environmental and land use policies including those covering development in the countryside, soil resources, green infrastructure, safeguarded areas, amenity, landscape, trees (including Ancient Woodland), biodiversity, protected species, historic environment and minerals. These, alongside other relevant policies applicable to the final site will provide specific guidance and parameters to work within when proposing and assessing developments.

2.3.10.5 The Sunderland Local Plan includes similar overarching visionary concepts covering adapting to and tackling climate change, supporting renewable energy and protecting the Natural Environment with Strategic Priorities 9 and 8 covering these respectively, with subsequent policies covering detail. Of relevance to this proposal are policies on ecology, archaeology, minerals and the Green Belt. These will be covered in detail as appropriate through the EIA Report/ES.

2.3.10.6 Within the local plan Objectives and Policies across both areas, there is a promotion of development which protects the environment while reducing the causes of climate change and supporting the transition to a low carbon economy. There is support for the development of appropriate renewable energy sources also.

2.4 Other Consents and Legislation

2.4.1 Habitats Regulations

2.4.1.1 The Council Directive 92/43/EEC (The Habitats Directive) entered into force in 1992 in the EU. The aim of the Directive is to maintain or restore natural habitats and wild species listed on the Annexes at a favourable conservation status (FCS). This protection was granted through the designation of European Sites (Special Areas of Conservation (SAC)) and measures to protect European Protected Species (EPS). The European Directive (2009/147/EC) on the conservation of wild birds (The Birds Directive) aimed to protect the conservation status of rare and vulnerable species of wild birds, listed under Annex 1 of the directive, through effective protection and management (i.e. the designation of Special Protection Areas (SPA)).

2.4.1.2 Following the UK's Exit from the EU, the UK has no direct obligations under the Habitats Directive. However, The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 ensure that the UK is legally obliged to continue to maintain the standards required by the EU Habitats and Wild Birds Directives, subject to only minor (non-material) changes. As such, the Habitats and Birds Directive continue to provide the framework for the conservation and management of rare and vulnerable habitats and species and wild birds within Europe and the UK.

2.4.1.3 The Conservation of Habitats and Species Regulations 2017 and the Conservation of Offshore Marine Habitats and Species Regulations 2017 (together, the Habitats

Regulations) require the assessment of any significant effects on qualifying features of internationally important nature conservation sites that are likely to arise as a result of a proposed project. These internationally important sites include SACs, or candidate SACs (cSACs), SPAs or potential SPAs (pSPAs), sites of community importance (SCI) and Ramsar sites. These have been traditionally referred to as European Sites or Natura 2000 sites; following the UK's departure from the EU they are now referred to as the National Site Network.

2.4.1.4 These requirements of the Habitats Regulations are met in the consenting process through the use of HRA, which requires a project to demonstrate, using evidence, that there will be no Adverse Effects on the Integrity (AEoI) on the overall ecological coherence of the national site network. The assessment is to be undertaken by the 'competent authority', which in the case of the MHPGC Project is the Scottish Ministers for Scotland, and the SoS for England. The sensitive sites (hosting habitats and species of value) include:

- SAC, designated for Annex 1 seabed habitat features;
- SPAs, designated for the protection of valued bird species;
- Ramsar Sites, which are not explicitly covered by the regulations, but must still be included in the process due to NPPF guidance.

2.4.1.5 The HRA process consists of four key stages, which aim to consider if projects are likely to have an AEoI on the national site network. The first of these is screening, which identifies if the project could result in any LSE on designated features of sensitive sites. If LSE are found, to a site in the national site network or to its designated features, then the project must be subject to an appropriate assessment by the competent authority (The SoS for the UK, or The Scottish Ministers for Scotland). The competent authority will, during this appropriate assessment process, determine whether a project has the potential to cause AEoI on the relevant sites, which if found will need to be considered as a derogation case, which includes an assessment of alternative solutions, Imperative Reasons of Overriding Public Interest (where required) and the designation of compensatory measures (again, where required).

2.4.1.6 The MHPGC Project must provide sufficient information on any potential impacts of the project on sites protected under the Habitats Regulations to enable the competent authority to undertake the HRA.

2.4.1.7 The Scoping Opinions from the Planning Inspectorate and MD-LOT, as well as advice from key stakeholders, will inform the contents of the HRA for the MHPGC Project. The relevant designated sites (such as SPAs, SACs and Ramsar sites) within the zone of influence of the project area will be included in the HRA where the project has LSE on designated features.

2.4.2 European Protected Species Legislation

2.4.2.1 EPS are animals and plants listed in Annex IV of the Habitats Directive, which are afforded protection under the Habitats Regulations. If an activity is likely to have a risk of disturbance or injury to an EPS, under law, a licence is required. In the marine environment, these licences are often required for cetacean species (whales, dolphins and porpoise), all of which are considered marine EPS. These licences are

obtained in Scotland from NatureScot, Scottish Ministers or Marine Scotland, and in England, from the MMO or Natural England, depending on the reason for the licence application. These licences are often sought after consent and prior to construction, where detail of the project design is known, and the actual risk can be more accurately defined.

2.4.2.2 Activities relevant to this project which may require licencing under EPS licenses include those such as underwater sound disturbance due to construction activity. Should such licences be required, these will be discussed and agreed with the relevant authority during the post-consent and preconstruction phase of the MHPGC Project.

3 Project Description

3.1 Introduction

3.1.1.1 This chapter of the Scoping Report provides an outline description of the offshore and onshore components required for construction, operation and maintenance (O&M) and decommissioning phases of the Morven Hawthorn Pit Grid Connection Project (hereafter referred to as 'MHPGC Project'), based on current project design information and understanding of the receiving environment.

3.2 Project Design Envelope Approach

3.2.1.1 The Project Design Envelope (PDE) approach (also known as the Rochdale Envelope approach) will be adopted for the assessment of the MHPGC Project, in accordance with current industry good practice. Further information on the Rochdale Envelope approach is presented in Chapter 5: EIA Methodology of the Scoping Report.

3.2.1.2 The PDE sets out the design assumptions and parameters from which the realistic Maximum Design Scenarios (MDS) will be drawn for the MHPGC Project Environmental Impact Assessment (EIA). The MDS approach allows the EIA process to be conducted on the basis of a realistic 'worst case' scenario (i.e. the maximum project design parameters) which is selected from different design and construction scenarios. This approach provides flexibility, while ensuring all likely significant effects are assessed within the EIA process and reported in the EIA Report/Environmental Statement (ES).

3.2.1.3 The Applicant will, through the EIA process, seek to refine the proposed envelope, make design and construction commitments where necessary and practicable and present final detailed realistic MDS at consent application.

3.2.1.4 At this stage in the EIA process, scoping, the project description is indicative, and the PDE has been set to include sufficient flexibility to accommodate future project refinement. This chapter therefore sets out a series of options and parameters for which maximum (and where relevant, minimum) values are shown. These values constitute the MDS in relation to the MHPGC Project.

3.3 Overview of the Morven Hawthorn Pit Grid Connection Project

3.3.1 Morven Hawthorn Pit Grid Connection Project Scoping Boundary

3.3.1.1 The Morven Offshore Wind Project (here after referred to as 'the Project') was scoped into the Pathway to 2030 workstream of the UK Government Offshore Transmission Network Review. As part of this review, National Grid assessed options to improve the coordination of offshore wind farm (OWF) connections and associated transmission networks. The output of this process concluded that the Project should connect the wind farm to the National Grid substation at Hawthorn Pit (National Grid ESO, 2022). The connection from the wind farm to the National Grid substation at Hawthorn Pit is referred to as the MHPGC Project and is the subject of this Scoping Report.

3.3.1.2 The MHPGC Project assets will be located within the Scoping Boundary shown in Figure 3.1. It is noted that the Scoping Boundary includes the array area for the

Project in order to include the area within which the export cables will connect with the offshore substation platform(s). The offshore substation platform(s) itself is outside scope of this report and will be assessed within the Morven Offshore Wind Array Project EIA to be submitted to Marine Scotland.

3.3.1.3 The area of the Scoping Boundary is approximately 5,243km^2. The offshore part of the boundary is located in the North Sea, in both Scottish and English waters. The onshore element of the boundary is located within the local authority areas of Durham County Council and Sunderland City Council. The area of the Scoping Boundary in Scottish waters forms part of this scoping request to Marine Directorate: Licencing and Operations Team (MD-LOT), and the area of the Scoping Boundary in England and English waters, forms part of the scoping request to the Planning Inspectorate (PINS) for England (under the Development Consent Order (DCO) process).

3.3.1.4 No terrestrial considerations are required for the MHPGC project within the Scottish scoping boundary. The offshore transmission export cable assets of the project fall within offshore Scottish territorial waters and will require a separate Scottish marine licence under the Marine and Coastal Access Act 2009 (Section 2.3.5), up to the Scottish/English territorial boundary line as identified within Figure 3.1 of the project scoping boundary. The physical parameters of the offshore assets to be assessed in Scottish and English waters are the same.

3.3.1.5 For the proposed MHPGC, where the project scoping boundary is identified within English offshore and inshore waters and where onshore infrastructure is wholly in England, the project would be consented under a DCO application (Section 2.3.6). Figure 3.1 identifies the boundary of the project that would be consented under the DCO.

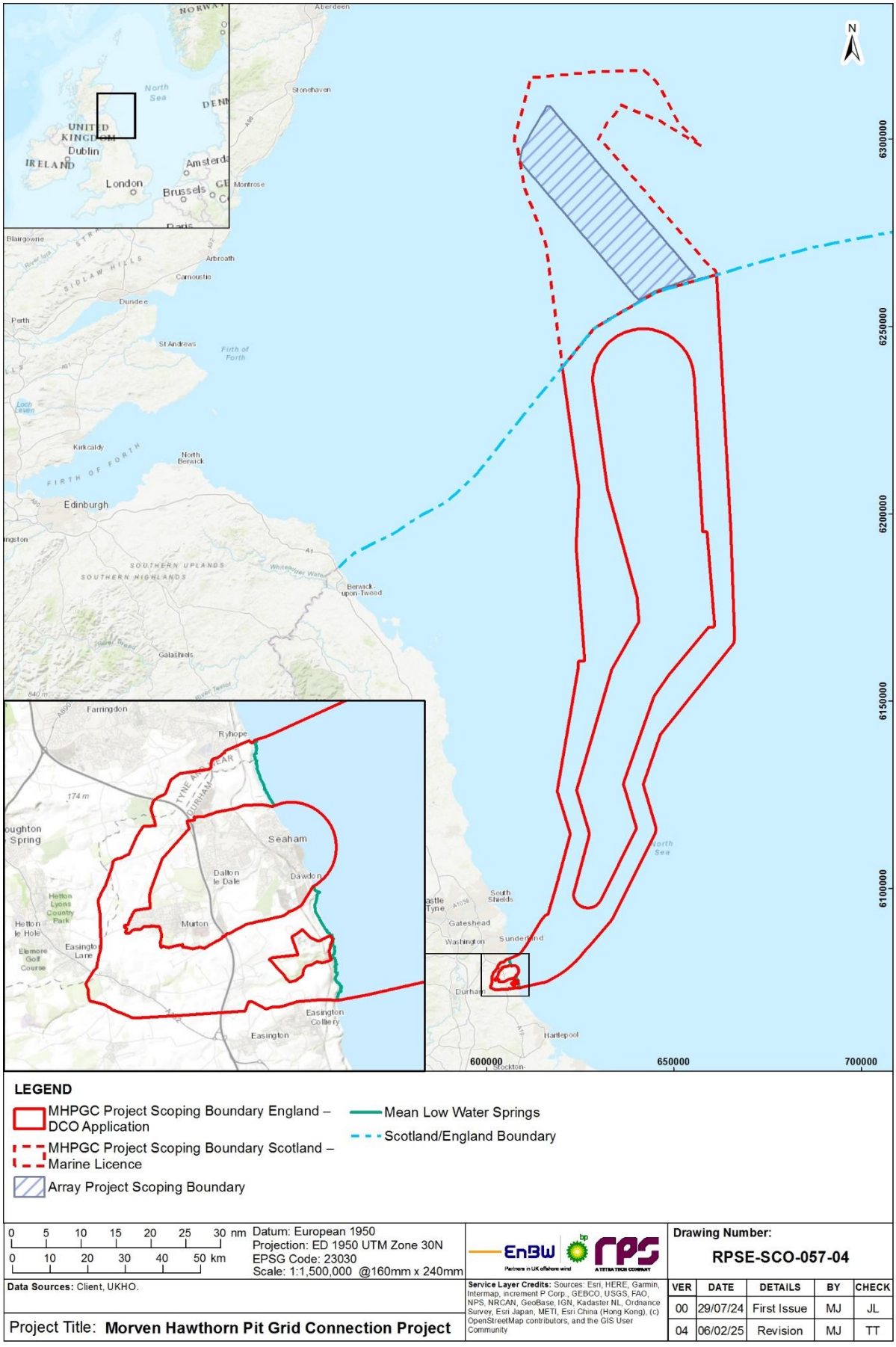


Figure 3.1: Location of the Morven Hawthorn Pit Grid Connection Project Scoping Boundary

3.3.2 Project Infrastructure Overview

3.3.2.1 An overview of the key components of the MHPGC Project are outlined in Table 3.1, and are detailed in the following sections of this chapter.

Table 3.1: Overview of Permanent Infrastructure included within the Morven Hawthorn Pit Grid Connection Project Scope

Infrastructure		Description
Offshore: Scottish and English Waters.	High voltage direct current (HVDC) export cables.	Cables connecting the offshore substation platform(s) within the Morven Array Area, to Landfall.
	Cable protection.	Cable protection measures may be required to protect assets from damage, current and wave action.
Onshore: England.	HVDC export cables.	Onshore cables that connect the offshore HVDC export cables to the Land Sub-station (LSS).
	LSS.	A purpose-built LSS site will be required to house the electrical equipment required to adjust the power quality and power factor required to connect to the National Grid substation at Hawthorn Pit.
	High voltage alternating current (HVAC) export cables.	Cables connecting the LSS to the existing National Grid substation at Hawthorn Pit.
	Grid connection.	The existing National Grid substation at Hawthorn Pit.

3.4 Offshore Infrastructure

3.4.1.1 The key components of the offshore transmission assets are likely to include:

- offshore export cables;
- cable protection;
- cable landfall and associated infrastructure.

3.4.1.2 The requirements for each design aspect are summarised in the following sections.

3.4.2 Offshore Export Cables

3.4.2.1 Offshore export cables are used for the transfer of power from offshore substation platform(s) to landfall at the Transition Joint Bays (TJBs). A TJB is the interface where offshore HVDC export cables connect to onshore HVDC export cables. The offshore

export cable corridor will have a maximum total length of 341km. The maximum number of cables will not exceed 6. These cables will comprise of HVDC power cables, Dedicated Metallic Return (DMR), and fibre optic cables.

3.4.2.2 The design envelope for the offshore export cables is described in Table 7.59. Flexibility is required in the location, depth of burial and protection measures for the offshore export cables to ensure physical and technical constraints, changes in available technology and project economics can be accommodated within the final design. An illustration of a typical cable bundle is provided in Figure 3.2:

Table 3.2: Key Parameters for Offshore Export Cables

Parameter	Maximum Design Envelope
Maximum number of cables.	6
Indicative maximum length of cable corridor (km).	341
Maximum length of cable corridor in Scottish waters (km).	80
Maximum length of cable corridor in English waters (km).	261
Maximum voltage (kV).	525
Maximum external cable diameter (mm per cable).	300
Maximum width of cable corridor (km).	1.5
Burial technique.	Jet trenching, mechanical trenching, dredging, ploughing, controlled flow excavation, rock cutting, backfilling.
Target cable burial depth (m).	0.5 to 2.5
Cable protection material type.	Burial, Concrete Mattresses, Rock Placement, Rock Bags, Grout bags, Cement bags, Sandbags, Articulated pipes, Cast Iron Shells, Bend Restrictors/Stiffeners, Cable Protection Systems, Frond Mats.

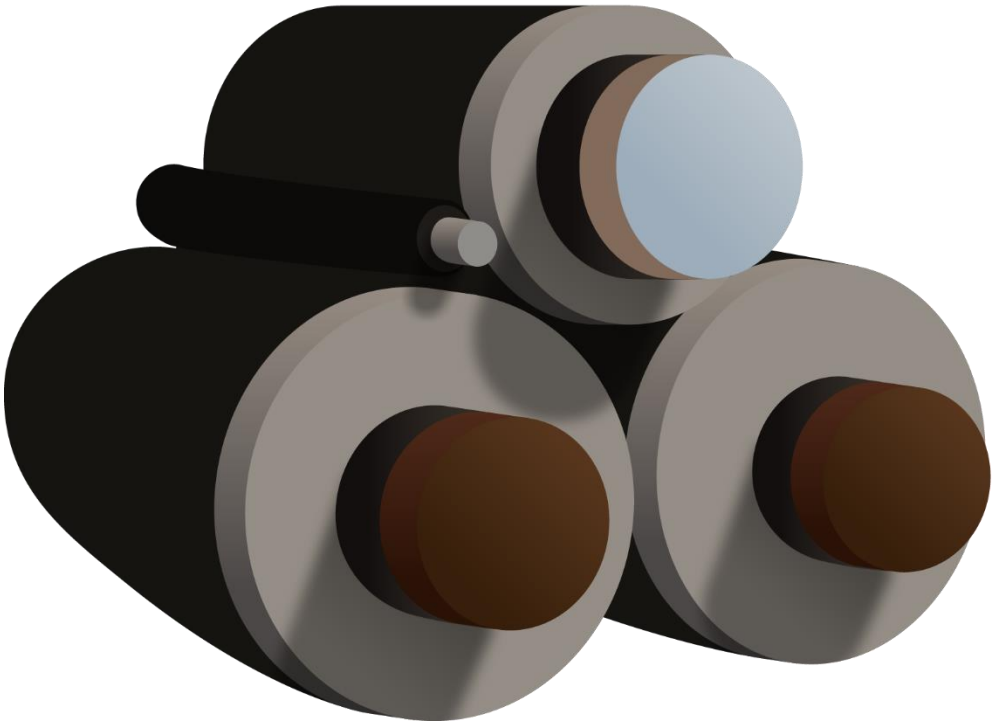


Figure 3.2: An Illustration of a Typical Bundle of Cables.

3.4.2.3 Figure 3.2 shows a typical cable bundle including power cables (brown), DMR (blue) and fibre optic (grey).

3.4.3 Offshore Construction

Export Cable Installation

3.4.3.16 Offshore export cables will be buried or protected with cable protection where burial is not practicable (for example, where crossing existing cables, pipelines or exposed bedrock). This will ensure that the cable remains secure, is not a hazard to other sea users and does not risk becoming damaged or exposed by tidal currents. Where cable protection is required, the protection measure will be dependent on several factors such as seabed conditions. The most appropriate protection measure will be determined when conditions are understood, being informed by geophysical and geotechnical survey information.

3.4.3.17 Offshore export cables may be installed using methods such as ploughing, trenching or jetting. The offshore export cable installation methodology and potential cable protection measures will be described in the EIA Report/ES and finalised at the final design stage (post-consent), informed by environmental and pre-construction site investigation survey results.

Seabed Preparation

3.4.3.18 Seabed preparation may be required prior to cable installation. Seabed preparation may include seabed levelling, removing surface and subsurface debris such as boulders, fishing nets or lost anchors. If debris is present below the seabed surface, then excavation may be required for access and removal. Methods such as plough,

jetting, scar plough, remotely operated vehicle (ROV) grab, boulder grab and grapnel run are potential seabed preparation methods.

3.4.3.19 Where it is not possible to avoid unexploded ordnance (UXO), any UXO found with a potential to contain live ammunition may be treated on site, with any remaining debris of sufficient size to present a snagging risk to commercial fishing activities removed. This will be carried out following consultation with Marine Scotland, the Marine Management Organisation (MMO) and the Ministry of Defence (MoD). The UXO risk mitigation strategy will be based on procedures following industry best practice (currently mainly according to CIRIA C754 guidelines). For future site investigation activities, mitigation measurements according to a respective UXO desktop analysis will be conducted for avoidance of encountering potential UXO by such activities. For the installation and construction phase of the MHPGC Project, a dedicated UXO survey with subsequent identification and clearance campaign will be conducted prior to the construction works, considering potential seabed changes. As techniques for survey, identification and clearance operations are continuously evolving, respective assessments to select the optimum appropriate strategy and technology (e.g. low order deflagration or high order disposal) based on best industry practice and applicable stipulations and guidelines will be carried out at the given time, at the earliest one year ahead of the start of offshore construction works. The maximum design envelope for UXO removal will be included in the EIA Report/ES based on a number of informed assumptions and is considered in the Scoping Report.

3.5 Onshore Infrastructure

3.5.1.1 The key onshore components of the MHPGC Project are likely to include:

- HVDC export cables (to mean high water springs (MHWS));
- cable landfall and TJBs;
- onshore export cables (HVDC cables);
- associated joint bays;
- LSS;
- grid connection export cables (HVAC cables);
- associated link boxes;
- connection works at National Grid Hawthorn Pit substation.

3.5.1.2 The requirements for each design aspect are summarised in the following sections.

3.5.2 Cable Landfall and Transition Joint Bays

3.5.2.1 The landfall will be located along the northeast coast of England. The exact location is subject to a process of refinement and will be described in the Preliminary Environmental Information Report (PEIR). The offshore export cables will likely be installed through the intertidal zone using trenchless methods (e.g. Horizontal Directional Drilling (HDD) or Direct Pipe, where cables are pulled through pre-installed underground ducts).

3.5.2.2 The offshore export cables will be jointed to the onshore export cables at TJBs. The TJBs are underground concrete structures and will be located on the landward side of the landfall.

3.5.2.3 The works at landfall will consist of onshore based compound area(s) used for the drilling activities, drilling in the direction from land to sea. These works may require access to the beach for construction vehicles. There may be a requirement to have an offshore marine spread during the drilling process which is dependent on the length of the trenchless drill profile.

3.5.2.4 The design envelope for the landfall is described in Table 3.3.

Table 3.3: Key Parameters for Landfall and Transition Joint Bays

Parameter	Maximum Design Envelope
Maximum number of exit pits.	Up to an estimated eight exit pits.
Maximum number of TJBs.	Two.
Approximate TJB permanent footprint (per pit) (m^2).	900
Approximate transition pit construction footprint (per pit) (m^2).	10,000
Landfall works compound(s) (m^2).	10,000
Proposed landfall installation method.	Trenchless.

3.5.3 Onshore Export Cables (HVDC) and Grid Connection Cables (HVAC)

3.5.3.1 Cables running from the TJBs to the LSS will be HVDC cables. For this section, overall number of cables will not exceed six. These cables may comprise of HVDC power cables, DMR, and fibre optic cables.

3.5.3.2 The cables will be buried in up to two separate trenches. The cables may be installed directly into open trenches or pulled through pre-installed ducting. This section of the onshore cable corridor will have a maximum width of 50m (including both the permanent installation area and temporary working area) and will be located within the MHPGC Project Scoping Boundary. The width of the permanent and/or temporary areas may change where obstacles are encountered. Where necessary the onshore cable corridor may split to avoid obstacles and separate cable trench corridors may not run parallel to one another but still ensure the temporary and permanent overall corridor width would not exceed 100m. Along the HVDC cable route there will be joint bays approximately every 700m with up to 48 joint bays required assuming maximum cable route length. An indicative cross-section of a HVDC cable route is provided in Figure 3.3.

3.5.3.3 Cables running from the LSS to the grid connection point will be HVAC cables. For this section of onshore cables there will be up to four circuits (each circuit consisting of three power cables, earthing and various communication control cables). The cables will be buried in up to four separate trenches each containing multiple cables.

The cables may be installed directly into open trenches or pulled through pre-installed ducting. This section of onshore cable corridor will have a maximum width of 100m (including both the permanent installation area and temporary working area) and will be located within the MHPGC Project Scoping Boundary. The width of the permanent and/or temporary areas may change where obstacles are encountered. An indicative cross-section of a HVAC cable route is provided in Figure 3.4:

3.5.3.4 The onshore cable corridor, both the HVAC and HVDC section, will also include temporary access roads to allow the movement of construction vehicles and the installation of the onshore export cables, in addition to other related works such as construction compounds and laydown areas.

3.5.3.5 The design envelope for the onshore export cables is provided in Table 3.4.

Table 3.4: Key Parameters for Onshore Export Cables

Parameter	Maximum Design Envelope
HVDC Section from JTBs to LSS	
Maximum number of cables.	6
Maximum cable voltage (kV).	525
Maximum number of cable trenches.	2
Indicative max length of cable corridor (km).	16.8
Indicative width of cable corridor (m).	50
Target trench depth (m).	1.6
Maximum number of joint bays.	48
Width of haul road (m) excluding passing bays.	Approximately 6m per trench.
HVAC Section from LSS to Grid Connection	
Maximum number of cables.	24
Maximum cable voltage (kV).	400
Maximum number of cable trenches.	4
Indicative maximum length of cable corridor (km).	5.3
Maximum width of cable corridor (m).	100
Target trench depth (m).	1.6
Maximum number of link boxes.	32
Width of haul roads (m) excluding passing bays.	Approximately 6m (max one haul road per trench).

3.5.3.6 The majority of the HVDC and HVAC cables will be installed using open trenching methods, however where an open trench approach is not practicable due to obstructions (e.g., major roads, railways and watercourses), trenchless techniques may be employed, such as HDD.

3.5.3.7 During construction of the cable trenches the topsoil and subsoil will be removed and stored on site within the temporary working corridor of the onshore cable corridor. Potential construction impacts will be managed through a Code of Construction Practice.

3.5.3.8 Along the HVAC cable section there will be up to 32 link boxes required to ensure the safe/balanced operation of the system. These will be an underground concrete chamber approximately 15m by 15m in size with access via manhole cover at ground level.

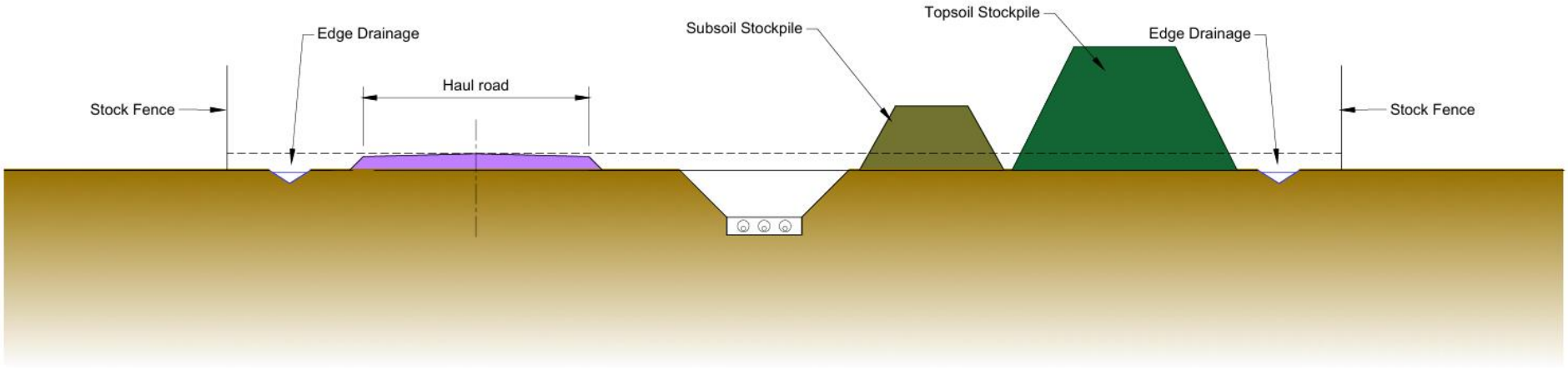


Figure 3.3: Indicative Cross-Section of a HVDC Cable Route (not to scale)

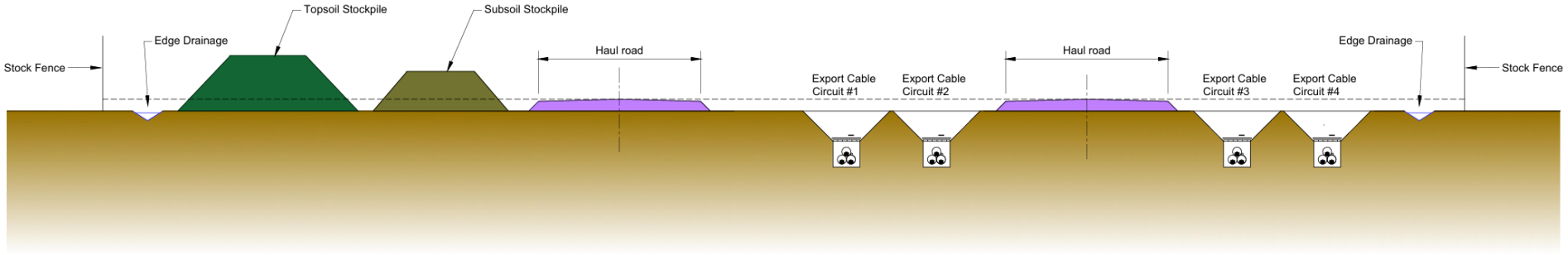


Figure 3.4: Indicative Cross-Section of a HVAC Cable Route (not to scale)

3.6 Land Sub-Station

3.6.1.1 A purpose-built LSS site will be built housing the electrical equipment required to adjust the power quality and power factor to meet the UK Grid Code as required to supply the National Transmission System. The design envelope accommodates LSS options in either dual 320kV monopole or single 525kV bi-pole HVDC configurations to convert between HVAC and HVDC transmission. Further design work will be required before a detailed design is chosen.

3.6.1.2 The LSS site footprint will also include switchgear and further electrical equipment to condition the power quality of the offshore windfarm transmission system. Condition equipment is foreseen to meet UK grid code requirements and interface with the National Transmission System.

3.6.1.3 The LSS site will also include landscaping and drainage mitigation. Temporary construction compound(s) and working area(s) will be provided to facilitate the construction of the LSS.

3.6.1.4 The design envelope for the LSS site is provided in Table 3.5. It should be noted that two parallel monopole or single bi-pole configuration substations are different in form and size, and a decision on which is chosen is yet to be made, however the maximum parameters of these options are presented here.

Table 3.5: Key Parameters for Land Sub-Station Site

Parameter	Maximum Design Envelope
Maximum permanent footprint of LSS site (m^2).	70,000
Maximum area of temporary footprint of LSS site (m^2).	55,000
Height of main structure(s)/building(s) (m) (includes lightning protection).	30
Maximum width of main building (m).	100
Maximum length of main building (m).	200

3.6.1.5 The exact location of the LSS site will be identified through the EIA site selection process and will take into account environmental and physical constraints as well as technical and commercial considerations. An overview of the site selection process is provided in Chapter 4: Site Selection and Consideration of Alternatives.

3.6.1.6 Temporary compounds and laydown areas will be required to facilitate the construction of the LSS structure or structures (depending on final design), Onshore Export Cables and Grid Connection Cables. To install the platform for the LSS, some 'cut and fill' may be required (i.e., excavated material may be used to create a level site for LSS construction after foundation installation). The extent of cut and fill required will be determined as the design progresses. The LSS building substructures are likely to be composed of steel and cladding materials.

3.7 Construction Programme

3.7.1.1 The indicative high-level construction programme shown in Figure 3.5 provides an overview of installation durations of the main elements of the MHPGC Project.

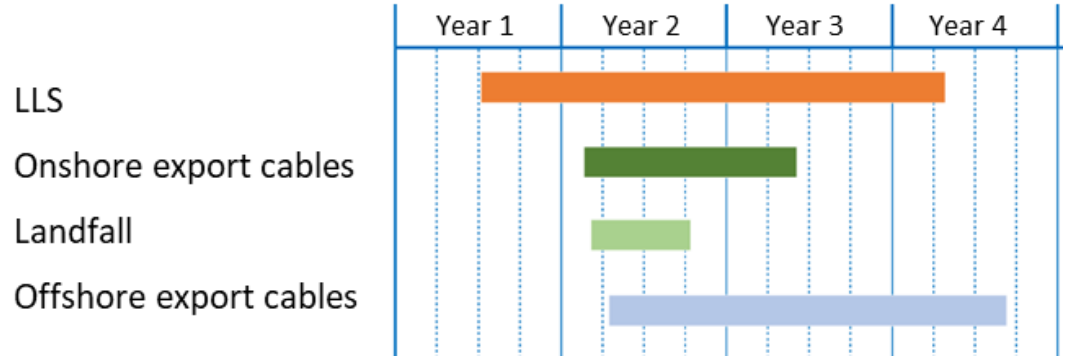


Figure 3.5: Indicative Construction Programme

3.7.2 Offshore Construction

3.7.2.1 The offshore components of the MHPGC Project are likely to be installed over a period of up to 2.5 years. The general construction sequence is likely to include the following:

- pre-construction site investigation surveys;
- seabed preparation activities;
- offshore export cables installation;
- post installation surveys and additional cable protection.

3.7.3 Onshore Construction

3.7.3.1 The onshore elements of the MHPGC Project may be installed over a period of up to 36 months. The onshore construction will include installation/construction of the:

- landfall;
- TJBs;
- onshore export cables (HVDC cables) including joint bays;
- LSS;
- grid connection cables (HVAC cables) including link boxes;
- any necessary works at the National Grid Hawthorn Pit connection point.

3.8 Operation and Maintenance

3.8.1.1 The operational lifetime of the MHPGC Project is expected to be up to 35 years, in line with the Morven Offshore Wind Array Project. O&M activities will be required throughout the operational life of the MHPGC Project.

3.8.1.2 Routine maintenance activities offshore may include inspections, minor repairs, cleaning activities, and replacement of consumables and corrosion protection systems. Non-routine major maintenance activities may include cable reburial and cable repair activities. Routine O&M activities may be carried out from Crew Transfer Vessels or Service Operation Vessels, with major maintenance activities (such as component exchanges) potentially requiring jack-up vessels, or specialist vessels such as cable repair and cable laying vessels. Full details of the proposed O&M activities will be set out in the PEIR and the ES.

3.8.1.3 The offshore export cables will be continuously monitored remotely. However, the O&M requirements for the onshore export cables may require infrequent on-site inspections and corrective maintenance activities, if and where they may be required. Access will be required to landfall, TJBs, link boxes and onshore cable routes for O&M.

3.8.1.4 The LSS will be monitored and operated remotely. O&M staff will visit the LSS to undertake preventative and corrective works.

3.9 Decommissioning

3.9.1.1 At the end of the operational lifetime, the MHPGC project assets will be decommissioned in line with the regulations, requirements, guidance and best practice relevant at that time.

3.9.1.2 During decommissioning, it is anticipated offshore cables and any offshore cable protection may be left in-situ, to minimise environmental impacts associated with their removal. The possibility of removing the subsea cables and leaving structures above the seabed in-situ with appropriate navigation markers will also be assessed. The decommissioning sequence will generally be the reverse of the construction sequence and involve similar types and numbers of vessels and equipment.

3.9.1.3 Onshore it is anticipated that all above ground structures will be removed. It is expected that the onshore export cables will be left in situ to minimise the environmental disturbance during decommissioning. The cable ends will be cut, sealed and securely buried as a precautionary measure.

3.9.1.4 The structures of link boxes will be removed only if it is feasible with minimal environmental disturbance.

3.9.1.5 The components of the LSS have varying life expectancies. Transformers typically have a lifetime of up to 50 years, and some components lives can be extended beyond this period. Decommissioning of the LSS will be reviewed in discussion with the transmission system operator and appropriate regulators in the light of any other existing or proposed future use of the substation. If complete decommissioning is required, then all of the electrical infrastructure will be removed, and any waste arising disposed of in accordance with relevant regulations.

3.10 Measures Adopted as Part of the Morven Hawthorn Pit Grid Connection Project

3.10.1.1 Measures adopted as part of the MHPGC Project may include those developed as part of the project design, industry standard measures committed to by the Applicant, or measures which are required by law. These include modifications to

location or design, industry standard measures committed to by the Applicant including lighting and marking, and commitment to implementing post-consent management plans, to avoid, prevent, reduce or, if possible, offset significant adverse environmental effects. Measures adopted as part of the MHPGC Project are referred to in the relevant topic-specific sections within the Scoping Report and Appendix A.

4 EIA Methodology

4.1 Introduction

4.1.1.1 Environmental Impact Assessment (EIA) is a process for identifying the likely significant environmental effects (positive and negative) of a proposed development during its construction, operation and maintenance (O&M) and decommissioning phases. The process also identifies measures to avoid, prevent, reduce or, if possible, offset significant adverse effects. The EIA process culminates in the provision of an EIA Report/Environmental Statement (ES) that provides an assessment of the likely significant effects to inform decision-making.

4.1.1.2 The EIA process aims to be systematic, analytical, impartial, consultative and iterative, allowing opportunities for environmental concerns to be addressed in the design and evolution of a proposed development. Typically, throughout the evolution of the design, a number of design iterations take place in response to environmental constraints identified during the EIA process, stakeholder engagement and consultation prior to the final design being submitted for approval. This iterative design process is a fundamental element of EIA and will be described further at later stages in the EIA Report/ES as the design continues to develop.

4.1.1.3 The general EIA approach can be understood as three stages. These are scoping, consultation and the EIA report/ES. Each of these will be discussed in the following sections.

4.1.1.4 The works will be assessed in compliance with the Marine Works (Environmental Impact Assessment) Regulations 2007 for offshore marine waters in Scotland and the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 for the offshore and onshore infrastructure in England. There is no substantive difference between these regulations and are hereafter collectively referred to as the 'EIA Regulations' unless otherwise stated.

4.1.1.5 This chapter describes the methodology applied for the EIA of the Morven Hawthorn Pit Grid Connection Project (hereafter referred to 'MHPGC Project').

4.2 Scoping

4.2.1.1 Scoping is an important part of the EIA process as it informs a proportional and robust approach to assessment through initial evaluation of the likely significant effects of the proposed development. It establishes the scope of assessment for the EIA through a review of existing data, information and from expert opinion. The key inputs to the process are listed below:

- requirements of EIA regulations (see section 4.3), and other good practice guidelines;
- identification of key project components;
- identification of site-specific environmental constraints;
- an assessment of each key topic by specialists;
- consultation with stakeholders.

4.2.1.2 The outputs from this process are a scoping report which provides a high-level assessment of the relevant potential impacts which have been found to date and to identify the likely significant effects that will be scoped into the EIA, and conversely, scope out those where no likely significant effect is anticipated. These impacts are determined using the available data and professional expertise in line with the EIA Regulations which require that the assessment focuses on aspects of the environment likely to be subject to significant effects. The approach used during scoping is shown below:

- review of the existing data and information;
- review of potential impacts expected to arise during the project;
- determine any topics and impacts to be scoped out of the proposed EIA, with suitable justification provided, which are deemed not likely to be significant;
- determine the effects which could be significant and need further assessment and whether there is sufficient data to undertake a robust assessment on these for EIA;
- identify additional data which is required to carry out the EIA and Habitats Regulations Assessment (HRA), and the methods which should be used to do so (i.e. identification of additional survey work).

4.2.1.3 Effective scoping enables agreement to be reached on the effects and methodologies to be taken forward and assessed and reported in much greater detail in the EIA Report/ES. It also provides an opportunity for early interaction with stakeholders, strengthening the assessment evidence base and allowing active participation of interested parties in project development and decision making. This can in turn improve project design, environmental soundness and social acceptability.

4.3 Legislation and Guidance

4.3.1.1 This section builds upon the legislation given in Chapter 2: Policy and Legislation, of the Scoping Report and will be used to inform the MHPGC Project throughout the EIA process. A summary of EIA legislation and guidance relevant to the MHPGC Project is listed below (topic specific chapters summarise relevant guidance):

- Environmental Impact Assessment Guide to: Delivering Quality Development (IEMA, 2016);
- Delivering Proportionate EIA. A Collaborative Strategy for Enhancing UK Environmental Impact Assessment Practice (IEMA, 2017);
- The Horlock Rules: National Grid Company plc, NGC Substations and the environment: Guidelines on siting and design.

4.3.1.2 A summary of Scottish guidance and best practice guidelines relevant to the MHPGC Project are listed below:

- Scottish Government Planning Advice Note 1/2013: Environmental Impact Assessment (Scottish Government, 2013);

- Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal (CIEEM, 2018);
- Institute of Environmental Management and Assessment (IEMA) Environmental Impact Assessment Guide to Shaping Quality Development (IEMA, 2016);
- A Handbook on Environmental Impact Assessment, Version 5 (SNH, 2018);
- Assessing the Cumulative Impact of Onshore Wind Energy Developments (NatureScot, 2021).

4.3.1.3 A summary of English guidance and best practice guidelines relevant to the MHPGC Project are listed below:

- Advice Note Seven: Environmental Impact Assessment: Preliminary Environmental Information, Screening and Scoping (Version 7) (The Planning Inspectorate, 2020b);
- Advice Note Seventeen: Cumulative effects assessment relevant to nationally significant infrastructure projects (The Planning Inspectorate, 2015).
- The Statement of Environmental Impact Assessment Practice in the UK (IEMA, 2011);
- EIA Guidance for Offshore Renewable Energy Projects – Guidebook (BSI, 2015);
- Environmental Impact Assessment Guide to Shaping Quality Development (IEMA, 2015);
- Delivering Proportionate EIA (IEMA, 2017);
- Assessing Greenhouse Gas Emissions and Evaluating their Significance (IEMA, 2017);
- Review of Cabling Techniques and Environmental Effects applicable to the Offshore Windfarm Industry (BERR, 2008);
- Guidelines for Data Acquisition to support Marine Environmental Assessments of Offshore Renewable Energy Projects (Cefas, 2011);
- General advice on assessing potential impacts of and mitigation for human activities on Marine Conservation Zone (MCZ) features, using existing regulation and legislation (JNCC and Natural England, 2011);
- Natural England and JNCC advice on key sensitivities of habitats and Marine Protected Areas in English Waters to offshore wind farm cabling within Proposed Round 4 leasing areas (JNCC and Natural England, 2019).

4.3.1.4 These lists of guidance documents are not exhaustive and provide a general overview of the important guidance that will help to inform the EIA process for the MHPGC Project. The lists will be continually reviewed and updated throughout the EIA process up to submission of the planning application. Each individual environmental topic will also refer to relevant topic-specific guidance in the environmental topic chapters (Chapters 7 to 10) of the Scoping Report, where appropriate. A full list of the relevant legislation and guidance considered as part of the EIA process will be provided within the EIA Report/ES.

4.4 Key Principles of the Assessment

4.4.1 Overview

4.4.1.1 The EIA will assess the likely significant effects which may arise throughout the MHPGC Project. This assessment will be broken down into environmental topics (as listed in Chapter 1: Introduction, of the Scoping Report) which will address the potential impacts relevant to each topic separately. Each of these topics will address the following:

- the relevant planning policy and guidance;
- the study area(s) for topic specific assessments;
- data sources;
- the current environmental baseline conditions relevant to the study area;
- an assessment of effects (see below);
- the proposed assessment methodology for those effects scoped in.

4.4.1.2 The assessment of effects will consider the Maximum Design Scenario (MDS) for each topic and hence, identify the potential likely significant effects for each topic resulting from the MDS. The significance of these effects and potential for mitigation to reduce or offset the effects will be discussed. Each chapter will then consider the requirements for additional and future monitoring. The likelihood of cumulative (with other major developments) and transboundary (i.e. effects on the European Economic Area (EEA) states) effects will also be assessed for each topic.

4.4.1.3 The following sections outline the key principles which will be applied to each topic chapter.

4.4.2 Assessing Impacts in Scottish and English Waters

4.4.2.1 It is recognised that the MHPGC Project may result in impacts in both Scottish and English waters. As Scotland and England have distinct regulators, where appropriate, each topic chapter will make clear the assessment of likely significant effects in each jurisdiction.

4.4.2.2 There are instances where it is not appropriate to assess and present the likely significant effects by splitting into Scottish and English waters. For example, highly mobile species such as marine mammals often move across borders and are considered part of the same population within a biogeographical region. Therefore, any potential effects are assessed at this scale, and changes to the receptor population are not expected to differ significantly across borders.

4.4.3 Proportionate Environmental Impact Assessment

4.4.3.1 The scoping process can ensure a proportional and robust approach to assessment through initial evaluation and reporting of identified likely significant effects in a Scoping Report. Therefore, in accordance with guidance and legislation, this Scoping Report seeks to ensure that the EIA process and resultant EIA Report/ES is focused to help inform the decision-making process. Where appropriate, the scoping process seeks to scope out environmental effects and specific matters under a topic from

further assessment with suitable justification and evidence provided. This focuses the assessment on the likely significant effects and ensures a proportionate approach in accordance with IEMA's Delivering Proportionate EIA guidance document (IEMA, 2017).

4.4.3.2 The level of environmental assessment will differ between professional opinions, but there are guidelines and other tools to ensure that the likely significant effects are identified and addressed appropriately. These include:

- information sharing with the sector;
- a transparent consultation process;
- avoiding the use of over-precautionary data.

4.4.3.3 Where more certainty in relation to information exists, this Scoping Report aims to focus the scope of the assessment on material issues. This involves the:

- use of the existing evidence base relating to baseline environment conditions (i.e. if a particular environmental receptor is known to be absent from baseline conditions) then it can be scoped out of the assessment;
- the inclusion of mitigation measures (informed by standard tried and tested practices) such as standard construction management measures to avoid and minimise effects from construction works.

4.4.4 Habitats Regulations Assessment

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

4.4.4.2 The Conservation of Habitats and Species Regulations 2017 (the Habitats Regulations) and the Conservation of Offshore Marine Habitats and Species Regulations 2017 require the assessment of any significant effects on qualifying features of internationally important nature conservation sites that are likely to arise as a result of a proposed project. These internationally important sites include SACs, or candidate SACs (cSACs), SPAs or potential SPAs (pSPAs), sites of community importance (SCI) and Ramsar sites. The assessment is to be undertaken by the

'competent authority', which in the case of the MHPGC Project is the Scottish Ministers for Scotland, and the Secretary of State (SoS) for England.

4.4.4.3 In order to carry out the HRA the competent authority, an applicant will provide information to the competent authority in the form of a Report to Inform the Appropriate Assessment (RIAA). This does not form part of the EIA Report/ES, although the baseline presented contains some of the same information.

4.4.4.4 In parallel to the EIA process, the HRA, including the HRA Screening Report and subsequent RIAA, will be consulted upon during the pre-application consultation process.

4.4.5 Maximum Design Scenario Approach

4.4.5.1 At this stage of the project design, whilst the components of the infrastructure required to meet the project need have been confirmed, the location of some project elements is indicative, and several options are included as part of the design. Furthermore, the location and extent of construction elements, for example construction compounds, is not yet confirmed. Work is ongoing to identify the preferred offshore cable corridor, landfall location, onshore cable corridor and Land Substation site and further information on how options for the location of these project elements are being refined can be found in Chapter 6: Site Selection and Consideration of Reasonable Alternatives, of the Scoping Report. Therefore a 'MDS Approach' has been adopted for EIA Scoping. This approach, also known as the 'Rochdale Envelope' Approach and referred to as the Project Design Envelope (PDE) in this Scoping Report, is employed 'where the nature of the Proposed Development means that some details of the whole project have not been confirmed' and 'flexibility is sought to address uncertainty' (Planning Inspectorate, 2018).

4.4.5.2 The MHPGC Project Scoping Boundary has been defined to represent the MDS (see Figure 3.1 in Chapter 3: Project Description, of the Scoping Report). It incorporates all integral and associated development that the Applicant will be seeking consent for as part of the Marine Licence (for Scotland) and the Development Consent Order (DCO; for England) for the MHPGC Project. This is to allow design flexibility for the following reasons:

- to take account of ongoing engineering and detailed design development;
- to allow for design changes in light of on-going environmental surveys and assessment;
- to take account of feedback received through engagement, including through consultation events with the public, key stakeholder meetings and discussions with landowners.

4.4.5.3 The spatial scope for each environmental topic, the area over which changes to the environment are predicted to occur as a consequence of the MHPGC Project, will depend on the nature of the potential effects and the location of receptors that could be affected. It takes account of:

- the physical area of the MHPGC Project based on the MDS Approach;
- the nature of the baseline environment;
- the manner and extent to which environmental effects may occur.

4.4.5.4 Each of the environmental topic Chapters (7 to 10), of the Scoping Report describes the study area to be considered, providing a clear explanation as to why the study area has been adopted. The spatial scope of each assessment may be refined for the EIA Report/ES in response to comments from consultees or further assessment work.

4.4.5.5 The term 'offshore' refers to environmental features located on the seaward side of MHWS and 'onshore' refers to environmental features on the landward side of MLWS. It is acknowledged that this approach creates an area of overlap (i.e. the 'intertidal' area) between MLWS and MHWS. The approach to the assessment of the intertidal zone is indicated within each topic chapter in the study area description (within Chapters 7 to 10, of the Scoping Report).

4.4.6 Measures Envisaged to Avoid, Prevent, Reduce or, if Possible, Offset Significant Adverse Effects

4.4.6.1 In accordance with the EIA Regulations, the EIA Report/ES will include a description of the 'measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects of the project on the environment'. For each environmental topic, the EIA process will systematically identify impacts and effects and take into consideration environmental measures that the MHPGC Project will adopt. These environmental measures include avoidance, best practice and design commitments, which are classified into primary or tertiary measures in accordance with the IEMA 'EIA Guide to Shaping Quality Development' (Table 4.1; IEMA, 2016) definitions as follows.

Table 4.1: Designed In Measures and Mitigation (IEMA, 2016)

Type		Definition
Primary.	Designed in.	Measures included as part of the MHPGC Project design. Includes modifications to location or design, integrated into the application for consent. These measures are implemented through the DCO itself.
Secondary.	Post-design.	Foreseeable mitigation which requires further activity, identified through the EIA process. Industry standard measures committed to by the Applicant might include a requirement to implement post-consent management plans to reduce the significance or likelihood of adverse environmental effects. These measures are also implemented through the DCO itself.
Tertiary.	Designed in.	Inexorable mitigation which will be implemented regardless of the design process and the EIA (i.e. actions that would occur with or without input from the EIA feeding into the design process), e.g. contractor standard industry practices which manage potential nuisance activities or compliance with statutory requirements.

4.4.6.2 Opportunities for such measures will be identified throughout the evolution of the design of the MHPGC Project and the EIA process, whereby potential significant adverse environmental effects will be fed back into the design process to verify whether they can be avoided or otherwise mitigated. Alongside this, good practice measures will be identified with reference to legislative requirements and measures of standard practice to manage commonly occurring effects. These design measures and good practice measures will be included within the MHPGC Project plans, including construction management plans, and drawings and thus are integrated into the overall Project. The EIA Report/ES will also confirm how mitigation measures will be implemented, for example, by way of a planning condition.

4.4.6.3 The EIA Report/ES will report on the potential likely significant effects of the MHPGC Project following the implementation of all mitigation to determine the 'residual effects'. A clear statement will be made as to whether the residual effects are significant or not significant in EIA terms. Residual effects may be beneficial as well as adverse.

4.5 Identification of Impacts and Assessment of Significance

4.5.1.1 For consistency, and to allow comparison between environmental topics, the methodology described in this section will be applied when preparing the EIA Report/ES. This methodology is designed to consider whether impacts of the MHPGC Project would have an effect on any environmental receptors. Assessments broadly consider the magnitude of impacts and the sensitivity of resources or receptors that could be affected to classify the significance of effects.

4.5.1.2 The conclusion that is made on whether an effect should be considered significant is based upon professional judgement, with reference to the description of the MHPGC Project in Chapter 3: Project Description, of the Scoping Report, and available information about:

- the magnitude and other characteristics of the potential changes (impacts) that are expected to be caused by the MHPGC Project;
- the sensitivity of receptors to these changes;
- the effects of these changes on relevant receptors;
- the value of receptors (where relevant).

4.5.1.3 For each environmental topic, the categories of resource or receptor sensitivity and magnitude of impact will be described or defined. The following sections therefore provide the generic criteria for the definition of resource or receptor sensitivity, magnitude of change and classification of effect.

4.5.1.4 The environmental topic chapters (Chapters 7 to 10, of the Scoping Report) provide greater detail on the approach to the assessment and specific guidelines for the definition of impact magnitude and resource or receptor sensitivity. The approach to the assessment undertaken by each environmental topic will broadly follow the approach set out in the following sections. Variations from this approach may be applicable to specific environmental topics whereby professional judgment in the application of standards mandated by professional bodies (for example the Institute of Ecology and Environmental Management (IEEM) or the Landscape Institute) is

applied. Where this is the case, further detail and justification will be provided in those relevant chapters.

4.5.1 Definitions of Impact and Effect

4.5.1.1 The MHPGC Project has the potential to create a range of impacts and effects on the physical, biological and human environment. For the purposes of the EIA, 'impact' is used to define a change that is caused by an action. Impacts can be defined as direct, indirect, secondary, cumulative and inter-related, and can also be either adverse or beneficial. In addition, for certain impacts, the reversibility of an impact is relevant to its overall effect. An irreversible (permanent) impact may occur when recovery is not possible, or not possible within a reasonable timescale. In contrast, a reversible (temporary) impact is one where natural recovery is possible over a short time, or where mitigation measures can be effective at reversing the impact.

4.5.1.2 The term 'effect' will be used in the EIA to express the consequence of an impact. For example, the installation of cables (action) results in increased levels of underwater noise (impact), with the potential to disturb marine mammals (effect).

4.5.1.3 Each topic chapter will consider the magnitude of the impact alongside the sensitivity of potential receptors in determining the significance of the effect, in accordance with defined significance criteria (see section 4.5.2).

4.5.2 Resource and Receptor Sensitivity

4.5.2.1 The sensitivity or value of a receptor is largely a product of the importance of an asset, as informed by legislation and policy, and as qualified by professional judgement. For example, higher value receptors for landscape, biodiversity or the historic environment may be defined as being of international or national importance; lower value resources may be designated as being sensitive or important at a county or district level.

4.5.2.2 The use of a receptor also plays a part in its classification. For example, when considering visual amenity, a receptor which is residential in nature may be valued more than a place of work as the environmental quality of the residential receptor is more likely to be an important part of that receptor's use.

4.5.2.3 Table 4.2 sets out the generic guidelines for the assessment of sensitivity of a resource or receptor.

Table 4.2: Generic Guidelines for the Assessment of Sensitivity

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

4.5.3 Magnitude of Change

4.5.3.1 The magnitude of change affecting a receptor that would result from the MHPGC Project will be identified on a scale from minor alterations or change, up to major changes or the total or substantial loss of the receptor. For certain environmental topics, the magnitude of change would be related to guidance on levels of acceptability (for example, for air quality or noise), and is therefore based on numerical parameters. For others it will be a matter of professional judgement to determine the magnitude of change, using descriptive terminology.

4.5.3.2 Table 4.3 sets out the generic guidelines of the assessment of the magnitude of change.

Table 4.3: Generic Guidelines for the Assessment of Magnitude

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

4.5.4 Determination of Significance

4.5.4.1 The significance of effects is derived with reference to information about the nature of the MHPGC Project, the sensitivity or value of receptors that could be affected, together with the magnitudes of change that are likely to occur.

4.5.4.2 For many environmental topics, significance can be determined by using a matrix. Variations to this matrix approach, which may be applicable to specific environmental topics are detailed within the respective chapters (Chapters 7 to 10, of the Scoping Report), along with descriptions of receptor sensitivity, magnitude of change and levels of effect that are considered significant. Definitions of how the categories that are used in the matrix are derived for each environmental topic are also set out.

4.5.4.3 In addition, professional judgement is applied in the assessment, as the boundaries between the sensitivities or magnitudes of change may not be clearly defined and the resulting assessment conclusions may need clarifying.

4.5.4.4 The overarching significance matrix that will be used for the EIA is shown in Table 4.4. The generic definitions that will be used to determine the level of significance are shown in Table 4.5. Reference is made to:

- 'major' effects, which will always be determined as being significant;
- 'moderate' effects can be significant, or not significant, based on specific scenarios and professional judgement;
- 'minor' or 'negligible' effects, which will always be deemed as 'not significant'.

4.5.4.5 Effects can be either beneficial or adverse.

Table 4.4: Significance Evaluation Matrix

Sensitivity of Receptor		Magnitude of change			
		High	Medium	Low	Very Low
Sensitivity or value	High	Major (significant).	Major (significant).	Moderate (potentially significant).	Minor (not significant).
	Medium	Major (significant).	Moderate (potentially significant).	Minor (not significant).	Minor (not significant).
	Low	Moderate (potentially significant).	Minor (not significant).	Minor (not significant).	Negligible (not significant).
	Very Low	Minor (not significant).	Minor (not significant).	Negligible (not significant).	Negligible (not significant).

Table 4.5: Generic Classification of Effect Definitions

Level of significance	Description
Major.	Very large or large change in environmental or socio-economic conditions. Effects, both negative and positive, which are likely to be important considerations at a national to regional level because they contribute to achieving national or regional objectives, or which are likely to result in exceedance of statutory objectives or breaches of legislation.
Moderate.	Intermediate change in environmental or socio-economic conditions. Effects that are likely to be important considerations at a regional or local level.
Minor.	Small change in environmental or socio-economic conditions.
Negligible.	No discernible change in environmental or socio-economic conditions. An effect that is likely to have a neutral or negligible influence.

4.6 Addressing Uncertainty

4.6.1.1 There is a degree of uncertainty which must be managed through the EIA process. Examples can include a lack of access to private land to undertake surveys such as ecological surveys or uncertainty as to how baseline conditions will evolve in the future. There is also a degree of uncertainty in terms of the margin of error which may occur within forecasting or modelling tools. Information is provided in Chapters 7 to 10, of the Scoping Report, regarding how sufficient environmental baseline information will be obtained and the precautionary approach to assessment that will

be undertaken when survey access is not possible. These chapters also set out how any uncertainties in modelling and forecasting are addressed.

4.6.2 Consideration of Future Baseline Conditions

4.6.2.1 The temporal scope covers the time period over which changes to the environment and the resultant effects are predicted to occur and are typically defined as either being temporary or permanent:

- Permanent: these are effects that will remain even when the MHPGC Project is decommissioned;
- Temporary: these are effects that are related to environmental changes associated with a particular activity and that will cease when that activity finishes.

4.6.2.2 The assessment will have regard to the MHPGC Project programme and will evaluate the environmental effects of the MHPGC Project during construction, O&M and decommissioning. These effects will be compared to the situation prevailing before the MHPGC Project is commenced (the current baseline), the evolution of the baseline if the MHPGC Project is present, and to the situation that would prevail in the future without the MHPGC Project (the projected future baseline). Given the timescales over which the MHPGC Project is expected to operate, there is potential for baseline conditions to change substantially during this time.

4.6.2.3 Decommissioning will be caried out in accordance with the legislation in place at that time and designed in measures and environmental measures, similar to those proposed for the construction phase of the MHPGC Project, would be implemented during decommissioning.

4.6.2.4 If decommissioning is required at the end of the MHPGC Projects lifetime, then activities and consequent effects associated with the decommissioning phase are expected to be of a similar or lesser level to those during the construction phase works, however, for completeness, each topic chapter has considered if the decommissioning phase is likely to result in significant effects.

4.6.2.5 The future baseline is the theoretical situation that would exist in the absence of the MHPGC Project. This is based upon extrapolating the current baseline using technical knowledge of likely changes to predict this (e.g. predictable changes such as climate change, changes that can be predicted based on reasonable assumptions and modelling calculations, information about other relevant developments etc.).

4.6.2.6 Each environmental topic chapter of the EIA Report/ES will define the baseline against which the environmental effects of the MHPGC Project will be assessed. The baseline conditions to be assessed for each environmental topic are outlined in Chapters 7 to 10, of the Scoping Report. Where relevant, topic chapters provide further information on the time elements within the MHPGC Project programme that will be considered for their assessment.

4.6.3 Forecasting and Modelling

4.6.3.1 Where forecasting and modelling tools are used, care will be taken to ensure that the tool selected is appropriate for the assessment, taking into account legislation, guidance documents, topic-specific good practice and relevant stakeholder

feedback. Model assumptions will be described, and calibration will be used to ensure a reasonable degree of accuracy in measurements.

4.6.3.2 Uncertainty will also be addressed by undertaking modelling for a number of scenarios and topics, at representative points across the MHPGC Project. Topic chapters within the EIA Report/ES will set out the specific measures due to be taken, with regard to modelling inputs and outputs.

4.7 Cumulative Impact Assessment

4.7.1.1 Cumulative effects are those that arise as a result of the MHPGC Project in combination with other large-scale developments or projects. A Cumulative Effects Assessment (CEA) will be carried out for the MHPGC Project which will examine the result from the combined impacts of the MHPGC Project with other elements of the Morven Offshore Wind Farm scheme and other developments on the same single receptor or resource as required under the EIA Regulations and the cumulation of environmental effects occurring as a result of the MHPGC Project.

4.7.1.2 Cumulative effects are defined as those that result from incremental changes caused by other reasonably foreseeable plans and projects alongside the MHPGC Project. Cumulative effects are, therefore, the combined effects on the same single receptor/resource of the assessed project considered along with the effects from a number of other, different plans and projects.

4.7.1.3 A fundamental requirement of undertaking the CEA is to identify any foreseeable developments or activities (e.g. planned, existing and approved developments) which the MHPGC Project may interact with to produce cumulative effects. Interactions have the potential to arise during all phases of development, including the construction, O&M, and decommissioning phases.

4.7.1.4 The foundation of the CEA will be a 'whole project assessment' which will consider the different elements of the Morven Offshore Wind Farm, based on the information publicly available at the time the MHPGC Project is assessed. This will consider the onshore and offshore aspects of the MHPGC Project, the infrastructure (including offshore substation platforms (OSPs)) and the second grid connection into the Branxton area. The potential effects of the whole project will thereafter be considered together with cumulative effects of other relevant and reasonably foreseeable developments.

4.7.1.5 For the MHPGC Project CEA, other proposed major developments in the area will be taken into account within the CEA. The Planning Inspectorate Advice Note Seventeen: Cumulative Effects Assessment Relevant to Nationally Significant Infrastructure Projects (the Planning Inspectorate, 2019) and Scottish Government (2018) recommend that major developments (both onshore and offshore) in the area, as identified through consultation with local authorities and other relevant consenting bodies, should be taken into account when conducting CEA, including those which are:

- under construction;
- permitted application(s), but not yet implemented;
- submitted application(s) not yet determined;

- projects on the National Infrastructure Planning Portal's Programme of Projects;
- projects identified in relevant development plans;
- projects identified in other plans and programmes as may be relevant.

4.7.2 Cumulative Effects Assessment Screening Stage

4.7.2.1 The CEA process is divided into a screening stage and an assessment stage. The proposed process is broadly illustrated in Figure 4.1 and will follow the methodology for CEA defined in the Planning Inspectorate's Advice Note Seventeen (Planning Inspectorate, 2019). This is a four-stage approach, as follows:

- Stage 1: establish the Zone of Influence (ZoI) for the MHPGC Project and identify a 'longlist' of 'other development';
- Stage 2: identify a 'shortlist' of 'other development' for the CEA;
- Stage 3: information gathering;
- Stage 4: assessment.

4.7.2.2 Firstly, the ZoI, within which any potential effects of the MHPGC Project may combine with the effects arising from other plans, projects and activities, will be defined by environmental specialists and combined into a single area within which other plans, projects and activities will be identified. In identifying the ZoI the following will be considered:

- Physical overlap: a physical overlap refers to the ability for impacts arising from the MHPGC Project to overlap with those from other projects/plans on a receptor basis. This means that, in most examples, an overlap of the physical extents of the impacts arising from the two (or more) projects/plans must be established for a cumulative effect to arise. Exceptions to this exist for certain mobile receptors that may move between, and be subject to, two or more separate physical extents of impact from two or more projects.
- Temporal overlap: in order for a cumulative effect to arise from two or more projects, a temporal overlap of impacts arising from each must be established. It should be noted that some impacts are active only during certain phases of development, so it is important to establish the extent to which an overlap may occur between the specific phase of the MHPGC Project and other projects/plans. The absence of a strict overlap, however, may not necessarily dismiss a cumulative effect, as receptors may become further affected by additional, non-temporally overlapping projects.

4.7.2.3 Once a ZoI is identified a list of plans, projects and activities within that ZoI will be prepared to inform the CEA, known as the CEA long list. In compiling the long list consideration will be given to Table 2 of the Planning Inspectorate Advice Note 17 which considered the level of detail available about other existing development and/or approved development. A process will be followed to methodically and transparently screen the large number of projects and plans that may be considered cumulatively alongside the MHPGC Project. This involves a stepwise process that considers the level of detail available for projects/plans, as well as the potential for interactions to occur on the following basis:

- Data confidence: data confidence is taken into account when screening projects, plans and activities into or out of the CEA. The premise here is that projects, plans and activities with a low level of detail that are publicly available cannot meaningfully contribute to a CEA and, as such, are screened out. The application of this screening step is consistent with Guiding Principle 7 of the RenewableUK Cumulative Impact Assessment Guidelines (RenewableUK, 2013).

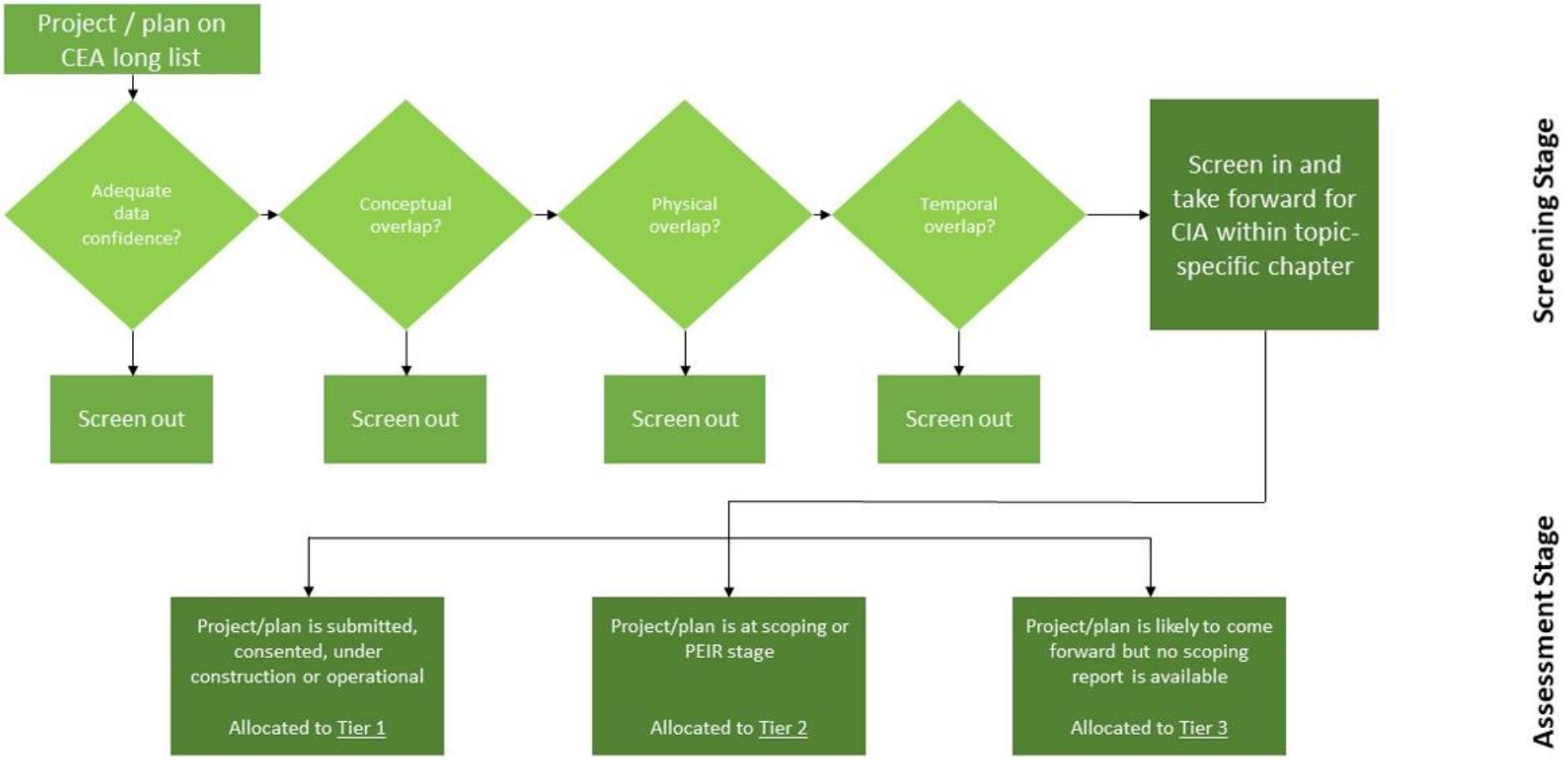


Figure 4.1: Proposed Methodology for the Screening of Projects/Plans to Identify Potential Cumulative Effects of Relevance to the Morven Hawthorn Pit Grid Connection Project

4.7.2.4 Once a project has been taken forward to the assessment stage, a tiered approach is proposed for the CEA (Figure 4.1). The tiered approach provides a framework to assist the decision maker in placing relative weight upon the potential for each project/plan assessed cumulatively to ultimately be realised, based upon the project/plan's current stage of maturity. The allocation of projects/plans into tiers is not affected by the screening process; it is a categorisation applied to all projects/plans that have been screened in for assessment.

4.7.2.5 The definitions of the tiers to be used will be included in the EIA Report/ES but they will be broadly consistent with the RenewableUK Cumulative Impact Assessment Guidelines, specifically Guiding Principle 4 and Guiding Principle 7 (RenewableUK, 2013).

4.7.2.6 All projects/plans that have been screened into the CEA via the screening process will be allocated into one of the Tiers and assessed for cumulative effect. Where practicable, the CEA methodology then follows the outline of the project-alone assessment methodology as described in Section 4.5. This approach allows consistency throughout the EIA and enables comparisons to be made.

4.8 Transboundary Impacts

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

4.8.1.2 The EIA Directive requires the assessment of transboundary effects to be considered within the EIA or state if no transboundary impacts are anticipated.

4.8.1.3 The Espoo Convention has been implemented in the UK by the EIA Regulations which require an EIA Report/ES to consider the transboundary effects of a development.

4.8.1.4 The Planning Inspectorate's Advice Note Twelve (Planning Inspectorate, 2020) also sets out a procedure for screening, consulting and assessing transboundary issues, and The Scottish Government (2018) also sets out the expectations of assessing transboundary effects. Given the nature of the Onshore MHPGC Project and its proposed location significant transboundary effects are unlikely. The Onshore MHPGC Project will broadly follow the process set out in the Planning Act 2008 with respect to the transboundary EIA and will have regard to any other guidance that may prevail at the time of undertaking the assessment. The procedure involves the following broad steps which are divided into two stages:

4.8.1.5 Stage 1:

- developer may carry out pre-application consultation with other State(s) if required;
- developer notifies the relevant government bodies in England and Scotland of transboundary assessment;

- developer prepares initial matrix to identify potential significant impacts on other state(s) and provides to the relevant authorities;
- Scottish Ministers (Scottish waters) or PINS (English waters) are responsible for undertaking the transboundary screening process and notifying other relevant state(s);
- other state(s) then notify the relevant authority of their wish to participate in the consultation.

4.8.1.6 Stage 2:

- developer submits the Application, including translated non-technical summary and a consultation report summarising any pre-submission transboundary consultation;
- Scottish Ministers or PINS undertake consultation with other relevant States;
- other State(s) consult with their public and provide comments and responses, which are taking into consideration during the decision-making process.

4.9 Inter-related Effects

4.9.1.1 The EIA Regulations require a consideration of the interactions between EIA topics that may lead to additional environmental effects. For example, the separate impacts of underwater noise and habitat loss may interact together, leading to an effect on a single receptor, such as marine mammals.

4.9.1.2 The approach to the assessment of inter-related effects will consider two levels of potential effect:

- project lifetime effects: effects that occur throughout more than one phase of the MHPGC Project (e.g. construction, O&M, or decommissioning) and may interact together to create a more significant effect than when assessed in isolation;
- receptor-led effects: effects that interact spatially and/or temporally resulting in the potential for inter-related effects upon a single receptor. These may be shore-term, temporary or longer term, potentially permanent effects.

4.9.1.3 The assessment of inter-related effects will be undertaken with reference to the potential for such effects to arise specific to receptor groups (i.e. the proposed approach will, in the main, not assess every individual receptor considered at the EIA stage, but rather, potentially sensitive groups of receptors).

4.9.1.4 The broad approach to inter-related effects assessment will follow the key steps below:

- review of the assessment carried out for each EIA topic area, to identify receptor groups with the potential to experience inter-related effects from the MHPGC Project;
- identify potential inter-related effects on these receptor groups via review of the assessment carried out across a range of topics;
- develop tables that list all potential effects on the selected receptors across the construction, O&M and decommissioning phases (project-lifetime effects);

- develop lists for all potential receptor-led effects;
- qualitative assessment on how individual effects may combine to create inter-related effects and identify the potential for significant effects on receptors.

5 Consultation Process

5.1 Consultation to Date

5.1.1.1 The Morven Offshore Wind Project (hereafter referred to as 'the Project') has undertaken Non-Statutory Consultation at four venues in and around Seaham and the Hawthorn Pit connection point. The events were run with varying start and end times, including evenings and a Saturday event to maximise opportunity for local people to attend. The consultation outlined the Project's search corridors for the onshore and offshore export cable route and the search area for the Land Substation including maps of potential corridors of search to encourage feedback and comments from the community.

5.1.1.2 In addition to four in person events, the Project maintains a project website with link for a virtual exhibition replicating all information provided at the in-person events for members of the public not able to attend events in person. This also includes access to the feedback form.

5.2 Pre-Application Consultation

5.2.1 Scotland

5.2.1.1 In Scottish waters, the Morven Hawthorn Pit Grid Connection Project (hereafter referred to as 'MHPGC Project') is entirely offshore (beyond the 12nm limit). The Marine Licensing (Pre-application Consultation) (Scotland) Regulations 2013 ('the PAC Regulations') prescribe the marine licensable activities which are subject to Pre-Application Consultation (PAC). In combination with the Marine (Scotland) Act 2010, the PAC Regulations dictate the nature of the pre-application process. There is no similar provision for PAC within the Marine and Coastal Access Act 2009.

5.2.1.2 In accordance with the PAC Regulations and associated guidance from Marine Directorate: Licencing Operations Team (MD-LOT) (MD-LOT, 2018) these requirements only apply in respect of relevant applications in the Scottish Inshore Region (i.e. from mean high water springs (MHWS) to the 12nm limit). On this basis, there is no mandatory requirement for statutory PAC.

5.2.1.3 The ensuing Environmental Impact Assessment (EIA) for the Marine Scheme will be subject to Part 5 (Publicity and Procedures on Submission of EIA Reports/ES) under the Marine Works EIA (Scotland) Regulations 2007, namely: Regulation 16 (Publication of EIA Report); Regulation 17 (Publicity of determinations and provision of information); Regulation 18 (Consultation); Regulation 19 (Copies of EIA Report for the Scottish Ministers); and Regulation 20 (Copies of EIA Report/ES for the Public). The Applicant will work with MD-LOT to help ensure full compliance with the relevant EIA consultation requirements.

5.2.1.4 Technical consultation will continue to be undertaken through the EIA process with Scottish stakeholders.

5.2.2 England

5.2.2.1 In England, the consultation process is more prescriptive. The Planning Inspectorate's (PINS) Advice Note Three: EIA Notification and Consultation (the

Planning Inspectorate, 2017a) states that "It is the responsibility of the Applicant to ensure that their pre-application consultation fully accords with the requirements of the [Planning Act 2008], including associated regulations, and that they have regard to relevant guidance".

5.2.2.2 The Planning Act 2008 requires the Applicant to:

- Consult with the relevant local authorities on what should be contained within the promoter's Statement of Community Consultation (SoCC), which will describe how the promoter proposes to consult the local community about the proposal (as prescribed in Section 47 of the Planning Act 2008);
- Have regard to the local authorities' responses to that consultation in preparing the SoCC;
- Make the SoCC available for inspection in the local community and publish the SoCC in a locally circulating newspaper, as required under Section 47 of the Planning Act 2008 and carry out consultation in accordance with the SoCC (this Scoping Report will help to inform that consultation exercise);
- Consult with the local authorities and such persons as prescribed in Section 42 and Section 44 of the Planning Act 2008 and Schedule 1 of the Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009;
- Consult with the public by publishing a newspaper notice of the proposed application in local and national press, in accordance with Section 48 of the Planning Act 2008;
- Have regard to any relevant responses to this consultation, as prescribed in Section 49 of the Planning Act 2008;
- Consult a range of statutory consultees as identified by the PINS (this Scoping Report will help inform that consultation exercise). Consultation from non-statutory consultees will also be taken into account where relevant;
- Set a deadline of at least 28 days by which responses to consultation must be received.

5.2.3 Statement of Community Consultation

5.2.3.1 Under Section 47 of the Planning Act 2008, the Applicant has a duty to prepare a SoCC, which sets out how it plans to consult local communities on the proposed development. The Applicant must conduct its consultation in line with the SoCC. The Applicant must consult on the contents of the SoCC with each of the local authorities in whose area the proposed development is situated (as prescribed in Section 43(1) of the Planning Act 2008).

5.2.3.2 Consultation on the contents of a draft SoCC will be undertaken in accordance with Section 47 of the Planning Act 2008.

5.2.4 Evidence Plan Process

5.2.4.1 Since September 2012, applicants applying for a Development Consent located in England, have been able to agree evidence plans with relevant Statutory Nature Conservation Bodies (SNCBs).

5.2.4.2 Evidence plans are formal mechanisms to agree what information the Applicant needs to supply to the PINS as part of a Development Consent Order (DCO) application. This helps to ensure compliance with the Habitats Regulations, and helps applicants provide sufficient information as part of their application.

5.2.4.3 Guidance on the evidence plan approach is provided within the PINS Advice Note Eleven, Annex H – Evidence Plans for Habitats Regulations Assessments of Nationally Significant Infrastructure Projects (the Planning Inspectorate, 2017b). The PINS Advice Note Eleven, Annex H describes four stages to the evidence plan process:

- The Applicant requests an evidence plan;
- The Applicant and relevant SNCB(s) agree the initial structure and content of the evidence plan;
- The Applicant gathers and analyses the evidence and the relevant SNCB(s) assess the evidence through an iterative process. The Applicant and SNCB(s) agree where specific issues are resolved;
- The evidence plan process is finalised and agreed by the Applicant and SNCB(s) during the pre-application stage.

5.2.4.4 It is proposed that an evidence plan steering group be established for the MHPGC Project, comprising the key regulatory bodies and SNCBs. It is proposed that the steering group will meet at key milestones throughout the EIA process. In addition, Expert Working Groups (EWG) will be stablished to discuss topic specific issues with relevant stakeholders. EWG meetings will be held at key stages in the EIA process or when new information becomes available for each topic, to provide the opportunity for stakeholders to provide feedback and advice at an early stage. It is proposed that EWGs be established for the following topics:

- physical processes, marine archaeology, benthic ecology and fish and shellfish ecology;
- marine mammals;
- offshore ornithology;
- terrestrial ecology.

5.3 Timing of Consultation

5.3.1 Future Consultation

5.3.1.1 Under the Planning Act, prior to the submission of the DCO (including deemed marine licence applications), further consultation will take place with relevant parties. This will include, but not be limited to, consultation on the site selection process for the offshore and onshore transmission infrastructure and consultation on the Preliminary Environmental Information (PEI) (including submission of a Preliminary Environmental Information Report (PEIR)). This will ensure that relevant stakeholder feedback is received and can be taken into account.

5.3.1.2 Consultation will continue with key topic-specific technical stakeholders throughout the EIA process.

5.3.1.3 The PINS, and MD-LOT (for the offshore export cable and related works), having received this Scoping Report, will consult with statutory consultees to seek their comments on the scope of the MHPGC Project EIA Report/ES. In addition to the bodies that the PINS and MD-LOT will formally consult, the Applicant will make the Scoping Report available to other stakeholders via the MHPGC Project website (www.morvenoffshorewind.com). Following consultation with statutory consultees on the scope of the EIA Report/ES, the Secretary of State and MD-LOT will provide a Scoping Opinion.

5.3.2 Future Surveys

5.3.2.1 Phase 1 surveys will be conducted onshore and in the Intertidal Area. Depending on the results of the Phase 1 surveys, Phase 2 surveys may be required. Any Phase 2 surveys will be discussed and agreed with the relevant stakeholders through the EWGs.

5.3.3 Phase 1 Consultation

5.3.3.1 In relation to consultation under the Planning Act, as set out at the start of this chapter an online consultation platform is being used alongside a number of in-person events. These have included public exhibitions and pop-up events to allow those interested in, or affected by, the MHPGC Project to view the information provided.

5.3.3.2 At these events (whether online or in person), members of the public are able to view the latest information on the MHPGC Project, including maps and diagrams illustrating the likely proposed infrastructure routing. At in person events they were able to speak directly with members of the MHPGC Project team and ask any questions or raise any concerns they may have. Participants were encouraged to complete a feedback form which is also available via the project website and virtual exhibition.

5.3.3.3 At the end of Phase 1 consultation, a consultation feedback report will be produced. The report will include an overview of the issues raised during the Phase 1 community consultation events and will inform future development of the consultation and EIA process, where appropriate.

5.3.4 Phase 2 Consultation

5.3.4.1 Following the Phase 1 consultation, Phase 2 consultation comprises statutory consultation (under Section 42 of the Planning Act 2008) on the PEIR. This document will act as a draft Environmental Statement (ES), will be based on this Scoping Report and Scoping Opinion, and will take into account comments received from the consultation process.

5.3.4.2 In parallel to this consultation with statutory consultees, the Applicant will hold a second round of public consultation events, either online or in local authority areas across the consultation zone. At this stage, the Applicant will specifically consult stakeholders and the local community on the contents of the PEIR and following this additional community consultation events will be held. The dates, venues and times will be confirmed nearer to the time and advertised online and in local media.

5.3.4.3 During these consultation events, the Applicant may be able to present a more refined scheme for development, on which members of the public can comment. Participants will have the opportunity to complete a feedback form and a consultation feedback report will be produced and made available online.

5.3.5 Preliminary Environmental Information Report

5.3.5.1 The Planning Act 2008 requires PEI to be provided for public consultation by those seeking a Development Consent. The level of detail required in the PEI is not defined by The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017; however it must cover those areas being assessed by the ES, which will accompany the application for development consent. There is no formal requirement for consultation on PEI in relation to the separate marine licence application to MD-LOT and none is proposed.

5.3.5.2 The Applicant plans to submit and consult upon the PEIR for the MHPGC Project as part of Phase 2 consultation. The PEIR is intended to allow statutory consultees, local communities and interested parties to understand the nature, scale, location and likely significant environmental effects of the MHPGC Project, such that they can make an informed contribution to the process of PAC under the Planning Act 2008 and to the EIA process.

5.3.5.3 The Applicant expects it will further refine the MHPGC Project proposal, in terms of the detailed consent application to be submitted, based upon the consultation responses received from the PEI process. The final results of the EIA will be presented in an ES and a summary of all consultation responses received will be presented in a Consultation Report, both of which will accompany the applications for development consent and marine licence.

5.4 Applications for Consent

5.4.1.1 The application for a DCO (including deemed marine licence(s)) and marine licence is currently planned to be submitted to The PINS and MD-LOT, respectively in 2026. The EIA Report/ES that will be submitted to accompany the application will be prepared taking into account the responses to the consultations, which will be captured in the Consultation Report that will accompany the applications.

6 Site Selection and Consideration of Reasonable Alternatives

6.1 Introduction

6.1.1.1 The Marine Works (Environmental Impact Assessment) Regulations 2007, and The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017, collectively termed The Environmental Impact Assessment (EIA) regulations, both require a description of the reasonable alternatives considered by the Applicant(s) and an indication of the main reasons for selection of the chosen option, taking into account effects of the Project on the environment. This information will be provided in the Preliminary Environmental Information Report (PEIR)/Environmental Statement (ES). The consideration of siting options and alternatives, including design refinement, is iterative during the EIA process and, therefore, this process is not yet complete. This section of this Scoping Report therefore provides an overview of the process to date for the Morven Hawthorn Pit Grid Connection Project, (hereafter MHPGC Project), and outlines future activities.

6.1.1.2 The site selection process is linked to, and has been informed by, work undertaken by National Grid ESO, who is responsible for determining the most appropriate point of connection to the national electricity transmission network via the Holistic Network Design (HND) (National Grid ESO, 2022).

6.2 Work undertaken by National Grid ESO

6.2.1.1 Offshore wind farms in the UK currently connect to the onshore national electricity transmission system via individual radial connections (i.e. with each offshore wind farm having its own point of interconnection with the national electricity transmission system on land).

6.2.1.2 In 2020, the Offshore Transmission Network Review (OTNR) was launched by the Department for Business, Energy and Industrial Strategy (BEIS), now the Department for Energy Security and Net Zero (DESNZ) with the objective to “ensure that the transmission connections for offshore wind generation are delivered in the most appropriate way, considering the increased ambition for offshore wind to achieve net zero. This will be done with a view to finding the appropriate balance between environmental, social and economic costs”.

6.2.1.3 The OTNR, and its associated projects (including the HND), examined a range of technical and engineering solutions to improve the coordination of new offshore wind generation connections and transmission (Offshore Transmission Network Review, 2020). The HND process has sought to balance the needs of consumers, developers, communities and the environment. The 'Pathway to 2030 Holistic Network Design report (National Grid ESO, 2022) sets out the methodology used, noting that all four objectives have been considered on an equal footing. The review considered the following information for each objective:

- economic and efficient costs – an economic optimiser was used that considered network costs, market conditions and system benefits;
- deliverability and operability – a deliverability assessment framework was developed that considered factors such as supply chain of technologies, construction timeframes, and consenting challenges;

- environmental impact – assessments of environmental constraints were undertaken using Geographical Information System (GIS) datasets to determine the location and severity of environmental constraints. Any proposed designs that would result in severe environmental impacts were not provided as inputs to the economic optimiser;
- local community impact – assessments of community constraints were undertaken using GIS data sources to determine the location and severity of community constraints. Any proposed designs that would result in severe community impacts were not provided as inputs to the economic optimiser.

6.2.1.4 Stakeholders were engaged with at different points during this process. These included a Central Design Group (CDG), consisting of representation from key stakeholders, including the onshore transmission owners (National Grid Electricity Transmission, Scottish Power Transmission, Scottish and Southern Electricity Networks-Transmission). This group was supplemented by four subgroups, through which expert input and formal advice on specific elements of the design was received. These comprised:

- a stakeholder and communications subgroup;
- a commercial subgroup;
- an environmental subgroup;
- a developer forum (including input from the Applicants, based on their own work to identify constraints and critical analysis of the design).

6.2.1.5 The HND identified the existing National Grid substation at Hawthorn Pit as the preferred point of interconnection for the Morven Offshore Wind Project.

6.3 Work being undertaken by the Applicant

6.3.1.1 The Applicant is undertaking a site selection process in parallel to, and building on the output of, the HND process. This process will develop and refine export cable routes and land substation (LSS) site options to enable the connection to the existing National Grid substation at Hawthorn Pit.

6.3.1.2 The objective of any such siting process is to identify technically, economically and environmentally feasible locations, whilst minimising potential impacts on the existing environment and communities. The design and siting process is iterative, based on engineering, the findings of the EIA process (such as findings of the baseline surveys) and on feedback from consultation with stakeholders.

6.3.1.3 The site selection and routing process also considers principles in key guidance documents, such as the Horlock and Holford Rules (National Grid, 1959; National Grid, 2009) as adhered to by National Grid, and input from land owners. In addition, this ongoing process will take into account relevant policies set out in Chapter 2: Policy and Legislation.

6.3.2 Methodology Overview

6.3.2.1 The Applicant's site selection process is iterative, remaining under review and being continually updated as more information becomes available. Where necessary,

options will be refined and the appraisal updated, or new options will be identified and appraised following the gathering of site data and consultation.

6.3.2.2 The identification and appraisal of options for locating the different elements of the MHPGC Project assets is following five broad stages outlined below:

1. Identification of the Study Area;
2. Identification and Analysis of Constraints;
3. Identification of Options;
4. Appraisal of Options;
5. Option Refinement.

Stage 1 – Identification of the MHPGC Study Area

6.3.2.3 The study area was determined by considering the locations of the generation assets and the Hawthorn Pit connection point. The study area was sized to enable identification and assessment of realistic and credible alternatives while considering relevant environmental, technical and cost factors. To facilitate identification of the study area, three key components were identified:

- subsea cable routing study area;
- landfall study area; and
- underground cable routing and LSS siting study area.

Subsea Cable Routing Study Area

6.3.2.4 The subsea cable routing study area comprised the Morven Offshore Wind Array Project Scoping Boundary (Scottish waters) and extended south through the North Sea towards the Durham coastline (English waters). The study area was developed to consider a wide range of potential route options balanced with the directness and length of route options. The western extent of the study area was largely defined by the Farnes East Marine Conservation Zone (MCZ), the eastern extent defined by the Swallow Sand MCZ. Exclusion of North East of Farnes Deep Highly Protected Marine Area (HPMA), located in the centre of the study area, resulted in two main search corridors within which possible routes continue to be refined.

Landfall Study Area

6.3.2.5 An approximate 10-12 km section of coastline was identified between the south of Sunderland and the north of Horden. The majority of the landfall study area lies within the administrative area of Durham County Council, however, a small section to the north (east of Ryhope) lies within the administrative area of Sunderland City Council. Landfall sits atop sea cliffs ranging between 25m and 50m Above Ordnance Datum (AOD) with gently sloping arable farmland falling towards the coast.

6.3.2.6 Landfall opportunities to the north and south of this section of the coastline would result in a longer onshore cable route with greater environmental and cost impacts and therefore the width of the study area was not extended onshore beyond the 10-12km section of coastline identified.

6.3.2.7 Large sections of the coastline are the subject of ecological designations including the Durham Coast Special Area of Conservation (SAC) and Site of Special Scientific Interest (SSSI) and Northumbria Coast Special Protection Area (SPA). These ecological designations occupy the majority of the study area. Areas without designated sites and non-urban areas were preferred. The Landfall study area also considered onshore infrastructure including, for example, the Durham Coast railway line which running broadly north to south parallel to the coastline connecting Newcastle to Middlesbrough. This, and similar infrastructure, was a key consideration for landfall siting given the installation of cables by trenchless techniques and is influenced by the length of the drill required and limitations on cable pulling.

Underground Cable Routing and Land Substation Siting Study Area

6.3.2.8 The initial underground cable routing and LSS siting study area form a single area totalling approximately 77km^2. The small scale of the study area is a direct consequence of the proximity of the National Grid Hawthorn Pit Substation location to the coast and the need for the area to allow for direct routing opportunities from the coastline towards the point of connection.

6.3.2.9 The initial LSS siting study area was comprised of a 5km buffer around the existing National Grid Hawthorn Pit 400kV Substation and was subsequently adapted to take account of some of the constraints present for the purpose of refining a future LSS Search Area. This included excluding key constraints such as urban areas.

Stage 2 – Identification and Analysis of Constraints

6.3.2.10 To guide the identification of options, key environmental, consenting and technical constraints have been, and will continue to be, identified. These constraints vary in nature and the degree to which they might influence or constrain the siting of infrastructure. When identifying options, the avoidance of constraints is preferred, but in some instances, this may not be practicable. Where there are proven solutions and/or mitigation measures are not available, the Applicant and stakeholders may determine it is unavoidable for the preferred option to impact on a constraint.

6.3.2.11 Where constraints data for the study area is available in electronic format, datasets are processed, grouped into topics and presented as constraints layers within a GIS environment for mapping.

6.3.2.12 Table 6.1 presents the constraints currently being considered within the options appraisal. These constraints (and, where appropriate, buffer zones around them) will continue to evolve, as appropriate, with the site selection process.

Table 6.1: Key Constraints Considered

Topic	Description
Biodiversity	• Ramsar sites; • Special Protection Areas (SPAs); • Special Areas of Conservation (SACs); • Sites of Special Scientific Interest (SSSIs); • Marine Conservation Zones (MCZs); • Annex 1 habitats outside of an SAC (inc. sandbanks and reefs); • Fish spawning and nursery grounds; • National Nature Reserves; • Local Nature Reserves; • Marine Nature Reserves; • Ancient/mature woodland; • Local Wildlife Sites; • Royal Society for the Protection of Birds reserves; • Sites identified within local planning policy; • Natural England Priority Habitats.
Marine geology and physical processes	• Seabed geology (including major geological features (e.g megaripples, sandwaves)); • Sedimentology.
Shipping and navigation	• Shipping lanes; • Vessel traffic separation schemes; • Navigation channels; • High density shipping areas; • International Maritime Organisation Deep Water Routes; • Ferry routes.
Civil and military aviation and radar	• Commercial aviation (including recreational aviation); • Oil and Gas Radar Early Warning Systems; • Military aviation; • PEXA (military practice and exercise areas (danger areas); • PEXA areas (other restrictions in place to restrict civilian activities).
Commercial fisheries	• Offshore lease areas for shellfish and aquaculture; • High intensity spawning and nursery grounds for commercially important fish.
Landscape/seascape	• Areas of Outstanding Natural Beauty; • National Parks;

Topic	Description
	• Country Parks; • Local landscape designations; • Landscape Character; • Sites identified within local planning policy; • Coastal heritage sites and historic seascape areas.
Cultural heritage	• World Heritage Sites; • Scheduled Monuments; • Registered Parks and Gardens; • Registered Battlefields; • Conservation Areas; • Listed Buildings; • Protected/unprotected wrecks; • Naval maritime graves; • Durham County Council Historic Environment Record (HER) data.
Water resources and flood risk	• Flood Zone 3; • Flood Zone 2; • Surface water flooding; • Groundwater Source Protection Zones; • Main Rivers.
Ground conditions and contamination	• Potentially contaminated sites; • Historic landfill sites; • Regional/local designations.
Land use/community	• Sites allocated within local planning policy Tourism/recreation facilities; • Agricultural Land Classifications; • Public Right of Way (PRoW) network; • National Cycle Routes; • National Trails; • Residential properties.
Infrastructure	• Oil and gas installations; • Carbon capture/gas storage areas; • Offshore mines (potash); • Aggregate licence areas; • Tunnels; • Cables (live and out of service); • Pipelines (live and out of service) Interconnectors;

Topic	Description
	• Munition dumps; • Hydrocarbon fields; • Renewables cable corridors; • Anchorage areas; • Active disposal sites; • Overhead lines; • Coastal defences.
Other	• Geological SSSI; • Known geology; • Land parcel size for land substation; • Planning/consented projects; • Third party constraint.

Stage 3 – Identification of Options

6.3.2.13 Following the mapping and analysis of constraints, the identification of siting options is led by a series of design and construction engineering assumptions (for example, the parameters set out in Chapter 3: Project Description), alongside a number of design principles. These assumptions and design principles will be considered 'optimal' and used as a starting point only. It is not always practicable for options to meet the desirable criteria, and this is ultimately reflected in how the options are appraised. The design principles currently in use are set out in Table 6.2.

Table 6.2: Site Selection Design Principles

MHPGC Project Element	Design Principles
Offshore export cable route	• route(s) should be as straight and as direct as practicable; • minimise route length in intertidal waters; • avoid/minimise impacts upon international, European and national designations; • avoid/minimise impacts on ecologically important sandbanks and reefs; • avoid historic wrecks; • avoid interactions with areas of known unexploded ordnances (UXO) and/or explosive dumping grounds; • avoid known vessel anchorages; • avoid known extraction areas; • avoid known licenced locations for the disposal of dredge materials; • avoid interactions with known leasing areas for offshore renewable energy; • minimise the number of crossings of existing offshore export cables and pipelines, where crossing is required, cables and pipelines to be crossed at 90°; • maintain required separation distances with other offshore export cables and pipelines including consideration for sufficient space (with safety buffer) for offshore cable installation and maintenance vessels; • minimise seabed take in aggregate dredging areas; • avoid areas of hard substrate where practicable.
Landfall	• avoid/minimise impacts upon international, European and national designations; • avoid direct impacts on woodland/woodland removal; • minimise the number of third-party asset crossings (e.g. cables and pipelines); • maintain required separation distances with other offshore export cables and pipelines, including consideration for sufficient space (with safety buffer) for offshore cable installation and maintenance vessels; • allow for open cut works if practicable and without unacceptable environmental impacts; • minimise the extent of intertidal working; • avoid areas of known recreational boating; • avoid known bathing beaches;

MHPGC Project Element	Design Principles
	• preference for mild slope, avoid cliffs where possible; • preference for direct beach access with favourable metocean conditions; • avoid known interactions with adverse ground conditions (rock etc.).
LSS location	• areas of local amenity value, important existing habitats and landscape features including ancient woodland, historic hedgerows, surface and ground water sources and nature conservation areas should be protected as far as reasonably practicable (Horlock Rules); • area should take advantage of the screening provided by landform and existing features and the potential use of site layout and levels to keep intrusion into surrounding areas to a reasonably practicable minimum (Horlock Rules); • area should aim to keep the visual, noise and other environmental effects to a reasonably practicable minimum (Horlock Rules); • the area should be limited to that required for development consistent with appropriate mitigation measures and to minimise the adverse effects on existing land use and rights of way (Horlock Rules); • access to the site should be targeted towards areas that minimise the impact on the local population during the construction phase; • avoid/minimise impacts upon international, European and national designations; • avoid direct impacts on woodland/woodland removal; • avoid/minimise heritage setting impacts; • avoid/minimise interactions with Flood Zones 3 and 2 and notable areas of surface water flooding; • minimise working within proximity of overhead lines and maintain stand-off distances where unavoidable; • minimise construction with challenging ground conditions (e.g. rocky outcrops/areas of loose boulders and potentially contaminated land); • avoid or minimise best and most versatile agricultural land where practicable.
Onshore cable route(s)	• route(s) should be as straight and as direct as practicable; • avoid impacts to international, European and national designations;

MHPGC Project Element	Design Principles
	• avoid areas of known ecological significance (e.g. known presence of protected species); • avoid direct impacts on woodland/woodland removal; • avoid residential areas/properties; • minimise routing through challenging ground conditions (e.g. rocky outcrops/areas of loose boulders, potentially contaminated land and wetlands); • minimise the number and length of complex crossings, where practicable (e.g. railways); • avoid known interactions with areas of socio-economic or recreational amenity such as greenspaces, sports pitches or gardens; • avoid locations of shallow mining risk; • avoid known interactions with buildings and functional educational, medical and transport sites; • avoid direct impacts on cultural heritage features; • avoid direct conflicts with known major planning applications and known planning designations; • avoid urban areas; • avoid known areas of historic, current or future resource extraction; • avoid areas of known flood risk where practicable; • avoid historic and active landfill sites; • avoid known contaminated sites; • avoid or minimise best and most versatile agricultural land where practicable.

6.3.2.14 Through consideration of these site selection principles, the initial study areas were refined with the MHPGC Scoping Boundary subsequently defined. The design principles informed development of landfall locations, onshore and offshore search corridors from the generating assets to the Hawthorn Pit connection point. The MHPGC Project infrastructure may be installed at any location within the Morven Array Project boundary, so the scoping boundary encompasses the entirety of the Array Area

6.3.2.15 Two offshore search corridors were refined (east and west, Figure 6.1). Onshore, corridors to the north and south of Seaham were identified (Figure 6.2) and referred to as Northern Corridor and Landfall, Central Corridor and Landfall and Southern Corridor and Landfall for ease of reference through this scoping report.

6.3.2.16 To refine the LSS Search Area, a qualitative appraisal of environmental and technical factors was undertaken. The focus of the siting process was a 5km area around the

Hawthorn Pit Grid Connection point. The objective was the identification of 5-6ha areas within 5 km of the connection point capable of locating a LSS; however, this was balanced by consideration of field boundaries (which are indicative of land ownership extents) as well as environmental and technical factors. As a result, potential sites varied significantly in size and shape. This process identified an initial 6 sites. Subsequently, due to consenting risk and/or other consented development, some sites were discounted. However, through ongoing land discussions and identification of emerging land constraints two additional potential sites were added for consideration. This process and the spread of potential sites informed the extent of the LSS Search Area (Figure 6.2).

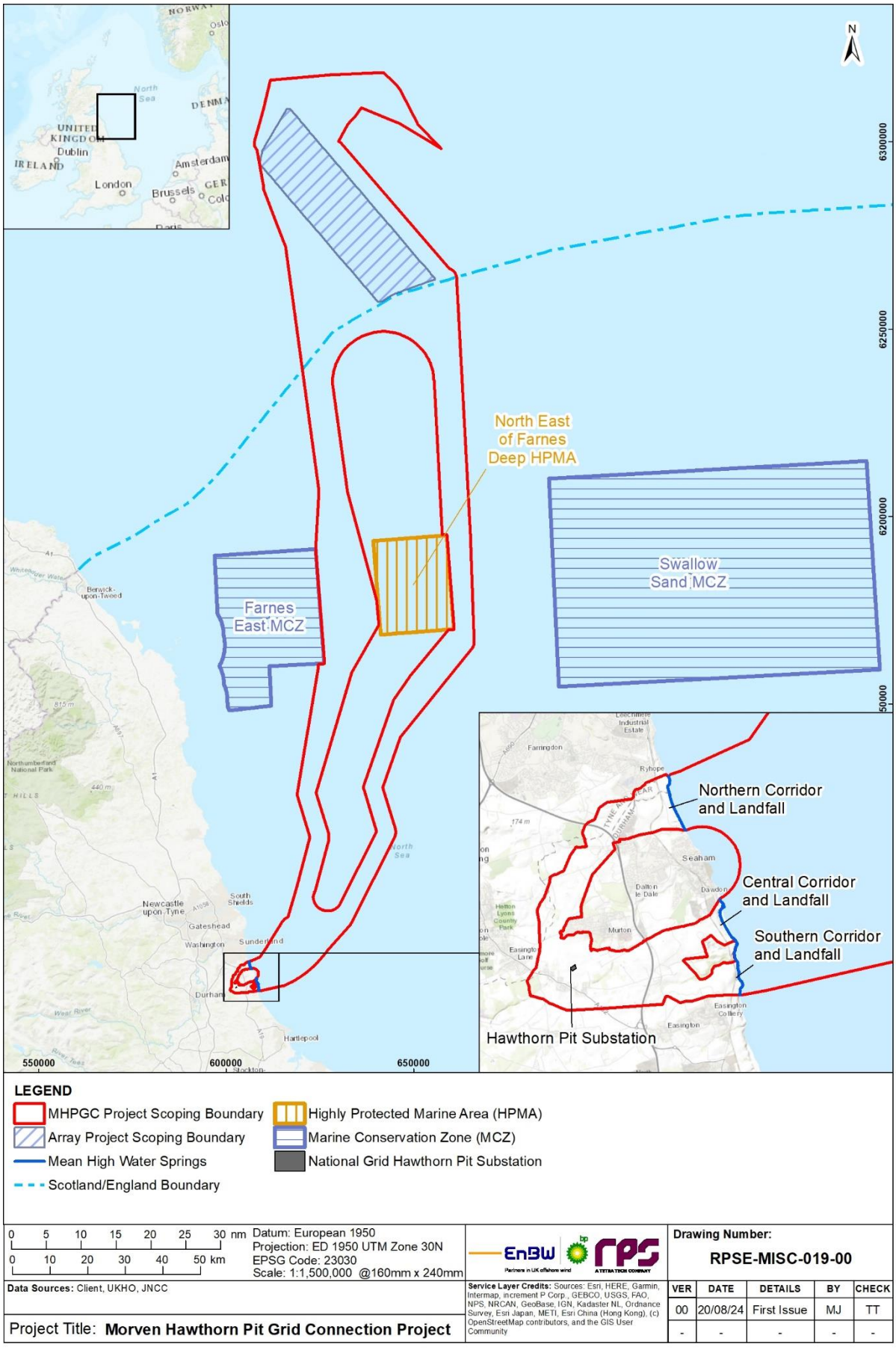


Figure 6.1: Refined Subsea Cable Routing and Landfall Study Areas



Figure 6.2: Morven Hawthorn Pit Grid Connection Project Scoping Boundary with Onshore Corridors, Land Substation Search Area and Hawthorn Pit Connection Point

Stage 4 – Appraisal of Options

6.3.2.17 A black/red/amber/green (BRAG) approach is proposed to evaluate the options for each of the elements of the MHPGC Project assets against each of the appraisal topics. This will provide a systematic and transparent means by which the options can be compared, with 'black' representing areas or factors of greater constraint, and green representing areas/factors of lesser constraint.

Stage 5 – Option Refinement

6.3.2.18 As noted, site selection is an iterative process. Options will be refined and their appraisal will be updated, or new options will be identified and appraised following the gathering of further site data and stakeholder consultation feedback.

6.3.3 Current Status and Next Steps

6.3.3.1 The Scoping Boundary (Figure 6.1) used within this Scoping Report reflects the current status of the site selection process, and has been developed to accommodate all future optionality in identifying preferred options for the MHPGC Project assets.

6.3.3.2 Refinement of the Scoping Boundary will be informed by a number of different activities including;

- ongoing appraisal of cable route options informed by environmental surveys;
- various technical and engineering studies;
- feedback from stakeholders.

6.3.3.3 Non-statutory consultation on the Project was undertaken in July and September 2024. Following this, the outcome of the site selection process for the MHPGC Project will be used to inform the Preliminary Environmental Information Report (PEIR), which will be the subject of statutory consultation. Feedback received will be incorporated into future iterations of the design.

6.3.3.4 As part of the ensuing EIA, the Applicant will carry out an assessment of alternatives, with the results presented in the PEIR/Environmental Statement (ES) used to support consent applications to the Planning Inspectorate and MD-LOT in England and Scotland respectively.

7 Environmental Topics and Potential Impacts - Offshore

7.1 Physical Processes

7.1.1 Introduction

7.1.1.1 This chapter of the Scoping Report identifies the physical processes receptors of relevance to the Morven Hawthorn Pit Grid Connection Project (hereafter referred to as 'MHPGC Project') and considers the potential impacts arising from the construction, operation and maintenance (O&M), and decommissioning of the MHPGC Project. This scoping chapter adopts a proportionate approach to only those impacts with potential to result in likely significant effects and therefore scopes out other impacts where there is evidence that the effects are not likely to be significant.

7.1.1.2 Throughout this Scoping Report, the following elements are collectively referred to as physical processes:

- bathymetry;
- geology and seabed substrata;
- suspended sediments;
- tidal currents and elevation;
- wind and waves;
- sediment transport (which is influenced by the elements above).

7.1.2 Policy and Legislation

7.1.2.1 This section identifies the relevant legislation, policy and other documentation that will inform the assessment of likely significant effects with respect to physical processes (shown in Table 7.1). Further information on policies relevant to the Environmental Impact Assessment (EIA) and their status is provided in Chapter 2: Policy and Legislation, of the Scoping Report.

Table 7.1: Legislation Relevant to Physical Processes

Relevant Policy	Relevance to the Assessment
National Legislation & Policy (UK)	
Infrastructure Planning (Environmental Impact Assessment) Regulations 2017.	Legislation underpinning the EIA process.
United Kingdom (UK) Marine Policy Statement.	The framework for preparing Marine Plans and taking decisions affecting the marine environment.
National Legislation & Policy (Scotland)	

Relevant Policy	Relevance to the Assessment
The Marine Works (Environmental Impact Assessment (EIA)) (Scotland) Regulations 2007.	Legislation underpinning the marine EIA process in Scottish waters (relevant to projects from 12 to 200nm).
Sectoral Marine Plan (SMP) for Offshore Wind Energy (Scottish Government, 2020)	Consideration of impacts at a project level, including loss of/damage to marine and coastal habitats and effects on subsea geology, sediments and coastal processes arising from changes in hydrodynamics and existing wave regimes.
Scotland's National Marine Plan – a Single Framework for Managing our Seas (NMP) (Scottish Government, 2015).	General policies for the development and use of the marine environment. Ensures the conservation objectives of protected sites.
National Legislation & Policy (England)	
Planning Act 2008 (as Amended).	Legislation defining application process.
National Policy Statements (NPS) designated under the Planning Act 2008.	Three of the six energy National Policy Statements contain policy relevant to offshore wind development (NPS EN-1, NPS EN-3 and NPS-EN-5). NPS EN-1 and NPS EN-3 include guidance on what matters are to be considered in the physical processes assessment and highlight a number of factors relating to the determination of an application and in relation to mitigation.
North East Inshore and North East Offshore Coast Marine Plans.	The assessment of potential changes to physical processes will be made with consideration to the specific policies set out in these plans. These may include requirements relating to Marine Protected Areas (MPA), cable installation and cumulative effects etc.
River Tyne to Flamborough Head Shoreline Management Plan (SMP).	The assessment of potential changes to physical processes will be made with consideration to the specific policies set out in this SMP. For example, this relates to erosion and flood risk policies, which could be affected by hydrodynamic, wave and sediment transport processes.

7.1.3 Study Area

7.1.3.1 For the purpose of this Scoping Report, the Physical Processes Study Area has been defined as the extent of one spring tidal excursion around the MHPGC Project Scoping Boundary (Figure 7.1). The Physical Processes Study Area encompasses the MHPGC Project Scoping Boundary, including the entire water column and the seabed that may be influenced by changes to physical processes.

7.1.3.2 One spring tidal excursion of between circa 5km and 9km from the MHPGC Project Scoping Boundary has been identified using the Atlas of UK Marine Renewable Energy Resources (ABPmer, 2017), which provides a layer showing the approximate distance that suspended sediment may be transported before being carried back on the returning mean spring tide.

7.1.3.3 The MHPGC Project Scoping Boundary, and study area will be refined at the Preliminary Environmental Information Report (PEIR) using the same principles as outlined in this scoping chapter.

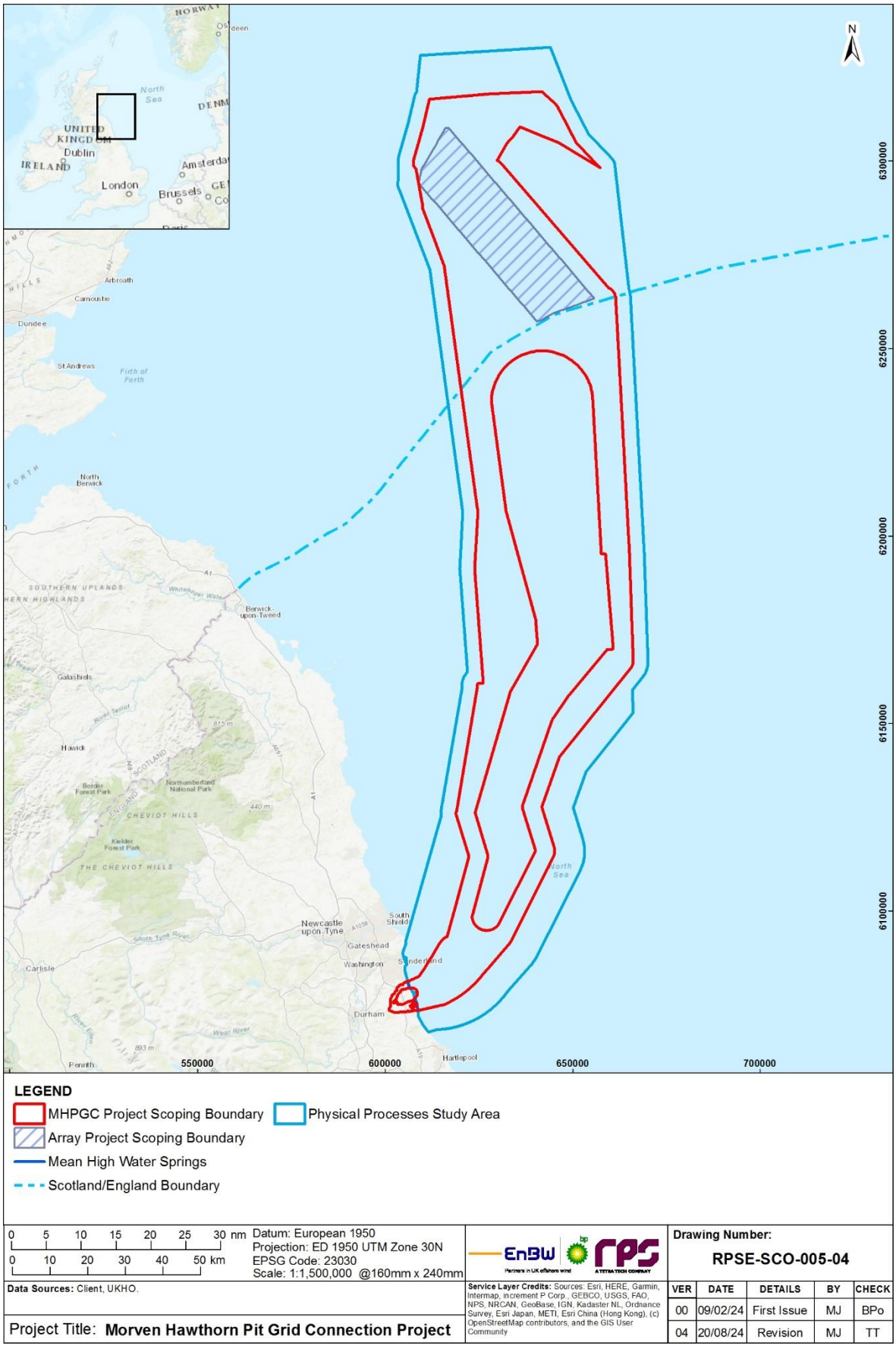


Figure 7.1: Physical Processes Study Area

7.1.4 Data Sources

7.1.4.1 The baseline environment for physical processes has been characterised through a review of key desktop datasets and reports, as listed in Table 7.2. This list is not exhaustive, and further datasets and reports will be covered in more detail as part of the Physical Processes Technical Report and the Physical Processes Chapter of the MHPGC Project Environmental Impact Assessment (EIA) Report/Environmental Statement (ES).

7.1.4.2 To support the acquisition of physical processes data, site specific geophysical and metocean surveys commenced in 2023 and are continuing within the MHPGC Project Scoping Boundary. These datasets will provide detailed data relevant to physical processes at ES/EIA stage. A range of geophysical data was collected during the 2023 survey, across the MHPGC Project Scoping Boundary. This detailed data will be used to inform the physical processes baseline and modelling undertaken for the MHPGC Project ES, supplemented by the relevant lower resolution datasets, used to inform the Scoping baseline, as listed in Table 7.2.

7.1.4.3 In addition, six metocean devices were deployed within the Morven Array Project Scoping Boundary in September 2022 to collect data over a period of twelve to 24 months. These devices in the north of the MHPGC Project Scoping Boundary consisted of two light detection and ranging (LiDAR) buoys, two wavebuoys and two subsea moorings. Further devices will be deployed during 2024 to provide metocean data in the southern region of the MHPGC Project Scoping Boundary. The metocean data has not been used to inform the baseline. However, these data will be used to provide a detailed, site specific baseline characterisation in the Physical Processes Technical Report and inform the assessment presented in the Physical Processes Chapter of the MHPGC Project EIA Report/ES.

Table 7.2: Summary of Key Desktop Data Sources Used to Characterise the Physical Processes Baseline

Title	Source	Year	Author
International/National (UK)			
Spatial data for marine protected areas including MPAs, marine conservation zones (MCZs), special areas of conservation (SACs) and highly protected marine areas (HPMAs).	JNCC (2023a).	2023	Joint Nature Conservation Committee (JNCC) Marine Protected Area (MPA) mapper.
SPM data report.	Centre for Environment, Fisheries and Aquaculture	2016	Suspended Sediment Climatologies around the UK.

Title	Source	Year	Author
	Science (Cefas) (2016).		
Sea floor geomorphology.	Bundesanstalt für Geowissenschaften und Rohstoffe (BGR) (2023).	2023	Sea floor geomorphology.
Bathymetry.	EMODnet (2022).	2022	European Marine Observation and Data Network (EMODnet) digital bathymetry.
SPM data.	Silva (2016).	2016	Monthly Average non-algal Suspended Particulate Matter (SPM) Concentrations.
Annual mean significant wave height (m). Annual mean wave power (kW/m). Mean spring tidal range (m). Spring Peak Current Speeds (m/s). Mean tidal excursion range (m).	ABP Marine Environmental Research (ABPmer) (2017).	2017	Atlas of UK Marine Renewable Energy Resources.
National (Scottish Waters)			
Seabed geology and sediment data (scale: 1:250,000), Quaternary deposits (scale: 1:1,000,000).	Marine Scotland (2017).	2017	British Geographical Survey (BGS) Seabed geology layers.
Tidal ranges, current speeds, and sediment transport.	SSE Renewables (2022).	2022	Berwick Bank Wind Farm Environmental Impact Assessment (EIA) Report, Volume 2, Chapter 7: Physical Processes.
Metocean data.	Royal HaskoningDHV (2012b).	2012	Seagreen Alpha and Bravo Offshore Wind Farms Environmental Statement, Volume 3 Technical Appendices: Appendix E2 – Metocean and Geophysical Surveys.
Suspended sediments and tidal current speeds.	Royal HaskoningDHV (2012a).	2012	Seagreen Alpha and Bravo Offshore Wind Farms Environmental Statement,

Title	Source	Year	Author
			Volume 3 Technical Appendices: Appendix E3 – Geomorphological Assessment.
Metocean data.	Mainstream Renewable Power Ltd (2012).	2012	Neart na Gaoithe (NnG) Offshore Environmental Statement, Chapter 9 – Physical Processes.
National (English Waters)			
Spatial data for SACs and sites of special scientific interest (SSSI).	Natural England (2023b, c).	2023	Natural England Open Data Publication.

7.1.5 Baseline Environment

7.1.5.1 This section presents a high level overview of the baseline environment of the Physical Processes Study Area. For the purposed of the Scoping Report desktop data sources have been used to characterise the physical processes baseline. Results from the site specific surveys will be used to inform the EIA Report/ES.

Scottish Waters

Bathymetry

7.1.5.2 Bathymetry data from EMODnet (2022) suggests that the water depth across the Physical Processes Study Area within Scottish waters ranges from approximately 60m to 80m, relative to the lowest astronomical tide (LAT) (Figure 7.2).

Geology and seabed substrata

7.1.5.3 Offshore marine bedrock data (scale 1:250,000) provided by the British Geographical Survey (BGS) illustrates that the Physical Processes Study Area is dominated by Triassic rock (Siliciclastic argillaceous and sandstone), Permian rock (mudstone and gypsum-stone) (Marine Scotland, 2017). Furthermore, BGS sediment data (scale 1:250,000) illustrates that the Holocene sediments within the Physical Processes Study Area are comprised of mainly sand, slightly gravelly sand and muddy sand (Marine Scotland, 2017). Quaternary deposits are shown by the BGS to vary from soft mud, firm to hard mud, sand and gravel and diamicton, with sands and gravels dominating the composition (Marine Scotland, 2017) (Figure 7.3).

Suspended Sediments

7.1.5.4 Finer sediment fractions (e.g. fine sand, mud and silt) are easily mobilised in the water column and are therefore, more likely to be suspended. Sand transport rates are relatively low over much of the central North Sea, due to increased water depth and lower tidal current speeds than other regions (HR Wallingford, 2009). Sediment transport rates in the North Sea increase during storm events, as evidenced by the modelling undertaken for Berwick Bank OWF (SSE Renewables, 2022).

7.1.5.5 In Scottish waters, total suspended solids (TSS) were low at four sampling stations in the Firth of Forth in March and June 2011, with TSS levels of <5mg/l in most samples (Royal HaskoningDHV, 2012a). TSS were generally higher in March, with values of 10 to 11mg/l recorded several times, and a maximum value of 18mg/l (Royal HaskoningDHV, 2012a). Tidal currents are the primary drivers of suspended sediment concentrations (SSCs), and fluctuations occurring across the spring-neap cycle and across tidal stages were observed in both March and June 2011 (Royal HaskoningDHV, 2012a).

English Waters

Bathymetry

7.1.5.6 Bathymetry data from EMODnet (2022) suggests that the water depth across the Physical Processes Study Area within English waters ranges from 0m (at the coast) to approximately 110m, relative to the LAT (Figure 7.2).

Geology and seabed substrata

7.1.5.7 Data provided by BGR (2023) illustrate that geomorphological features, such as moraines and channels, are present along certain sections of the Physical Processes Study Area, particularly off the coast of Berwick-upon-Tweed (Figure 7.3).

Suspended sediments

7.1.5.8 Cefas (2016) presented an analysis of the spatial distribution on non-algal SPM in UK waters. Within the Physical Processes Study Area in English waters, mean SPM levels were estimated to be between 0mg/l to 9mg/l from 1998 to 2015, with higher levels typically observed in winter months and towards the shoreline (Cefas, 2016; Silva, 2016).

7.1.5.9 During storms, wave driven currents can temporarily elevate SSCs. They can rise significantly, and then gradually decrease to baseline conditions after the storm. Therefore, SSC levels follow a broadly seasonal pattern due to the seasonal nature and frequency of storms. Elevated SSCs during storm events are less significant in deeper water, as the degree of wave penetration is lower than that of shallower water. Therefore, SSCs are likely to be higher in the nearshore areas of the Physical Processes Study Area than compared to its majority, which is predominantly in deeper water offshore. However, in the nearshore areas, the existing higher concentrations of natural suspended sediments allows for a smaller percentage change in suspended sediments compared to deeper water offshore where any increase may attribute to a large proportion of the concentration.

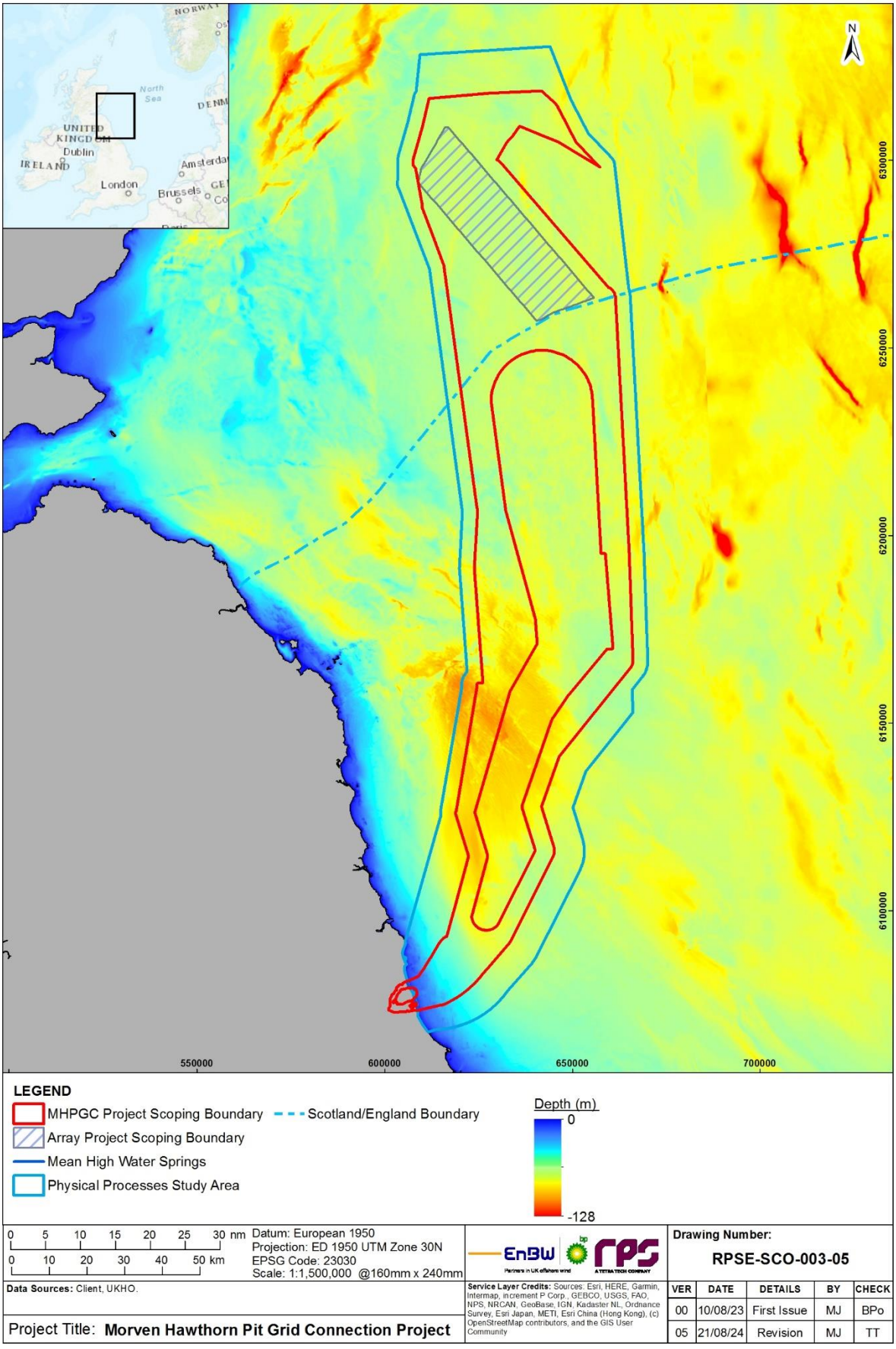


Figure 7.2: Bathymetry in the North Sea (EMODnet, 2022)

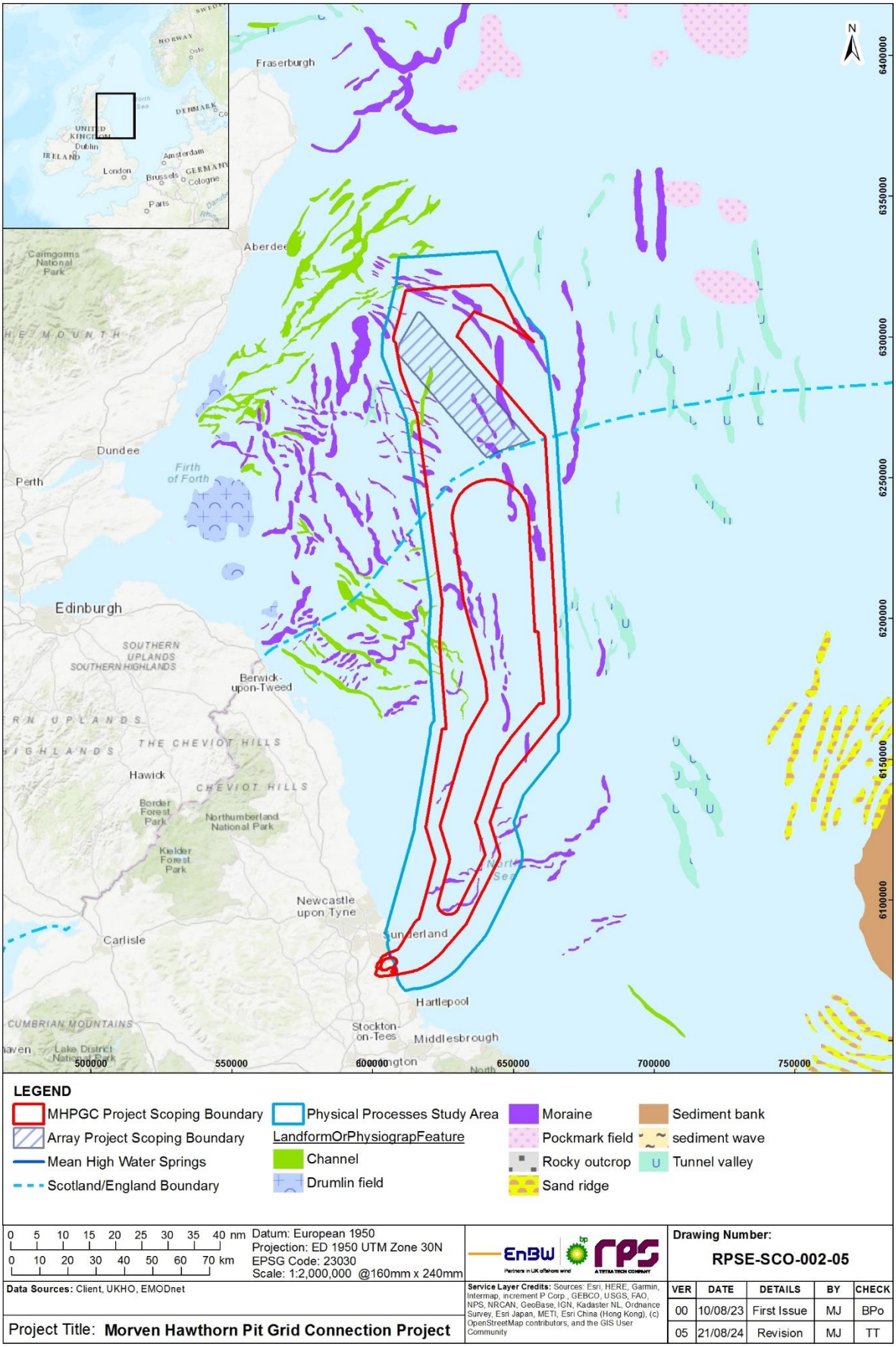


Figure 7.3: Geomorphological Features of the North Sea (BGR, 2023)

Project wide (Scottish and English waters)

Tidal Currents and Elevation

7.1.5.10 Currents are primarily driven by tides, with a residual component driven by storms. In the North Sea, the propagation of tidal waves (as well as the dominant residual circulation) generally follows cyclonic patterns (Vindenes *et al.,* 2018). The Atlas of UK Marine Renewable Energy Resources reports mean spring tidal ranges between approximately 2.15m to 4.3m across the Physical Processes Study Area (ABPmer, 2017). The Atlas also indicates spring peak current speeds of approximately 0.2m/s to 0.9m/s (ABPmer, 2017). Elsewhere in the North Sea, a mean tidal range of 3.25m and current speeds between 0.5m/s to 0.6m/s were calculated within Berwick Bank OWF (SSE Renewables, 2022). In addition, metocean deployments within the Seagreen 1 OWF and Seagreen 1A OWF recorded maximum current speeds of 0.91m/s, with mean speeds of 0.21m/s to 0.35m/s across the survey area (Royal HaskoningDHV, 2012a).

7.1.5.11 A detailed baseline will be presented within the EIA Report/ES to provide an overview of the site specific tidal regime within the Physical Processes Study Area.

Wind and Waves

7.1.5.12 The North Sea experiences strong winds however, wave heights vary greatly due to water depth and fetch limitations (Royal HaskoningDHV, 2012a). Annual mean significant wave height may reach a maximum of approximately 2m across the Physical Processes Study Area, and annual mean wave power reaches a maximum of approximately 19kW/m (ABPmer, 2017).

7.1.5.13 Data collected from other projects in the North Sea have been consulted in the absence of site specific metocean data. At the Seagreen OWF, a significant wave height of 6.7m was recorded during the stormiest event of an 18 month wave buoy deployment in January 2012 (Royal HaskoningDHV, 2012b). In addition, peak spectral wave periods of up to 20 seconds were recorded, both associated with strong winds and storms that are characteristic of the North Sea (Royal HaskoningDHV, 2012b). At NnG OWF, the highest significant wave height recorded was 6m and wave periods ranged between two seconds and nine seconds (Mainstream Renewable Power Ltd, 2012). However, it should be noted that both Seagreen and NnG OWFs are further inshore than a significant proportion of the MHPGC Project , thus there is potential for larger significant wave heights and wave periods within the Physical Processes Study Area, some of which is exposed to greater fetch lengths and less influenced by land.

7.1.5.14 Although this measured data is now somewhat dated, in conjunction with the data from APBmer, it is considered sufficient at characterising the baseline wave regime in the vicinity of the MHPGC Project Scoping Boundary due to the absence of more recent data and the site specific data. It is unlikely that this type of site specific data will vary significantly in the intervening period. Site specific metocean devices will be deployed during 2024 to provide metocean data in the southern region of the MHPGC Project Scoping Boundary to aid in the description of a more detailed assessment of the baseline environment in the EIA Report/ES.' The site specific data will also be used to validate the hydrodynamic and wave models developed as part of the assessment.

Designated Sites

7.1.5.15 There are various designated sites with qualifying features relevant to physical processes within the Physical Processes Study Area (Table 7.3, Figure 7.4).

Table 7.3: Designated Sites Relevant to Physical Processes within the Physical Processes Study Area

Site	Distance from Physical Processes Study Area (km)	Relevant Features for Designation
Scottish Waters		
Firth of Forth Banks Complex MPA.	0.00 (overlaps).	Includes the Berwick, Montrose and Scalp Banks and the Wee Bankie shelf banks and mounds. It also includes a mosaic of different sand and gravel sediments that overlie subsea banks and mounds. It is designated for the following physical processes receptors: • Annex I Habitat: Offshore subtidal sands and gravels; • shelf banks and mounds; moraines representative of the Wee Bankie Key Geodiversity Area (JNCC, 2021b).
English Waters		
North East of Farnes Deep HPMA and MPA.	0.00 (overlaps).	Originally an MCZ, this site was designated as a HPMA in 2023, which extends protection to the entire marine ecosystem (seabed, water column, physical processes, and all species). Designated for the following features relevant to physical processes: • subtidal coarse sediment; • subtidal sand; • subtidal mixed sediments; subtidal mud (JNCC, 2023b).
Durham Coast SAC.	0.00 (overlaps).	Vegetated sea cliffs considered to be one of the best areas in the UK. Includes Marine areas, sea inlets, coastal sand dunes, sand beaches, machair, shingle, sea cliffs, islets, humid grassland and mesophile grassland (JNCC, 2015).
Durham Coast Site of Special Scientific Interest (SSSI).	0.00 (overlaps).	Includes beaches and dune systems (Natural England, 2023a).
Farnes East MCZ.	0.00 (overlaps).	Designated for the following features relevant to physical processes:

Site	Distance from Physical Processes Study Area (km)	Relevant Features for Designation
		• moderate energy circalittoral rock; • subtidal coarse sediment; • subtidal sand; • subtidal mud; • subtidal mixed sediments (JNCC, 2021a).

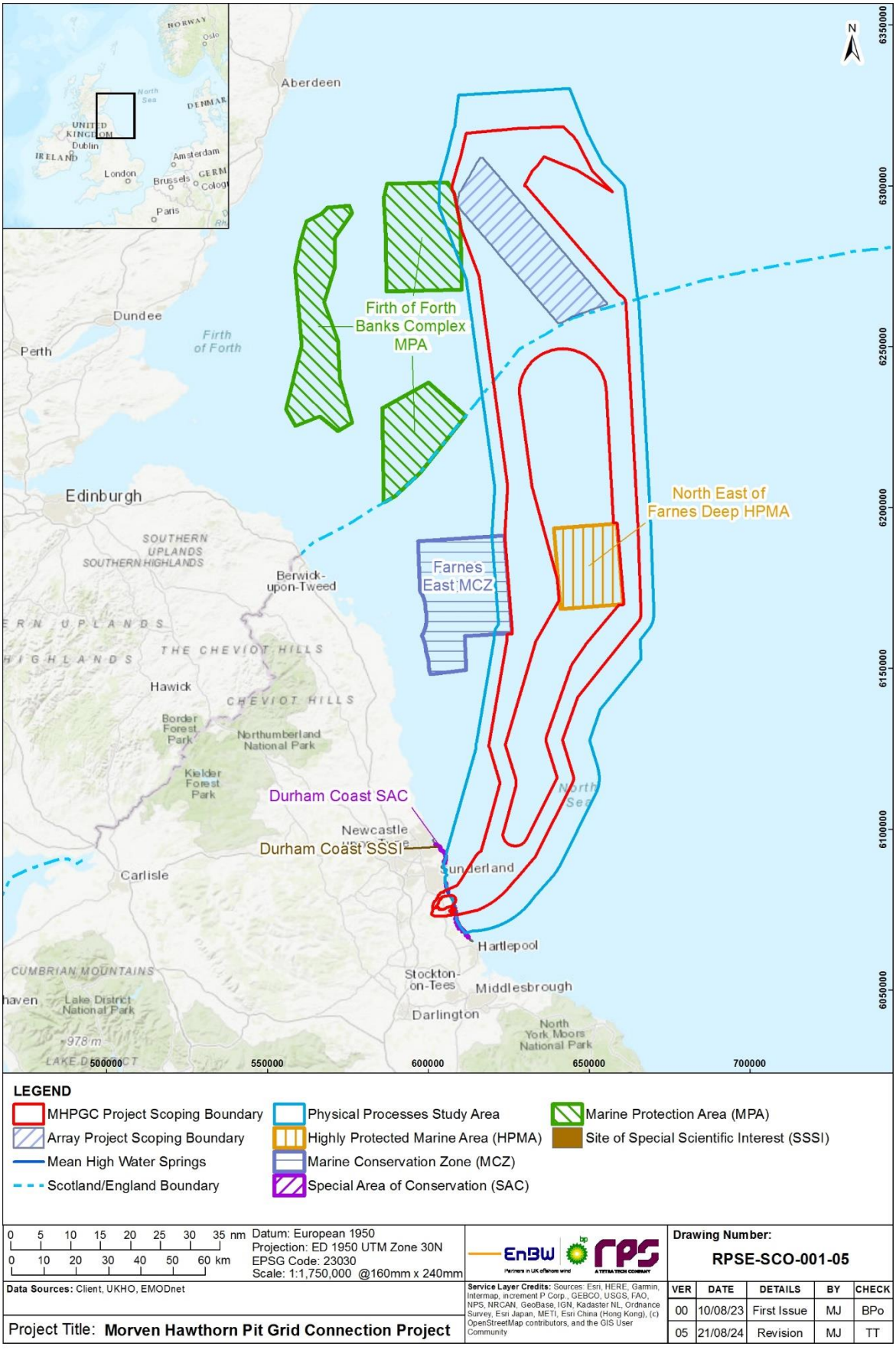


Figure 7.4: Designated Sites in the vicinity of the Physical Processes Study Area (JNCC, 2023a and Natural England, 2023b, 2023c)

7.1.6 Potential Impacts of the Morven Hawthorn Pit Grid Connection Project

7.1.6.1 A range of potential impacts on physical processes have been identified which may occur during the construction, O&M, and decommissioning phases of the MHPGC Project in the absence of designed-in measures. These impacts have been compiled by drawing on industry experience and expertise to identify those impact receptor pathways that may potentially lead to a significant impact.

7.1.6.2 The impacts that have been scoped into the assessment are outlined in Table 8.60 together with a description of any additional data collection (e.g. site specific surveys) and supporting analyses (e.g. modelling) that will be required to enable a full assessment of the impacts.

7.1.6.3 At this stage, there are no potential impacts proposed to be scoped out of the assessment.

7.1.6.4 The potential impacts from the MHPGC Project have been considered collectively for both English and Scottish waters, as these will not change between these areas given the commonality of the works proposed (offshore cabling).

Table 7.4: Impacts Proposed to be Scoped into the Morven Hawthorn Pit Grid Connection Project Assessment for Physical Processes

*Project phase refers to construction (C), O&M (O) and decommissioning (D).

Impact	Project Phase*			Relevant to England or Scotland	Justification	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D				
Increased suspended sediment concentrations (SSCs) and associated deposition.	✓	×	✓	Scottish and English waters	There is potential for increased SSCs, and associated deposition associated with activities during the construction and decommissioning phase. These include seabed preparation and cable installation in the construction phase and cable removal in the decommissioning phase. 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.	Data collected during the site specific geophysical survey campaign will provide data to support the development of the physical processes numerical modelling. Site specific metocean data may also be utilised to validate desktop sources and modelling. In addition, a detailed desktop data review will be conducted during the EIA process, which will be used to support the	Numerical modelling will be conducted to provide an overview of baseline conditions and to support the impact assessment for physical processes. Further detail on this modelling is provided in section 7.1.8.

Impact	Project Phase*			Relevant to England or Scotland	Justification	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D				
Impact to seabed morphology.	✓	✓	×	Scottish and English waters	During seabed preparation, there is potential to alter the seabed morphology. The presence of infrastructure within the water column, primarily in shallow areas, could alter the wave and tidal regime and impact sediment transport as a result. This could potentially impact physical features and physical processes receptors within the Physical Processes Study Area.	baseline characterisation further.	
Impacts to sediment transport pathways due to the presence of infrastructure.	×	✓	×	Scottish and English waters	The presence of infrastructure on the seabed (such as cable protection) could potentially disrupt sediment transport pathways directly, which may affect physical features and physical processes receptors.		

7.1.7 Designed In Measures and Mitigation

7.1.7.1 As part of the Project design process, a number of designed in measures (primary and tertiary) will reduce the potential for impacts on physical processes (Table 7.5). As there is a commitment to implement these measures, they are considered inherent to the design of the MHPGC Project. The determination of magnitude and significance will assume the implementation of such measures. Some of these measures are considered standard industry practice for this type of development.

7.1.7.2 The requirement for any additional (secondary) mitigation measures will be dependent on the significance of the effects on physical processes receptors. The requirement for and feasibility of any mitigation measures will be consulted upon with statutory consultees throughout the EIA process.

Table 7.5: Designed in Measures of the Morven Hawthorn Pit Grid Connection Project, Relevant to Physical Processes

Reference Number	Designed in Measures	Justification	Primary or Tertiary
MM-10	Development and adherence to a Cable Specification and Installation Plan (CSIP).	There is a potential for cable exposure to occur due to interactions between metocean regime (wave, sand and currents). Sediment transportation can lead to exposure of cables and infrastructure, although the use of a target cable burial depth alongside the cable installation strategy should provide sufficient depth to avoid exposure. The Cable Plan will outline the technical specifications of the cables used in the MHPGC Project and describe the installation methodology; also includes cable protection to be installed.	P
MM-11	Implementation, management and monitoring of cable protection (via burial or external protection where adequate burial depth, as identified via risk assessment, is not feasible) with any damage, destruction or decay of cables notified to MCA, NLB, Kingfisher and United Kingdom Hydrography	To protect the cable and also the infrastructure of other seabed users.	P

Reference Number	Designed in Measures	Justification	Primary or Tertiary
	Office (UKHO) no later than 24 hours after discovered. Secured through the Navigation Safety and Vessel Management Plan.		

7.1.8 Proposed Assessment Methodology

7.1.8.1 The Physical Processes Chapter of the EIA Report/ES will follow the methodology set out in Chapter 4: EIA Methodology, of the Scoping Report. The following guidance will also be considered:

- 'Guidelines in the use of Metocean data through the lifecycle of a marine renewable development' (Cooper *et al*., 2008);
- 'Coastal Process Modelling for Offshore Wind Farm Environmental Impact Assessment: Best Practice Guide' (Lambkin *et al.,* 2009);
- 'Advice to Inform Development of Guidance on Marine, Coastal and Estuarine Physical Processes Numerical Modelling Assessments' (Pye *et al.,* 2017).

7.1.8.2 As stated in Table 8.60, numerical modelling is planned to fully assess the potential impacts of all phases of development upon physical processes. This modelling will be undertaken to assess the magnitude and significance of impacts upon physical processes and will include SSCs, seabed morphology (including changes to the wave and tidal regime), and sediment transport and pathways.

7.1.8.3 The modelling will be undertaken using MIKE software, which contains a suite of global standard coastal and environmental modelling modules. These modules can be applied to a single model mesh and allow the modelling of combined (coupled) parameters to be undertaken. The MIKE flexible mesh coupled modules will then be used to model the baseline wave climate, tidal flows and sediment transport. This model provides sufficient detail to simulate the parameters and is also computationally efficient as it uses a flexible mesh comprising the most recent bathymetric data. The modelling will be validated using all available sources, including data from the site specific surveys within the Physical Processes Study Area, which were unavailable at the time of writing this Scoping Report.

7.1.8.4 The computational model applied in the baseline study will be amended to assess the impact of the following:

- installation (including seabed preparation and cable installation activities);
- operational effects on seabed morphology (as a result of changes to waves, tides and sediment transport);
- operational effects due to the presence of the infrastructure and disruption to the sediment transport regime.

7.1.8.5 The outputs of the numerical modelling will be used to support the impact assessment for other topics in the EIA Report/ES, such as benthic subtidal and intertidal ecology, and fish and shellfish ecology.

7.1.9 Potential Cumulative Impacts

7.1.9.1 Cumulative effects with the Morven Offshore Wind Array Project and the second grid connection project in the Branxton area Southeast Scotland will be considered, together with cumulative effects with other developments, where relevant.

7.1.9.2 The cumulative effect assessment will follow the approach outlined in Chapter 4: EIA Methodology, of the Scoping Report.

7.1.10 Potential Inter-related Effects

7.1.10.1 The EIA will consider inter-related effects arising from the MHPGC Project, across their own phases (project lifetime) and different effects on one receptor in one phase (receptor led). The EIA will consider inter-related effects of multiple impacts from the construction, O&M and decommissioning phases of the MHPGC Project, affecting one receptor. Inter-related effects will be assessed through consideration of all effects on a receptor, considering both spatial and temporal overlap, within the MHPGC Project. This will ensure that the MHPGC Project is appropriately considered within the EIA and in line with Chapter 4: EIA Methodology, of the Scoping Report.

7.1.11 Potential Transboundary Impacts

7.1.11.1 The Physical Processes Study Area has been defined as the extent of one spring tidal excursion from the MHPGC Project Scoping Boundary. The Physical Processes Study Area is, therefore, entirely out with any other European Economic Area (EEA) State and no potential transboundary impacts are predicted for this topic. Physical processes have, therefore, been screened out of further assessment for transboundary impacts in the EIA.

7.2 Underwater Sound

7.2.1 Introduction

7.2.1.1 This chapter of the Scoping Report identifies the elements of underwater sound of relevance to the Morven Hawthorn Pit Grid Connection Project (hereafter referred to as 'MHPGC Project') and considers the potential impacts arising from the construction, operation and maintenance (O&M), and decommissioning of the MHPGC Project. This scoping chapter adopts a proportionate approach to only those impacts with potential to result in likely significant effects and therefore scopes out other impacts where there is evidence that the effects are not likely to be significant.

7.2.1.2 The underwater sound modelling study will provide an assessment of the levels of underwater sound generated during each of the MHPGC Project phases. The impacts of this underwater sound on the following receptor groups are discussed in their respective chapters:

- Chapter 7.5: Fish and Shellfish Ecology;
- Chapter 7.6: Marine Mammals;
- Chapter 7.8: Commercial Fisheries.

7.2.2 Policy and Legislation

7.2.2.1 This section identifies the relevant legislation, policy and other documentation that will inform the assessment of likely significant effects with respect to underwater sound. Further information on policies relevant to the Environmental Impact Assessment (EIA) and their status is provided in Chapter 4: EIA Methodology, of the Scoping Report.

7.2.2.2 Underwater sound (identified as noise) is one of the Descriptors for achieving Good Environmental Status (GES) under the EU Marine Strategy Framework Directive (MSFD) (number 11: Introduction of Energy, including noise, Directive 2008/56/EC). The two relevant criteria of the MSFD (D11C1 and D11C2) stipulate that the spatial distribution, temporal extent, and levels of anthropogenic impulsive and continuous low-frequency sound (respectively) do not exceed levels that adversely affect populations of marine animals (original Decision 2010/477/EU, later superseded by Commission Decision 2017/848). The MSFD was transposed into UK law by the Marine Strategy Regulations 2010.

7.2.2.3 The impacts of underwater sound on the receptors outlined above may also fall under other policy and legislation relevant to the protection of those receptors. These are outlined in Chapter 2: Policy and Legislation of the Scoping Report and the respective topic chapters:

- Chapter 7.5: Fish and Shellfish Ecology;
- Chapter 7.6: Marine Mammals.

7.2.3 Study Area

7.2.3.1 The impact of underwater sound generated during the MHPGC Project phases is assessed by considering the impact on the sensitive receptors outlined above. The Underwater Sound Study Area is therefore defined by those receptors outlined in

paragraph 7.2.1.2 and, as such, no separate study area is identified. Figure 7.5 shows the study area of the receptors groups identified above.

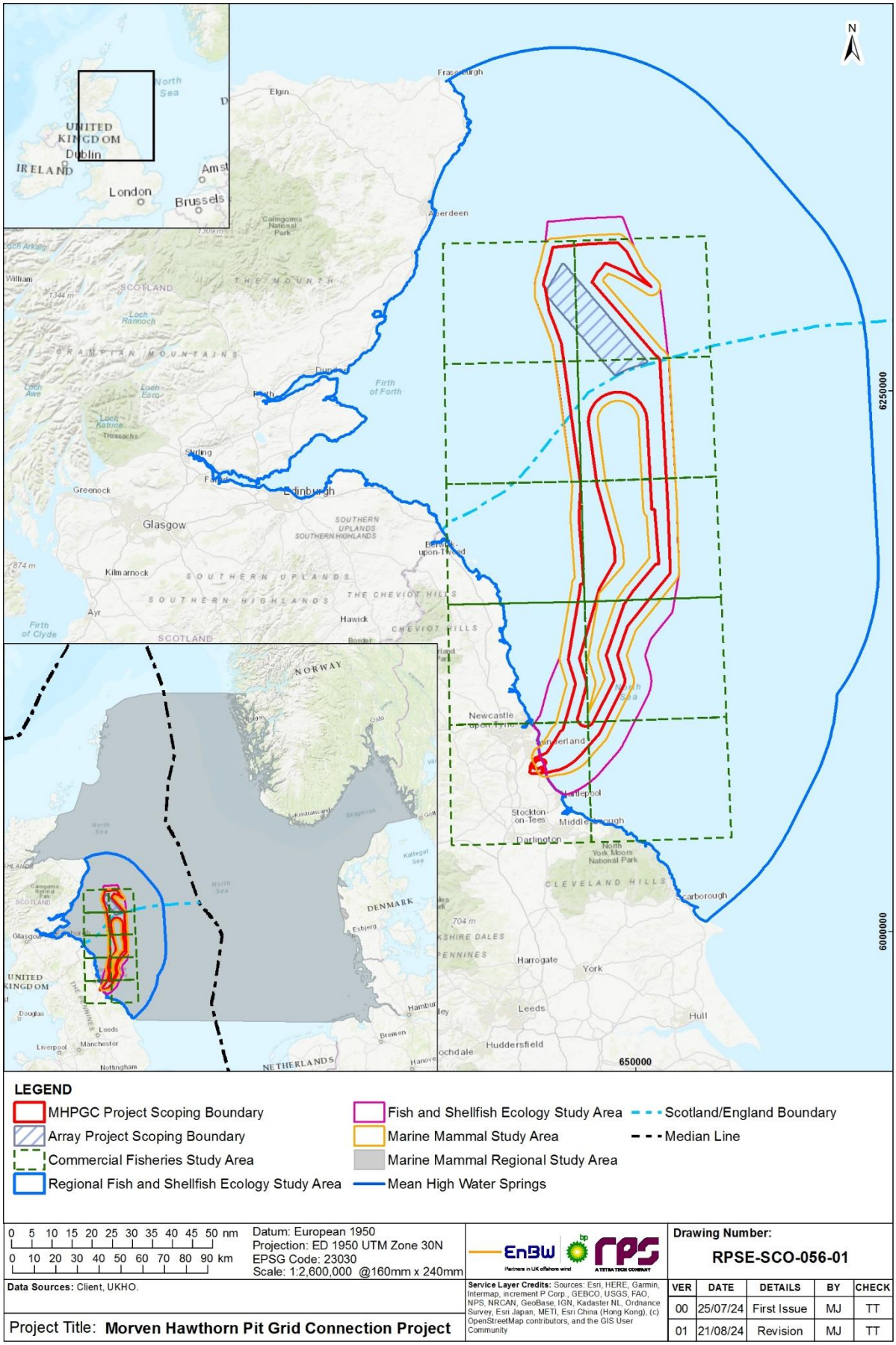


Figure 7.5: Marine Mammal, Fish and Shellfish and Commercial Fisheries Study Areas.

7.2.4 Data Sources

7.2.4.1 Data collected during site specific project surveys will be used to inform the environmental input for underwater sound modelling. This data may include, but is not limited to, bathymetric data, seabed geoacoustic parameters, and seawater temperature and conductivity data.

7.2.4.2 Public data sources will be used where data inputs for underwater sound modelling are not provided by data collection during characterisation of the baseline environment, or where collected data requires augmentation. A summary of the datasets that have so far been identified is presented in Table 7.6.

Table 7.6: Summary of Likely Data Sources to be Used for Underwater Sound Modelling

Title	Source	Year	Author
International/UK			
Copernicus European North West Shelf-Ocean Physics Reanalysis.	E.U. Copernicus Marine Service Information.	2023	E.U. Copernicus Marine Service Information (CMEMS).
European Marine Observation and Data Network (EMODnet) bathymetry.	EMODnet.	2022	EMODnet Bathymetry Consortium, 2022.
Generalised Digital Environmental Model.	Generalised Digital Environmental Model.	2009	Teague *et al.*, 1990 Carnes, 2009.
Acoustic source levels: vessels and construction sound.	Published literature.	Various.	For example: Nedwell and Edwards, 2004. Robinson *et al.,* 2011 Jiménez-Arranz *et al.*, 2020. MacGillivray and de Jong, 2021.
Acoustic source levels: mid- and high-frequency geophysical sources. Source specific parameters such as source level, operating frequency, pulse length, pulse repetition rate, transducer shape and beamwidth, beam count and swath coverage.	Manufacturer datasheets.	Various.	Various.
National (Scotland)			

Title	Source	Year	Author
Scottish Shelf Waters Reanalysis Service.	Marine Scotland.	2022	Barton *et al*.

7.2.5 Baseline Environment

Project wide (Scottish and English waters)

7.2.5.1 Ambient underwater sound represents the baseline environment for underwater sound and is defined as the sound present in the absence of a specified activity (ISO 18405:2017). The specified activities for the purposes of the EIA are the underwater sound-generating processes within each of the MHPGC Project phases. Ambient sound is a composite of many sources, near or far, which may be geophonic (naturally generated, non-biological), biophonic (generated by non-human living organisms), or anthrophonic (generated by humans or human activity) in origin (Krause, 2008).

7.2.5.2 Sources of geophonic sound may be related to oceanographic conditions. Higher sea states and wind speeds commonly generate higher sound levels due to breaking whitecaps, surface flow sound, wave generation, cavitation, and pressure change (Urick, 1983). Rainfall may also elevate sound levels via sound from surface impacts and bubble entrapment (Heindsmann *et al.*, 1955; Bom, 1969; Scrimger *et al.*, 1987). Waves, sea ice, currents, and seismic activity (such as earth movement and subsea landslides) can also be geophonic contributors generating high sound levels, although typically only for short durations (Chapp *et al.*, 2005; Ardhuin *et al.*, 2011).

7.2.5.3 Marine mammals are the primary biological contributors to underwater ambient sound, though some aquatic invertebrates and fish species are also capable of producing sound. Marine mammals, particularly cetaceans, rely almost exclusively on sound for navigating, foraging, breeding, and communicating (Clark, 1990; Edds-Walton, 1997; Tyack and Clark, 2000).

7.2.5.4 Anthropogenic underwater sound can either be produced for a specific purpose (e.g. geophysical surveys) or generated as a by-product of marine operations. Within the relevant study areas for underwater sound, as shown in Paragraph 7.2.3.1 and Figure 7.5, the primary sources of anthropogenic sound are likely to be related to shipping activity and, to a lesser extent, oil and gas activity. The predominant sources of sound from shipping are engine sound radiating through vessel hulls and cavitating propulsion systems. More detailed information related to shipping including vessel types and numbers is presented in Chapter 7.9: Shipping and Navigation of the Scoping Report.

7.2.5.5 No site specific surveys have been carried out to characterise the baseline underwater sound conditions in either Scottish or English waters for this Scoping Report. Surveys that will be carried out to characterise the environment that will help inform underwater sound modelling are presented in Table 7.7.

7.2.6 Potential Impacts from the Morven Hawthorn Pit Grid Connection Project

7.2.6.1 A range of potential impacts have been identified which may arise from underwater sound generated during the construction, O&M, and decommissioning phases of the MHPGC Project. Industry experience and subject matter expertise has been used to identify activities generating underwater sound which may affect the sensitive receptors outlined in paragraph 7.2.1.2.

7.2.6.2 The impacts that have been scoped into the assessment are outlined in Table 7.7 together with a description of any additional data collection (e.g. site specific surveys) and supporting analyses (e.g. modelling) that will be required to enable a full assessment of the impacts.

7.2.6.3 Potential impacts scoped out of the assessment are presented in Table 7.8, with justification.

7.2.6.4 The potential impacts from the MHPGC Project have been considered collectively for both English and Scottish waters, as these will not change between these areas given the commonality of the works proposed (offshore cabling).

Table 7.7: Impacts Proposed to be Scoped into the Morven Hawthorn Pit Grid Connection Project Assessment for Underwater Sound.

* Project phase refers to construction (C), O&M (O) and decommissioning (D).

Impact	Project Phase*			Relevant to England or Scotland	Justification	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D				
Increased underwater sound from unexploded ordnance (UXO) clearance.	✓	×	×	Scottish and English Waters	UXO clearance, undertaken as preparatory work before construction phase only, generates impulsive sound which can affect marine fauna.	Data collected during the site specific geophysical and geotechnical survey campaign will provide data to characterise the geo-acoustic environment, as needed for underwater sound modelling.	Numerical modelling will be conducted to assess the impact of underwater sound on receptor groups highlighted in section 7.2.1. The approach is outlined in section 7.2.8 and presented in more detail in Appendix B: Underwater Sound Impact Modelling Methodology, of the Scoping Report. The results of the underwater sound assessment will be presented in an Underwater Sound Technical Report, and any possible impacts on identified receptors will be incorporated in Chapter 7.5: Fish and Shellfish Ecology, Chapter 7.6:

Impact	Project Phase*			Relevant to England or Scotland	Justification	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D				
Increased underwater sound from non-impulsive sound sources.	✓	✓	✓	Scottish and English Waters	Effects of non-impulsive sound on marine fauna are assessed against different criteria than those used for impulsive sound. The exact sources of non-impulsive sound have not yet been explicitly defined but are likely to include: • vessel activity during all MHPGC Project phases; • activities such as cable laying, cable burial, and cable protection installation during the construction phase; • decommissioning activities such as removal of cables and cable protection.		Marine Mammal and Chapter 7.8: Commercial Fisheries, of the Scoping Report.

Impact	Project Phase*			Relevant to England or Scotland	Justification	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D				
Increased underwater sound from geophysical surveys.	✓	✓	✓	Scottish and English Waters	Geophysical surveys may be undertaken during all MHPGC Project phases, generating sound which can affect marine fauna. Different geophysical sources may be categorised as impulsive or non-impulsive dependent on their signal characteristics.		The approach will be the same as above. Where sound source signatures may not clearly be defined as either impulsive or non-impulsive, the more stringent assessment criteria will be applied.

Table 7.8: Impacts Proposed to be Scoped out of the Morven Hawthorn Pit Grid Connection Project Assessment for Underwater Sound

Impact	Justification
Effects of the particle motion element of underwater sound on marine mammals during all phases.	The ability of marine mammals to detect particle motion is poorly understood (Mooney *et al.*, 2016) and consequently there is no evidence that particle motion has any effect on marine mammals. This impact is therefore scoped out of Chapter 7.6: Marine Mammal, of the Scoping Report.

7.2.7 Designed In Measures and Mitigation

7.2.7.1 The following designed in measures are relevant to underwater sound. The designed in measures will evolve over the development process as the EIA progresses.

7.2.7.2 As part of the Project design process, a number of designed in measures (primary and tertiary) will reduce the potential for impacts on underwater sound (Table 7.9). As there is a commitment to implement these measures, they are considered inherent to the design of the MHPGC Project. The determination of magnitude and significance will assume the implementation of such measures. Some of these measures are considered standard industry practice for this type of development.

7.2.7.3 Any secondary mitigation requirements for underwater sound will be dependent on the significance of the effects, as identified during the EIA process.

Table 7.9: Designed in measures and mitigation as part of the Morven Hawthorn Pit Grid Connection Project, relevant to underwater sound.

Reference Number	Designed in Measures	Justification	Primary or Tertiary
MM-99	A low-order UXO disposal method (e.g. deflagration) will be considered the preferred method of UXO disposal where appropriate.	Low-order UXO disposal techniques such as deflagration release much less energy into the marine environment than high-order techniques such as detonation. This reduces the levels of underwater sound generated. There are several methodologies that may be used to clear UXO targets, including detonation of the UXO using an explosive counter-charge placed next to the UXO on the seabed (referred to as a 'high order' technique) or methods that neutralise the UXO to be safe without detonation (referred to as 'low order' techniques). These low order techniques include 'deflagration' which involves the use of a small charge to 'burn out' the explosive material without detonation. The use of the low order techniques is dependent on the condition of the UXO	P

Reference Number	Designed in Measures	Justification	Primary or Tertiary
		and individual circumstances. Furthermore, the Applicant will not know what condition a UXO is in until it is investigated through the pre-construction site investigation surveys. Therefore, whilst the use of low order techniques is a potentially viable solution for clearance of UXO, it is not possible to make a commitment to using them at this stage as it will not be known whether it is a feasible option.	

7.2.8 Proposed Assessment Methodology

7.2.8.1 A detailed outline of the proposed methodology for assessing impacts of underwater sound is presented in Appendix B: Underwater Sound Impact Modelling Methodology. The broad outline of the procedure is as follows:

- estimate source levels for each activity either through source modelling, manufacturer specified parameters, or use of a suitable proxy source;
- conduct sound propagation modelling in three dimensions around the source and estimate distances to impact criteria thresholds;
- consider cumulative impacts of multiple events and multiple operations if necessary.

7.2.9 Potential Cumulative Impacts

7.2.9.1 Cumulative effects with the Morven Offshore Wind Array Project and the second grid connection project in the Branxton area Southeast Scotland will be considered, together with cumulative effects with other developments, where relevant.

7.2.9.2 The cumulative effect assessment will follow the approach outlined in Chapter 4: EIA Methodology, of the Scoping Report.

7.2.10 Potential Inter-related Effects

7.2.10.1 The EIA will consider inter-related effects arising from the MHPGC Project, across their own phases (project lifetime) and different effects on one receptor in one phase (receptor led). The EIA will consider inter-related effects of multiple impacts from the construction, O&M and decommissioning phases of the MHPGC Project, affecting one receptor. Inter-related effects will be assessed through consideration of all effects on a receptor, considering both spatial and temporal overlap, within the MHPGC Project. This will ensure that the MHPGC Project is appropriately considered within the EIA and in line with Chapter 4: EIA Methodology, of the Scoping Report.

7.2.10.2 Consideration will be given to inter-related effects on relevant receptors due to underwater sound in the respective topic sections (Chapter 7.5: Fish and Shellfish Ecology, Chapter 7.6: Marine Mammal and Chapter 7.8: Commercial Fisheries), of the Scoping Report.

7.2.11 Potential Transboundary Impacts

7.2.11.1 Consideration will be given to transboundary impacts on relevant receptors due to underwater sound in the respective topic sections (Chapter 7.5: Fish and Shellfish Ecology, Chapter 7.6: Marine Mammal and Chapter 7.8: Commercial Fisheries), of the Scoping Report.

7.3 Water Quality

7.3.1 Introduction

7.3.1.1 This chapter of the Scoping Report identifies the water quality receptors of relevance to the Morven Hawthorn Pit Grid Connection Project (hereafter referred to as 'MHPGC Project') and considers the potential impacts arising from the construction, operation and maintenance (O&M), and decommissioning of the MHPGC Project. This scoping chapter adopts a proportionate approach to only those impacts with potential to result in likely significant effects and therefore scopes out other impacts where there is evidence that the effects are not likely to be significant.

7.3.1.2 It is proposed to scope out offshore water quality from the Environmental Impact Assessment (EIA) and this chapter of the Scoping Report sets out the rationale for this approach.

7.3.1.3 A Water Framework Directive (WFD) Screening and Scoping Assessment is provided in Appendix D: WFD Screening and Scoping, of the Scoping Report.

7.3.2 Policy and Legislation

7.3.2.1 This section identifies the relevant legislation, policy and other documentation that will inform the assessment of likely significant effects with respect to Water Quality Further information on policies relevant to the Environmental Impact Assessment (EIA) and their status is provided in Chapter 2: Policy and Legislation.

7.3.2.2 To provide a robust evidence base, Table 7.10 presents a summary of legislation and policies relevant to water quality, for which this section takes account of specific requirements to assess and address likely impacts on receptors and relevant environmental issues.

Table 7.10: Relevant Legislation and Policy

Relevant Legislation	Relevance to the Assessment
International Legislation	
Marine Strategy Framework Directive	The overarching aim of the Directive is to protect Europe's marine waters by applying an ecosystem-based approach to the management of human activities while enabling the sustainable use of the marine environment for present and future generations. The Directive establishes a legal framework for the development of marine strategies designed to achieve Good Environmental Status (GES) in the marine environment by, at the latest, the year 2020. The marine strategy involves defining GES, setting environmental targets and indicators, implementing monitoring programmes for ongoing assessment, and developing and implementing programmes of measures to achieve or maintain GES. GES is defined as "The environmental status of marine waters where these provide ecologically diverse and dynamic oceans and seas which are clean, healthy and productive, and the use

Relevant Legislation	Relevance to the Assessment
	of the marine environment is at a level that is sustainable, thus safeguarding the potential for uses and activities by current and future generations". The assessment of GES is undertaken by reference to qualitative descriptors which define overarching objectives in respect of key socio-economic or ecological aspects of the marine environment including: • biodiversity; • non-indigenous species; • commercially exploited fish; • food webs; • eutrophication; • sea floor integrity; • hydrographical conditions; • contaminants; • contaminants in seafood; • marine litter; and • introduction of energy, including underwater noise at levels that do not adversely affect the marine environment.
National Legislation (UK)	
Marine Strategy Regulations, 2010	Transposes the requirements of the European Union's (EU's) Marine Strategy Framework Directive (MSFD) into domestic law, requires the United Kingdom (UK) to put in place measures to achieve or maintain GES of marine waters within the marine strategy area by 31 December 2020.
UK Marine Policy Statement, 2011	This is a policy framework prepared and adopted under section 44 of the Marine and Coastal Access Act 2009, which gives it a statutory basis. The framework aims to achieve sustainable development in the UK's marine area by balancing economic, social, and environmental considerations.
National Legislation (Scotland)	
The Marine (Scotland) Act 2010	This Act makes provisions for those functions and activities in the Scottish marine area, including provision about marine plans, licensing of marine activities, the protection of the area and its wildlife including seals and regulation of sea fisheries, and for connected purposes.
The Water Environment (Controlled Activities)	These regulations were introduced under the Water Environment and Water Services (Scotland) Act 2003to specify the control regimes for discharges to, abstractions from and impoundments and engineering activities affecting the water

Relevant Legislation	Relevance to the Assessment
(Scotland) Regulations 2011	environment (e.g. rivers, lochs, transitional waters (estuaries), coastal waters, groundwater and groundwater dependant wetlands).
The Water Environment (Shellfish Water Protected Areas: Environmental Objectives etc.) (Scotland) Regulations 2013.	These regulations concern the management of water quality for commercial shellfish cultivation and aim to protect and improve the quality of shellfish waters in Scotland. They set environmental objectives to support the life and growth of shellfish and ensure high-quality shellfish products suitable for human consumption.
The Environment (EU Exit) (Scotland) (Amendment etc.) Regulations 2019	Legislation implementing the requirements of the directives such as the WFD, so that it continues to work in the same way after EU exit.
National Legislation (England)	
Marine and Coastal Access Act 2009	This act makes provisions for those functions and activities in the marine area, including provision about marine plans, licensing of marine activities, the protection of the area and its wildlife including seals and regulation of sea fisheries, and for connected purposes.
The Water Environment (WFD) (England and Wales) Regulations 2017	These regulations establish a framework for managing water resources in England and Wales, aiming to protect and improve water quality, ensure sustainable use and integrate the protection of water bodies into broader environmental policy. They include coastal and marine waters as part of their scope, setting chemical and ecological standards for pollution and degradation.
The Environment (Amendment etc.) (EU Exit) Regulations 2019	The amendments made by these regulations address deficiencies in retained EU law, ensuring that the MSFD and the WFD and supporting legislation remain operational and enforceable in the UK post-Brexit. Without these regulations, legal gaps, loss of regulatory functions and technical deficiencies would undermine the effectiveness of these directives.
National Policy (Scotland)	
National Marine Plan 2015	The Scottish National Marine Plan (SNMP) sets out strategic policies for the sustainable development of Scotland's marine resources out to 200 nm. It is required to be compatible with the UK Marine Policy Statement and existing marine plans across the UK. It incorporates plans for the development of a range of sectors, including: • sea Fisheries;

Relevant Legislation	Relevance to the Assessment
	• aquaculture; • wild salmon and diadromous fish; • oil and gas; • carbon capture and storage; • recreation and tourism; • shipping ports, harbours and ferries; • submarine cables; • defence; • aggregates; • offshore wind and marine renewable energy. The NMP sets out the environmental requirements that constrain development within Scottish waters and draws out general planning policies (GEN 1 to GEN 21) which are considered when assessing development in the marine environment. Policies of the NMP relevant to water quality include: • By contributing to the management of human induced pressures on water quality, marine planning will provide one delivery mechanism for River Basin Management Plans (RBMPs); • Developments and activities should not result in a deterioration of the quality of waters to which the WFD, MSFD or other related Directives apply and also take account of Shellfish Growing Waters and Bathing Water Directives. Decision makers should satisfy themselves where relevant that any development will not cause a deterioration in status of any water to which the WFD applies, subject to the provision of Article 4.7 of that Directive (Gen 12 Water Quality and Resource). • Development and use of the marine environment must: - comply with legal requirements for protected areas and protected species; - not result in significant impact on the national status of Priority Marine Features (PMFs); - protect and, where appropriate, enhance the health of the marine area (GEN 9 Natural heritage).
Sectoral Marine Plan for Offshore Wind Energy 2020	The Sectoral Marine Plan for Offshore Wind Energy aims to identify sustainable plan options for the future development of commercial-scale offshore wind energy in Scotland, including deep water wind technologies, and covers both Scottish inshore (Scottish territorial waters or within 12 nm from shore) and

Relevant Legislation	Relevance to the Assessment
	offshore waters (extending out to the Exclusive Economic Zone (EEZ) limit). The Strategic Environmental Assessment (SEA) of the Sectoral marine Plan identified that there is a potential impact on water quality during the installation, operation and decommissioning processes, from all of the technologies, due to increased turbidity, seabed disturbance and contamination from installation, maintenance and decommissioning equipment and vessels. It is likely the magnitude of the impacts will differ between the technologies employed during the construction, operation and decommissioning. The SEA states that the associated impact on marine biodiversity, particularly those dependent on existing water conditions such as benthic species (i.e. filter feeders) is likely to be site specific.
National Policy (England)	
North East Inshore and North East Offshore Marine Plan	The North East Inshore and North East Offshore Marine Plan provides guidance for sustainable development from the Scottish Border to Flamborough Head in Yorkshire. It is required to be compatible with the UK Marine Policy Statement and existing marine plans across the UK. The Plan applies national policies in a local context, ensuring the needs and aspirations of both marine plan areas are reflected by considering plan area level issues and supporting evidence. It incorporates plans for the development of a range of sectors, including: • aquaculture; • cables; • coastal change; • defence; • dredging and disposal; • fisheries; • heritage assets; • infrastructure; • marine aggregates; • Marine Protected Areas; • minerals; • oil and gas; • ports and shipping; • recreation; • renewable energy;

Relevant Legislation	Relevance to the Assessment
	• seascape; • tourism; • water quality. Policies of the North East Inshore and North East Offshore Marine Plan relevant to water quality include: • NE-WQ-1: proposals that protect, enhance and restore water quality will be supported. Proposals that cause deterioration of water quality must demonstrate that they will, in order of preference: a) avoid; b) minimise; c) mitigate – deterioration of water quality in the marine environment.
Local Policy (England)	
Core Strategy and Development Plan 2015-2033 (Sunderland City Council, 2020).	This plan includes policies aimed at protecting and improving the quality of coastal and marine environments. These policies are part of the broader objectives to ensure sustainable development and environmental protection in the region. Key policies include: **NE2: Marine and Coastal Environment** - This policy aims to protect and enhance the marine and coastal environment. It focuses on maintaining water quality, protecting marine habitats, and ensuring sustainable use of marine resources. **Policy NE3: Water Quality** - This policy ensures that developments do not adversely affect water quality. It requires measures to prevent pollution and manage water runoff, which can impact coastal and marine waters.

7.3.3 Study Area

7.3.3.1 For the purpose of this Scoping Report, the Water Quality Study Area has been defined as the extent of one spring tidal excursion from the MHPGC Project Scoping Boundary (Figure 7.6). The Water Quality Study area thus extends circa 5km to 9km from the MHPGC Project Scoping Boundary, extending up to Mean High Water Springs (MHWS) at the top of the intertidal zone. The 5km to 9km equates to one maximum tidal ellipse over a large spring tide around the MHPGC Project Scoping Boundary representing the dominant tidal currents. This buffer is designed to incorporate the Zone of Influence (ZoI) for the maximum extent of indirect impacts to benthic subtidal receptors, fish and shellfish ecology and Marine Protected Area (MPA) receptors from increases in Suspended Sediment Concentrations (SSC) and deposition.

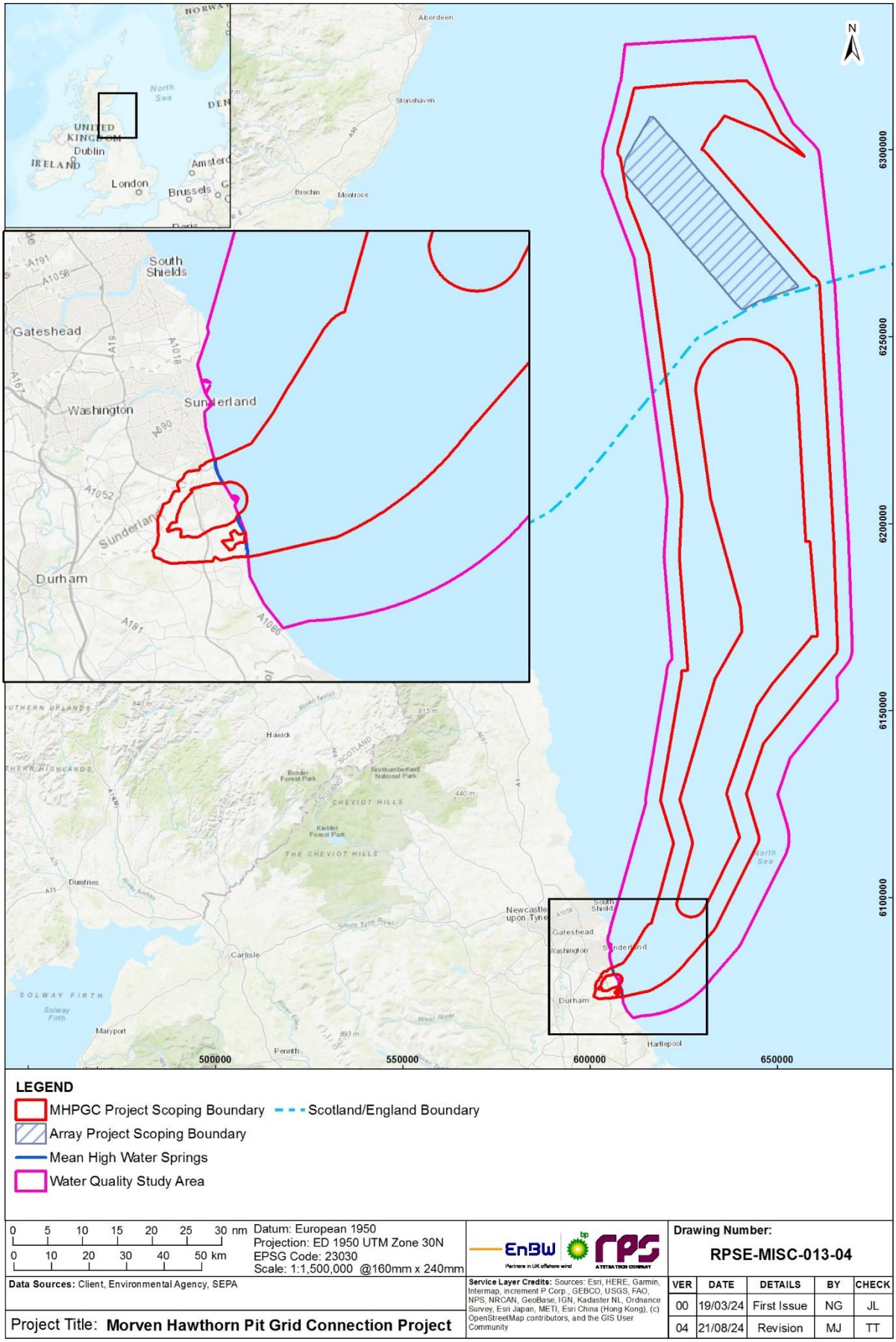


Figure 7.6: Water Quality Study Area

7.3.4 Data Sources

Desktop Data

7.3.4.1 An initial desk based review of literature and data sources to support this chapter has identified a number of data sources that provide coverage of the Water Quality Study Area. These are summarised in Table 7.11.

Table 7.11: Summary of Key Desktop Datasets and Reports

Title	Source	Year	Author
National (Scottish Waters)			
The River Basin Management Plan for Scotland 2021– 2017.	Scottish Environmental Protection Agency (SEPA).	2021.	SEPA for the Scottish Government.
Scottish Bathing Waters 2023.	SEPA for the Scottish Government.	2023a; 2023b.	SEPA for the Scottish Government.
Shellfish water protected areas.	SEPA for the Scottish Government.	2023c.	SEPA for the Scottish Government.
National (English Waters)			
Action level tool for sediment contaminants.	Centre for Environment Fisheries and Aquaculture Science (Cefas).	2023.	Cefas.
English Bathing Waters.	English Government.	2024a.	English Government.
Sediment analysis and sample plans.	Marine Management Organisation (MMO).	2023.	MMO.
Shellfish water protected areas.	English Government.	2024b.	Cefas.

Site Specific Survey Data

7.3.4.2 A site specific survey was conducted during June to November 2023 to define the environmental baseline for the MHPGC Project. This survey was designed to characterise the Water Quality Study Area. The full scope of the survey is outlined in Chapter 7.4: Benthic Subtidal and Intertidal Ecology.

7.3.4.3 Sediment samples were collected at 66 stations for analysis of Total Hydrocarbon Content (THC), Polycyclic Aromatic Hydrocarbons (PAHs), metals, Total Organic Carbon, organotin and Polychlorinated Biphenyls (PCBs), to allow comparison of contaminant levels to the relevant Action Levels (ALs) and MMO (2023) guidelines, which give an indication on the degree of contamination.

7.3.4.4 Outputs of this analysis have been used to inform the scoping of impacts to water quality from the MHPGC Project. The results of this sampling are presented in Table 7.12.

7.3.5 Baseline Environment

7.3.5.1 The Offshore Water Quality Study Area sits within the geographic scope of monitoring for the MSFD descriptors, as it lies within the marine waters in which the UK exercises jurisdiction. Compliance with the Marine Strategy Regulations through the UK Marine Strategy is measured by GES, however, data from monitoring programmes are pending publication as of early 2023.

Project wide (Scottish and English waters)

Bathing waters

7.3.5.2 There are no bathing water beaches within the study area in Scottish waters.There are two bathing water beaches within the Water Quality Study Area in English waters: Seaham Hall Beach and Seaham Beach. Seaham Hall Beach was classified as 'sufficient' in 2023, and Seaham Beach was classified as 'good' in 2023. There is no explicit statutory requirement for bathing waters to achieve or maintain a given status, but summary information on water quality status must be available to the public at bathing locations.

Site Specific Survey Contaminant Results

7.3.5.3 Seabed disturbance associated with construction, maintenance, and decommissioning activities (e.g. cable installation) could lead to the remobilisation of sediment-bound contaminants that may affect water quality.

7.3.5.4 Results of analysis of samples from the site specific survey for the MHPGC Project (Gardline, 2024) showed only one station with hydrocarbon levels above the United Kingdom Offshore Operators Association (UKOOA) mean background reference concentrations, therefore levels were considered consistent with background concentrations. THC concentrations were all below thresholds expected to impact on water quality. Furthermore, analysis of PAH concentrations across the survey area found a lack of petrogenic contamination across the survey area. For PCBs, levels were typically below the Limit of Detection (LOD) across the survey area, with 20 of the 66 stations having values above LOD. Of these 20 stations, no concentrations exceeded the Cefas AL 1 concentrations.

7.3.5.5 Of the metals that were reported, five (arsenic, chromium, mercury, nickel and lead) exceeded Cefas AL 1 at one or more station, with no analyte exceeding Cefas AL 2. Metal concentrations across the survey area were below the relevant impacts thresholds and impacts range median values. However, concentrations of arsenic (As) were reported to be above the impacts range low at one station while concentrations of copper (Cu) were above impacts range low at a single station. For stations located in Scottish waters, Cd and Hg were below LOD at all stations while all other stations were below the UKOOA (2001) mean for the central North Sea, indicating that these stations were comparable to the wider area.

7.3.5.6 Organotin concentrations were reported to below the LOD at all stations surveyed, except for one station, where concentrations of dibutyltin and tributyltin were

recorded as 0.003 and 0.005µg g-1 respectively. In addition, concentrations of organochloropesticides were generally below LOD across the survey area. Where ALs were available, only Dieldrin concentrations at three stations exceeded AL 1.

7.3.5.7 There is a disposal site for material dredged from Seaham Harbour within the Water Quality Study Area. The material is tested for contaminants prior to the disposal being granted. Removal or disturbance of sediment during the cable laying will be temporary.

7.3.5.8 The risk of sediment-bound contaminants being released in concentrations likely to affect water quality is therefore considered negligible.

7.3.5.9 This potential impact is therefore proposed to be scoped out of further consideration within the EIA, subject to consultation with the Statutory Nature Conservation Bodies (SNCBs).

Shellfish Water Protected Areas

7.3.5.10 The Water Environment (Shellfish Water Protected Areas: Environmental Objectives etc.) (Scotland) Regulations 2013 and the Water Environment (WFD) (England and Wales) Regulations 2017 transpose the Shellfish Waters Directive (2006/113/EC) concerning the management of water quality for commercial shellfish cultivation into Scottish law and English law respectively.

7.3.5.11 Shellfish, such as mussels and oysters, filter large volumes of water to obtain food. During this process they can concentrate organisms such as bacteria and viruses in their bodies, some of which may be harmful to humans (pathogens). Such organisms can be present due to contamination of water with sewage or animal faeces (faecal contamination) (Marine Scotland, 2023).

7.3.5.12 Levels of faecal contamination in shellfish collected from production areas (PAs) are monitored as prescribed in the European Regulation (EU) 2017/625. *E. coli* is used as an indicator of this contamination and, as such, of water

7.3.5.13 A WFD Screening and Scoping Assessment is provided in Appendix D: WFD Screening and Scoping, of the Scoping Report

7.3.6 Potential Impacts of the Morven Hawthorn Pit Grid Connection Project

7.3.6.1 Water quality is not generally regarded as a receptor in itself. However, changes in water quality such as increased SSC in the water may indirectly impact other receptors including benthic ecology, fish and shellfish and offshore ornithology through indirect impacts on prey availability. All potential significant impacts on offshore water quality have been identified based on professional experience of transmission projects, which may occur during the construction, O&M and decommissioning phases of the MHPGC Project. These impacts are outlined in Table 7.12.

7.3.6.2 As outlined in paragraph 7.3.1.2, it is proposed to scope out all potential impacts on offshore water quality from the EIA Report/Environmental Statement (ES). The justifications for this approach are presented in Table 7.12.

7.3.6.3 The potential impacts from the MHPGC Project have been considered collectively for both English and Scottish waters, as these will not change between these areas given the commonality of the works proposed (offshore cabling).

Table 7.12: Impacts Proposed to be Scoped out of the Morven Hawthorn Pit Grid Connection Project Assessment for Water Quality

Impact	Basis for Impact
Impacts to sediment transport and sediment transport pathways due to the presence of infrastructure.	There is no associated infrastructure within the water column throughout all phases of the MHPGC Project that could alter the tidal regime or impact sediment transport and pathways. It is anticipated that the physical processes modelling undertaken for the MHPGC Project will demonstrate that impacts to sediment transport or sediment transport pathways would be spatially restricted to within the MHPGC Project Scoping boundary and the surrounding area. Any impacts on water quality are expected to dissipate quickly. This impact is proposed to be scoped out of further consideration within the EIA with respect to offshore water quality receptors.
Increased SSC and associated deposition.	Sediment disturbance arising from construction activities and potential decommissioning (e.g. cable installation and including any deposits arising, Unexploded Ordnance clearance and seabed preparation) and maintenance operations (e.g. cable repair/reburial) may result in increases in SSC and siltation rate changes. However, any increases in SSC are predicted to be short term, returning to baseline levels on subsequent tides. Any impacts on water quality are expected to dissipate quickly. This impact is proposed to be scoped out of further consideration within the EIA with respect to offshore water quality receptors.
Increased risk of introduction and spread of Invasive Non-Native Species (INNS).	There is potential for an increased risk of introduction and spread of INNS through the vessel movements required during all phases of the MHPGC Project. This risk will be assessed in the Benthic Subtidal Ecology Chapter of the EIA Report/ES and mitigated through the designed in measures set out in Table 7.13. An Environmental Management Plan (EMP) will be implemented, which will aim to manage and reduce the risk of potential introduction and spread of INNS so far as reasonably practicable and vessels will be required to comply with the International Maritime Organisation (IMO) ballast water management guidelines. Therefore, significant impacts on offshore water quality as a result of the introduction and spread of INNS are not predicted. This impact is proposed to be scoped out of further consideration within the EIA with respect to offshore water quality receptors.
Accidental pollution during construction, O&M and decommissioning.	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, equipment/machinery and operational painting and cleaning of marine growth. However, the risk of such events is managed by the implementation of measures set out in standard post-consent plans (e.g. an EMP, including a Marine Pollution Contingency

Impact	Basis for Impact
	Plan (MPCP)) (see Table 7.13). These plans include planning for accidental spills, address all potential contaminant releases and include key emergency contact details. They will also set out industry good practice and OSPAR (Oslo and Paris Conventions), IMO and MARPOL (International Convention for the Prevention of Pollution from Ships) guidelines for preventing pollution at sea. Therefore, the likelihood of accidental pollution occurring is very low and in the unlikely event that such events did occur, the magnitude of these will be minimised through measures such as a MPCP. This impact is proposed to be scoped out of further consideration within the EIA with respect to offshore water quality receptors.
Impacts from the release of sediment-bound contaminants.	As outlined in paragraph 7.3.5.4 to paragraph 7.3.5.6, levels of sediment contamination within the study area are low. Therefore, there is little possibility of release of sediment-bound contaminants, and this will not pose a risk to the water quality of the area. This impact is, therefore, proposed to be scoped out of further consideration within the EIA with respect to offshore water quality receptors.
Impacts to bathing water quality	In view of the MHPGC Project relative to the designated bathing waters and the designed in measures presented in Table 7.13, the MHPGC Project is considered to present no increased risk of deterioration of designated bathing waters. It is, therefore, proposed to scope out bathing waters receptors from the EIA in relation to the MHPGC Project.
Impacts to Shellfish water protected areas	In view of the offshore location of the MHPGC Project relative to the closest shellfish water protected area (Holy Island, 45 km) and the designed in measures presented in Table 7.13, the MHPGC Project is considered to present no increased risk of deterioration of any shellfish water protected areas. It is, therefore, proposed to scope out shellfish water protected area receptors from the EIA in relation to the MHPGC Project.
Impacts to the achievement of Good Environmental Status (GES)	In view of the offshore location of the MHPGC Project and the designed in measures presented in Table 7.13, the MHPGC Project is not considered to present any increased risk to the achievement of the indicators of GES, or the aspirations of the UK Marine Strategy. It is proposed to scope these pathways to reduced water quality out of the EIA.

7.3.6.4 The potential impacts from the MHPGC Project have been considered collectively for both English and Scottish waters, as these will not change between these areas given the commonality of the works proposed (offshore cabling).

7.3.7 Designed In Measures and Mitigation

7.3.7.1 The following designed in measures are relevant to water quality. The designed in measures will evolve over the development process as the EIA progresses.

7.3.7.2 As part of the MHPGC Project design process, a number of designed in measures (primary and tertiary) will reduce the potential for impacts on water quality (Table 7.13). As there is a commitment to implement these measures, they are considered inherent to the design of the MHPGC Project. The determination of magnitude and significance will assume the implementation of such measures. Some of these measures are considered standard industry practice for this type of development.

7.3.7.3 Any secondary mitigation requirements for water quality impacts that are not scoped out will be dependent on the significance of the impacts, as identified during the EIA process. The requirement for and feasibility of any mitigation measures will be consulted upon with statutory consultees throughout the EIA process.

Table 7.13: Designed in Measures and Mitigation as Part of the Morven Hawthorn Pit Grid Connection Project, Relevant to Water Quality and Appendix D Water Framework Directive Screening and Scoping

Reference Number	Designed in Measures	Justification	Primary or Tertiary
MM-8	Development of, and adherence to, an EMP, including actions to minimise INNS, and a MPCP, which will include planning for accidental spills, address all potential contaminant releases and include key emergency details.	Provides a means to ensure the efficient management and communication of commitments made for the management of the potential environmental impacts. For offshore water quality, measures will be adopted to ensure that the potential for release of pollutants is minimised. Measures will be included for controlling INNS and their impact on water quality receptors.	T
MM-10	Development and adherence to a Cable Specification and Installation Plan (CSIP).	There is a potential for cable exposure to occur due to interactions between Metocean regime (wave, sand and currents). Sediment transportation can lead to exposure of cables and infrastructure, although the use of a target cable burial depth alongside the cable installation strategy should provide sufficient	T

Reference Number	Designed in Measures	Justification	Primary or Tertiary
		depth to avoid exposure. The CSIP will outline the technical specifications of the cables used in the Morven Hawthorn Pit Grid Connection Project and describe the installation methodology; also includes cable protection to be installed	
MM-11	Implementation, management and monitoring of cable protection (via burial or external protection where adequate burial depth, as identified via risk assessment, is not feasible) with any damage, destruction or decay of cables notified to Maritime and Coastguard Agency (MCA), NLB, Kingfisher and United Kingdom Hydrography Office (UKHO) no later than 24 hours after discovered.	Cable protection may be necessary in some locations where sufficient cable burial depth cannot be achieved or where cables become exposed during the lifetime of the MHPGC Project. To ensure that the CSIP has been successfully implemented, monitoring will be undertaken as part of wider MHPGC Project pre- and post-construction. Geophysical surveys and are likely to involve a combination of multibeam echosounder or high-resolution side-scan sonar. This minimises the risks of underwater allision with cable protection, anchor or fishing gear interaction with subsea cables and interference with magnetic position fixing equipment.	P
MM-22	Development and adherence to a Construction Method Statement (CMS).	Provided as a means of controlling specific health and safety risks that have been identified and to secure the health and safety aspects of the MHPGC Project are secured. Ensures health and safety risks do not translate into environmental risks through adherence to good practice.	P

7.3.8 Proposed Assessment Methodology

7.3.8.1 It is proposed that Water Quality is scoped out of the EIA, and therefore no assessment methodology is proposed.

7.3.9 Potential Cumulative Impacts

7.3.9.1 No likely significant effects on offshore water quality have been identified, as outlined in Table 7.12. The impacts of changes in water quality, alone and cumulatively, on biological receptors will be considered in each relevant EIA Chapter.

7.3.9.2 In these chapters the cumulative effects with the Morven Offshore Wind Array Project and the second grid connection project in the Branxton area Southeast Scotland will be considered, together with cumulative effects with other developments, where relevant. The cumulative effect assessment will follow the approach outlined in Chapter 4: EIA Methodology.

7.3.9.3 No cumulative effects assessment for water quality as a receptor, is proposed.

7.3.10 Potential Inter-related Effects

7.3.10.1 The EIA will consider inter-related effects arising from the MHPGC Project, across their own phases (project lifetime) and different effects on one receptor in one phase (receptor led). The EIA will consider inter-related effects of multiple impacts from the construction, O&M and decommissioning phases of the MHPGC Project, affecting one receptor. Inter-related effects will be assessed through consideration of all effects on a receptor, considering both spatial and temporal overlap, within the MHPGC Project. This will ensure that the MHPGC Project is appropriately considered within the EIA and in line with Chapter 4: EIA Methodology.

7.3.11 Potential Transboundary Impacts

7.3.11.1 The Water Quality Study Area has been defined as the extent of one spring tidal excursion from the MHPGC Site. The Water Quality Study Area is entirely out of any other European Economic Area (EEA) State and therefore no potential transboundary impacts are predicted for this topic. Water Quality impacts have, therefore, been screened out of further assessment for transboundary impacts in the EIA.

7.4 Benthic Subtidal and Intertidal Ecology

7.4.1 Introduction

7.4.1.1 This chapter of the Scoping Report identifies the subtidal and intertidal benthic ecology receptors of relevance to the Morven Hawthorn Pit Grid Connection Project (hereafter referred to as 'MHPGC Project') and considers the potential impacts arising from the construction, operation and maintenance (O&M), and decommissioning of the MHPGC Project. This scoping chapter adopts a proportionate approach to only those impacts with potential to result in likely significant effects and therefore scopes out other impacts where there is evidence that the effects are not likely to be significant.

7.4.2 Policy and Legislation

7.4.2.1 This section identifies the relevant legislation, policy and other documentation that will inform the assessment of likely significant effects with respect to subtidal and intertidal benthic ecology. Further information on policies relevant to the Environmental Impact Assessment (EIA) and their status is provided in Chapter 2: Policy and Legislation.

7.4.2.2 To provide a robust evidence base, Table 7.14 presents a summary of legislation and policies relevant to subtidal and intertidal benthic ecology, for which this section takes account of specific requirements to assess and address likely impacts on receptors and relevant environmental issues.

Table 7.14: Relevant Policy and Legislation

Relevant Legislation	Relevance to the Assessment
International Legislation	
Convention for the Protection of the Marine Environment of the Northeast Atlantic (Oslo Paris (OSPAR)) 1998.	OSPAR includes the OSPAR List of Threatened and/or declining species and habitats for which the OSPAR Commission sets priorities for the conservation and protection of marine biodiversity.
National Legislation (UK)	
The Conservation of Offshore Habitats and Species Regulations 2017 (as amended) (transposes the offshore elements of the EU Habitats Directive (92/43/EC) into United Kingdom (UK) legislation).	Before deciding to undertake, or give any consent, permission or other authorisation for, a plan or project which is likely to have a significant effect on a European offshore marine site or a European site (either alone or in combination with other plans or projects), and is not directly connected with or necessary to the management of the site, a competent authority must make an appropriate assessment of the implications of the plan or project for that site in view of that site's conservation objectives. If the potential for adverse effects on European site integrity cannot be discounted, the project could only proceed if imperative reasons

Relevant Legislation	Relevance to the Assessment
	of over-riding public interest are found to exist and if compensatory measures can be secured.
Marine Strategy Regulations 2010 (transposes the EU Marine Strategy Framework Directive (MSFD) 2008/56/EC into UK legislation).	The UK Marine Strategy Regulations 2010 require the UK to take the necessary measures to achieve or maintain Good Environmental Status (GES) through the development of a UK Marine Strategy.
UK Marine Policy Statement, 2011	This is a policy framework prepared and adopted under section 44 of the Marine and Coastal Access Act 2009, which gives it a statutory basis. The framework aims to achieve sustainable development in the UK's marine area by balancing economic, social, and environmental considerations.
National Legislation (Scotland)	
Nature Conservation (Scotland) Act 2004.	Places duties on public bodies in relation to the conservation of biodiversity and strengthens wildlife enforcement legislation.
Marine (Scotland) Act 2010.	The Scottish Ministers, and public authorities must act in the way best calculated to further the achievement of sustainable development, including the protection and, where appropriate, enhancement of the health of that area.
National Policy (Scotland)	
National Marine Plan 2015	The Scottish National Marine Plan (SNMP) sets out strategic policies for the sustainable development of Scotland's marine resources out to 200 nm. It is required to be compatible with the UK Marine Policy Statement and existing marine plans across the UK. It incorporates plans for the development of a range of sectors, including: • sea fisheries; • aquaculture; • wild salmon and diadromous fish; • oil and gas; • carbon capture and storage; • recreation and tourism; • shipping ports, harbours and ferries; • submarine cables; • defence; • aggregates;

Relevant Legislation	Relevance to the Assessment
	• offshore wind and marine renewable energy. The NMP sets out the environmental requirements that constrain development within Scottish waters and draws out general planning policies (GEN 1 to GEN 21) which are considered when assessing development in the marine environment.
Sectoral Marine Plan for Offshore Wind Energy 2020	The Sectoral Marine Plan for Offshore Wind Energy aims to identify sustainable plan options for the future development of commercial-scale offshore wind energy in Scotland, including deep water wind technologies, and covers both Scottish inshore (Scottish territorial waters or within 12 nm from shore) and offshore waters (extending out to the Exclusive Economic Zone (EEZ) limit).
National Policy (England)	
North East Inshore and North East Offshore Marine Plan.	NE-SCP-1: • Proposals that may have a significant adverse impact upon the seascapes and landscapes of an area should only be supported if they demonstrate that they will, in order of preference: a. avoid b. minimise c. mitigate d. if it is not possible to mitigate, the public benefits for proceeding with the • proposal must outweigh significant adverse impacts to the seascapes and landscapes of an area. Where possible, proposals should demonstrate that they have considered how highly the seascapes and landscapes of an area is valued, its quality, and the areas potential for change. In addition, the scale and design of the proposal should be compatible with its surroundings, and not have a significant adverse impact on the seascapes and landscapes of an area. NE-MPA-1: • Proposals that support the objectives of Marine Protected Areas (MPAs) and the ecological coherence of the MPA network will be supported; • Proposals that may have adverse impacts on the objectives of MPAs must demonstrate that they will, in order of preference: a. avoid; b. Minimise;

Relevant Legislation	Relevance to the Assessment
	c. mitigate adverse impacts, d. with due regard given to statutory advice on an ecologically coherent network. NE-BIO-1/2: • Proposals that enhance the distribution of priority habitats/habitat adaptation/connectivity and priority/native species will be supported. Proposals that may have significant adverse impacts on the distribution of priority habitats/habitat adaptation/connectivity and priority species/native species migration must demonstrate that they will, in order of preference: a. Avoid; b. Minimise; c. Mitigate; d. compensate for significant adverse impacts. NE-CE-1: • Proposals which may have adverse cumulative effects with other existing, authorised or reasonably foreseeable proposals must demonstrate that they will, in order of preference: a. Avoid; b. Minimise; c. mitigate significant adverse cumulative and/or in combination effects. NE-UWN-2: • Proposals that result in the generation of impulsive or non-impulsive noise must demonstrate that they will, in order of preference: a. avoid; b. Minimise; c. mitigate significant adverse impacts on highly mobile species; d. if it is not possible to mitigate significant adverse impacts, proposals must state the case for proceeding.
National Policy Statements (NPS)	NPS-EN1; • Where the development is subject to EIA, the applicant should ensure that the Environmental Statement (ES) clearly sets out any effects on internationally, nationally, and locally designated sites of ecological or geological conservation importance (including those outside England), on protected species and on habitats and other species identified as being of principal importance for the conservation of biodiversity,

Relevant Legislation	Relevance to the Assessment
	including irreplaceable habitats. (NPS EN-1 paragraph 5.4.17); • The applicant should show how the project has taken advantage of opportunities to conserve and enhance biodiversity and geological conservation interests. (NPS EN-1 paragraph 5.4.19); • Applicants should include appropriate avoidance, mitigation, compensation, and enhancement measures as an integral part of the proposed development. In particular, the applicant should demonstrate that: a. During construction, they will seek to ensure that activities will be confined to the minimum areas required for the works; b. The timing of construction has been planned to avoid or limit disturbance; c. During construction and operation best practice will be followed to ensure that risk of disturbance or damage to species or habitats is minimised, including as a consequence of transport access arrangements; d. Habitats will, where practicable, be restored after construction works have finished; e. Opportunities will be taken to enhance existing habitats rather than replace them, and where practicable, create new habitats of value within the site landscaping proposals. Where habitat creation is required as mitigation, compensation, or enhancement, the location and quality will be of key importance. In this regard habitat creation should be focused on areas where the most ecological and ecosystems benefits can be realised; f. mitigations required as a result of legal protection of habitats or species will be complied with. (NPS EN-1 paragraph 5.4.35). NPS-EN3: • Given the scale of offshore wind deployment required to meet 2030 and 2050 ambitions, applicants will need to give close consideration to impacts on MPAs, either alone or in combination, and employ the mitigation hierarchy and if necessary provide compensation (both individually and in combination with other plans or projects) which may be needed to approve their projects. It is likely that mitigation may include proactive measures to reduce the impact of deployment (e.g. micrositing of offshore transmission routes to avoid vulnerable habitats, alternatives piling or trenching

Relevant Legislation	Relevance to the Assessment
	techniques, noise abatement technology, collision avoidance methods or, if necessary, compensation for habitat loss). (NPS EN-3 paragraph 2.8.52 and 2.8.53); • In addition, Applicants should have regard to the specific ecological and biodiversity considerations that relate to proposed offshore renewable energy infrastructure developments, namely: a. Fish; b. Intertidal and subtidal seabed habitats and species; c. Marine mammals; d. Birds; e. Wider ecosystem impacts and interaction, and other relevant protected migratory species. • 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, Habitats Regulations Appraisals (HRAs) and MCZ (Marine Conservation Zone) assessments. (NPS EN-3 paragraph 2.8.98 and 2.8.91); • Applicants need to consider environmental and biodiversity net gain as set out in Section 4.6 of EN-1 and the Environment Act 2021. Applicants should assess the potential of their proposed development to have net positive effects on marine ecology and biodiversity, as well as negative effects. (NPS EN-3 paragraph 2.8.102 – 2.8.103); and • Applicants should consult at an early stage of pre-application with relevant statutory consultees and energy not-for profit organisations/non governmental organisations as appropriate, on the assessment methodologies, baseline data collection, and potential avoidance, mitigation and compensation options which should be undertaken. In developing proposals applicants must refer to the most recent best practice advice originally provided by Natural England under the Offshore Wind Enabling Action Programme and/or their relevant Statutory Nature Conservation Body (SNCB). Any relevant data that has been collected as part of post-construction ecological monitoring from existing operational offshore wind farms should be referred to where appropriate. (NPS EN-3 paragraph 2.8.104 – 2.8.106).

7.4.3 Study Areas

7.4.3.1 Two study areas are defined for Benthic Subtidal and Intertidal Ecology:

- the Benthic Ecology Study Area;
- the Regional Benthic Ecology Study Area.

7.4.3.2 The study areas are shown in Figure 7.7 and defined as follows:

- the Benthic Ecology Study Area is defined as the MHPGC Project Scoping Boundary plus a buffer extending approximately 5km to 9km from the MHPGC Project Scoping Boundary, extending up to Mean High Water Springs (MHWS) at the top of the intertidal zone. The 5km to 9km buffer equates to one maximum tidal ellipse[1] over a large spring tide around the MHPGC Project Scoping Boundary representing the dominant tidal currents. This buffer is designed to incorporate the Zone of Influence (ZoI) from indirect impacts (e.g. increases in suspended sediment concentrations (SSCs) and potential changes in physical processes). Beyond the tidal excursion extent of 5km to 9km, any effects from the MHPGC Project on benthic ecology receptors would be minimal. The Benthic Ecology Study Area is the area within which the site specific benthic surveys have been undertaken to inform the baseline characterisation and to identify benthic receptors, against which potential impacts associated with the MHPGC Project will be assessed as part of the EIA;
- The Regional Benthic Ecology Study Area will provide a wider context to the Benthic Ecology Study Area. This area, as shown in Figure 7.7, encompasses wider North Sea subtidal and intertidal habitats and neighbouring consented, developing and planned Offshore Wind Farms (OWFs) and designated sites.

[1] One spring tidal excursion has been identified through interim numerical modelling techniques and is defined as the distance that suspended sediment is transported before being carried back on the returning tide. The interim model, and the resulting buffer range, was informed from bathymetric datasets available as part of the Marine Environmental Data Information Network (MEDIN, 2024), and is in line with the Atlas of UK Marine Renewable Energy Resources (ABPmer, 2017).

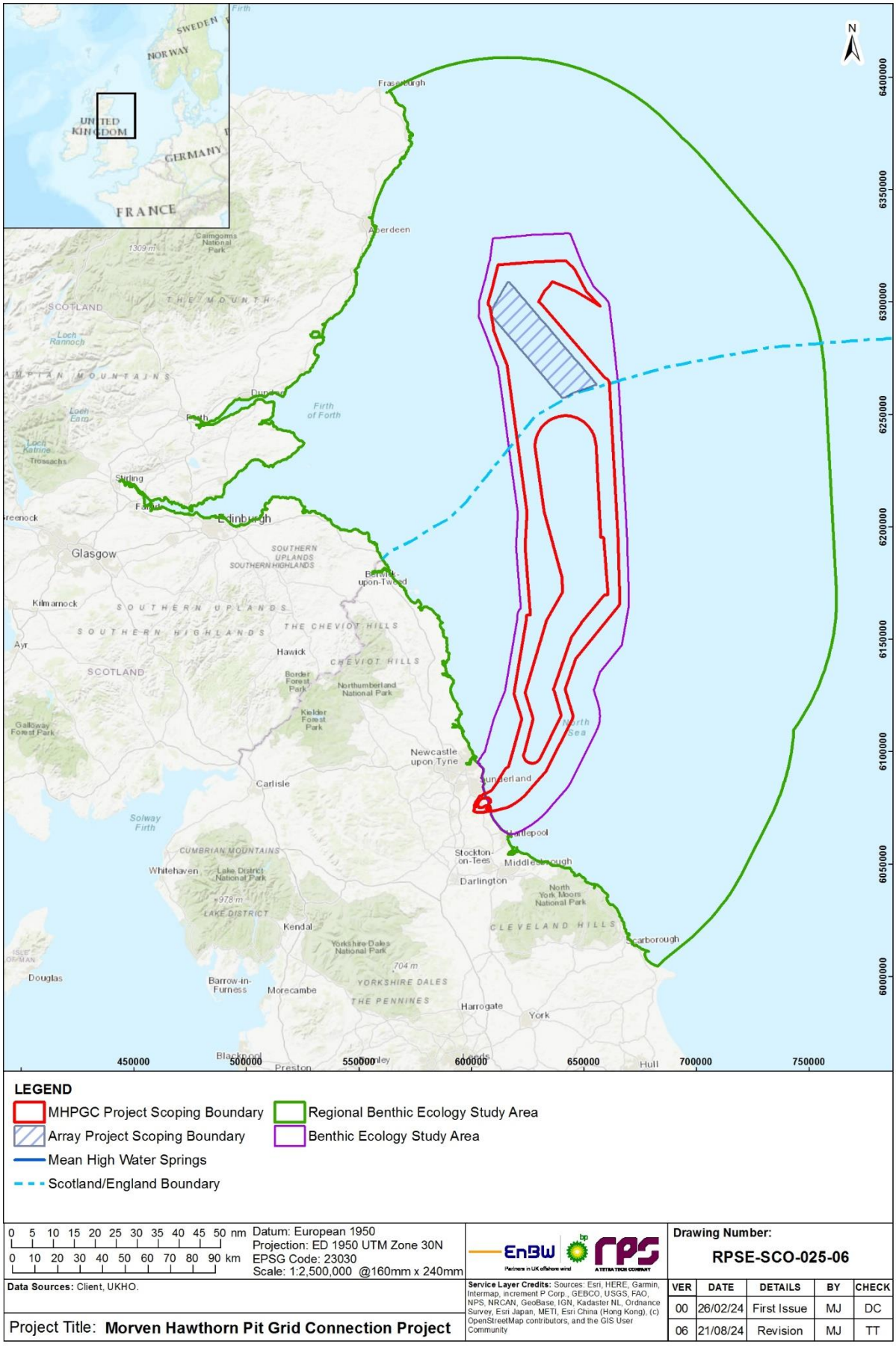


Figure 7.7: Benthic Ecology Study Area and Regional Benthic Ecology Study Area

7.4.4 Data Sources

Desktop Data

7.4.4.1 An initial desk based review of literature and data sources to support the Scoping Report identified a number of data sources. These provide coverage of the Regional Benthic Ecology Study Area and will provide context to the benthic ecology survey data collected in the site specific surveys within the Benthic Ecology Study Area. Key desktop datasets and reports are summarised in Table 7.15.

Table 7.15: Summary of Key Desk Top Datasets and Reports

Title	Source	Year	Author
International / National (UK)			
Marine Life Information Network (MarLIN)	MarLIN	2024	Tyler-Walters *et al*.
Marine Environmental Data Information Network (MEDIN)	MEDIN	2024	MEDIN
Eastern Green Link 2 - Marine Scheme Environmental Appraisal Report Volume 2 Chapter 8 - Benthic Ecology.	National Grid Electricity Transmission and Scottish Hydro Electric Transmission plc	2022	AECOM
EMODnet Oslo and Paris Conventions (OSPAR) threatened and/or declining habitats in the NE Atlantic (EUSeaMap).	EMODnet – Seabed Habitats	2022	OSPAR
European Marine Observation and Data Network (EMODnet) broad scale seabed habitat map for Europe (EUSeaMap).	EMODnet – Seabed Habitats	2019	EMODnet – Seabed Habitats
National Biodiversity Network (NBN) Atlas.	NBN Atlas	2019	NBN Atlas
The Marine Nature Conservation Review (MNCR) Area Summary for southeast Scotland and northeast England.	JNCC	1998	Brazier *et al*.
National (Scottish Waters)			
Scottish Marine Energy Research (ScotMER) Benthic Evidence Map	Marine Directorate	2024	Marine Directorate
Descriptions of Scottish Priority Marine Features (PMFs).	NatureScot (previously Scottish	2016	Tyler-Walters *et al.*

Title	Source	Year	Author
	Natural Heritage (SNH))		
Morven Offshore Wind Array Project (hereafter "Array Project") Site Specific Surveys: Taken from the Array EIA Scoping Report.	bpEnBW	2023	RPS
Ossian Array EIA Scoping Report: Chapter 6: Benthic Subtidal Ecology.	Ossian	2023	Ossian
Berwick Bank Wind Farm Offshore Environmental Impact Assessment (EIA) Appendix 8.1: Benthic Subtidal and Intertidal Ecology Technical Report.	SSE Renewables	2022	SSE Renewables
Firth of Forth Banks Complex MPA – Relevant Documentation – Site Summary Document.	JNCC	2014	JNCC
Analysis of seabed imagery from the 2011 survey of the Firth of Forth Banks Complex, the 2011 International Bottom Trawl Survey (IBTS) Quarter 4 (Q4) survey and additional deep water sites from Marine Scotland Science surveys.	JNCC	2014	Axelsson, M., Dewey, S. and Allen, C.
Biotope Assignment of Grab Samples from Four Surveys Undertaken in 2011 Across Scotland's Seas (2012).	JNCC	2014	Pearce *et al.*
Seagreen 1A Benthic Ecology Validation Survey Report.	Seagreen 1A Ltd	2021	Seagreen 1A Ltd
Mapping habitats and biotopes from acoustic datasets to strengthen the information base of MPAs in Scottish waters – Phase 2.	JNCC	2014	Sotheran, I. and Crawford-Avis, O.
Mapping habitats and biotopes from acoustic datasets to strengthen the information base of MPAs in Scottish waters.	JNCC	2014	Sotheran, I. and Crawford-Avis, O.
The Marine Scotland National Marine Plan Interactive (NMPi) maps.	Marine Scotland	2019	Marine Scotland for the Scottish Government
Seagreen Alpha and Bravo OWFs Environmental Impact Statement.	Seagreen Wind Energy Limited (Ltd)	2012	Seagreen Wind Energy Ltd

Title	Source	Year	Author
Volume 1, Chapter 11 Benthic Ecology and Intertidal Ecology.			
European Offshore Wind Deployment Centre: Request for an Environmental Impact Assessment (EIA), Scoping Opinion.	Aberdeen OWFs Limited	2010	Aberdeen OWFs Limited
Appendix 7.1 Benthic Characterisation Survey Report.	Neart na Gaoithe Offshore Wind Ltd	2010	Neart na Gaoithe Offshore Wind Ltd
The ecology of Scottish inshore fishing grounds.	Aberdeen OWFs Limited	1958	McIntyre A. D.
Hywind Scotland Pilot Park ES.	Hywind Offshore Wind Farm	2015	Statoil
Offshore ES, Volume 1B: Biological Environment, Chapter 12 Benthic Ecology.	Inch Cape Offshore Limited	2011	Inch Cape Offshore Limited
National (English Waters)			
North East of Farnes Deep MPA and Highly Protected Marine Area (HPMA) – Relevant Documentation – Site summary Document.	Joint Nature Conservation Committee (JNCC)	2023	JNCC
A big data approach to macrofaunal baseline assessment, monitoring and sustainable exploitation of the seabed.	Centre for Environment, Fisheries and Aquaculture Science (Cefas)	2017	Cooper, K.M. and Barry, J.
Farnes East MCZ – Relevant Documentation – Site Summary Document.	JNCC	2021	JNCC
Kincardine OWFs: Environmental Statement (ES).	Kincardine Offshore Wind Farm	2016	Kincardine OWFs
Blyth NaREC Offshore Demonstration Site, Benthic Surveys.	AMEC	2011	AMEC
Teesside OWFs, ES.	EDF Energy	2004	EDF Energy

Site Specific Survey Data

7.4.4.2 A site specific benthic ecology characterisation survey for the Benthic Ecology Study Area was undertaken during June to November 2023 by Gardline Ltd. on the vessel

Ocean Geograph, to provide benthic characterisation of habitats and species assemblages and any contamination (Gardline Ltd., 2024).

7.4.4.3 This survey investigated 133 stations (as shown in Figure 7.8) within the Benthic Ecology Study Area to characterise the benthic community and identify any potentially sensitive features. Drop Down Video (DDV) camera data were successfully acquired at all 133 stations and 0.1m^2 Day grab samples were collected at 127 stations for subsequent macrofaunal and Particle Size Analysis (PSA) analyses.

7.4.4.4 Macrofaunal analysis and PSA will be undertaken in accordance with the northeast Atlantic Marine Biological Analytical Quality Control (NMBAQC) Scheme's best practise guidance (Worsfold & Hall, 2010; Mason, 2016).

7.4.4.5 In addition to traditional macrofaunal analysis, samples were collected for environmental DNA metabarcoding, with sediment samples from 65 stations sent to the laboratory for analysis to determine the species composition of the bacterial community and provide additional data on the infauna community.

7.4.4.6 Sediment samples were also collected at 66 stations for analysis of total hydrocarbons, Polycyclic Aromatic Hydrocarbons (PAHs), metals, Total Organic Carbon (TOC), organotin and Polychlorinated Biphenyls (PCBs), to allow comparison of contaminant levels to the relevant Action Levels (ALs) and Canadian Sediment Quality Guidelines (CSQG; CCME, 2001), which give an indication on the degree of contamination and the likely impact on marine ecology.

7.4.4.7 The DDV investigations were carried out in line with the epibiota monitoring operational and interpretation guidelines (Hitchin *et al*., 2015; Turner *et al*., 2016). Multiple photographs were taken along 200m transects using a hover and drift technique at approximately 0.5m to 1m above the seabed. Video was also taken and reviewed to aid the assessment of relevant benthic features.

7.4.4.8 Outputs from this analysis will be used to inform the characterisation of the physical environment and biological communities within the Benthic Ecology Study Area. Outputs will also be used to identify and report on the presence of habitats of conservation importance. The results of these surveys will be presented as part of the benthic ecology technical report of the EIA Report/ES.

7.4.4.9 Further site specific survey works are being undertaken in 2024, to categorise habitats and species in the study area and investigate areas potentially affected by trenchless techniques. These include an intertidal and nearshore survey for benthic ecology, which will also inform the determination of impacts for the Benthic Ecology Chapter of the EIA Report/ES.

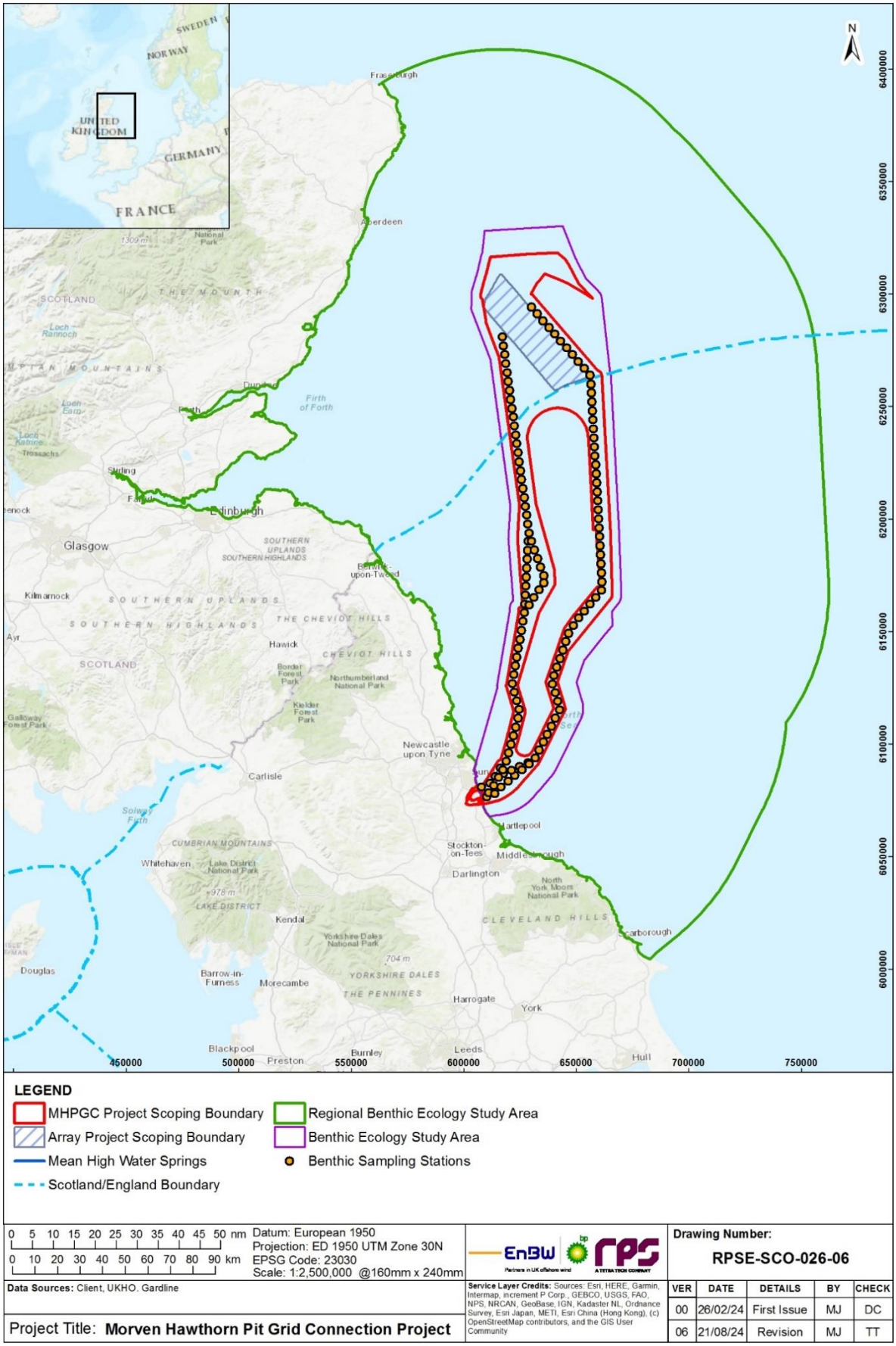


Figure 7.8: Benthic Sample Locations within the Morven Hawthorn Pit Grid Connection Project Scoping Boundary

7.4.5 Baseline Environment

Baseline Environment in Scottish Waters

7.4.5.1 This section provides a summary of the benthic ecology baseline environment for the MHPGC Project, based on desktop data. The environmental baseline is split into the benthic features which occur in Scottish waters, and those which occur in English waters.

7.4.5.2 The following section describes the baseline environment for the areas of the Regional Benthic Ecology Study Area and Benthic Ecology Study Area which are in Scottish waters.

Subtidal Sediments in Scottish Waters

Regional Benthic Ecology Study Area

7.4.5.3 Based on EUSeaMap data (EMODnet, 2019) and NMPi data (NMPi, 2019), within the Regional Benthic Ecology Study Area which falls in Scottish waters, seabed sediments are dominated by a mosaic of 'deep circalittoral coarse sediment' (A5.15) and 'deep circalittoral sand' (A5.27) (Figure 7.9). These are European Union Nature Information System (EUNIS) biotope classifications, which is a hierarchical system used to classify habitats in the marine environment depending on their sediment type and biota. The sediment transitions to become more dominated by 'deep circalittoral sand' (A5.27) in the east of the Regional Benthic Ecology Study Area (Figure 7.9).

7.4.5.4 Within the mosaic of 'deep circalittoral coarse sediment' (A5.15) and 'deep circalittoral sand' (A5.27) there are also smaller patches of 'deep circalittoral mud' (A5.37), with the largest areas existing further inshore, in the west of the Regional Benthic Ecology Study Area (Figure 7.9).

7.4.5.5 There are areas of 'Atlantic and Mediterranean moderate energy circalittoral rock' (A4.2) further inshore to the southwest and further along the coast to the east and south of the English/Scottish waters boundary, within the Regional Benthic Ecology Study Area. The largest area of this Circalittoral Rock (CR) occurs around the entrance to the Firth of Forth and along the coast of Budle and Bamburgh. The CR around the entrance to the Firth of Forth is accompanied by 'deep circalittoral mixed sediment' (A5.45) (Figure 7.9).

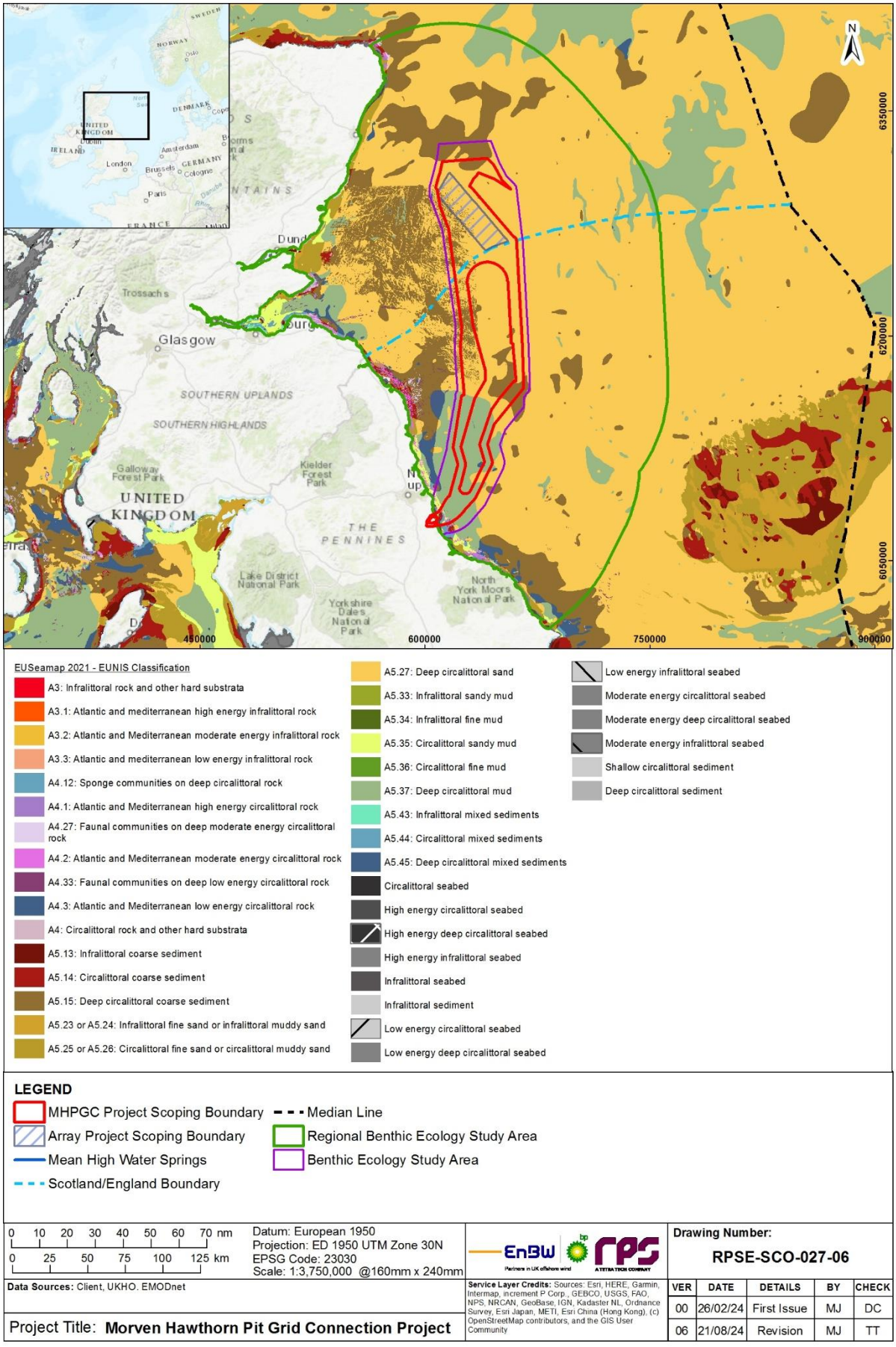


Figure 7.9: EUSeaMap Data Showing Seabed Classifications for the Regional Benthic Ecology Study Area

Firth of Forth Banks Complex MPA

7.4.5.6 The key geological features of the Regional Benthic Ecology Study Area are the Berwick, Scalp and Montrose Banks and the Wee Bankie shelf banks and mounds. The 'Shelf Banks and Mounds' and 'Moraines representative of the Wee Bankie Key Geodiversity Area' are both protected features of the Firth of Forth Banks Complex MPA (Figure 7.10), and are composed of sands and gravels (JNCC, 2021). The Wee Bankie includes moraines, which are formed from glacial till deposited during the last Ice Age and they are scientifically important for their role in improving our understanding of the history of glaciation around Scotland (JNCC, 2021).

7.4.5.7 The whole Firth of Forth Banks Complex MPA (Figure 7.10) is also designated for offshore subtidal sands and gravels. The offshore subtidal sands and gravels feature comprises a heterogeneous mosaic of coarse sandy and mixed sediments, and the feature is interspersed with small patches of rock and mud. The JNCC consider the heterogeneity of the habitat types present to be a consequence of localised hydrodynamic processes acting on the MPA (JNCC, 2014).

7.4.5.8 The Axelsson *et al*. (2014) analysis of the video and still photography from the 2011 surveys undertaken within the Firth of Forth Banks Complex MPA as part of the Scottish MPA Project, reported three broad habitat types: soft sediments with ripples; mixed sediment; and coarse sediments with some rocky outcrops. In the north of the area surveyed for this study (which overlaps with the Benthic Subtidal Ecology Study Area), gravelly sand sediments were more frequently recorded and gravelly muddy sands and mixed sediments were more dominant in the south of the area surveyed for this study (Axelsson *et al*., 2014).

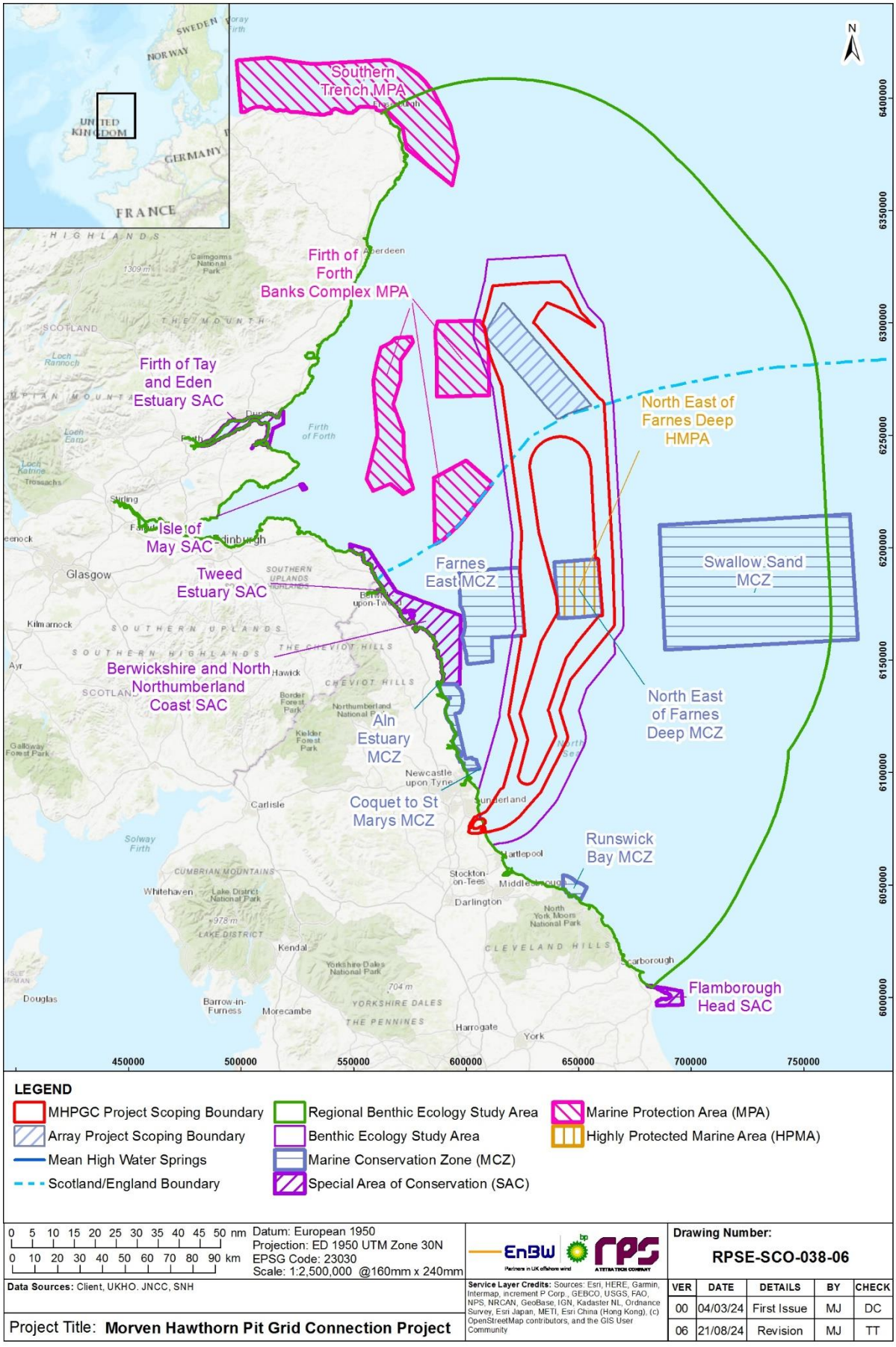


Figure 7.10: Designated Sites within the Regional Benthic Ecology Study Area

Other Offshore Wind Farms

7.4.5.9 The benthic surveys conducted for planned and operational offshore wind projects and transmission projects within the Regional Benthic Ecology Study Area also provide an overview of the sedimentary habitats present; the relevant projects from which benthic survey results will be used are listed below and shown in Figure 7.11:

- Berwick Bank OWF;
- the Cambois Connection Marine Scheme;
- Neart na Gaoithe OWF;
- Inch Cape OWF;
- Seagreen 1 OWF;
- Morven Offshore Wind Array Project;
- Ossian Array Project;
- Kincardine Floating Demonstration OWF;
- Aberdeen OWF;
- Hywind Buchan Deep OWF.

7.4.5.10 Berwick Bank OWF, located 13km west of the MHPGC Project (Figure 7.11), conducted geophysical surveys in 2019 and 2021 (SSE Renewables, 2022). The data from these surveys identified heterogenous sediment across Berwick Bank's proposed array area. Features such as megaripples, sand waves, ribbons and bars were noted across the south and northwest extents.

7.4.5.11 Grab samples conducted across Berwick Bank OWF's proposed array area and export cable corridor indicated that the sediments were predominantly slightly gravelly sands according to the Folk (1954) sediment classification. Sediments closer to the coast in the Berwick Bank OWF export cable corridor were, typically, finer than the offshore sediment in the array area. In the nearshore area of Berwick Bank OWF's proposed development export cable corridor, there were hard and coarse substrates and rock present, as well as muddy sands. According to the simplified Folk Classification (Long, 2006), most stations were classified as coarse sediments with areas of mud and sandy mud and mixed sediments.

7.4.5.12 The Cambois Connection Marine Scheme, which will connect the Berwick Bank OWF to the landfall, will comprise up to four buried high voltage direct current subsea cables that are expected to overlap with the Regional Benthic Ecology Study Area (Figure 7.11). The subtidal sediments surveyed for this development in Scottish waters were characterised as slightly gravelly sand and gravelly sand in the east, near the Array Project, with coarser sandy gravel further to the west (SSE Renewables, 2023).

7.4.5.13 Baseline characterisation surveys for Neart na Gaoithe OWF, including seabed sampling, were conducted in 2009 (Neart na Gaoithe Offshore Wind Ltd, 2010). Within the Neart na Gaoithe OWF, which lies 68km west of the MHPGC Project (Figure 7.11), most sampling stations were classified as slightly gravelly sand. The array area in the offshore environment was associated with coarser sediment with a larger gravel component. Along the export cable corridors, the sediments had a

greater fines component with most sediment samples as slightly gravelly muddy sand and muddy sand.

7.4.5.14 The baseline characterisation surveys for Inch Cape OWF array area (Inch Cape Offshore Limited, 2011), which lies 58km to the northwest of the MHPGC Project (Figure 7.11), reported the sediments to be primarily circalittoral sands and gravelly sands, with smaller areas of muddy mixed sediment.

7.4.5.15 Surveys conducted in 2011 to support the EIA benthic baseline characterisation for Seagreen 1 OWF, which lies 23km west of the MHPGC Project (Figure 7.11), classified most samples as gravelly sand and sandy gravels, with samples in the export cable corridor and the west of the array area generally having a higher mud content (Seagreen Wind Energy Ltd, 2012). Video sampling of these areas found shelly and gravelly sand as well as ripples and megaripples. Cobbles were also recorded and were the predominant sediment component at six sites within Seagreen 1 OWF.

7.4.5.16 Recent site specific benthic surveys were also undertaken to inform the baseline characterisation for the Ossian Array Project (located to the east of the MHPGC Project, overlapping with the MHPGC Project Scoping Boundary, Figure 7.11), and published in the Scoping Report (Ossian, 2023). These surveys found the Benthic Ecology Study Area was dominated by sand, with numerous patches of gravel observed, mainly in the west. There was also the presence of megaripples and sand waves, indicating some degree of sediment mobility and occasional furrows, indicative of erosion (Ossian, 2023).

7.4.5.17 The Kincardine Floating Demonstration OWF site lies 39km northwest of the MHPGC Project, east of Aberdeen (Figure 7.11). Site specific sampling of the array area and export cable corridor for this project indicated that the sediment was difficult to sample as the seabed was quite compact (Kincardine Offshore Wind Farm, 2016). Samples, which were obtained largely in the export cable corridor, characterised the sediment as sandy with medium grain sand identified closer to shore and fine sand identified further offshore and within the array area. The seabed also exhibited rippled bedforms.

7.4.5.18 Aberdeen OWF lies close to the coast, north of Aberdeen, 56km from the MHPGC Project (Figure 7.11). Surveys in this area identified the seabed within the project boundary to predominantly be composed of silty sand with patches of finer sediment (Aberdeen Offshore Wind Farm Limited, 2010). In the southeast of the Aberdeen OWF there is also a ribbon of finer sand within the silty sand.

7.4.5.19 The Hywind Buchan Deep OWF is located 55km north of the MHPGC Project, east of Peterhead (Figure 7.11). The site specific surveys in this area found the sediments to be dominated by sand and gravel. Boulder fields were present at locations close to shore in the export cable corridor and as depth decreases to less than 20 m, approximately 1km from shore, the seabed consists almost entirely of outcropping bedrock (Statoil, 2015). In the array area, sediments were similar to the export cable corridor, dominated by sand and gravel with megaripples. Scattered patches of boulders were also found in the northwest of the array area.

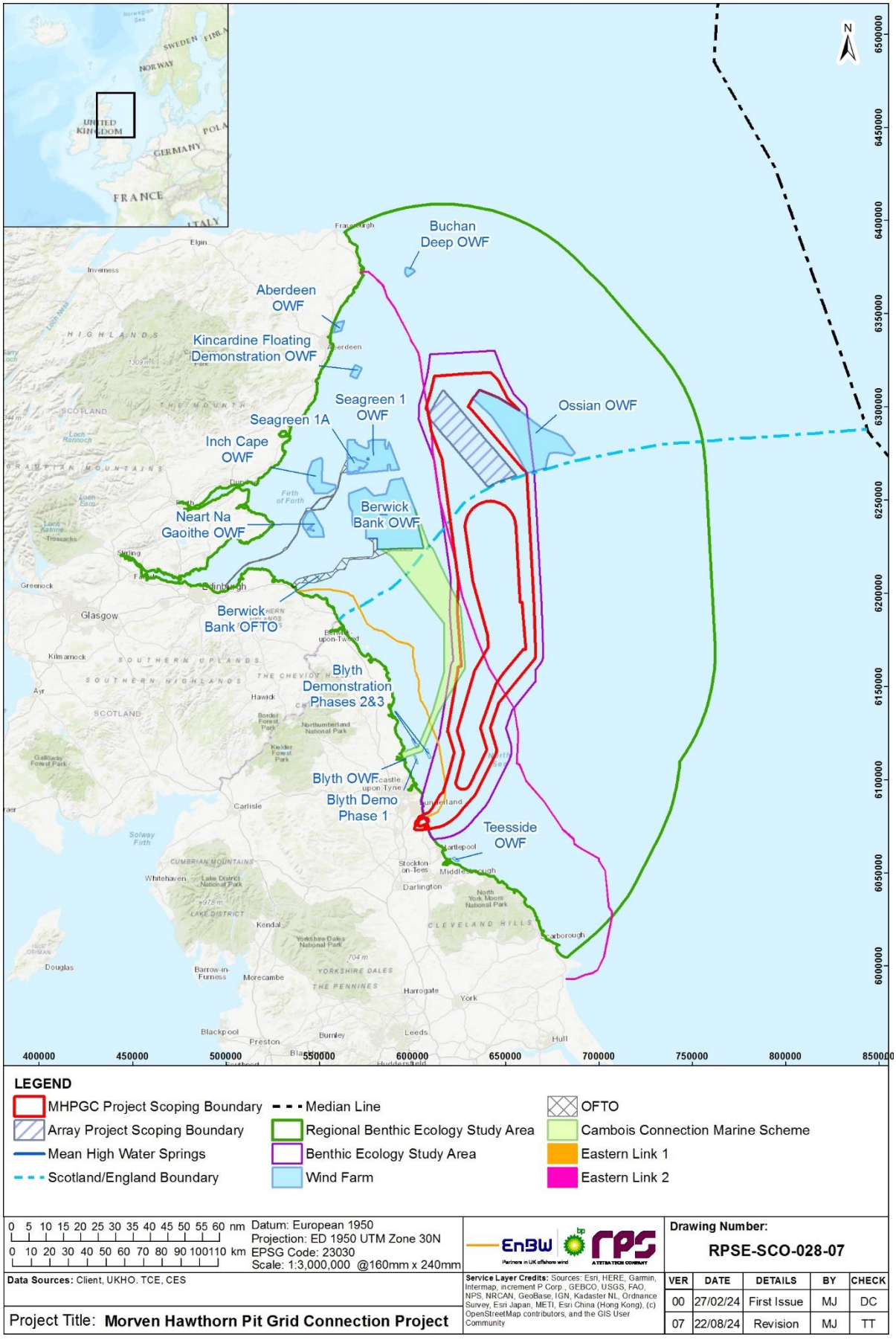


Figure 7.11: Offshore Wind Farms in the Regional Benthic Ecology Study Area

Benthic Ecology Study Area

7.4.5.20 The majority of the Benthic Subtidal Ecology Study Area within Scottish waters is predicted to consist mostly of sand, with some areas of coarse sediment. This is informed by previous survey works for other OWFs in the Regional Benthic Ecology Study Area outlined above and EUSea Map data (Figure 7.9).

7.4.5.21 Surveys were conducted in spring/summer 2022 to inform the ecology baseline for the Morven Array Project Scoping Report (RPS, 2023). Grab sample locations were to the north of and overlapping with the MHPGC Project. The sediment of all but one station was classified as sand, with varying mud and gravel content. The remaining station was classified as sandy gravel (RPS, 2023).

7.4.5.22 Results from the site specific benthic surveys included sediment characterisation from PSA, which will be reported in full in the MHPGC Project EIA Report/ES. The sediments across the survey area (Figure 7.9) were broadly consistent with those previously recorded in the 2022 Morven Array Project survey (RPS, 2023), with most stations classified as sand (Gardline Ltd., 2024).

Sediment Contamination in Scottish Waters

7.4.5.23 Within Scottish waters, sediment contamination levels are expected to be overall very low within the Regional Benthic Ecology Study Area, in line with the findings of the Array Project site specific surveys.

7.4.5.24 The Array Project site specific surveys found only a single station with a concentration of arsenic exceeding the Marine Scotland AL 1 and CSQG Threshold Effect Level (TEL). This site was to the far north of the Array Project survey area and did not exceed the Cefas AL2 or CSQG Probably Effect Level (PEL) levels (RPS, 2023). All other sampling stations were below the Marine Scotland AL 1 and CSQG TEL for arsenic and all other metals tested (RPS, 2023).

7.4.5.25 Similarly, results from the Array Project site specific surveys showed low levels of PCBs, with only four stations with detectable levels, which were below Marine Scotland Action Level 1 (AL1) and below the CSQG TEL (RPS, 2023). Concentrations of all PAHs at all stations across the Array area were below their relevant CSQG TEL and Marine Scotland AL1 thresholds (RPS, 2023). Levels of organotin were below the detection limit at all stations (RPS, 2023).

7.4.5.26 The detailed contaminant analyses results from the MHPGC Project site specific surveys, and comparison to relevant ALs and guidelines, will be presented and discussed in the MHPGC Project EIA Report/ES. However, concentrations of total hydrocarbons, PAHs, PCBs, metals and organotins were generally low in samples from stations within Scottish waters (Gardline Ltd., 2024).

Subtidal Benthic Communities in Scottish Waters

Regional Benthic Ecology Study Area

7.4.5.27 The north part of the North Sea is mainly characterised by polychaete dominated communities (Spionidae, Glyceridae, Terebellidae, Capitellidae, Phyllodocidae and Nemertea), sparse faunal communities (Nephtyidae, Spionidae, Opheliidae) and diverse faunal communities (including the polychaetes: Spionidae, Nephtyidae, Lumbrineridae, Oweniidae, Cirratulidae, Capitellidae, Ampharetidae, the

echinoderm Amphiuridae, the bivalve Semelidae and Nemertea) (Cooper and Barry, 2017).

7.4.5.28 The MNCR study of the nearshore subtidal zone from North Berwick in Lothian to Flamborough Head in Yorkshire recorded nearshore seabed habitats along much of the coast within the Regional Benthic Ecology Study Area. Five JNCC marine habitat classification biotopes (Connor *et al.,* 2004) were recorded in Scottish waters (Brazier *et al*., 1998), including sublittoral mixed sediment/muddy sand biotopes, kelp forests, sublittoral fine sand biotopes and CR biotopes.

- *'Kurtiella bidentata* and *Thyasira* spp. in circalittoral muddy mixed sediment'/'*Amphiura filiformis*, *Kurtiella bidentata* and *Abra nitida* in circalittoral sandy mud' (SS.SMx.CMx.KurThyMx/SS.SMu.CSaMu.AfilKurAnit);
- *'Laminaria hyperborea* forest and foliose red seaweeds on moderately exposed upper infralittoral rock' (IR.MIR.KR.Lhyp.Ft);
- 'amphipods and *Scolelepis* spp. in littoral medium-fine sand' (LS.LSa.MoSa.AmSco);
- *'Nephtys cirrosa* and *Bathyporeia* spp. in infralittoral sand' (SS.SSa.IFiSa.NcirBat);
- 'brittlestars on faunal and algal encrusted exposed to moderately wave-exposed circalittoral rock' (CR.MCR.EcCr.FaAlCr.Bri).

7.4.5.29 Analysis by Sotheran and Crawford-Avis (2014a) was undertaken on the data from seabed acoustic surveys in 2013 to contribute to the evidence base for the presence and extent of MPA features in Scottish waters. Phase 1 of the surveys included the approaches to the Firth of Forth.

7.4.5.30 Habitats varied from sand sediments to coarse and mixed sediments in the inshore regions, and sand sediments in the offshore region. The biotope 'circalittoral muddy sand' (SS.SSa.CMuSa) was recorded in the nearshore subtidal area close to St. Andrews, with CR habitats with 'mixed faunal turf communities' (CR.HCR.XFa) and 'echinoderms and crustose communities' (CR.MCR.EcCr) recorded in the nearshore subtidal area off Craighead.

7.4.5.31 'Offshore circalittoral sand' (SS.SSa.OSa) and 'offshore circalittoral coarse sediment' (SS.SCS.OSC) were recorded across the approaches to the Firth of Forth and the Wee Bankie to Gourdon. However, SS.SSa.OSa was more frequently recorded in the regions further offshore. 'Circalittoral mixed sediments' (SS.SMx.CMx) and 'offshore mixed sediments' (SS.SMx.OMx) were recorded in areas further inshore. Occasional patches of CR were also recorded across the approaches to the Firth of Forth and Wee Bankie to Gourdon areas (Sotheran and Crawford-Avis, 2014a).

7.4.5.32 The following biotopes were reported within the Regional Benthic Ecology Study Area, in Scottish waters (Sotheran and Crawford-Avis, 2014a):

- kelp with cushion fauna and/or foliose red seaweeds ('foliose red seaweeds with dense *Dictyota dichotoma* and/or *Dictyopteris polypodioides* on exposed lower infralittoral rock' (IR.HIR.KFaR.FoR.Dic) and '*Laminaria hyperborea* and red seaweeds on exposed vertical rock' (IR.HIR.KFaR.LhypRVt);
- mixed faunal turf communities on CR ('*Flustra foliacea* and colonial ascidians on tide-swept exposed circalittoral mixed substrata' (CR.HCR.XFa.FluCoAs.X),

'*Flustra foliacea*, small solitary and colonial ascidians on tide-swept circalittoral bedrock or boulders' (CR.HCR.XFa.FluCoAs.SmAs) and '*Flustra foliacea* and colonial ascidians on tide-swept moderately wave-exposed CR' (CR.HCR.XFa.FluCoAs);

- circalittoral coarse sediment ('*Spirobranchis triqueter* with barnacles and bryozoan crusts on unstable circalittoral cobbles and pebbles' (SS.SCS.CCS.SpiB));
- deep circalittoral coarse sediment ('offshore circalittoral coarse sediment' (SS.SCS.OCS), and SS.SCS.OCS.(Sbom));
- circalittoral muddy sand ('*Abra alba* and *Nucula nitidosa* in circalittoral muddy sand or slightly mixed sediment' (SS.SSa.CMuSa.AalbNuc) and SS.SSa.CMuSa);
- offshore circalittoral sand (SS.SSa.OSa/SS.SSa.OSa.(Sbom));
- circalittoral mixed sediments ('*Ophiothrix fragilis* and/or *Ophiocomina nigra* brittlestar beds on sublittoral mixed sediment' (SS.SMx.CMx.OphMx), '*Flustra foliacea* and *Hydrallmania falcata* on tide-swept circalittoral mixed sediment' (SS.SMx.CMx.(FluHyd)), SS.SMx.CMx.KurThyMx and '*Sabellaria spinulosa* on stable circalittoral mixed sediment' (SS.SBR.PoR.SspiMx));
- deep circalittoral mixed sediments ('polychaete-rich *Galathea* community with encrusting bryozoans and other epifauna on offshore circalittoral mixed sediment' (SS.SMx.OMx.(PoGintBy));
- *'Modiolus modiolus* beds on open coast circalittoral mixed sediment' (SS.SBR.SMus.ModMx);
- *'Alcyonium digitatum, Spirobranchus triqueter*, algal and bryozoan crusts on wave-exposed circalittoal rock' (CR.MCR.EcCr.FaAlCr.Adig) and '*Flustra foliacea* on slightly scoured silty circalittoral rock' (CR.MCR.EcCr.FaAlCr.Flu);
- 'seapens and burrowing megafauna in circalittoral fine mud' (SS.Smu.CfiMu.SpnMeg).

7.4.5.33 Phase 2 survey analysis by Sotheran and Crawford-Avis (2014b) reported the following biotopes within the eastern approaches to the Firth of Forth area:

- 'circalittoral coarse sediment' (SS.SCS.CCS);
- SS.SSa.CMuSa;
- SS.SSa.OSa.

7.4.5.34 With regards to protected species and habitats, such as those protected as Scottish PMFs (a variety of habitats and species that are a priority for conservation in Scotland's seas (Tyler-Walters *et al.*, 2016)), Annex I species under the Habitats Directive and UK Biodiversity Action Plan (BAP) species, the NBN Atlas and the SeaSearch database (2024) include records of *Sabellaria* spp. and ocean quahog (*Arctica islandica*) in the Regional Benthic Ecology Study Area (NBN, 2021). Tyler-Walters *et al*. (2016) reported blue mussel (*Mytilus edulis*) and horse mussel (*M. modiolus*) beds, burrowed mud, kelp beds, ocean quahog aggregations, maerl or coarse shell gravel with burrowing sea cucumbers, seagrass beds and offshore subtidal sands and gravels within the Regional Benthic Ecology Study Area.

Firth of Forth Bank Complex MPA

7.4.5.35 The Firth of Forth Bank Complex MPA is designated for ocean quahog, offshore subtidal sands and gravels, shelf banks and mounds and moraines; more detail on designated sites and their protected features are included in Table 7.16. The MHPGC Project is adjacent to part of the Firth of Forth Banks Complex MPA (Figure 7.10); no infrastructure of the MHPGC Project is within the MPA.

7.4.5.36 Analysis by Axelsson *et al.* (2014) of grab samples and still photography from sample locations within the Firth of Forth Banks Complex MPA identified multiple other habitats of conservation interest. *M. modiolus* beds were identified on muddy gravels and coarse sands. 'seapen and burrowing megafauna communities' habitats were also observed on finer sediments classified as sandy mud. This habitat is characterised by the seapen (*Pennatula phosphorea*), which can be identified in video and still imagery. Other associated species included *A. digitatum*, *F. foliacea* and the sunstar *Crossaster papposus*. Stony reefs were identified at four sample locations across the Firth of Forth Banks Complex MPA. The seabed at these locations was characterised by moderately large pebbles and cobbles on muddy sand and gravel colonised by large aggregations of ascidians or *A. digitatum*. A further three sites within the Firth of Forth Banks Complex MPA showed signs of "stony reef", however this could not be confirmed by the author as the topography was indistinct, the soft sediment component was too large or the extent was unknown (minimum requirement from Irving (2009) is 25m^2) at these locations (Axelsson *et al.,* 2014).

Eastern Green Link 2

7.4.5.37 The Eastern Green Link 2 subsea cable route (Figure 7.11) passes through the Regional Benthic Ecology Study Area, extending from Peterhead in Scotland to Bridlington in England. Site specific surveys of the Eastern Green Link 2 subsea cable route were undertaken in 2021 including a combination of DDV and grab sampling methods (AECOM, 2022). The survey identified a variety of taxonomic groups, mostly polychaetes, followed by molluscs and arthropods (mainly crustaceans).

7.4.5.38 Habitats with coarse or mixed sediments were identified as having higher taxonomic abundance and diversity compared to sand habitats, in part due to high levels of epifauna including *S. spinulosa*, especially towards the nearshore stations. Characteristic species of coarse or mixed sediment habitats included the polychaetes *Mediomastus fragilis*, *Lumbrineris* spp., *Glycera lapidum*, the pea urchin *Echinocyamus pusillus* and a range of encrusting fauna. Habitats dominated by sand were characterised by species such as the brittlestar *A. filiformis*, the polychaetes *Goniada maculata*, *Diplocirrus glaucus* and *Spiophanes kroyeri* and the bivalve *Timoclea ovata* (AECOM, 2022).

7.4.5.39 The site specific surveys also identified protected habitats and species of conservation importance; those identified within the Regional Benthic Ecology Study Area were subtidal sands and gravels (a UK BAP Priority Habitat and PMF) and ocean quahog (AECOM, 2022).

Berwick Bank Offshore Wind Farm

7.4.5.40 The Berwick Bank OWF (Figure 7.11) is located 13km to the west of the MHPGC Project, within the Regional Benthic Ecology Study Area. The baseline

characterisation surveys for Berwick Bank OWF occurred in 2020 and comprised of grab and DDV sampling (SSE Renewables, 2022).

7.4.5.41 The results of these surveys identified that the Berwick Bank OWF array area was predominantly populated by sand based communities including SS.SMu.CSaMu.AfilKurAnit and '*Echinocyamus pusillus*, *Ophelia borealis* and *Abra prismatica* in circalittoral fine sand' (SS.SSa.CFiSa.Epus.OborApri), which were found to be particularly dominant in the east of the Berwick Bank OWF array area, accompanied by smaller areas of SS.SSa.OSa, and '*Kurtiella bidentata* and *Thyasira* spp. in circalittoral muddy mixed sediment' (SS.SMx.CMx.MysThyMx). In the west of the Berwick Bank OWF array area mixed sediment and mud-based communities are more prevalent, including 'polychaete-rich deep *Venus* community in offshore mixed sediments' (SS.SMx.OMx.PoVen) and SS.SMu.CSaMu.AfilKurAnit biotopes, with two patches of non-reef forming '*Sabellaria spinulosa* on stable circalittoral mixed sediment' (SS.SBR.PoR.SspiMx) in the south.

7.4.5.42 The Berwick Bank OWF export cable corridor is also characterised by mixed and soft sediment communities such as SS.SSa.OSa and '*Amphiura filiformis* and *Ennucula tenuis* in circalittoral and offshore sandy mud' (SS.SMu.CSaMu.AfilEten) in the offshore end of the export cable corridor and transitioning to SS.SMu.CFiMu.SpnMeg in the central section. The 'echinoderms and crustose communities' (CR.MCR.EcCr) biotope was recorded in the inshore areas adjacent to the landfall.

7.4.5.43 During the Berwick Bank OWF survey, some grab samples also recorded species of conservation importance. *A. islandica* were recorded in the array area and export cable corridor and *M. modiolus* were recorded in the Berwick Bank OWF array area only in small numbers (<4 individuals) except for one trawl, which recorded 31 individuals. No *M. modiolus* beds were recorded during the DDV survey, and no *M. modiolus* were recorded in the infauna grab survey.

Cambois Connection Marine Scheme

7.4.5.44 The Cambois Connection Marine Scheme is located in the west of the Regional Benthic Ecology Study Area. The baseline benthic characterisation survey for the Cambois Connection Marine Scheme was undertaken alongside the Berwick Bank OWF survey in 2022, and comprised grab and DDV sampling (Natural Power, 2023). The results of the survey identified that, within Scottish waters, the biotopes were in alignment with the findings from the Berwick Bank OWF surveys (SSE Renewables, 2022).

7.4.5.45 The survey for this project identified the presence of the same species of conservation importance as the Berwick Bank OWF assessment when resurveying the parts of the Berwick Bank OWF array area. The survey also identified the presence of habitats of conservation importance, specifically subtidal sands and gravels, and mud habitats in deep water (SSE Renewables, 2023). There were several stations which qualified as low resemblance Annex I stony and bedrock reef, although these were located outside of the Regional Benthic Ecology Study Area.

Neart na Gaoithe Offshore Wind Farm

7.4.5.46 The Neart na Gaoithe OWF (Figure 7.11) array area is approximately 68km west of MHPGC Project. The baseline characterisation surveys for the Neart na Gaoithe OWF

array area reported slightly gravelly sands with areas of coarser sediments (e.g. sandy gravels and gravelly sand). Analysis of the grab samples mainly characterised the Neart na Gaoithe OWF array area as SS.SMu.CSaMu.AfilEten and a mosaic of SS.SCS.CCS/SS.SSa.OSa. Small patches of '*Thyasira* spp. and *Ennucula tenuis* in circalittoral sandy mud' (SS.SMu.CSaMu.ThyEten) were reported in the east, '*Abra prismatica, Bathyporeia elegans* and polychaetes in circalittoral fine sand' (SS.SSa.CFiSa.ApriBatPo) in the south and '*Owenia fusiformis* and *Amphiura filiformis* in offshore circalittoral sand or muddy sand' (SS.SSa.OSa.OfusAfil) in the north and west of the Neart na Gaoithe OWF array area (Neart na Gaoithe Offshore Wind Ltd, 2010). No protected or rare species were recorded (Neart na Gaoithe Offshore Wind Ltd, 2010).

7.4.5.47 Analysis of the DDV data mainly characterised the array area as SS.SMu.CFiMu.SpnMeg with regular patches of SS.SMx.CMx throughout the Neart na Gaoithe OWF array area. Sublittoral mixed sediments (SS.SMx), SS.SMx.CMx.OphMx and CR.MCR.EcCr (on boulders) were also recorded in small patches in the array area (Neart na Gaoithe Offshore Wind Ltd, 2010).

Inch Cape Offshore Wind Farm

7.4.5.48 The Inch Cape OWF is located 58km to the west of MHPGC Project and within the Regional Benthic Ecology Study Area (Figure 7.11). The baseline characterisation surveys for the Inch Cape OWF showed that the array area was dominated by circalittoral sands and gravelly sands with areas of mixed sediment. The epifaunal surveys recorded epibenthic species that were typical for these sediments and included dead man's fingers (*A. digitatum*), horned wrack (*F. foliacea*), brittlestars (e.g. *O. fragilis*), hydroids (e.g. *H. falcata*) and a number of small fish and mobile benthic invertebrates. The DDV survey recorded a number of similar species; the key species recorded were *A. digitatum, S. triqueter, Munida rugosa, F. foliacea*, and the common starfish *Asterias rubens*. The brittlestar *O. fragilis* occurred in high densities, but only at two stations (Inch Cape Offshore Limited, 2011).

7.4.5.49 The dominant biotopes within the array were SS.SMx.CMx.MysThyMx covering 65% of the array area, SS.SCS.OCS covering 31% of the area and '*Mediomastus fragilis*, *Lumbrineris* spp. and venerid bivalves in circalittoral coarse sand or gravel' (SS.SCS.CCS.MedLumVen) covering 4% of the area (Inch Cape Offshore Limited, 2011). A number of *S. spinulosa* individuals were recorded, however, no evidence of Annex I reef features was found.

Seagreen 1 Offshore Wind Farm

7.4.5.50 Seagreen 1 OWF (Figure 7.11) baseline characterisation surveys were conducted in 2011, approximately 38km west of the MHPGC Project, and comprised grab sampling, beam trawl sampling and DDV sampling (Seagreen Wind Energy Ltd, 2012).

7.4.5.51 *'Sabellaria spinulosa* on stable circalittoral mixed sediment' (SS.SBR.PoR.SspiMx), '*Moerella* spp. with venerid bivalves in infralittoral gravelly sand' (SS.SCS.ICS.MoeVen) and '*Flustra foliacea* and *Hydrallmania falcata* on tide-swept circalittoral mixed sediment' (SS.SMX.CMx.FluHyd) were identified as key biotopes in the west of the Seagreen 1 OWF. More centrally, the seabed was dominated by the Sabellidae polychaete family, 'dense *Chone*' (SS.SMx.OMx.(*Chone*)) and also a sparser version of this habitat.

7.4.5.52 In the east, SS.SMx.OMx.PoVen was identified as a key habitat across the whole area, with the centre also associated with *S. spinulosa* and the east with the *Chone* spp. polychaete.

7.4.5.53 The number of species and individuals within the east of the Seagreen 1 OWF was generally lower than within the west, likely due to a predominance of finer sediments in the east. Epifauna and encrusting fauna were more common where the sediments were coarser, containing gravel, shell or cobble (Seagreen Wind Energy Ltd, 2012).

7.4.5.54 Pre-construction benthic monitoring and Annex I reef surveys within the Seagreen 1 OWF were undertaken in the array area and export cable corridor in 2020. Benthic habitats were recorded as SS.SMx.CMx, SS.SMx.CMx.FluHyd and SS.SMx.CMx.OphMx, with patches of 'moderate energy circalittoral rock' (CR.MCR) and SS.SCS.OSC (Seagreen Wind Energy Ltd, 2020). The *S. spinulosa* aggregations identified in these surveys were not found to meet criteria to define them as reefs, however, they were in association with high biodiversity areas (Seagreen Ltd, 2012). Patches of medium and low resemblance stony reef were recorded among larger areas of cobble and sand in the offshore section of the export cable corridor, and within the centre and northeast of the Seagreen 1 OWF array area (Seagreen Wind Energy Ltd, 2020).

Seagreen 1A Project

7.4.5.55 The Seagreen 1A project provides the infrastructure required to connect the remaining 36 consented offshore wind turbines at the Seagreen OWF to the grid at the same landfall point as the Inch Cape OWF (Figure 7.11). A benthic validation survey was undertaken in 2020 and 2021 to support the marine licence application for Seagreen Project 1A. The benthic subtidal survey (comprised of grab and DDV sampling) was located to the west of the MHPGC Project, closer to the Scottish coast.

7.4.5.56 Sediments recorded ranged from sand to mixed sediments with sample stations closer to the coast containing a higher percentage of mud and those further offshore containing a higher percentage of sand (Seagreen 1A Ltd, 2021). The Seagreen Project 1A benthic validation survey recorded sandy mud biotopes ('circalittoral sandy mud' (SS.SMu.CSaMu) and SS.SMu.CSaMu.AfilKurAnit) across the mid-section of the export cable corridor survey area. Mixed sediment biotopes (SS.SMx.OMx.PoVen and SS.SMx.CMx.OphMx) were recorded in the furthest offshore samples within the export cable corridor survey area. The inshore sections of the export cable corridor survey area were dominated by muddy sediment biotopes (SS.SMu.CFiMu.SpnMeg and '*Melinna palmata* with *Magelona* spp. and *Thyasira* spp. in infralittoral sandy mud' (SS.SMu.ISaMu.MelMagThy)). No Annex I reefs were recorded during the Seagreen Project 1A benthic validation surveys, which included some areas of the Seagreen 1 OWF array area (Seagreen 1A Ltd, 2021).

Ossian Array Project

7.4.5.57 Site specific survey data from the Ossian Array Project indicated the presence of two biotopes within the Array Benthic Subtidal Ecology Study Area. These were *Echinocyamus pusillus*, *Ophelia borealis*, and *Abra prismatica* in circalittoral fine sand (SS.SSa.CFiSa.EpusOborApri) and SS.SSa.CFiSa.ApriBatPo (Ossian, 2023).

7.4.5.58 High abundances of polychaetes, primarily the sand mason worm (*Lanice conchilega*) and *Spiophanes bombyx*, were recorded. There were 196 non-colonial taxa recorded from the grab samples, with the most abundant being *L. conchilega, S. bombyx*, the bivalve *A. prismatica*, the polychaete *Scoloplos armiger* and the sea urchin *E. pusillus*. The colonial fauna were dominated by hydrozoans and bryozoans, while echinoderms comprised the majority of the total biomass collected during grab sampling.

7.4.5.59 Fauna in the DDV and still photographs were generally sparse and species composition consisted of the following: *L. conchilega*, bryozoans and cnidarians, echinoderms, seapens (*Pennatula phosphorea*), ocean quahog, and the symbiotic hermit crab *Pagarus prideaux* with anemone *Adamsia palliata.*

Kincardine Offshore Wind Farm

7.4.5.60 The site specific surveys at the Kincardine OWF (Figure 7.11) involved a combination of DDV and grab sampling of the Kincardine OWF export cable corridor and array area (Kincardine Offshore Wind Farm, 2016). The Kincardine OWF array area was predominantly characterised by SS.SSa.OSa which was found at all 18 stations across the development area. DDV identified *A. digitatum* and *A. rubens* at all 18 sample stations within the array area; these species were also the most common within the Kincardine OWF export cable corridor. In the Kincardine OWF export cable corridor, east of the Kincardine OWF array area, there was a greater variety of habitats identified, the majority of which were 'circalittoral fine sand' SS.SSa.CfiSa, followed by SS.SSa.OSa, with only a couple of stations defined as SS.SCS.CCS.

Aberdeen Offshore Wind Farm

7.4.5.61 Within the Aberdeen OWF (FigureFigure 7.11) in the north of the Regional Benthic Ecology Study Area two main biotopes were identified: SS.SCS.CCS and SS.SSa.CMuSa (Aberdeen Offshore Wind Farm Limited, 2010). Data from surveys completed around this area by McIntyre (1958) described the benthic environment to be dominated by bivalves and polychaetes as well as echinoderms such as *Ophiocten affinis* and *E. pusillus*.

Hywind Offshore Wind Farm

7.4.5.62 The Hywind Buchan Deep OWF, located in the north of the Regional Benthic Ecology Study Area, identified a variety of habitats within its export cable corridor and array area. DDV surveys of the Buchan Deep recorded the SS.SSa.CFiSa biotope, characterised by a poorly developed epifauna with sparse hermit crabs and brittle stars, as well as hydroids and anemones on the scattered cobbles (Statoil, 2015). The main infaunal species here were the polychaetes *S. armiger*, *S. bombyx* and *O. fusiformis*, the brittle stars *A. filiformis* and *O. affinis* and the burrowing sea urchins *Spatangus* sp. and *E. pusillus* (Statoil, 2015). The occasional patches of boulders and mixed sediment supported a higher diversity of epifaunal species including shrimps, sponges, sessile cnidarians and occasional aggregations of sandy tubes of the polychaete *S. spinulosa*. Coverage of *S. spinulosa* on the seabed in these locations was low, patchy and small in extent (Statoil, 2015).

Benthic Ecology Study Area

7.4.5.63 The benthic communities in the Morven Array Project Benthic Ecology Study Area were dominated by the SS.SSa.CFiSa.ApriBatPo, SS.SSa.CFiSa.EpusOborApri, and SS.SSa.CFiSa biotopes (RPS, 2024). Adult specimens of ocean quahog (*A. islandica*), an OSPAR threatened and/or declining species (OSPAR, 2022), were identified at three stations. The 'scarce tube-dwelling anemone' *Arachnanthus sarsi*, which is listed as a PMF in Scottish territorial waters (Marine and Coastal Access Act, 2009a; JNCC, 2012), and is classified as "a rare mobile species in Scottish waters" on the Scottish Biodiversity List (2020), was observed at eight stations, distributed broadly across the Benthic Ecology Study Area.

7.4.5.64 The site specific benthic characterisation survey further assessed for the presence of habitats of conservation importance as well as general species distribution across the Benthic Ecology Study Area in Scottish waters. Results will be reported in full in the MHPGC Project EIA Report/ES and used to identify any potential impacts of the MHPGC Project. However, visible fauna observed within the grab samples were limited, and samples were generally dominated by polychaetes (Gardline Ltd., 2024). Juvenile ocean quahogs were identified at four stations (Gardline Ltd., 2024).

Baseline Environment in English Waters

7.4.5.65 The following section describes the baseline environment for the areas of the Regional Ecology Study Area and Benthic Ecology Study Area which are in English waters.

Subtidal Sediments in English Waters

Regional Benthic Ecology Study Area

7.4.5.66 Based on EUSeaMap data (EMODnet, 2019), within the Regional Benthic Ecology Study Area which falls within English waters, seabed sediments are dominated by a mosaic of "deep circalittoral coarse sediment" (A5.15) and "deep circalittoral sand" (A5.27) (Figure 7.9). The sediment transitions to become more dominated by A5.27 in the east of the Regional Benthic Ecology Study Area.

7.4.5.67 In the southwest of the Regional Benthic Ecology Study Area there is a large area of "deep circalittoral mud" (A5.37). Further inshore to the west, along the coast, there are also areas of "Atlantic and Mediterranean moderate energy CR" (A4.2) and "circalittoral sandy mud" (A5.35). A mix of biotopes can be found along the coast including patches of "circalittoral mixed sediment" (A5.44), "circalittoral coarse sediment" (A5.14) and "deep circalittoral mixed sediment" (A5.45) (Figure 7.9).

Farnes East MCZ

7.4.5.68 The seabed in the Farnes East MCZ is predominantly composed of subtidal coarse sediment, subtidal sand, and subtidal mixed sediments, with some small patches of moderate energy CR. At the deepest point of the MCZ, there is a glacial trench, which contains subtidal mud (JNCC, 2021). These subtidal sediment types are all listed as protected features.

7.4.5.69 The Farnes East MCZ post-survey site report combined data from the 2012 and 2014 site verification surveys and analysed the biotypes. The results confirmed the presence of moderate energy CR, subtidal coarse sediment, subtidal sand, subtidal

mud, and subtidal mixed sediments (DEFRA, 2015a). The area surveyed is found to the west of the Benthic Ecology Study Area.

North East Of Farnes Deep MCZ and HPMA

7.4.5.70 The seabed in the North East of Farnes Deep MCZ and HPMA is mainly composed of subtidal mixed sediments, with subtidal sand and subtidal coarse sediment each also occupying approximately a quarter of the total site area, with a small area of subtidal mud present in the west of the site. All of these are designated as protected features of the MCZ. The geological and geographical features of the site include glacial features and topographic features of the North East Bank seabed mound or pinnacle; however, these are not designated features of the MCZ. The protected feature of the HPMA is the entire marine ecosystem of the area i.e. all marine flora and fauna, habitats and geological or geomorphological interests, including all abiotic elements and supporting ecosystem functions and processes.

Other Offshore Wind Farms

7.4.5.71 The benthic surveys conducted for planned and operational OWF within the Regional Benthic Ecology Study Area also provide an overview of the sedimentary habitats present; those in English waters are listed below and shown in Figure 7.11. The information included in this section is focused on the surveys of the export cable corridors for the OWFs listed below, which will help to inform the benthic ecology baseline characterisation for the southern section of the MHPGC Project:

- Blyth OWF;
- Teesside OWF.

7.4.5.72 Surveys were conducted of the Teesside OWF array area and associated export cable corridor in 2003, approximately 19km south of the MHPGC Project. The dominant sediment type was sand, with a couple of stations recorded as gravel (EDF Energy, 2004).

7.4.5.73 The 2010 Blyth OWF, approximately 24 km west of the MHPGC Project, survey found seabed sediment to be largely comprised of fine to muddy sands, with areas of gravelly sand. Muddy sand dominated inshore, with courser sandy sediments further offshore (AMEC, 2011).

Benthic Ecology Study Area

7.4.5.74 Within the Benthic Ecology Study Area, it is likely that nearshore sediments, close to the proposed export cable corridor landfall, will consist of coarse sediments ("circalittoral mixed sediment" (A5.44) and "circalittoral coarse sediment" (A5.14)) and muds ("circalittoral sandy mud" (A5.35)) based on EUSeaMap data (EMODnet, 2019; Figure 7.9). The sediment composition further offshore is likely to transition to be mostly "deep circalittoral mud" (A5.37), then a mosaic of "deep circalittoral coarse sediment" (A5.15) and "deep circalittoral sand" (A5.27) closer to the array area (Figure 7.9).

7.4.5.75 Results from the site specific benthic surveys included sediment characterisation from PSA, which will be reported in full in the MHPGC Project EIA Report/ES. However, sediments were heterogenous across sampling locations, with sediments in English waters altering to a higher proportion of the fines sediment fraction than

sand or gravel the further south the sampling locations were, likely due to the proximity to the coastline and major riverine systems (Figure 7.9; Gardline Ltd., 2024).

Intertidal Sediments in English Waters

7.4.5.76 PSA of samples collected during intertidal surveys for the Blyth OWF (AMEC, 2011) and the Teesside OWF (EDF Energy, 2004) revealed sediments in both areas, located either side of the Benthic Ecology Study Area, were mainly medium to fine sands.

Sediment Contamination in English Waters

7.4.5.77 In terms of sediment contamination, it is possible that levels will exceed Cefas AL1 levels as levels of organotin and some metals have been shown to exceed Cefas AL1 in the Regional Benthic Ecology Study Area according to data in the Cefas Action Level viewer (Cefas, 2023).

7.4.5.78 The detailed contaminant analyses results from the MHPGC Project site specific surveys, and comparison to relevant ALs and guidelines, will be presented and discussed in the MHPGC Project EIA Report/ES. However, concentrations of total hydrocarbons, PAHs, PCBs, metals and organotins were generally low in samples from stations within English waters (Gardline Ltd., 2024).

Subtidal Benthic Communities in English Waters

Regional Benthic Ecology Study Area

7.4.5.79 Dedicated benthic characterisation surveys were undertaken during spring/summer 2021 along the proposed Eastern Green Link 2 subsea cable route, which crosses through the Regional Benthic Ecology Study Area. A wide variety of benthic communities and species were found, including the reef-building *S. spinulosa*, especially in the English nearshore stations (AECOM, 2022). Characterising species of coarse or mixed sediment habitats included the polychaetes *M. fragilis*, *Lumbrineris spp*, *G. lapidum*, the sea urchin *E. pusillus* and a range of encrusting fauna. Habitats dominated by sand were characterised by species such as the brittlestar *A. filiformis*, the polychaetes *G. maculata, D. glaucus* and *S. kroyeri* and the bivalve *T. ovata*. Further inshore, samples were dominated by epifauna found in coarse sediment and gravel habitats.

Farnes East MCZ

7.4.5.80 The Farnes East MCZ is designated for moderate energy CR, subtidal coarse sediment, subtidal sand, mud and mixed sediments, 'seapen and burrowing megafauna communities' and ocean quahog; more detail on the designated sites in the Regional Benthic Ecology Study Area is included in Table 7.16. The 'seapen and burrowing megafauna communities' habitat is protected in the Farnes East MCZ as a result of the presence of two species of seapen; the slender seapen (*Virgularia mirabilis*) and the phosphorescent seapen (*Pennatula phosphorea*), as well as the presence of Norway lobster (*Nephrops norvegicus*) burrows in the deep mud habitat on site (JNCC, 2021).

7.4.5.81 The Sotheran *et al.* (2016) community analysis of offshore grab and video data from 103 sample stations in the Farnes East MCZ, from a site characterisation survey which took place in 2012 and a return survey during 2014, recorded five biotopes:

- SS.SSa.CFiSa.EpusOborApri;
- SS.SMu.CSaMu.ThyEten;
- SS.SMx.OMx;
- SS.SCS.OCS;
- SS.SSa.OSa.OfusAfil.

7.4.5.82 In total 271 taxa were recorded during the community analysis surveys, these included:

- areas of slightly gravelly sand, characterised by species such as *A. prismatica*, *O. borealis* and *Aricidea (Acmira) catherinae*;
- sandier stations characterised by moderately deep slightly gravelly sand with *E. pusillus, O. borealis*, *G. lapidum*, *O. fusiformis* and *A. prismatica*;
- stations characterised by moderately deep gravelly sand with species such as *E. pusillus, Leptochiton asellus, Paradoneis lyra, Clymenura* sp. and *Paramphinome jeffreysii*;
- stations characterised by gravelly muddy sand with *Hydroides norvegica, L. asellus, Hilbigneris gracilis, G. lapidum* and Serpulidae (Sotheran, *et al*., 2016).

North East Of Farnes Deep MCZ and HPMA

7.4.5.83 The North East of Farnes Deep MCZ (Figure 7.10) was designated by Defra as a HPMA in June 2023 for its relatively high levels of biodiversity in comparison to the wider Northern North Sea region (JNCC, 2023). This has extended the protection of the site from the previously designated specific features to protect the entire marine ecosystem (seabed, water column processes and all species) within the site.

7.4.5.84 During the 2012 site MCZ site verification survey, seapens and macrofaunal burrows were observed in the video and still images from two ground truthing stations, but the description of sediment in these samples did not match the 'seapen and burrowing megafauna communities' habitat and so this was not included as a designated feature of the site (DEFRA, 2015b). Ocean quahog was recorded in 13 samples collected during the survey, with a total of 28 specimens recorded, mostly in the eastern and south-western corner of the site (DEFRA, 2015b).

7.4.5.85 From community analysis of offshore grab and video data, the faunal communities for the North East of Farnes Deep MCZ and HPMA were characterised (Allen *et al.,* 2016). Polychaetes were common across the area including: *H. norvegica, P. jeffreysii, Galathowenia oculata, P. lyra,* and *M. fragilis*. Other common fauna within these samples included *E. pusillus, L. asellus,* Nemertea and Sipuncula. Biotopes identified from these surveys were:

- SS.SMx.OMx.PoVen;
- SS.SSa.CFiSa.EpusOborApri*;*
- SS.SSa.OSa.OfusAfil;
- SS.SSa.CFiSa;
- SS.SMx.CMx*.*

Other Offshore Wind Farms

7.4.5.86 Subtidal benthic communities around the Teesside OWF were generally dominated by molluscs and polychaetes. The most common bivalves were *A. nitida*, *N. nitidosa* and juvenile razor shells (*Ensis* sp.). The most common polychaetes were *M. johnstoni* and *Chaetozone setosa*. High numbers of *S. spinulosa* were also found, but this species was only present at a few stations and was not found in reef form (EDF Energy, 2004).

7.4.5.87 The subtidal survey for the Blyth OWF found the following biotopes (AMEC, 2011):

- SS.SSa.CMuSa.AalbNuc;
- SS.SMx.CMx.KurThyMx;
- SS.SSa.IFiSa.NcirBat.

7.4.5.88 The subtidal biotopes surveyed in English waters for the Cambois Connection Marine Scheme were dominated by SS.SSaCFiSa.ApriBatPo, interspersed with less frequent '*Paramphinome jeffreysii*, *Thyasira* spp. and *Amphiura filiformis* in offshore circalittoral sandy mud' (SS.SMu.Omu.PjefThyAfil) and the higher level biotope SS.SMx.Omx (Natural Power, 2023).

Benthic Ecology Study Area

7.4.5.89 Site specific benthic characterisation surveys assessed for the presence of habitats of conservation importance as well as general species distribution across the Benthic Ecology Study Area in English waters. Results will be reported in full in the MHPGC Project EIA Report/ES and used to identify any potential impacts of MHPGC Project. However, most stations in English waters were dominated by polychaetes (Gardline Ltd., 2024).

7.4.5.90 Juvenile ocean quahogs were identified at 45 sampling locations, while single individuals of the slender seapen were recorded at four sampling locations and phosphorescent seapen at two (Gardline Ltd., 2024).

Intertidal Benthic Communities in English Waters

Regional Benthic Ecology Study Area

7.4.5.91 The intertidal survey conducted for the Teesside OWF, approximately 19 km south of the MHPGC Project, revealed low faunal abundance and diversity (EDF Energy, 2004), with the following biotopes identified:

- 'Talitrids on the upper shore and strandline' (LS.LSa.St.Tal);
- 'Barren littoral coarse sand' (LS.LSa.MoSa.BarSa);
- 'Amphipods and *Scolelepis* spp. In littoral medium-fine sand' (LS.LSa.MoSa.AmSco).

7.4.5.92 The 2010 Blyth OWF (approximately 24 km north of the MHPGC Project) survey found the same intertidal biotopes listed above for the Teesside OWF, with the addition of the following rocky shore biotopes (AMEC, 2011):

- *'Semibalanus balanoides*, *Patella vulgata* and *Littorina* spp. on exposed to moderately exposed or vertical sheltered eulittoral rock' (LR.HLR.MusB.Sem.Sem);

- *'Fucus vesiculosus* and barnacle mosaics on moderately exposed mid eulittoral rock' (LR.MLR.BF.FvesB);
- *'Laminaria digitata* on moderately exposed sublittoral fringe bedrock' (IR.MIR.KR.Ldig.Ldig).

Benthic Ecology Study Area

7.4.5.93 A site specific intertidal survey is predicted to take place during July and August 2024, to investigate areas potential affected by trenchless techniques. Results will be reported in the benthic ecology technical report in the MHPGC Project EIA Report/ES.

7.4.6 Designated Sites and Features of Conservation Importance in English and Scottish Waters

Designated Sites

7.4.6.1 Within the Regional Benthic Ecology Study Area there a number of European (i.e. Special Areas of Conservation (SACs)) and nationally (i.e. MPAs and MCZs) designated sites with relevant subtidal benthic ecology features; these are summarised in Table 7.16 and illustrated in Figure 7.10.

Table 7.16: Summary of Designated Sites with Relevant Benthic Ecology Features within the Regional Benthic Ecology Study Area

Designated Site	English Waters or Scottish Waters	Distance to MHPGC Project (km)	Distance to Benthic Ecology Study Area (km)	Relevant Benthic Features
Firth of Forth Banks Complex MPA.	Scottish.	Adjacent.	Overlaps.	• Ocean quahog; • Offshore subtidal sands and gravels; • Shelf banks and mounds; • Quaternary of Scotland: Moraines.
Farnes East MCZ.	English.	0.2	Overlaps.	• Moderate energy CR; • Subtidal coarse sediment; • Subtidal sand; • Subtidal mud; • Subtidal mixed sediments; • Seapen and burrowing megafauna communities.
North East of Farnes Deep MCZ/HPMA.	English.	0.2	Overlaps.	• Ocean quahog; • Subtidal mixed sediments, coarse sediment, mud and sand; • The marine ecosystem of the area.
Coquet to St. Mary's MCZ.	English.	12	2	• Low, moderate and high energy intertidal rock; • Intertidal mixed and coarse sediments; • Intertidal mud, sand and muddy sand; • Intertidal under boulder communities;

Designated Site	English Waters or Scottish Waters	Distance to MHPGC Project (km)	Distance to Benthic Ecology Study Area (km)	Relevant Benthic Features
				• Moderate and high energy infralittoral rock; • Moderate energy CR; • Subtidal mud, sand, coarse and mixed sediments.
Swallow Sand MCZ.	English.	22	18	• Subtidal coarse sediment; • Subtidal sand; • North Sea glacial tunnel valley (Geological/Geomorphological feature).
Berwickshire and North Northumberland Coast SAC.	Scottish/English.	24	20	• Mudflats and sandflats not covered by seawater at low tide; • Large shallow inlets and bays; • Reefs; • Submerged or partially submerged sea caves.
Runswick Bay MCZ.	English.	33	25	• Low, moderate and high energy intertidal rock; • Intertidal sand and muddy sand; • Moderate energy infralittoral and CR; • Subtidal mud, sand, mixed and coarse sediments; • Ocean quahog.
Aln Estuary MCZ.	English.	33	29	• Coastal saltmarshes and saline reedbeds; • Intertidal mud; • Estuarine rocky habitats;

Designated Site	English Waters or Scottish Waters	Distance to MHPGC Project (km)	Distance to Benthic Ecology Study Area (km)	Relevant Benthic Features
				• Sheltered muddy gravels.
Southern Trench MPA.	Scottish.	48	34	• Burrowed mud; • Shelf deeps; • Quaternary of Scotland: Moraines; • Quaternary of Scotland: Sub-glacial tunnel valleys; • Submarine Mass Movement: Slide scars.
Tweed Estuary SAC.	Scottish/English.	61	57	• Estuaries; • Mudflats and sandflats not covered by seawater at low tide.
Isle of May SAC.	Scottish.	92	88	• Reefs.
Flamborough Head SAC.	English.	94	86	• Reefs; • Vegetated sea cliffs of the Atlantic and Baltic Coasts; • Submerged or partially submerged sea caves.
Firth of Tay and Eden Estuary SAC.	Scottish	95	91	• Estuaries; • Sandbanks which are slightly covered by sea water all the time.

7.4.6.2 The identification of designated sites for inclusion in the MHPGC Project Benthic Subtidal and Intertidal Ecology Chapter of the EIA Report/ES was carried out as follows:

- Sites with relevant qualifying features which overlap with the MHPGC Project Scoping Boundary were screened in for further assessment;
- Sites with relevant qualifying features, which are located within the likely ZoI of impacts associated with the MHPGC Project were screened in for further assessment. The ZoI has been identified as one maximum tidal ellipse over a large spring tide around the MHPGC Project Scoping Boundary, i.e. the Benthic Subtidal Ecology Study Area.

7.4.6.3 On this basis, designated sites within the Benthic Ecology Study Area have been included in the EIA assessment. This ensures that all sites potentially affected by changes in water quality (e.g. increased SSCs) and potential changes to the hydrodynamic regime are included in the assessment.

7.4.6.4 Designated sites within the Benthic Ecology Study Area, with relevant benthic features, are the Firth of Forth Banks Complex MPA, Farnes East MCZ and North East of Farnes Deep MCZ/HPMA. All other designated sites are located outside the Benthic Ecology Study Area, beyond the ZoI for benthic receptors (Figure 7.10).

7.4.6.5 The conservation objectives of the aforementioned sites are to ensure that, subject to natural change, the integrity of the site is maintained or restored as appropriate and that the site contributes to achieving the Favourable Conservation Status (FCS) of its qualifying features.

7.4.6.6 Further detail on potential impacts of the MHPGC Project on MPAs is presented in the MPA Screening Report (Appendix E).

Features of Conservation Importance

7.4.6.7 From a review of the EMODnet OSPAR habitats viewer (OSPAR, 2022), Tyler-Walters *et al.* (2016) and other data sources listed in Table 7.15, records of a number of features of conservation importance have been found within the Regional Benthic Ecology Study Area, mostly within coastal areas. These features are listed in Table 7.17, with details of their designation(s) (OSPAR threatened and/or declining habitats and species, BAP Priority Habitats and PMFs).

Table 7.17: Summary of Records of Features of Conservation Importance within the Regional Benthic Ecology Study Area

Feature	English Waters or Scottish Waters	OSPAR	BAP Priority Habitat	PMF
Kelp forests	English and Scottish	✓		✓
Seagrass *Zostera* beds	English and Scottish	✓	✓	

Feature	English Waters or Scottish Waters	OSPAR	BAP Priority Habitat	PMF
Sabellaria spinulosa reefs	English and Scottish	✓	✓	
Intertidal mudflats	English and Scottish	✓	✓	✓
Blue mussel *Mytilus edulis* beds	English and Scottish	✓	✓	✓
Horse mussel *Modiolus modiolus* beds	English and Scottish	✓	✓	✓
Seapen and burrowing megafauna communities	English and Scottish	✓		✓
offshore deep sea muds	Scottish			✓
offshore subtidal sands and gravels	Scottish		✓	✓
Maerl or coarse shell gravel with burrowing sea cucumbers	Scottish		✓	✓
Ocean quahog *Arctica islandica*	English and Scottish	✓		✓
Fireworks Anemone *Pachycerianthus multiplicatus*	Scottish			✓
Tall seapen *Funiculina quadrangularis*	Scottish			✓
Mud burrowing amphipod *Maera loveni*	Scottish			✓
Fan mussel *Atrina fragilis*	Scottish			✓

7.4.6.8 Of those features of conservation importance known within the Regional Benthic Ecology Study Area and listed in Table 7.17, there are records of the following features within the Benthic Ecology Study area in Scottish waters:

- seapen and burrowing megafauna communities;
- offshore deep sea muds;
- offshore subtidal sands and gravels;
- ocean quahog *Arctica islandica.*

7.4.6.9 Of those features of conservation importance known within the Regional Benthic Ecology Study Area and listed in Table 7.17, there are records of the following features within the Benthic Ecology Study area in English waters:

- kelp forests;
- *Sabellaria spinulosa* reefs;
- intertidal mudflats;
- blue mussel *Mytilus edulis* beds;
- seapen and burrowing megafauna communities;
- ocean quahog *Arctica islandica*.

7.4.7 Potential Impacts of the Morven Hawthorn Pit Grid Connection Project

7.4.7.1 A range of potential impacts on benthic subtidal ecology have been identified which may give rise to likely significant effects during the construction, O&M, and decommissioning phases of the MHPGC Project.

7.4.7.2 The impacts that have been scoped into the assessment as having the potential to give rise to likely significant effects are outlined in Table 7.18, together with a description of any additional data collection (e.g. site specific surveys) and supporting analyses (e.g. modelling) that will be required to enable a full assessment of the impacts.

7.4.7.3 Potential impacts scoped out of the assessment as there is no potential for them give rise to likely significant effects are presented in Table 7.19, with justification.

7.4.7.4 The potential impacts from the MHPGC Project have been considered collectively for both English and Scottish waters, as these will not change between these areas given the commonality of the works proposed (offshore cabling).

Table 7.18: Impacts Proposed to be Scoped in to the Morven Hawthorn Pit Grid Connection Project Assessment for Benthic Ecology

*Project phase refers to construction (C), O&M (O) and decommissioning (D).

Impact	Project Phase*			Relevant to England or Scotland	Basis for Impact	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D				
Temporary habitat loss/disturbance.	✓	×	✓	Scottish and English waters	There is potential for temporary, direct habitat loss and disturbance during the construction phase as a result of all construction activities that interact with the seabed. There is potential for temporary, direct habitat loss and disturbance due to decommissioning activities to remove joint bays and cable protection, resulting in potential impacts on benthic ecology. 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. The preferred method for construction in the intertidal area is using	Benthic subtidal surveys were undertaken across the Benthic Ecology Study Area in summer 2023. Further site specific benthic ecology characterisation surveys are planned for intertidal and nearshore benthic ecology. These surveys will provide data to support the benthic characterisation within the Benthic Ecology Study Area, along with desktop information and data sources listed in Table 7.15.	No specific modelling is required to inform this impact assessment, although the assessment will be quantitative in nature (i.e. clearly presenting the maximum spatial scale of impacts). This assessment will be based on information derived from the Project Design Envelope (PDE). The significance of impacts upon benthic receptors will be determined by correlating the magnitude of the impact and the

Impact	Project Phase*			Relevant to England or Scotland	Basis for Impact	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D				
					trenchless techniques to install a number of ducts through which the offshore cables are pulled to the landing site. This should minimise the disturbance to the local community and will be considered in the EIA Report/ES.		sensitivity of the receptor. Where possible, the magnitude of the impact will be quantified for the Maximum Design Scenario (MDS). For example, the MDS for temporary habitat loss/disturbance will be quantified and the assessment will present the areas of habitat potentially affected in the context of the size of the Regional Benthic Ecology Study Area. The sensitivity of benthic receptors will be determined using the Marine Evidence-based Sensitivity Assessment (MarESA) tool (Tyler-Walters *et*

Impact	Project Phase*			Relevant to England or Scotland	Basis for Impact	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D				
							al., 2018) and the Feature Activity Sensitivity Tool (FeAST) (FeAST working group, 2023).
Increased SSCs and associated deposition.	✓	×	✓	Scottish and English waters	Sediment disturbance arising from construction activities (e.g. cable installation – including drilling and any deposits arising, unexploded ordnance (UXO) clearance and seabed preparation) and decommissioning activities may result in indirect impacts on benthic communities due to temporary increases in SSCs and associated sediment deposition (i.e. smothering impacts). Changes in SSCs can impact benthic receptors through changes in water clarity and reduced feeding due to increases in suspended solids, smothering and siltation rate changes. This assessment will consider the potential impacts on benthic subtidal ecology.	Benthic subtidal surveys were undertaken across the Benthic Ecology Study Area in summer 2023. Further site specific benthic ecology characterisation surveys are planned for intertidal and nearshore benthic ecology. These surveys will provide data to support the benthic characterisation within the Benthic Ecology Study Area, along with desktop	The outputs of numerical modelling undertaken for the physical processes assessment will inform this impact assessment. Further details of this modelling are presented within Chapter 7.1: Physical Processes, of the Scoping Report. The significance of impacts upon benthic receptors will be determined by correlating the magnitude of the

Impact	Project Phase*			Relevant to England or Scotland	Basis for Impact	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D				
					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.	information and data sources listed in Table 7.15.	impact and the sensitivity of the receptor. Where possible, the magnitude of the impact will be quantified for the MDS. The sensitivity of benthic receptors will be determined using the MarESA tool (Tyler-Walters *et al.*, 2018) and the FeAST (FeAST working group, 2023). For the O&M and decommissioning phases, the magnitude is assumed to be no greater than for the construction phase, therefore modelling carried out for the construction phase

Impact	Project Phase*			Relevant to England or Scotland	Basis for Impact	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D				
							will be used to quantify the magnitude of impacts.
Long term habitat loss.	✓	✓	✓	Scottish and English waters	There is the potential for long term habitat loss to occur directly under any cable protection required along the export cables. Permanent habitat loss may occur under any infrastructure that is not decommissioned at the end of the MHPGC Project's lifetime, such as cable protection.	Benthic subtidal surveys were undertaken across the Benthic Ecology Study Area in summer 2023. Further site specific benthic ecology characterisation surveys are planned for intertidal and nearshore benthic ecology. These surveys will provide data to support the benthic characterisation within the Benthic Ecology Study Area, along with desktop information and data	No specific modelling is required to inform this impact assessment, although the assessment will be quantitative in nature (i.e. clearly presenting the maximum spatial scale of impacts). This assessment will be based on information derived from the PDE. The significance of impacts upon benthic receptors will be determined by correlating the magnitude of the impact and the

Impact	Project Phase*			Relevant to England or Scotland	Basis for Impact	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D				
						sources listed in Table 7.15.	sensitivity of the receptor. Where possible, the magnitude of the impact will be quantified for the MDS. The sensitivity of benthic receptors will be determined using the MarESA tool (Tyler-Walters *et al.*, 2018) and the FeAST (FeAST working group, 2023).
Disturbance/remobilisation of sediment-bound contaminants.	✓	✓	✓	Scottish and English waters	Seabed disturbance associated with construction, O&M and decommissioning activities (e.g. cable installation) could lead to the remobilisation of sediment-bound contaminants that may result in harmful and/or adverse impacts on benthic communities.	There is comprehensive desktop information and data sources available to characterise contamination levels within the Regional Benthic Ecology Study Area, including the	The outputs of numerical modelling undertaken for the physical processes assessment will inform this impact assessment. Further details of this modelling are presented within

Impact	Project Phase*			Relevant to England or Scotland	Basis for Impact	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D				
						Cefas Action Level viewer (Cefas, 2023), which show levels of sediment contaminants are very low. However, the majority of the available sediment chemistry data collated to date is from OWF surveys in the Regional Benthic Study Area and is therefore not focused directly on the Benthic Ecology Study Area. This is not currently sufficient information to scope out this impact. Targeted benthic subtidal surveys over the Benthic Ecology Study Area include the collection of sediment samples for	Chapter 7.1: Physical Processes, of the Scoping Report. A qualitative assessment will then be undertaken using the modelling outputs for context of dispersal and presented in the EIA, based on a thorough review of the site specific information on contaminants in the Benthic Ecology Study Area and available scientific evidence on the impacts on benthic ecology receptors. This assessment will be based on information derived from the PDE. The significance of impacts upon benthic

Impact	Project Phase*			Relevant to England or Scotland	Basis for Impact	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D				
						contaminant analyses, and results from these surveys will be presented and analysed in the EIA Report/ES.	receptors will be determined by correlating the magnitude of the impact and the sensitivity of the receptor. Where possible, the magnitude of the impact will be quantified for the MDS. The sensitivity of benthic receptors will be determined using the MarESA tool (Tyler-Walters *et al.*, 2018) and the FeAST (FeAST working group, 2023).
Increased risk of introduction and spread of Invasive Non-Native Species (INNS).	✓	✓	✓	Scottish and English waters	There is potential for an increased risk of introduction and spread of INNS through all phases of MHPGC Project; through vessel movements, mobilisation of sediments,	Benthic subtidal surveys were undertaken across the Benthic Ecology Study Area in summer 2023.	No specific modelling is required to inform this impact assessment. A qualitative

Impact	Project Phase*			Relevant to England or Scotland	Basis for Impact	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D				
					colonisation of hard structures such as cable protection, etc.	Further site specific benthic ecology characterisation surveys are planned for intertidal and nearshore benthic ecology. These surveys will provide data to support the benthic characterisation within the Benthic Ecology Study Area, along with desktop information and data sources listed in Table 7.15.	assessment will be undertaken and presented in the EIA Report/ES. This assessment will be based on information derived from the PDE. The significance of impacts upon benthic receptors will be determined by correlating the magnitude of the impact and the sensitivity of the receptor. Where possible, the magnitude of the impact will be quantified for the MDS. The sensitivity of benthic receptors will be determined using the MarESA tool (Tyler-Walters *et al.*, 2018) and the

Impact	Project Phase*			Relevant to England or Scotland	Basis for Impact	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D				
							FeAST (FeAST working group, 2023).
Colonisation of hard structures.	✗	✓	✗	Scottish and English waters	Artificial structures placed on the seabed (i.e. cable protection) in the offshore environment are expected to be colonised by a range of marine organisms leading to localised increases in biodiversity. These structures may also facilitate the spread of marine INNS.	Benthic subtidal surveys were undertaken across the Benthic Ecology Study Area in summer 2023. Further site specific benthic ecology characterisation surveys are planned for intertidal and nearshore benthic ecology. These surveys will provide data to support the benthic characterisation within the Benthic Ecology Study Area, along with desktop information and data sources listed in Table 7.15.	No specific modelling is required to inform this impact assessment. A qualitative assessment will be undertaken and presented in the EIA Report/ES. This assessment will be based on information derived from the PDE. INNS will be considered. The significance of impacts upon benthic receptors will be determined by correlating the magnitude of the impact and the sensitivity of the

Impact	Project Phase*			Relevant to England or Scotland	Basis for Impact	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D				
							receptor. Where possible, the magnitude of the impact will be quantified for the MDS. The sensitivity of benthic receptors will be determined using the MarESA tool (Tyler-Walters *et al.*, 2018) and the FeAST (FeAST working group, 2023).
Changes in physical processes	×	✓	×	Scottish and English waters	The presence of cable protection may introduce localised changes to the tidal flow and wave climate, resulting in potential changes to the sediment transport pathways with associated impacts on benthic ecology.	Benthic subtidal surveys were undertaken across the Benthic Ecology Study Area in summer 2023. Further site specific benthic ecology characterisation surveys are planned for intertidal and nearshore benthic	Outputs of numerical modelling (as discussed in Chapter 7.1: Physical Processes, of the Scoping Report) undertaken for the physical processes assessment will inform this impact assessment. The

Impact	Project Phase*			Relevant to England or Scotland	Basis for Impact	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D				
						ecology. These surveys will provide data to support the benthic characterisation within the Benthic Ecology Study Area, along with desktop information and data sources listed in Table 7.15.	significance of impacts upon benthic receptors will be determined by correlating the magnitude of the impact and the sensitivity of the receptor. Where possible, the magnitude of the impact will be quantified for the MDS. The sensitivity of benthic receptors will be determined using the MarESA tool (Tyler-Walters *et al.*, 2018) and the FeAST (FeAST working group, 2023).
Removal of hard substrates.	✗	✗	✓	Scottish and English waters	The removal of artificial structures during decommissioning has the potential to lead to loss of	Benthic subtidal surveys were undertaken across the	No specific modelling is required to inform this impact

Impact	Project Phase*			Relevant to England or Scotland	Basis for Impact	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D				
					species/habitats colonising these structures.	Benthic Ecology Study Area in summer 2023. Further site specific benthic ecology characterisation surveys are planned for intertidal and nearshore benthic ecology. These surveys will provide data to support the benthic characterisation within the Benthic Ecology Study Area, along with desktop information and data sources listed in Table 7.15.	assessment, although the assessment will be quantitative in nature (i.e. clearly presenting the maximum spatial scale of impacts). This assessment will be based on information derived from the PDE. The significance of impacts upon benthic receptors will be determined by correlating the magnitude of the impact and the sensitivity of the receptor. Where possible, the magnitude of the impact will be quantified for the MDS. The sensitivity of benthic receptors

Impact	Project Phase*			Relevant to England or Scotland	Basis for Impact	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D				
							will be determined using the MarESA tool (Tyler-Walters *et al.*, 2018) and the FeAST (FeAST working group, 2023).
Impacts to benthic invertebrates due to Electromagnetic Fields (EMF).	✗	✓	✗	Scottish and English waters	The presence of additional EMFs from operational subsea cables (interconnector and export cables) may affect benthic subtidal ecology by changing the behaviours and physiology of relevant benthic ecology receptors.	Benthic subtidal surveys were undertaken across the Benthic Ecology Study Area in summer 2023. Further site specific benthic ecology characterisation surveys are planned for intertidal and nearshore benthic ecology. These surveys will provide data to support the benthic characterisation within the Benthic Ecology Study Area,	No specific modelling is required to inform this impact assessment, although the assessment will be quantitative in nature (i.e. clearly presenting the maximum spatial scale of impacts). This assessment will be based on information derived from the PDE. The significance of impacts upon benthic receptors will be determined by

Impact	Project Phase*			Relevant to England or Scotland	Basis for Impact	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D				
						along with desktop information and data sources listed in Table 7.15.	correlating the magnitude of the impact and the sensitivity of the receptor. Where possible, the magnitude of the impact will be quantified for the MDS. The sensitivity of benthic receptors will be determined using the MarESA tool (Tyler-Walters *et al.*, 2018) and the FeAST (FeAST working group, 2023).

Table 7.19: Impacts Proposed to be Scoped out of the Morven Hawthorn Pit Grid Connection Project Assessment for Benthic Ecology

Impact	Justification
Accidental release of pollutants during construction, O&M, and decommissioning.	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 standard post-consent plans (e.g. Environmental Management Plan (EMP), including a Marine Pollution Contingency Plan (MPCP)). Outline management plans will be provided with the Application with the Offshore EIA Report/ES. These plans include planning for accidental spills, address all potential contaminant releases and include key emergency contact details. These plans will also set out industry good practice and OSPAR, International Maritime Organisation and MARPOL (International Convention for the Prevention of Pollution from Ships) guidelines for preventing pollution at sea. Therefore, the likelihood of an accidental spill occurring is very low following the implementation of these plans and in the unlikely event that such an event did occur, the magnitude will be minimised through measures outlined in the MPCP. As such, it is intended that this impact is scoped out of further consideration within the Benthic Subtidal and Intertidal Ecology Chapter of the EIA Report/ES.
Impacts to benthic invertebrates due to thermal emissions from subsea electrical cables.	Thermal emissions generated by the subsea electrical cabling may affect benthic subtidal receptors, however there is limited evidence for subsea cables significantly changing the temperature of the sea floor and surrounding water and, therefore, the impact of heat on benthic invertebrates. A review by Taormina *et al.* (2018) of the current knowledge on the impacts of subsea cables, including thermal emissions, identified that buried cables can warm the sediment in direct contact with the cable which can then have an impact on the chemical and physical properties of the substrate. The thermal profile of a cable, however, can depend heavily on physical characteristics of the burial and the sediment (Taormina *et al.,* 2018). In addition, for buried cables, the temperature change at the seabed is reduced due to the distance between the cable and the seabed surface as a result of the increased dissipation of heat with distance from the cable (Meißner *et al*.,2007). A study conducted at Nysted OWF in Denmark (Meißner *et al*., 2007) found the temperature change in the top 30 cm of sediment (where most infauna live) above a high voltage cable (132kV) to be a maximum of 2°C which is well within the thermal tolerance for most benthic organisms. For cables that are unburied and

Impact	Justification
	instead protected by thick concrete mattresses or rock berms, the heat conduction is likely to be negligible due to the density of the structures. Based on their review Taormina *et al.* (2018) concluded the small area associated with these cable corridors and the expected weakness of thermal radiation, would not produce a significant impact. A Cable Specification and Installation Plan for the MHPGC Project will include cable burial where possible or cables will be protected as necessary therefore there is limited scope for impacts to benthic invertebrates due to heat from subsea cables.

7.4.8 Designed In Measures and Mitigation

7.4.8.1 As part of the project design process, a number of designed in measures (primary and tertiary) will reduce the potential for impacts on benthic subtidal ecology (Table 7.20). As there is a commitment to implement these measures, they are considered inherent to the design of the MHPGC Project. The determination of magnitude and significance of impacts will assume the implementation of such measures. Some of these measures are considered standard industry practice for this type of development.

7.4.8.2 The requirement for any additional (secondary) mitigation measures will be dependent on the significance of the impacts of the MHPGC Project on physical processes receptors. The requirement for and feasibility of any mitigation measures will be consulted upon with statutory consultees throughout the EIA process.

Table 7.20: Designed in Measures Adopted as Part of the Morven Hawthorn Pit Grid Connection Project Relevant to Benthic Subtidal Ecology

Reference Number	Designed in Measures	Justification	Primary or Tertiary
MM-9	Development of, and adherence to, an Environmental Management Plan (EMP), including actions to minimise Invasive Non-Native Species (INNS), and a Marine Pollution Contingency Plan (MPCP), which will include planning for accidental spills, address all potential contaminant releases and include key emergency details.	An Outline EMP will be provided at Application with the MHPGC Project EIA Report/ES and will provides a means to ensure the efficient management and communication of commitments made for the management of the potential environmental impacts. For offshore water quality, measures will be adopted to ensure that the potential for release of pollutants is minimised. Measures will be	T

Reference Number	Designed in Measures	Justification	Primary or Tertiary
		included for controlling INNS and their impact on benthic ecology receptors.	
MM-10	Development and adherence to a Cable Specification and Installation Plan (CSIP)	There is a potential for cable exposure to occur due to interactions between Metocean regime (wave, sand and currents). Sediment transportation can lead to exposure of cables and infrastructure, although the use of a target cable burial depth alongside the cable installation strategy should provide sufficient depth to avoid exposure. The CSIP will outline the technical specifications of the cables used in the MHPGC Project and describe the installation methodology; also includes cable protection to be installed.	T
MM22	Development and adherence to a Construction Method Statement (CMS).	Provided as a means of controlling specific health and safety risks that have been identified and to secure the health and safety aspects of the MHPGC Project are secured. Ensures health and safety risks do not translate into environmental risks through adherence to good practice.	P

7.4.8.3 Any further mitigation requirements for benthic subtidal ecology will be dependent on the significance of the impacts, as identified during the EIA process.

7.4.9 Proposed Assessment Methodology

7.4.9.1 The benthic ecology EIA will follow the methodology set out in Chapter 4: EIA Methodology, of the Scoping Report. Specific to benthic ecology, the following guidance documents will also be considered:

- Guidelines for Ecological Impact Assessment (EcIA) in the UK and Ireland. Terrestrial, Freshwater and Coastal (Chartered Institute of Ecology and Environmental Management (CIEEM), 2022);

- Guidance on Environmental Considerations for OWFs Development (OSPAR, 2008);
- Best Methods for Identifying and Evaluating *Sabellaria spinulosa* and Cobble Reef (Limpenny *et al*., 2010);
- Defining and Managing *Sabellaria spinulosa* Reefs (Gubbay, 2007);
- Identification of the Main Characteristics of Stony Reef Habitats under the Habitats Directive (Irving, 2009);
- Advances in assessing *Sabellaria spinulosa* reefs for ongoing monitoring (Jenkins *et al*., 2018);
- MarESA – A Guide (Tyler-Walters *et al*., 2018);
- SNH (now NatureScot) guidance: Guidance on Survey and Monitoring in Relation to Marine Renewables Deployments in Scotland – Volume 5: Benthic Habitats (Saunders *et al.*, 2011);
- Guidelines for Data Acquisition to Support Marine Environmental Assessments of Offshore Renewable Energy Projects (Judd, 2012).

7.4.9.2 A benthic ecology technical report will be produced for the EIA Report/ES which will present a detailed baseline characterisation for the MHPGC Project. The benthic ecology technical report will present the full results of the site specific survey data and the most recent desktop data. This report will inform the benthic ecology EIA for the EIA Report/ES. The approach and focus of these impact assessments will be discussed with stakeholders through consultation on the Scoping Report.

7.4.9.3 For the purposes of undertaking the EIA, marine habitats and species identified as occurring in the Benthic Ecology Study Area will be grouped into broad habitat/community types. These broad habitat/community types will be used to identify the Important Ecological Features (IEFs) against which impacts associated with the construction, O&M, and decommissioning phases of the MHPGC Project will be assessed.

7.4.9.4 Habitats with similar physical and biological characteristics (including species assemblage and richness/diversity) as well as conservation status/interest will be grouped together for the purposes of the EIA. Consideration will also be given to the sensitivities of different habitats in assigning the groupings, such that habitats and species with similar vulnerability and recoverability, often because of similar broad sediment types and species complements, will be grouped together. Impacts on IEFs will be described in terms of the magnitude of that impact and correlated against the sensitivity of each IEF to each impact, to produce a statement of significance.

7.4.9.5 Information on the sensitivities of benthic ecology receptors will largely be drawn from the MarESA (Tyler-Walters *et al*., 2018) and the FeAST. The MarESA is a database which has been developed through the MarLIN of Britain and Ireland and is maintained by several organisations, including the Marine Biological Association and statutory organisations in the UK. This database comprises a detailed review of available evidence on the impacts of pressures on marine species or habitats, and a subsequent scoring of sensitivity against a standard list of pressures, and their benchmark levels of impact. FeAST allows users to investigate the sensitivity of

marine features in Scotland's seas to pressures arising from human activities. Much of the evidence presented within FeAST has been derived from sensitivity assessments originally undertaken by MarLIN and further developed by several Scottish organisations such as NatureScot, Marine Scotland Science, the Scottish Environment Protection Agency and the JNCC. The tool focusses on features of conservation interest such as protected features of MPAs and PMFs.

7.4.9.6 The evidence base presented in the MarESA is peer reviewed and represents the largest review undertaken to date on the impacts of human activities and natural events on marine species and habitats. It is one of the best available sources of evidence relating to recovery of benthic species and habitats.

7.4.9.7 Further detail on how sensitivity is defined is outlined in Tyler-Walters *et al*. (2018). Sensitivities to the key activities across the lifetime of the MHPGC Project (i.e. construction, O&M, and decommissioning phases) will be summarised according to the MarESA for each of the IEFs within the Benthic Ecology Study Area. Where sensitivity information on specific biotopes is not available through the MarESA, suitable proxies will be used.

7.4.10 Potential Cumulative Impacts

7.4.10.1 Cumulative effects with the Morven Offshore Wind Array Project and the second grid connection project in the Branxton area Southeast Scotland will be considered, together with cumulative effects with other developments, where relevant.

7.4.10.2 The cumulative effect assessment will follow the approach outlined in Chapter 4: EIA Methodology.

7.4.10.3 Cumulative impacts arising from plans/projects/activities within the cumulative effects assessment (CEA) Benthic Subtidal Ecology Study Area will be assessed in the Benthic Subtidal and Intertidal Ecology EIA Report/ES Chapter. For the purposes of the CEA, the CEA Benthic Subtidal Ecology Study Area is proposed to be equivalent to the Regional Benthic Ecology Study Area.

7.4.10.4 For interactive/synergistic impacts (i.e. increases in suspended sediment concentration and changes in physical processes) only projects within two tidal excursions of the MHPGC Project will be assessed.

7.4.11 Potential Inter-related Effects

7.4.11.1 The EIA will consider inter-related effects arising from the MHPGC Project, across their own phases (project lifetime) and different effects on one receptor in one phase (receptor led). The EIA will consider inter-related effects of multiple impacts from the construction, O&M and decommissioning phases of the MHPGC Project, affecting one receptor. Inter-related effects will be assessed through consideration of all effects on a receptor, considering both spatial and temporal overlap, within the MHPGC Project. This will ensure that the MHPGC Project is appropriately considered within the EIA and in line with Chapter 4: EIA Methodology.

7.4.12 Potential Transboundary Impacts

7.4.12.1 There is the potential for transboundary impacts upon benthic subtidal ecology due to construction, O&M, and decommissioning impacts of the MHPGC Project.

7.4.12.2 This screening exercise identified the following potential impacts on benthic subtidal ecology receptors:

- temporary habitat loss/disturbance;
- long term habitat loss;
- increased SSC and associated deposition;
- increased risk of introduction and spread of INNS;
- colonisation of hard structures;
- changes in physical processes.

7.4.12.3 Potential impacts on benthic ecology receptors will be largely focused within the MHPGC Project Scoping Boundary. Therefore, considering the location of the MHPGC Project, the sessile nature of benthic ecology receptors and the adherence to an EMP to minimise the spread of INNS, no potential transboundary impacts are predicted for this receptor group. Benthic subtidal ecology has, therefore, been screened out of further assessment for transboundary impacts in the EIA.

7.5 Fish and Shellfish Ecology

7.5.1 Introduction

7.5.1.1 This chapter of the Morven Hawthorn Pit Grid Connection Project (hereafter referred to as 'MHPGC Project') identifies the fish and shellfish ecology receptors of relevance to the MHPGC Project and considers the potential impacts arising from the construction, operation and maintenance (O&M), and decommissioning of the MHPGC Project. This scoping chapter adopts a proportionate approach to only those impacts with potential to result in likely significant effects and therefore scopes out other impacts where there is evidence that the effects are not likely to be significant.

7.5.1.2 For the purpose of characterisation and assessment, the shellfish component of the Fish and Shellfish Ecology Chapter will focus on those mollusc and crustacean shellfish species of commercial interest and value to the wider region. Species such as ocean quahog (*Arctica islandica*) and horse mussel (*Modiolus modiolus*) will be considered as benthic ecology receptors, due to their lack of commercial value and their association with benthic habitats (including protected status) and are therefore addressed within Chapter 7.4: Benthic Subtidal and Intertidal Ecology, of the Scoping Report.

7.5.2 Policy and Legislation

7.5.2.1 This section identifies the relevant legislation, policy and other documentation that will inform the assessment of likely significant effects with respect to fish and shellfish ecology. Further information on policies relevant to the Environmental Impact Assessment (EIA) and their status is provided in Chapter 2: Policy and Legislation.

7.5.2.2 To provide a robust evidence base, Table 7.21 presents a summary of legislation and policies relevant to fish and shellfish ecology, for which this section takes account of specific requirements to assess and address likely impacts on receptors and relevant environmental issues.

Table 7.21: Relevant Policy and Legislation

Relevant Legislation	Relevance to the Assessment
International Legislation	
Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) 1973.	CITES is an agreement regulating the international trade in certain species of wild animals including some fish species.
The Bonn Convention on the Conservation of Migratory Species of Wild Animals, 1979.	Provides a global platform for the conservation and sustainable use of, amongst others, some fish species.

Relevant Legislation	Relevance to the Assessment
Convention on the Conservation of European Wildlife and Natural Habitats (The Bern Convention) 1979.	The obligations of the Convention are transposed into United Kingdom (UK) law by means of the Wildlife and Countryside Act (1981 as amended), Nature Conservation (Scotland) Act 2004 (as amended). The principal aims of the Convention are to ensure conservation and protection of wild plant and animal species and their natural habitats.
Convention on Biological Diversity 1993.	The principal aims of the Convention are to ensure conservation and protection of wild plant and animal species and their natural habitats.
Convention for the Protection of the Marine Environment of the Northeast Atlantic (Oslo Paris (OSPAR)) 1998.	OSPAR includes the OSPAR List of Threatened and/or declining species and habitats for which the OSPAR Commission sets priorities for the conservation and protection of marine biodiversity.
National Legislation (UK)	
The Conservation of Offshore Habitats and Species Regulations 2017 (as amended) (transposes the offshore elements of the EU Habitats Directive (92/43/EC) into UK legislation).	Before deciding to undertake, or give any consent, permission or other authorisation for, a plan or project which is likely to have a significant effect on a European offshore marine site or a European site (either alone or in combination with other plans or projects), and is not directly connected with or necessary to the management of the site, a competent authority must make an appropriate assessment of the implications of the plan or project for that site in view of that site's conservation objectives. If the potential for adverse effects on European site integrity cannot be discounted, the project could only proceed if imperative reasons of over-riding public interest are found to exist and if compensatory measures can be secured.
Marine Strategy Regulations 2010 (transposes the EU Marine Strategy Framework Directive (MSFD) 2008/56/EC into UK legislation).	The UK Marine Strategy Regulations 2010 require the UK to take the necessary measures to achieve or maintain Good Environmental Status (GES) through the development of a UK Marine Strategy.
The Wildlife and Countryside Act 1981 (as amended).	The Wildlife and Countryside Act 1981 is a UK law that protects wildlife and natural habitats. Some fish species are protected under this Act.
UK Marine Policy Statement, 2011	This is a policy framework prepared and adopted under section 44 of the Marine and Coastal Access Act 2009, which gives it a statutory basis. The framework aims to achieve sustainable development in the UK's marine area by balancing economic, social, and environmental considerations.

Relevant Legislation	Relevance to the Assessment
National Legislation (Scotland)	
Nature Conservation (Scotland) Act 2004.	Places duties on public bodies in relation to the conservation of biodiversity and strengthens wildlife enforcement legislation.
Marine (Scotland) Act 2010.	The Scottish Ministers, and public authorities must act in the way best calculated to further the achievement of sustainable development, including the protection and, where appropriate, enhancement of the health of that area.
National Policy (Scotland)	
National Marine Plan 2015	The Scottish National Marine Plan (SNMP) sets out strategic policies for the sustainable development of Scotland's marine resources out to 200 nm. It is required to be compatible with the UK Marine Policy Statement and existing marine plans across the UK. It incorporates plans for the development of a range of sectors, including: • sea fisheries; • aquaculture; • wild salmon and diadromous fish; • oil and gas; • carbon capture and storage; • recreation and tourism; • shipping ports, harbours and ferries; • submarine cables; • defence; • aggregates; • offshore wind and marine renewable energy. The SNMP sets out the environmental requirements that constrain development within Scottish waters and draws out general planning policies (GEN 1 to GEN 21) which are considered when assessing development in the marine environment.
Sectoral Marine Plan for Offshore Wind Energy 2020	The Sectoral Marine Plan for Offshore Wind Energy aims to identify sustainable plan options for the future development of commercial-scale offshore wind energy in Scotland, including deep water wind technologies, and covers both Scottish inshore (Scottish territorial waters or within 12 nm from shore) and offshore waters (extending out to the Exclusive Economic Zone (EEZ) limit).

Relevant Legislation	Relevance to the Assessment
National Policy (England)	
North East Inshore and North East Offshore Marine Plan.	NE-SCP-1: • Proposals that may have a significant adverse impact upon the seascapes and landscapes of an area should only be supported if they demonstrate that they will, in order of preference: – avoid – minimise – mitigate – if it is not possible to mitigate, – the public benefits for proceeding with the • proposal must outweigh significant adverse impacts to the seascapes and landscapes of an area. Where possible, proposals should demonstrate that they have considered how highly the seascapes and landscapes of an area is valued, its quality, and the areas potential for change. In addition, the scale and design of the proposal should be compatible with its surroundings, and not have a significant adverse impact on the seascapes and landscapes of an area. NE-MPA-1: • Proposals that support the objectives of Marine Protected Areas (MPAs) and the ecological coherence of the MPA network will be supported; • Proposals that may have adverse impacts on the objectives of MPAs must demonstrate that they will, in order of preference: – avoid; – Minimise; – mitigate adverse impacts, – with due regard given to statutory advice on an ecologically coherent network. NE-BIO-1/2: • Proposals that enhance the distribution of priority habitats/habitat adaptation/connectivity and priority/native species will be supported. Proposals that may have significant adverse impacts on the distribution of priority habitats/habitat adaptation/connectivity and priority species/native species migration must demonstrate that they will, in order of preference: – Avoid; – Minimise; – Mitigate; – compensate for significant adverse impacts.

Relevant Legislation	Relevance to the Assessment
	NE-CE-1: • Proposals which may have adverse cumulative effects with other existing, authorised or reasonably foreseeable proposals must demonstrate that they will, in order of preference: – Avoid; – Minimise; – mitigate significant adverse cumulative and/or in combination effects. NE-UWN-2: • Proposals that result in the generation of impulsive or non-impulsive noise must demonstrate that they will, in order of preference: – avoid; – Minimise; – mitigate significant adverse impacts on highly mobile species; – if it is not possible to mitigate significant adverse impacts, proposals must state the case for proceeding.
National Policy Statements (NPS)	NPS-EN1; • 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. (NPS EN-1 paragraph 5.4.17); • The applicant should show how the project has taken advantage of opportunities to conserve and enhance biodiversity and geological conservation interests. (NPS EN-1 paragraph 5.4.19); • The design of energy Nationally Significant infrastructure Project (NSIP) proposals will need to consider the movement of mobile/migratory species such as birds, fish and marine and terrestrial mammals and their potential to interact with infrastructure. As energy infrastructure could occur anywhere within England and Wales, both inland and onshore and offshore, the potential to affect mobile and migratory species across the UK and more widely across Europe (transboundary effects) requires consideration, depending on the location of development. (NPS EN-1 paragraph 5.4.22);

Relevant Legislation	Relevance to the Assessment
	• Applicants should include appropriate avoidance, mitigation, compensation, and enhancement measures as an integral part of the proposed development. In particular, the applicant should demonstrate that: – During construction, they will seek to ensure that activities will be confined to the minimum areas required for the works; – The timing of construction has been planned to avoid or limit disturbance; – During construction and operation best practice will be followed to ensure that risk of disturbance or damage to species or habitats is minimised, including as a consequence of transport access arrangements; – Habitats will, where practicable, be restored after construction works have finished; – Opportunities will be taken to enhance existing habitats rather than replace them, and where practicable, create new habitats of value within the site landscaping proposals. Where habitat creation is required as mitigation, compensation, or enhancement, the location and quality will be of key importance. In this regard habitat creation should be focused on areas where the most ecological and ecosystems benefits can be realised; – mitigations required as a result of legal protection of habitats or species will be complied with. (NPS EN-1 paragraph 5.4.35). NPS-EN3: • Given the scale of offshore wind deployment required to meet 2030 and 2050 ambitions, applicants will need to give close consideration to impacts on MPAs, either alone or in combination, and employ the mitigation hierarchy and if necessary provide compensation (both individually and in combination with other plans or projects) which may be needed to approve their projects. It is likely that mitigation may include proactive measures to reduce the impact of deployment (e.g. micrositing of offshore transmission routes to avoid vulnerable habitats, alternatives piling or trenching techniques, noise abatement technology, collision avoidance methods or, if necessary, compensation for habitat loss). (NPS EN-3 paragraph 2.8.52 and 2.8.53); • In addition, Applicants should have regard to the specific ecological and biodiversity considerations that relate to proposed offshore renewable energy infrastructure developments, namely:

Relevant Legislation	Relevance to the Assessment
	– Fish; – Intertidal and subtidal seabed habitats and species; – Marine mammals; – Birds; – Wider ecosystem impacts and interaction, and other relevant protected migratory species. • Applicants must undertake a detailed assessment of the offshore ecological, biodiversity and physical impacts of their proposed development, for all phases of the lifespan of that development, in accordance with the appropriate policy for offshore wind farm (OWF) EIAs, Habitats Regulations Appraisals (HRAs) and MCZ (Marine Conservation Zone) assessments. (NPS EN-3 paragraph 2.8.98 and 2.8.91); • Applicants need to consider environmental and biodiversity net gain as set out in Section 4.6 of EN-1 and the Environment Act 2021. Applicants should assess the potential of their proposed development to have net positive effects on marine ecology and biodiversity, as well as negative effects. (NPS EN-3 paragraph 2.8.102 – 2.8.103); and • Applicants should consult at an early stage of pre-application with relevant statutory consultees and energy not-for profit organisations/non governmental organisations as appropriate, on the assessment methodologies, baseline data collection, and potential avoidance, mitigation and compensation options which should be undertaken. In developing proposals applicants must refer to the most recent best practice advice originally provided by Natural England under the Offshore Wind Enabling Action Programme and/or their relevant Statutory Nature Conservation Body (SNCB). Any relevant data that has been collected as part of post-construction ecological monitoring from existing operational OWFs should be referred to where appropriate. (NPS EN-3 paragraph 2.8.104 – 2.8.106).

7.5.3 Study Areas

7.5.3.1 Two Study Areas are defined for fish and shellfish ecology:

- the Fish and Shellfish Ecology Study Area;
- the Regional Fish and Shellfish Ecology Study Area.

7.5.3.2 The study areas are shown in Figure 7.12 and are defined as follows:

- the Fish and Shellfish Study Area is defined as the MHPGC Project Scoping Boundary plus a buffer extending approximately 5km to 9km from the MHPGC Project Scoping Boundary, extending up to Mean High Water Springs (MHWS) at

the top of the intertidal zone. The 5km to 9km buffer equates to one maximum tidal ellipse over a large spring tide around the MHPGC Project Scoping Boundary representing the dominant tidal currents. This buffer is designed to incorporate the Zone of Influence (ZoI) from indirect impacts (e.g. increases in Suspended Sediment Concentrations (SSCs) and potential changes in physical processes). Beyond the tidal excursion extent of 5km to 9km, any effects from the MHPGC Project on benthic ecology receptors would be minimal. The Fish and Shellfish Ecology Study Area is the area within which the site specific benthic surveys have been undertaken to inform the baseline characterisation and to identify fish and shellfish receptors, against which potential impacts associated with the MHPGC Project will be assessed during the MHPGC Project EIA process;

- the Regional Fish and Shellfish Ecology Study Area encompasses wider North Sea habitats to provide the context required for the population and species information collected and identified within the MHPGC Project Fish and Shellfish Ecology Study Area. The Regional Study Area may not include the whole range of a species (given some have large ranges including migrations) but encompasses the range of habitats that can support different fish and shellfish species that may be directly or indirectly impacted. The approach for defining the Regional Fish and Shellfish Ecology Study Area is based on common best practice of export cable EIAs. This will inform assessments of any impacts affecting fish and shellfish receptors, including both direct and indirect impacts, such as underwater sound.

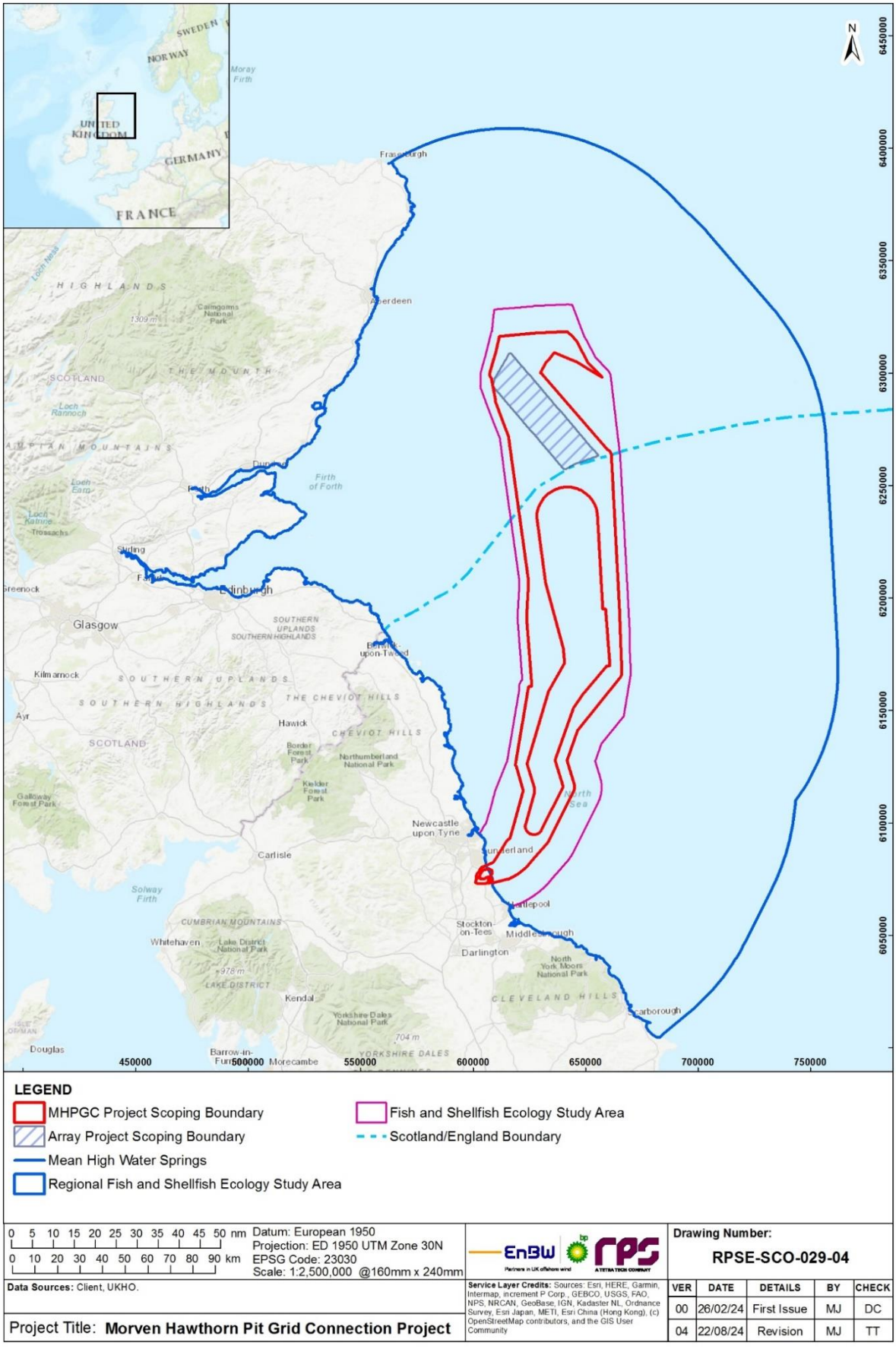


Figure 7.12: Fish and Shellfish Ecology Study Area and Regional Fish and Shellfish Ecology Study Area

7.5.4 Data Sources

Desktop Data

7.5.4.1 A number of data sources, which provide coverage of the Regional Fish and Shellfish Ecology Study Area and support the Scoping Report, were identified through an initial desk based review of existing literature and data sources. These data sources are summarised below in Table 7.22.

Table 7.22: Summary of Key Desktop Datasets and Reports for Fish and Shellfish Ecology

Title	Source	Year	Author
International/National (UK)			
Updating fisheries sensitivity maps in British waters.	Marine Directorate (formerly Marine Scotland).	2014	Aires *et al*.
Marine Life Information Network (MarLIN).	MarLIN	2024	Tyler-Walters *et al*.
National Biodiversity Network (NBN) Atlas.	NBN Atlas.	2019	NBN Atlas.
Marine recorder public UK snapshot.	Joint Nature Conservation Committee (JNCC)	2022	JNCC
European Marine Observation and Data Network (EMODnet) broadscale seabed habitat map for Europe (EUSeaMap).	EMODnet – Seabed Habitats.	2019	EMODnet.
Survey data/reports available through the International Council for the Exploration of the Sea (ICES), including International Herring Larvae Survey.	ICES	2022	ICES
Survey data/reports available through ICES, including IBTS (North Sea).	ICES	2022	ICES
UK sea fisheries annual statistics.	Marine Management Organisation (MMO)	2023	MMO
Eastern Green Link 2 Environmental Appraisal Report.	National Grid	2022	AECOM

Title	Source	Year	Author
Spawning and nursery grounds of selected fish species in UK waters.	Centre for Environment, Fisheries and Aquaculture Science (Cefas).	2012	Ellis *et al*.
Fisheries Sensitivity Maps.	Cefas.	1998	Coull *et al*.
National (Scottish Waters)			
The Marine Scotland National Marine Interactive (NMPI) maps.	Marine Scotland.	2019	Marine Scotland for the Scottish Government.
Developing Essential Fish Habitat Maps for Fish and Shellfish Species in Scotland.	Marine Directorate (formerly Marine Scotland)	In Press	Franco *et al*.
Descriptions of Scottish Priority Marine Features (PMFs).	NatureScot (formerly Scottish Natural Heritage).	2016	Tyler-Walters *et al.*
Morven Array OWF Scoping Report.	bp/EnBW	2023	RPS
Berwick Bank Wind Farm Offshore EIA report.	SSE Renewables (SSER)	2022	SSER
Berwick Bank Offshore Wind Farm (OWF) Scoping Report.	SSER	2021	SSER
Natural Fish and Shellfish Resource Environmental Statement (ES) section for the optimised project.	Seagreen Environmental Impact Assessment (EIA) Report: volume 1, chapter 9.	2018	Seagreen Wind Energy Limited (Ltd).
Distribution model for lesser sandeel.	Marine Scotland Science (MSS).	2021	Langton *et al*.
Inch Cape fish and benthic survey data.	AMEC Environment and Infrastructure UK Limited.	2013	AMEC.
National (English Waters)			
Blyth NaREC Offshore Demonstration Site, Pre-consent Fish and Fisheries Reports.	AMEC.	2011	AMEC.
Ecology & Fish Data Explorer.	Environment Agency (EA)	2024	EA
Teesside OWFs, ES.	EDF Energy.	2004	EDF Energy.

Site Specific Survey Data

7.5.4.2 A site specific benthic ecology characterisation survey was undertaken in summer 2023 to provide benthic characterisation of habitats and species assemblages and any contaminants encompassing the Fish and Shellfish Ecology Study Area (Gardline, 2024).

7.5.4.3 The survey used Drop Down Video (DDV) to assess presence of species of conservation and commercial importance. Once processed, the DDV imagery data will be used to support characterisation of the fish and shellfish receptors in the in the MHPGC Project EIA Report/Environmental Statement (ES).

7.5.4.4 Grab sampling to collect sediment samples for subsequent Particle Size Analysis (PSA) was conducted to determine the suitability of the survey area for spawning. Initial results show the majority of sampling stations (75%) classify as sand according to the Folk and Ward (1957) method (Gardline, 2024). An assessment for herring and sandeel spawning suitability using this PSA data will be undertaken in the MHPGC Project EIA Report/ES.

7.5.4.5 The site specific survey included sampling for environmental DNA (eDNA) from sediment and water, to determine the species composition of fish and elasmobranch communities. DNA metabarcoding will be used to support characterisation of the baseline fish and shellfish community in the MHPGC Project EIA Report/ES. Sediment DNA shows greater longevity than DNA within the water column, therefore may contain DNA material from organisms that were present some time ago, depending upon the depositional regime at the seabed. This DNA can, therefore, be used to provide a broader characterisation in terms of timescales. Seawater DNA, however, is typically considered to be representative of specimen occurrence within the preceding tidal cycle, as material can be quickly degraded and dispersed when free-floating. Comparison between the two datasets (sediment and seawater DNA metabarcoding), along with desktop data sources, can increase confidence in the results and the characteristic species. Results of relevance are included in section 7.5.5 and will be discussed in full in the MHPGC Project EIA Report/ES.

7.5.4.6 Further site specific survey works are being undertaken in 2024. These include an intertidal and subtidal survey for benthic ecology, which will also inform the determination of impacts for the MHPGC Project EIA Report/ES Fish and Shellfish Ecology Chapter. The subtidal survey will be focused on the nearshore area, compared to the 2023 survey which covered the entire MHPGC Project Scoping Boundary.

7.5.5 Baseline Environment

7.5.5.1 This section provides a concise summary of the baseline for the fish and shellfish environment of the Regional Fish and Shellfish Ecology Study Area. The seas off the east coast of Scotland and England have several protected areas designated for fish; these are summarised below and will be assessed in the MHPGC Project EIA Report/ES. As the receptors reported in this section are mobile species, the baseline environment has not been sectioned into English and Scottish waters.

Fish Assemblage

7.5.5.2 Demersal, pelagic, diadromous and elasmobranch fish species have been identified within the fish assemblage of the Regional Fish and Shellfish Ecology Study Area, including both commercial and non-commercial species. Demersal species likely include sandeel (Ammodytidae), cod (*Gadus morhua*), whiting (*Merlangius merlangus*), lemon sole (*Microstomus kitt*), ling (*Molva molva*), saithe (*Pollachius virens*) and plaice (*Pleuronectes platessa*). Pelagic species likely include herring (*Clupea harengus*), sprat (*Sprattus sprattus*), and mackerel (*Scomber scombrus*). Elasmobranch species, such as spotted ray (*Raja montagui*), thornback ray (*Raja clavata*), tope (*Galeorhinus galeus*), small-spotted catshark (*Scyliorhinus canciula*), spurdog (*Squalus acanthias*), thorny skate (*Amblyraja radiata*) and cuckoo ray (*Leucoraja naevus*), among others, have been observed in the Regional Fish and Shellfish Ecology Study Area (Coull *et al.,* 1998; Daan *et al.,* 2005; Baxter *et al.,* 2011; Ellis *et al.,* 2012).

7.5.5.3 Cod, horse mackerel (*Trachurus trachurus*) and haddock (*Melanogrammus aeglefinus*) eDNA were all detected in samples from the site specific survey (Gardline, 2024).

7.5.5.4 Species such as herring, sandeel and sprat are considered important prey species for marine mammals and coastal and offshore birds in the MHPGC Project Study Areas. Further details are provided in Chapter 7.6: Marine Mammals and Chapter 7.7: Offshore and Intertidal Ornithology.

7.5.5.5 Herring and sandeel are considered substrate-specific, as both rely on a particular sediment composition to support spawning and burrowing (sandeel). Substrata suitable for herring spawning is reported to comprise less than 5% mud content and greater than 10% gravel content (Reach *et al.*, 2013). Suitable substrate for sandeel inhabitation is reported as less than 10% mud content, over 50% sand and less than 80% gravel content, with a preference for areas comprising less than 4% mud content (prime and sub-prime) and over 70% sand (Holland *et al.,* 2005).

7.5.5.6 Landings data (MMO, 2022, 2023) have been reviewed from the ICES Rectangles presented in Figure 7.13 to provide an overview of the key fish species within the region and support characterisation of the fish assemblage. By value, the key fish species landed in 2022 in the relevant ICES Rectangles to the MHPGC Project (Figure 7.13) were herring, plaice, whiting, mackerel and sea trout (MMO, 2022, 2023).

Scottish waters

7.5.5.7 Between 2011 and 2020, site specific epifaunal beam trawl surveys were undertaken across the Berwick Bank and Seagreen 1 and Seagreen 1A OWFs (approximately 19km and 38km from the MHPGC Project, respectively). These surveys recorded a range of demersal species, such as dab (*Limanda limanda*), long rough dab (*Hippoglossoides platessoides*), lesser sandeel (*Ammodytes tobianus*), Raitt's sandeel (*A. marinus*), four-bearded rockling (*Enchelyopus cimbrius*), pogge (*Agonus cataphractus*), butterfish (*Pholis gunnellus*), Norwegian topknot (*Phrynorhombus norvegicus*), reticulated dragonet (*Callionymus reticulatus*), common dragonet (*C. lyra*), lemon sole, bullrout (*Myoxocephalus corpius*) and goby species (Gobiidae spp.). Commercial species such as plaice, whiting, cod, and red gurnard (*Chelidonichthys cuculus*) were also recorded, as were smooth sandeel (*Gymnammodytes semisquamatus*) and greater sandeel (*Hyperoplus lanceolatus*),

and one elasmobranch species, the cuckoo ray (Seagreen Wind Energy Ltd, 2012, 2018; SSER, 2022).

English waters

7.5.5.8 Surveys were conducted of the Teesside OWF array area and associated export cable corridor in 2003, approximately 19km south of the MHPGC Project. The most commonly recorded species in trawls were the demersal plaice and dab, as well as the lesser weever (*Echiichthys vipera*) (EDF Energy, 2004).

7.5.5.9 The 2010 survey of the Blyth OWF area, approximately 24km from the MHPGC Project found the most abundant fish species to be the demersal plaice, dab, whiting, and cod (AMEC, 2011). Other fish species found during this survey included the commercially important haddock (*Melanogrammus aeglefinus*), hake (*Merluccius merluccius*), herring, saithe, Dover sole (*Solea solea*), turbot (*Scophthalmus maximus*), and ling (AMEC, 2011). Three species of elasmobranch were also recorded: the lesser spotted dogfish (*Scyliorhinus canicula*), common smoothhound (*Mustelus mustelus*) and the cuckoo ray (AMEC, 2011).

Diadromous Fish Species

7.5.5.10 Diadromous fish (i.e. species that migrate between freshwater and the marine environment) migrate to and from rivers in the vicinity of the MHPGC Project and, therefore, they may migrate through the MHPGC Project during certain periods of the year (NBN Atlas, 2019). Diadromous fish include those that spend most of their lives at sea but spawn in fresh water (anadromous species, such as Atlantic salmon (*Salmo salar*)) and those that spend most of their lives in freshwater but spawn at sea (catadromous species such as European eel (*Anguilla anguilla*)).

Scottish waters

7.5.5.11 Based on information on diadromous fish populations on the east coast of Scotland, the Berwick Bank, Seagreen 1 and Seagreen 1A OWF EIAs identified eight diadromous fish species which have the potential to occur in offshore and coastal areas along the east coast of Scotland. These species were Atlantic salmon, sea trout (*Salmo trutta trutta*), sea lamprey (*Petromyzon marinus*), river lamprey (*Lampetra fluviatilis*), allis shad (*Alosa alosa*), twaite shad (*Alosa fallax*), and European smelt (*Osmerus eperlanus*) (Seagreen Wind Energy Ltd, 2018; SSER, 2022). It should be noted that river lamprey and European smelt are primarily coastal species and, therefore, may interact only with the coastal areas of the MHPGC Project. It should also be noted that sea lamprey are rarely found in coastal and estuarine waters and are often found at considerable depths in deeper offshore waters, so will be of more relevance to these sections of the MHPGC Project (Moore *et al*., 2003).

7.5.5.12 eDNA from the European eel was detected in samples from the site specific survey (Gardline, 2024).

7.5.5.13 Within Scottish waters, the River Dee Special Area of Conservation (SAC) (57km from the MHPGC Project) and River South Esk SAC (81km from the MHPGC Project) are designated for Annex II Atlantic salmon and the symbiotic freshwater pearl mussel (*Margaritifera margaritifera*) as primary features. The freshwater pearl mussel is listed in Annexes II and V of the EU Habitats and Species Directive and Appendix III of the Bern Convention and is also listed as Endangered on the International Union

for Conservation of Nature (IUCN) Red List. Although the freshwater pearl mussel is found upstream from these river mouths, they depend on the smelting populations of Atlantic salmon and sea trout as a mechanism of locomotion during their parasitic larval stage, by attaching to their gills (Taeubert and Geist, 2017; Österling and Söderberg, 2015). Therefore, freshwater pearl mussel populations may be indirectly affected if Atlantic salmon or sea trout are adversely affected by the MHPGC Project. The River Tay SAC, River Teith SAC and River Tweed SAC are also designated for Annex II Atlantic salmon.

English waters

7.5.5.14 Based on information on diadromous fish populations further south, on the east coast of England, the Eastern Green Link 2 Environmental Appraisal Report also identified five diadromous fish species which have the potential to occur in coastal areas along the north-east coast of England (the Eastern Green Link intersects with the MHPGC Project Scoping Boundary). These species were Atlantic salmon, sea trout, sea lamprey, river lamprey and European eel (AECOM, 2022).

7.5.5.15 Since the MHPGC Project spans both nearshore and offshore waters, all of the above-mentioned species are considered to have the potential to be present within the vicinity of the MHPGC Project.

7.5.5.16 No site specific surveys are proposed to inform the diadromous fish impact assessment. For the purpose of this Scoping Report, it will be assumed that the species referred to above are likely to be present within the Regional Fish and Shellfish Ecology Study Area during migration at key stages of their life cycles. This includes smolt migration from natal rivers and adult migration to spawning habitats. The aim of the impact assessment is to determine whether construction, O&M, or decommissioning activities have the potential to disrupt the migration of these species. Therefore, migratory seasons will be an important element of the baseline characterisation and will be collated through desktop data sources (Malcolm *et al.*, 2010, 2015; Godfrey *et al.*, 2015; Hume, 2017; Lothian *et al.*, 2017; Newton *et al.*, 2017; Gardiner *et al.*, 2018; Seagreen Wind Energy Ltd, 2018). It is recognised that robust recognition of key migration windows is difficult and, therefore, it is assumed diadromous fish may be present in the study areas year-round. Migration timings for diadromous fish species relevant to the MHPGC Project are provided in Table 7.23.

Table 7.23: Migration Timings for Key Diadromous Fish Species

Common Name	Scientific Name	Timing of Downstream Migration	Timing Spent at Sea before first Return	Timing of Upstream Migration	Source
Allis and twaite shad.	*Alosa alosa* and *Alosa fallax.*	Autumn (juveniles).	2 years spent in estuaries and marine areas, do not return to fresh	April to June (to spawn in freshwater).	Maitland and Hatton-Ellis, (2003), ABPMer, (2019).

Common Name	Scientific Name	Timing of Downstream Migration	Timing Spent at Sea before first Return	Timing of Upstream Migration	Source
			water until they are sexually mature.		
Atlantic salmon.	*Salmo salar.*	April to June.	1 to 4 years.	All year, with a peak in late summer/early autumn.	Malcolm *et al.,* (2010, 2015), ABPMer, (2019).
European eel.	*Anguilla Anguilla.*	June to November.	May not return to freshwater, many do not.	Varies spatially, typically arrives in coastal waters of the east coast in December and may migrate upstream until June.	Malcolm *et al.,* (2010).
River lamprey.	*Lampetra fluviatilis.*	From late autumn onwards (to feed in estuaries).	Spends 1 to 2 years in estuaries.	Winter and spring, when temperatures are <10 °C.	NatureScot, (2022a), ABPMer, (2019).
Sea lamprey.	*Petromyzon marinus.*	From late autumn onwards (to open sea) (timing varies between rivers).	18 to 24 months.	April to May (to spawn in May to June).	NatureScot, (2022a), ABPMer, (2019).
Sea trout.	*Salmo trutta.*	Spring.	2 or more years.	April to June.	Malcolm *et al.,* (2010).
European smelt.	*Osmerus eperlanus.*	N/A (migration to estuaries only).	Spends time in estuaries.	February to April (to spawn in estuaries and large rivers).	NatureScot, (2022b)

Shellfish Assemblage

Project wide (Scottish and English Waters)

7.5.5.17 The population structure of shellfish stocks around the UK is not well understood, with assessments largely based on previous fishing and landings data (Mesquita *et al.,* 2016). The shellfish industry in the UK is economically important; UK shellfish landings contributed to 45% (£313 million) of fisheries landings (£691.8 million) in 2021 (MMO), 2022). Fisheries landings data provides information which can be used as a principal overview of the species present within a certain area. Using fisheries catch and landings data alongside baseline data from other projects, we can build an overview of the species present within the Regional Fish and Shellfish Ecology Study Area.

7.5.5.18 Landings data have been reviewed from the ICES Rectangles presented in Figure 7.13 to provide an overview of the key shellfish species within the region and support characterisation of the shellfish assemblage. Shellfish contribute significant value to the Scottish and English fishing industries, with 67.2% of landed weight into England being of shellfish in 2021 (Uberoi *et al*., 2022). There are consistently high landings of Norway lobster (*Nephrops norvegicus*), and medium to low landings of European lobster (*Homarus gammarus*)*,* edible crab (*Cancer pagurus*)*,* velvet swimming crab (*Necora puber*)*,* king scallop (*Pecten maximus*), common whelk (*Buccinum undatum*)*,* razor clam (*Solen* spp.)*,* surf clam (*Spisula* spp.), soft-shelled clams (*Mya arenaria*)*,* squid (*Loligo* spp.) and octopus (Mesquita *et al.,* 2016; 2017; Marine Scotland, 2021; MMO, 2022). Occasionally caught species include green crab (*Carcinus maenas*)*,* common prawn (*Palaemon serratus*) and queen scallop (*Aequipecten opercularis*) (Marine Scotland, 2021).

7.5.5.19 The Eastern Green Link 2 Environmental Appraisal Report identified key shellfish species which occur in the North Sea and within the Regional Fish and Shellfish Ecology Study Area and so may be affected by the MHPGC Project. These included the king scallop and edible crab which are known to migrate from the Norfolk coast to the Yorkshire coasts (Eaton *et al.,* 2003), velvet swimming crab, Norway lobster and European lobster (AECOM, 2022).

7.5.5.20 Epifaunal trawls conducted for the Seagreen OWF in 2011 observed several shellfish species including king and queen scallop in the samples, with queen scallop found to be one of the most frequently recorded species, present in 64% of the samples recovered (201 individuals, overall; Seagreen Wind Energy Ltd, 2018). The Seagreen OWF fish and shellfish ecology chapter also refers to data supplied by Marine Directorate (formerly Marine Scotland) in 2012, demonstrating high abundances of *Nephrops* spp. recorded through underwater imagery acquisition by the Marine Directorate (formerly Marine Scotland) in the inshore waters of the Regional Fish and Shellfish Ecology Study Area.

7.5.5.21 The Blyth OWF area survey found Norway lobster, common lobster and edible crab to be the most common invertebrates recorded (AMEC, 2011).

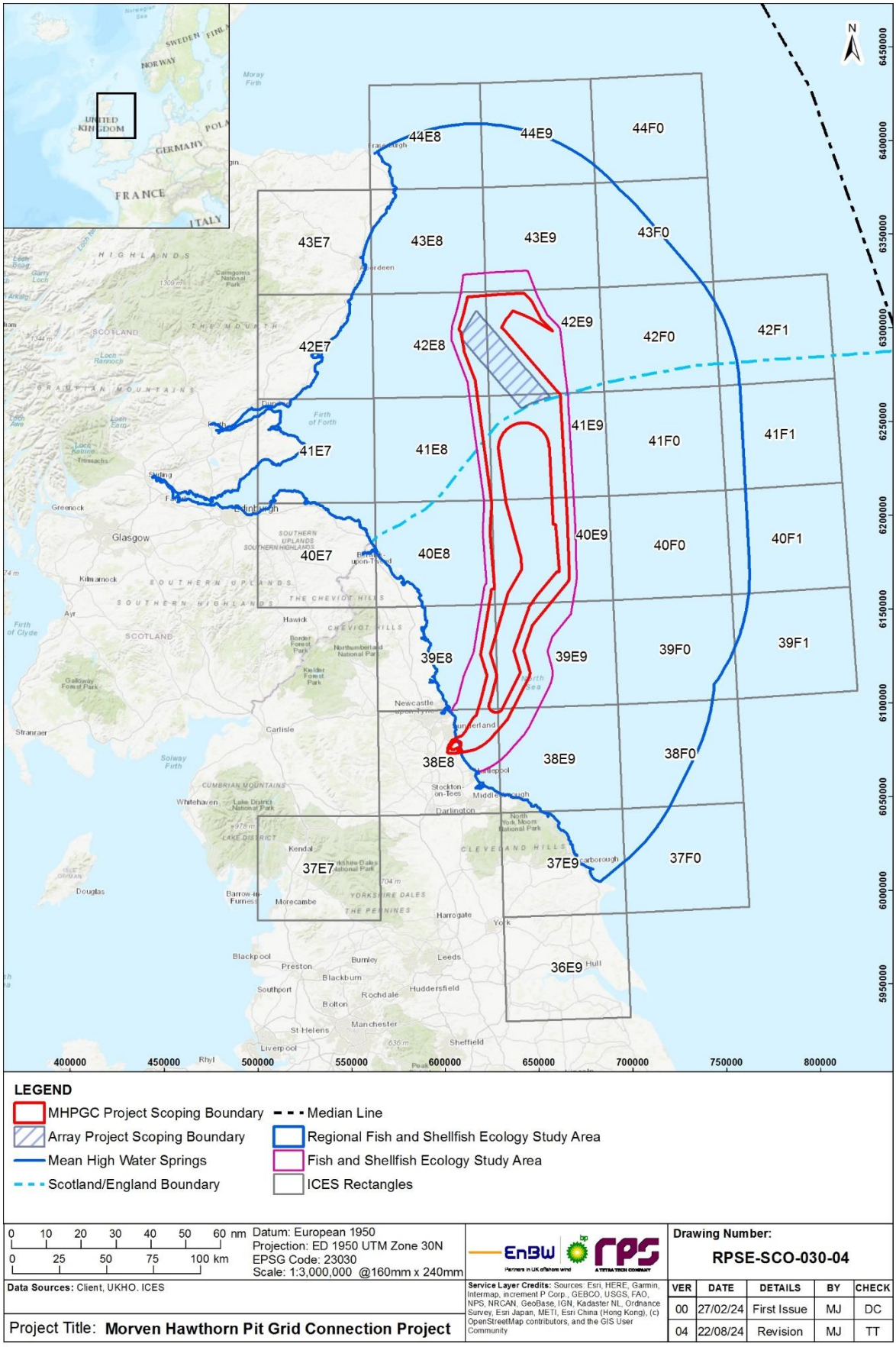


Figure 7.13: Morven Hawthorn Pit Grid Connection Project and Regional Fish and Shellfish Ecology Study Areas with International Council for the Exploration of the Sea Statistical Rectangles

Spawning and Nursery Grounds

Project wide (Scottish and English Waters)

7.5.5.22 The characterisation of the sediments in the Fish and Shellfish Ecology Study Area will inform the determination of spawning potential for specific areas of the seabed for herring and sandeel based on current guidelines (Cefas, 2001; Latto *et al*., 2013; Reach *et al.,* 2013). For herring, these guidelines state that generally, for an area to be considered appropriate for spawning, the area must fall into one of three sediment types based on the modified Folk (1954) classification: gravel, sandy gravel, or gravelly sand. For sandeel spawning, the area must be composed of mostly sand, with little mud (i.e. the sediment type should be sand, slightly gravelly sand, or gravelly sand).

7.5.5.23 Coull *et al*. (1998) identified the potential spawning and nursery areas in the North Sea for a range of species from a range of larvae, egg and benthic habitat survey data. For some species, these data were reviewed by Ellis *et al.* (2012) to update the data with details of spatial distribution of high and low intensity spawning and nursery grounds. These are useful in identifying broad spawning and nursery grounds, but not the exact definition of the boundaries of spawning and nursery grounds, particularly in the context of the relatively small footprint occupied by the MHPGC Project proposed export cable route.

7.5.5.24 Spawning and nursery grounds for herring and sandeel were identified in the Berwick Bank OWF EIA, therefore similar sites may be present close to or within the MHPGC Project.

7.5.5.25 More recently, Aires *et al.* (2014) provided an update to fisheries sensitivity maps in British waters following results of work by MSS, by collating evidence regarding the distribution of 0-group fish (fish within their first year of life) and larvae of key commercially targeted species. Species with known spawning and nursery grounds identified as overlapping with the MHPGC Project are summarised below in Table 7.24:.

7.5.5.26 Essential fish habitat maps are currently in publication by Marine Directorate (formerly Marine Scotland) and will, if available, be referenced within the Fish and Shellfish Ecology Technical Report to the MHPGC Project EIA Report/ES.

Table 7.24: Species with Spawning and Nursery Grounds Overlapping the Morven Hawthorn Pit Grid Connection Project Scoping Boundary (adapted from Coull *et al.,* 1998, Ellis *et al*., 2012 and Aires *et al.,* 2014)

Common Name	Species Name	Spawning	Nursery	Spawning Intensity	Nursery Intensity
Teleost fish					
Anglerfish.	*Lophius piscatorius.*	Insufficient data.	✓	N/A	Low.
Blue whiting.	*Micromesistius poutassou.*	Insufficient data.	✓	N/A	Low.

Common Name	Species Name	Spawning	Nursery	Spawning Intensity	Nursery Intensity
Cod.	*Gadus morhua.*	✓	✓	Low.	High and Low.
European hake.	*Merluccius merluccius.*	No grounds present.	✓	N/A.	Low.
Haddock.	*Melanogrammus aeglefinus.*	No grounds present.	✓	N/A.	Not specified.
Herring.	*Clupea harengus.*	✓	✓	Undetermined.	High, Low and Not specified.
Horse Mackerel[2].	*Trachurus trachurus.*	No grounds present.	No grounds present	N/A.	N/A.
Lemon sole.	*Microstomus kitt.*	✓	✓	Undetermined.	Not specified.
Ling.	*Molva molva.*	Insufficient data.	✓	N/A.	Low.
Mackerel.	*Scomber scombrus.*	No grounds present.	✓	N/A.	Low.
Norway pout.	*Trisopterus esmarkii.*	✓	✓	Low.	Not specified.
Plaice.	*Pleuronectes platessa.*	✓	✓	Low and Undetermined.	Low.
Sandeel.	Ammodytidae.	✓	✓	High and Low.	Low.
Sprat.	*Sprattus sprattus.*	✓	✓	Undetermined.	Not specified.
Whiting.	*Merlangius merlangus.*	✓	✓	Low and undetermined intensity.	High and not specified intensity.

[2] Horse mackerel nursery grounds are considered widespread based upon catches of juvenile fish during groundfish surveys, with no specific grounds defined, but catches have been recorded within the MHPGC Project Scoping Boundary and the wider Regional Fish and Shellfish Ecology Study Area.

Common Name	Species Name	Spawning	Nursery	Spawning Intensity	Nursery Intensity
Saithe.	*Pollachius virens*	No grounds present.	No grounds present	N/A.	N/A.
Elasmobranchs					
Common skate.	*Dipturus batis.*	No grounds present.	✓	N/A.	Low.
Spotted ray.	*Raja montagui.*	No grounds present.	✓	N/A.	Low.
Spurdog.	*Squalus acanthias.*	No grounds present.	✓	N/A.	Low.
Tope.	*Galeorhinus galeus.*	No grounds present.	✓	N/A.	Low.
Shellfish					
Nephrops (also known as the Norway lobster, Dublin Bay prawn, langoustine or scampi).	*Nephrops norvegicus.*	✓	✓	Undetermined.	N/A.

7.5.5.27 High and low intensity nursery grounds of herring, a widespread and ubiquitous pelagic fish species, are documented to overlap the MHPGC Project Scoping Boundary in both Scottish and English waters, whilst there are three spawning grounds of unknown intensity which sit adjacent to the site boundary and within the Regional Fish and Shellfish Ecology Study Area (Figure 7.15). Records collated by Ellis *et al.* (2012) reveal that herring larvae catches, albeit at relatively low levels, overlap with the Fish and Shellfish Ecology Study Area. This suggests that suitable spawning substrate for herring likely occurs within the MHPGC Project Scoping Boundary. The assessment will consider substrate suitability for herring spawning, based upon the site specific benthic survey sediment composition data, following the method outlined by Reach *et al.* (2013).

7.5.5.28 Both high and low intensity sandeel spawning grounds fall within the MHPGC Project in both Scottish and English waters, and extend across the Regional Fish and Shellfish Ecology Study Area (Figure 7.17). The MHPGC Project is also characterised by low intensity sandeel nursery grounds, although it is worth noting that these grounds extend across much of the North Sea (Ellis *et al.*, 2012). Further, distribution models by Langton *et al.* (2021) have predicted probabilities of occurrence and densities of sandeel within the ZoI, though these probabilities are far greater in areas of the

central North Sea that lie to the south of the MHPGC Project. There are five species of sandeel in UK waters which are widely distributed and abundant within suitable habitats. Sandbanks and other sandy substrates may be important habitats for these species. The assessment will consider substrate suitability for sandeel habitation, based upon the site specific benthic survey sediment composition data, following the method outlined by Latto *et al.* (2013). Figure 7.14 to Figure 7.19 show the spawning and nursery grounds of fish and shellfish species which overlap with the MHPGC Project, illustrating the reported intensity of activity within the grounds where information is available (Coull *et al*., 1998; Ellis *et al.,* 2012).

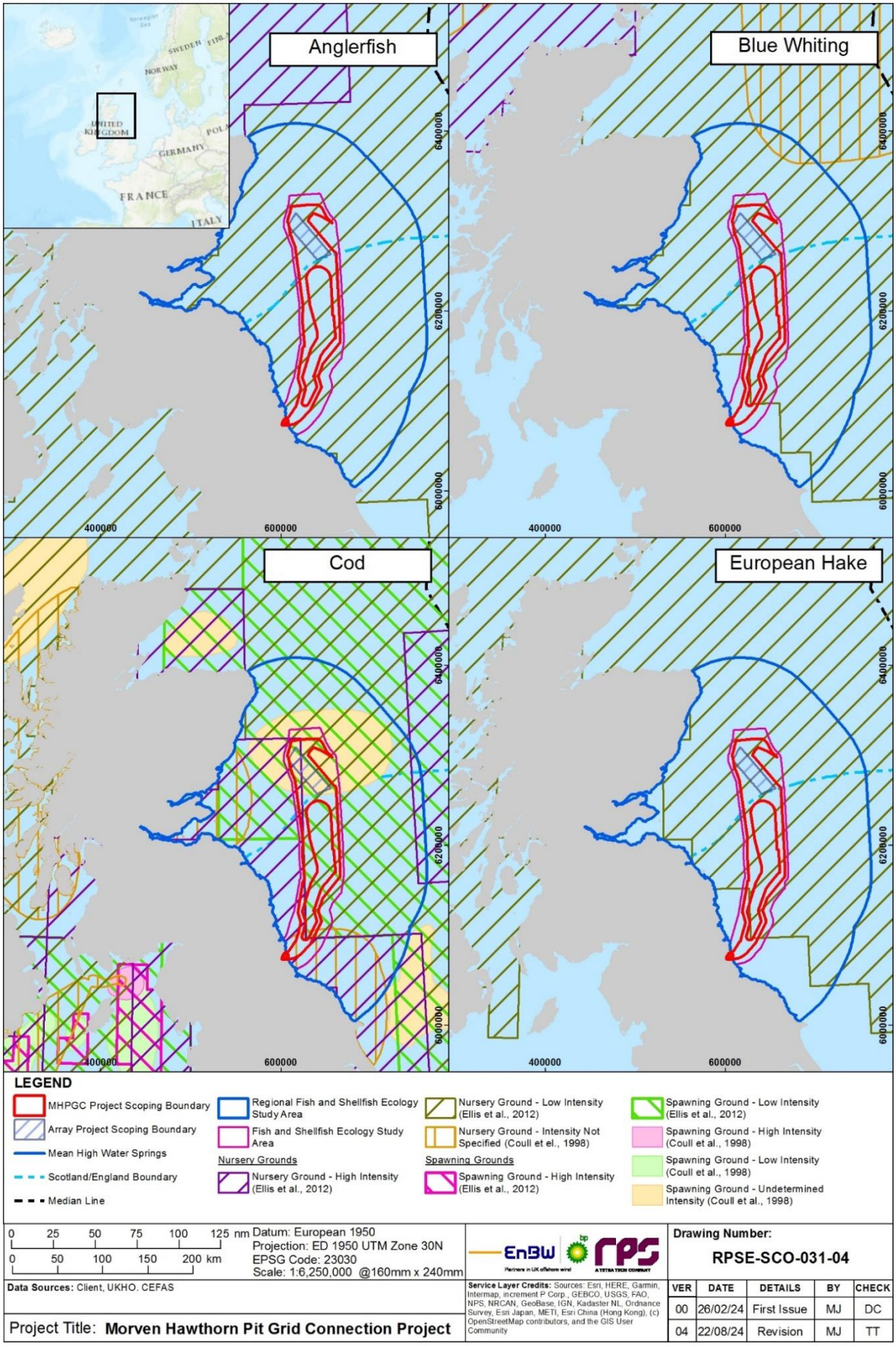


Figure 7.14: Spawning and Nursery Intensity Maps of Anglerfish, Blue Whiting, Cod and European Hake in Proximity to the Morven Hawthorn Pit Grid Connection Project

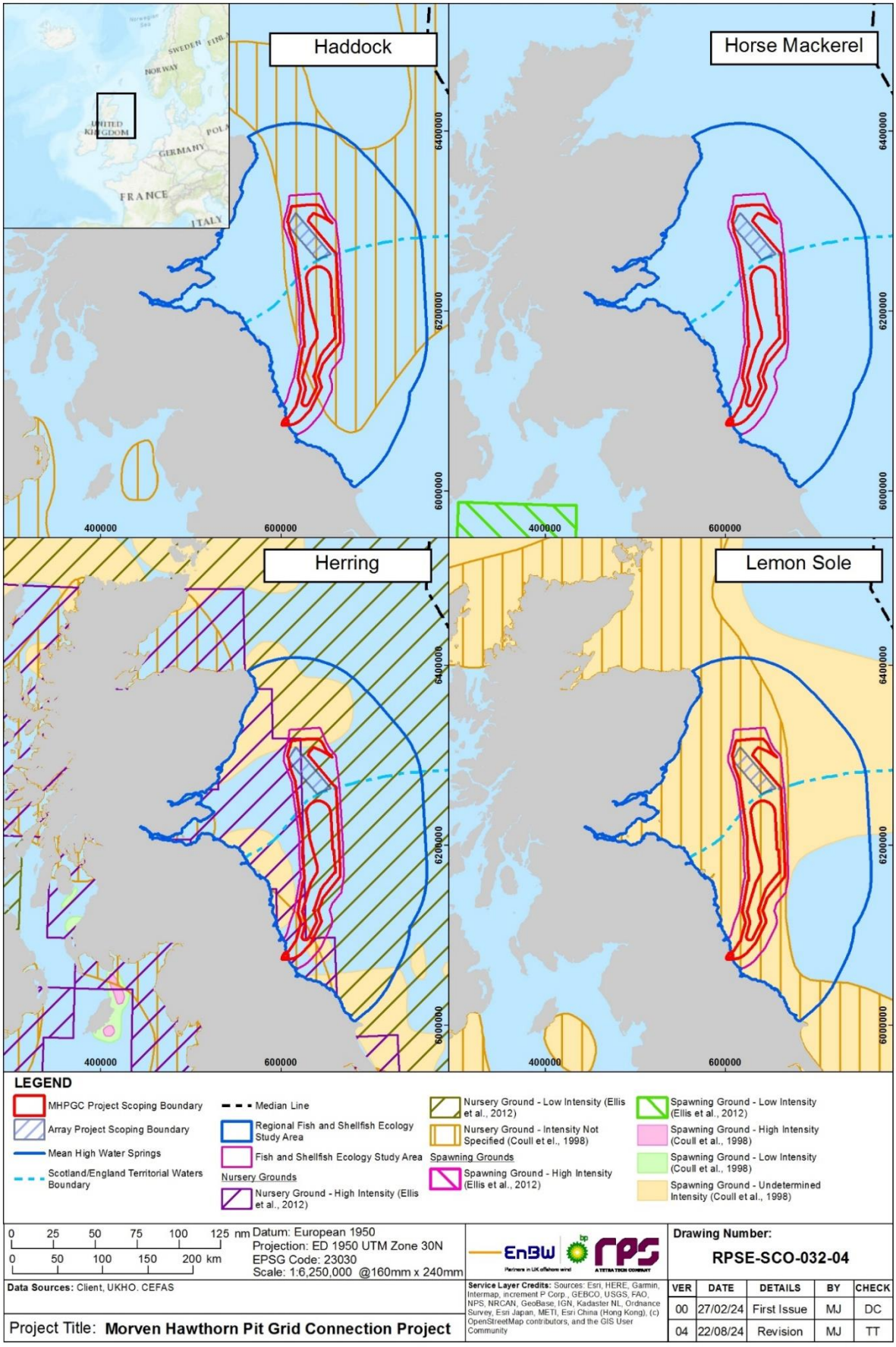


Figure 7.15: Spawning and Nursery Intensity Maps of Haddock, Horse Mackerel, Herring and Lemon Sole in Proximity to Morven Hawthorn Pit Grid Connection Project

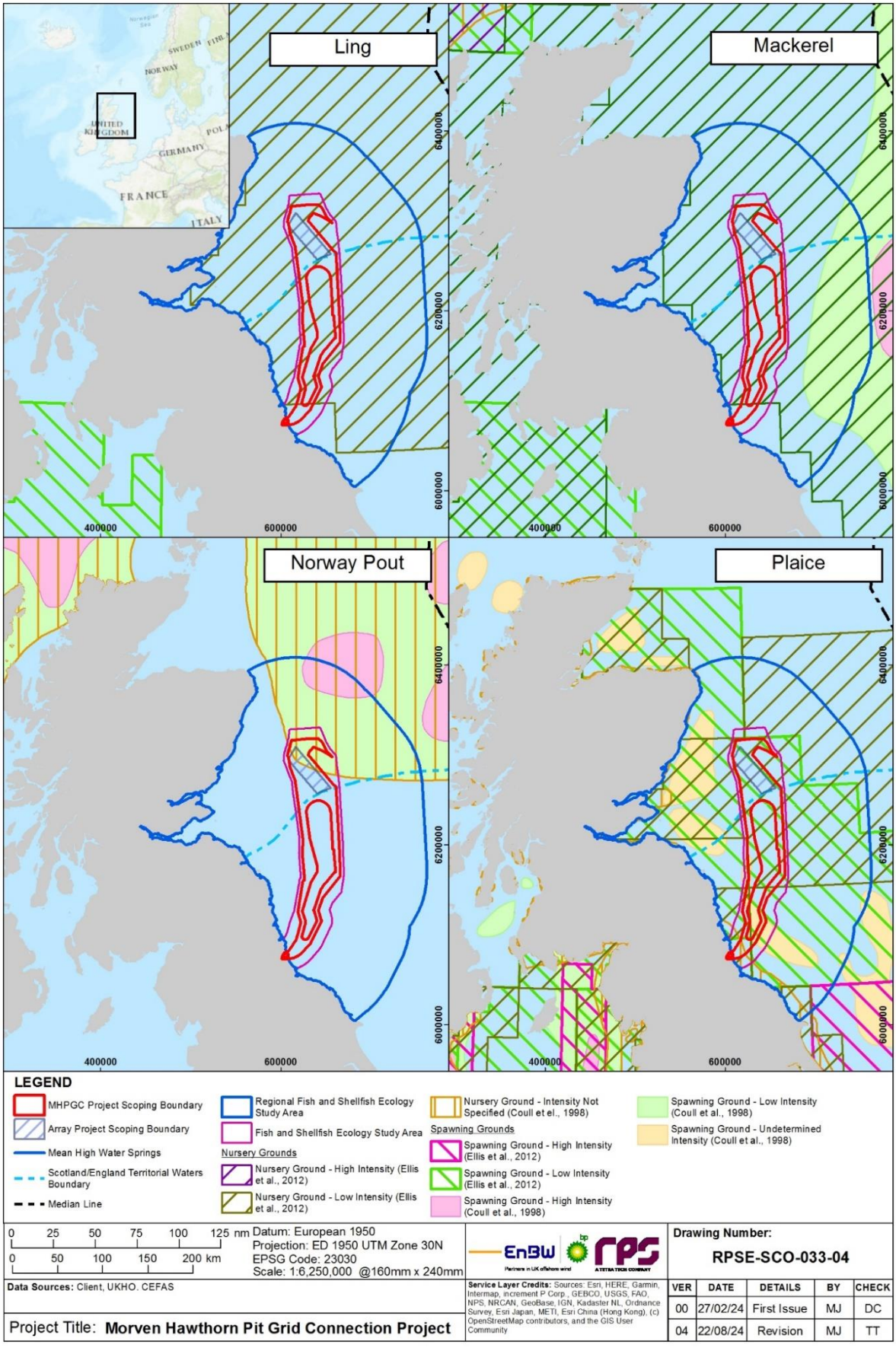


Figure 7.16: Spawning and Nursery Intensity Maps of Ling, Mackerel, Norway Pout and Plaice in Proximity to Morven Hawthorn Pit Grid Connection Project

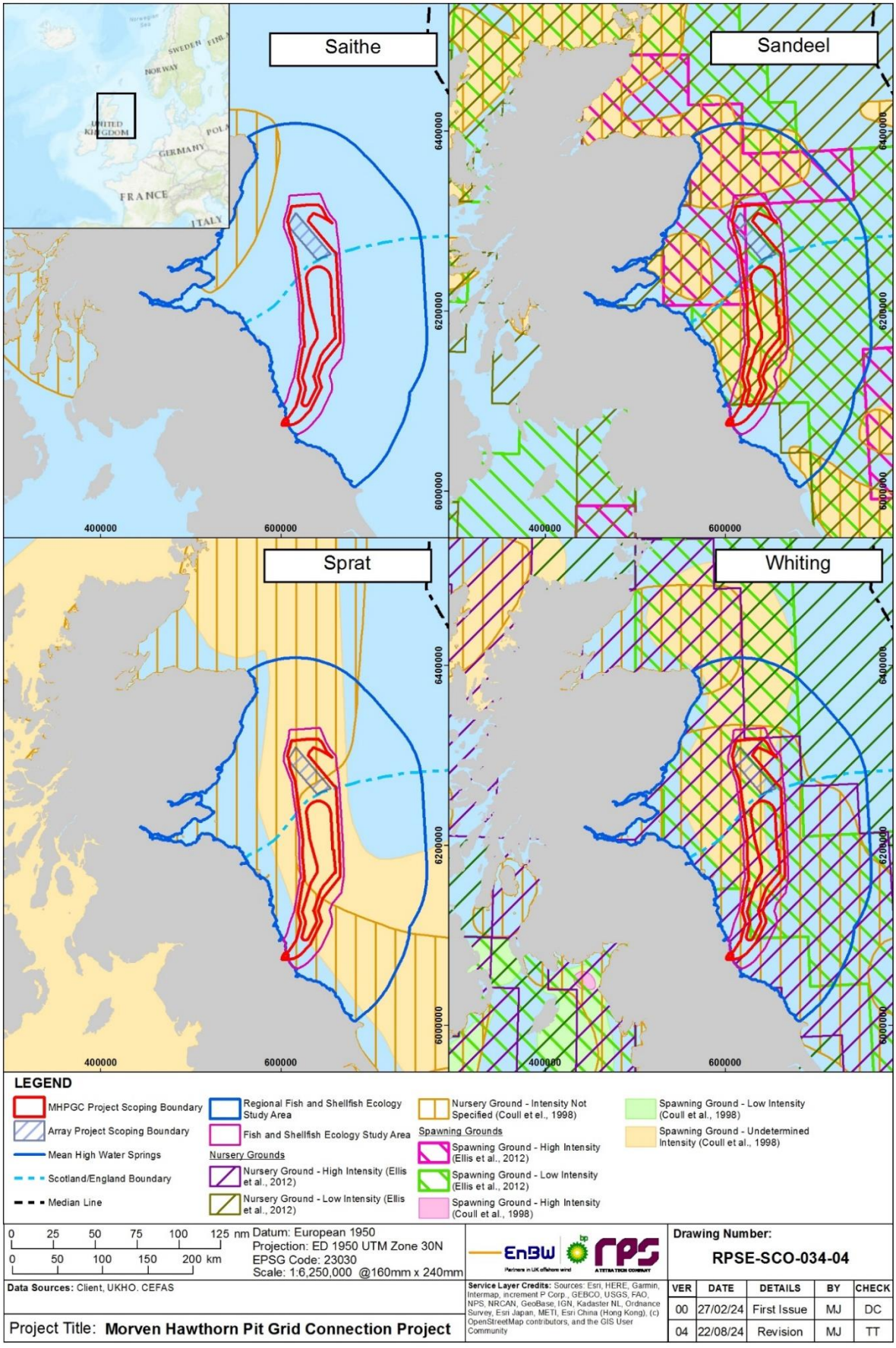


Figure 7.17: Spawning and Nursery Intensity Maps of Saithe, Sandeel, Sprat and Whiting in Proximity to Morven Hawthorn Pit Grid Connection Project

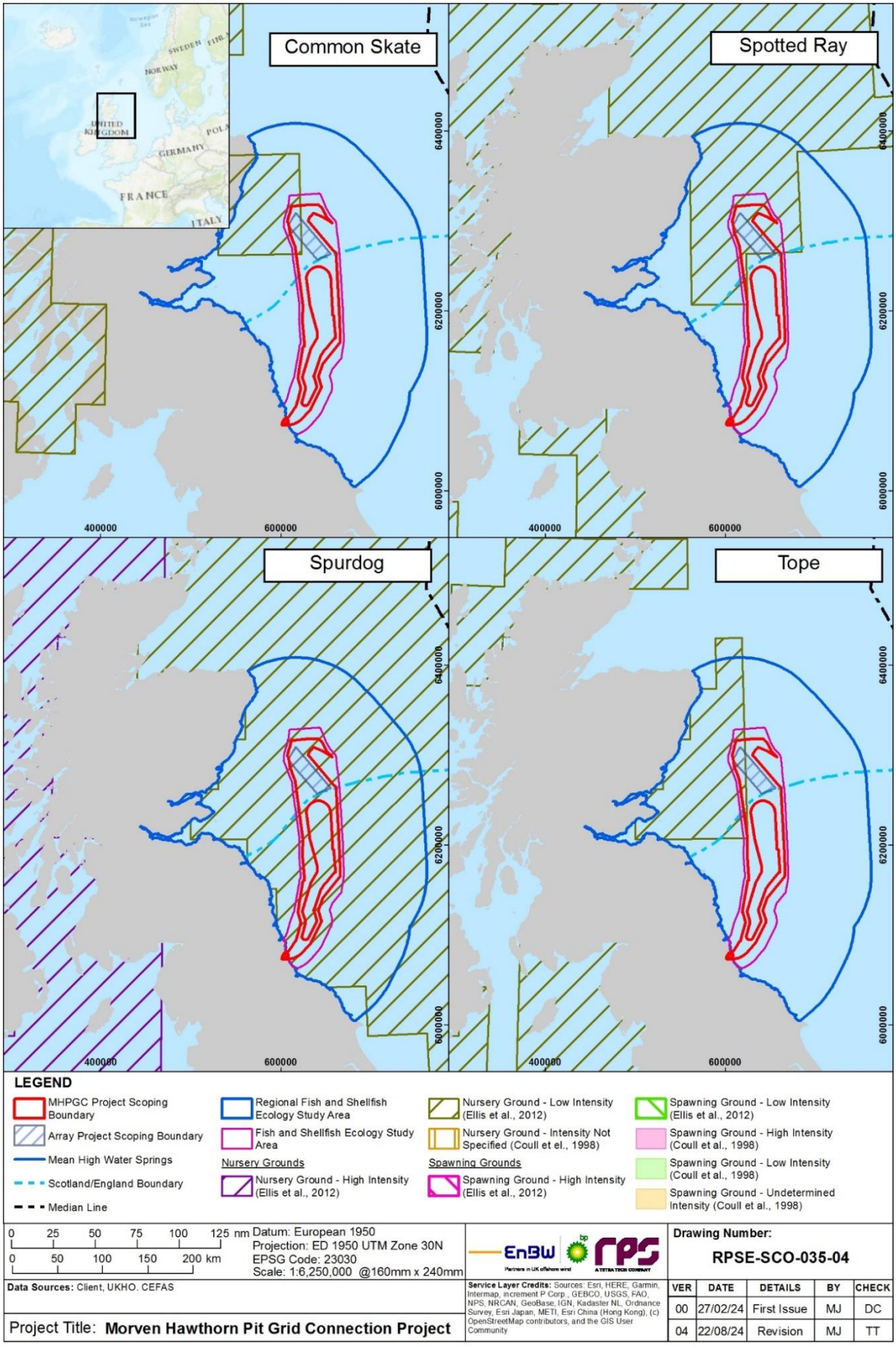


Figure 7.18: Spawning and Nursery Intensity Maps of Common Skate, Spotted Ray, Spurdog and Tope in Proximity to Morven Hawthorn Pit Grid Connection Project

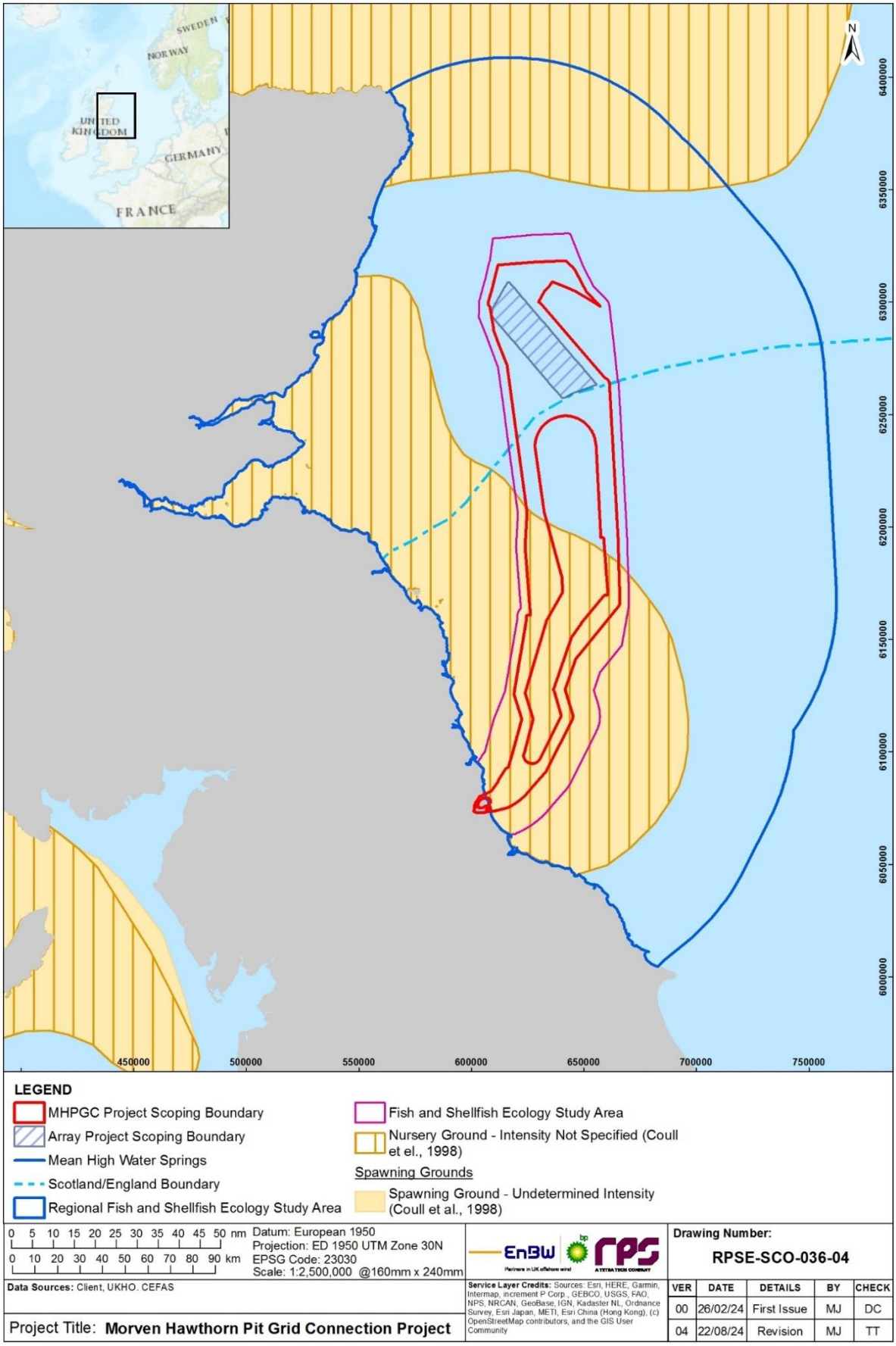


Figure 7.19: Spawning and Nursery Intensity Map of Nephrops Species in Proximity to Morven Hawthorn Pit Grid Connection Project

Designated Sites and Species of Conservation Importance

7.5.5.29 European designated sites (i.e. SACs) and nationally designated sites (i.e. MPAs and MCZs) with relevant qualifying features (i.e. fish and shellfish species) which overlap with the Regional Fish and Shellfish Ecology Study Area are listed in Table 7.25 and illustrated in Figure 7.20.

7.5.5.30 There are no sites designated for the protection of fish and shellfish that overlap with the MHPGC Project Scoping Boundary. The nearest site in Scottish waters is Turbot Bank Marine MPA, located 38km to the north of the MHPGC Project, which is designated for the protection of non-migratory fish (sandeel). However, Turbot Bank MPA is not within the ZoI of the MHPGC Project (i.e. not within the Fish and Shellfish Ecology Study Area). Sites in Scottish waters designated for the protection of mobile, migratory fish where connectivity may occur include the River Dee SAC, River South Esk SAC, River Tay SAC and River Teith SAC (Table 7.25 and Figure 7.20).

7.5.5.31 There are also several sites in northeast England that are protected for fish and shellfish, including some protected sites where connectivity with the MHPGC Project may occur via mobile, migratory species for which those sites are designated. These relevant sites in English waters comprise of the Humber Estuary SAC, Tweed Estuary SAC and River Tweed SAC and Site of Special Scientific Interest (SSSI).

Table 7.25: Summary of Designated Sites with Relevant Fish and Shellfish Features within the Regional Fish and Shellfish Ecology Study Area and their Distances to the Morven Hawthorn Pit Grid Connection Project

Designated Site	Scottish or English Waters	Distance to the MHPGC Project (km)	Distance to Fish and Shellfish Study Area (km)	Features
Turbot Bank MPA.	Scottish.	38	27	Sandeels.
River Dee SAC.	Scottish.	57	53	Atlantic salmon; Freshwater pearl mussel.
Tweed Estuary SAC.	English.	61	57	Sea lamprey; River lamprey.
River Tweed SAC.	Scottish/English.	66	62	Atlantic salmon; Sea lamprey; River lamprey.
River South Esk SAC.	Scottish.	81	77	Atlantic salmon; Freshwater pearl mussel.

Designated Site	Scottish or English Waters	Distance to the MHPGC Project (km)	Distance to Fish and Shellfish Study Area (km)	Features
River Tay SAC.	Scottish.	136	132	Atlantic salmon; Sea lamprey; River lamprey.
River Teith SAC.	Scottish.	198	194	Atlantic salmon; Sea lamprey; River lamprey.

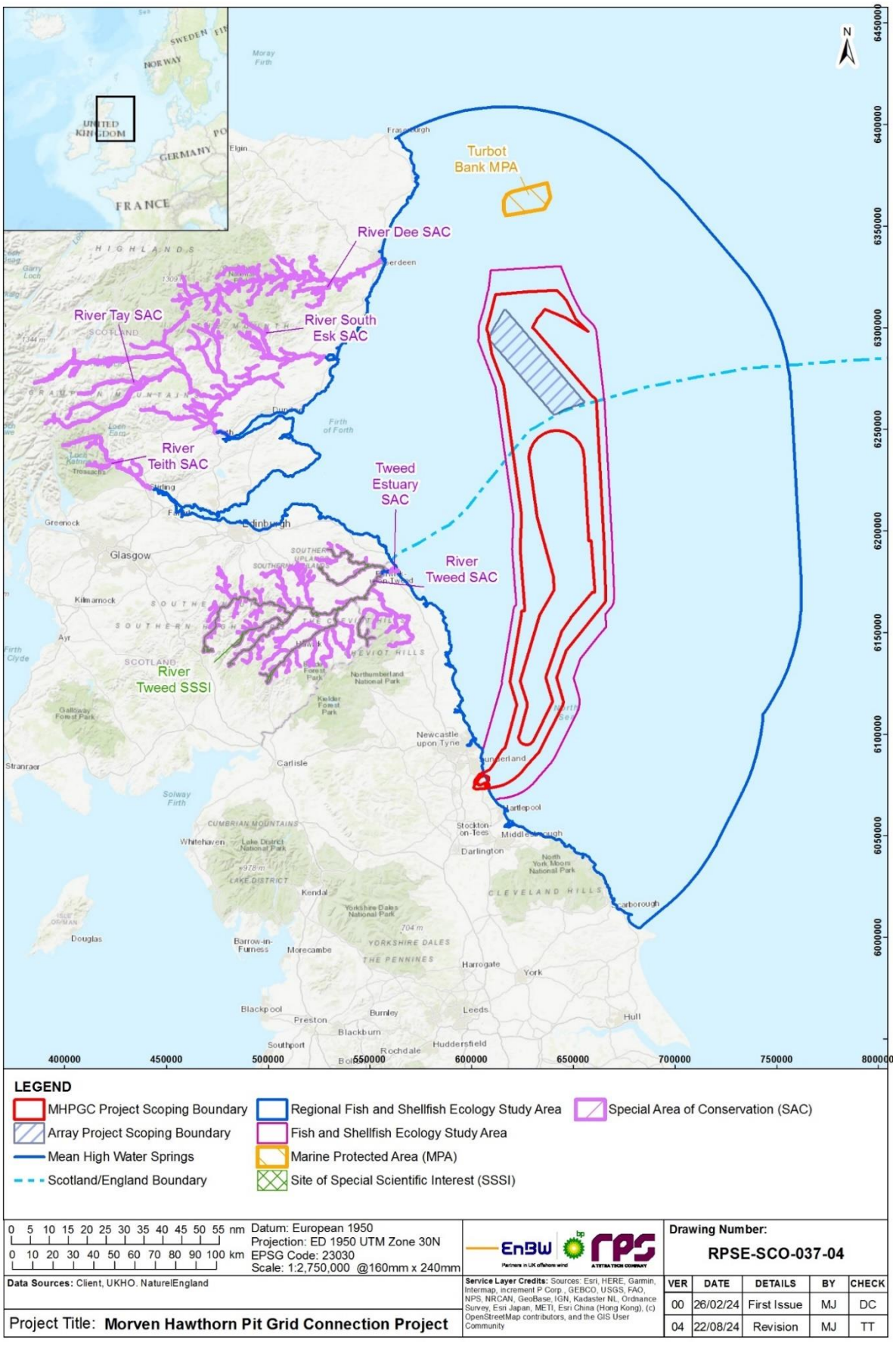


Figure 7.20: Designated Sites with Fish and Shellfish Features in Proximity to the Morven Hawthorn Pit Grid Connection

7.5.5.32 Species of conservation significance that are likely or have the potential to be present within the Regional Fish and Shellfish Ecology Study Area and with spawning/nursery grounds overlapping with the Regional Fish and Shellfish Ecology Study Area are listed in Table 7.26 and will be considered and assessed in the MHPGC Project EIA Report/ES.

7.5.5.33 Species of conservation importance include those listed on the IUCN red list (2024) and the Oslo and Paris Conventions (OSPAR) list of threatened and/or declining species.

7.5.5.34 Many of these species are protected as PMFs in Scottish waters (JNCC, 2012; Tyler-Walters *et al*., 2016). Species are listed as a PMF either if a large proportion of their population occurs in Scotland's seas, if the species is under threat or in decline, or due to the functional role of the species.

7.5.5.35 Species are protected in English waters as priority species under the UK Post-2010 Biodiversity Framework and Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006: species of principal importance in England.

Table 7.26: Fish and Shellfish Species of Conservation Importance that may occur within the Regional Fish and Shellfish Ecology Study Area

Common Name	Species Name	PMF	Priority Species UK Post-2010 Biodiversity Framework	Section 41 of the NERC Act 2006: Species of Principal Importance in England	IUCN Red List	OSPAR Threatened/ Declining List
Teleost fish						
Anglerfish.	*Lophius piscatorius.*		✓	✓		
Blue whiting.	*Micromesistius poutassou.*	✓	✓	✓		
Haddock.	*Melanogrammus aeglefinus.*				Vulnerable.	
Herring.	*Clupea harengus.*	✓	✓	✓		
Horse Mackerel.	*Trachurus trachurus.*	✓	✓	✓		
Sandeel.	Ammodytidae.	✓	✓	✓		
Saithe.	*Pollachius virens.*	✓				
Whiting.	*Merlangius merlangus.*	✓	✓	✓		
Atlantic cod.	*Gadus morhua.*	✓	✓	✓	Vulnerable.	✓
Atlantic salmon (marine life stages).	*Salmo salar.*	✓	✓	✓	Vulnerable.	✓
European eel.	*Anguilla Anguilla.*	✓	✓	✓	Critically endangered.	✓
Sea trout.	*Salmo trutta trutta.*	✓	✓	✓		✓

Common Name	Species Name	PMF	Priority Species UK Post-2010 Biodiversity Framework	Section 41 of the NERC Act 2006: Species of Principal Importance in England	IUCN Red List	OSPAR Threatened/ Declining List
Lampreys[3]						
River lamprey.	*Lampetra fluviatilis.*	✓	✓	✓		
Sea lamprey.	*Petromyzon marinus.*	✓	✓	✓		
Elasmobranchs						
Spurdog.	*Squalus acanthias.*	✓	✓			

[3] As well as being PMFs, sea lamprey and river lamprey are also Annex II species under the Habitats Directive.

7.5.6 Potential Impacts of the Morven Hawthorn Pit Grid Connection Project

7.5.6.1 A range of potential impacts on fish and shellfish ecology have been identified which may give rise to likely significant effects during the construction, O&M, and decommissioning phases of the MHPGC Project.

7.5.6.2 The impacts that have been scoped into the assessment as having the potential to give rise to likely significant effects are outlined in Table 7.27 together with a description of any additional data collection (e.g. surveys) and supporting analyses (e.g. modelling) that will be required to enable a full assessment of the impacts.

7.5.6.3 Potential impacts scoped out of the assessment as there is no potential for them give rise to likely significant effects are presented in Table 7.28, with justification.

7.5.6.4 The potential impacts from the MHPGC Project have been considered together for both English and Scottish waters, as the receptors considered in this assessment are mostly mobile species and given the commonality of the works proposed (offshore cabling).

Table 7.27: Impacts Proposed to be Scoped in to the Morven Hawthorn Pit Grid Connection Project Assessment for Fish and Shellfish Ecology.

*Project phase refers to construction (C), O&M (O) and decommissioning (D).

Impact	Project Phase*			Relevant to England or Scotland	Justification (Including Consideration of Designed in Measures)	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D				
Temporary habitat loss and disturbance of habitats.	✓	✗	✓	Scottish and English waters	There is potential for temporary, direct habitat loss and disturbance due to site preparation activities in advance of cable installation (including unexploded ordnance (UXO) clearance, anchor placements and pre-cabling seabed clearance), and placement of spud-can legs from jack-up operations. Any potential impacts on any spawning grounds associated with direct seabed disturbance during cable installation will be limited to the working corridor. There is potential for temporary, direct habitat loss and disturbance due to decommissioning activities to remove joint bays and cable protection, resulting in potential effects on fish and shellfish ecology. 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	There is wide-ranging and comprehensive desktop information and data sources available to characterise the Fish and Shellfish Ecology Study Area (Table 7.22). Additionally, relevant data from the site specific benthic surveys, such as PSA data to determine the suitability of the survey area for spawning, will be used in determining the baseline.	No specific modelling is required to inform this impact assessment, although the assessment will be quantitative in nature (i.e. clearly presenting the maximum spatial scale of impacts). This assessment will be based on information derived from the Project Design Envelope (PDE). The significance of impacts upon fish and shellfish receptors will be determined by correlating the magnitude of the impact and the sensitivity of the receptor. Where possible, the impact magnitude will be quantified for the Maximum Design Scenario

Impact	Project Phase*			Relevant to England or Scotland	Justification (Including Consideration of Designed in Measures)	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D				
					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. The preferred method for constructions in the intertidal area is to use trenchless techniques to install a number of ducts through which the offshore cables are pulled to the landing site. This should minimise the disturbance to the fish and shellfish ecology receptors and will be considered in the MHPGC Project Fish and Shellfish EIA Report/ES. For the offshore sections of the MHPGC Project, the methods being considered during construction are trenchless techniques. Therefore, the impacts are expected to be localised to the construction areas.		(MDS). For example, the MDS for habitat loss/disturbance will be quantified and the assessment will present the areas of habitat potentially affected in the context of the Fish and Shellfish Ecology Study Area. Impacts during the decommissioning phase are anticipated to be less than or equal to the construction phase.
Underwater sound impacting fish and shellfish receptors.	✓	×	✓	Scottish and English waters	There is potential for mortality, injury and/or disturbance to sensitive fish and shellfish species as a result of activities in advance of construction such as UXO clearance, pre-construction site investigation surveys and similar for	There is wide-ranging and comprehensive desktop information and data sources available to characterise the Fish and Shellfish Ecology	Underwater sound modelling will be undertaken as set out in Chapter 7.2: Underwater Sound, of the Scoping Report to inform the

Impact	Project Phase*			Relevant to England or Scotland	Justification (Including Consideration of Designed in Measures)	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D				
					decommissioning activities (removal of the joint bays and cable protection). In the O&M phase, major maintenance activities (cable reburial and cable repair activities) will be non-routine and therefore it is proposed that this impact is scoped out of further consideration within the Offshore EIA Report for the O&M phase.	Study Area (Table 7.22). Additionally, relevant data from the site specific benthic surveys, such as PSA data to determine the suitability of the survey area for spawning, will be used in determining the baseline.	assessment of underwater sound impacts to fish and shellfish. This will use the most up to date best practice guidelines (i.e. Popper *et al.,* 2014) and other scientific literature to give consideration to the potential for injury and disturbance to fish and shellfish species, including disruption to spawning activity for marine fish species, disruption to migration of diadromous fish species, with a particular focus on potential barriers to migration. In particular, the hearing ability of fish species will be considered, and both sound pressure and particle motion will be considered.

Impact	Project Phase*			Relevant to England or Scotland	Justification (Including Consideration of Designed in Measures)	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D				
							The significance of impacts upon fish and shellfish receptors will be determined by correlating the magnitude of the impact and the sensitivity of the receptor. Where possible, the impact magnitude will be quantified for the MDS. Impacts during the decommissioning phase are anticipated to be less than or equal to the construction phase.
Increased SSCs and associated sediment deposition.	✓	×	✓	Scottish and English waters	Sediment disturbance arising from construction activities (e.g. seabed preparation, UXO clearance, and cable installation), maintenance operations (e.g. cable repair/reburial etc.), and decommissioning activities (e.g. cable removal) may result in indirect impacts on fish and shellfish communities due to temporary increases in SSCs and associated sediment deposition (i.e.	As well as utilising the wide-ranging and comprehensive desktop data sources available (as set out in section 7.5.4 and Table 7.22), results from the baseline geophysical surveys and benthic surveys will be used to	The outputs of numerical modelling undertaken for the physical processes assessment (Chapter 7.1: Physical Processes of the Scoping Report) will inform this impact assessment. This will include consideration of the potential for effects on

Impact	Project Phase*			Relevant to England or Scotland	Justification (Including Consideration of Designed in Measures)	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D				
					smothering effects). Localised changes in sediment type may also potentially impact seabed dependent species (e.g. spawning herring). Any potential impacts associated with increased SSC as a result of construction or decommissioning works are anticipated to be highly localised and temporary. 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.	inform the modelling to be undertaken for the physical processes assessment of increased suspended sediment concentrations and associated deposition.	spawning habitats (i.e. changes to sediment composition, smothering of eggs etc.) and disturbance to diadromous fish species migration. This will consider differing sensitivities and life stages of the identified receptors. Impacts during the O&M and decommissioning phases are anticipated to be less than or equal to the construction phase. The significance of impacts upon fish and shellfish receptors will be determined by correlating the magnitude of the impact and the sensitivity of the receptor. Where possible, the impact magnitude will be quantified for the MDS.

Impact	Project Phase*			Relevant to England or Scotland	Justification (Including Consideration of Designed in Measures)	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D				
Long-term habitat loss.	✓	✓	✓	Scottish and English waters	There is the potential for long term habitat loss to occur directly under any cable protection required. The species which depend on the seabed for all or some of their life cycle (e.g. sandeel and herring) are most sensitive to this impact. Permanent habitat loss may occur under any infrastructure that is not decommissioned at the end of the MHPGC Project lifetime, such as cable protection.	There is wide-ranging and comprehensive desktop information and data sources available to characterise the Fish and Shellfish Ecology Study Area (Table 7.22). Additionally, relevant data from the site specific benthic surveys, such as PSA data to determine the suitability of the survey area for spawning, will be used in determining the baseline.	No specific modelling is required to inform this impact assessment, although the assessment will be quantitative in nature (i.e. clearly presenting the maximum spatial scale of impacts). This assessment will be based on information derived from the PDE. The significance of impacts upon fish and shellfish receptors will be determined by correlating the magnitude of the impact and the sensitivity of the receptor. Where possible, the impact magnitude will be quantified for the MDS. Impacts during the decommissioning phase are anticipated to be less

Impact	Project Phase*			Relevant to England or Scotland	Justification (Including Consideration of Designed in Measures)	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D				
							than or equal to the construction phase.
Colonisation of hard structures.	×	✓	×	Scottish and English waters	It is expected that artificial seabed structures (i.e. cable protection) will become colonised by a variety of marine organisms, leading to localised biodiversity increases. The spread of Invasive Non-Native Species (INNS) may also be facilitated by these structures.	There is wide-ranging and comprehensive desktop information and data sources available to characterise the Fish and Shellfish Ecology Study Area (Table 7.22). Additionally, relevant data from the site specific benthic surveys, such as PSA data to determine the suitability of the survey area for spawning, will be used in determining the baseline.	No specific modelling would be required to inform the assessment of the impact of colonisation of hard structures. A qualitative assessment will be undertaken and presented in the MHPGC Project EIA Report/ES. This assessment will be based on information derived from the PDE. INNS will be considered. The significance of impacts upon fish and shellfish receptors will be determined by correlating the magnitude of the impact and the sensitivity of the receptor. Where possible, the impact magnitude will be quantified for the MDS.

Impact	Project Phase*			Relevant to England or Scotland	Justification (Including Consideration of Designed in Measures)	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D				
Electromagnetic Fields (EMF) from subsea electrical cabling.	✗	✓	✗	Scottish and English waters	Subsea cables emit EMFs along their lengths with high voltage alternating current or direct current export cables emitting the greatest EMFs, which have the potential to change the background EMFs. These may impact sensitive species, including elasmobranchs, teleost fish and crustaceans by altering foraging or migratory behaviour (Hutchison *et al*., 2020), as well as predator/prey relationships.	There is wide-ranging and comprehensive desktop information and data sources available to characterise the Fish and Shellfish Ecology Study Area (Table 7.22). Additionally, relevant data from the site specific benthic surveys, such as PSA data to determine the suitability of the survey area for spawning, will be used in determining the baseline.	No specific modelling is required to inform this impact assessment. A qualitative assessment will be undertaken and presented in the MHPGC Project EIA Report/ES, based on a thorough review of the available scientific information on EMFs in the marine environment and effects on fish and shellfish ecology receptors. This assessment will be based on information derived from the PDE. The significance of impacts upon fish and shellfish receptors will be determined by correlating the magnitude of the impact and the sensitivity of the receptor. Where possible, the impact

Impact	Project Phase*			Relevant to England or Scotland	Justification (Including Consideration of Designed in Measures)	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D				
							magnitude will be quantified for the MDS.
Release of sediment-bound contaminants.	✓	✓	✓	Scottish and English waters	Seabed disturbance associated with construction, maintenance and decommissioning activities (e.g. cable installation) could lead to the remobilisation of sediment-bound contaminants that may result in harmful and adverse effects on fish and shellfish communities.	There is wide-ranging and comprehensive desktop information and data sources available to characterise the Regional Benthic Ecology Study Area, including the Cefas Action Level viewer (Cefas, 2023), which show levels of sediment contaminants are very low within the Regional Fish and Shellfish Study Area (see Chapter 7.4: Benthic Subtidal and Intertidal Ecology, of the Scoping Report). However, the majority of the available sediment chemistry data collated to date is from OWF surveys in the area	The outputs of numerical modelling undertaken for the physical processes assessment (Chapter 7.1: Physical Processes, of the Scoping Report) will inform this impact assessment. A qualitative assessment will then be undertaken using the modelling outputs for context of dispersal and presented in the MHPGC Project EIA Report/ES, based on a thorough review of the site specific information on contaminants in the MHPGC Project Benthic Ecology Study Area. The significance of impacts upon fish and shellfish receptors will be determined by correlating

Impact	Project Phase*			Relevant to England or Scotland	Justification (Including Consideration of Designed in Measures)	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D				
						and is therefore not focused over the MHPGC Project Fish and Shellfish Study Area. This is not currently sufficient information to scope out this impact. Targeted site specific benthic ecology characterisation surveys within the Fish and Shellfish Study Area include the collection of sediment samples for contaminant analyses.	the magnitude of the impact and the sensitivity of the receptor. Where possible, the impact magnitude will be quantified for the MDS. Impacts during the decommissioning phase are anticipated to be less than or equal to the construction phase.

Table 7.28: Impacts Proposed to be Scoped out of the Morven Hawthorn Pit Grid Connection Project Assessment for Fish and Shellfish Ecology

Impact	Justification
Accidental release of pollutants.	Vessels, vehicles, machinery, and other equipment have the potential to accidentally release pollution during all phases of development. However, the risk of such events is managed by the implementation of measures set out in standard post-consent plans including an Environmental Management Plan (EMP) and Marine Pollution Contingency Plan (MPCP). These plans will address accidental spills, discuss all potential contaminant releases, and include mitigation plans in case of accidental release. The EMP will also set out good practice techniques and use information and guidelines from the International Marine Organisation (IMO) and MARPOL (the International Convention for the Prevention of Pollution from Ships) guidelines for preventing pollution at sea. Therefore, the likelihood of spills occurring is very low following the implementation of these plans and if a spill was to occur the magnitude will be minimised through measures outlined in the MPCP. As such, it is proposed that this impact is scoped out of consideration within the MHPGC Project EIA Report/ES for fish and shellfish ecology.
Underwater sound from vessels.	The occurrence of vessels is not likely to represent a significant change from baseline noise levels of shipping, with cargo vessels and tankers regularly transiting the Fish and Shellfish Study Area and with fishing vessels actively fishing prevalent in the south of the Fish and Shellfish Study Area (as discussed in Chapter 7.8: Shipping and Navigation, of the Scoping Report). Therefore, the presence of additional vessels associated with the MHPGC Project is unlikely to add significant underwater sound over baseline levels. Underwater sound generated by vessels is likely to be low and potential impacts to fish and shellfish receptors are only likely to occur if individuals remained within their immediate vicinity (i.e. within metres) for several hours/days. This is highly unlikely to occur. Therefore, underwater sound generated by vessels is not considered to have potential effects on fish and shellfish receptors, and it is proposed to scope this impact out of further consideration within the Fish and Shellfish Ecology Chapter of the MHPGC Project EIA Report/ES.

Impact	Justification
Thermal emissions from operational cables.	Thermal emissions generated by the subsea electrical cabling may affect fish and shellfish receptors, however there is limited evidence for subsea cables significantly changing the temperature of the sea floor and surrounding water and, therefore, affecting fish and shellfish receptors. For buried cables, the temperature change at the seabed surface is low, due to the distance between the cable and the seabed surface and the increased dissipation of heat with distance from the cable (Meißner *et al*.,2007). The target burial depth for the offshore export cables of the MHPGC Project is 0.5m to 2.5 m. A study conducted at Nysted OWF in Denmark (Meißner *et al*., 2007) found the temperature change in the top 30cm of sediment above a high voltage cable (132kV) to be a maximum of 2°C. Given the target burial depth, the temperature change at the seabed surface where demersal fish and benthic shellfish will interface with the heated sediments is likely to be minimal and therefore not lead to impacts on fish and shellfish receptors. For cables that are unburied and instead protected by thick concrete mattresses or rock berms, the heat conduction is likely to be negligible due to the density of the structures. The review by Taormina *et al.* (2018) concluded the small area associated with these cable corridors and the expected weakness of thermal radiation would not produce a significant impact. A Cable Specification and Installation Plan (CSIP) for the MHPGC Project will include cable burial where possible or cables will be protected as necessary. Due to the impacts from thermal emissions being highly localised and the offshore export cables being buried or protected, this impact has been scoped out of the Fish and Shellfish Ecology Chapter of the MHPGC Project EIA Report/ES.

7.5.7 Designed In Measures and Mitigation

7.5.7.1 As part of the project design process, a number of designed in measures (primary and tertiary) will reduce the potential for impacts on fish and shellfish ecology, as detailed in Table 7.29. As there is a commitment to implement these measures, they are considered inherent to the design of the MHPGC Project. The determination of magnitude and significance of impacts in the MHPGC Project EIA Report/ES will assume the implementation of such measures. Some of these measures are considered standard industry practice for this type of development.

7.5.7.2 The requirement for any additional (secondary) mitigation measures will be dependent on the significance of the impacts of the MHPGC Project on fish and shellfish ecology receptors. The requirement for and feasibility of any mitigation measures will be consulted upon with statutory consultees throughout the MHPGC Project EIA process.

Table 7.29: Designed In Measures Adopted as part of the Morven Hawthorn Pit Grid Connection Project

Reference Number	Designed in Measures	Justification	Primary or Tertiary
MM-6	Development of, and adherence to, an Environmental Management Plan (EMP), including actions to minimise Invasive Non-Native Species (INNS), and a Marine Pollution Contingency Plan (MPCP), which will include planning for accidental spills, address all potential contaminant releases and include key emergency details.	An Outline EMP will be provided at Application with the MHPGC Project EIA Report/ES and will provides a means to ensure the efficient management and communication of commitments made for the management of the potential environmental impacts. Measures will be adopted to ensure that the potential for release of pollutants is minimised. The outline EMP will also include measures for controlling INNS and their impact on fish and shellfish ecology receptors.	T
MM-7	Placement of cable protection will be minimised as far as possible; however, a level of protection may be required at certain locations. Where rock protection is used, this will be evaluated	To reduce the extent of habitat loss	P

Reference Number	Designed in Measures	Justification	Primary or Tertiary
	and follow industry standard guidelines in terms of slope angle and rock grading. Secured through the Operation & Maintenance Plan (OMP).		
MM-10	Development and adherence to a Cable Specification and Installation Plan (CSIP).	There is a potential for cable exposure to occur due to interactions between the metocean regime (wave, sand and currents). Sediment transport can lead to exposure of cables and infrastructure, thus burial of cables alongside a cable installation strategy should provide sufficient depth to avoid cable exposure. The CSIP will outline the technical specifications of the cables used in the MHPGC Project, describe the installation methodology and cable protection. This measure will reduce EMF and thermal impacts on demersal fish and shellfish species.	T
MM-22	Development of, and adherence, to a Construction Method Statement (CMS).	Provided as a means of controlling specific health and safety risks that have been identified and to ensure the health and safety aspects of the MHPGC Project are secured. Ensures health and safety risks do not translate into environmental risks through adherence to best practice.	P

7.5.7.3 Any further mitigation requirements for fish and shellfish ecology will be dependent on the significance of the effects, as identified during the MHPGC Project EIA process.

7.5.8 Proposed Assessment Methodology

7.5.8.1 The methodology presented in Chapter 4: EIA Methodology, of the Scoping Report will be followed for the MHPGC Project EIA Report/ES. The following guidance and documents will also be considered, which are specific to the fish and shellfish topic:

- Guidelines for Ecological Impact Assessment (EcIA) in the UK and Ireland. Terrestrial, Freshwater, Coastal and Marine (Chartered Institute of Ecology and Environmental Management (CIEEM), 2022));
- Guidance on Environmental Considerations for OWFs Development (OSPAR, 2008);
- Sound exposure guidelines for Fishes and Sea Turtles (Popper *et al.,* 2014).
- MarESA – A Guide (Tyler-Walters *et al*., 2018);
- Screening Spatial Interactions between Marine Aggregate Application Areas and Atlantic Herring Potential Spawning Habitat: A Method Statement (Reach *et al.,* 2013);
- Screening Spatial Interactions between Marine Aggregate Application Areas and Sandeel Habitat: A Method Statement (Latto *et al*., 2013).

7.5.8.2 A Fish and Shellfish Ecology Technical Report will be produced for the MHPGC Project EIA Report/ES, which will present a detailed baseline characterisation for the MHPGC Project using the results of the extensive desk based study and informed by the benthic site specific survey data. Considering the extensive available data to inform the fish and shellfish ecology baseline from desk based sources is extensive, there is not expected to be a requirement to obtain any further data via site specific fish and shellfish ecology surveys. The Fish and Shellfish Ecology Technical Report will inform the Fish and Shellfish Ecology MHPGC Project EIA Report/ES Chapter. The approach and focus of the impact assessments will be discussed with stakeholders through consultation on this Scoping Report.

7.5.8.3 In the EIA assessment, fish and shellfish receptors identified as having the potential to occur in the Fish and Shellfish Ecology Study Area will be grouped into broad ecological receptor groups, called Important Ecological Features (IEFs), in line with guidelines set out in CIEEM (2022). These IEFs will be those features against which impacts associated with the construction, O&M and decommissioning phases of the MHPGC Project will be assessed. Criteria defining the value of each IEF will be defined to reflect topic-specific interests.

7.5.8.4 The Fish and Shellfish MHPGC Project EIA Report/ES Chapter will include a separate section for the assessment of sensitivity of diadromous fish, and the magnitude of each impact of the MHPGC Project on these species.

7.5.8.5 Information on the sensitivities of fish and shellfish ecology receptors will be drawn from the MarESA (Tyler-Walters *et al*., 2018) and the Feature Activity Sensitivity Tool (FeAST) (FEAST working group, 2023), where available. The MarESA is a database which has been developed through the MarLIN of Britain and Ireland and is maintained by several organisations, including the Marine Biological Association and statutory organisations (such as the JNCC, Natural England, NatureScot, Natural Resources Wales, Department for Environment, Food and Rural Affairs (Defra), Cefas

and the Marine Directorate). This database comprises a detailed review of available evidence on the effects of pressures on marine species or habitats, and a subsequent scoring of sensitivity against a standard list of pressures, and their benchmark levels of effect.

7.5.8.6 FeAST allows users to investigate the sensitivity of marine features in Scottish Waters to pressures arising from human activities. Much of the evidence presented within FeAST has been derived from sensitivity assessments originally undertaken by MarLIN and further developed by several Scottish organisations such as NatureScot, MSS, the Scottish Environment Protection Agency and the JNCC. The tool focuses on features of conservation interest such as protected features of MPAs and PMFs.

7.5.8.7 The evidence base presented in the MarESA is UK wide and peer reviewed. It represents the largest review undertaken to date on the effects of human activities and natural events on marine species and habitats; these assessments are undertaken mainly at the biological assemblage level.

7.5.8.8 Further detail on how sensitivity is defined is outlined in Tyler-Walters *et al*. (2018). Sensitivities to the key activities across the lifetime of the MHPGC Project (i.e. construction, O&M, and decommissioning phases) will be summarised according to the MarESA for each of the IEFs within the Regional Fish and Shellfish Ecology Study Area. Where sensitivity information on specific species or habitats is not available through MarESA, suitable proxies will be used.

7.5.8.9 The importance of key prey species such as herring, sprat and sandeel for marine mammals and birds will be assessed within relevant sections and informed by the Fish and Shellfish Ecology MHPGC Project EIA Report/ES Chapter, which will provide the outputs required to best inform these assessments.

7.5.8.10 Habitat suitability for sandeel and herring spawning will be assessed using data collected as part of the site specific benthic ecology characterisation survey, in line with industry best practice guidelines and considered in discussions with stakeholders following Scoping.

7.5.9 Potential Cumulative Impacts

7.5.9.1 For the purposes of the CEA, cumulative impacts will be assessed within a representative 50km buffer of the MHPGC Project, which covers the potential ZoI for all impacts excluding underwater sound. Underwater sound will be assessed within a 100km buffer, which is standard practice, to account for the wider ranging ZoI for underwater sound. These buffers are considered appropriate as most impacts considered in Table 7.27 will be localised in extent.

7.5.9.2 Cumulative effects with the Morven Offshore Wind Array Project and the second grid connection project in the Branxton area Southeast Scotland will be considered, together with cumulative effects with other developments, where relevant.

7.5.9.3 The cumulative effect assessment will follow the approach outlined in Chapter 4: EIA Methodology, of the Scoping Report.

7.5.10 Potential Inter-Related Effects

7.5.10.1 The EIA will consider inter-related effects arising from the MHPGC Project, across their own phases (project lifetime) and different effects on one receptor in one

phase (receptor led). The EIA will consider inter-related effects of multiple impacts from the construction, O&M and decommissioning phases of the MHPGC Project, affecting one receptor. Inter-related effects will be assessed through consideration of all effects on a receptor, considering both spatial and temporal overlap, within the MHPGC Project. This will ensure that the MHPGC Project is appropriately considered within the EIA and in line with Chapter 4: EIA Methodology, of the Scoping Report.

7.5.11 Potential Transboundary Impacts

7.5.11.1 There is the potential for transboundary impacts upon fish and shellfish ecology due to construction, O&M, and decommissioning impacts of the MHPGC Project. The following potential transboundary impacts were identified:

- temporary habitat loss/disturbance;
- long term habitat loss;
- increased SSC and associated sediment deposition;
- colonisation of hard structures;
- underwater sound;
- electromagnetic fields (EMF).

7.5.11.2 Impacts associated with indirect effects on fish and shellfish habitats, including habitat loss and suspended sediments are expected to be localised to within the Fish and Shellfish Study Area, which is entirely outwith other European Economic Area (EEA) States. However, fish species, including Annex II migratory fish species and fish of commercial importance for fishing fleets of other EEA States may transit through the Morven MHPGC Project Scoping Boundary. Therefore, these impacts have been scoped into the EIA transboundary assessment for this receptor group.

7.5.11.3 Increased underwater sound during the construction phase of the Morven MHPGC Project has the potential to kill, injure and/or disturb fish receptors, including Annex II migratory fish species and fish that have commercial value. A direct impact may result from, for example, unexploded ordnance (UXO) clearance, and an indirect impact may result from, for example, changes in prey availability during construction. Therefore, there is potential for transboundary impacts associated with the construction phase of the Morven MHPGC Project for this receptor group. Fish and shellfish ecology has been screened in for transboundary impacts and will be further considered in the EIA Report/ES.

7.6 Marine Mammals

7.6.1 Introduction

7.6.1.1 This chapter of the Scoping Report identifies the marine mammals receptors of relevance to the Morven Hawthorn Pit Grid Connection Project (hereafter referred to as 'MHPGC Project') and considers the potential impacts arising from the construction, operation and maintenance (O&M), and decommissioning of the MHPGC Project. This scoping chapter adopts a proportionate approach to only those impacts with potential to result in likely significant effects and therefore scopes out other impacts where there is evidence that the effects are not likely to be significant.

7.6.2 Policy and Legislation

7.6.2.1 This section identifies the relevant legislation, policy and other documentation that will inform the assessment of likely significant effects with respect to marine mammals (shown in Table 7.30). Further information on policies relevant to the Environmental Impact Assessment (EIA) and their status is provided in Chapter 2: Policy and Legislation.

Table 7.30: Relevant Legislation and Policy

Relevant Legislation	Relevance to the Assessment
International Legislation	
Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) 1973.	CITES is an agreement regulating the international trade in certain species of wild animals including marine mammals.
The Bonn Convention on the Conservation of Migratory Species of Wild Animals, 1979.	Provides a global platform for the conservation and sustainable use of, amongst others, whales and dolphins.
Convention on the Conservation of European Wildlife and Natural Habitats (The Bern Convention) 1979.	The obligations of the Convention are transposed into United Kingdom (UK) law by means of the Wildlife and Countryside Act (1981 as amended), Nature Conservation (Scotland) Act 2004 (as amended). The principal aims of the Convention are to ensure conservation and protection of wild plant and animal species and their natural habitats.
Agreement on the Conservation of Small Cetaceans of the Baltic, Northeast Atlantic, Irish and North Seas, 1992 (ASCOBANS).	The aim of the Agreement is to promote close cooperation between countries with a view to achieving and maintaining a favourable conservation status for small cetaceans throughout the Agreement Area.

Relevant Legislation	Relevance to the Assessment
Convention on Biological Diversity 1993.	The principal aims of the Convention are to ensure conservation and protection of wild plant and animal species and their natural habitats.
Convention for the Protection of the Marine Environment of the Northeast Atlantic (OSPAR) 1998.	OSPAR includes the OSPAR List of Threatened and/or declining species and habitats for which the OSPAR Commission sets priorities for the conservation and protection of marine biodiversity.
National Legislation (UK)	
The Conservation of Offshore Habitats and Species Regulations 2017 (as amended) (transposes the offshore elements of the EU Habitats Directive (92/43/EC) into UK legislation).	• Before deciding to undertake, or give any consent, permission or other authorisation for, a plan or project which is likely to have a significant effect on a European offshore marine site or a European site (either alone or in combination with other plans or projects), and is not directly connected with or necessary to the management of the site, a competent authority must make an appropriate assessment of the implications of the plan or project for that site in view of that site's conservation objectives. If the potential for adverse effects on European site integrity cannot be discounted, the project could only proceed if imperative reasons of over-riding public interest are found to exist and if compensatory measures can be secured; • A person is guilty of an offence if they deliberately capture, injure, or kill any wild animal of a European Protected Species (EPS). All cetacean species (whales, dolphins and porpoise) are EPS.
Marine Strategy Regulations 2010 (transposes the EU Marine Strategy Framework Directive (MSFD) 2008/56/EC into UK legislation).	The UK Marine Strategy Regulations 2010 require the UK to take the necessary measures to achieve or maintain Good Environmental Status (GES) by 2020 through the development of a UK Marine Strategy.
The Wildlife and Countryside Act 1981 (as amended).	The Wildlife and Countryside Act 1981 is a UK law that protects wildlife and natural habitats. Cetaceans are protected under this Act.
Conservation of Seals Act 1970.	An Act to provide the protection and conservation of seals in England, Wales, Scotland and in adjacent territorial waters. The Conservation of Seals Act 1970 prohibits killing or taking seals. It is an offence to intentionally or recklessly kill, injure or take a seal. As of 1 March 2021 amendments made to the Conservation of Seals Act 1970 by Schedule 9 of the Fisheries Act 2020 come into force. Individual seals can no longer be

Relevant Legislation	Relevance to the Assessment
	controlled under the 'netsman's defence' as this defence was removed from the legislation as of 1 March 2021.
National Legislation (Scotland)	
Nature Conservation (Scotland) Act 2004.	Places duties on public bodies in relation to the conservation of biodiversity and strengthens wildlife enforcement legislation. Wild animal protection is extended to include reckless as well as intentional acts. The Act makes it an offence to disturb or harass cetaceans and amends the provisions for enforcement. (4A)
Marine (Scotland) Act 2010.	• The Scottish Ministers, and public authorities must act in the way best calculated to further the achievement of sustainable development, including the protection and, where appropriate, enhancement of the health of that area; • The Act provides improved protection for seals. Certain haul-out sites have been designated here seals are protected from intentional or reckless harassment. The Act seeks to balance seal conservation with other pressures and requirements (such as species conservation). Part 6 prohibits the killing or taking of seals except under specific licence.
The Protection of Seals (Designation of Haul-Out Sites) (Scotland) Order 2014.	Introduced additional protection for seals at 194 designated haul-out sites: locations on land where seals come ashore to rest, moult or breed.
National Policy (England)	
North East Inshore and North East Offshore Marine Plan.	NE-SCP-1: • Proposals that may have a significant adverse impact upon the seascapes and landscapes of an area should only be supported if they demonstrate that they will, in order of preference: f. avoid g. minimise h. mitigate i. if it is not possible to mitigate, the public benefits for proceeding with the proposal must outweigh significant adverse impacts to the seascapes and landscapes of an area. Where possible, proposals should demonstrate that they have considered how highly the seascapes and landscapes of an area is valued, its quality, and the areas potential for change. In addition, the scale and design of the proposal should be compatible with its surroundings, and not have a significant adverse impact on the seascapes and landscapes of an area.

Relevant Legislation	Relevance to the Assessment
	NE-MPA-1: • Proposals that support the objectives of marine protected areas and the ecological coherence of the marine protected area network will be supported; • Proposals that may have adverse impacts on the objectives of marine protected areas must demonstrate that they will, in order of preference: j. avoid; k. Minimise; l. mitigate adverse impacts, m. with due regard given to statutory advice on an ecologically coherent network. NE-BIO-1/2: • Proposals that enhance the distribution of priority habitats/habitat adaptation/connectivity and priority/native species will be supported. Proposals that may have significant adverse impacts on the distribution of priority habitats/habitat adaptation/connectivity and priority species/native species migration must demonstrate that they will, in order of preference: a. Avoid; b. Minimise; c. Mitigate; d. compensate for significant adverse impacts. NE-CE-1: • Proposals which may have adverse cumulative effects with other existing, authorised or reasonably foreseeable proposals must demonstrate that they will, in order of preference: e. Avoid; f. Minimise; g. mitigate significant adverse cumulative and/or in combination effects. NE-UWN-2: • Proposals that result in the generation of impulsive or non-impulsive noise must demonstrate that they will, in order of preference: h. avoid; i. Minimise; j. mitigate significant adverse impacts on highly mobile species;

Relevant Legislation	Relevance to the Assessment
	k. if it is not possible to mitigate significant adverse impacts, proposals must state the case for proceeding.
National Policy Statements.	NPS-EN1; • 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. (NPS EN-1 paragraph 5.4.17); • The applicant should show how the project has taken advantage of opportunities to conserve and enhance biodiversity and geological conservation interests. (NPS EN-1 paragraph 5.4.19); • The design of energy NSIP proposals will need to consider the movement of mobile/migratory species such as birds, fish and marine and terrestrial mammals and their potential to interact with infrastructure. As energy infrastructure could occur anywhere within England and Wales, both inland and onshore and offshore, the potential to affect mobile and migratory species across the UK and more widely across Europe (transboundary effects) requires consideration, depending on the location of development. (NPS EN-1 paragraph 5.4.22); • Applicants should include appropriate avoidance, mitigation, compensation, and enhancement measures as an integral part of the proposed development. In particular, the applicant should demonstrate that: l. During construction, they will seek to ensure that activities will be confined to the minimum areas required for the works; m. The timing of construction has been planned to avoid or limit disturbance; n. During construction and operation best practice will be followed to ensure that risk of disturbance or damage to species or habitats is minimised, including as a consequence of transport access arrangements; o. Habitats will, where practicable, be restored after construction works have finished; p. Opportunities will be taken to enhance existing habitats rather than replace them, and where practicable, create new habitats of value within the site landscaping proposals. Where habitat creation is

Relevant Legislation	Relevance to the Assessment
	required as mitigation, compensation, or enhancement, the location and quality will be of key importance. In this regard habitat creation should be focused on areas where the most ecological and ecosystems benefits can be realised; q. mitigations required as a result of legal protection of habitats or species will be complied with. (NPS EN-1 paragraph 5.4.35). NPS-EN3: • Given the scale of offshore wind deployment required to meet 2030 and 2050 ambitions, applicants will need to give close consideration to impacts on MPAs, either alone or in combination, and employ the mitigation hierarchy and if necessary, provide compensation (both individually and in combination with other plans or projects) which may be needed to approve their projects. It is likely that mitigation may include proactive measures to reduce the impact of deployment (e.g. micrositing of offshore transmission routes to avoid vulnerable habitats, alternatives piling or trenching techniques, noise abatement technology, collision avoidance methods or, if necessary, compensation for habitat loss). (NPS EN-3 paragraph 2.8.52 and 2.8.53); • In addition, Applicants should have regard to the specific ecological and biodiversity considerations that relate to proposed offshore renewable energy infrastructure developments, namely: r. Fish; s. Intertidal and subtidal seabed habitats and species; t. Marine mammals; u. Birds; v. Wider ecosystem impacts and interaction, and other relevant protected migratory species. • Applicants must undertake a detailed assessment of the offshore ecological, biodiversity and physical impacts of their proposed development, for all phases of the lifespan of that development, in accordance with the appropriate policy for offshore wind farm (OWF) EIAs, HRAs and MCZ (Marine Conservation Zone) assessments. (NPS EN-3 paragraph 2.8.98 and 2.8.91); • Applicants need to consider environmental and biodiversity net gain as set out in Section 4.6 of EN-1 and the Environment Act 2021. Applicants should assess the potential of their proposed development to have net positive effects on

Relevant Legislation	Relevance to the Assessment
	marine ecology and biodiversity, as well as negative effects. (NPS EN-3 paragraph 2.8.102 – 2.8.103); • Applicants should consult at an early stage of pre-application with relevant statutory consultees and energy not-for profit organisations/non governmental organisations as appropriate, on the assessment methodologies, baseline data collection, and potential avoidance, mitigation and compensation options which should be undertaken. In developing proposals applicants must refer to the most recent best practice advice originally provided by Natural England under the Offshore Wind Enabling Action Programme and/or their relevant SNCB. Any relevant data that has been collected as part of post-construction ecological monitoring from existing operational OWFs should be referred to where appropriate. (NPS EN-3 paragraph 2.8.104 – 2.8.106); • Where necessary, assessment of the effects on marine; • mammals should include details of: a. Likely feeding areas impacts on prey species and prey habitat; b. Known birthing areas/haul-out sites for breeding and pupping; c. Migration routes; d. Protected sites; e. Baseline noise levels; f. Predicted construction and soft start noise levels in relation to mortality, permanent threshold shift (PTS), temporary threshold shift (TTS) and disturbance; g. Operational noise; h. Duration and spatial extent of the impacting activities including cumulative/in combination effects with other plans or projects; i. Collision risk; j. Entanglement risk; k. Barrier risk. • The scope, effort and methods required for marine mammal surveys and impact assessments should be discussed with the relevant SNCB. (NPS EN-3 paragraph 2.8.131 – 2.8.132); • The applicant should discuss any proposed noisy activities with the relevant statutory body and must reference the joint JNCC and SNCB underwater noise guidance, and any successor of this guidance, in relation to noisy activities (alone and in combination with other plans or projects)

Relevant Legislation	Relevance to the Assessment
	within SACs, SPAs and Ramsar sites, in addition to the JNCC mitigation guidelines for piling, explosive use, and geophysical surveys. Natural Resources Wales (NRW) has a position statement on assessing noisy activities which should also be referenced where relevant. Where the assessment identifies that noise from construction and Unexploded Ordnance (UXO) clearance may reach noise levels likely to lead to noise thresholds being exceeded (as detailed in the JNCC guidance) or an offence as described in paragraph 2.8.127 – 2.8.129 above is committed, the applicant must look at possible alternatives or appropriate mitigation. The applicant should develop a Site Integrity Plan (SIP) or alternative assessments for projects in English and Welsh waters to allow the cumulative impacts of underwater noise to be reviewed closer to the construction date, when there is more certainty in other plans and projects. (NPS EN-3 paragraph 2.8.133 – 2.8.135).
Other	
EPS Licence.	EPS are animal (and plant) species listed in Annex IV of the Habitats Directive that are afforded protection under The Conservation of Offshore Habitats and Species Regulations 2017. All cetacean species (whales, dolphins and porpoise) are EPS. If any activity is likely to cause disturbance or injury to an EPS, a licence will be required to undertake the activity legally. Activities that can be licensed under EPS licences include those such as underwater sound disturbance to marine mammals due to UXO clearance activities. EPS licences are obtained from NatureScot (or the Scottish Ministers, depending on the location of the activity and the species subject to the licence application) in Scottish Waters, and Natural England in English Waters.

7.6.3 Study Area

7.6.3.1 Two study areas are defined for marine mammals (Figure 7.21):

- the Marine Mammal Study Area;
- the Marine Mammal Regional Study Area .

7.6.3.2 The study areas are defined as follows:

- The Marine Mammal Study Area is defined as the area encompassing the Offshore Morven Hawthorn Grid Connection Scoping Boundary (hereafter referred to as 'MHPGC Project Scoping Boundary') plus a buffer of 4 km. This 4 km buffer was defined using the existing best practice approach for aerial surveys (SNCBs, 2017). The guidance (SNCBs, 2017) that is developed for birds has also been applied for marine mammals as birds and marine mammals are

surveyed side by side. SNCBs (2017) recommend that for most species a standard displacement buffer of 2 km with the exception of the species groups of divers and sea ducks. Divers and sea ducks have been assessed as being the most sensitive species groups to offshore development and associated boat and helicopter traffic. Therefore for divers and sea ducks a 4 km displacement buffer is recommended. This captures the zone of influence (ZoI) of most of the impacts to marine mammals and also has been used for marine mammals for EIA for other projects, including the majority of commissioned windfarms in the UK;

- The Marine Mammal Regional Study Area for the MHPGC extends over the northern North Sea geographic region extending to the European coastline. Marine mammals are highly mobile and their range may extend over large distances and, therefore, the Marine Mammal Regional Study Area for the MHPGC provides wider context. The desktop review will consider the ecology, distribution, and abundance of marine mammals within the Marine Mammal Regional Study Area and will inform the assessment where the wider potential ZoI for a given impact (e.g. underwater sound from UXO clearance) may extend beyond the MHPGC Marine Mammal Study Area. The Marine Mammal Regional Study Area will also be applied as the initial screening area for the cumulative effects assessment (CEA).

7.6.3.3 Other areas of importance for marine mammals are the regional marine mammal management units (MUs), which differ between species (Table 7.31). The marine mammal MU will be used as reference populations for the quantitative assessment (i.e. comparing the number of animals affected by a given impact against the species-specific MU). The area for Small Cetaceans in European Atlantic Waters and the North Sea (SCANS)-IV Survey Block NS-C and NS-D (Gilles *et al.*, 2023) are also shown on the map (Figure 7.22) for additional context as published data on densities and abundance of key species is available for these survey areas which overlap the MHPGC.

7.6.3.4 The MHPGC Project Scoping Boundary and study areas will be refined during the EIA process using the same principles as outlined in this scoping chapter.

Table 7.31: Protection Legislation Relevant to the Key Marine Mammal Species which have the Potential to Occur within the Marine Mammal Study Area

Species	The Conservation of Offshore Habitats and Species Regulations 2017	The Conservation (Natural Habitats, &c.) (EU Exit) (Scotland) (Amendment) Regulations 2019	Marine (Scotland) Act 2010	Nature Conservation (Scotland) Act 2004	The Wildlife and Countryside Act 1981	Marine Strategy Regulations 2010	Conservation of Seals Act 1970	The Protection of Seals (Designation of Haul-Out Sites) (Scotland) Order 2014	Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) 1973	The Bonn Convention 1979	The Bern Convention 1979	Agreement on the Conservation of Small Cetaceans of the Baltic, North East Atlantic, Irish and North Seas, 1992 (ASCOBANS)	Convention on Biological Diversity 1993	Annex V of the OSPAR Convention 1992
Harbour porpoise (*Phocoena phocoena*)	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓
White-beaked dolphin (Lagenorhynchus albirostris)	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓
Bottlenose dolphin (*Tursiops truncatus*)	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓

Species	The Conservation of Offshore Habitats and Species Regulations 2017	The Conservation (Natural Habitats, &c.) (EU Exit) (Scotland) (Amendment) Regulations 2019	Marine (Scotland) Act 2010	Nature Conservation (Scotland) Act 2004	The Wildlife and Countryside Act 1981	Marine Strategy Regulations 2010	Conservation of Seals Act 1970	The Protection of Seals (Designation of Haul-Out Sites) (Scotland) Order 2014	Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) 1973	The Bonn Convention 1979	The Bern Convention 1979	Agreement on the Conservation of Small Cetaceans of the Baltic, North East Atlantic, Irish and North Seas, 1992 (ASCOBANS)	Convention on Biological Diversity 1993	Annex V of the OSPAR Convention 1992
Minke whale (Balaenoptera acutorostrata)	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓
Humpback whale (Megaptera novaeangliae)	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓
Harbour seal (*Phoca vitulina*)	✓	✓	✓	✓		✓	✓	✓		*	✓	✓	✓	✓
Grey seal (Halichoerus grypus)	✓	✓	✓	✓		✓	✓	✓		*	✓	✓	✓	✓

* Applies to harbour seal and grey seal in the Wadden Sea population, not UK waters

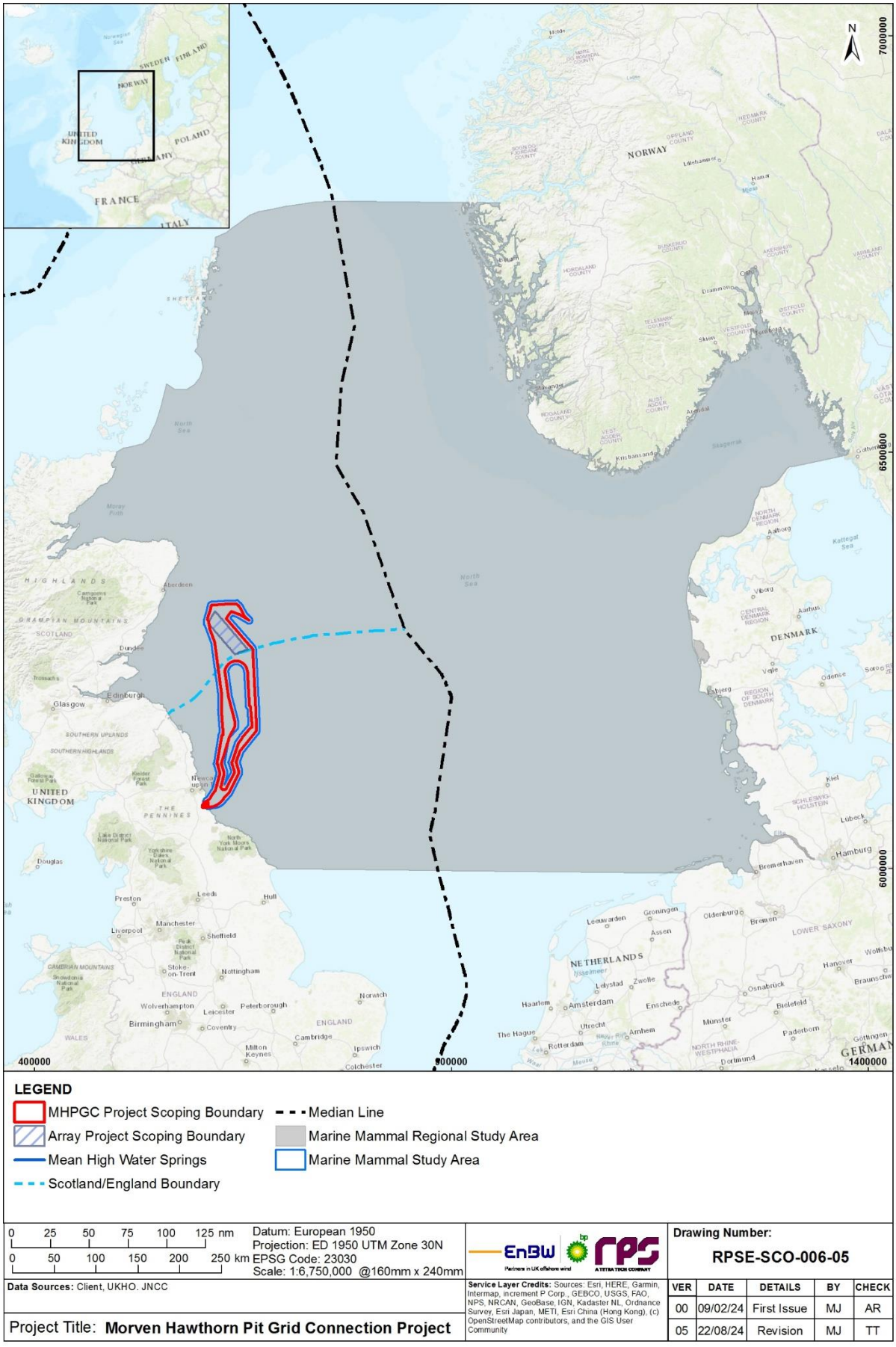


Figure 7.21: Marine Mammal Study Area and Marine Mammal Regional Study Area

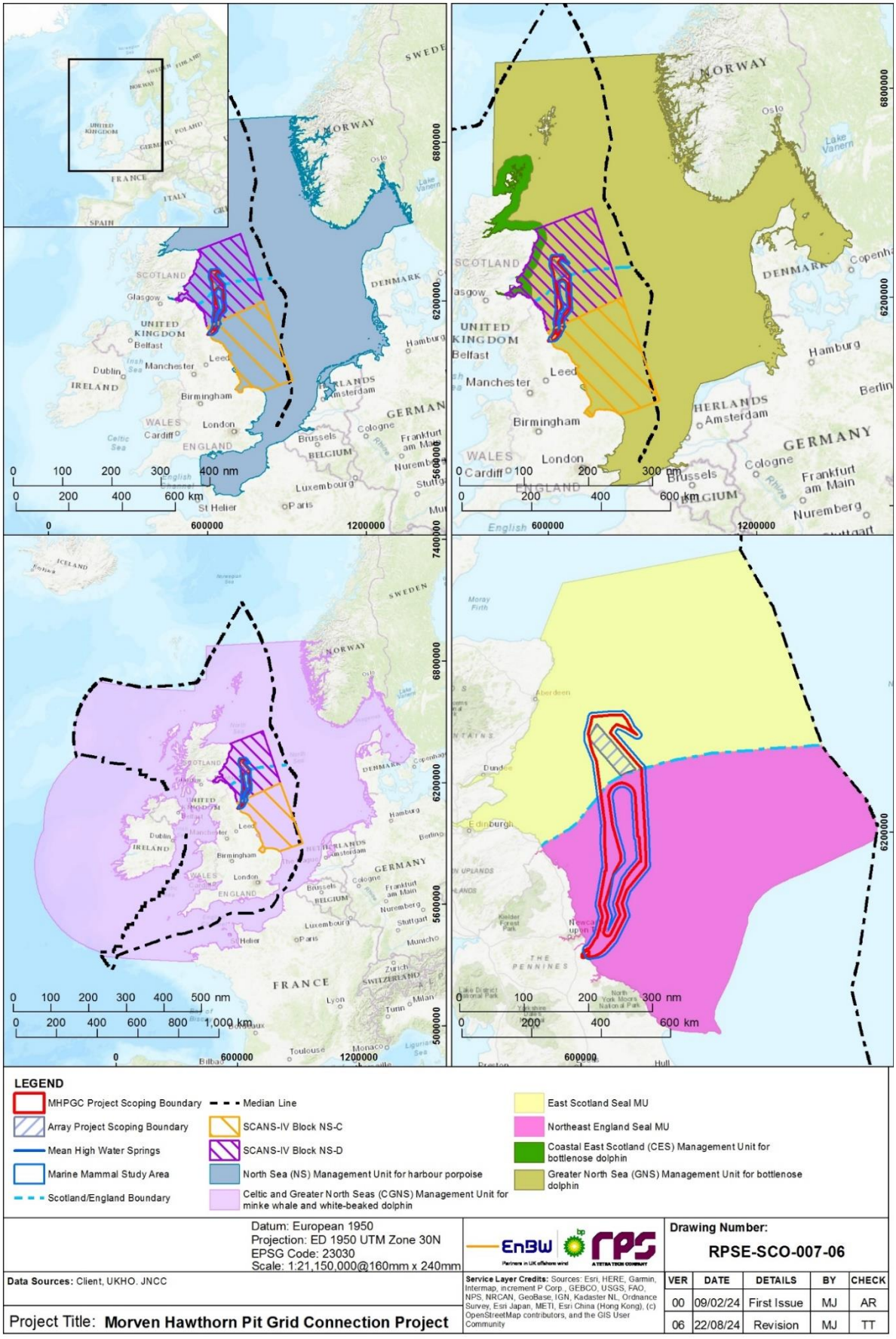


Figure 7.22: The Marine Mammal MUs of Relevance to the Morven Hawthorn Pit Grid Connection Project

7.6.4 Data Sources

7.6.4.1 An initial desk based review of literature to support this Scoping Report has identified a number of data sources that provide coverage of the Marine Mammal Regional Study Area. These are summarised in Table 7.32.

Table 7.32: Summary of Key Desktop Datasets and Reports

Title	Source	Year	Author
International/National (UK)			
Analysis of The Crown Estate aerial survey data for marine mammals for the FTOWDG region	SMRU Limited	2012	Grellier and Lacey
Atlas of Cetacean distribution in northwest European waters	JNCC	2003	Reid *et al.*
Background information on marine mammals for Strategic Environmental Assessment (SEA) 6.	Sea Mammal Research Unit (SMRU), University of St Andrews	2005	Hammond *et al.*
Map view – inventory of the Cetaceans database sightings and effort.	Joint Cetacean Data Programme (JCDP)	2023	JCDP
Design-based estimates of cetacean abundance in offshore European Atlantic waters	Final Report of the Cetacean Offshore Distribution and Abundance in the European Atlantic	2009	Macleod *et al.*
Distribution maps of Cetacean and seabird populations in the North-East Atlantic.	Journal of Applied Ecology	2020	Waggitt *et al.*
JNCC Report 680: Updated abundance estimates for Cetacean MUs in UK waters (Revised 2022).	JNCC	2022	Inter-Agency Marine Mammal Working Group (IAMMWG)
Joint Nature Conservation Committee (JNCC) Report 544: Harbour Porpoise Density.	JNCC	2015	Heinänen and Skov
Modelled density surfaces of Cetaceans in European Atlantic	SMRU, University of St Andrews	2022	Lacey *et al.*

Title	Source	Year	Author
waters in summer 2016 from the SCANS-III surveys[4].			
Estimates of cetacean abundance in European Atlantic waters in summer 2022 from the SCANS-IV aerial and shipboard surveys.	Institute for Terrestrial and Aquatic Wildlife Research, University of Veterinary Medicine Hannover	2023	Gilles *et al.*
Estimates of cetacean abundance in European Atlantic waters in summer 2016 from the SCANS-III aerial and shipboard surveys.	SMRU, University of St Andrews	2021	Hammond *et al.*
Revised Phase III Data Analysis of Joint Cetacean Protocol Data Resource.	JNCC	2016	Paxton *et al.et al.*
Scientific advice on matters related to the management of seal populations: 2022.	SMRU, University of St Andrews	2018, 2021 - 2023	Special Committee on Seals (SCOS)
Sympatric Seals, Satellite Tracking and Protected Areas: Habitat-Based Distribution Estimates for Conservation and Management	Frontiers in Marine Science	2022	Carter *et al.*
National (Scottish Waters)			
Cetacean Baseline Characterisation for the Firth of Tay based on existing data: Bottlenose dolphins	SMRU Consulting	2011	Quick and Cheney
Integrating multiple data sources to assess the distribution and abundance of bottlenose dolphins *Tursiops truncatus* in Scottish waters	Mammal review	2013	Cheney *et al.*
Seal telemetry and haul-out study obtained for Morven Offshore Wind Array Project	SMRU Consulting	2023	SMRU Consulting

4 SCANS IV will be incorporated into the baseline if data is available at the time of drafting the marine mammal technical report.

Title	Source	Year	Author
(hereafter referred to as 'Array Project')			
Regional baselines for marine mammal knowledge across the North Sea and Atlantic areas of Scottish waters. Scottish Marine and Freshwater Science.	Marine Scotland Science	2020	Hague *et al.*
Seagreen Firth of Forth Round 3 Zone Marine Mammal Surveys	Royal Haskoning and Seagreen Wind Energy Ltd	2012	Sparling
Forth and Tay Offshore Wind Developers Group cetacean survey data analysis report	SMRU	2012	Mackenzie *et al.*
Improving understanding of bottlenose dolphin movements along the east coast of Scotland	SMRU Consulting	2021	Arso Civil *et al*
National (English Waters)			
Dogger Bank Teesside A & B Environmental Statement (ES) Chapter 14 Appendix B DMP Analysis Report	Forewind	2014	Forewind

7.6.4.2 As well as the desk based data sources summarised in Table 7.32, site specific aerial surveys for the Array Project will provide an important source of data to inform the marine mammal baseline in the offshore areas of the MHPGC. Aerial surveys for the Array Project, which overlap with the offshore section of the MHPGC, have been ongoing since January 2021, and concluded in September 2023: a total of 33 months of observations. The site specific aerial surveys of the Array Project can only inform the marine mammal baseline for MHPGC but not characterise the environment as the surveys will only have covered parts of MHPGC.

7.6.5 Baseline Environment

7.6.5.1 Due to the highly mobile nature of marine mammal species, it is not possible to split the environmental baselines between Scottish and English waters. Therefore, the below baseline is relevant in the Marine Mammal Regional Study Area.

Project wide (Scottish and English waters)

Designated Sites

7.6.5.2 The Marine Mammal Study Area does not overlap with any protected sites that have been designated for marine mammal features (Figure 7.23). Designated sites with relevant qualifying marine mammal features in UK waters, which overlap with the

Marine Mammal Regional Study Area, are described in this chapter. For the purposes of the Scoping Report, UK waters only have been included here; the Likely Significant Effects (LSE) Screening will consider waters extending into Europe.

7.6.5.3 A full screening of European sites (i.e. SACs) with qualifying marine mammal features will be undertaken in the LSE Screening Report for the MHPGC, as part of the Habitats Regulations Assessment (HRA) process. The assessment of European sites and impacts on the site(s) conservation objectives will be undertaken in the Report to Inform the Appropriate Assessment (RIAA).

7.6.5.4 Table 7.33 provides an early indication of the designated sites that may be considered within the LSE Screening Report and, potentially, the RIAA if an LSE is identified. The list of designated sites, which includes all marine mammal SACs and MPAs within the Marine Mammal Regional Study Area, will be presented in the marine mammal EIA Report/ES Chapter. As a more detailed understanding of the MHPGC activities and impact pathways develops, the EIA will consider potential impacts on relevant Annex II marine mammal species of European designated sites, and those for which MPAs have been designated. The inclusion of designated sites in the EIA will then be reviewed on the basis of the potential for significant impacts.

7.6.5.5 The Southern Trench MPA, which lies 48 km from the MHPGC in Scotland, is designated under Section 80 of the Marine (Scotland) Act 2010 (Figure 7.23). Therefore, Minke whale is only protected within the boundaries of the MPA only and therefore there is not anticipated to be any requirement for inclusion of this site within an MPA Assessment as there is not expected to be a pathway from the impacts to the MPA. This will be evaluated as the impact assessment progresses. For this reason, minke whale is not included in the LSE Screening Report.

Table 7.33: Summary of Designated Sites with Relevant Qualifying Features Located within the Marine Mammal Regional Study Area which may be scoped in for Further Assessment, upon review of Potential Impacts

Designated Site	English or Scottish Waters	Distance to the MHPGC Project Scoping Boundary (km)	Features
Berwickshire and North Northumberland Coast SAC	Scottish/English	23.6	Grey seal
Isle of May SAC	Scottish	92.1	Grey seal
Southern Trench MPA	Scottish	48.1	Minke whale
Firth of Tay and Eden Estuary SAC	Scottish	94.5	Harbour seal
Dornoch Firth and Morrich More SAC	Scottish	213.6	Harbour seal
Moray Firth SAC	Scottish	173.1	Bottlenose dolphin

Designated Site	English or Scottish Waters	Distance to the MHPGC Project Scoping Boundary (km)	Features
Southern North Sea SAC	English	63.0	Harbour porpoise

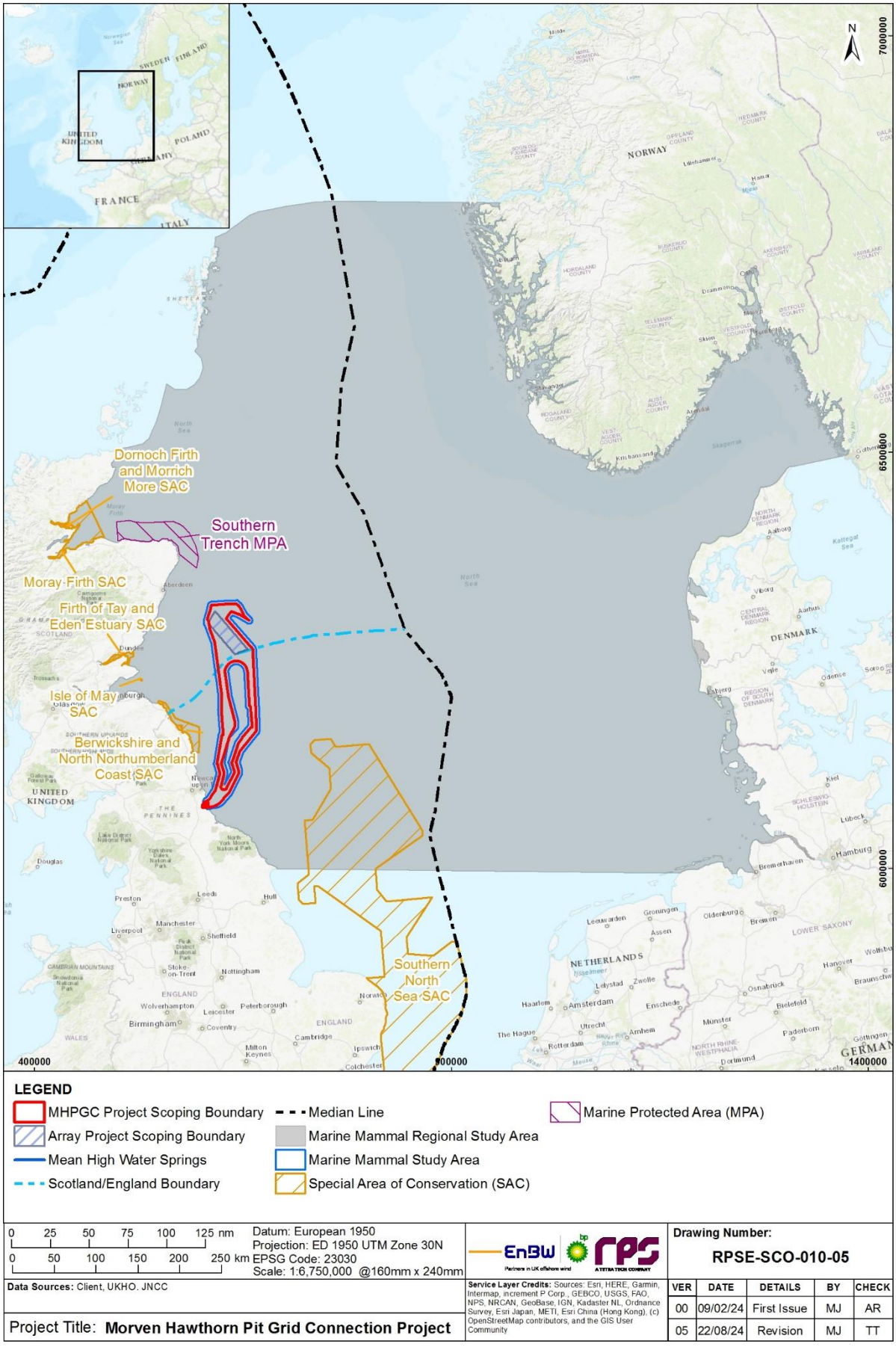


Figure 7.23: Marine Nature Conservation Designations in UK waters of Relevance to Marine Mammals that overlap with the Marine Mammal Regional Study Area

Harbour Porpoise

7.6.5.6 The harbour porpoise has a large population and is extensively distributed throughout the North Sea, where it is the most abundant cetacean species (JCDP 2023; Hammond *et al.*, 2021; Evans and Waggitt, 2020; Chevallard *et al.*, 2019). Harbour porpoise diets are diverse, vary regionally, and predominantly consist of cephalopods and an assortment of fish species (Ransijn *et al.*, 2019). Historical studies of harbour porpoise in Scottish waters have illustrated that sandeels and whiting dominate the species' diet (Santos and Pierce, 2003; Baines *et al.*, 2012; Ransijn *et al.*, 2019). Long term passive acoustic data collected near the Moray Firth, Scotland, has shown that harbour porpoises were increasingly detected during sunrise, sunset and throughout the night in deeper areas with muddy substrate, but in shallow, sandy areas during the day (Williamson *et al.*, 2017). Similarly, long term observations of harbour porpoise distribution identified seasonal shifts between coastal and offshore habitats, with greater density in the vicinity of the MHPGC observed during summer (April to September) months (Heinänen and Skov, 2015). These studies suggest both short term and seasonal movement between inshore coastal and offshore habitats and highlight the importance of multiple habitat types necessary to ensure species success. According to the Marine Mammal Research Unit (MMRU), harbour porpoises have a typical life expectancy of around 8 to 12 years (MMRU, 2022).

7.6.5.7 The most recent assessment of harbour porpoise in UK waters concluded that the overall trend in Conservation Status was Unknown, highlighting that there was insufficient data to establish a trend for the population size or to assess potential prospects for the population (JNCC, 2019a).

7.6.5.8 Hague *et al.* (2020) present information on regional baselines for marine mammals across the North Sea and Atlantic areas of Scottish waters. The most recent broadscale data on harbour porpoise is reported to be that available from the SCANS-IV survey campaign (Gilles *et al.*, 2023) and the series of SCANS surveys between 1994 and 2016, although these only reflect summer distribution. These data suggest the density of harbour porpoise varies throughout the North Sea MU. For example, in the UK portion of the MU, the densities range from 0.2813 animals per km^2 in Block CS-K (covering the Moray Firth and Orkney) to 0.6027 animals per km^2 in Block NS-C (southern North Sea) (Gilles *et al.*, 2023). The MHPGC spans Blocks NS-D and NS-C, with a density of 0.5985 and 0.6027 animals per km^2 respectively. This is in the same order of magnitude as SCANS-III densities, modelled by Lacey *et al.*, 2022, which suggested the average density of harbour porpoise is 0.835 animals per km^2 for the Marine Mammal Study area.

7.6.5.9 The Joint Cetacean Protocol has undertaken an analysis of 18 years of data to inform the identification of discrete and persistent areas of relatively high harbour porpoise density in the UK marine area (Heinänen and Skov, 2015). Areas of persistent high density of harbour porpoise include Smith Bank in the Moray Firth, 160 km from the MHPGC, and a large area of the southern North Sea, subsequently designated as the Southern North Sea SAC for the protection of harbour porpoise, which lies approximately 63 km from the MHPGC (Figure 7.25; Heinänen and Skov, 2015; Robinson *et al.*, 2021; Waggitt *et al.*, 2020). In the harbour porpoise North Sea MU, water depth and hydrodynamic variables are the most important predictors for presence and density of harbour porpoise Marine Mammal Regional Study Area.

7.6.5.10 The MHPGC is within the North Sea (NS) MU for harbour porpoise (Figure 7.22; IAMMWG, 2022), which is estimated to have an abundance of 346,601 individuals (coefficient of variation (CV): 0.09; 95% confidence interval (CI): 289,498 – 419,967) based on estimates from SCANS-III (Hammond *et al.*, 2021). Within the UK portion of the NS MU, the population is estimated to have an abundance of 159,632 (CV: 0.12, 95% CI: 127,442 – 199,954) (IAMMWG, 2022; Hammond *et al.*, 2021; Rogan *et al.*, 2018).

Scottish waters

7.6.5.11 Site specific surveys were carried out for the Array Project, which lies in MHPGC, with initial data collected during site specific (aerial) surveys for the Morven Array area indicating harbour porpoise numbers are higher in the spring and summer months, with lower values in autumn and winter.

7.6.5.12 Site specific surveys have also been undertaken at other projects in the Firth of Forth, which are closer to the coast, and in the southern North Sea. Data from surveys at the Seagreen Project (Seagreen 1A Offshore Wind ~38.1 km Farm/Seagreen Phase 1 Windfarm ~23.27 km) and Berwick Bank OWFsF (~12.96 km) correspond with the initial data collected in the Marine Mammal Study Area, indicating harbour porpoise numbers are higher in spring and summer months (Seagreen Wind Energy 2018; SSER 2022a). Specifically, for the Seagreen Project, relative densities of 0.099 animals per km^2 were estimated during summer (CV = 0.12), compared with 0.049 animals per km^2 during winter (Grellier and Lacey, 2012). For Berwick Bank OWFs densities were calculated as absolute estimates to correct for animals being unavailable for detection (i.e. while diving at depths too deep to be observed). Here, mean densities of 0.503 animals per km^2 (95% CI: 0.270, 0.979) were estimated during spring and summer, compared with 0.094 animals per km^2 (95% CI: 0.040, 0.324) during autumn and winter (SSER, 2022b).

English waters

7.6.5.13 Similarly in English waters, analysis of data collected for the Dogger Bank Zone (Dogger bank A ~153.5 km, Dogger bank B ~132.8 km, Dogger bank C ~194.4 km, Dogger bank South West ~138.2 km & Dogger bank South East ~168.4 km) indicated a mean absolute density of 0.641 animals per km^2 (95% CI: 0.578, 0.714), based on aerial survey data collected monthly between 2009 and 2012 (Forewind, 2014).

7.6.5.14 Given evidence from baseline studies and site specific surveys in the area, harbour porpoise is considered likely to occur year-round within the Marine Mammal Study Area and wider potential ZoIs (where an impact may extend beyond the MHPGC Marine Mammal Study Area plus the 4km buffer, see paragraph 7.6.3.2).

Minke Whale

7.6.5.15 The minke whale is the smallest, most abundant baleen whale (*mysticete*) species observed in UK waters (Robinson *et al.*, 2021; Evans and Waggitt, 2020). Recent studies have determined there are approximately 9,000 individuals in the North Sea, with most sightings coming from continental shelf waters up to 200m in depth along the northern North Sea (Robinson *et al.*, 2021; JCDP 2023). Studies have shown that minke whale is more commonly sighted in summer months when the species undergoes seasonal movements, illustrating their wide spatial distribution (Gilles *et*

al., 2019). While the species has been frequently observed from April to October in coastal waters of the North Sea, sightings have been documented year-round (Dolman *et al.*, 2013; Reid *et al.*, 2003; Waggitt *et al.*, 2020).

7.6.5.16 The most recent assessment of minke whale in UK waters concluded that the overall trend in Conservation Status was Unknown, highlighting that there was insufficient data to establish a trend for the population size or to assess the potential prospects for the population (JNCC, 2019b).

7.6.5.17 Minke whales in UK waters are part of the Celtic and Greater North Seas (CGNS) MU (Figure 7.24; IAMMWG, 2022), which is estimated to have an abundance of 20,118 minke whale (CV: 0.18, 95% CI: 14,061–28,786) based on estimates from the SCANS-III surveys (Hammond et al., 2017; Hammond et al., 2021) and the ObSERVE survey (Rogan et al., 2018). Within the UK portion of the CGNS MU, the population is estimated to have an abundance of 10,288 (CV: 0.26, 95% CI: 6,210–17,042) (IAMMWG, 2022; Hammond et al., 2021; Rogan et al., 2018).

Scottish waters

7.6.5.18 Off the coast of Scotland sightings peak from July to August, relating to meso-scale oceanographic features that most likely increase minke whale foraging opportunities in the area (Tetley and Robinson, 2008; Robinson *et al.*, 2009). The minke whale diet in Scottish waters primarily consists of sandeel, herring, whiting, and plankton (HWDT, 2021; Pierce *et al.*, 2004). There is evidence that minke whales undergo large, seasonal migrations between breeding grounds and foraging grounds, although these have not been conclusively identified for UK waters (Risch *et al.*, 2014; Risch *et al.*, 2019a). The species' relatively small size and elusive behaviour have resulted in uncertainty regarding their migratory routes and seasonal distributions, making effective conservation and management difficult (Risch *et al.*, 2019b).

7.6.5.19 Minke whale is a commonly occurring species off the coast of Scotland. More specifically, they are found to have significant distributions along the southern coastline in the Moray Firth. Minke whales are observed less frequently in the southern North Sea compared to the northern and central North Sea (Risch *et al.*, 2019a). These highly productive waters are home to rich feeding grounds, which attract high densities of minke whales during summer and autumn months, resulting in the designation of the Southern Trench Marine Protected Area (MPA) (shown on; Robinson *et al.*, 2021). The Southern Trench MPA covers an area of 2,536km^2 off the Aberdeenshire coast (from Buckie to Peterhead). The dynamic mixing of warm and cold waters provides a thermal front that attracts abundant shoaling fish, including herring, mackerel and cod, and the soft sands provide an ideal habitat for sandeel, a key prey species for minke whale (NatureScot, 2019).

7.6.5.20 Acoustic recordings were collected from May to November 2016 across ten recording sites within the Moray Firth and the Eastern coast of Scotland (Risch *et al.*, 2019a). These recording sites, from north to south, include locations close to the settlements of Latheron, Helmsdale, Cromarty, Spey Bay, Fraserburgh, Cruden Bay, Stonehaven, Arbroath, St Andrews, and St Abbs. Minke whale acoustic recordings were present at 70% of the recording locations, with most detections in the Moray Firth, particularly at Latheron, Helmsdale, and Spey Bay (Risch *et al.*, 2019a). The nearest recording site to the MHPGC is approximately 50 km to the west at

Stonehaven, which had just one detection hour of minke whale, out of 2,740 analysis hours, collected over approximately four months (Risch *et al.*, 2019a).

7.6.5.21 For minke whale, the density estimates reported by Hague *et al.* (2020) were sourced from SCANS-III (Hammond *et al.*, 2021) and Cetacean Offshore Distribution and Abundance in the European Atlantic (Macleod *et al.*, 2009). These data suggest that density estimates in Scottish waters range from 0.008 to 0.039 minke whales per km^2. Block R represents the higher end of the range, with up to 0.039 (CV: 0.614) minke whale per km^2, whilst Block O is 0.010 (CV: 0.621) minke whale per km^2 (Hammond *et al.*, 2021). Within the vicinity of the MHPGC plus buffer, SCANS-III densities (remodelled by Lacey *et al.*, 2022) suggest the density of minke whale is, on average, 0.024 animals per km^2. Higher densities of minke whale are found to the north of the MHPGC in the outer Moray Firth (approximately 0.04 animals per km^2), reflected in the designation of the Southern Trench MPA. Density estimates for minke whale from the most recent SCANS-IV (Gilles *et al.*, 2023) surveys indicate similar patterns, with density in Block NS-C (corresponding well with SCANS-III Block O) estimated at 0.010 animals per km^2 (CV: 0.881) and density in Block NS-D (corresponding with SCANS-III Block R) estimated at 0.042 animals per km^2 (CV: 0.594).

7.6.5.22 During the site specific surveys of the Array Project (which overlaps the Marine Mammal Study Area), low numbers of minke whale were sighted and during the summer months only (MvOWL, 2023). Site specific surveys have also been undertaken at other projects in the Firth of Forth closer to the coast. Data from surveys at the Seagreen Project (Seagreen 1A Offshore Wind Farm/Seagreen Phase 1 Windfarm) and Berwick Bank Wind Farm correspond with the data collected at the Array Project, indicating minke whale numbers are highest in spring and summer months (Seagreen Wind Energy 2018; SSER 2022a). Observations were too low to provide seasonal estimates for the Seagreen Project (Grellier and Lacey, 2012), however for Berwick Bank Wind Farm a mean overall absolute density of 0.016 animals per km^2 (CI: 0.009, 0.023) was calculated, with a maximum absolute density of 0.047 animals per km^2 occurring in July 2020 although noting that these were estimates based on a limited number of observations (SSER, 2022b).

English waters

7.6.5.23 This seasonality reflects the seasonal frontal systems (as described for the Southern Trench MPA) attracting minke whale to move inshore to feed on sandeel and other prey items. Further south, minke whale density across the Dogger Bank Zone (Dogger bank A, Dogger bank B, Dogger bank C, Dogger bank South West & Dogger bank South East) was estimated as 0.009 animals per km^2 (95% CI: 0.000, 0.024), taken as a mean across surveys conducted monthly between 2009 and 2012 (Forewind, 2014).

7.6.5.24 Given evidence from baseline studies and from previous surveys at nearby projects, minke whales are considered likely to occur regularly in the summer months within the Marine Mammal Study Area and wider potential ZoIs.

White-Beaked Dolphin

Project wide (Scottish and English waters)

7.6.5.25 The white-beaked dolphin is endemic to the North Sea, with an estimated population of nearly 36,000 individuals (Ijsseldijk *et al.*, 2018). The white-beaked dolphin is the second most common cetacean species present in the North Sea following the harbour porpoise (Schick *et al.*, 2020). This species is typically found along continental shelf waters between 50–100m in depth, predominantly in the western portion of the central and northern North Sea (Hammond *et al.*, 2013). Analysis of stomach contents from North Sea white-beaked dolphins have illustrated that cod, gobies, haddock, and whiting play an important role in the species' diet (Schick *et al.*, 2020). Sexual maturity has been found to range between six to ten years in females and seven to 12 years in males (Schick *et al.*, 2020). Although little is known regarding the species' reproductive behaviours, calving is believed to take place in summer months from May to September (Ijsseldijk *et al.*, 2018), coinciding with peak densities found along the Scottish coast (Gilles *et al.*, 2019; Waggitt *et al.*, 2020). Temperature is a critical factor in determining the distribution of white-beaked dolphins. Several authors have emphasised the potential impacts of increased water temperatures due to ramifications of climate change and their imoacts on prey abundance and distribution, altering white-beaked dolphin habitat and foraging preferences (Evans and Bjørge, 2013; Ijsseldijk *et al.*, 2018).

7.6.5.26 The Conservation Status of the white-beaked dolphin in UK waters was assessed as Favourable but this has subsequently been revised to Unknown for the latest assessment (JNCC, 2019c). Large-scale abundance surveys conducted from 1994–2005 have consistently reported similar numbers, suggesting that the population size has remained relatively stable without significant increase or decrease in total population size within the North Sea (Hammond *et al.*, 2021; Paxton *et al.*, 2016).

7.6.5.27 The abundance estimate for white-beaked dolphin within SCANS-III Survey Block R was 15,694 individuals, with a density of 0.243 animals per km^2 (Hammond *et al.*, 2021), whilst the estimate for Survey Block O was 143 with a density of 0.002 animals per km^2. Observations from SCANS-IV surveys were 0.0799 animals per km^2 in Survey Block NS-D (corresponding to SCANS-III Survey Block R) and 0.0149 animal per km^2 in Survey Block NS-C (corresponding to SCANS-III Survey Block O). These estimates equated to abundances of 5,149 and 894, respectively (Gilles *et al.*, 2023). Within the vicinity of the MHPGC plus buffer, SCANS-III densities (remodelled by Lacey *et al.*, 2022) suggest the average density of white-beaked dolphin is 0.084 animals per km^2. Site specific surveys for the Berwick Bank Wind Farm estimated an overall mean absolute density of 0.009 animals per km^2 (CI: 0.003, 0.017), with peak densities of 0.039 animals per km^2 recorded during September 2020 although noting that these were estimates based on a limited number of observations (SSER, 2022b).

7.6.5.28 The relevant MU for white-beaked dolphins is the Central and Greater North Seas (CGNS) MU (IAMMWG, 2022), which has an estimated population size of 43,951 dolphins (CV: 0.22, 95% CI: 28,439–67,924) based on estimates from the SCANS-III survey (Hammond *et al.*, 2021) and the ObSERVE survey (Rogan *et al.*, 2018). Within the UK portion of the CGNS MU, it is estimated there are 34,025 white-beaked dolphin (IAMMWG, 2022).

7.6.5.29 During the site specific surveys of the Array Project (which overlaps the Marine Mammal Study Area), white-beaked dolphin was sighted in low numbers and during the summer months only (MvOWL, 2023). Site specific surveys have also been undertaken at other projects in the Firth of Forth closer to the coast. Data from

surveys at the Seagreen Project (Seagreen 1A Offshore Wind Farm/Seagreen Phase 1 Windfarm) and Berwick Bank Wind Farm correspond with the data collected at the Array Project indicating white-beaked dolphin numbers are highest in summer months (Seagreen Wind Energy 2018; SSER 2022a).

7.6.5.30 Given evidence from baseline studies and from previous surveys at nearby projects, white-beaked dolphins are considered likely to occur regularly in the summer months within the Marine Mammal Study Area and wider potential ZoIs as defined in paragraph 7.6.3.2.

Bottlenose Dolphin

Project wide (Scottish and English waters)

7.6.5.31 The conservation status of the bottlenose dolphin in UK waters was assessed as Favourable but this has subsequently been revised to Unknown for the latest assessment (JNCC, 2019d). The Moray Firth coastal population of bottlenose dolphin has recently shown signs of increased range extension, occurring off the eastern coast of Scotland and England (Cheney et al., 2014; Evans and Waggitt, 2020).

7.6.5.32 Scotland is home to a small, resident population of bottlenose dolphin that is protected in the Moray Firth SAC, approximately 173 km from the MHPGC (Figure 7.20) (Cheney *et al.*, 2018 JNCC, 2022a). The Moray Firth hosts the only year-round resident population of bottlenose dolphin in the North Sea (Robinson *et al.*, 2017). Bottlenose dolphins have also been recorded off the western Isles of Scotland and are commonly found in inshore and deep coastal waters (Avant, 2008). However, the Coastal East Scotland population has been known to show high site fidelity and the Moray Firth area is understood as their core location (Fernandez-Betelu *et al.*, 2019), and, therefore, the Moray Firth SAC was established to protect this population.

7.6.5.33 Bottlenose dolphin have been known to exhibit high flexibility in both their foraging behaviour and habitat use (Fernandez-Betelu *et al.*, 2019). Prey availability and prey concentration drive species' habitat preference, with their foraging behaviours known to adapt accordingly (Genov *et al*., 2019; Garagouni *et al.*, 2019). Most female bottlenose dolphins found in the Moray Firth were found to give birth from six to 13 years of age, with calves born predominantly from May to October, peaking during the summer months with increased water temperatures (Robinson *et al.*, 2017).

7.6.5.34 There are two different ecotypes for bottlenose dolphin in Scottish waters: the wide-ranging offshore ecotype and the philopatric coastal ecotype (Louis *et al.* 2014). Coastal ecotypes are concentrated mostly within distinct populations in the east and west coast of Scotland, namely the Moray Firth and Firth of Tay (east coast) and the Inner Hebrides and Sound of Barra (west coast) (Hague *et al.*, 2020; van Geel 2016; Cheney *et al.*, 2013). These coastal ecotypes are primarily limited to coastal waters and are likely to result in an overlap with the MHPGC. There is less certainty in the distribution and abundance of the offshore ecotypes (Cheney *et al.*, 2013).

7.6.5.35 The East Coast Marine Mammal Acoustic Study (ECOMMAS) utilised acoustic recorders (C-PODs) to collect data on the relative abundance of bottlenose dolphins in 30 locations off the east coast of Scotland, from St Abbs in the Scottish Borders to Latheron in Caithness (NMPi, 2022; Hague *et al.*, 2020; Williamson, 2018). Deployments are undertaken twice per year since 2013 (currently ongoing), with data covering the months of April to November (Hague *et al.*, 2020). Data collected

from 2013–2016 (available via Marine Directorate) illustrated that the greatest presence of bottlenose dolphin was detected at Cromarty, situated approximately 200 km northwest of the MHPGC, almost certainly representing the coastal ecotype only (NMPi, 2022).

7.6.5.36 Although regional density is greatest in the Moray Firth, distribution of bottlenose dolphin in this region extends south along the Northumbria coast, and ongoing citizen science projects suggest that some members of this population are relocating as far as south of Withernsea (Hackett, 2022; Sea Watch Foundation, 2022).

7.6.5.37 The MHPGC is located within the Greater North Sea (GNS) MU for bottlenose dolphin (Figure 7.23; IAMMWG, 2022). The abundance of bottlenose dolphin in the GNS MU is estimated at 2,022 individuals (CV of 0.75), equating to a density of 0.003 animals per km^2 (IAMMWG, 2022). The UK portion of the GNS MU encompasses a large area of the North Sea and include animals from both coastal and offshore ecotypes.

7.6.5.38 The Coastal East Scotland (CES) MU (inshore of 12nm) is located approximately 39 km to the west of the MHPGC lies and links the Moray Firth SAC with key foraging habitat along the east coast of Scotland and into the coastal waters of northern England. Animals move along this coastal area but are primarily found nearshore in waters less than 20 m deep (Quick *et al.*, 2014). The most recent population estimate of bottlenose dolphin abundance for the CES MU is 224 dolphins (95% CI: 214–234) (IAMMWG, 2022), based on capture-mark-recapture photo-ID (Arso Civil *et al.*, 2021).

7.6.5.39 The density estimate for bottlenose dolphin within SCANS-III Block R was estimated as 0.0298 animals per km^2 (CV = 0.861) (Hammond *et al.*, 2021), although no sightings were made in Block NS-D during the SCANS-IV surveys (Gilles *et al.*, 2023). Conversely, no density estimate is available for SCANS-III Block O, but in SCANS-IV Block NS-C the density estimate was 0.042 animals per km^2 (CV: 0.683).

7.6.5.40 Within the Marine Mammal Study Area, SCANS-III densities (remodelled by Lacey *et al.*, 2022) suggest the density of bottlenose dolphin is, on average, 0.005 animals per km^2. This supports findings from Waggitt *et al.* (2020) which presented estimated density maps (at 10 km^2 resolution) based on compiled data for the Northeast Atlantic between 1980 and 2018 and suggests that, in the waters off the east coast of Scotland, there are very low densities of bottlenose dolphin in offshore numbers between July to October.

7.6.5.41 During the site specific surveys of the Array Project (which overlaps the Marine Mammal Study Area), no sightings of bottlenose dolphin were recorded (MvOWL, 2023). Site specific survey data from other OWFs projects in the Firth of Forth closer to the coast were investigated. At Berwick Bank Wind Farm, which is located closer to the Scottish east coast population compared to the MHPGC, bottlenose dolphin was sighted in very low numbers during site specific aerial surveys, and it was not possible to generate site specific density estimates (SSER, 2022a). There were no bottlenose dolphin sightings during the Firth of Forth Round 3 surveys (Sparling, 2012) but three individuals were recorded during aerial surveys for the FTOWDG region (Grellier and Lacey, 2012).

7.6.5.42 Both the broadscale data and previous surveys at nearby projects suggest that bottlenose dolphin may not be a key receptor due to the low likelihood of

encountering this species within the Marine Mammal Study Area. Further, with respect to the CES population, which supports higher densities of bottlenose dolphin, there is less likely to be a receptor-impact pathway due to the distance of the MHPGC from the CES (i.e. if there is no overlap of the ZoIs with the CES range). However, inclusion of bottlenose dolphin in the quantitative impact assessment will be determined based on the results of underwater sound modelling to determine the potential extent of the ZoI for UXO clearance for the MHPGC. If there is no overlap of the ZoI for underwater sound from UXO clearance with the CES population range, the assessment will consider this species (and potential impacts on the offshore cohort) as part of a less detailed (more qualitative) assessment together with other species that may occur in very low numbers or are occasional visitors within the Firth of Forth region. Feedback is sought from consultees on this approach.

Grey Seal

7.6.5.43 Grey seals have a wide distribution in the seas around the UK, with the largest pupping sites located in the Inner and Outer Hebrides, Orkney, Isle of May, Farne Islands and Donna Nook (JNCC, 2022b). The most recent assessment of grey seal in UK waters concluded that the overall trend in Conservation Status was Favourable, with an overall trend in Conservation Status assessed as Improving (JNCC, 2019e).

7.6.5.44 The most recent UK wide grey seal pup production count was in 2016 and 2018, which resulted in a modelled UK adult population size in 2020 of 157,300 grey seals (95% CI 144,600–169,400) (SCOS, 2022). Pup production in the UK increased by 1.4% per annum between 2016 and 2019, with growth mainly limited to North Sea colonies. In the Firth of Forth, grey seal pup production count increased by 4.2% per annum over the same period, with Fast Castle now representing the biggest grey seal colony in the North Sea (SCOS, 2022).

Scottish waters

7.6.5.45 The Marine Mammal Study Area is located within the East Scotland MU for seals where the most recent grey seal count was 2,712 (August 2021) (SCOS, 2023). Using the most recent scalars from SCOS (2023) this count can be extrapolated from the estimated proportion hauled-out (0.2515, 95% CI: 0.2145–0.2907) to produce a population estimate of 14,645 grey seals in the MU (95% CI: 12,670–17,171) (SCOS, 2023).

7.6.5.46 At sea distribution (absolute density) of grey seal derived from high-resolution GPS tracking data across the UK and Ireland reveals that, across the Marine Mammal Study Area, up to eight grey seals are estimated to be present in the majority of 5 km x 5 km grid cells at any one time, equating to a density of up to 0.31 animals per km^2 (Carter *et al.*, 2022).

7.6.5.47 During the site specific surveys of the Array Project (which overlaps the Marine Mammal Study Area), the Scoping Report detailed grey seal counts during site specific aerial surveys were on average, very low with single observations recorded in nine months across the 33-month Digital Aerial Survey (DAS) campaign, and one occasion when two animals were identified (MvOWL, 2023). However, a number of sightings were of unidentified seals, and these are considered likely to be grey seals due to the distance offshore. Site specific surveys have also been undertaken at

other projects in the Firth of Forth closer to the coast and allow comparison of densities with the MHPGC. Data from surveys at the Seagreen Project (Seagreen 1A Offshore Wind Farm/Seagreen Phase 1 Windfarm) and Berwick Bank Wind Farm suggest grey seal numbers are generally low throughout the year but with peak numbers in May/June (Seagreen Wind Energy 2018; SSER 2022a). Seasonal absolute density at the Berwick Bank Wind Farm was calculated at 0.285 animals per km^2 (CI: 0.124, 0.421) during spring and summer, and 0.238 animals per km^2 (CI: 0.058, 0.417) during autumn and winter (SSER, 2022b), however it was not possible to calculate estimates for the Seagreen Project surveys (Grellier and Lacey, 2012).

English waters

7.6.5.48 Similarly in English waters, analysis of data collected for the Dogger Bank Zone (Dogger Bank A, Dogger Bank B, Dogger Bank C, Dogger Bank South West & Dogger Bank South East) indicated a mean absolute density of 0.021 animals per km^2 (95% CI: 0.016, 0.033), based on aerial surveys conducted monthly between 2009 and 2012 (Forewind, 2014).

7.6.5.49 Given the sightings from previous surveys at nearby projects, and from the seal telemetry and habitat preference maps (Carter *et al.*, 2022), grey seals are considered likely to occur year-round within the Marine Mammal Study Area and the wider potential ZoIs referred to in paragraph 7.6.3.2, albeit in low numbers.

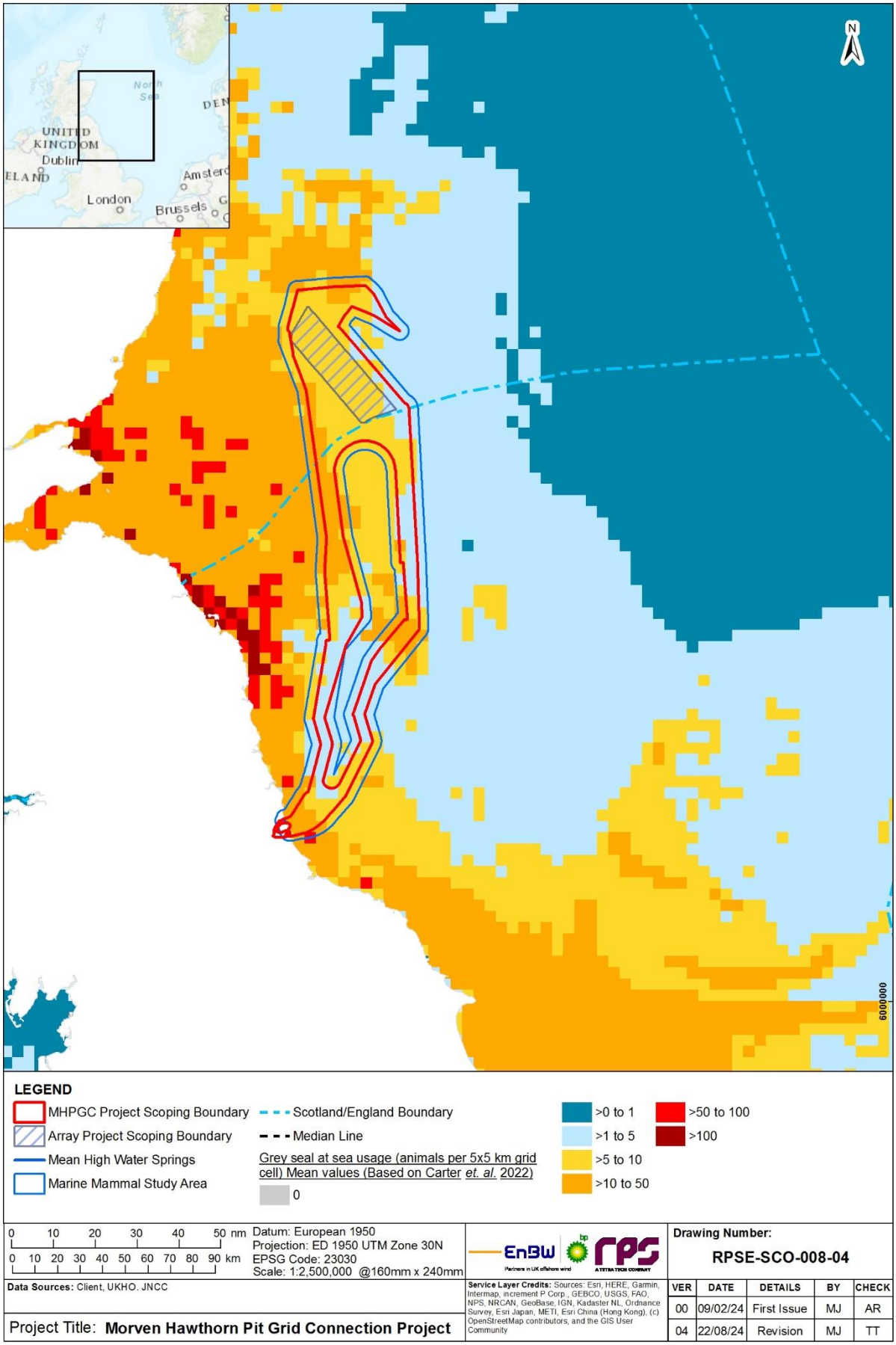


Figure 7.24: Grey Seal at sea Distribution (from Carter *et al.*, 2022)

Harbour Seal

Project wide (Scottish and English waters)

7.6.5.50 Harbour seals are present around the UK with a higher abundance around Scotland; approximately 80% of the UK population resides around the Scottish coast. Low numbers are also encountered along the south and west coast of England, and along the coasts of Wales and Ireland.

7.6.5.51 Harbour seals have been assessed as having an Unfavourable – Inadequate Conservation Status overall (JNCC, 2019f) and, although this is an improvement from the previous 2013 assessment (Unfavourable – Bad) due an increase in the overall UK population trend and stable range, there were too few data points to confidently draw conclusions on the current and future population trends (JNCC, 2019f).

7.6.5.52 At sea distribution (relative density) of harbour seal derived from high-resolution GPS tracking data across the UK and Ireland reveals that densities across the Marine Mammal Study Area are likely to be very low. Less than one harbour seal is estimated to be present in most of the 5 km x 5 km grid cells that overlap with the Marine Mammal Study Area at any one time, with up to five animals per 5 km x 5 km grid cell nearer the coast and equating to a mean density of 0.001 animals per km^2 (Carter et al., 2022).

7.6.5.53 The Marine Mammal Study Area is located within the East Scotland MU for seals. The most recent harbour seal August moult count presented for this East Scotland MU is 343 (2016–2019 count period) (SCOS, 2022), which can be scaled by the estimated proportion hauled-out (0.72, 95% CI: 0.54–0.88) to provide an estimate of 476 harbour seals in the East Scotland MU in 2019 (95% CI: 389–635) (Lonergan *et al.*, 2013; SCOS, 2022). The MHPGC is adjacent to the North-East England MU where the most recent population estimate is 109 (95% CI: 89–146) (SCOS, 2022).

7.6.5.54 SCOS (2022) illustrates the regional fluctuations in population trends; for the east coast of Scotland region the counts between 1996 and 2015 recorded large declines in the population, but in the most recent counting period (2016-2021) the counts of harbour seal have increased from 224 to 343. In the northeast of England, the count has increased from 54 in the 1996-1997 count period to 79 in the most recent count period (2016-2021). Notably the most recent count data at the Firth of Tay and Eden Estuary SAC shows no evidence that the population is recovering after the decline in the 2000s and the 2019 SAC count is ~95% lower than the 1992 count (SCOS, 2021). The Firth of Tay and Eden Estuary SAC is located approximately 95 km from the MHPGC and, given that harbour seals tend to forage within 40 km to 50 km from haul-out sites (SCOS, 2018), the MHPGC does not represent a key habitat in the regional context.

7.6.5.55 During the site specific surveys of the Morven OWFs Array Project (which overlaps the Marine Mammal Study Area), no sightings of harbour seal were observed. Findings from desk based data from surveys at other projects in the Firth of Forth suggest harbour seal numbers are generally low throughout the year but with peak numbers in May/June (Seagreen Wind Energy 2018; SSER 2022a).

7.6.5.56 Although, undoubtedly, harbour seal is a vulnerable species off eastern Scotland given the historic population declines and unknown future trajectory, the baseline data suggests that the MHPGC does not fall within an important area for harbour

seal. Very low densities (or zero in some cases) of harbour seal were predicted in cells overlapping the MHPGC, as seen in the seal telemetry and habitat preference maps although noting a slightly higher density area to the South of the MHPGC (Carter *et al.*, 2022). Harbour seal is, therefore, considered likely to occur in very low numbers within the Marine Mammal Study Area and, at this stage, may not be a key species for assessment. This will be evaluated in light of the results of a SMRU-commissioned seal telemetry study for the MHPGC to determine the potential usage of the site (e.g. animals moving between haul-outs and the MHPGC). Feedback on this approach is sought from consultees.

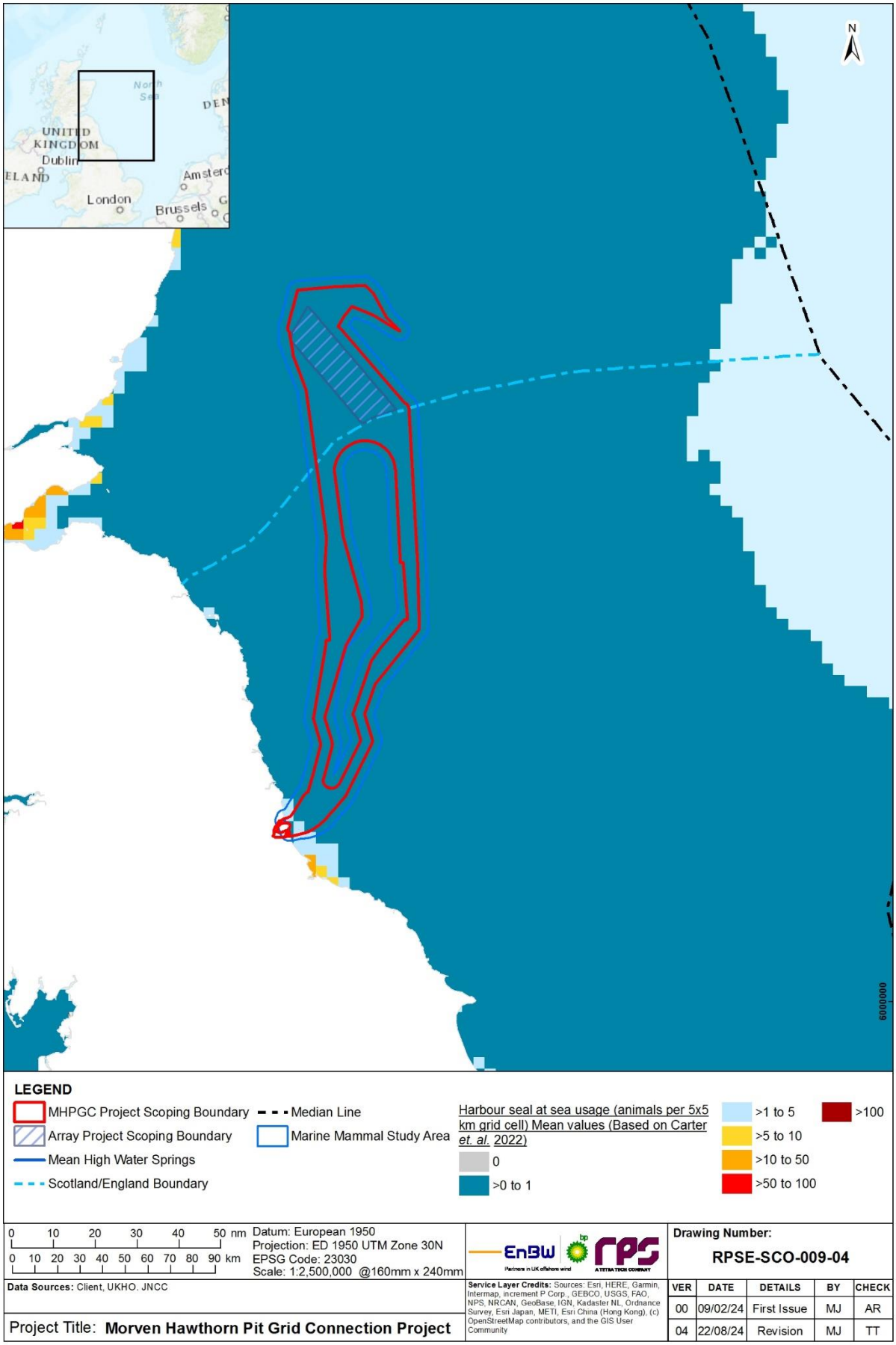


Figure 7.25: Harbour Seal at sea Distribution (from Carter *et al.*, 2022)

Other Marine Mammal Species

Project Wide (Scottish and English waters)

7.6.5.57 A number of other marine mammal species have been recorded occasionally (or in very low numbers) within, or in proximity to, the Marine Mammal Study Area during historic surveys.

7.6.5.58 There were a low number of Atlantic white-sided dolphins (*Lagenorhynchus acutus*) and one Risso's dolphin (*Grampus griseus*) recorded within the Marine Mammal Regional Study Area in the most recent SCANS-III survey (Hammond *et al.*, 2017; Hammond *et al.*, 2021). Estimated density maps (at 10km^2 resolution) based on compiled data for the Northeast Atlantic between 1980 and 2018 suggest that, in the waters off the east coast of Scotland, Atlantic white-sided dolphin may occur in very low numbers between late spring and early autumn while Risso's dolphin may occur seasonally in low numbers from July to November (Waggitt *et al.*, 2020). One sighting of a group of ten white-sided dolphins was observed during site specific boat-based surveys conducted during Firth of Forth Round 3 surveys for the nearby Seagreen 1 OWFs (Sparling, 2012).

7.6.5.59 Killer whale (*Orcinus orca*), short-beaked common dolphin (*Delphinus delphis*), long-finned pilot whales (*Globicephala melas*) and pygmy sperm whale (*Kogia breviceps*) have been recorded as rare or occasional visitors within the Marine Mammal Regional Study Area (Reid *et al.*, 2003). One common dolphin, one killer whale and a group of eight long-finned pilot whales, were observed in aerial surveys for Seagreen's regional study area (Grellier and Lacey, 2012). Waggitt *et al.* (2020) maps suggest that, in the Firth of Forth offshore region, there were very low estimated densities of short-beaked common dolphin in summer months. Whilst there are accounts that short-beaked common dolphin may have expanded its range northward in UK waters (MacLeod *et al.*, 2005; van Weelden *et al.*, 2021), given its preference for warmer temperate and tropical seas, it is still regarded as an occasional visitor within the northern North Sea. Waggitt *et al.* (2020) also found low estimated densities of killer whale in all months and long-finned pilot whales are more likely to occur further north in the offshore waters of the Moray Firth.

7.6.5.60 The Forth Marine Mammal Project has mapped inshore sightings of marine mammals (from coastal vantage points) within the Firth of Forth between April 2021 to April 2023, although noting that there is a high probability that the same individuals were recorded by multiple observers. The interactive map shows that short-beaked common dolphin has been only sighted occasionally, mostly in summer months; a single killer whale was sighted in June 2021; several sightings of humpback whale were recorded in December 2022 and January/February 2023; and several sightings of sei whale were recorded in spring/summer 2021.

7.6.5.61 Several recent sightings of humpback whale (*Megaptera novaeangliae*) in Scottish east coast waters have been highlighted, including the Firth of Forth, and suggested that further information should be sought on the occurrence and presence of this species within the Marine Mammal Study Area and Marine Mammal Regional Study Area.

7.6.5.62 Due to low likelihood of occurrence and/or their rarity in the Marine Mammal Regional Study Area most species reported above are not considered to require

further assessment for the MHPGC. The exception is humpback whale which, based on the recent increase in sightings around the Firth of Forth, will be taken forward for consideration in the assessment (qualitatively). Further baseline information will be gathered as part of a more comprehensive literature review to ensure that all key species are considered in the assessment. Initial feedback is sought from consultees for the key species identified within this Scoping Report (see paragraph 7.6.5.63 & 7.6.5.64).

Summary of Key Species

7.6.5.63 The key species that are likely to occur in the Marine Mammal Study Area and that are proposed to be taken forward to the impact assessment for a detailed assessment are:

- harbour porpoise;
- minke whale;
- white-beaked dolphin;
- grey seal;
- bottlenose dolphin;
- humpback whale (qualitative assessment).

7.6.5.64 Species that may be rare or occasional visitors and/or occur in very low numbers in the Marine Mammal Study Area and, therefore, will be scoped out:

- harbour seal (depending on the results of the telemetry study);
- short-beaked common dolphin;
- Atlantic white-sided dolphin;
- Risso's dolphin;
- killer whale;
- long-finned pilot whale;
- pygmy sperm whale;
- sei whale.

7.6.5.65 The species listed above are afforded protection under various legislation, including species protected under Annex II of the Habitats Regulations. Table 7.31 provides an overview of the relevant legislation pertaining to the key species to be taken forward for assessment (including harbour seal for which further information is required to determine whether to include in the scope of the environmental assessment).

7.6.5.66 As part of the Scoping Opinion, feedback is sought from consultees on this approach.

7.6.6 Potential Impacts from the Morven Hawthorn Pit Grid Connection Project

7.6.6.1 A range of potential impacts on marine mammals have been identified, which may give rise to likely significant impacts during the construction, O&M and decommissioning phases of the MHPGC.

7.6.6.2 The impacts that have been scoped into the assessment as having the potential to give rise to likely significant impacts are outlined in Table 7.34, together with a description of any additional data collection (e.g. site specific surveys) and supporting analyses (e.g. modelling) that will be required to enable a full assessment of the Impacts.

7.6.6.3 Potential impacts scoped out of the assessment as there is no potential for them give rise to likely significant impacts are presented in Table 7.35, with justification.

7.6.6.4 The potential impacts from the Morven Hawthorn Pit Grid Connection Project have been considered collectively for both English and Scottish waters, as these will not change between these areas given the commonality of the works proposed (offshore cabling).

Table 7.34: Impacts Proposed to be Scoped into the Morven Hawthorn Pit Grid Connection Assessment for Marine Mammals

*Project phase refers to construction (C), O&M (O) and decommissioning (D).

Impact	Project Phase			Relevant to England or Scotland	Basis for Impact	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D				
Injury and disturbance from underwater sound generation from UXO clearance.	✓	×	×	Scottish and English waters	UXO clearance may result in hearing damage/auditory injury or behavioural disturbance/displacement (including barrier impacts) of marine mammals.	Desktop data sources and relevant OWF surveys will be used to characterise the baseline environment. Published correction factors will be applied to determine absolute densities and allow quantification of the potential numbers of animals injured/disturbed during UXO clearance. Agreement will be sought with consultees on the most appropriate densities and correction factors to apply to the assessment.	Underwater sound modelling will be undertaken for UXO clearance activities (as set out in section 7.6.8) and will be used to inform the marine mammal impact assessment. A range of UXO sizes and clearance methodologies will be explored to develop the project description (e.g. largest and most likely size/type of UXO, number of possible UXOs requiring clearance, high order vs low order/low yield clearance methodologies). The modelled sound contours will be applied to the marine mammal density values in the Marine Mammal Study Area and used to quantify the number of animals that may experience injury in the form of PTS, or disturbance impacts using TTS as a proxy. Barrier impacts (as described above) will also be investigated with respect to modelled contours. Assessment will

Impact	Project Phase			Relevant to England or Scotland	Basis for Impact	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D				
							incorporate recommendations outlined in the joint interim position statement on UXO clearance (UK Government *et al*., 2022)
Disturbance to marine mammals from vessel use and other sound-producing activities.	✓	✓	✓	Scottish and English waters	The impact of vessel use during all phases of the MHPGC may result in behavioural disturbance/displacement (including barrier impacts) of marine mammals. Other sound-producing activities could also result in disturbance including construction activities (e.g. drilling, trenching, and rock placement), O&M activities and decommissioning activities.	Desktop data sources and relevant OWF surveys will be used to characterise the baseline environment. Published correction factors will be applied to determine absolute densities and allow quantification of the potential numbers of animals injured/disturbed during vessel use and other sound-producing activities. Agreement will be sought with consultees on the most appropriate densities and correction factors to apply to the assessment.	It is proposed that sound emissions from a suite of different vessel types will be modelled to represent the likely range of vessel types to be used at different phases of the MHPGC Project if needed. Similarly, a range of different construction activities (e.g. drilling, trenching and rock placement, etc.) will be investigated as part of the assessment. A quantitative assessment using agreed species densities will be used to determine the number of animals potentially affected within ranges, as predicted by the underwater sound model. Barrier impacts (as described above) will also be investigated with respect to modelled contours.
Injury to marine mammals	✓	×	✓	Scottish and English waters	Increased vessel traffic during construction and decommissioning activities	Baseline characterisation to understand the key marine mammal species	Collision risk will be assessed semi-quantitatively. The numbers and types of vessels and round trips will

Impact	Project Phase			Relevant to England or Scotland	Basis for Impact	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D				
due to collision with vessels.					may result in collisions with marine mammals.	within the Marine Mammal Study Area using desktop data sources and relevant OWF surveys.	provide a quantitative baseline against existing traffic in the area (using information from the shipping and navigation risk assessment). A qualitative assessment will then be undertaken looking at sensitivities of different species and based on best available literature at the time of writing.
Impacts on marine mammals due to changes in prey availability.	✓	✓	✓	Scottish and English waters	Changes in prey abundance and distribution resulting from construction activities, O&M activities and decommissioning activities may impact on the ability of marine mammals to forage in the area.	Baseline characterisation to understand the main prey items of marine mammal species within the Marine Mammal Study Area using desktop data sources and relevant OWF surveys.	The assessment will be developed using the information in the Fish and Shellfish EIA assessment which will considers a range of different Impacts (e.g. habitat loss, disturbance from underwater sound, increased sedimentation, etc.) on sensitive fish and shellfish receptors (Chapter 7.5: Fish and Shellfish Ecology, of the Scoping Report). The assessment will adopt a semi-quantitative approach, describing the magnitude of impacts where possible (e.g. extent of habitat loss, range of impacts from underwater sound, amount of sediment released, etc.) and consider

Impact	Project Phase			Relevant to England or Scotland	Basis for Impact	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D				
							the possible indirect impacts on marine mammals in the context of their wider distribution across the Marine Mammal Regional Study Area. This assessment reflects the 'ecosystem approach' as it considers the implications of changes to habitats and fish and shellfish receptors and what that means for marine mammals.
Disturbance to marine mammals from pre-construction site investigation surveys.	✓	×	×	Scottish and English waters	Geophysical surveys in the pre-construction phase may result in behavioural disturbance/displacement of marine mammals.	Desktop data sources and relevant OWF surveys will be used to characterise the baseline environment. Published correction factors will be applied to determine absolute densities and allow quantification of the potential numbers of animals injured/disturbed during surveys. Agreement will be sought with consultees on the most appropriate densities and	Comparative sound modelling for geophysical activities will be undertaken to inform an assessment of possible impacts from elevated levels of underwater sound. Geophysical equipment sound emissions characteristics and survey area details/design will be modelled to determine impact ranges and this information will be combined with the species densities to provide a quantitative assessment of the number of animals potentially affected. If, however, there is no information on the types of

Impact	Project Phase			Relevant to England or Scotland	Basis for Impact	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D				
						correction factors to apply to the assessment.	geophysical surveys the assessment will adopt a qualitative approach instead discussing 'typical' impacts based on geophysical survey that have been carried out elsewhere.

Table 7.35: Impacts Proposed to be Scoped out of the Morven Hawthorn Pit Grid Connection Assessment for Marine Mammals

Impact	Basis for Impact
Injury and disturbance from underwater sound generated by piling	No infrastructure associated with the MHPGC will require piling, and as such no receptor-impact pathway exists.
Accidental pollution during all phases.	There is a risk of pollution (e.g. fuel or oil) being accidentally released during the construction, O&M and decommissioning phases from sources including vessels/vehicles and equipment/machinery. This may lead to direct mortality of marine mammals or a reduction in prey availability, either of which may affect species' survival rates. However, the risk of such events is managed by the implementation of measures set out in standard post- consent plans (e.g. an Environmental Management Plan (EMP), including a Marine Pollution Contingency Plan (MPCP)). These plans include planning for accidental spills, address all potential contaminant releases and include key emergency contact details. They also set out industry good practice and OSPAR, International Maritime Organisation (IMO) and MARPOL guidelines for preventing pollution at sea. Therefore, the likelihood of an accidental spill occurring is very low and, in the unlikely event that such events did occur, the magnitude of these will be minimised through measures set out in the MPCP. As such, this impact will be scoped out of further consideration within the marine mammal EIA Report/ES chapter.
Increased suspended sediment concentrations (SSC) and associated sediment deposition during all phases.	Disturbance to water quality as a result of construction operations can have both direct and indirect Impacts on marine mammals. Indirect Impacts would include impacts on prey species (which is scoped in). Direct Impacts include the impairment of visibility and, therefore, foraging ability, which might be expected to reduce foraging success. Marine mammals are well known to forage in tidal areas where water conditions are turbid and visibility conditions poor. For example, harbour porpoise and harbour seal in the UK have been documented foraging in areas with high tidal flows (e.g. Pierpoint, 2008; Marubini *et al.*, 2009; Hastie *et al.*, 2016); therefore, low light levels, turbid waters and suspended sediments are unlikely to negatively impact marine mammal foraging success. When the visual sensory systems of marine mammals are compromised, they are able to sense the environment in other ways, for example, seals can detect water movements and hydrodynamic trails

Impact	Basis for Impact
	with their mystacial vibrissae; while odontocetes primarily use echolocation to navigate and find food in darkness. Whilst elevated levels of SSC arising during construction of the Project may decrease light availability in the water column and produce turbid conditions, the maximum impact range is expected to be localised with sediments rapidly dissipating over one tidal excursion. In addition, there is a large natural variability in the SSC within the Marine Mammal Study Area, so marine mammals living here will be tolerant of any small scale increases, such as those associated with the construction activities. As such, this impact will be scoped out of further consideration within the marine mammal EIA Report/ES chapter.
Impact of Electromagnetic Field (EMF) (from surface laid or buried cables) during the O&M phase.	Based on the data available to date, there are uncertainties of EMF related to marine renewable devices having impact (either positive or negative) on marine mammals (Copping, 2018). Threshold values for EMF impacts are only available for a few species (mainly elasmobranchs), leaving major uncertainties in several important taxonomic groups (cetaceans, pinnipeds, fish, crustaceans, etc.). There is currently no evidence that seals can detect or respond to EMF, but some species of cetaceans may be able to detect variations in magnetic fields (Normandeau *et al.*, 2011). To date, the only marine mammal known to show any response to EMF is the Guiana dolphin (*Sotalia guianensis*) which has been shown to possess an electroreceptive system that uses the vibrissal crypts on their rostrum to detect electrical stimuli similar to those generated by small to medium sized fish (Czech-Damal *et al.,* 2013). However, this has not been shown in any other species of marine mammal and this species does not occur within the Marine Mammal Study Area. Furthermore, magnetic fields from alternating current cables are only detectible within a few metres of the cable and decrease with distance from the cable (Hutchison *et al.,* 2020), so the lack of sensitivity combined with extremely small scale of emissions means there will be no likely impact on marine mammals. As such, this impact will be scoped out of further consideration within the marine mammal EIA Report/ES chapter.

Impact	Basis for Impact
Injury to marine mammals due to collision with vessels during the O&M phase.	The impact pathway of injury to marine mammals due to collision with vessels during the O&M phase will be scoped out of further consideration within the marine mammals EIA Report/ES chapter. O&M vessels will transit slowly through the MHPGC, and the MHPGC will adhere to the Scottish Marine Wildlife Watching Code.
Effects of the particle motion element of underwater sound on marine mammals during all phases.	There is no evidence that particle motion has any effect on marine mammals therefore this impact is scoped out of the Marine Mammals Chapter of the EIA Report/ES.

7.6.7 Designed In Measures and Mitigation

7.6.7.1 The following designed in measures are relevant to marine mammals. The designed in measures will evolve over the development process as the EIA progresses.

7.6.7.2 As part of the project design process, a number of designed in measures (primary and tertiary) will reduce the potential for impacts on marine mammals (Table 7.36). As there is a commitment to implement these measures, they are considered inherent to the design of the MHPGC. The determination of magnitude and significance will assume the implementation of such measures. Some of these measures are considered standard industry practice for this type of development.

7.6.7.3 The requirement for any additional (secondary) mitigation measures will be dependent on the significance of the impacts on marine mammals receptors. The requirement for and feasibility of any mitigation measures will be consulted upon with statutory consultees throughout the EIA process.

Table 7.36: Designed in Measures and Mitigation as Part of the Morven Hawthorn Pit Grid Connection, Relevant to Marine Mammals

Reference Number	Designed in Measures	Justification	Primary or Tertiary
MM-77	Development of, and adherence to, an EMP, including actions to minimise INNS, Marine Mammal Mitigation Protocol (MMMP) and a Marine Pollution Contingency Plan (MPCP), which will include planning for accidental spills, address all potential contaminant	An Outline EMP will be provided at Application with the MHPGC Project EIA Report/ES, which will include a MMMP. The MMMP may include using Marine Mammal Observer(s) and Passive Acoustic Monitoring to monitor the mitigation zone (MZ), as determined by the underwater sound modelling) to ensure that animals are not observed within	T

Reference Number	Designed in Measures	Justification	Primary or Tertiary
	releases and include key emergency detail	the MZ during UXO clearance. Acoustic Deterrent Devices may be used if required to deter animals from the MZ. For offshore water quality, measures will be adopted to ensure that the potential for release of pollutants from construction and O&M is minimised. In this manner, the accidental release of contaminants from vessels will be strictly controlled, thus providing protection for marine mammals and their prey species across all phases of the development.	
MM-78	A Vessel Management Plan (VMP) will be developed to reduce disturbance to marine mammal receptors from transiting vessels. Vessels will transit slowly through the MHPGC, and all vessel operators will adhere to the Scottish Marine Wildlife Watching Code (NatureScot, 2023) and Defra Marine and Coastal Wildlife Code (Defra, 2023).	The Scottish Marine Wildlife Watching Code and the Defra Marine and Coastal Wildlife Code set out recommendations, advice and information relating to commercial and leisure activities involving the watching of marine wildlife. These guidance documents are considered appropriate in reducing the potential impacts upon marine mammal receptors from vessel movements associated with the MHPGC Project.	T

7.6.8 Proposed Assessment Methodology

7.6.8.1 The marine mammal offshore EIA will follow the methodology set out in Chapter 4: EIA Methodology, of the Scoping Report. Specific to the marine mammal EIA Report/ES, the following guidance documents will also be considered:

- Guidelines for EcIA in the UK and Ireland. Terrestrial, Freshwater, Coastal and Marine (CIEEM, 2019);
- EU Guidance on Wind Energy Developments and Natura 2000 legislation (European Commission, 2010);
- Oslo Paris Convention (OSPAR) Guidance on Environmental Considerations for OWF Development (OSPAR, 2008);

- Marine mammal sound exposure criteria: Updated scientific recommendations for residual hearing effects (Southall *et al.*, 2019);
- Marine mammal sound exposure criteria: assessing the severity of marine mammal behavioural response to human sound (Southall *et al.*, 2021);
- JNCC guidelines for minimising the risk of disturbance and injury to marine mammals whilst using explosives (JNCC, 2021);
- JNCC guidelines for minimising the risk of injury to marine mammals from geophysical surveys (JNCC, 2017);
- Guidance on sound management in harbour porpoise SACs (JNCC, 2020);
- The UK Marine Strategy Regulations 2010 seek to achieve Good Environmental Status (GES) in seas by 2020. The qualitative descriptors for determining GES include "Introduction of energy, including underwater sound, is at levels that do not adversely affect the marine environment";
- UK Government Policy paper: Marine environment: unexploded ordnance clearance joint interim position statement (UK Government *et al.*, 2022).

7.6.8.2 The impact criteria will be based on the most recent and up to date scientific research and guidance, while utilising a precautionary approach. Potential impacts arising from underwater sound on marine mammals will be assessed with respect to the potential for injury (PTS) and behavioural disturbance. The approach to the underwater sound modelling assessment is presented in Chapter 7.2: Underwater Sound of the Scoping Report, and Appendix B: Underwater Sound Methodology Statement and will consist of a detailed quantitative assessment for underwater sound (impulsive and continuous sound sources). The underwater sound model will predict the ranges of impact for both permanent auditory injury and behavioural disturbance for each marine mammal hearing group and for the sound-producing activities (i.e. UXO clearance, vessel noise etc). Determination of whether there is a potential for injury or disturbance is based on whether the received sound levels are likely to exceed published impulsive thresholds for different marine mammal hearing groups.

7.6.8.3 To quantify the magnitude of impacts (injury and disturbance) the area within modelled sound contours will be mapped and combined with baseline density information for key marine mammal species. Densities will either be applied as an average (i.e. multiplying the area of the sound contour by the average density) or the underwater sound contours will be overlaid on a spatial density map and numbers calculated from the underlying grid cells.

7.6.8.4 For the purposes of undertaking the EIA Report/ES, marine mammal receptors identified as having the potential to occur in the Marine Mammal Study Area will be grouped into broad ecological receptor groups, called Important Ecological Features (IEFs), in line with guidelines set out in CIEEM (2019). These IEFs will be those features against which impacts associated with the construction, O&M and decommissioning phases of the MHPGC Project will be assessed. Criteria defining the value of each IEF will be defined to reflect topic-specific interests.

7.6.9 Potential Cumulative Impacts

7.6.9.1 Cumulative effects with the Morven Offshore Wind Array Project and the second grid connection project in the Branxton area Southeast Scotland will be considered, together with cumulative effects with other developments, where relevant.

7.6.9.2 The cumulative effect assessment will follow the approach outlined in Chapter 4: EIA Methodology, of the Scoping Report.

7.6.9.3 The impacts of fishing and existing shipping activity will not be considered in the CEA since these activities occur throughout the baseline and are, therefore, already accounted for in the existing marine mammal baseline characterisation abundance and density estimates.

7.6.9.4 The cumulative effects Study Area (within which the initial screening for other plans/projects is undertaken) will be defined as the Marine Mammal Regional Study Area (see section 7.6.3).

7.6.10 Potential Inter-related Effects

7.6.10.1 The EIA will consider inter-related effects arising from the MHPGC Project, across their own phases (project lifetime) and different effects on one receptor in one phase (receptor led). The EIA will consider inter-related effects of multiple impacts from the construction, O&M and decommissioning phases of the MHPGC Project, affecting one receptor. Inter-related effects will be assessed through consideration of all effects on a receptor, considering both spatial and temporal overlap, within the MHPGC Project. This will ensure that the MHPGC Project is appropriately considered within the EIA and in line with Chapter 4: EIA Methodology, of the Scoping Report.

7.6.11 Potential Transboundary Impacts

7.6.11.1 There is the potential for transboundary impacts upon marine mammals due to construction, O&M and decommissioning impacts of the MHPGC. These include:

- injury and disturbance from underwater sound generated from UXO clearance;
- injury and disturbance from vessel use and other (non-piling) sound-producing construction activities;
- injury due to collision with vessels;
- changes in prey availability; and
- disturbance from pre-construction site investigation surveys.

7.6.11.2 It is acknowledged that some marine mammals can travel large distances to forage and consequently the Marine Mammal Regional Study Area extends beyond the Scottish and UK offshore water limits and into the waters of neighbouring European Economic Area (EEA) States. Therefore, there is the potential for transboundary impacts associated with the MHPGC to directly affect Annex II marine mammal species. The potential for transboundary effects will be considered within the EIA Report/ES.

7.7 Offshore and Intertidal Ornithology

7.7.1 Introduction

7.7.1.1 This chapter of the Scoping Report identifies the offshore and intertidal ornithology receptors of relevance to the Morven Hawthorn Pit Grid Connection Project (hereafter referred to as 'MHPGC Project') and considers the potential impacts arising from the construction, operation and maintenance (O&M), and decommissioning of the MHPGC Project. This scoping chapter adopts a proportionate approach to only those impacts with potential to result in likely significant effects and therefore scopes out other impacts where there is evidence that the effects are not likely to be significant.

7.7.1.2 The scope and approach to the assessment of potential likely significant effects on terrestrial ornithology is set out in Chapter 8.3: Terrestrial Ecology and Ornithology.

7.7.2 Policy and Legislation

7.7.2.1 This section identifies in Table 7.37 to Table 7.40, the relevant legislation, policy and other documentation that will inform the assessment of likely significant effects with respect to offshore and intertidal ornithology. Further information on policies relevant to the Environmental Impact Assessment (EIA) and their status is provided in Chapter 2: Policy and Legislation.

Table 7.37: Legislation Relevant to Offshore and Intertidal Ornithology

Legislation description	Relevance to the Assessment
Convention on Wetlands of International Importance especially as Waterfowl Habitat 1971 (United Nations, 1994).	
The United Kingdom (UK) Government is a signatory to the Convention on Wetlands of International Importance 1972 ("the Ramsar Convention"). The Ramsar Convention provides for the listing of wetlands of international importance. UK Government policy is to give sites listed under this convention ("Ramsar Sites") the same protection as European sites and the national site network.	The MHPGC Project has the potential for impacts on internationally designated wetland sites covered by the Convention.
The Convention on the Conservation of European Wildlife and Natural Habitats 1979 (the 'Bern Convention') (Council of Europe, 1979).	
The principal aims of the Bern Convention are the conservation and protection of the wild plant and animal species (and the natural habitats thereof) listed in Appendices I and II of the Convention. It also seeks to increase cooperation between governments and to regulate the exploitation of species listed in Appendix III, which includes migratory fish species, cetaceans and pinnipeds.	The MHPGC Project has the potential for impacts on plant and animal species listed under Appendices I and II of the Convention.

Legislation description	Relevance to the Assessment
The Convention on Migratory Species of Wild Animals 1979 (The Bonn Convention) (United Nations, 1979).	
Provides protection for endangered migratory species (listed in Appendix I) and their habitats. Appendix II species are those that have an unfavourable conservation status that require international agreements for their conservation and management. The legal requirement for the strict protection of Appendix I and Appendix II species is provided by the Wildlife & Countryside Act (1981) (UK Government, 1981).	The MHPGC Project has the potential for impacts on species listed under Appendices I and II of the Convention.
The Environment Act 2021 (UK Government, 2021).	
The Environment Act 2021 (passed in November 2021) translates aspects of the government's "A Green Future: Our 25 Year Plan to Improve the Environment" into legislation. The Environment Act will make it mandatory, once the relevant secondary legislation is passed pursuant to the Act, for Town and Country Planning Act developments (subject to exemptions) to deliver a 10% Biodiversity Net Gain (BNG). A legal requirement for Nationally Significant Infrastructure Projects (NSIPs) consented under the Planning Act 2008 to deliver a biodiversity net gain commitment is expected to come into force in November 2025.	Legislation underpinning BNG requirements which are expected to become mandatory for Development Consent Order (DCO) projects in November 2025. The Act strengthens the duty on public bodies to conserve and enhance biodiversity in discharging their duties (including planning controls).
The Conservation of Habitats and Species Regulations 2017 (the Habitat Regulations) (UK Government, 2017a).	
The Habitat Regulations transpose Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (the Habitats Directive) and elements of Directive 2009/147/EC on the conservation of wild birds ('the Birds Directive') in England. These aim to protect biodiversity through the conservation of natural habitats and species of wild fauna and flora. These regulations provide for the designation and protection of 'European sites', the protection of 'European protected species', and the adaptation of planning and other controls for the protection of European Sites. The regulations are amended by the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 (UK Government, 2019) following the UK's withdrawal from the EU. These changes allow for new administrative and regulatory arrangements and the creation of a national site network comprising the	The MHPGC Project has the potential for impacts on designated sites and protected species covered by the Regulations. The MHPGC Project has the potential to require protected species mitigation which is licensable under the Regulations.

Legislation description	Relevance to the Assessment
protected sites already designated under the Nature Directives, and any further sites designated under these regulations.	
Natural Environment and Rural Communities Act 2009	
The NERC Act makes provision for bodies concerned with the natural environment and rural communities; to make provision in connection with wildlife, sites of special scientific interest, National Parks and the Broads; to amend the law relating to rights of way; to make provision as to the Inland Waterways Amenity Advisory Council; to provide for flexible administrative arrangements in connection with functions relating to the environment and rural affairs and certain other functions; and for connected purposes.	The MHPGC Project has the potential for impacts on Species of Principal Importance.
The Nature Conservation (Scotland) Act 2004	
The Nature Conservation (Scotland) Act 2004 makes provision in relation to the conservation of biodiversity; to make further provision in relation to the conservation and enhancement of Scotland's natural features; to amend the law relating to the protection of certain birds, animals and plants; and for connected purposes.	The MHPGC Project has the potential for impacts on species listed on the Scottish Biodiversity List.
The Wildlife and Countryside Act 1981	
This prohibits certain methods of killing or taking wild animals; amends the law relating to protection of certain mammals; restricts the introduction of certain animals and plants; amends the Endangered Species (Import and Export) Act 1976; amends the law relating to nature conservation, the countryside and National Parks and makes provision with respect to the Countryside Commission; amends the law relating to public rights of way; and for connected purposes.	The MHPGC Project has the potential for impacts on species listed Schedule 1 of this Act and to impact SSSI features.
Marine and Coastal Access Act 2009	
The Act makes provision in relation to marine functions and activities; makes provision about migratory and freshwater fish; makes provision for and in connection with the establishment of an English coastal walking route and of rights of access to land near the English coast; enables the making of Assembly Measures in relation to Welsh coastal routes for recreational journeys and rights of access to land near the Welsh coast; makes further provision in relation to Natural England and the Countryside	The MHPGC Project has the potential for impacts on species that may be features of MCZs

Legislation description	Relevance to the Assessment
Council for Wales; to make provision in relation to works which are detrimental to navigation; and amends the Harbours Act 1964; and for connected purposes It also makes provision for the designation of Marine Conservation Zones (MCZ) in English and Welsh territorial waters and UK offshore waters.	

Table 7.38: International Policy

Policy Description	Relevance to the Assessment
Habitats Regulations (UK Government, 2017a).	
The Council Directive 92/43/EEC (The Habitats Directive) entered into force in 1992 in the EU and aimed to maintain or restore natural habitats and species of importance (listed) to within a favourable conservation status (FCS). The other regulations which transpose into UK and Scottish Law the requirements of the Habitats and Bird Directives and are of relevance to the project, are listed below, and are hence referred to as the 'Habitats Regulations'. • The Conservation (Natural Habitats &c.) Regulations 1994 ; • The Conservation of Habitats and Species Regulations 2017. These requirements of the Habitats Regulations are met in the consenting process through the use of Habitat Regulations Assessment (HRA), which requires a project to demonstrate, using evidence, that there will be no Adverse Effects on the Integrity on the overall ecological coherence of the national site network (previously referred to as European sites). The sensitive sites (hosting habitats and species of value) include: • Special Area of Conservation (SAC): designated for Annex 1 habitats; • Special Protection Area (SPA): designated for the protection of valued bird species.	The MHPGC Project has the potential for impacts on designated sites and protected species covered by the Regulations. HRA would be undertaken where relevant in line with the requirements of the Regulations. The MHPGC Project has the potential to require protected species mitigation which is licensable under the Regulations.

Policy Description	Relevance to the Assessment
Ramsar Sites, which are not explicitly covered by the regulations, but must still be included in the process, owing to National Planning Policy framework guidance.	

Table 7.39: National Policy (England)

Policy	Policy Context
Overarching NPS for Energy EN-1 (DESNZ, 2023c).	Paragraph 4.3.20: States the Secretary of State must have regard to the ambitions, goals and targets set out in the Government's Environmental Improvement Plan 2023 for improving the natural environment, including the achievement of 13 legally binding targets for England set under the Environment Act (e.g. biodiversity, tree and woodland cover). Section 4.6: Discusses Environmental and BNG. Paragraph 4.6.2 states "Projects in England should consider and seek to incorporate improvements in natural capital, ecosystem services and the benefits they deliver when planning how to deliver BNG". Section 4.6 also notes that Schedule 15 of the Environment Act 2021 contains provisions which, when commenced, mean the Secretary of State may not grant an application for a DCO unless satisfied that a biodiversity gain objective is met. Section 5.4: Discusses the generic biodiversity conservation effects, mitigation, and need to protect the most important biodiversity conservation interests including statutory and non statutory sites, habitats and species. This section also describes the following: • Habitat Regulations: The highest level of biodiversity protection is afforded to sites identified through international conventions. • SSSIs: For development considered likely to have an adverse effect on a SSSI, consent should not normally be granted, unless the benefits clearly outweigh the impact; • Regional and Local sites: National planning policy expects policies to secure their protection from harm or loss and enhance ecological connection. Given the need for new nationally significant infrastructure, these should not be used in themselves to refuse consent; • Ancient woodland, ancient trees, veteran trees and other irreplaceable habitats: Government policy commits to maintain and enhancing irreplaceable habitat which should not result in loss or deterioration unless outweighed by the benefits and a suitable compensation strategy exists;

Policy	Policy Context
	• Protection and enhancement of habitats and species: Consent is only granted where there is an over-riding public interest and other relevant legal tests are met.
Renewable Energy Infrastructure EN-3 (DESNZ, 2023a).	Paragraph 2.3.6: States that any significant adverse effects on the qualities for which the area has been designated are clearly outweighed by the urgent need for this type of infrastructure; Paragraph 2.4.8: States that any necessary land-side infrastructure will be appropriately resilient to climate change induced weather phenomena; Paragraph 2.8.119 States: An assessment of the effects across the intertidal/coastal zone should demonstrate compliance with mitigation measures and include information, where relevant, about: • Any alternative landfall sites that have been considered by the applicant during the design phase and an explanation for the final choice; • Any alternative cable installation methods that have been considered by the applicant during the design phase and an explanation for the final choice; • Potential loss of habitat; • Disturbance during cable installation, maintenance/repairs and removal (decommissioning); • Potential risk from invasive and non native species; • Predicted rates at which the intertidal zone might recover from temporary effects, based on existing monitoring data; • Protected sites; • Paragraph 2.8.214 states: At the earliest possible stage, alternative ways of working should be employed to avoid environmental impacts. Where impacts cannot be avoided, measures to reduce and mitigate impacts should be employed.
Electricity Networks Infrastructure EN-5 (DESNZ, 2023b).	Paragraph 2.2.10 states: Applicants must take into account Schedule 9 to the Electricity Act 1989 to preserve natural beauty, conserve flora and fauna and mitigate as is reasonable. In formulating proposals for new electricity networks infrastructure Applicants should "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." Paragraph 2.5.1 states: Electricity networks infrastructure can allow for excellent opportunities to: i.e. reconnect important habitats via green corridors, biodiversity stepping zones, and reestablishment of appropriate hedgerows.

Policy	Policy Context
	Paragraph 2.9.25 states: In such cases the Secretary of State should only grant development if they are satisfied that the benefits accruing from the former proposal clearly outweigh any environmental impacts that it presents, the mitigation hierarchy has been followed, and that any technical obstacles associated with it are surmountable.

Table 7.40: Local Policy (England)

Legislation	Legislative Context
County Durham.	
County Durham Plan 2020-2035 (Durham Local Plan) (Durham County Council, 2020).	The Durham Local Plan is the overarching statutory development plan for County Durham: • Policy 27: States Proposals will be permitted for new or extensions to existing energy generation, utility transmission facilities, telecommunication masts or other broadcast and broadband equipment which facilitate the electronic transfer of data where it can be demonstrated that the scheme will not cause significant adverse impacts or that its benefits outweigh any adverse negative effects; • Policy 37: States 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, as defined on the policies map, or that have the potential to individually or cumulatively impact on their setting must only be undertaken on the basis of maintaining and enhancing its environmental capital in accordance with the principles of the Marine Policy Statement and other principles of sustainable development; • Policy 41: States proposals for new development will not be permitted if significant harm to biodiversity or geodiversity resulting from the 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,; • Policy 42: States development that has the potential to have an effect on internationally designated site(s), (including all development within 0.4 kilometres of the sites, as shown on Map B of the policies map document), either individually or in combination with other plans or

Legislation	Legislative Context
	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; • Policy 43: States in all cases where development impacts adversely on a national or local designated site (i.e. SSSI, National Nature Reserve (NNR), Local Nature Reserve (LNR), Local Wildlife Site (LWS)), 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.
County Durham Landscape Strategy (Durham County Council, 2008).	The County Durham Landscape Strategy covers the broad issues of climate change, biodiversity, geodiversity, cultural heritage, tranquillity and green infrastructure. The biodiversity objectives aims are to: • support and encourage the conservation and enhancement of biodiversity; • promote and develop a landscape-scale approach to biodiversity in County Durham; • promote an integrated approach to action on landscape and biodiversity and particularly through the use of Natural Area Partnerships; • secure a 'positive audit' for biodiversity in new development; and • promote biodiversity in landscape design; • The overarching aims are: - conserve and enhance the character and diversity of the Durham Landscape; - make development and land management more sustainable by helping to ensure that they respect the character of the landscape and contribute towards wider environmental objectives; - support and complement other environmental strategies to help promote co-ordinated action on the environment.
Sunderland City Council.	
Sunderland Core Strategy and Development Plan 2015 – 2033 (Sunderland	The Sunderland Local Plan includes local policies for development management purposes over the period from 2015 to 2033:

Legislation	Legislative Context
Local Plan) (Sunderland City Council, 2023).	• Policy NE1: To maintain and improve the Green Infrastructure Network through enhancing, creating and managing multifunctional greenspaces and bluespaces that are well connected to each other and the wider countryside; • Policy NE2: States where appropriate, development must demonstrate how it will provide net gains in biodiversity and avoid (through locating on an alternative site with less harmful impacts) or minimise adverse impacts on biodiversity and geodiversity in accordance with the mitigation hierarchy; • Policy NE3: States that significant trees, woodlands and hedgerows should be conserved where feasible.
Wildlife Corridors Network Review (Burton Reid Associates, 2020).	The Wildlife Corridors Network Review covers Gateshead Council, South Tyneside Council and Sunderland City Council. The Wildlife Corridors Networks are consistent with national planning policy and Networks Evidence Handbook (Natural England, 2020) and overlap with the Sunderland Local Plan (Sunderland City Council, (2023) The pertinent policies are: • Policy EA3: To optimise conditions for wildlife, implement the Durham Biodiversity Action Plan and tackle habitat fragmentation through: - securing and enhancing the integrity of designated sites; - maintaining, enhancing, restoring and adding to biodiversity and geological conservation interests; - ensuring that new development would result in not net loss of biodiversity to priority habitats (as named within the policy document); - reduce the fragmentation of, improve or extend existing priority habitats; - protect and strengthen populations of priority or other protected species; and - enhance the biodiversity value of wildlife corridors. • Policy DM7: To protect and enhance the important environmental assets of the borough. All proposals for development: - must ensure that any individual or cumulative detrimental impacts on sites are avoided; - will only be permitted where they would not adversely affect the integrity, natural character or biodiversity and geodiversity value of sites including statutory sites and wildlife corridors.

7.7.3 Study Area

7.7.3.1 The areas comprising the Offshore and Intertidal Ornithology Study Area are shown in Figure 7.26, and include the offshore and intertidal elements of the MHPGC Project Scoping Boundary plus an associated four kilometre (km) buffer. The Offshore and Intertidal Ornithology Study Area incorporates the associated offshore and intertidal environment within the buffer up to Mean High Water Spring (MHWS). The Offshore and Intertidal Ornithology Study Area does not incorporate any areas above MHWS; impacts affecting ornithological receptors in these areas are addressed in Chapter 8.3: Terrestrial Ecology and Ornithology, of the Scoping Report.

7.7.3.2 The Offshore and Intertidal Ornithology Study Area has been defined incorporating relevant buffers for the species that may be affected by impacts associated with the MHPGC Project (see section 7.7.5). For offshore ornithological features, a 4km buffer has been used which is the standard buffer used for baseline characterisation surveys for offshore ornithological receptors, when sensitive species that may require a larger buffer (e.g. red-throated diver (*Gavia stellata*)) are considered unlikely to be a key consideration in the assessments required (JNCC *et al.,* 2022).

7.7.3.3 A 1km buffer has been used for intertidal ornithological receptors, consistent with the buffer used to define the study area for intertidal surveys undertaken which follows standard survey guidance (Bibby *et al.,* 2000) and knowledge of the likely disturbance distances of key species associated with the potential impacts of the MHPGC Project (Cutts *et al.,* 2013)(see section 7.7.5). The 1km buffer is applied from each of the landfall locations and covers intertidal areas up to MHWS and seaward into the subtidal environment. A 1km buffer is considered to encompass the potential zone of influence (ZoI) upon intertidal ornithological receptors of impacts associated with the MHPGC Project (e.g. habitat loss/disturbance and noise; see section 7.7.6). As this buffer is smaller than that considered for offshore ornithological receptors it is incorporated within the four kilometre buffer defined for offshore ornithological features.

7.7.3.4 As shown in Figure 7.26, part of the Morven Array Project aerial survey area overlaps with the Offshore and Intertidal Ornithology Study Area. Surveys undertaken are described in section 7.7.4 below.

7.7.3.5 The MHPGC Project will include minimal infrastructure that has the potential to impact offshore and intertidal ornithology receptors. The Offshore and Intertidal Ornithology Study Area is considered to incorporate the area within which impacts may occur on offshore ornithological receptors as a result of activities during the installation, O&M and decommissioning of the MHPGC Project. It is considered that this area also encompasses the area within which any impacts on intertidal ornithological receptors will occur, although it is not considered that impacts will occur over as large an area as for offshore ornithological receptors (see section 7.7.6). Therefore, the Offshore and Intertidal Ornithology Study Area is considered suitable for characterising the offshore and intertidal ornithology features and for considering potential impacts arising from the MHPGC Project on offshore and intertidal ornithology receptors.

7.7.3.6 Seabirds and other migratory birds are highly mobile species and there is potential for birds occurring within the Offshore and Intertidal Ornithology Study Area to have originated from more distant locations (e.g. a breeding colony). For each species, a regional study area is considered based on the life history characteristics of the species considering the phenology and associated distribution of birds. These aspects are considered between and within species groups to inform the assessment of impacts. The information used to define the regional study area for each species might include consideration of phenology of different life stages, the origin of birds, the individual ZoIs for impacts, how these interact with different populations and the extent of cumulative impacts. Published foraging ranges (Woodward *et al.* 2019) and regional population scales (Furness, 2015) will be reviewed to determine the potential connectivity of breeding and non-breeding populations, including those associated with designated sites, with the Offshore and Intertidal Ornithology Study Area.

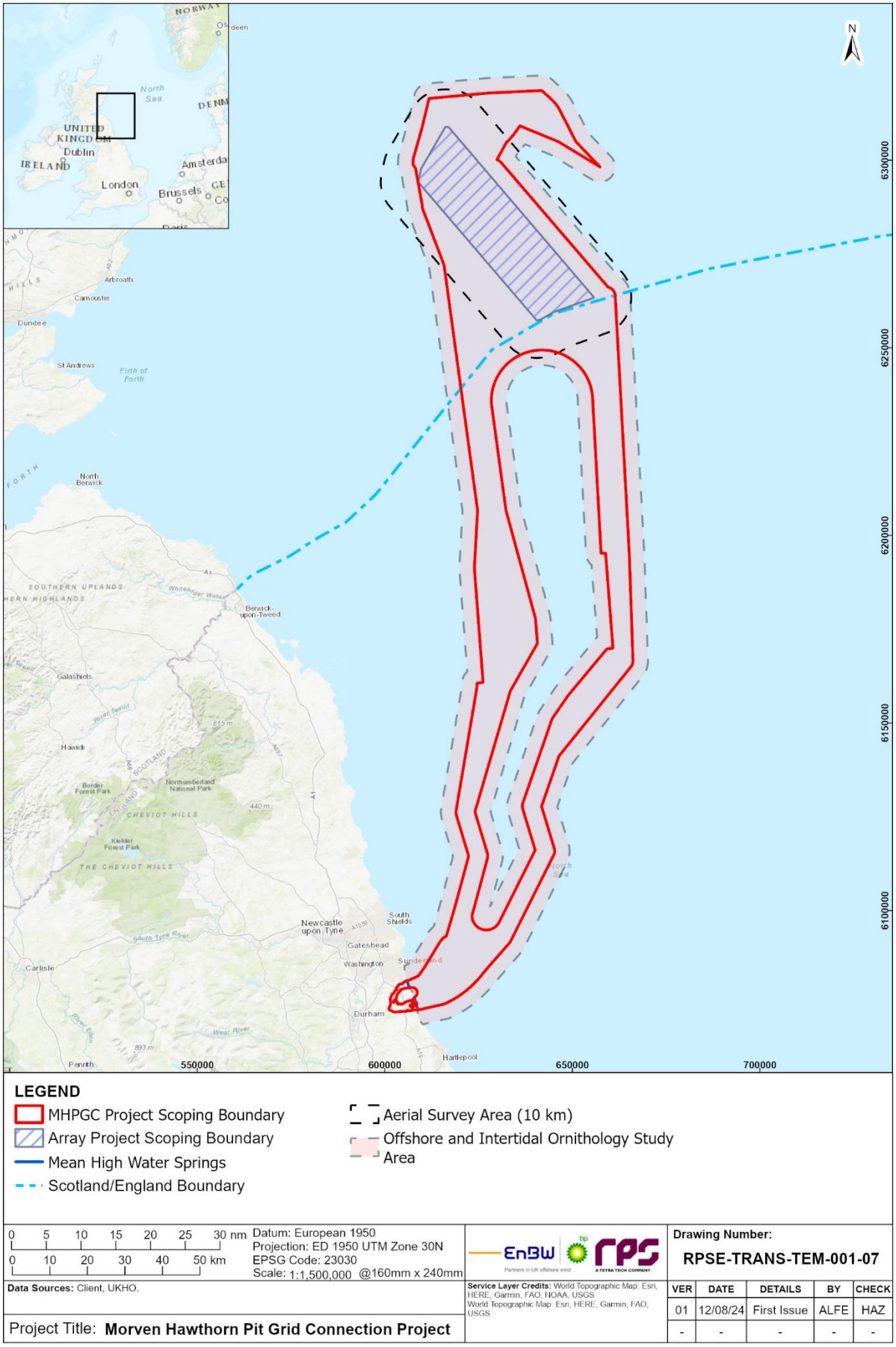


Figure 7.26: Offshore and Intertidal Ornithology Study Area

7.7.4 Data Sources

Desk based literature review

7.7.4.1 An initial desk based review of literature and data sources has been undertaken to support this Scoping Report. This review highlighted the information presented in Table 7.41 to be of relevance to the ornithological interest within the Offshore and Intertidal Ornithology Study Areas defined in section 7.7.3. This review included information on general seabird ecology, migration behaviour, population sizes and conservation status in the North Sea and Britain as a whole (particularly on the east coast).

Table 7.41: Examples of Data Sources and Literature that will be Used to Inform Assessments for the Morven Hawthorn Pit Grid Connection Project

Title	Source	Year	Author
International/UK			
BirdLife International Seabird Tracking Database.	https://www.seabirdtracking.org/	2014.	BirdLife International.
Seabird tracking.	Bogdanova *et al.* (2020a;b; 2022).	Various.	Bogdanova *et al.*
Bird distribution, migration and foraging movements.	Published papers.	Various.	Stone *et al.* (1995); Wernham *et al*. (2002); Brown and Grice (2005); Kober *et al*. (2010); Bradbury *et al*. (2014); Dean *et al*. (2003); Söhle *et al*. (2006); HiDef Ltd. (2015); Furness (2015); Cleasby *et al*. (2020); Davies *et al*. (2021); Wernham *et al*. (2002); Wright *et al*. (2012); Wakefield *et al*. (2013; 2017); Furness *et al*. (2018); Woodward *et al*. (2019); Waggitt *et al*. (2019); Buckingham *et al*. (2022); Woodward *et al.* (2023); Bowey and Newsome. (2012).
Bird breeding ecology, population estimates and demographic rates.	Published papers.	Various.	Cramp and Simmons (1977-94); Del Hoyo *et al.* (1992-2011); Robinson (2005); Mitchell *et al.* (2004); BirdLife International (2004); Holling *et al.* (2011); Musgrove *et al*. (2013); Furness (2015); Horswill *et al*. (2017); Joint Nature Conservation Committee (JNCC) (2020); Birdlife International

Title	Source	Year	Author
			Seabird Tracking Database (2014); Wetland Bird Survey and Non-Estuarine Waterbird Survey data (survey data obtained from the British Trust for Ornithology, summary reports including Austin *et al.* 2017 and Frost *et al.,* 2021)); Burton *et al.* (1995); Cadwallender and Cadwallender (2013); Burnell *et al.* (2023); Woodward *et al.* (2020); JNCC *et al.* (2024).
Literature pertaining to potential impacts of offshore cables on birds.	Published papers.	Various.	Garthe and Hüppop (2004); Drewitt and Langston (2006); Maclean *et al*. (2009); Speakman *et al.* (2009); Furness and Wade (2012); Furness *et al*. (2013); Bradbury *et al*. (2014); Wade *et al.* 2016; Webb *et al.* (2016); Dierschke *et al*. (2017); Jarrett *et al*. (2018); Leopold and Verdaat (2018); Mendel *et al*. (2019); Goodale and Milman (2020); Cutts *et al.* (2013).
Designated Sites	https://designatedsites.naturalengland.org.uk	2024.	Natural England.
Seabird Monitoring Programme Online Database	http://jncc.defra.gov.uk/smp	2024.	JNCC.
The identification of possible marine SPAs for seabirds in the UK: The application of Stage 1.1-1.4 of the SPA selection guidelines	JNCC.	2012.	Kober. (2012).

7.7.4.2 Other relevant data sources will also be explored, such as data owned by private entities (i.e. universities), organisations (such as the Royal Society for the Protection of Birds (RSPB)) and published (i.e. via a Boolean search) and used within the assessments required where relevant.

7.7.4.3 A significant amount of information from previous and current development in Scotland and the region relevant to the MHPGC Project can be found on the Scottish Government's Marine Directorate website (https://marine.gov.scot/marine-projects). Similar information in England will be obtained from the Planning

Inspectorate (PINS) website. In addition, there are a number of projects in the same location as the proposed landfalls (e.g. Scotland England Green Link 1; (AECOM Infrastructure & Environment UK Limited (2022)) and information from these projects will be utilised where available and appropriate.

Site specific surveys

7.7.4.4 Monthly intertidal surveys were undertaken commencing in April 2023 and concluding in March 2024, excluding June 2023 for which surveys are not required as it is not a key period for key species (i.e. relevant species will be present at breeding grounds elsewhere). This follows the standard approach to such surveys. The area covered by these surveys is shown in Figure 7.27. A 1km buffer was included around the landfall point. Two surveys were also conducted covering the southern half of the southern landfall option between Chourdon Point and Hawthorn Hive, one in both April 2023 and May 2023. Surveys comprise monthly 'through-the-tidal-cycle' counts. For each survey, two surveyors conducted vantage point surveys of the intertidal area. The location and extent of flocks and individual waterbirds were recorded. In addition to the waterbirds recorded along the intertidal areas were any observations of high tide water roosts.

Other primary data sources

7.7.4.5 Digital aerial survey (DAS) data has been collected across the Morven Array Project Boundary plus a 10km buffer. The DAS area overlaps to an extent with the MHPGC Project Offshore and Intertidal Ornithology Study Area which is indicated in Figure 7.26. Monthly digital aerial surveys commenced in January 2021 and concluded in September 2023 (see Figure 7.26), following guidance from NatureScot (2023a) and Natural England (2022).

7.7.4.6 In addition, data from regional datasets including Waggitt *et al.* (2019) (which covers all of UK waters), Bradbury *et al.* (2014) (which covers English waters) and recent aerial survey programmes in Scottish waters (HiDef Aerial Surveying Limited, 2023) will be interrogated to inform the identification of key ornithological receptors. These are identified in the following section.



Figure 7.27: Intertidal Survey Area for the Morven Hawthorn Pit Grid Connection Project

7.7.5 Baseline Environment

7.7.5.1 Extensive ornithological surveys (e.g. Carter *et al*. 1993; Stone *et al*. 1995), associated reviews (e.g. Stienen *et al*. 2007; Kober *et al*. 2010; Bradbury *et al*. 2014 and Waggitt *et al*. 2019) as well as data collected to support previous environmental assessments for other offshore wind farm and transmission projects have shown that the North Sea is an important area for seabirds. The mix of birds present indicates that the Offshore and Intertidal Ornithology Study Area is probably used at different times by birds (i) over-wintering in the area; (ii) foraging from nearby breeding coastal colonies; and (iii) on post-breeding dispersal, migration, and pre-breeding return.

7.7.5.2 The Offshore and Intertidal Ornithology Study Area is located in the North Sea, covering areas within both Scottish and English waters. This includes the South-east Scotland: Montrose to Eyemouth and North-east England: Berwick-on-Tweed to Filey Bay sea areas as defined in JNCC (1997). The following sections identify the relevant baseline environment in Scotland and England.

Designated sites

7.7.5.3 Species that occur within the Offshore and Intertidal Ornithology Study Area may be qualifying features of designated sites. To inform the Scoping Report, a generic 50km buffer has been used to identify designated sites with offshore ornithological features (e.g. SPAs) within close proximity (i.e. within 50km) to the MHPGC Project. The 50km buffer is considered appropriate based upon professional experience in offshore and intertidal ornithological assessment. It is also considered to be an adequate spatial extent for consideration of potential for effects on migratory species which may to lead to significant effects on receptors within the MHPGC Project Scoping Boundary.

7.7.5.4 Impacts may occur on features of designated sites beyond this distance however, it is likely that those sites within close proximity (i.e. within 50km) will be the focus of the assessments required. Table 7.42 identifies those designated sites with offshore ornithological features within 50km of the MHPGC Project Boundary. A thorough appraisal of SPAs and Ramsar sites with connectivity to the MHPGC Project will be provided in the Habitats Regulations Assessment (HRA) screening report for the MHPGC Project to be submitted as part of the Section 42 process and through consultation with relevant statutory bodies prior to the submission of the main application and this may discount impacts on those SPAs and features listed in Table 7.42 and/or include additional sites.

Table 7.42: Special Protection Areas and Ramsar Sites and Associated Qualifying Features within 50km of the Offshore Morven Hawthorn Pit Grid Connection Project Boundary

Designated Site	Distance to MHPGC Project Boundary (straight line distance) (km)	Jurisdiction	Qualifying Features
Northumbria Coast SPA.	0	English waters	Turnstone *Arenaria interpres* Purple sandpiper *Calidris maritima* Little tern *Sterna albifrons* Arctic tern *Sterna paradisaea*
Northumbria Coast Ramsar.	0	English waters	Turnstone *Arenaria interpres* Purple sandpiper *Calidris maritima* Little tern *Sterna albifrons* Cormorant *Phalacrocorax carbo* Kittiwake *Rissa tridactyla* Arctic tern *Sterna paradisaea* Golden plover *Pluvialis apricaria* Eider *Somateria mollissima* Sanderling *Calidris alba*
Teesmouth and Cleveland Coast SPA.	5.6	English waters	Knot *Calidris canutus* Ruff *Philomachus pugnax* Avocet *Recurvirostra avosetta* Common tern *Sterna hirundo* Arctic tern *Sterna paradisaea* Sandwich tern *Sterna sandvicensis* Redshank *Tringa totanus* Non-breeding waterbird assemblage
Teesmouth and Cleveland Coast Ramsar.	7.5	English waters	Knot *Calidris canutus* Redshank *Tringa totanus* Little tern *Sterna albifrons* *Shoveler Spatula clypeata* Greenshank *Tringa nebularia*
Northumberland Marine SPA.	14.7	English waters	Roseate tern *Sterna dougallii* Common tern *Sterna hirundo* Arctic tern *Sterna paradisaea*

Designated Site	Distance to MHPGC Project Boundary (straight line distance) (km)	Jurisdiction	Qualifying Features
			Sandwich tern *Sterna sandvicensis* Little tern *Sterna albifrons* Puffin *Fratercula arctica* Guillemot *Uria aalge*
Coquet Island SPA.	26.7	English waters	Roseate tern *Sterna dougallii* Common tern *Sterna hirundo* Arctic tern *Sterna paradisaea* Sandwich tern *Sterna sandvicensis* Breeding seabird assemblage
Farne Islands SPA.	36.5	English waters	Roseate tern *Sterna dougallii* Common tern *Sterna hirundo* Arctic tern *Sterna paradisaea* Sandwich tern *Sterna sandvicensis* Guillemot *Uria aalge* Breeding seabird assemblage
Outer Firth of Forth and St Andrew's Complex SPA.	42.3	Scottish waters	Razorbill *Alca torda* Goldeneye *Bucephala clangula* Long-tailed duck *Clangula hyemalis* Puffin *Fratercula arctica* Red-throated diver *Gavia stellata* Herring gull *Larus argentatus* Common gull *Larus canus* Little gull *Larus minutus* Black-headed gull *Larus ridibundus* Velvet scoter *Melanitta fusca* Common scoter *Melanitta nigra* Red-breasted merganser *Mergus serrator* Gannet *Morus bassanus* Shag *Phalacrocorax aristotelis* Slavonian grebe *Podiceps auritus*

Designated Site	Distance to MHPGC Project Boundary (straight line distance) (km)	Jurisdiction	Qualifying Features
			Manx shearwater *Puffinus puffinus* Kittiwake *Rissa tridactyla* Eider *Somateria molissima* Common tern *Sterna hirundo* Arctic tern *Sterna paradisaea* Guillemot *Uria aalge*
Lindisfarne SPA.	45.1	English waters	Bar-tailed godwit *Limosa lapponica* Common scoter *Melanitta nigra* Dunlin *Calidris alpina alpina* Eider *Somateria mollissima* Golden plover *Pluvialis apricaria* Grey plover *Pluvialis squatarola* Greylag goose *Anser anser* Light-bellied brent goose *Branta bernicla hrota* Little tern *Sternula albifrons* Long-tailed duck *Clangula hyemalis* Red-breasted merganser *Mergus serrator* Redshank *Tringa totanus* Ringed plover *Charadrius hiaticula* Roseate tern *Sterna dougallii* Sanderling *Calidris alba* Shelduck *Tadorna tadorna* Non-breeding waterbird assemblage, Whooper swan *Cygnus cygnus* Wigeon *Mareca penelope*
Lindisfarne Ramsar.	45.1	English waters	Light-bellied brent goose *Branta bernicla hrota* Greylag goose *Anser anser* Wigeon *Mareca penelope*

Designated Site	Distance to MHPGC Project Boundary (straight line distance) (km)	Jurisdiction	Qualifying Features
			Ringed plover *Charadrius hiaticula* Bar-tailed godwit *Limosa lapponica* Redshank *Tringa totanus* Common scoter *Melanitta nigra* Golden plover *Pluvialis apricaria* Grey plover *Pluvialis squatarola* Ruff *Philomachus pugnax* Curlew *Numenius arquata* Greenshank *Tringa nebularia* Slavonian grebe *Podiceps auritus* Shelduck *Tadorna tadorna* Eider *Somateria mollissima* Knot *Calidris canutus* Dunlin *Calidris alpina alpina*

7.7.5.5 The Offshore and Intertidal Ornithology Study Area also overlaps with the Durham Coast Site of Special Scientific Interest (SSSI). This SSSI is designated for populations of purple sandpiper, sanderling, turnstone, knot, kittiwake, fulmar and cormorant.

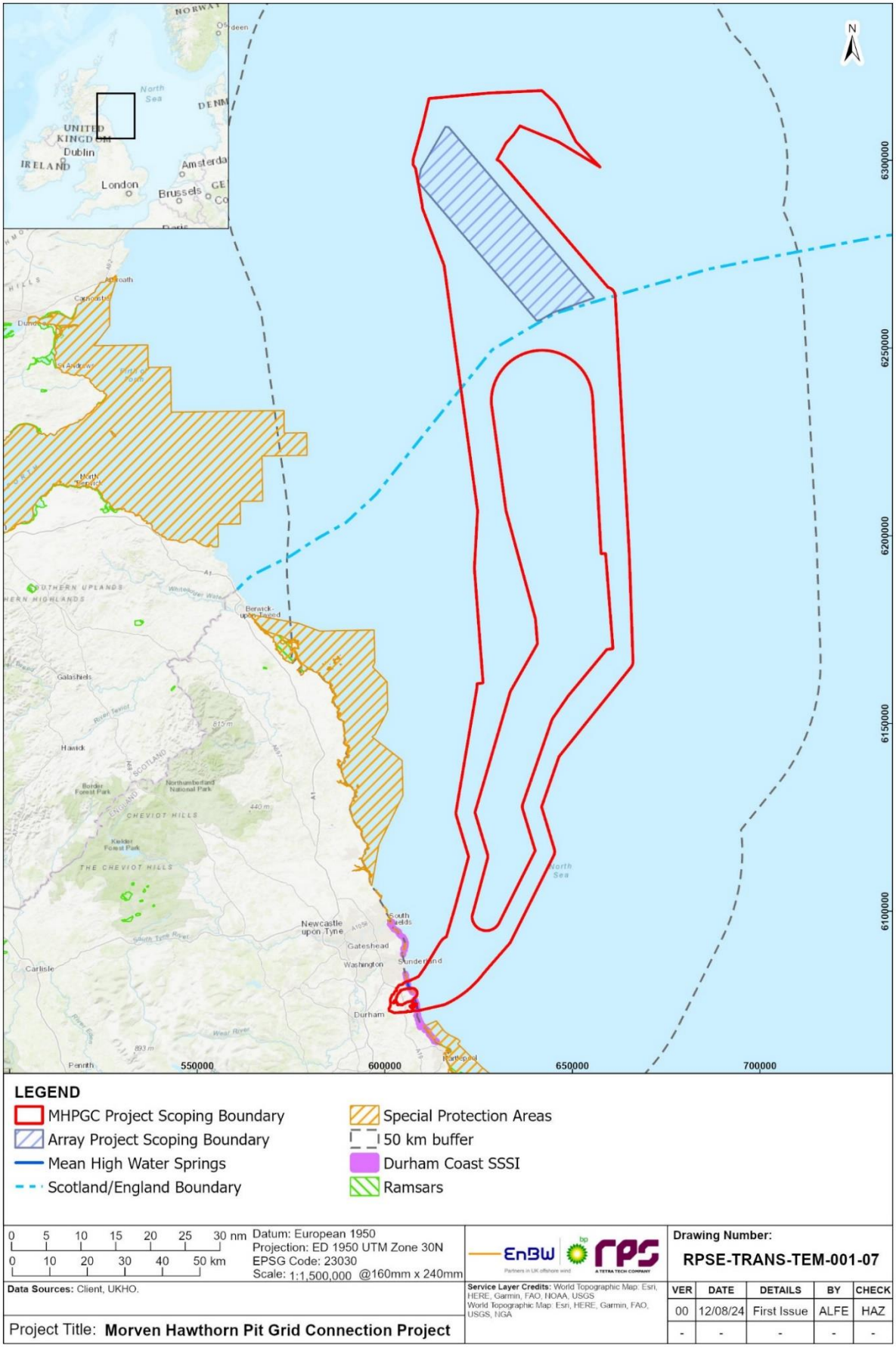


Figure 7.28: Designated Sites within 50km of the Morven Hawthorn Pit Grid Connection Project

Baseline Environment in Scottish Waters

Offshore environment

7.7.5.6 In the breeding season, the Southeast of Scotland Sea Area is internationally important for at least 13 breeding seabird species (northern gannet (*Morus bassanus*), cormorant (*Phalacrocorax carbo*), shag (*Phalacrocorax aristotelis*), herring gull (*Larus argentatus*), lesser black-backed gull (*Larus fuscus*), black-legged kittiwake (*Rissa tridactyla*), common tern (*Sterna hirundo*), Arctic tern (*Sterna paradisaea*), Sandwich tern (*Sterna sandvicensis*), common guillemot (*Uria aalge*), razorbill (*Alca torda*) and Atlantic puffin (*Fratercula arctica*) (JNCC, 1997; NatureScot, 2020).

7.7.5.7 The eastern coast of Scotland contains a number of important seabird breeding colonies. A large sea area extending outwards from the Firth of Forth is designated as the Outer Firth of Forth and St Andrews Bay Complex SPA to protect breeding and non-breeding seabird populations that utilise the marine area. In the non-breeding season, the area continues to support many of the aforementioned seabird species in addition to wintering populations of a further 11 species (goldeneye (*Bucephala clangula*), long-tailed duck (*Clangula hyemalis*), red-throated diver, common gull (*Larus canus*), little gull (*Hydrocoloeus minutus*), black-headed gull (*Chroicocephalus ridibundus*), velvet scoter (*Melanitta fusca*), common scoter (*Melanitta nigra*), Slavonian grebe (*Podiceps auratus*) and eider (*Somateria mollissima*)), although the distribution of these species tends to be more coastal (NatureScot, 2020).

7.7.5.8 Due to the seabird interest in the region, it has been the focus of extensive research both on the seabirds themselves and the factors that attract them. Such research has identified that the shallow sand banks of Wee Bankie and Marr Bank, which are both located approximately 40km to the west of the Offshore and Intertidal Ornithology Study Area, are important as feeding areas for seabirds in the region (Daunt *et al*. 2011; Wanless *et al*. 1998). A review of evidence undertaken to identify areas supporting important seabird aggregations identified a number of areas within the Firth of Forth and Outer Firth of Forth and moving offshore in a northeast direction (Cook *et al*. 2015). There are two important bird areas as defined by Cook *et al.* 2015 that either overlap or are within close proximity of the Offshore and Intertidal Ornithology Study Area; Area 32 approximately 30km to the south-east and Area 40 which has a small overlap with the north eastern portion of the Offshore and Intertidal Ornithology Study Area. These areas were identified as important bird areas due to aggregations of guillemot (Area 32) and puffin (Area 40) in the non-breeding season.

7.7.5.9 Reviews of available tracking data suggest that the Offshore and Intertidal Ornithology Study Area may be utilised by:

- gannet from the Forth Islands SPA (Wakefield *et al*. 2013);
- kittiwake from Fowlsheugh SPA (Bogdanova *et al*. 2022) and other local colonies (e.g. St Abb's to Fast Castle SPA and the Forth Islands SPA) to a moderate extent (overlap with 50 to 75% utilisation distribution contours in Cleasby *et al*. 2020);
- guillemot and razorbill from local colonies to a lesser extent (overlap with the 95% utilisation distribution contour) (Cleasby *et al*. 2020).

Baseline Environment in English Waters

7.7.5.10 The Offshore and Intertidal Ornithology Study Area within English waters (see Figure 7.26) includes where the MHPGC Project makes landfall.

Offshore environment

7.7.5.11 The offshore section of the MHPGC Project in English waters will be used by the same seabird species as identified in Scottish waters, as discussed above. In addition, a range of species utilise the coastal waters including divers, grebes and seaducks; all these species are reliant on the marine environment for a significant part of their lives. The region, including breeding sites such as Farne Islands, Coquet Island, and Marsden Bay, is crucial for seabirds both nationally and internationally. The region attracts the highest concentrations of seabirds during the breeding season with nearshore waters off Northumberland and northern Durham particularly important year-round (Tasker, 1995).

7.7.5.12 The populations of several species breeding in the region comprise more than 1% of their national population levels (Stroud *et al.,* 2016). This includes several species that are qualifying features of designated sites (Table 7.42), including the populations of breeding terns (roseate tern, common tern, Arctic tern, Sandwich tern) on the Farne Islands and Coquet Island. However, available tracking data indicates limited, if any connectivity between the tern species at these sites and the MHPGC Project (Wilson *et al.,* 2014; Parsons *et al.,* 2015). A review of evidence undertaken to identify areas supporting important seabird aggregations did not identify any areas that would overlap with the Offshore and Intertidal Ornithology Study Area in English waters (Cook *et al.,* 2015).

Intertidal environment

7.7.5.13 The proposed cable landfall locations and the nearby vicinities are beach habitat comprising a mixture of intertidal sands and cliffs. Project-specific intertidal surveys have determined that these habitats are used by a variety of non-breeding (wintering and passage migrant) wader species for feeding and roosting. These include visitors from Arctic and sub-Arctic breeding grounds and birds that may be associated with breeding grounds in the UK such as redshank (*Tringa totanus*), oystercatcher, turnstone (*Arernaria interpres*) and curlew. The beach habitats at the proposed landfall locations are also used by several non-breeding gull species for feeding and roosting, including herring gull, common gull and black-headed gull.

7.7.5.14 Wetland Bird Survey (WeBS) data indicates that the intertidal area within the Offshore and Intertidal Ornithology Study Area is of limited importance to the species of designated sites (see Table 7.42). The peak counts for available months for species of wading bird recorded in each WeBS core count sector that overlaps with the MHPGC Project are presented in Table 7.43.

Table 7.43: Peak Counts (and month) for Features of Designated Sites within Wetland Bird Survey Core Count Sectors that overlap with the Morven Hawthorn Pit Grid Connection Project.

Species	Foxholes to Chourdon Point (October to March).	Ryhope Dene to Hendon (October to June).	Chourdon Point to Seaham.	Seaham Harbour to Ryhope Dene.
Purple sandpiper.	0	0	7 (Feb).	6 (Sep).
Sanderling.	0	0	1 (Jan).	0
Turnstone.	0	27 (Dec).	25 (Nov).	10 (Feb).
Knot.	0	0	0	0

7.7.5.15 Winter and breeding bird surveys were also undertaken in the coastal habitats north of Seaham in 2020/21 to support the application for the Scotland England Green Link 1 (AECOM, 2022). Common tern and oystercatcher were encountered during surveys undertaken in the breeding season, although breeding activity was not identified for either species in the vicinity of the MHPGC Project. A further five species (curlew, eider, great black-backed gull, oystercatcher and red-throated diver) were identified during the winter bird surveys.

7.7.5.16 Surveys were also undertaken to count birds in the coastal high tide and low tide in the Ryhope Dene area, in the north of the Offshore and Intertidal Ornithology Study Area, in 2013 (Snowball *et al.,* 2014). High tide surveys observed low numbers of purple sandpiper, turnstone, red-throated diver, golden plover, Mediterranean gull, sandwich tern, and Arctic tern.

7.7.6 Potential Impacts of the Morven Hawthorn Pit Grid Connection Project

7.7.6.1 A range of potential impacts on offshore and intertidal ornithology receptors have been identified which may occur during the construction, O&M, and decommissioning phases of the MHPGC Project. The impacts that have been scoped into the assessment are outlined in Table 7.44, together with a description of any additional data collection (e.g. site specific surveys) and supporting analyses (e.g. modelling) that will be required to enable a full assessment of the impacts.

7.7.6.2 These impacts were identified with reference to published literature, experience from previous projects and Natural England's Advice on Operations and guidance from NatureScot (NatureScot, 2023a).

7.7.6.3 On the basis of the offshore and intertidal ornithology information currently available and the description of MHPGC Project outlined in Chapter 3: Project Description, of the Scoping Report, potential impacts scoped out of the assessment are presented in Table 7.45, with justification.

7.7.6.4 The potential impacts from the Morven Hawthorn Pit Grid Connection Project have been considered collectively for both English and Scottish waters, as these will not change between these areas given the commonality of the works proposed (offshore cabling).

Table 7.44: Potential Impacts Proposed to be Scoped in to the Morven Hawthorn Pit Grid Connection Project Assessment on Offshore and Intertidal Ornithological Receptors

*Project phase refers to construction (C), O&M (O) and decommissioning (D).

Impact	Project Phase*			Relevant to England or Scotland	Justification	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D				
Disturbance and displacement from airborne noise, underwater sound, and visual disturbance associated with the presence of vessels.	✓	✓	✓	Scottish and English waters	Airborne noise and underwater sound generated during construction and decommissioning activities (such as Unexploded Ordnance (UXO) removal), and the presence of vessels, may temporarily disturb/displace birds from foraging areas through noise and visual disturbance. In the O&M phase although activity is much reduced, disturbance from vessels undertaking maintenance and repair activities may occur.	Desk study, ornithological baseline surveys and data analysis.	The vulnerability of each species to this impact will be informed by standard literary sources (e.g. Wade *et al*. 2016; Cutts *et al.,* 2013). The magnitude of impacts will be informed by baseline survey data (as described in section 7.7.4) and the spatial extent of disturbance.

Impact	Project Phase*			Relevant to England or Scotland	Justification	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D				
Indirect impacts from underwater sound affecting prey species.	✓	✗	✓	Scottish and English waters	There is potential for mortality, injury and/or disturbance to sensitive fish and shellfish species as a result of construction activities such as pre-construction geophysical surveys and Unexploded Ordnance (UXO) detonation. Similar disturbance related impacts associated with the operation of vessels and potential removal of cables may arise during the decommissioning phase. This may cause reduced energy intake affecting the productivity or survival of birds.	Ornithological baseline surveys and data analysis, supported by information presented in Fish and Shellfish Ecology Chapter of the EIA Report/Environmental Statement (ES).	The assessment of potential impacts on birds will draw upon the results from the Fish and Shellfish Ecology Chapter of the EIA Report/ES and a qualitative assessment will be undertaken based on predicted extent of impact and known behaviour of fish to noise using the latest published literature.

Impact	Project Phase*			Relevant to England or Scotland	Justification	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D				
Temporary habitat loss/disturbance from increased Suspended Sediment Concentrations (SSCs), including indirect impacts on prey species.	✓	✗	✓	Scottish and English waters	There is potential for temporary, direct benthic habitat loss and disturbance to sediments as a result of activities during all the construction and decommissioning phases (e.g. seabed preparation, UXO clearance, cable installation and removal of infrastructure) (see Chapter 6: Subtidal and Intertidal Benthic Ecology, of the Scoping Report). This has potential to affect the foraging efficiency of diving birds or those birds using the intertidal environment as well as indirect impacts from impacts on fish and shellfish prey.	Ornithological baseline surveys and data analysis, supported by information presented in the Benthic subtidal and intertidal ecology and Fish and Shellfish Ecology Chapters of the EIA Report/ES.	The assessment of potential impacts on birds will draw upon the results from the Benthic subtidal and intertidal ecology and Fish and Shellfish Ecology Chapters of the EIA Report/ES and a qualitative assessment will be undertaken based on predicted extent of impact on habitats.

Table 7.45: Impacts Proposed to be Scoped out of the Morven Hawthorn Pit Grid Connection Project Assessment for Offshore and Intertidal Ornithological Receptors

Impact	Justification
Accidental pollution during all phases of the MHPGC Project.	Pollution impacts (accidental oil/fuel spills) during all phases of the MHPGC Project are scoped out on the basis that the implementation of a Marine Pollution Contingency Plan will avoid the risk of significant pollution events. Consequently, seabirds and shorebirds are extremely unlikely to be significantly affected by any such pollution impacts. As such, no significant impacts would occur, and it is proposed that this is scoped out of the EIA Report/ES.

7.7.6.5 The potential impacts from the MHPGC Project have been considered collectively for both English and Scottish waters, as these will not change between these areas given the commonality of the works proposed (offshore cabling).

7.7.7 Designed In Measures and Mitigation

7.7.7.1 As part of the Project design process, a number of designed in measures (primary and tertiary) will reduce the potential for impacts on Offshore and Intertidal Ornithological (Table 7.46). As there is a commitment to implement these measures, they are considered inherent to the design of the MHPGC Project. The determination of magnitude and significance will assume the implementation of such measures. Some of these measures are considered standard industry practice for this type of development.

7.7.7.2 The requirement for any additional (secondary) mitigation measures will be dependent on the significance of the impacts on physical processes receptors. The requirement for and feasibility of any mitigation measures will be consulted upon with statutory consultees throughout the EIA process.

Table 7.46: Designed in Measures Adopted as part of the Morven Hawthorn Pit Grid Connection Project, Relevant to Offshore and Intertidal Ornithology

Reference number	Designed in Measures	Justification	Primary or Tertiary
MM-13	Development of, and adherence to, an Environmental Management Plan (EMP), including a Marine Pollution Contingency Plan (MPCP), which will include planning for accidental spills, address all potential contaminant releases and include key emergency details.	An Outline EMP will be provided at Application with the MHPGC Project EIA Report/ES and will provides a means to ensure the efficient management and communication of commitments made for the management of the potential environmental impacts. Measures will be adopted to	T

Reference number	Designed in Measures	Justification	Primary or Tertiary
		ensure that the potential for release of pollutants from construction, O&M, and decommissioning plant is minimised. In this manner, contaminants from vessels will be strictly controlled, thus providing protection for birds and their prey species across all phases of the MHPGC Project.	
MM-14	Cable installation in the nearshore will be undertaken using trenchless methods	The use of trenchless methods reduces the magnitude of impacts on intertidal birds and requirement for installation activities in the intertidal environment	P
MM-79	A Vessel Management Plan (VMP) will be developed which will determine vessel routing to and from construction areas and ports to avoid areas of high risk.	The VMP will minimise disturbance of bird species and allow the identification of standard routes. An outline VMP will be provided at Application with the EIA Report/ES. This will also include codes of conduct for vessel behaviour and for vessel operators including advice to operators to not deliberately approach aggregations of seabirds.	P

7.7.7.3 Any secondary mitigation requirements for offshore and intertidal ornithology will be dependent on the significance of the impacts, as identified during the EIA process.

7.7.8 Proposed Assessment Methodology

7.7.8.1 The Offshore and Intertidal Ornithology Chapter of the EIA Report/ES will follow the methodology set out in Chapter 4: EIA Methodology, of the Scoping Report. The aspects of the assessment methodology discussed below are specific to offshore and intertidal ornithological receptors.

Guidance

7.7.8.2 The impact assessments for offshore and intertidal ornithological will consider the following guidance, where relevant:

- Guidelines for ecological impact assessment (EcIA) in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. September 2018 Version 1.2 - updated April 2022 (CIEEM, 2022);
- Offshore Wind Marine Environmental Assessments: Best Practice Advice for Evidence and Data Standards. Phase I: Expectations for pre-application baseline data for designated nature conservation and landscape receptors to support offshore wind applications (Natural England, 2022a);
- Offshore Wind Marine Environmental Assessments: Best Practice Advice for Evidence and Data Standards. Phase II: Expectations for pre-application engagement and best practice guidance for the Evidence Plan process (Natural England, 2022b);
- Offshore Wind Marine Environmental Assessments: Best Practice Advice for Evidence and Data Standards. Phase III: Expectations for data analysis and presentation at examination for offshore wind applications (Natural England, 2022c);
- Environmental Impact Assessment (EIA) for Offshore Renewable Energy projects (British Standards Institute (BSI) (2015);
- UK Planning Inspectorate Advice Note Twelve: Transboundary Impacts (PINS, 2015); and Advice Note Seventeen: Cumulative Effects Assessment (PINS, 2019);
- Guidance to support Offshore Wind Applications: Marine Ornithology and associated topic-specific guidance notes (NatureScot, 2023a, b, c);
- Natural England and JNCC advice on key sensitivities of habitats and Marine Protected Areas in English Waters to offshore wind farm cabling within Proposed Round 4 leasing areas (Natural England and JNCC, 2019);
- Nature Conservation Considerations and Environmental Best Practice for subsea cable for English Inshore and UK Offshore Waters (JNCC and Natural England, 2022);
- Nationally Significant Infrastructure Projects (NSIP) - Advice Note Ten: Habitats Regulations Assessment relevant to NSIPs (Planning Inspectorate, 2022a);
- NSIPs - Advice Note Seventeen: CEA relevant to NSIPs (Planning Inspectorate, 2022b);
- NSIPs – Advice Note Seven: Environmental Impact Assessment: process, preliminary environmental information and environmental statements (Planning Inspectorate, 2022c).

Valued Ornithological Receptors

7.7.8.3 In accordance with the Chartered Institute of Ecology and Environmental Management guidelines on Ecological Impact Assessments (EcIA) (CIEEM, 2022), the assessment of the likely ecological impacts of the MHPGC Project will focus on 'valued ornithological receptors' (VORs). VORs are species populations and assemblages of high ecological value, present within the ZoI of the MHPGC Project in numbers that could mean that any impacts associated with a project could be considered significant.

7.7.8.4 The value of species populations and of assemblages will be evaluated with reference to their importance in terms of 'biodiversity conservation' value (which relates to the need to conserve representative areas of different habitats and the genetic diversity of species populations), the species' abundance within the Offshore and Intertidal Ornithology Study Area and the species' legal status.

7.7.8.5 For the purposes of this assessment, species populations and assemblages will be valued using the following scale:

- international;
- national;
- regional;
- local;
- negligible.

7.7.8.6 The Chartered Institute of Ecology and Environmental Management guidelines on EcIA (CIEEM, 2022) recommends an approach to valuation that involves defining the different values that could be attached to the ornithological receptors under consideration. A VOR will be identified where the abundance of a species present within the Offshore and Intertidal Ornithology Study Area is considered to be more than negligible. The criteria for defining conservation value are presented in Table 7.47.

Table 7.47: Conservation Value Criteria

Conservation Value	Definition
International	Cited interest of SPA(s), including species identified in the review by Stroud *et al.* (2016) and those within the assemblage of an SPA.
National	European Union (EU) Birds Directive Annex I, EU Habitats Directive priority habitat/species. Cited interest of SSSIs.
Regional	Red Listed on Board of County Commissioners (BoCC), Serial Peripheral Interface.
Local	Amber Listed on BoCC.
Negligible	Very low importance and rarity, local scale, Green Listed on BoCC.

Assessment

7.7.8.7 Within the EIA, VORs will be assessed in relation to their seasonal occurrence, distribution and sensitivity in relation to the MHPGC Project and associated impacts. This will include consideration of site specific surveys and other desk based data sources.

7.7.8.8 A semi-quantitative, evidence-based assessment will be undertaken to consider impacts and identify any required mitigation. A HRA and Marine Protected Area (MPA) assessment will also be undertaken. In the ES chapter the assessment will consider the sensitivity, magnitude and significance of an effect.

7.7.8.9 The sensitivity of each species to each impact will be defined based on the following factors:

- The conservation importance of the species
- The vulnerability of each species to the impact in question using relevant literature (e.g. Wade *et al.,* 2016; Cutts *et al.,* 2013)
- The recoverability of the species

7.7.8.10 Following this consideration will be given to the magnitude of impacts. In most cases this will be undertaken on a semi-quantitative basis however, it may be necessary to provide a fully quantified analysis where highly vulnerable species are considered to be impacted. For disturbance impacts this could therefore necessitate the methods set out in appropriate guidance (e.g. JNCC *et al.,* 2022). For other species the impact magnitude will be determined based on the likely abundance, occurrence and distribution of the species under consideration.

7.7.9 Potential Cumulative Impacts

7.7.9.1 Cumulative effects with the Morven Offshore Wind Array Project and the second grid connection project in the Branxton area Southeast Scotland will be considered, together with cumulative effects with other developments, where relevant.

7.7.9.2 The cumulative effect assessment will follow the approach outlined in Chapter 4: EIA Methodology.

7.7.10 Potential Inter-related Effects

7.7.10.1 The EIA will consider inter-related effects arising from the MHPGC Project, across their own phases (project lifetime) and different effects on one receptor in one phase (receptor led). The EIA will consider inter-related effects of multiple impacts from the construction, O&M and decommissioning phases of the MHPGC Project, affecting one receptor. Inter-related effects will be assessed through consideration of all effects on a receptor, considering both spatial and temporal overlap, within the MHPGC Project. This will ensure that the MHPGC Project is appropriately considered within the EIA and in line with Chapter 4: EIA Methodology.

7.7.11 Potential Transboundary Impacts

7.7.11.1 Transboundary impacts related to offshore and intertidal ornithology include:

- disturbance and displacement from airborne noise, underwater noise, and presence of vessels and infrastructure;
- indirect impacts on prey species;
- temporary habitat loss/disturbance and increased SSCs.

7.7.11.2 There is the potential for transboundary impacts associated with the MHPGC Project to directly affect receptors from European Economic Area (EEA) States due to the

wide-ranging nature of some species throughout the annual cycle. The potential for transboundary impacts will be considered within the EIA Report/ES.

7.8 Commercial Fisheries

7.8.1 Introduction

7.8.1.1 This chapter of the Scoping Report identifies the commercial fisheries receptors of relevance to the Morven Hawthorn Pit Grid Connection Project (hereafter referred to as 'the MHPGC Project') and considers the potential impacts arising from the construction, operation and maintenance (O&M), and decommissioning of the MHPGC Project. This scoping chapter adopts a proportionate approach to only those impacts with potential to result in likely significant effects and therefore scopes out other impacts where there is evidence that the effects are not likely to be significant.

7.8.1.2 The offshore aspects of the MHPGC Project will be located in Scottish offshore waters (beyond 12 nautical miles (nm) from the Scottish coast) and English offshore and inshore waters.

7.8.2 Policy and Legislation

7.8.2.1 Policy and legislation relevant to the MHPGC Project is set out in Chapter 2: Policy and legislation. There is no policy and legislation specific to commercial fisheries that is not addressed in Chapter 2: Policy and Legislation.

7.8.3 Study Area

7.8.3.1 The MHPGC Project is located in International Council for the Exploration of the Sea (ICES) Division VIb (Central North Sea). ICES Divisions are separated into statistical rectangles, used in this baseline for the analysis and visualisation of fisheries data. The Commercial Fisheries Study Area is defined by the ICES rectangles within which the MHPGC Project Scoping Boundary is situated. As shown in Figure 7.29, these are ICES rectangles 42E8, 42E9, 41E8, 41E9, 40E8, 40E9, 39E8, 39E9, 38E8 and 38E9.

7.8.3.2 The Commercial Fisheries Study Area shown in Figure 7.29 will be used to identify fisheries active in areas relevant to the MHPGC Project.

7.8.3.3 Where relevant, data and information will be analysed for wider areas to provide context and describe the full extent of activity of the fisheries included in the assessment.

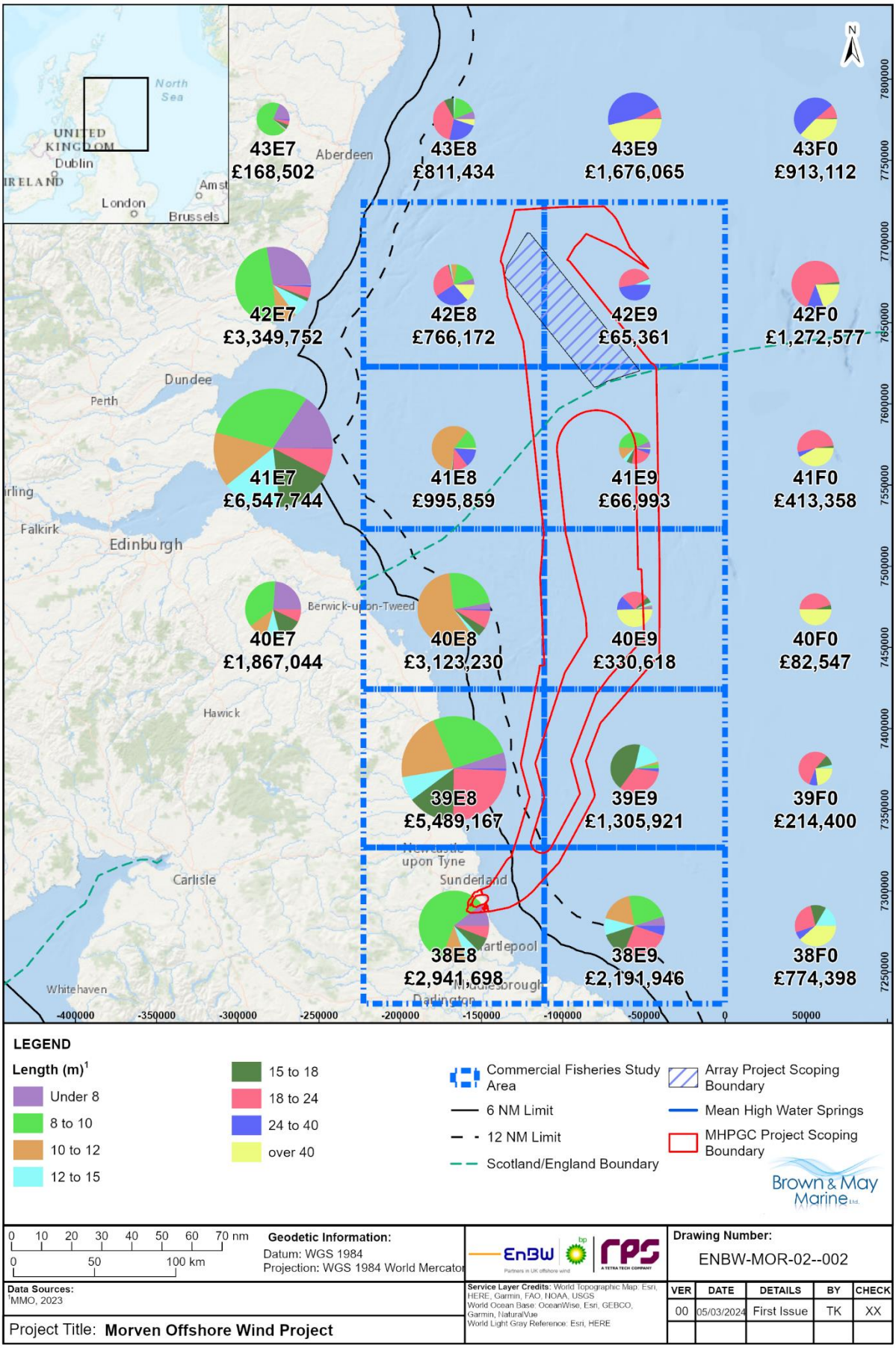


Figure 7.29: Commercial Fisheries Study Area

7.8.4 Data Sources

7.8.4.1 The sources of information presented in Table 7.48 will be used to inform the commercial fisheries baseline.

7.8.4.2 In addition to the information detailed in Table 7.48, information obtained from the fish and shellfish ecology and benthic and intertidal ecology assessments will be reviewed and integrated in the commercial fisheries EIA Report/ES Chapter as appropriate.

7.8.4.3 Site specific commercial fisheries surveys are not considered necessary to inform the commercial fisheries baseline.

Table 7.48: Data Sources used to Inform the Commercial Fisheries Assessment

Title	Source	Years	Author
International/National (UK)			
Automatic Identification System (AIS) data.	European marine observation and data network (EMODnet) (2023).	2023.	EMODnet.
UK Surveillance data.	UK fisheries statistics data (MMO, 2022).	2012 – 2021.	Marine Management Organisation (MMO)/Marine Scotland.
UK Landings data.	UK fisheries statistics data (MMO, 2023).	2018 – 2022.	MMO/Marine Scotland.
UK Vessel Monitoring System (VMS) data.	UK fisheries statistics data (MMO, 2022).	2012 – 2021.	MMO/Marine Scotland.
Danish Landings Data.	Ministry of Environment and Food of Denmark (2019).	2014 – 2018.	Ministry of Environment and Food of Denmark.
Danish VMS data.	Ministry of Environment and Food of Denmark (2019).	2014 – 2018.	Ministry of Environment and Food of Denmark.
Belgian Landings data.	Zanzi, Antonella; Holmes, Steven (2017).	2010-2014.	Zanzi, Antonella; Holmes, Steven.
Belgian VMS data.	Flanders Research Institute Agricultural, Fisheries and Food Research (ILVO) (2015).	2010 – 2014.	ILVO.

Title	Source	Years	Author
Dutch Landings data.	Wageningen University & Research (WUR) (2024) Average Landings by ICES rectangle	2019 – 2023.	WUR.
Dutch VMS data.	Institute for Marine Resources and Ecosystem Studies (IMARES), WUR (2017-2021).	2017 – 2021.	IMARES.
French Landings data.	Zanzi, Antonella; Holmes, Steven (2017).	2012 – 2016.	EC STECF.
National (Scottish waters)			
Fishing Activity for UK Vessels 12m and under.	Marine Scotland (2022).	2017 – 2021.	Marine Scotland.

7.8.4.4 It should be noted that the quantitative datasets identified in Table 7.48 may not capture all fishing activity in the Commercial Fisheries Study Area. For instance, the VMS datasets only cover vessels ≥12m (ILVO and IMARES data) or ≥15m (MMO data) in length. However, other published data does provide a useful insight into fishing activity undertaken in inshore areas (e.g. Regional Inshore Fisheries Group (RIFGs) publications) and will be reviewed throughout the Environmental Impact Assessment (EIA) process.

7.8.4.5 To further inform and characterise the baseline, consultation will be undertaken with other fisheries groups as appropriate. These groups will be able to inform of any variations and trends in commercial fisheries activity which are an important aspect of the baseline assessment. Given the time periods considered in this scoping exercise, existing baseline data captures potential changes in commercial fisheries activity resulting from the COVID-19 pandemic which will be included but appropriately qualified. It should also be noted that changes in fishing patterns resulting from the withdrawal of the UK from the European Union (EU) and the Common Fisheries Policy would be expected in future data sets.

7.8.4.6 Engagement with the Scottish Fishermen's Federation (SFF), who represent several constituent fishing associations in Scottish waters, and the Scottish Whitefish Producers Association (SWFPA) at a wider project level has been, and will continue to be, ongoing. The National Federation of Fishermen's Organisations (NFFO), which is the representative body for the fishing industry in England and Wales have also been, and will continue to be, engaged with. Further consultation will be undertaken with relevant fisheries stakeholders in order to corroborate the findings of desk based baseline data analysis and to provide insight into specific fishing grounds and the activity of any vessels regularly operating in the area under consideration. Consultation will also be important to obtain details and specifications for vessels and gears active in the Commercial Fisheries Study Area

7.8.4.7 In English inshore waters, the MHPGC Project falls within the management areas of the following Inshore Fisheries and Conservation Authorities (IFCAs):

- Northumberland IFCA (NIFCA), covering inshore waters out to 6nm between the border with Scotland and the River Tyne;
- North Eastern IFCA (NEIFCA), covering inshore waters out to 6nm between the River Tyne and North East Lincolnshire (Cleethorpes).

7.8.4.8 IFCAs are either committees or collaborative (joint) committees of the local authorities that fall within a given Inshore Fisheries Conservation district. IFCAs are primarily tasked with the sustainable management of inshore fisheries resources in their district. IFCAs have a number of different specific roles including fisheries management inside of 6nm, marine conservation and management of protected areas, sustainable management of fisheries and 'good regulation' implemented through a range of measures, including local bylaws. Furthermore, the IFCAs will be consulted in regards to any data relevant to inshore fisheries.

7.8.4.9 Following withdrawal from the EU, the UK and the EU have agreed to a Trade and Cooperation Agreement (TCA), applicable on a provisional basis from 01 January 2021. The TCA sets out fisheries rights and confirms that from 01 January 2021 and during a transition period until 30 June 2026, UK and EU vessels will continue to access respective EEZs (12 to 200nm) to fish.

7.8.4.10 The assessment will further consider likely changes to the future baseline, primarily associated with withdrawal from the EU, including potential changes in quota allocations.

7.8.5 Baseline Environment

7.8.5.1 With the exception of the ICES Rectangles, the descriptions in this baseline have not been presented separately for Scottish and English fleets. Given that the receptor is commercial fishing fleets and their target fisheries, and as fishing vessel licenses for both England and Scotland allow access to UK waters, it was not considered appropriate to separate the baseline further in this Scoping Report.

Project wide (Scottish and English waters).

7.8.5.2 This section provides a concise summary of the baseline of the Commercial Fisheries Study Area.

7.8.5.3 Based on a review of the data sources outlined in Table 7.48, it is apparent that the Commercial Fisheries Study Area supports a range of commercial fishing activities, such as demersal trawls, potting, scallop dredging and pelagic trawls.

7.8.5.4 No site specific commercial fisheries surveys are required, however, extensive consultation with fisheries stakeholders is planned to be undertaken to help inform the commercial fisheries baseline within the MHPGC Project EIA Report/Environmental Statement (ES). The benthic site specific survey data and AIS data from the shipping and navigation assessment will also be referenced as part of the MHPGC Project EIA Report/ES and integrated into the characterisation of the commercial fisheries baseline, as appropriate.

7.8.5.5 Table 7.49 gives an indication of the nationalities that are active in the Commercial Fisheries Study Area. As shown, the majority of sightings are of UK registered vessels, with negligible sightings of transboundary vessels within the area.

Table 7.49: Surveillance Sightings in the Commercial Fisheries Study Area by Nationality and Method (2012 – 2021) (Source: MMO, 2022)

Nationality	Vessel Type	Total Over 10 Years
United Kingdom.	Beam trawler.	7
	Bottom seiner.	2
	Demersal stern trawler.	357
	Drift netter.	113
	Gill netter.	9
	Hand gathering/hand lining.	1
	Long liner.	2
	Other dredges (including mussel).	7
	Pair trawler (all).	6
	Pelagic stern trawler.	2
	Potter/whelker.	1,189
	Rod and line.	11
	Scallop dredger.	316
	Shrimper.	5
	Side trawler (Pelagic/Demersal).	3
	Stern trawler (Pelagic/Demersal).	245
	Trawler (all).	1,165
	Unknown.	32
	Total UK.	**3,472**
Denmark.	Sandeeler.	8
	Pelagic Stern Trawler.	1
	Stern Trawler (Pelagic/Demersal).	9
	Trawler (all).	1
	Total Denmark.	**19**
Netherlands.	Demersal Stern Trawler.	2
	Stern Trawler (Pelagic/Demersal).	4
	Trawler (all).	8
	Total Netherlands.	**14**
France.	Scallop Dredger.	1
	Stern Trawler (Pelagic/Demersal).	5
	Trawler (all).	4

Nationality	Vessel Type	Total Over 10 Years
	Total France.	**10**
Belgium.	Beam Trawler.	1
	Scallop Dredger.	2
	Total Belgium.	**3**

Scottish waters

7.8.5.6 The landings value data presented in Figure 7.30 and Figure 7.31 indicates that the fishing methods used across the Commercial Fisheries Study Area are diverse.

7.8.5.7 ICES rectangles 42E8, 42E9 and 41E8 are predominately within Scottish waters. Landings in ICES rectangle 41E8 are dominated by pots and traps targeting edible crabs and lobsters, whilst 42E8 is dominated by dredge targeting scallops. Further offshore in ICES rectangle 42E9, demersal trawls dominate targeting whiting.

7.8.5.8 Figure 7.32 gives an indication of the distribution of values of fishing by all UK methods combined as derived from integrating VMS data for vessels over 15m with landings value data. As shown, the MHPGC Project Scoping Boundary in Scottish waters does not represent an area of high value for the UK fishing fleet

English waters

7.8.5.9 ICES triangles 41E9, 40E8, 40E9, 39E8, 39E9, are predominately within English waters. Vessels undertaking demersal trawls appear to be most active in the English waters in the southern sector of the Commercial Fisheries Study Area, with landings from demersal trawls contributing to over half the total landings values in ICES rectangles 39E8, 39E9 and 38E8. The main species targeted using this method are nephrops, and to a lesser extent whiting and haddock (Figure 7.31).

7.8.5.10 Landings from potting are derived largely from the western and southern-most sections of the Commercial Fisheries Study Area, closer to shore (Figure 7.30). The species targeted by this method are lobsters and to a lesser extent edible crabs (Figure 7.31).

7.8.5.11 Landings from dredges targeting scallops contribute to the total landings values in ICES rectangle 38E9. In additions, landings from pelagic trawls targeting herring have been recorded in ICES rectangle 40E9.

A discrete area of moderate to high landings values is present over the inshore section of the cable route in English waters (Figure 7.32).

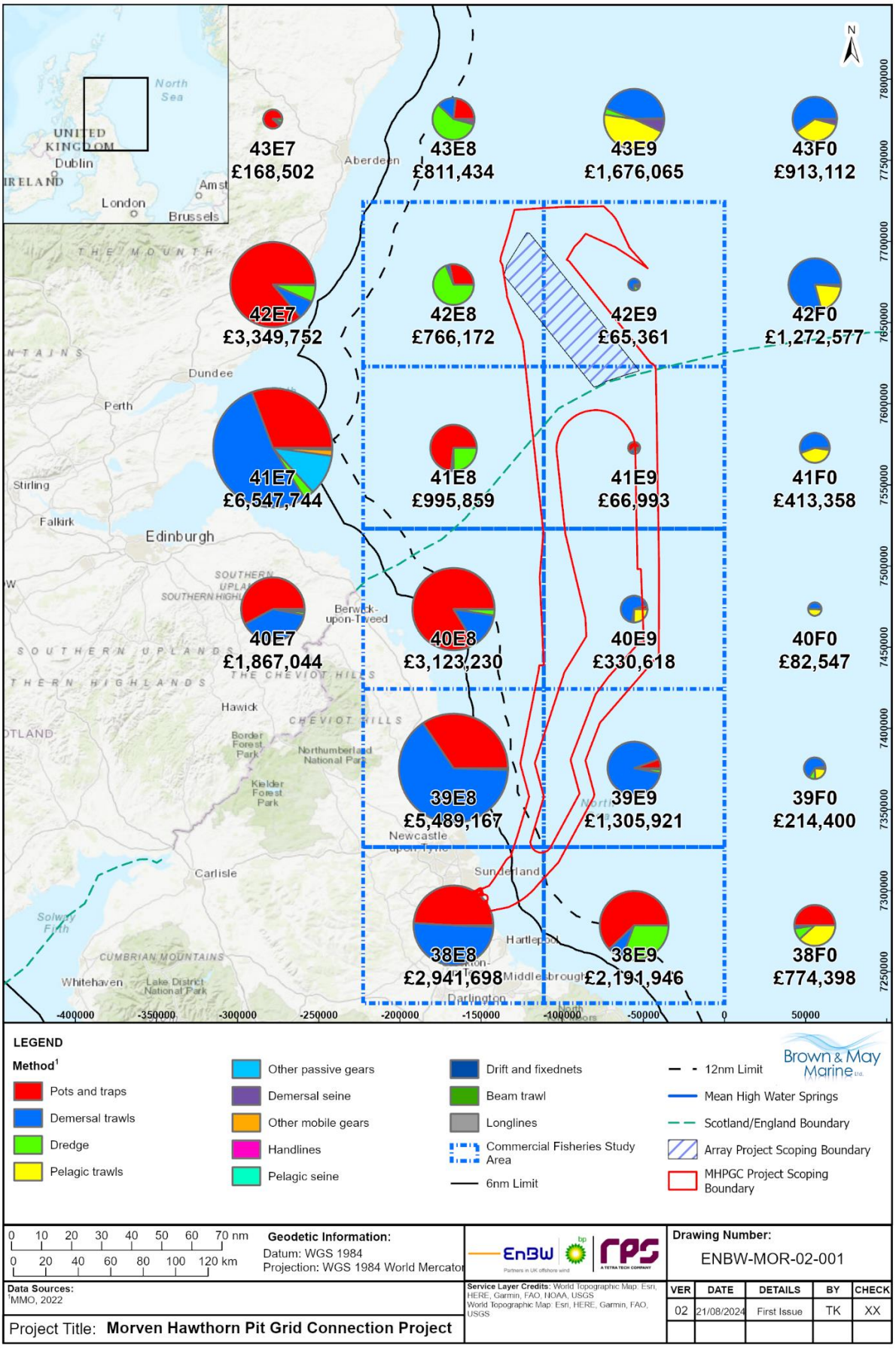


Figure 7.30: UK Landings (£) by Method in the Commercial Fisheries Study Area (Average 2018-2022) (Source: MMO, 2023)

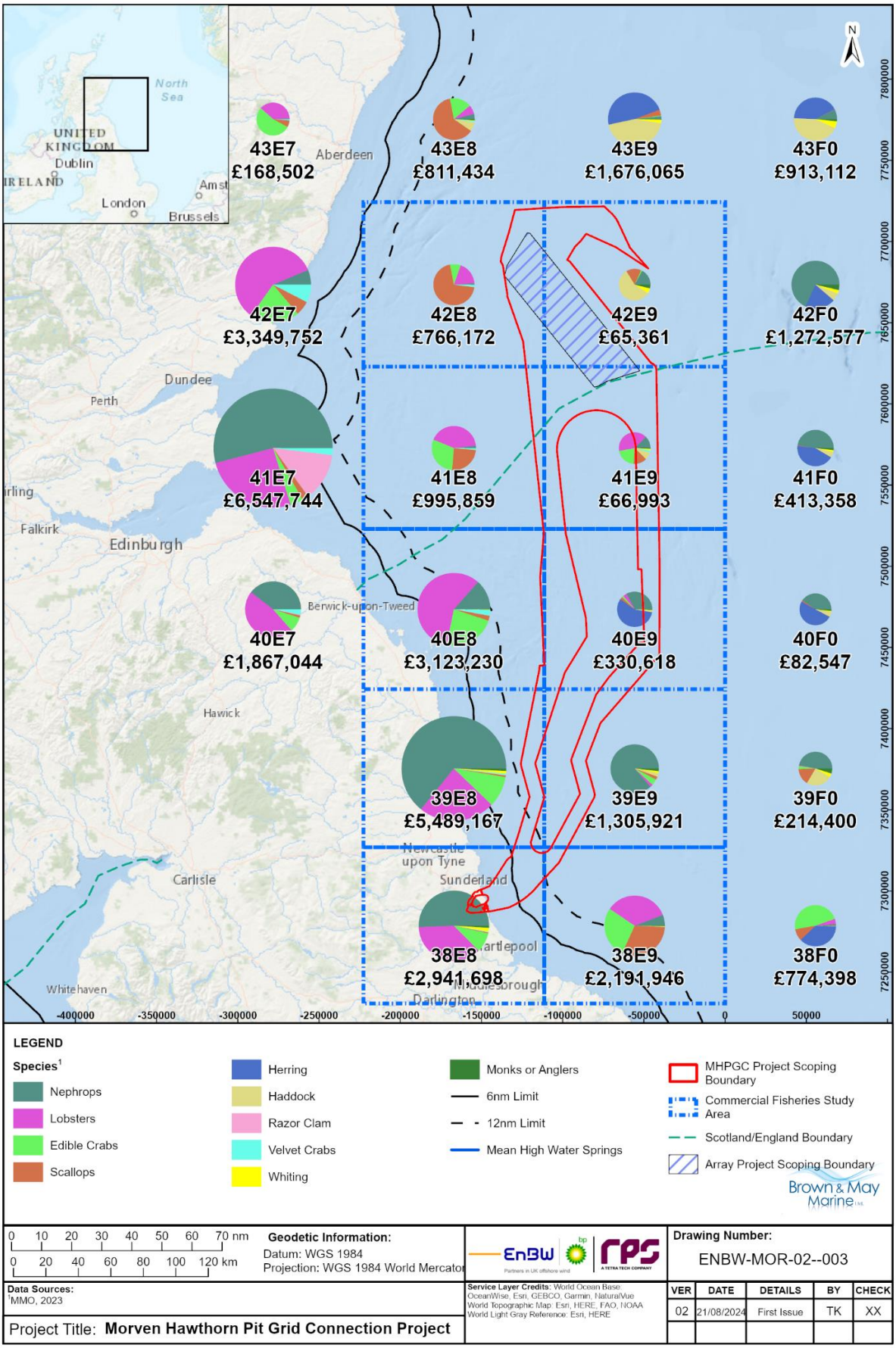


Figure 7.31: UK Landings (£) by Species in the Commercial Fisheries Study Area (Average 2018-2022) (Source: MMO, 2023)

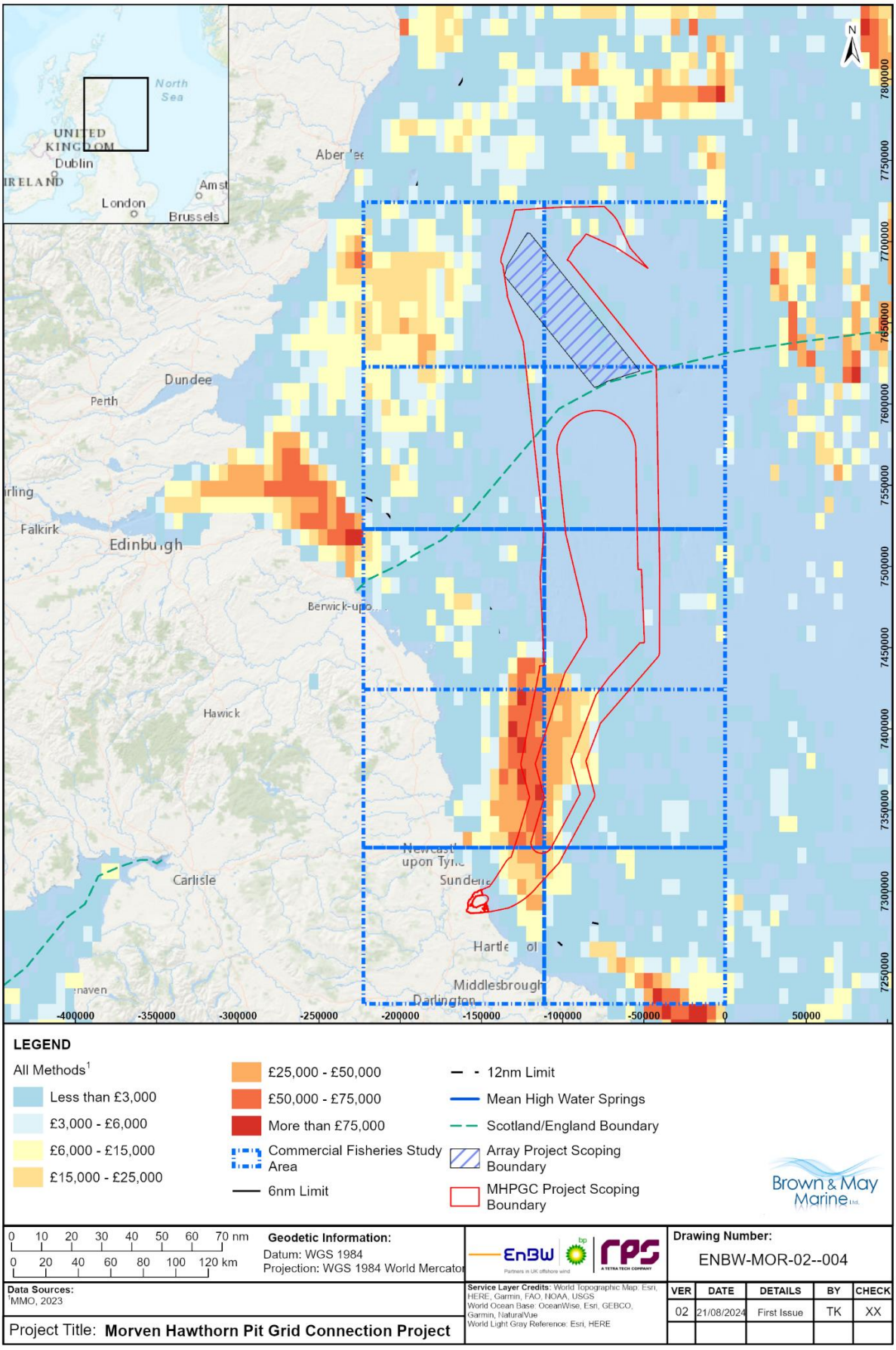


Figure 7.32: UK VMS (£) for Vessels Over 15m All Methods Combined (Average 2016 – 2020) (Source: MMO, 2022)

7.8.6 Potential Impacts of the Morven Hawthorn Pit Grid Connection Project

7.8.6.1 A range of potential impacts on commercial fisheries have been identified which may give rise to likely significant effects during the construction, O&M, and decommissioning phases of the MHPGC Project.

7.8.6.2 The impacts that have been scoped into the assessment as having the potential to give rise to likely significant effects are outlined in Table 7.50 together with a description of any additional data collection (e.g. site specific surveys) and supporting analyses that will be required to enable a full assessment of the impacts.

7.8.6.3 No potential impacts to commercial fisheries have been scoped out of the assessment.

7.8.6.4 The potential impacts from the MHPGC Project have been considered collectively for both English and Scottish waters, as these will not change between these areas given the commonality of the works proposed (offshore cabling).

Table 7.50: Impacts Proposed to be Scoped into the Morven Hawthorn Pit Grid Connection Project Assessment for Commercial Fisheries

*Project phase refers to construction (C), O&M (O) and decommissioning (D).

Impact	Project Phase*			Relevant to England or Scotland	Justification	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D				
Temporary loss or restricted access to fishing grounds.	✓	✗	✓	Scottish and English waters.	The presence of cable installation, O&M and decommissioning works can result in the loss of, or restricted access to existing fishing grounds. Similarly, access to grounds may be limited as a result of the presence of vulnerable sections of cables (i.e. cables awaiting burial or protection).	Analysis of currently available fisheries data and information (see Table 7.48), as well as consultation with fisheries stakeholders.	A qualitative assessment will be undertaken to assess the significance of the impact.

Impact	Project Phase*			Relevant to England or Scotland	Justification	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D				
Displacement of fishing activity into other areas.	✓	✓	✓	Scottish and English waters.	Loss of or restricted access to fishing grounds may result in fishers being temporarily displaced into other areas throughout the construction and decommissioning works.	Analysis of currently available fisheries data and information (see Table 7.48), as well as consultation with fisheries stakeholders.	A qualitative assessment will be undertaken to assess the significance of the impact.
Interference with fishing activity.	✓	✓	✓	Scottish and English waters.	Interference/conflict with fishing activity may arise as a result of transiting construction and O&M vessels, as well as decommissioning vessels.	Analysis of currently available fisheries data and information (see Table 7.48), as well as consultation with fisheries stakeholders.	A qualitative assessment will be undertaken to assess the significance of the impact.
Increased steaming distances and times.	✓	✓	✓	Scottish and English waters.	The presence of cable installation, O&M and decommissioning works can result in the loss of, or restricted access to existing fishing grounds	Analysis of currently available fisheries data and information (see Table 7.48), as well as consultation with fisheries stakeholders.	A qualitative assessment will be undertaken to assess the significance of the impact.
Snagging risk – loss or damage to fishing gear.	✓	✓	✓	Scottish and English waters.	The presence of: pre-commissioned infrastructure associated with MHPGC Project (i.e.	Analysis of currently available fisheries data and information (see Table 7.48), as well as	A qualitative assessment will be undertaken to assess the significance of the impact.

Impact	Project Phase*			Relevant to England or Scotland	Justification	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D				
					cables awaiting burial or protection); infrastructure associated with MHPGC Project (i.e. cable protection, cable crossings); decommissioning related infrastructure; other seabed obstacles (i.e. accidentally dropped objects, etc.) may pose a potential snagging risk to fishing vessels and could have potential to result in loss or damage to fishing gear. This snagging risk may also have implications with regard to the safety of fishing vessels and crews. The safety risks for fishing vessels associated with potential gear snagging, will be assessed together with navigational risks under shipping and navigation (see	consultation with fisheries stakeholders.	

Impact	Project Phase*			Relevant to England or Scotland	Justification	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D				
					Chapter 7.8: Shipping and Navigation, of the Scoping Report).		
Long term loss or restricted access to fishing grounds.	✗	✓	✗	Scottish and English waters.	Project activities, together with the presence of project infrastructure can result in long term loss of, or restricted access to existing fishing grounds.	Analysis of currently available fisheries data and information (see Table 7.48), as well as consultation with fisheries stakeholders.	A qualitative assessment will be undertaken to assess the significance of the impact. Additionally, scouting surveys for the presence of static gears may be required.
Impacts on commercially exploited species.	✓	✓	✓	As described in Chapter 7.4: Benthic Subtidal and Intertidal Ecology and Chapter 7.5: Fish and Shellfish Ecology, of the Scoping Report.			

7.8.7 Designed In Measures and Mitigation

7.8.7.1 As part of the project design process, a number of designed in measures (primary and tertiary) will reduce the potential for impacts on commercial fisheries (Table 7.51). As there is a commitment to implement these measures, they are considered inherent to the design of the MHPGC Project. The determination of magnitude and significance will assume the implementation of such measures. Some of these measures are considered standard industry practice for this type of development.

7.8.7.2 The requirement for any additional (secondary) mitigation measures will be dependent on the significance of the impacts on commercial fisheries receptors. The requirement for and feasibility of any mitigation measures will be consulted upon with statutory consultees throughout the EIA process.

Table 7.51: Designed in Measures Adopted as part of the Morven Hawthorn Pit Grid Connection Project for Commercial Fisheries.

Reference Number	Designed in Measures	Justification	Primary or Tertiary
MM-4	Prior to the start of construction, the UK Hydrographic Office (UKHO) will be informed of the locations and estimated and actual dates of construction and operation activities, and the maximum height of any equipment to be used, to facilitate the promulgation of maritime safety information and updating of nautical charts and publications and to allow inclusion on Aviation Charts.	To maximise awareness of the MHPGC Project, promote safety and allow vessels to plan their activities.	T
MM-7	Placement of cable protection will be minimised as far as possible; however, a level of protection may be required at certain locations. Where rock protection is used, this will be evaluated and follow industry standard guidelines in terms of slope angle and rock grading. Secured through the OMP.	To minimise the snagging risk to vessels.	P
MM-10	Development and adherence to a Cable Specification and Installation Plan (CSIP) .	The CSIP will outline the technical specification of the cables used in the MHPGC Project and describe the installation methodology.	P

Reference Number	Designed in Measures	Justification	Primary or Tertiary
MM-11	Implementation, management and monitoring of cable protection (via burial or external protection where adequate burial depth, as identified via risk assessment, is not feasible) with any damage, destruction or decay of cables notified to Maritime and Coastguard Agency (MCA), NLB, Kingfisher and United Kingdom Hydrography Office (UKHO) no later than 24 hours after discovered.	To minimise the snagging risk to vessels.	P
MM-15	The MHPGC project will seek to minimise cable crossings through cable route selection.	To minimise the snagging risk to vessels.	P
MM-32	Adherence to good practice guidance with regards to fisheries liaison (e.g. FLOWW, 2014;2015) including ongoing consultation with the fishing industry and Fisheries Industry Representatives (FIRs), as appropriate, and the appointment of a Fisheries Liaison Officer (FLO).	To facilitate productive relationships with fisheries stakeholders and provide a point of contact to liaise and engage with the fishing industry. This will allow good practice to be taken into account to minimise and mitigate impacts on commercial fishing, as appropriate. To provide a forum for information sharing and discussion of key issues with fisheries stakeholders and other developers in the region. The FLO will facilitate the minimisation of potential for conflict between the MHPGC Project and fishing activities.	T
MM-33	Development of a Fisheries Management and Mitigation Strategy (FMMS) and a Fisheries Liaison and Co-existence Plan (FLCP). The FMMS and FLCP will include details on the measures	To detail the Applicant's proposed approach to fisheries liaison and facilitate co-existence. An outline FMMS and FLCP will be provided at	T

Reference Number	Designed in Measures	Justification	Primary or Tertiary
	which are proposed to be implemented to minimise impacts on commercial fishing.	Application with the MHPGC Project EIA Report/ES.	
MM-34	Undertaking of post-lay and cable burial inspection surveys and monitoring with provision of "as installed" infrastructure locations to the Kingfisher Information Service, Offshore Renewable and Cable Awareness project (KISORCA). Secured through the Cable Specification and Installation Plan (CSIP), as part of the Operation & Maintenance Plan (OMP).	To minimise the risks of interactions with cable protection, anchor or fishing gear interaction with subsea cables.	P
MM-80	Development of, and adherence to, a Vessel Management Plan (VMP) and Navigational Safety Plan (NSP).	The VMP will confirm the types and numbers of vessels that will be engaged on the MHPGC Project and consider vessel coordination, including indicative transit route planning. An Outline Navigation Safety and Vessel Management Plan combining the VMP and the NSP will be provided at Application with the MHPGC Project EIA Report/ES.	T
MM-81	Timely and efficient distribution of Notices to Mariners (NtM), Kingfisher notifications and other navigational warnings of the position and nature of works associated with the MHPGC Project.	Maximises awareness of the MHPGC Project allowing vessels to plan their activities in advance.	T

7.8.8 Proposed Assessment Methodology

7.8.8.1 Chapter 4: EIA Methodology, of the Scoping Report sets out the EIA methodology for the MHPGC Project EIA Report/ES. Additionally, the following guidance will also be considered for commercial fisheries.

- FLOWW Best Practice Guidance for Offshore Renewables Developments: Recommendations for Fisheries Liaison: Fishing Liaison with Offshore Wind and Wet Renewables Group (FLOWW, 2014);
- FLOWW Best Practice Guidance for Offshore Renewables Developments: Recommendations for Fisheries Disruption Settlements and Community Funds. Fishing Liaison with Offshore Wind and Wet Renewables Group (FLOWW, 2015);
- best practice guidance for fishing industry financial and economic impact assessments. UK Fisheries Economics Network (UKFEN, 2012);
- options and opportunities for marine fisheries mitigation associated with wind farms (Blythe-Skyrme, 2010);
- fishing and Submarine Cables - Working Together (ICPC, 2009);
- spatial Squeeze in Fisheries- Final Report ABPmer no. R3900 June 2022;
- good Practice Guidance for Assessing Fisheries Displacement (Marine Scotland, 2022).

7.8.8.2 Additionally, the Commercial Fisheries ES for the MHPGC Project will consider any new guidance, or any updates to existing guidance as appropriate. Opinions arising from stakeholder engagement will also be considered.

7.8.9 Potential Cumulative Impacts

7.8.9.1 Cumulative effects with the Morven Offshore Wind Array Project and the second grid connection project in the Branxton area Southeast Scotland will be considered, together with cumulative effects with other developments, where relevant.

7.8.9.2 The cumulative effect assessment will follow the approach outlined in Chapter 4: EIA Methodology.

7.8.10 Potential Inter-related Effects

7.8.10.1 The EIA will consider inter-related effects arising from the MHPGC Project, across their own phases (project lifetime) and different effects on one receptor in one phase (receptor led). The EIA will consider inter-related effects of multiple impacts from the construction, O&M and decommissioning phases of the MHPGC Project, affecting one receptor. Inter-related effects will be assessed through consideration of all effects on a receptor, considering both spatial and temporal overlap, within the MHPGC Project. This will ensure that the MHPGC Project is appropriately considered within the EIA and in line with Chapter 4: EIA Methodology, of the Scoping Report.

7.8.10.2 Where relevant, the commercial fisheries impact assessment will be informed by the outcomes of the fish and shellfish ecology, subtidal and intertidal benthic ecology, and shipping and navigation assessments.

7.8.10.3 Potential inter-related effects include:

- impacts on commercially exploited fish and shellfish populations (Chapter 7.5: Fish and Shellfish Ecology);
- increased steaming distances (Chapter 7.8: Shipping and Navigation);

- increased vessel traffic associated with the project within fishing grounds, leading to interference with fishing activity (Chapter 7.8: Shipping and Navigation).

7.8.11 Potential Transboundary Impacts

7.8.11.1 Detailed information on the distribution and level of fishing activity undertaken by non-UK fleets in the study area will be reviewed and included in the Commercial Fisheries Chapter of the EIA Report/ES as appropriate. Where significant activity is identified by any non-UK fishing fleet, potential impacts will be assessed in detail in the Commercial Fisheries Chapter of the EIA Report/ES following the same methodology as UK fisheries.

7.8.11.2 Transboundary impacts are taken as being related to whether vessels from other nationalities have rights to fish in a given area. The potential for transboundary impacts will be further considered in the EIA Report/ES.

7.9 Shipping and Navigation

7.9.1 Introduction

7.9.1.1 This chapter of the Morven Hawthorn Pit Grid Connection Project (hereafter referred to as 'MHPGC Project') identifies the shipping and navigation receptors of relevance to the MHPGC Project and considers the potential impacts arising from the construction, operation and maintenance (O&M), and decommissioning of the MHPGC Project. This scoping chapter adopts a proportionate approach to only those impacts with potential to result in likely significant effects and therefore scopes out other impacts where there is evidence that the effects are not likely to be significant.

7.9.1.2 The offshore elements of the MHPGC Project will be located in Scottish offshore waters (beyond 12 nautical miles (nm) from the Scottish coast) and English offshore and inshore waters.

7.9.2 Policy and Legislation

7.9.2.1 This section identifies the relevant legislation, policy and other documentation that will inform the assessment of likely significant effects with respect to shipping and navigation. Further information on policies relevant to the Environmental Impact Assessment (EIA) and their status is provided in Chapter 2: Policy and Legislation.

7.9.2.2 Impacts on shipping and navigation receptors will be assessed within the Navigational Risk Assessment (NRA) using a Formal Safety Assessment (FSA) compliant with International Maritime Organisation (IMO) guidelines. Where appropriate, features outside of the Shipping and Navigation Study Area, such as navigational features, the cumulative screening of other offshore developments within a 20nm buffer of the MHPGC Project, and taking international ports and operators into consideration, will be considered in the NRA.

7.9.2.3 Relevant guidance, policy, and legislation used to inform shipping and navigation impacts from the MHPGC Project are described in Table 7.52.

Table 7.52: Overview of the Shipping and Navigation Guidance, Policy and Legislation Used

Legislation Description	Relevance to the Assessment
International/UK	
Revised Guidelines for FSA for Use in the IMO Rule-Making Process (IMO, 2018)	A structured and systematic methodology based upon risk analysis and Cost Benefit Analysis (if applicable) to reduce impacts to As Low as Reasonably Practicable (ALARP).
MGN (Marine Guidance Note) 654 (Merchant and Fishing) Safety of Navigation: Offshore Renewable Energy Installations (OREIs) – Guidance on United Kingdom (UK) Navigational Practice, Safety and Emergency Response and its annexes	Highlights issues that shall be considered when assessing the effect on navigational safety from offshore renewable energy developments, proposed in UK internal waters, UK territorial sea, or the UK Exclusive Economic Zone (EEZ).

Legislation Description	Relevance to the Assessment
(Maritime and Coastguard Agency (MCA), 2021a)	
MGN 661 (Merchant and Fishing) Navigation – Safe and Responsible Anchoring and Fishing Practices (MCA, 2021b)	Highlights the importance of full awareness of the submarine pipelines and cables on the seabed, prior and during anchoring operations, and during fishing activities.
UK Marine Policy Statement (Department for Environment, Food & Rural Affairs (DEFRA), 2011)	Provides a framework for preparing Marine Plans and taking decisions affecting the marine environment.
North East Marine Plan (Marine Management Organisation (MMO), 2021)	Provides a policy framework to be used to help inform decision-making on what activities take place in the marine environment and how the marine environment is developed, protected and improved.
The UK Marine Plans, specifically Scotland's National Marine Plan (Scottish Government, 2015), as well as the Sectoral Marine Plan for Offshore Wind Energy (2020)[5]	Covers management of, and identifies sustainable plan options for, the future development of commercial-scale offshore wind energy in Scotland, including deep water wind technologies, in both Scottish inshore and offshore waters.
United Nations Convention on the Law of the Sea (UNCLOS) (UNCLOS, 1982)	Lays down a comprehensive regime of law and order in the world's oceans and seas establishing rules governing all uses of the oceans and their resources.
Submarine Telegraph Act (UK Government, 1885)	Establishes rules governing the protection of subsea cables.
Convention on the International Regulations for Preventing Collisions at Sea (COLREGs) (IMO), 1972/78)	Establish the navigation rules which must be followed by vessels at sea to prevent a collision incident.
Chapter V, Safety of Navigation, of the Annex to the International Convention for the Safety of Life at Sea (SOLAS) (IMO, 1974)	Specifies the minimum standards for the construction, equipment and operation of vessels, compatible with their safety.

7.9.3 Study Area

7.9.3.1 The Shipping and Navigation Study Area is defined for data analysis as a 5nm buffer applied around the MHPGC Project Scoping Boundary of the MHPGC Project and

[5] The National Marine Plan (2015) and the Sectoral Marine Plan (2020) are currently in the process of being updated by Scottish Ministers.

is presented in Figure 7.33. The 5nm buffer is considered appropriate based upon professional experience and is considered sufficient to characterise the vessel traffic and marine incident elements of the shipping and navigation baseline as it captures relevant routeing in proximity to the MHPGC Project, whilst also remaining project-specific for vessel activities and navigational features by not considering those at a distance not likely to cause an impact.

7.9.3.2 Navigational features are not considered within a particular study area, but rather are considered on a regional basis, noting the potential for vessel traffic movements within the Shipping and Navigation Study Area associated with routeing to/from navigational features located outside the Shipping and Navigation Study Area.

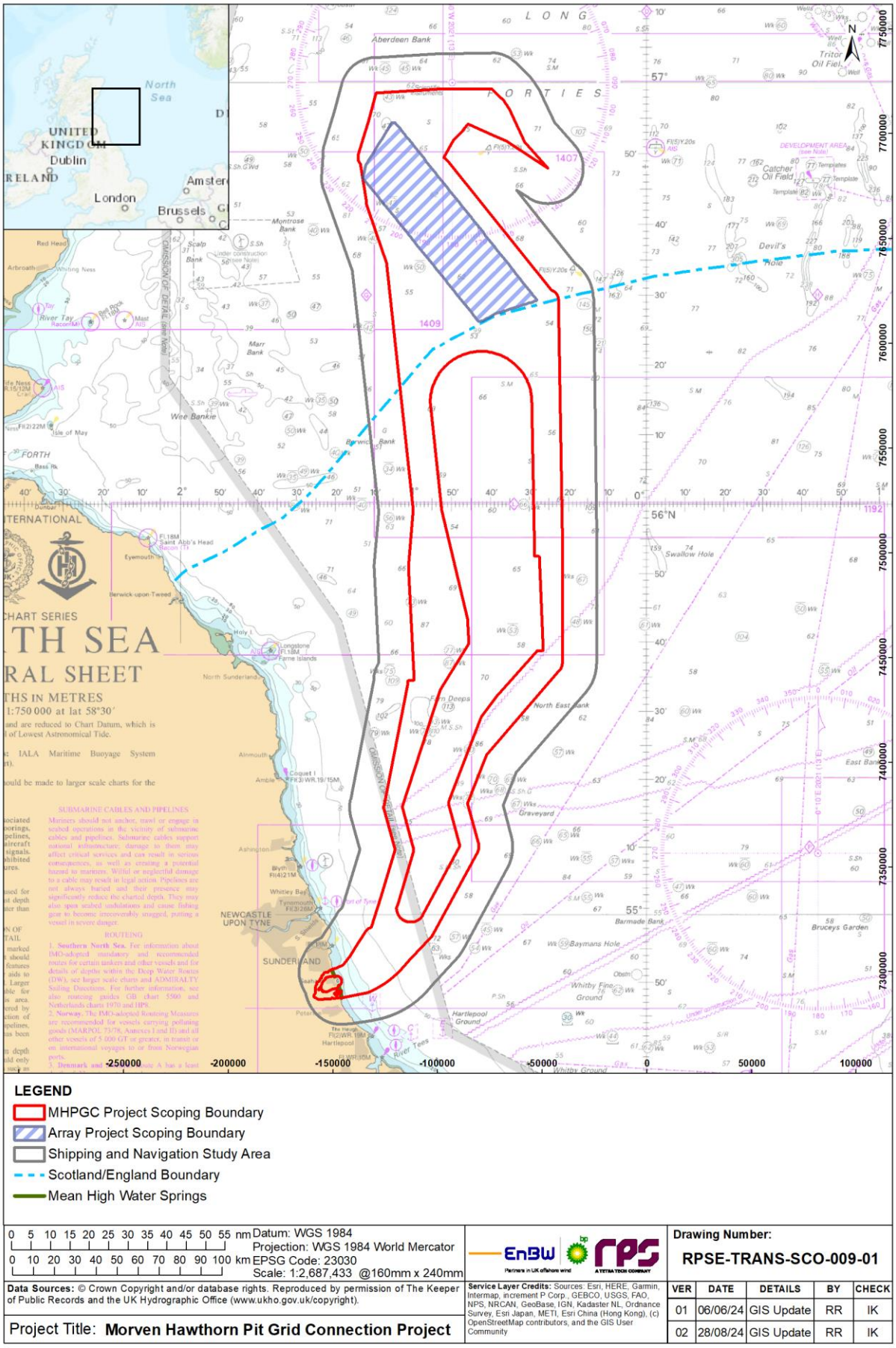


Figure 7.33: Overview of the Shipping and Navigation Study Area

7.9.4 Data Sources

7.9.4.1 The baseline data described in this chapter has been informed by the following data sources presented in Table 7.53.

Table 7.53: Summary of Data Sources Used for the Shipping and Navigation Baseline

Title	Source	Year	Author
International/National (UK)			
Automatic Identification System (AIS) data for the period 01 February – 14 February 2023	Anatec Ltd	2023	Anatec Ltd
AIS data for the period 01 July – 14 July 2023	Anatec Ltd	2023	Anatec Ltd
United Kingdom Hydrography Office (UKHO) Admiralty Charts 268, 273, 1191, 1192, 1407 and 1409	UKHO	2022	UKHO
Admiralty Sailing Directions North Sea (West) Pilot NP54	UKHO	2022	UKHO
Marine Accident Investigation Branch (MAIB) incident data	MAIB	2012 – 2021	MAIB
Royal National Lifeboat Institution (RNLI) incident data	RNLI	2013 – 2022	RNLI

7.9.5 Baseline Environment

7.9.5.1 This section establishes the baseline environment in terms of key navigational features, vessel traffic and marine incidents for the purposes of identifying potential impacts which should be scoped into the EIA.

Key Navigational Features

7.9.5.2 Navigational charts and Admiralty Sailing Directions pertinent to the MHPGC Project were studied to define charted features or key navigational practices. The key navigational features charted in proximity to the MHPGC Project are presented in Figure 7.34. It is noted that, for clarity, only charted wrecks and obstructions located within the Shipping and Navigation Study Area are presented.

7.9.5.3 A total of 149 charted wrecks or obstructions are located within the Shipping and Navigation Study Area, with 50 of these located within the MHPGC Project Scoping Boundary itself.

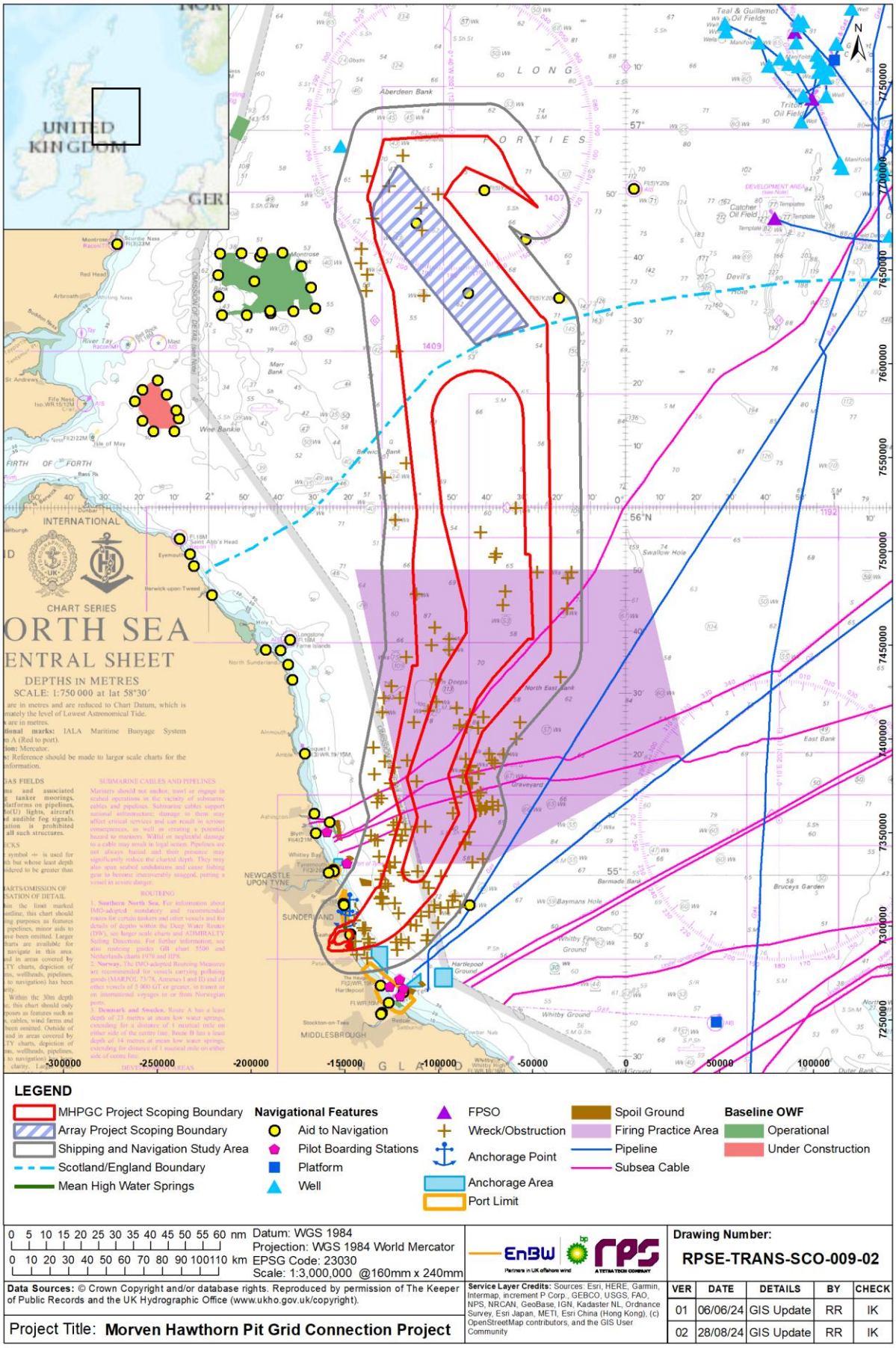


Figure 7.34: Key Navigational Features in Proximity to the Morven Hawthorn Pit Grid Connection Project

Scottish waters

7.9.5.4 Key aids to navigation are prevalent close to coast, with lighthouses in coastal locations noted. The closest oil and gas installation to the MHPGC Project is the BW Catcher Floating Production Storage and Offloading unit, located approximately 38nm to the east of the MHPGC Project Scoping Boundary.

7.9.5.5 Offshore Wind Farms (OWF) are included within the baseline in proximity to the MHPGC Project Scoping Boundary, namely, the fully operational Seagreen[6] (13nm to the west), and the under construction Neart na Gaoithe (located 37nm to the west). There are other OWFs in proximity to the MHPGC Project Scoping Boundary that are neither operational nor under construction, these will be assessed in further detail within the Cumulative Effects Assessment (CEA) within the NRA. Other infrastructure located in the vicinity to the MHPGC Project include the commissioned North Sea Link subsea cable, the Scotland to England Green Link (SEGL) Eastern Link 1 and 2 subsea cables (both of which are pre-construction), the EGL 3 and 4 subsea cables (also at pre-construction) and the planned Eastern high voltage direct current (HVDC) Link interconnector and Berwick Bank Cambois connection.

English waters

7.9.5.6 Two pipelines running in a northeast to southwest bearing pass outside the Shipping and Navigation Study Area to the south, between the UK and oil and gas infrastructure in the North Sea. There are three subsea cables that pass through the MHPGC Project Scoping Boundary, with all three in an east to west bearing. Two of these run between the UK and Norway, with the other between the UK and Denmark.

7.9.5.7 The port limits for Sunderland intersect the MHPGC Project Scoping Boundary at the southwest, with the port limits for Hartlepool and Tees 4nm to the south, and for the Port of Tyne approximately 6nm to the west.

7.9.5.8 OWFs are included within the baseline in proximity to the MHPGC Project Scoping Boundary, namely, the operational Blyth and Teesside (located 9nm to the west and 11nm to the southeast respectively). There are other OWFs in proximity to the MHPGC Project Scoping Boundary that are neither operational nor under construction, these will be assessed in further detail within the Cumulative Effects Assessment (CEA) within the NRA. Other infrastructure located in the vicinity to the MHPGC Project include the commissioned North Sea Link subsea cable, the Scotland to England Green Link (SEGL) Eastern Link 1 and 2 subsea cables (both of which are pre-construction), the EGL 3 and 4 subsea cables (also at pre-construction) and the planned Eastern Link interconnector.

7.9.5.9 Pilot boarding stations for vessels approaching Newcastle, Middlesbrough, and Blyth are located outwith the Shipping and Navigation Study Area, and are a minimum of 6nm, 7nm, and 11nm from the MHPGC Project, respectively. Various charted anchorages are located in proximity, these include the Whiskey anchorage 1nm south of the MHPGC Project Scoping Boundary, the Charlie anchorage approximately

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8nm southeast, the Echo anchorage approximately 9nm southeast, and an unnamed anchorage in the approaches to the Tyne, approximately 7nm west.

7.9.5.10 Firing practice area D513 is located in the southern half of the MHPGC Project Scoping Boundary. As described by Admiralty Chart 1192, "no restrictions are placed on the right to transit the firing practice areas at any time. The firing practice areas are operated using a clear range procedure; exercises and firing only take place when the areas are considered to be clear of all shipping."

Vessel Traffic

Project wide (Scottish and English Waters)

7.9.5.11 Two 14 day periods of vessel traffic data have been collected using terrestrial AIS receivers, covering 01 February to 14 February 2023 (the 'winter period') and 01 July to 14 July 2023 (the 'summer period'). The vessel traffic data collected over both periods is colour coded by vessel type and presented in Figure 7.35. Vessels deemed as constituting temporary traffic (e.g., vessels involved in the construction of Neart na Gaoithe OWF, and unmanned vessels engaged in surveys) have been removed on the basis that these are neither representative of the baseline, nor a likely future case scenario.

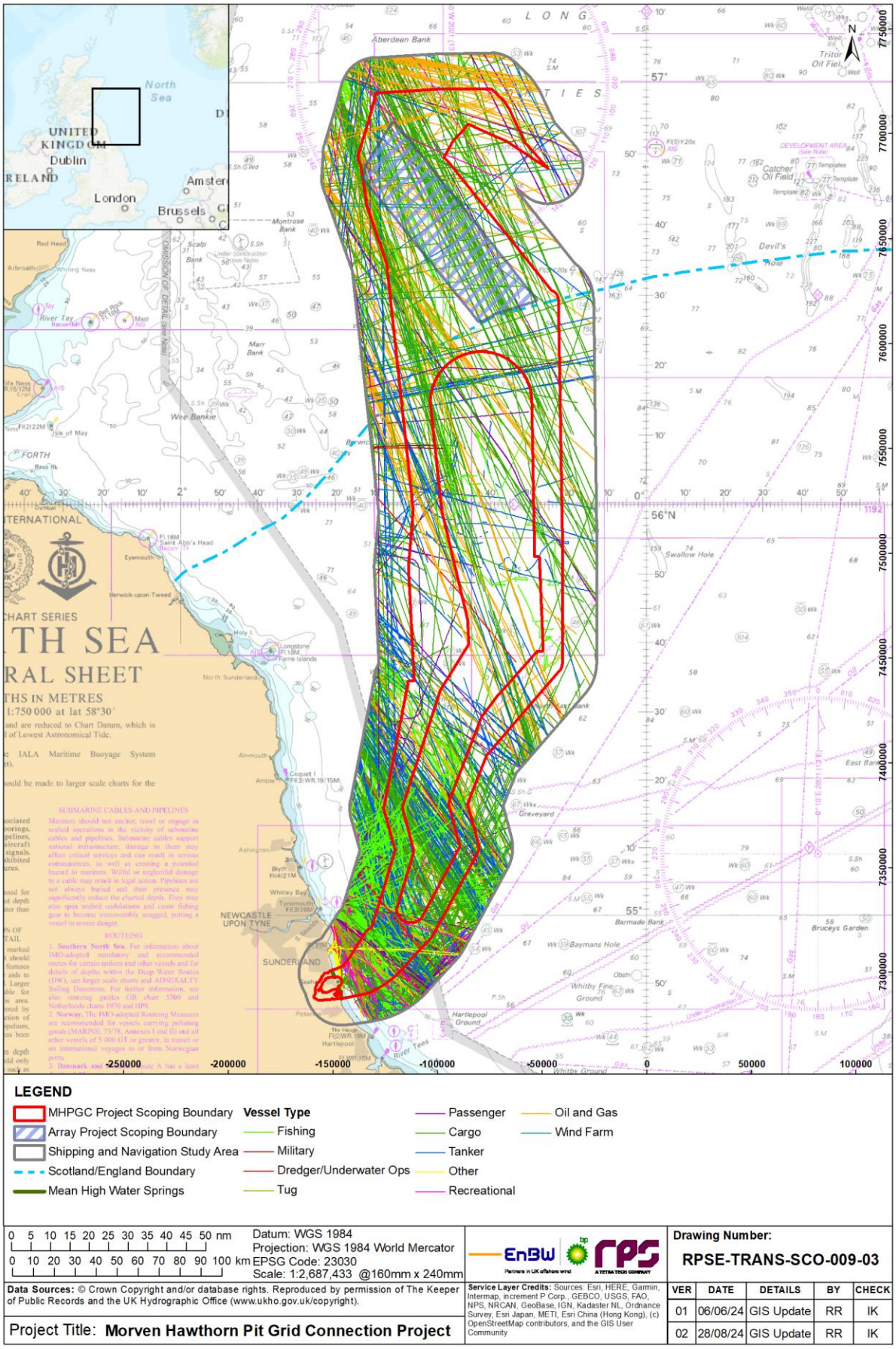


Figure 7.35: 28 Days of Automatic Identification System Vessel Traffic within the Shipping and Navigation Study Area (Winter and Summer 2023)

7.9.5.12 An average of 65 unique vessels per day were recorded within the Shipping and Navigation Study Area during the winter period, with an average of 44 unique vessels per day intersecting the MHPGC Project Scoping Boundary itself. An average of 67 unique vessels were recorded within the Shipping and Navigation Study Area during the summer period, with an average of 48 unique vessels intersecting the MHPGC Project Scoping Boundary itself. The difference in vessel numbers per day between the MHPGC Project Scoping Boundary and Shipping and Navigation Study Area was primarily related to the routeing at the north of the Shipping and Navigation Study Area, as well as vessel transits in the northeast and southeast, and fishing vessel activity close to shore.

7.9.5.13 The most frequently recorded vessel types within the Shipping and Navigation Study Area during the winter period were fishing vessels (38%), cargo vessels (26%) and tankers (19%). The most frequently recorded vessel types within the Shipping and Navigation Study Area during the summer period were cargo vessels (29%), fishing vessels (18%) and tankers (16%).

7.9.5.14 In general, commercial vessel traffic (cargo, passenger and tanker) was most prevalent in a northwest to southeast orientation along the coast and to/from Seaham and Sunderland. Commercial vessels transiting the coast were typically on routes to/from Newcastle and ports in the Firth of Forth, with routeing between Iceland and the Netherlands present further offshore.

7.9.5.15 Regular Roll-on/Roll-off passenger (RoPax) vessel routeing was recorded from two DFDS Seaways-operated vessels between Newcastle and Ijmuiden (the Netherlands), with one of the vessels recording approximately one vessel transit every two days in the winter and summer periods and the other recording approximately one vessel transit every two days in the summer period only. This RoPax route crossed the MHPGC Project at the south, close to landfall.

7.9.5.16 Regular Roll-on/Roll-off cargo (RoRo) vessel routeing was recorded from a CLdN-operated vessel between Þorlákshöfn (Iceland) and Rotterdam (the Netherlands). An average of two vessel transits per week were recorded in both the winter and summer periods in the northeast of the Shipping and Navigation Study Area.

7.9.5.17 Oil and gas vessel transits were recorded primarily in the north of the MHPGC Project, with these vessels routeing between Aberdeen and various offshore installations within the central North Sea.

7.9.5.18 Fishing vessel activity was prevalent in the south of the Shipping and Navigation Study Area. Based on vessel speed and track behaviour, it is likely that these vessels are primarily actively fishing as opposed to transiting. The vast majority of fishing vessel tracks (96%) were likely to be active fishing.

7.9.5.19 Approximately four vessels per day were recorded as likely being at anchor within the Shipping and Navigation Study Area during the survey periods. These were comprised solely of tankers (55%) and cargo vessels (45%). Vessels were most commonly recorded anchoring at the Whiskey anchorage southeast of Seaham, with vessels also recorded anchoring in the approaches to Sunderland. No vessels were recorded as likely at anchor within the MHPGC Project Scoping Boundary itself.

Marine Incidents

Scottish and English waters

7.9.5.20 A total of 856 RNLI lifeboat launches to 821 unique incidents were reported within the Shipping and Navigation Study Area between 2013 and 2022, corresponding to an average of 82 unique incidents per year. Incidents were primarily concentrated close to coast, approximately 90% of recorded RNLI incidents were noted within 5nm of shore. Of all incidents recorded, the most frequent incident types were machinery failure (28%) and 'person in danger' (26%). Unspecified incident types comprised 32% of all incidents. The most frequent casualties involved in incidents were 'person in danger' (34%) and powered recreational vessels (18%). Unspecified casualties comprised 19% of all incidents. Approximately seven incidents per year were recorded within the MHPGC Project Scoping Boundary itself. The majority of lifeboat launches were from the Sunderland station (75%), with launches from Hartlepool (11%) and Tynemouth (9%) also frequently recorded.

7.9.5.21 A total of 72 unique incidents were reported to the MAIB within the Shipping and Navigation Study Area between 2012 and 2021, corresponding to an average of seven incidents per year. The most common incident types recorded within the Shipping and Navigation Study Area were machinery failure (44%) and 'accident to person' (17%). The most frequently recorded vessel types involved in these incidents were fishing vessels (70%) and recreational vessels (13%). Approximately two incidents per year were recorded within the MHPGC Project Scoping Boundary itself.

7.9.6 Potential Impacts of the Morven Hawthorn Pit Grid Connection Project

7.9.6.1 A range of potential impacts on shipping and navigation have been identified which may occur during the construction, O&M and decommissioning phases of the MHPGC Project.

7.9.6.2 The impacts that have been scoped into the assessment are outlined in Table 7.54 together with a description of any additional data collection and supporting analyses that will be required to enable a full assessment of the impacts. In line with MGN 654, no impacts will be scoped out of the assessment.

7.9.6.3 At this stage, there are no potential impacts proposed to be scoped out of the assessment.

7.9.6.4 The potential impacts from the Morven Hawthorn Pit Grid Connection Project have been considered collectively for both English and Scottish waters, as these will not change between these areas given the commonality of the works proposed (offshore cabling).

Table 7.54: Impacts Proposed to be Scoped in to the Morven Hawthorn Pit Grid Connection Project Assessment for Shipping and Navigation

*Project phase refers to construction (C), O&M (O) and decommissioning (D).

Impact	Project Phase*			Relevant to England or Scotland	Justification	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D				
Increased vessel to vessel collision risk resulting from Project vessel movements (third party to Project vessel)	✓	✓	✓	Scottish and English waters.	The increased levels of vessel traffic in the area associated with the construction, O&M and decommissioning of the MHPGC Project may lead to increased collision risk (third party vessel to MHPGC Project vessel).	Additional six-month AIS-only vessel traffic data analysis will be undertaken to characterise vessel movements in the area and Vessel Monitoring System (VMS) data will be used to validate fishing vessel movements. Non-AIS traffic will be qualified using desktop sources and consultation with interested parties.	Qualitative assessment including consideration of baseline data, desktop sources, consultation and expert opinion.
Increased vessel to vessel collision risk resulting from displacement (third party to third party)	✓	✓	✓	Scottish and English waters.	Baseline vessel traffic data indicates that certain vessels are likely to deviate to pass around the construction/decommissioning area and, as such, collision risk in the area may increase. Non-AIS traffic will need to be considered.	Additional six-month AIS-only vessel traffic data analysis will be undertaken to characterise vessel movements in the area and VMS data will be used to validate fishing vessel movements. Non-AIS traffic will be qualified using desktop sources and consultation with interested parties.	Qualitative assessment including consideration of baseline data, desktop sources, consultation and expert opinion.

Impact	Project Phase*			Relevant to England or Scotland	Justification	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D				
Reduced access to local ports and harbours	✓	×	✓	Scottish and English waters.	The increased levels of vessel traffic in the area associated with the construction and decommissioning of the MHPGC Project may lead to disruptions to vessel schedules or difficulty in arriving at local ports.	Additional six-month AIS-only vessel traffic data analysis will be undertaken to characterise vessel movements in the area and VMS data will be used to validate fishing vessel movements. Non-AIS traffic will be qualified using desktop sources and consultation with interested parties.	Qualitative assessment including consideration of baseline data, desktop sources, consultation and expert opinion.
Disruption to fishing and recreational activities	✓	×	✓	Scottish and English waters.	Construction and decommissioning of the MHPGC Project may lead to increased difficulty of fishing vessels to partake in active fishing, as well as reduced access to sea area for fishing and recreational vessel transits.	Additional six-month AIS-only vessel traffic data analysis will be undertaken to characterise vessel movements in the area and VMS data will be used to validate fishing vessel movements. Non-AIS traffic will be qualified using desktop sources and consultation with interested parties.	Qualitative assessment including consideration of baseline data, desktop sources, consultation and expert opinion.

Impact	Project Phase*			Relevant to England or Scotland	Justification	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D				
Disruption to third party marine activities (i.e. dredging)	✓	✗	✓	English waters	Construction and decommissioning of the MHPGC Project may lead to increased difficulty of carrying out routine dredging works.	Additional six-month AIS-only vessel traffic data analysis will be undertaken to characterise vessel movements in the area and VMS data will be used to validate fishing vessel movements. Non-AIS traffic will be qualified using desktop sources and consultation with interested parties.	Qualitative assessment including consideration of baseline data, desktop sources, consultation and expert opinion.
Reduction of under-keel clearance as a result of subsea infrastructure	✗	✓	✗	Scottish and English waters.	Implementation of MHPGC Project infrastructure and associated protection could lead to reduction in water depth, and a risk of under-keel interaction to passing vessels.	Additional six-month AIS-only vessel traffic data analysis will be undertaken to characterise vessel movements in the area and VMS data will be used to validate fishing vessel movements. Non-AIS traffic will be qualified using desktop sources and consultation with interested parties.	Qualitative assessment including consideration of baseline data, desktop sources, consultation and expert opinion.

Impact	Project Phase*			Relevant to England or Scotland	Justification	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D				
Anchor interactions with subsea cables	×	✓	×	Scottish and English waters.	The presence of subsea cables may lead to an increase in the risk of anchor interactions.	Additional AIS vessel traffic data analysis will be undertaken to characterise vessel movements in the area, including the identification of areas where anchoring activity occurs frequently, as well as high risk areas where vessels may anchor in an emergency. Non-AIS traffic will be qualified using desktop sources and consultation with interested parties.	Qualitative assessment including consideration of baseline data, desktop sources, consultation and expert opinion.
Fishing gear interactions with subsea cables from a navigational safety perspective (noting that the risk to fishing from the MHPGC Project will be assessed fully in Chapter 7.8: Commercial Fisheries).	×	✓	×	Scottish and English waters.	The presence of subsea cables may lead to an increase in the risk of fishing gear interactions. Impacts are not considered for the construction and decommissioning phases because of the designed in measures in place that reduce the impact to acceptable parameters.	Additional AIS vessel traffic data analysis will be undertaken to characterise vessel movements in the area, including the identification of areas where fishing activity occurs frequently. Non-AIS traffic will be qualified using desktop sources and consultation with interested parties.	Qualitative assessment including consideration of baseline data, desktop sources, consultation and expert opinion.

Impact	Project Phase*			Relevant to England or Scotland	Justification	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D				
Interference with navigation, communications and position fixing equipment	✗	✓	✗	Scottish and English waters.	The subsea cables may impact equipment onboard vessels, including potential effects of electromagnetic interference from cables. Impacts are not considered for the construction and decommissioning phases because of the designed in measures in place that reduce the impact to acceptable parameters.	Additional AIS vessel traffic data analysis will be undertaken to characterise vessel movements in the area. Non-AIS traffic will be qualified using desktop sources and consultation with interested parties.	Qualitative assessment will include desktop sources and previous studies into effects.

7.9.7 Designed In Measures and Mitigation

7.9.7.1 As part of the project design process, a number of designed in measures (primary and tertiary) will reduce the potential for impacts on shipping and navigation (Table 7.55). As there is a commitment to implement these measures, they are considered inherent to the design of the MHPGC Project. The determination of magnitude and significance will assume the implementation of such measures. Some of these measures are considered standard industry practice for this type of development.

7.9.7.2 The requirement for any additional (secondary) mitigation measures will be dependent on the significance of the effects on shipping and navigation receptors. The requirement for and feasibility of any mitigation measures will be consulted upon with statutory consultees throughout the EIA process.

Table 7.55: Designed in Measures of the Morven Hawthorn Pit Grid Connection Project, Relevant to Shipping and Navigation

Reference number	Designed in Measures	Justification	Primary or Tertiary
MM-11	Implementation and monitoring of cable protection (via burial or external protection where adequate burial depth, as identified via risk assessment, is not feasible) with any damage, destruction or decay of cables notified to MCA, NLB, Kingfisher and UKHO no later than 24 hours after discovered.	Minimises the risks of underwater allision with cable protection, anchor or fishing gear interaction with subsea cables and interference with magnetic position fixing equipment.	T
MM-32	Adherence to good practice guidance with regards to fisheries liaison (e.g. FLOWW, 2014;2015) including ongoing consultation with the fishing industry and Fisheries Industry Representatives (FIRs), as appropriate, and the appointment of a Fisheries Liaison Officer (FLO).	To allow for effective communication with fishing vessels in the area.	T
MM-76	Compliance of Project vessels with international marine regulations as adopted by the Flag State, including the International Regulations for Preventing Collisions at Sea (COLREGs) (International Maritime	Minimises the risk introduced due to the presence of Project vessels.	T

Reference number	Designed in Measures	Justification	Primary or Tertiary
	Organisation (IMO), 1972/77) and the International Convention for the Safety of Life at Sea (SOLAS) (IMO, 1974) through the Navigation Safety and Vessel Management Plan.		
MM-81	Timely and efficient distribution of Notices to Mariners (NtM), Kingfisher notifications and other navigational warnings of the position and nature of works associated with the MHPGC Project.	Maximises awareness of the MHPGC Project allowing vessels to passage plan in advance.	T
MM-82	Relevant policy guidance on water depth reduction will be followed during the planning and installation of the cable.	To ensure that water depths are not reduced to unsafe levels.	T
MM-83	Communication with relevant harbour authorities such as the Port of Sunderland will be undertaken when full details of the construction works are known, and a cable lay plan will be in place detailing specific procedures relating to cable installation works in busy shipping channels.	Minimisation of disruption to port activities.	T
MM-84	Cable installation vessels and support vessels will display appropriate marks and lights, and, where possible, will broadcast their status on AIS at all times.	Indication of the nature of the work in progress, and highlight their restricted manoeuvrability	T
MM-85	Temporary aids to navigation will be deployed (if required).	Guidance of vessels around any areas of installation activity.	T
MM-86	Passing vessels will be requested to maintain a ‘safe’ distance from installation vessels restricted in manoeuvrability. This will be monitored by guard vessels.	Collision prevention for vessels which are unable to perform evasive manoeuvres.	T
MM-87	Guard vessel(s) as required by risk assessment.	Maximises awareness of temporary hazards.	T

Reference number	Designed in Measures	Justification	Primary or Tertiary
MM-88	Compliance with Marine Guidance Note (MGN) 654 (MCA, 2021) and its annexes, where applicable.	Ensures that reductions in under-keel clearance are acceptable.	T
MM-89	Suitable cable design, including burial and cable separation distance, to minimise impact of Electromagnetic Field (EMF) and limit compass deviation to three-degrees for 95% of the MHPGC Project, and five-degrees for the remaining 5% of the MHPGC Project.	Consideration of EMF interference when determining cable design elements including burial and separation distance between cables.	P
MM-90	Appropriate marking on UKHO Admiralty charts.	To alert potential seabed users of the MHPGC Project.	T
MM-91	Marine coordination and communication to manage Project vessel movements.	Reduce risk of collision for Project vessels.	T

7.9.8 Proposed Assessment Methodology

7.9.8.1 An assessment will be undertaken to consider the potential impacts of the MHPGC Project on vessel routeing in the Shipping and Navigation Study Area and the wider Cumulative Study Area. This will include the routeing to and from the main ports in the area.

7.9.8.2 As required under the MCA methodology (Annex 1 to MGN 654) (MCA, 2021a) and in line with international marine risk assessment standards, the IMO FSA (IMO, 2018) approach will be applied to the assessment of effects. The FSA methodology is centred on risk control. The method assesses each impact in terms of its frequency of occurrence and the severity of its consequence, to determine its significance as either 'broadly acceptable', 'tolerable with mitigation' or 'unacceptable.' The FSA methodology risk matrix is shown in Table 7.56. Any impact assessed as 'unacceptable' will require additional mitigation measures implemented beyond those considered designed in to reduce the impact to within 'tolerable' or 'broadly acceptable' parameters.

Table 7.56: IMO FSA Risk Matrix

Frequency of Occurrence	Frequent	Tolerable with Mitigation	Tolerable with Mitigation	Unacceptable	Unacceptable	Unacceptable
	Reasonably Probably	Broadly Acceptable	Tolerable with Mitigation	Tolerable with Mitigation	Unacceptable	Unacceptable
	Remote	Broadly Acceptable	Broadly Acceptable	Tolerable with Mitigation	Tolerable with Mitigation	Unacceptable
	Extremely Unlikely	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable	Tolerable with Mitigation	Tolerable with Mitigation
	Negligible	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable	Broadly Acceptable	Tolerable with Mitigation
		Negligible	Minor	Moderate	Serious	Major
		Severity of Consequence				

7.9.8.3 The frequency and consequence rankings per hazard will be determined using a number of inputs, notably:

- outputs of the characterisation of the baseline including vessel traffic surveys;
- consideration of designed in measures;
- lessons learned from other OWF transmission assets;
- consultation output;
- expert opinion.

7.9.8.4 Additional six-month AIS-only analysis will be undertaken to capture vessel traffic movements in two seasonal three-month periods.

7.9.9 Potential Cumulative Impacts

7.9.9.1 Cumulative effects with the Morven Offshore Wind Array Project and the second grid connection project in the Branxton area Southeast Scotland will be considered, together with cumulative effects with other developments, where relevant.

7.9.9.2 The cumulative effect assessment will follow the approach outlined in Chapter 4: EIA Methodology.

7.9.10 Potential Inter-related Effects

7.9.10.1 The EIA will consider inter-related effects arising from the MHPGC Project, their own phases (project lifetime) and different effects on one receptor in one phase (receptor led). The EIA will consider inter-related effects of multiple impacts from the construction, O&M and decommissioning phases of the MHPGC Project, affecting

one receptor. Inter-related effects will be assessed through consideration of all effects on a receptor, considering both spatial and temporal overlap, within the MHPGC Project. This will ensure that the MHPGC Project is appropriately considered within the EIA and in line with Chapter 4: EIA Methodology.

7.9.11 Potential Transboundary Impacts

7.9.11.1 Given the international nature of shipping, the in-isolation impact assessment and the cumulative impact assessment will consider vessel routeing to and from international ports and used by vessels owned by international operators. Therefore, impacts listed in Section 7.9.6 may be relevant at a transboundary level. The potential for transboundary impacts will be further considered in the EIA Report/ES.

7.10 Marine Archaeology

7.10.1 Introduction

7.10.1.1 This chapter of the Scoping Report identifies the marine archaeology receptors of relevance to the Morven Hawthorn Pit Grid Connection Project (hereafter referred to as 'MHPGC Project') and considers the potential impacts arising from the construction, operation and maintenance (O&M), and decommissioning of the MHPGC Project. This scoping chapter adopts a proportionate approach to only those impacts with potential to result in likely significant effects and therefore scopes out other impacts where there is evidence that the effects are not likely to be significant.

7.10.1.2 The potential impacts on Cultural Heritage and Archaeology (landward of Mean Low Water Springs (MLWS)) are described in Chapter 8.4: Cultural Heritage and Archaeology of this Scoping Report.

7.10.2 Policy and Legislation

7.10.2.1 This section identifies the relevant legislation, policy and other documentation that will inform the assessment of likely significant effects with respect to marine archaeology (Table 7.57). Further information on policies relevant to the Environmental Impact Assessment (EIA) and their status is provided in Chapter 2: Policy and Legislation.

Table 7.57: Relevant Policy and Legislation for Marine Archaeology

Relevant Legislation	Relevance to the Assessment
National Legislation (Scotland)	
Scottish Marine Regions Order 2015 (Scottish Government, 2015a)	The Scottish Marine Regions Order 2015 established statutory Scottish Marine Regions (SMRs) up to the 12nm limit. Assessment areas which consolidate the existing statutory SMRs with non-statutory Offshore Marine Regions (OMRs) which extend seaward from 12nm to the continental shelf limits adjacent to Scotland.
National Legislation (England)	
Protection of Wrecks Act 1973 (UK Government, 1973)	Section 1 of the Protection of Wrecks Act 1973 provides for the designation of a restricted area round the site of a vessel lying wrecked on or in the seabed and on account of the historical, archaeological or artistic importance or of any objects contained or formerly contained in it. Section 2 of the Protection of Wrecks Act 1973 provides for the designation of a prohibited area round a vessel lying wrecked of which is considered as dangerous due to their contents.

Relevant Legislation	Relevance to the Assessment
Ancient Monuments and Archaeological Areas Act 1979 (as amended) (UK Government, 1979)	This Act is primarily concerned with onshore assets, but in recent years it has also been used to provide some level of protection for underwater sites. Scheduled Monuments and Areas of Archaeological Importance (AAIs or their equivalent) are afforded statutory protection by the Secretary of State, and consent is required for any works. The law is administered by the Secretary of State within the Department of Culture, Media and Sport generally via their statutory advisors.
Protection of Military Remains Act 1986 (as amended) (UK Government, 1986)	The Protection of Military Remains Act 1986, section 2 makes it an offence to interfere with any remains of an aircraft or vessel which are comprised in a place which is part of a controlled site or any remains of an aircraft or designated vessel which has crashed, sunken or stranded while in military service, unless a licence is obtained. Any crashed military aircraft will receive automatic protection under this Act (section 1(1)). Maritime vessels sunk or stranded during military service are not automatically protected, but the Secretary of State has powers to designate as a protected vessel (section 1(2)).
Merchant Shipping Act 1995 (UK Government, 1995)	This Act details the procedures for determining the ownership of maritime finds that turn out to be 'wreck' in the offshore, onshore, or the intertidal zone of UK territorial waters. 'Wreck' includes all craft, parts of these, their cargo or equipment. Section 236 of the Merchant Shipping Act 1995 stipulates that all wreck within the UK's territorial waters (up to 12 nm) and any wreck landed in the UK from outside the UK's territorial waters must be declared to the Receiver of Wreck (RoW) who acts on behalf of the MCA in administering this section of the Act. If any maritime finds are brought onshore, the RoW must be notified, and the finds must be kept until the RoW determines ownership or requests that they be given to the RoW. This Act is administered by the MCA. All items which are raised from the seabed, regardless of age or importance, must be reported to the RoW who will act to settle questions of ownership and salvage.
Marine (Scotland) Act 2010 (UK Government, 2010)	Section 67 of this act allows Scottish ministers to designate a historic marine protected area (HMPA). HMPAs consist of marine historic assets (e.g. historic shipwrecks) of national importance within Scottish territorial waters (section 73).

7.10.3 Study Area

7.10.3.1 The Marine Archaeology Study Area is shown in Figure 7.36 and is defined as the MHPGC Project Scoping Boundary up to MLWS plus a 2km buffer offshore. The Marine Archaeology Study Area encompasses all elements of the MHPGC Project and was used as the search area for obtaining records from relevant archive databases. This Marine Archaeology Study Area allows for a greater understanding of the wider archaeological baseline environment and for trends to be recognised and allows any identified sites to be placed into a wider archaeological context.

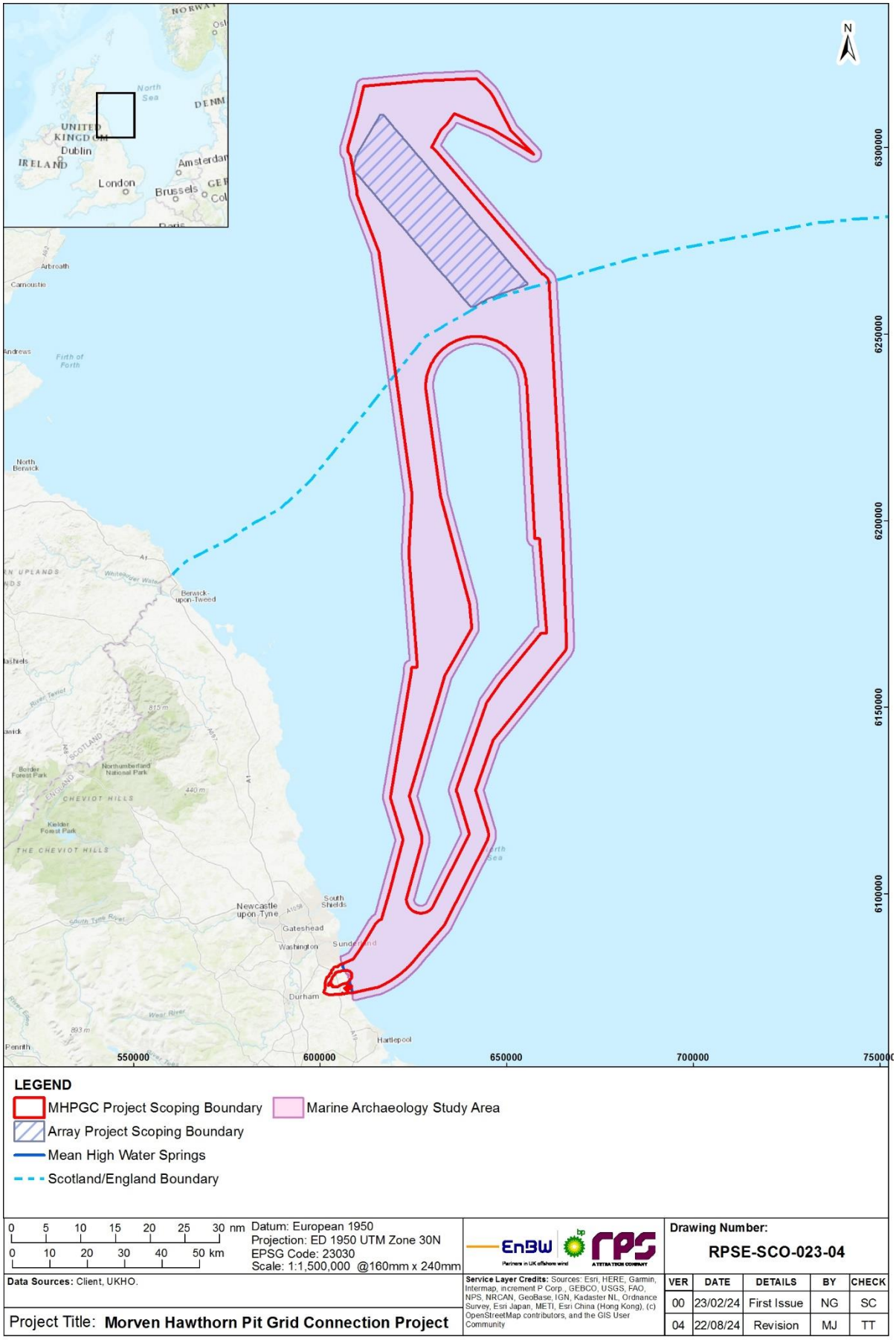


Figure 7.36: Morven Hawthorn Pit Grid Connection Project Marine Archaeology Study Area

7.10.4 Data Sources

7.10.4.1 Several data sources were consulted to inform the Marine Archaeology Chapter of the Scoping Report and will be used to inform the Marine Archaeology Technical Report to be submitted with the EIA Report/Environmental Statement (ES). Data sources relevant to the MHPGC Project are presented in Table 7.58. Northumberland, Newcastle, and Durham Council Historic Environment Records (HER) were contacted but did not hold any data within the MHPGC Project Scoping Boundary. Geophysical surveys have been undertaken within the MHPGC Project Scoping Boundary and the results will be included in the marine archaeology technical report at the Preliminary Environmental Information Report (PEIR) stage.

Table 7.58: Data Sources of Relevance to Marine Archaeology

Title	Source	Year	Author
International/National (UK)			
United Kingdom Hydrographic Office (UKHO) Wreck and Obstructions Data	UKHO	2024	UKHO
National Maritime Heritage Records (UK)	Unpath'd Waters	2024	HE, HES, UKHO, Archaeology Data Service, Coastal and Intertidal Zone Archaeological Network (CITiZAN)
Submerged Landscapes	European Marine Observation and Data Network (EMODnet) Geology	2023b	BGS
Submerged Prehistoric Archaeology and Landscape of the Continental Shelf (SPLASHCOS)	SPLASHCOS	2013	SPLASHCOS
GeoIndex (Offshore)	British Geological Survey (BGS)	2023a	BGS
National (Scottish Waters)			
National Record of the Historic Environment (NRHE) records for Scotland (hereafter Canmore)– including shipping and aviation wrecks, protected wrecks, and HMPAs	Historic Environment Scotland (HS)	2023	HES

Title	Source	Year	Author
Aberdeenshire Council HER (including shipping and aviation wrecks)	Aberdeenshire Council	2023	Aberdeenshire Council
Angus Council HER (including shipping and aviation wrecks)	Angus Council	2023	Angus Council
Protected Wrecks Map	Marine Directorate – Licensing and Operations Team (MD-LOT)	2023	MD-LOT
National (English Waters)			
NRHE for England	Historic England (HE)	2023	HE

7.10.4.2 These sources were compiled into gazetteers (see Appendix C, of the Scoping Report) to aid in establishing the baseline of the Marine Archaeology Study Area. The maritime and aviation archaeology data has been classified as either, records where material is known to be on the seabed and 'recorded losses'. Recorded losses represent maritime and aviation losses that are known to have occurred in the vicinity but to which no specific location can be attributed.

7.10.4.3 Where multiple entries across the datasets occur that relate to the same archaeological receptor, the coordinates form the UKHO dataset assume primacy as they are most frequently updated with the latest surveyed positions.

7.10.5 Baseline Environment

7.10.5.1 This chapter provides a summary of the marine archaeological baseline environment within the Marine Archaeology Study Area. The baseline environment is structured into the following categories:

- Submerged prehistoric archaeology: this includes palaeochannels and other inundated terrestrial landforms that may preserve sequences of sediment of palaeoenvironmental interest, as well as Palaeolithic and Mesolithic sites and artefacts;
- Maritime archaeology: relates generally to craft or vessels and any of their associated structures and/or cargo;
- Aviation archaeology: this comprises all military and civilian aircraft crash sites and related remains.

7.10.5.2 Gazetteers of the known marine archaeology within the Marine Archaeology Study Area can be found in Appendix C, of the Scoping Report.

7.10.5.3 The following archaeological baseline has been considered chronologically using the broad temporal phases described below. Dates are given according to convention,

with prehistoric periods given in years Before Present (BP) and later archaeological/historical periods given as Before Christ (BC) or *anno domini* (AD). Due to the differences in archaeological periodisation, two archaeological chronologies are presented. Scotland's archaeological periods (Table 7.59) is based on the Scottish Archaeological Research Framework (ScARF). England's archaeological and historical periods are those given by HE (Table 7.60).

Table 7.59: Scottish Archaeological Periods and Associated Date Ranges (ScARF, 2012a)

Period	Date Range
Palaeolithic.	Circa 700,000 to 12,750 BP.
Mesolithic.	12,750 to 6,250 BP.
Neolithic.	6,250 to 4,450 BP.
Chalcolithic and Bronze Age.	4,450 BP/2,500 BC to 2,750 BP/800 BC.
Iron Age.	800 BC to AD 400.
Roman presence.	AD 77 to 211.
Medieval.	AD 400 to 1500.
Modern.	AD 1500 to Present Day.

Table 7.60: English Archaeological Periods and Associated Date Ranges (Historic England, 2024)

Period	Date Range
Palaeolithic	Circa 1,000,000 to 12,000 BP.
Mesolithic.	12,000 to 6,000 BP.
Neolithic.	6,000 to 4,200 BP.
Bronze Age.	4,600BP/2,600 BC to 2,800 BP/800 BC.
Iron Age.	800 BC to AD 43.
Roman.	AD 43 to 410.
Early Medieval.	AD 410 to 1066.
Medieval.	AD 1066 to 1500.
Post-medieval.	AD 1500 to 1800.
19th century.	AD 1800 to 1899.
Modern.	AD 1900 to Present.

Baseline environment in Scottish waters

Submerged Prehistoric Archaeology

7.10.5.4 There is a lack of evidence for human occupation during the Palaeolithic in Scotland, the Marine Archaeology Study Area was likely repeatedly covered in ice during recurring glacial cycles, such as the Wolstonian (350,000 to 132,000 BP) and the Devensian (122,000 to 10,000 BP) (Historic England, 2023). If any Palaeolithic (ca 949,000 to 12,000 BP) material did exist, it would likely have been obliterated by the actions of the ice or at least the ice would have reworked anything that survived. The eastern Scottish seaboard, represented by Late Upper Palaeolithic (LUP) lithic assemblage at Nethermills Farm Aberdeenshire, dating to around 14,000 BP) (Ballin and Wickham-Jones, 2017), the pattern and process of this post-glacial reoccupation is unclear.

7.10.5.5 Offshore, however, there is little to no potential for the survival of archaeological material before the advent of the Holocene period (12,000 BP to Present). The northern section of the Marine Archaeology Study Area, primarily the area within Scottish waters may have quickly been submerged following the Last Glacial Maximum (LGM), circa 18,00 BP. Raised marine deposits have been found within the inner estuaries of Scottish rivers, suggesting that even nearshore areas were submerged by the Windermere Interstadial (circa 15,000 to 13,000 BP). This in turn suggests that offshore areas were submerged by this period at least, or perhaps even earlier (Brooks *et al.*, 2011; Holloway *et al.*, 2002; Peacock, 1999; Stoker *et al.*, 2008). Thus, it can be inferred that most of the Marine Archaeology Study Area may have been submerged relatively quickly following the LGM. There is, therefore, low potential for submerged prehistoric archaeology within the Scottish jurisdiction of the Marine Archaeology Study Area.

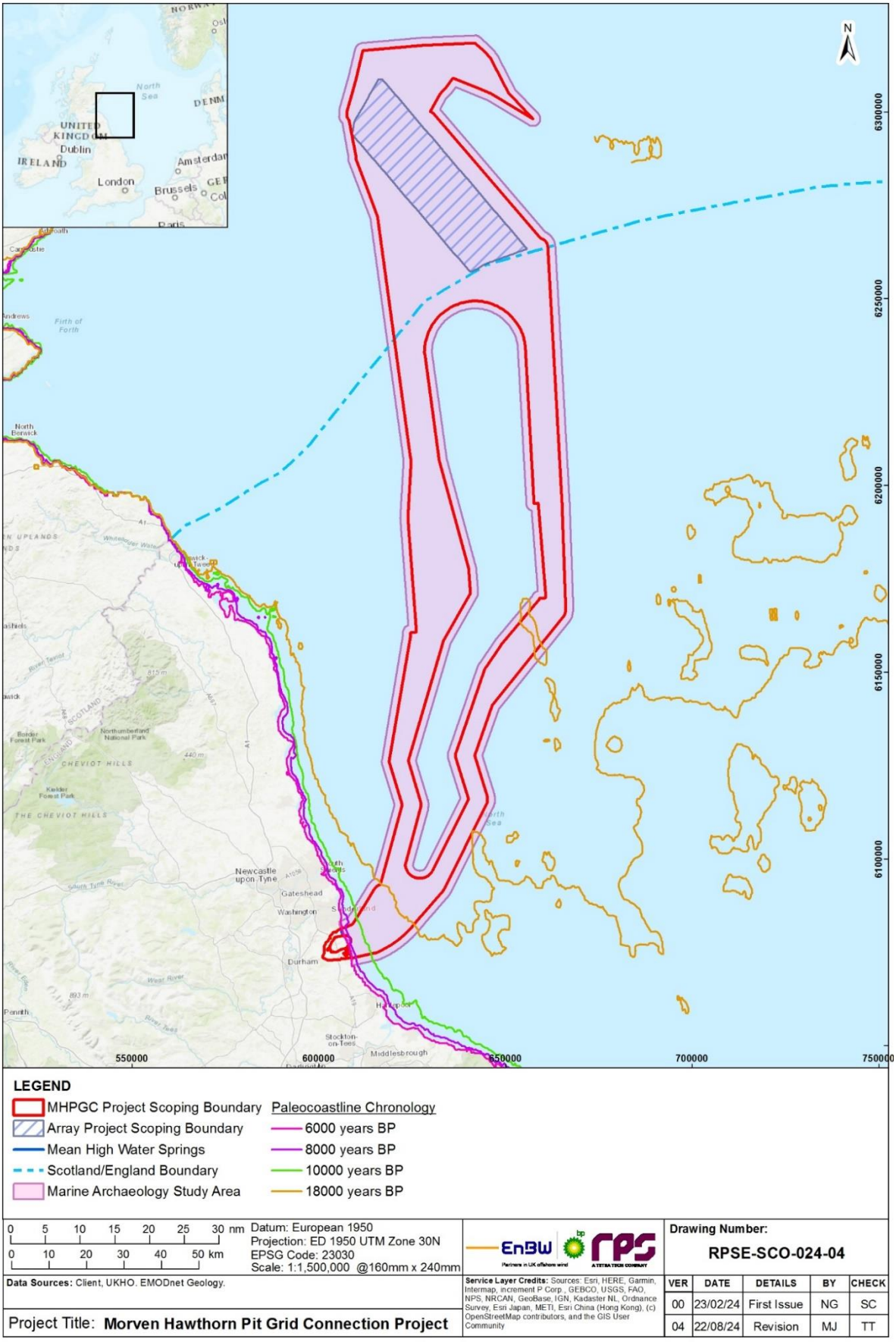


Figure 7.37: Modelled Palaeocoastlines (Brooks *et al.*, 2011) in Relation to the Marine Archaeology Study Area

Maritime and Aviation Archaeology

7.10.5.6 The desktop study has identified 12 wrecks or possible wreck sites within the Scottish jurisdiction of the Marine Archaeology Study Area that are considered 'live'. Their locations are shown in Figure 7.38. Live wreck records are those considered to relate to known material on the seabed through either geophysical or diver observation. Of these 12 wrecks, three can be identified by name. *Baysoto* is a steam ship, built in 1905, that was torpedoed and sunk on 06 August, 1917. The remains on the seabed appear intact and upright. *Ailsa* is a steam ship that was captured by a German submarine and scuttled on 18 June 1915. *Valiant* is a fishing vessel that sunk on 13 May 1992. The remains on the seabed appear upright and intact. The remaining nine wrecks cannot be identified by name and so no identification can be made or further information given at this time. Only one of the nine unknown wrecks appears to be degraded while the rest have been observed intact, so it is possible that site specific geophysical survey may aid in the identification of these wrecks. As there are 13 recorded losses within Scottish waters of the Marine Archaeology Study Area, it is also possible that the as yet unidentified wrecks relate to some of these recorded losses (see the fuller discussion of recorded losses below).

7.10.5.7 The recorded locations of all wreck sites are presented in Appendix C, of the Scoping Report. The results of the proposed geophysical survey will aid in establishing the presence and significance of archaeological material within the Marine Archaeology Study Area.

7.10.5.8 The UKHO data for the Marine Archaeology Study Area includes seven records of sites that have the status of 'dead', indicating that although material has been positively identified at some point, further observations at these locations have not located material and so it has likely either become buried, dispersed, or completely deteriorated. Whilst it is considered less likely for material of archaeological significance to exist at these locations there is still some potential for material to have dispersed, become buried, or disintegrated. Archaeological assessment of the geophysical survey data will clarify whether archaeological material survives at these locations and will further characterise the archaeology of the Marine Archaeology Study Area.

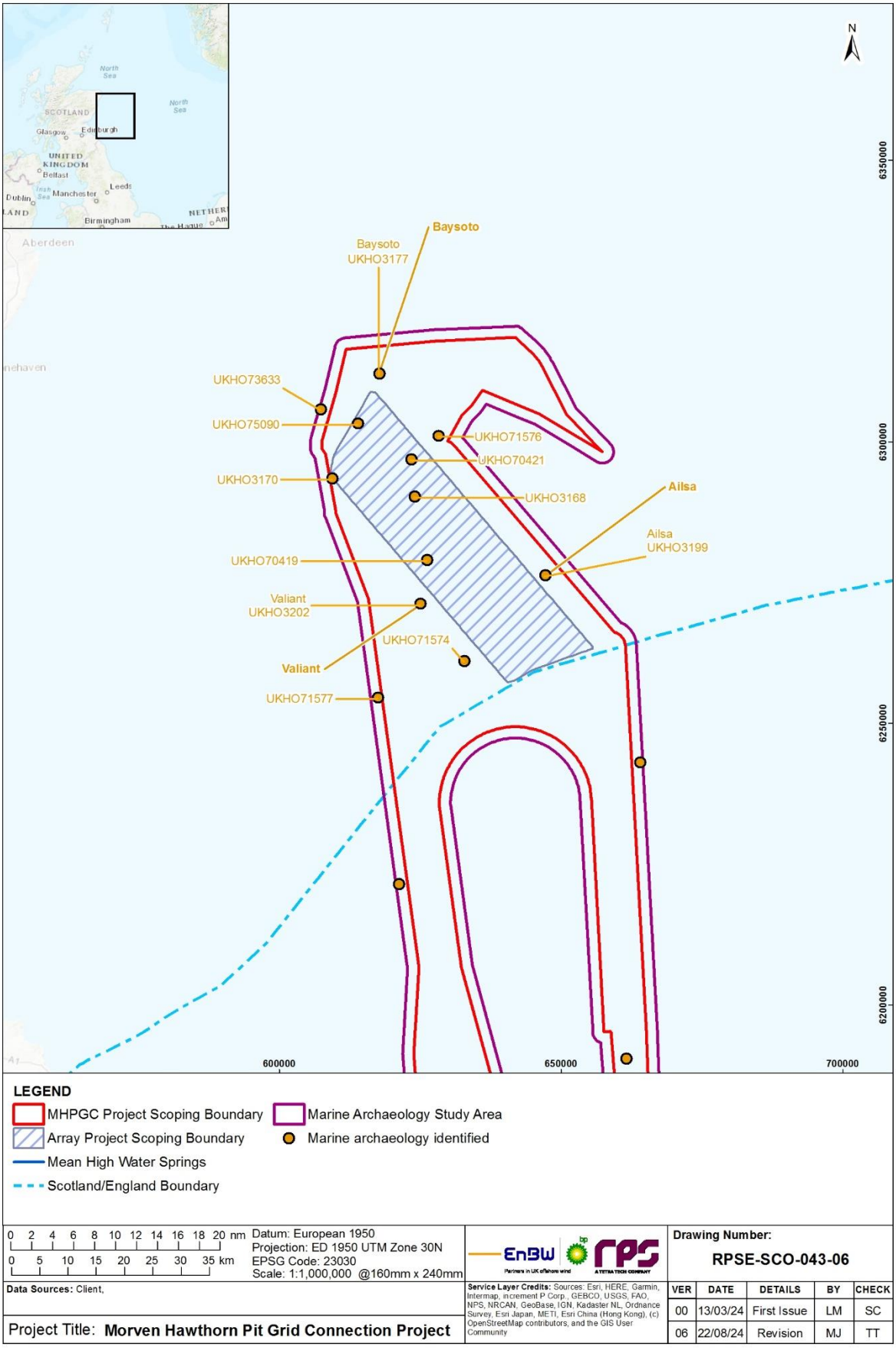


Figure 7.38: Marine Archaeology Within the Northern Portion of the Marine Archaeology Study Area

Maritime Archaeology Potential

7.10.5.9 Maritime archaeological sites and materials can be defined as the physical remains of boats and ships that have been wrecked, sunk or have foundered, and artefacts that rest upon the seabed as the result of being jettisoned or lost overboard (for example anchors, cannon or fishing gear).

7.10.5.10 Although the existence and survival of Palaeolithic and Mesolithic watercraft are highly speculative in Scottish waters, economic strategies such as seal-hunting, particularly around the Pleistocene-Holocene Transition (circa 12,000–8,000 BP) may have led to the need for watercraft (Ballin and Bjerck, 2016). Mesolithic material at sites on the Northern Isles such as Stronsay, Orkney suggest potential travel by watercraft (Lee and Woodward, 2009).

7.10.5.11 Maritime activity in the Bronze Age is evidenced by vessel examples and equipment, such as the Carpow logboat from the Tay Estuary, an inshore example of a probably common type of vessel used across historical periods (Strachan, 2010). A fragment of an earlier logboat, dating to circa 4,000 BP was found at Catherinefield, Dumfries and Galloway (Mowat, 1996).

7.10.5.12 Iron Age maritime activity is evidenced by sites such as Dumbuck crannog which lies on the intertidal foreshore of the Firth of Clyde (Dixon, 2004; Hale and Sands, 2005; Jacobsson *et al.*, 2017). Structural timbers have been dated to this period, and at least 30 logboats have been found on, or close to, the shores of the inner Firth of Clyde. This suggests that the firths of the eastern coast of Scotland may hold similar evidence, including watercraft capable of coastal journeys.

7.10.5.13 Maritime activity in the North Sea and in the vicinity of the MHPGC Project increased during the early medieval period. Early medieval boats are known from the inland waterways of Perth and Kinross, such as the Errol two logboat (radiocarbon dated to between AD 548-AD 599) (Strachan, 2010). Vessel traffic increase towards the end of this period is due, in part, to Viking raiding as well as the intensification of regional trade and migration, and the growth of several ports on the east coast of the UK (Friel, 2003; Hutchinson, 1997; Kelly, 1992; Middleton, 2005). Archaeological evidence for vessels from this period is, however, rare and evidence only exists for the later part of the Medieval period. Boat fragments from a probably substantial sea-faring ship were produced from excavations in Perth, including frames, lengths of clinker planking, an oarport cover and tholes (pins on which oars pivot while rowing) (Martin and Bogdan, 2012; ScARF, 2012b).

7.10.5.14 Due to the advent of shipping records and the increased use of metal structural elements into vessel designs throughout the Modern period, losses from this time represent the greatest potential for unrecorded archaeology to be discovered. Wrecks from the 19th and early 20th centuries are often more visible to geophysical survey on the seabed than remains of wooden vessels. Metal construction materials reflect sonar signals better than wood, producing more recognisable anomalies in bathymetric data, and generate strong magnetic anomalies. This greater visibility is reflected in the generally higher number of known wrecks (i.e. those that have been located and accurately charted on the seabed) in contrast to earlier periods.

7.10.5.15 There are 13 recorded vessel losses within the Marine Archaeology Study Area for the Scottish jurisdiction, all of which relate to losses which occurred in the nineteenth and twentieth centuries. Of these 13, two were sunk by enemy action

during World War I (*Duke of York* and *Sceptre*) while a third (HMS *Rockingham*) hit a mine and later sunk while being towed on 27 September 1944. The remaining 10 recorded losses were wrecked through a combination of bad weather, accidents, and/or misadventure.

7.10.5.16 The Modern period presents the greatest potential for previously unrecorded archaeological material to be encountered within the Marine Archaeology Study Area.

Aviation Archaeology Potential

7.10.5.17 There are no known aviation crash sites designated under the Protection of Military Remains Act 1986 within the Scottish waters of the Marine Archaeology Study Area. In addition to the 13 recorded vessel losses discussed above, there are an additional four recorded losses of aircraft within the consulted datasets which may relate to as yet unknown material on the seabed.

7.10.5.18 Three of the four aviation recorded losses are military in nature. The earliest record for an aviation loss is that of a Short Admiralty Type 74 seaplane that failed to return from North Sea patrol on 29 September 1914. The second military aviation recorded loss is that of an F-4 Phantom fighter jet that crashed on 04 August 1978 from which wreckage was sighted by another aircraft but could not be relocated due to visibility. The third is that of a Jaguar T2 fighter that crashed into the sea on 22 June 1979. The remaining recorded aviation loss is that of a helicopter that crashed on 14 November 1970 while *en route* from Dyce Airport to the oil rig Staflo and may have floated for a time before finally sinking.

7.10.5.19 Thousands of military and civilian aircraft casualties have occurred in UK waters since the advent of powered flight in the early 20th century. The bulk of these are casualties date to World War II and most are concentrated off the south and southeast coasts of England (Wessex Archaeology, 2008). There are, however, significant wartime aviation facilities in northeastern Scotland. Aviation training and mission flights were conducted from eastern Scotland such as Royal Air Force (RAF) Dyce, Edzell, Montrose, Arbroath (HMS Condor), RAF Dalcross, Kinloss, Lossiemouth, Crimond (HMS Merganser) during World War II, all of which may have contributed to as yet unlocated aviation losses within the Marine Archaeology Study Area (Scottish Aviation Trail, 2023).

7.10.5.20 Since World War II, despite the volume of both military and civilian air traffic, there have been few aviation losses off the east coast of Scotland in the vicinity of the Marine Archaeology Study Area. While the aviation archaeology record is potentially larger than the recorded losses illustrate, the ephemeral nature of aircraft wrecks ensures that many sites remain unknown and unrecorded. In addition, despite the potential extensive losses at sea, records are seldom tied to an accurate position. These difficulties complicate any assessment of the likely presence of aircraft wreckage on any particular area of seabed. Any military aviation crash sites are subject to protection under the Protection of Military Remains Act 1986; civilian aircraft, however, are not subject to protection under the terms of that Act.

Baseline environment in English waters

Submerged Prehistoric Archaeology

7.10.5.21 The prehistoric record for England spans from the earliest hominin occupation of what is now the UK, at least as far back as 970,000 BP (based on evidence from Happisburgh, Norfolk and Pakefield, Suffolk) (Historic England, 2023).

7.10.5.22 While palaeocoastline modelling undertaken by Brooks *et al*. (2011) (Figure 7.37) suggests that the majority of the Marine Archaeology Study Area, up to approximately 18 km seaward of landfall may have been fully submerged since the LGM. It is, therefore, unlikely that there is any potential for evidence of submerged prehistoric archaeology in these areas of the Marine Archaeology Study Area. However, where the palaeocoastline modelling indicates there were potentially stable subaerial landforms within the Marine Archaeology Study Area, there is potential for submerged prehistoric archaeological material in association with these palaeolandscapes. The palaeocoastline was modelled to have existed here as early as 18,000 BP and, as such, there remains a possibility of submerged palaeolandscapes features and prehistoric archaeology. The presence of the Botney Cut Formation was also located in the southern part of the Marine Archaeology Study Area, associated with channels within fluvial networks surrounding Doggerland during periods of subaerial exposure. The presence of the Botney Cut Formation and the proximity of the Marine Archaeology Study Area to Doggerland indicates that the potential for submerged prehistoric archaeology is high (MSDS Marine, 2023; see Figure 7.37). Further site specific investigation, particularly in this area, can further knowledge of palaeolandscapes.

7.10.5.23 The SPLASHCOS dataset recorded several sites just to the north and south of the Marine Archaeology Study Area. A stray find of an antler harpoon, dated to the Mesolithic period, was located at Whitburn (Mellars, 1970). Due to its excellent preservation, it is thought that it washed up from submerged peats offshore. Mesolithic and Neolithic sites and finds have been recorded to the south of the Marine Archaeology Study Area on the foreshore between Hartlepool and Seaton Carew. Most importantly was the discovery of a Neolithic human skeleton (Buglass, 1994; Waugham *et al.*, 2005). Other sites and finds include lithic implements, a red deer skeleton with a wooden point embedded in its ribs, and a possible Neolithic fish trap.

7.10.5.24 Archaeological assessment of the geophysical and geotechnical survey data will further characterise the palaeolandscape and submerged prehistoric potential of the Marine Archaeology Study Area, the results of which will be presented in the Marine Archaeology Technical Report of the EIA Report/ES.

Maritime Archaeology

The UKHO data contains 112 ‘live’ records that are wrecks or possible wreck sites within the English jurisdiction of the Marine Archaeology Study Area. Their distribution is shown in Figure 7.39 and Figure 7.40 and full details are given in Appendix C, of the Scoping Report.

Designated maritime archaeology

7.10.5.25 One wreck designated as a Protected Place for the purposes of the Protection of Military Remains Act 1986 (as amended), that of the RFA *Creosol* (UKHO 5669), is located within the southern portion of the MHPGC Project Scoping Boundary. RFA *Creosol* is a British tanker built in 1916 as one of 18 Admiralty-designed vessels. RFA Creosol was sunk on 07 February 1918 by the German submarine UC-17, with the loss of two lives.

7.10.5.26 While not designated, the wreck of HMS *Snaefell* (UKHO 5679) is also present within the southern portion of the MHPGC Project Scoping Boundary. HMS *Snaefell* is a steam paddle minesweeper that was bombed and sunk on 06 July 1941. An unknown submarine (UKHO 4683) is also recorded within the Marine Archaeology Study Area. While military vessels are not automatically protected by the Protection of Military Remains Act 1986 (as amended), the Ministry of Defence (MoD) holds the power to protect, through this Act, any vessel that was lost during active service. As this was an active-duty loss, if the remains can be positively identified as HMS *Snaefell*, then the possibility exists for its designation.

Non-designated maritime archaeology

7.10.5.27 Of the remaining 110 wrecks, 48 are named, though there are multiple instances of a single vessel having more than one record attached to it – e.g. *Carmarthen Coast* and *Vianna* – which indicates that multiple wrecks may fit the description of known vessel losses in the vicinity. Further investigation may help establish the identify of unknown wrecks within the Marine Archaeology Study Area. The remaining 62 wrecks cannot be positively identified at this time, however further archaeological investigation through geophysical survey may aid in the understanding of these wreck sites. The landfall location of the MHPGC Project lies between the two historically important and busy ports of Sunderland and Hartlepool. All of the wrecks date to the post-medieval, and Modern periods.

7.10.5.28 The earliest known wreck is that of the *Loch-Na-Gar*, a barge built in 1861 and sank on 14 December 1901. The latest wreck is that of *Blue Dawn*, an ex-Navy pinnace that sank on 13 February 2004 from an unknown cause.

7.10.5.29 While the majority of the wrecks sank by storm, accident, or unknown cause (as they have not been positively identified), some of the known wrecks can be tied to loss events in World Wars I and II. Of known conflict losses, more occurred during World War I than later. Apart from RFA *Creosol* described above, the *John M Smart* was sunk by a German torpedo boat destroyer and broke into two; *Helvetia* and *Narcissus* were captured and scuttled in separate acts; *Imperialist* (UKHO 4567) sank after striking a mine; *Intent* (UKHO 5670) was torpedoed and sunk by submarine UC40; *Saga* (UKHO 5672) was sunk by UB 64 (though this record also relates to a recorded loss, indicating some uncertainty over its identification at this location); *Thames* (UKHO 5788) was torpedoed by UC17; *Stewarts Court* was torpedoed by UB 112 on 21 August 1918. During World War II, the only other known losses by enemy action (apart from HMS *Snaefell* described above) are those of *Adams Beck* (UKHO 5743) which was bombed and sunk by German aircraft in 1941; HC Flood and Clare (UKHO 5795) which were both mined in separate incidents.

7.10.5.30 There is a remarkable number of contemporary vessel losses for the study area in addition to *Blue Dawn* discussed above. These include *Ada Jean* (UKHO 57856), a fishing vessel which sank on 22 September 1978; Jenny *M* (UKHO 5769), a fishing vessel that sank after taking on water on 06 September 1983; and Triumph (UKHO 4551), a fishing vessel that sank on 23 May 1993 after a collision with a drifting tree.

7.10.5.31 Within the UKHO dataset there are 51 records listed as 'dead', indicating that although material has been positively identified at some point, further observations at these locations have not located material and so it has likely either become buried, dispersed, or completely deteriorated. Archaeological interpretation of the geophysical survey data will clarify whether archaeological material survives at these locations and will further characterise the maritime archaeology of the Marine Archaeology Study Area.

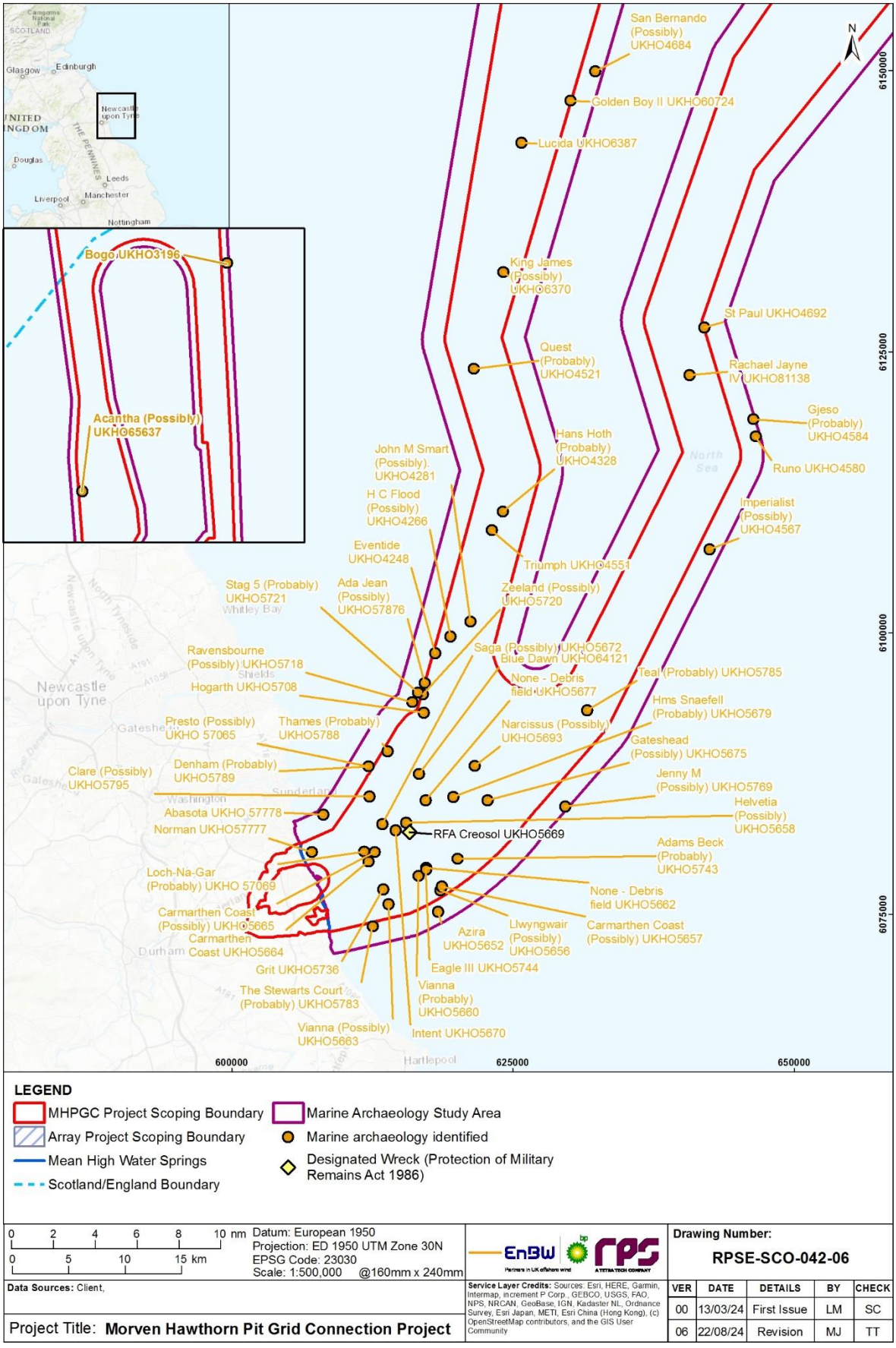


Figure 7.39: Maritime Archaeology (Named Wrecks) within the Southern Portion Marine Archaeology Study Area

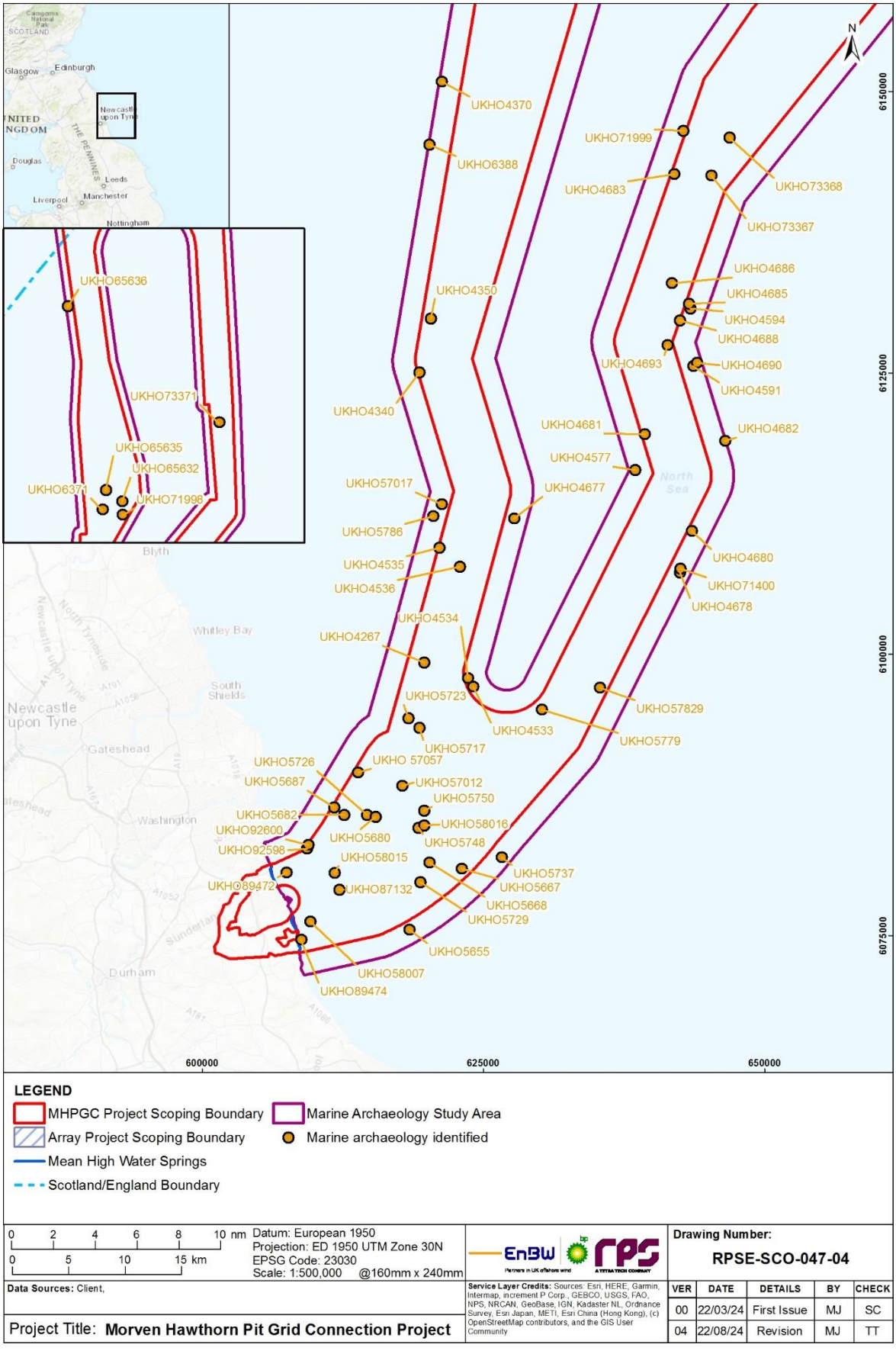


Figure 7.40: Marine Archaeology Identified (unknown wrecks) within the Southern Portion of the Marine Archaeology Study Area

Maritime and Aviation Archaeology Potential

Maritime Archaeology Potential

7.10.5.32 The potential for the survival of evidence of early prehistoric maritime activity in the UK is low and there is currently no known archaeological evidence of watercraft that pre-date the Mesolithic in Western Europe. However, the technology and expertise required to construct small craft, such as longboats, was certainly available by the Mesolithic and there is circumstantial evidence from the UK, Denmark and Germany for the existence of watercraft during the Mesolithic (Van de Noort, 2011). Neolithic sea-faring is similarly sparse but can be inferred from insular archaeological sites and evidence for long distance trade after the submergence of the land bridge between Britain and continental Europe.

7.10.5.33 The east coast of England has produced some of the earliest examples of Bronze Age ships and shipping in northwest Europe. The proximity of the Marine Archaeology Study Area to possible shipping routes across the North Sea and up and down the east coast of England suggests that during the Bronze Age, vessels were passing through the English waters of the Marine Archaeology Study Area.

Examples of Bronze Age sea-faring craft such as five sewn-plank boats discovered at Ferriby in North Yorkshire (Chapman, 2021; Van de Noort, 2011), the Brigg 'raft', also on the Humber (Yorkshire), Goldcliff, Gwent (Wales) (McGrail, 1994) and the remains of a boat at Dover, Kent (England) (Clark, 2004) have been discovered elsewhere in the UK.

7.10.5.34 There is extensive evidence of trade and military activity across the middle and northern North Sea during the Roman period, as the forts and cities in eastern and northern England. Maritime technology from this period includes a substantial, sea-going vessel (known as the 'Romano-Celtic' type) which was developed in northwestern Europe during the later Iron Age (Marsden, 2014). Examples include the Blackfriars Boat, from London (Dunkley, 2016; Marsden, 2014) and the Barlands Farm boat, from the Severn Estuary in southeast Wales (Lawer and Nayling, 1993) . The 'County Hall' ship is a particular example of a boat constructed using typically Mediterranean techniques, but dendrochronological evidence demonstrated that it was constructed in Britain during the Roman period (Marsden, 2014).

7.10.5.35 Maritime activity in the southern North Sea, including the Marine Archaeology Study Area increased during the early Medieval period due, in part, to Saxon and Viking raiding, the intensification of regional trade, the migration that followed and the growth of a number of major ports on the east coast of the UK. The subsequent Norman conquest in 1066 established new international trade links, with trade continuing throughout the Medieval period.

7.10.5.36 Later, the establishment of the Hanseatic League in Lubeck in 1169 resulted in increased commercial shipping activity and the development of ports across northwestern Europe. The League represented some 84 cities, including ports on the eastern coast of England, such as Newcastle, Kingston-upon-Hull, King's Lynn, Norwich and Great Yarmouth (Hutchinson, 1997; Woodman, 2005). Vessel traffic would have occurred between ports in eastern England as well as internationally.

7.10.5.37 There are 100 recorded losses in English waters within the Marine Archaeology Study Area. Recorded losses are listed in Appendix C. A review of the wreck records illustrate that, as for Scotland, the overwhelming majority of these losses date to the

Post-medieval, nineteenth century, and Modern periods. The earliest recorded loss is that of *Richard and Clementia*, a 1751 English cargo vessel (though no further information on its circumstances are available). There are several examples of recorded losses relating to hostilities of World War I, including: the 1917 wreck of *Poltava*, which was mined by the German submarine UC 44; similarly *Folmina* was mined the submarine UB 34, *Saga* by UB 64, and *Maindy Bridge* torpedoed by UC 49. The number of known wrecks on the seabed combined with the volume of recorded losses clearly indicate the potential for encountering previously unknown marine archaeology receptors is high. In addition to wrecked vessels on the seabed, the origin of these wrecks in conflict also indicates the potential to encounter debris is high.

Aviation Archaeology Potential

7.10.5.38 There are no known aviation crash sites designated under the Protection of Military Remains Act 1986 within the Marine Archaeology Study Area.

7.10.5.39 While no securely located aviation wreck remains exist in the Marine Archaeology Study Area, the potential exists to encounter as yet unknown aviation material.

7.10.5.40 By 1918 there were some seven military airfields of the Royal Flying Corps in Northeastern England, including Ashington, (Northumberland), Catterick, Copmanthorpe, Helperby, Marske-by-the-Sea, Redcar, Ripon and Thornaby (all North Yorkshire). There was also a seaplane station at South Shields (Northumberland) and a substation at Seaton Carew (County Durham) (Airfields of Britain Conservation Trust (ABCT), 2024). The lightweight construction of these early airframes (wood and cloth) also means they are unlikely to survive in the marine environment unless buried in seabed sediments.

7.10.5.41 During World War II, it is estimated that an average of five aircraft were lost over the UK every day and that many of these losses occurred over the sea (De la Bédoyère, 2001). Losses on both sides during the war from AD 1940-1945 fall into two general categories: offensive German operations associated with bombing raids targeting the north of England and the associated British defensive fighter response; and RAF, Allied, and later American bombing operations against Germany from bases in the north of England which were routed over the North Sea to the Dutch coast where aircraft defences were less dense (Lyall, 1971). These RAF airfields include Acklington, Brunton, Blakelaw, Boulmer, RRH Brizlee Wood, Cramlington, Eshott, Milfield, Morpeth, Ouston, and Woolsington - all of which may have contributed to as yet unlocated aviation losses within the Marine Archaeology Study Area (ABCT, 2024). The location of the Marine Archaeology Study Area and the patterns of aircraft activity during World War II suggest that there were potentially numerous aircraft losses in the area. There are five recorded aviation losses in the Marine Archaeology Study Area include a mixture of RAF and German aircraft which date to World War II, such as a British Hurricane Mk I (NRHE 1391411, a British Whitley Mk V bomber (NRHE 1342751), a German Dornier bomber (NRHE 1398484), a German Heinkel bomber (NRHE 1402221), a German Junkers Ju88 (NRHE 1404661). The existence of these records for the area indicates that, although not tied to an accurate seabed position, the potential for encountering aviation archaeology within the Marine Archaeology Study Area is high.

7.10.5.42 Since World War II, as with Scotland, potential civilian aircraft losses could relate to private journeys by small aircraft, or the relatively frequent transport between UK airfields and oil and gas platforms in the North Sea.

7.10.6 Potential Impacts of the Morven Hawthorn Pit Grid Connection Project

7.10.6.1 Potential impacts on marine archaeology receptors have been identified which may occur during the construction, O&M, and decommissioning phases of the MHPGC Project. The impacts that have been scoped into the assessment are outlined in Table 7.61 together with a description of any additional data collection and supporting analyses that will be required to enable a full assessment of the impacts.

7.10.6.2 On the basis of the baseline information currently available and the project description outlined in Chapter 3: Project Description of this Scoping Report, no impacts are proposed to be scoped out of the assessment for marine archaeology.

7.10.6.3 The potential impacts from the Morven Hawthorn Pit Grid Connection Project have been considered collectively for both English and Scottish waters, as these will not change between these areas given the commonality of the works proposed (offshore cabling).

Table 7.61: Impacts Proposed to be Scoped into the Project Assessment for Marine Archaeology

*Project phase refers to construction (C), O&M (O) and decommissioning (D).

Impact	Project Phase *			Relevant to England or Scotland	Justification	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D				
Sediment disturbance and deposition leading to indirect impacts on marine archaeology receptors.	✓	✓	✓	Scottish and English Waters.	Construction works, including seabed preparation and cable installation, O&M activities (including cable repair) and decommissioning may cause seabed sediment disturbance and associated deposition, which could lead to indirect impacts on archaeological receptors.	Review of desktop data and archaeological assessment of geophysical survey data with reference to the results of the physical processes modelling, will consider the extent of sediment disturbance and associated deposition.	Qualitative assessment informed by review of desktop data and archaeological assessment of geophysical survey data will enable reparation of a Marine Archaeology Technical Report (TR) The TR will establish the marine archaeology baseline and support an assessment of significance of effect. Significance of effect will be determined through defining the magnitude of the impact based on the MDS against the sensitivity of the marine archaeology receptors identified in the TR. Mitigation measures such as those proposed in Section 7.10.7 will be developed in consultation with relevant stakeholders and adopted as part of the MHPGC Project in order to eliminate or minimise a potential impacts.

Impact	Project Phase *			Relevant to England or Scotland	Justification	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D				
Direct damage to archaeology receptors (e.g. wrecks, debris, submerged prehistoric receptors (palaeolandscapes and associated archaeological receptors)).	✓	✓	✓	Scottish and English Waters.	Construction works could directly affect any archaeological receptors present within the MHPGC Project Scoping Boundary. These effects will likely be localised, but should they occur, they could lead to adverse and irreversible damage to archaeological receptors. Operational activities such as anchor deployment have the potential to directly impact archaeological receptors. Where receptor locations are already known, measures for their avoidance and protection include implementing Archaeological Exclusion Zones (AEZ). Effects from	As above.	As above.

Impact	Project Phase *			Relevant to England or Scotland	Justification	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D				
					decommissioning are likely to be similar to effects from construction.		
Alteration of sediment transport regimes.	✓	✓	✓	Scottish and English Waters.	The physical presence of infrastructure on the seabed such as cable protection, may interrupt sediment transport pathways, which could be directed towards or away from archaeological receptors causing damage. This is applicable during the O&M phase only as construction and decommissioning activities will lead to sediment disturbance and deposition, covered above.	As above.	As above.

7.10.7 Designed In Measures and Mitigation

7.10.7.1 As part of the project design process, a number of designed in measures (primary and tertiary) will reduce the potential for impacts on Marine Archaeology (Table 7.62). As there is a commitment to implement these measures, they are considered inherent to the design of the MHPGC Project. The determination of magnitude and significance will assume the implementation of such measures. Some of these measures are considered standard industry practice for this type of development.

7.10.7.2 The requirement for any additional (secondary) mitigation measures will be dependent on the significance of the effects on marine archaeology receptors. The requirement for and feasibility of any mitigation measures will be consulted upon with statutory consultees throughout the EIA process.

Table 7.62: Designed in Measures of the Morven Hawthorn Pit Grid Connection Project, Relevant to Marine Archaeology

Reference Number	Designed in Measures	Justification	Primary or Tertiary
MM-40	The implementation of AEZs around sites identified as having a known important archaeological potential.	AEZs will ensure offshore infrastructure avoids any potential direct impacts on sites of identified archaeological importance. The size of the AEZ will be evidence-based and established using the precautionary principle to ensure that it is of sufficient size to protect the site from the nature of impact (The Crown Estate, 2021; Wessex Archaeology, 2007).	P

Reference Number	Designed in Measures	Justification	Primary or Tertiary
MM-41	All anomalies of archaeological potential to be considered during pre-construction activities and final design. If they are likely to be impacted, these anomalies would undergo further archaeological investigation. Should these anomalies prove to be of archaeological importance then future AEZs may be implemented following consultation with Heritage Environment Scotland (HES) and HE. Micro-siting of infrastructure and mooring lines to avoid known wrecks if practicable.	To identify any sites of archaeological importance that may require further investigation, avoidance or engagement with HE and HES. TAEZs and AEZs will ensure offshore infrastructure avoids any potential direct impacts on previously unknown sites of identified archaeological importance.	P
MM-42	Archaeologists to be consulted in advance of pre-construction site preparation activities and, if appropriate, to carry out watching briefs of such work.	To record archaeological remains that may be affected by pre-construction clearance operations.	P
MM-43	Mitigation of unavoidable direct impacts on known sites of archaeological importance during pre-construction and construction activities. Options include i) preservation by record, ii) stabilisation and iii) detailed analysis and safeguarding of otherwise comparable sites elsewhere.	To offset the effects of disturbance/destruction of irreplaceable archaeological remains.	P

Reference Number	Designed in Measures	Justification	Primary or Tertiary
MM-44	Development and adherence to a WSI and Protocol for Archaeological Discoveries (PAD). Operational awareness of the location of those archaeological anomalies identified as having a low potential. Reporting through the agreed PAD will be undertaken should material of potential archaeological interest be encountered.	The Outline WSI will include proposed AEZs for marine archaeology receptors identified within the geophysical survey data to prevent direct damage to maritime archaeology receptors. The PAD will allow for the recording, preservation and protection of any unexpected archaeological discoveries that may occur due to sediment disturbance and deposition during the MHPGC Project.	T
MM-45	The identification and implementation of Temporary Archaeological Exclusion Zones (TAEZs) based on all available information including the stated positional accuracy, the recorded size of the target and the potential archaeological significance around those records for wrecks and obstructions outside of the survey data coverage but within the MHPGC Project boundary.	TAEZs will ensure offshore infrastructure avoids any potential direct impacts on previously unknown sites of identified archaeological importance.	P
MM-46	Archaeologists engaged by the Applicant to be consulted on survey specifications for, and data analysis of, future pre-construction geophysical surveys, geotechnical surveys, pre-construction Remotely Operated Vehicle (ROV) or diver surveys, and pre-construction site preparation activities. If appropriate, in monitoring/checking of data.	To identify any sites of archaeological importance that may require further investigation, avoidance or engagement with HE and HES.	P

Reference Number	Designed in Measures	Justification	Primary or Tertiary
MM-47	Commitment to the ongoing monitoring of known archaeological receptors through the acquisition of relevant spatial survey data. This monitoring will include the appropriateness of, and necessary adjustments to, AEZs through the lifetime of the MHPGC Project.	Changes to marine archaeology receptors during the lifetime of offshore wind projects are not well known. Industry guidance suggests that monitoring methods, set out in the Outline Written Scheme of Investigation (WSI), may include periodic reporting on adherence to exclusion zones and the results of watching briefs. Periodic reporting will provide a potential beneficial effect through regional mapping of accessible data and provision of publicly accessible data post-consent.	P

7.10.8 Proposed Assessment Methodology

7.10.8.1 The Marine Archaeology EIA will follow the methodology set out in Chapter 4: EIA methodology, of this Scoping Report. Specific to the marine archaeology EIA, the following guidance will also be considered:

- Standard and Guidance for Historic Environment Desk Based Assessment (Chartered Institute for Archaeologists, 2014b).
- Historic Environment Guidance for the Offshore Renewable Energy Sector (Wessex Archaeology, 2007).
- Joint Nautical Archaeology Policy Committee Code of Practice for Seabed Development, (The Joint Nautical Archaeology Policy Committee, 2006).
- Model Clauses for Archaeological Written Schemes of Investigation, Offshore Renewables Projects (Wessex Archaeology for the Crown Estate, 2021).
- PAD: Offshore Renewables Projects (The Crown Estate, 2014).
- Principles of Cultural Heritage Impact Assessment (IEMA *et al.*, 2021).
- Archaeological Written Schemes of Investigation for Offshore Wind Farm Projects (The Crown Estate, 2021).

- Commercial Renewable Energy Development and the Historic Environment. HE Advice Note 15 (Historic England, 2021).
- Scottish National Marine Plan (Scottish Government, 2015b).
- Designation Policy and Selection Guidance (Historic Environment Scotland, 2019).
- Deposit Modelling and Archaeology: Guidance for mapping buried deposits (Historic England, 2020).
- Radiocarbon Dating and Chronological Modelling (Bayliss and Marshall, 2022).
- England's Historic Seascapes: Consolidating the National Method (Tapper and Johns, 2008) .

Approach to Assessment of Historic Seascape Character (HSC)

7.10.8.2 The assessment of effects on HSC in English waters will be undertaken in accordance with established guidance (Natural England, 2012) and the methodology developed in consultation with HE. HSC is not something that can be physically impacted, but something that can be changed; therefore, the assessment has defined the

7.10.9 Potential Cumulative Impacts

7.10.9.1 Cumulative effects with the Morven Offshore Wind Array Project and the second grid connection project in the Branxton area Southeast Scotland will be considered, together with cumulative effects with other developments, where relevant.

7.10.9.2 The cumulative effect assessment will follow the approach outlined in Chapter 4: EIA Methodology, of this Scoping Report.

7.10.9.3 The following ground condition and contmination impacts have the potential to result in cumulative effects:

- adverse effects on geology and geodiversity (e.g. permanent loss of all or part of a geodiversity receptor or damage to geodiversity during construction of a development, or temporary loss of access to a geological feature);
- permanent or temporary sterilisation of mineral resources due to development.

7.10.9.4 Given the largely rural nature of the land within the MHPGC Project Scoping Boundary, the likely absence of large-scale land contamination, and the linear nature of the MHPGC Project, it is unlikely that there will be other developments with the potential to introduce new sources of contamination that could impact on a receptor shared with the MHPGC Project. During construction it can reasonably be assumed that standard construction practices and actions undertaken by 'other developments' would meet existing legislative requirements under CDM Regulations (2015) and the Health and Safety at Work Act (1974) such that the risk of pollution incidents would be low, and that unexpected contamination found during construction of the 'other developments' would be managed in line with the Environment Agency guidance LCRM.

7.10.9.5 For ground conditions and contamination, UK planning legislation requires all developments to be suitable for their proposed use, so that risks posed by land

contamination to human health, the water environment, ecological receptors or property receptors (including the built environment and agricultural property including livestock), have been appropriately controlled/managed. Most of the land along the corridor(s) will be restored to its original land use. Therefore, no effects have been identified for the operation phase of the MHPGC Project that have the potential to act cumulatively with impacts from other developments to contribute to cumulative ground conditions effects.

7.10.10 Potential Inter-related Effects

7.10.10.1 The EIA will consider inter-related effects arising from the MHPGC Project, across their own phases (project lifetime) and different effects on one receptor in one phase (receptor led). The EIA will consider inter-related effects of multiple impacts from the construction, O&M and decommissioning phases of the MHPGC Project, affecting one receptor. Inter-related effects will be assessed through consideration of all effects on a receptor, considering both spatial and temporal overlap, within the MHPGC Project. This will ensure that the MHPGC Project is appropriately considered within the EIA and in line with Chapter 4: EIA Methodology.

7.10.11 Potential Transboundary Impacts

7.10.11.1 The Marine Archaeology Study Area is defined as the MHPGC Project Scoping Boundary with an additional 2km buffer. This lies entirely within the UK Exclusive Economic Zone (EEZ) and outside the boundaries of any European Economic Area (EEA) state. There are no potential transboundary impacts from onshore marine archaeology from the MHPGC Project. This is due to any likely significant effects being experienced locally, rather than a wider geographic scale.

7.11 Other Sea Users, Marine Infrastructure and Communications

7.11.1 Introduction

7.11.1.1 This chapter of the Scoping Report identifies the other sea users, marine infrastructure, and communications receptors of relevance to the Morven Hawthorn Pit Grid Connection Project (hereafter referred to as 'MHPGC Project') and considers the potential impacts arising from the construction, operation and maintenance (O&M), and decommissioning of the MHPGC Project. This scoping chapter adopts a proportionate approach to only those impacts with potential to result in likely significant effects and therefore scopes out other impacts where there is evidence that the effects are not likely to be significant.

7.11.1.2 Potential impacts upon other sea users, marine infrastructure and communications related to navigational safety are addressed in Chapter 7.9: Shipping and Navigation, of the Scoping Report.

7.11.2 Policy and Legislation

7.11.2.1 This section identifies the relevant legislation, policy and other documentation that will inform the assessment of likely significant effects with respect to other sea users, marine infrastructure and communications. Further information on policies relevant to the Environmental Impact Assessment (EIA) and their status is provided in Chapter 2: Policy and Legislation, of the Scoping Report.

7.11.2.2 Planning policy and legislation on the consenting process for infrastructure in Scottish and English waters is presented in Chapter 2: Policy and Legislation, of the Scoping Report. Planning policy, specifically in relation to other sea users, marine infrastructure and communications in English waters is contained in the North East Marine Plan (HM Government, 2021), which is developed in accordance with the requirements set out under the Marine and Coastal Access Act 2009 and the UK Marine Policy Statement. In Scotland waters, planning policy is contained in the Scottish National Marine Plan (NMP) (Scottish Government, 2015).

Scottish waters

7.11.2.3 The Scottish NMP covers both inshore waters (out to 12nm) and offshore waters (12nm to 200nm), where Scottish Parliament can legislate in relation to activities affecting the marine environment. Key provisions of the Scottish NMP are set out in Table 7.63. These are summarised here with further detail presented in Chapter 2: Policy and Legislation, of the Scoping Report.

English waters

7.11.2.4 The North East Marine Plan comprises a planning approach for English coastal and offshore waters between the Scottish border and Flamborough Head in Yorkshire (HM Government, 2021). It provides an approach to decision-making by regulators and marine users on where, when, and how to undertake activities in the northeast and nearshore northeast Marine Plan areas. Key provisions of the English northeast Marine Plan are set out in Table 7.63.

Table 7.63: Legislation of Relevance

Relevant Legislation	Relevance to the Assessment
National Legislation (Scotland)	
Policy Framework (Scottish Government, 2015).	**Oil and Gas:** A) Maximise the recovery of reserves through a focus on industry-led innovation, enhancing the skills base and supply chain growth. B) An industry which delivers high-level risk management across all its operations and that it is especially vigilant in more testing current and future environments. C) Continued technical development of enhanced oil recovery and exploration, and the associated seismic activity carried out according to the principles of the Best Available Technique (BAT). B) BAT and Best Environmental Practice approach where possible, to work with emerging sectors to transfer the experience, skills and knowledge built up in the oil and gas industry to allow other sectors to benefit and reduce their environmental impact.
	Carbon Capture and Storage A) Safe, cost-effective, and timely deployment of Carbon Capture and Storage (CCS), assisting the delivery of Scotland's climate change objectives and positioning the North Sea as Europe's principal hub for surplus CO_2 storage, servicing electricity generators and heavy industry from sources throughout Europe. B) CCS available as a realistic low carbon deployment option for electricity generation in advance of 2020, and support the decarbonisation of electricity generation by 2030, without affecting the security of supply. C) Scotland at the forefront of the development and deployment of CCS technology, putting in place successful commercialisation projects, which promote the utilisation of existing infrastructure. D) To further develop CCS technology as a potential source of large-scale CO_2 supply for use in Enhanced Oil Recovery processes in the North Sea. E) Initiate an Environmental Assessment, with relevant agencies, to allow early consideration of the environmental issues with deployment of CCS.
	Dredging and Disposal: A) Dredging is an essential activity to maintain existing shipping channels, establish safe approaches to new ports or open up routes to old ports. Dredged material may be disposed of at licensed marine disposal sites or used for alternative purposes such as land reclamation or coastal nourishment, if suitable, to minimise seabed disposal. Licensed areas may change – normally as a result of disuse, monitoring information or the need for sites in additional locations. The consideration of both

Relevant Legislation	Relevance to the Assessment
	dredged navigation channels and disposal sites in marine planning and decision making is important to support safe access to ports and the disposal of dredged material in appropriate locations adverse impacts.
	Marine Aggregates: A) Growth of the marine aggregates industry in Scotland, ensuring supply is available to meet demand should it arise while taking account of environmental impacts.
	Subsea Cables: A) Protect submarine cables whilst achieving successful seabed user co-existence. B) Achieve the highest possible quality and safety standards and reduce risks to all seabed users and the marine environment. C) Support the development of a Digital Fibre Network, connecting Scotland's rural and island communities and contributing to world-class connectivity across Scotland. D) Safeguard and promote the global communications network. E) Support the generation, distribution and optimisation of electricity from traditional and renewable sources to Scotland, United Kingdom (UK) and beyond.
National Policy (England)	
Policy Framework (HM Government, 2021).	**Oil and Gas:** A) In areas where an oil and gas license has already been issued or formally applied for, additional development (e.g. renewable energy) should not be permitted unless it can be demonstrated that the other development or activity is compatible with the oil and gas activity. B) Proposals within areas of geological oil and gas extraction potential demonstrating compatibility with future extraction activity will be supported.
	Carbon Capture and Storage: A) Decommissioning programmes for oil and gas facilities should demonstrate that they have considered the potential for re-use of infrastructure. B) Carbon capture, usage and storage proposals incorporating the re-use of existing oil and gas infrastructure will be supported. C) Proposals associated with the deployment of low carbon infrastructure for industrial clusters should be supported.
	Dredging and Disposal: A) In areas of authorised dredging activity, including those subjects to navigational dredging, proposals for other activities will not be supported unless they are compatible with the dredging activity. B) Proposals that cause significant adverse impacts on licensed disposal sites should not be supported. Proposals that may have significant adverse impacts on licensed

Relevant Legislation	Relevance to the Assessment
	disposal sites must demonstrate that they will, in order of preference: a) avoid b) minimise c) mitigate - adverse impacts so they are no longer significant. If it is not possible to mitigate the significant adverse impacts, proposals must state the case for proceeding. C) Proposals for the disposal of dredged material must demonstrate that they have been assessed against the waste hierarchy. Where there is the need to identify new dredge disposal sites, including for alternative use sites, proposals should be supported if they conform to best practice and guidance.
	Subsea Cables: A) Where burial is not achievable, decisions should take account of protection measures for the cable that may be proposed by the applicant. Where burial or protection measures are not appropriate, proposals should state the case for proceeding without those measures. B) Proposals demonstrating compatibility with Cables existing landfall sites and incorporating measures to enable development of future landfall opportunities should be supported. Where this is not possible proposals will, in order of preference: a) avoid b) minimise c) mitigate - adverse impacts on existing and potential future landfall sites so they are no longer significant. If it is not possible to mitigate significant adverse impacts, proposals should state the case for proceeding. C) Where seeking to locate close to existing subsea cables, proposals should demonstrate compatibility with ongoing function, maintenance and decommissioning activities relating to the cable.

7.11.3 Study Areas

7.11.3.1 Two study areas have been defined for the assessment of different groupings of receptors for the MHPGC Project. These are the Local Other Sea Users, Marine Infrastructure and Communications Study Area, and Regional Other Sea Users, Marine Infrastructure and Communications Study Area, as shown in Figure 7.41.

The Local Other Sea Users, Marine Infrastructure and Communications Study Area

7.11.3.2 The Local Other Sea Users, Marine Infrastructure and Communications Study Area is defined as the MHPGC Project Scoping Boundary with an additional 1km buffer. The 1km buffer has been included as oil and gas infrastructure, cables and pipelines and offshore wind farm (OWF) structures undergoing maintenance will require a 500m safety zone or advisory clearance distance (HSE, 2022). This area consists of the extent of potential direct physical overlap between the MHPGC Project activities and the following receptors (if identified):

- recreational receptors (including receptors carrying out fishing, sailing and motor cruising, kite surfing, surfing, windsurfing, sea/surf kayaking, canoeing and beach users);
- offshore energy projects (e.g.OWFs, wave and tidal projects, CCS, oil and gas projects);
- cable and pipeline operators;
- offshore microwave fixed communication links.

The Regional Other Sea Users, Marine Infrastructure and Communications Study Area

7.11.3.3 The Regional Other Sea Users, Marine Infrastructure and Communications Study Area is based on one tidal excursion from the MHPGC Project Scoping Boundary, identified using the Atlas of UK Marine Renewable Energy Resources (ABPmer, 2017). This is considered to represent the maximum area within which increases in suspended sediments could arise from MHPGC Project activities, beyond which impacts are not expected to occur. The Regional Other Sea Users, Marine Infrastructure and Communications Study Area is relevant to those human activity receptors that are susceptible to increases in suspended sediment concentrations, namely:

- marine aggregate extraction, dredging and disposal sites;
- scuba diving.

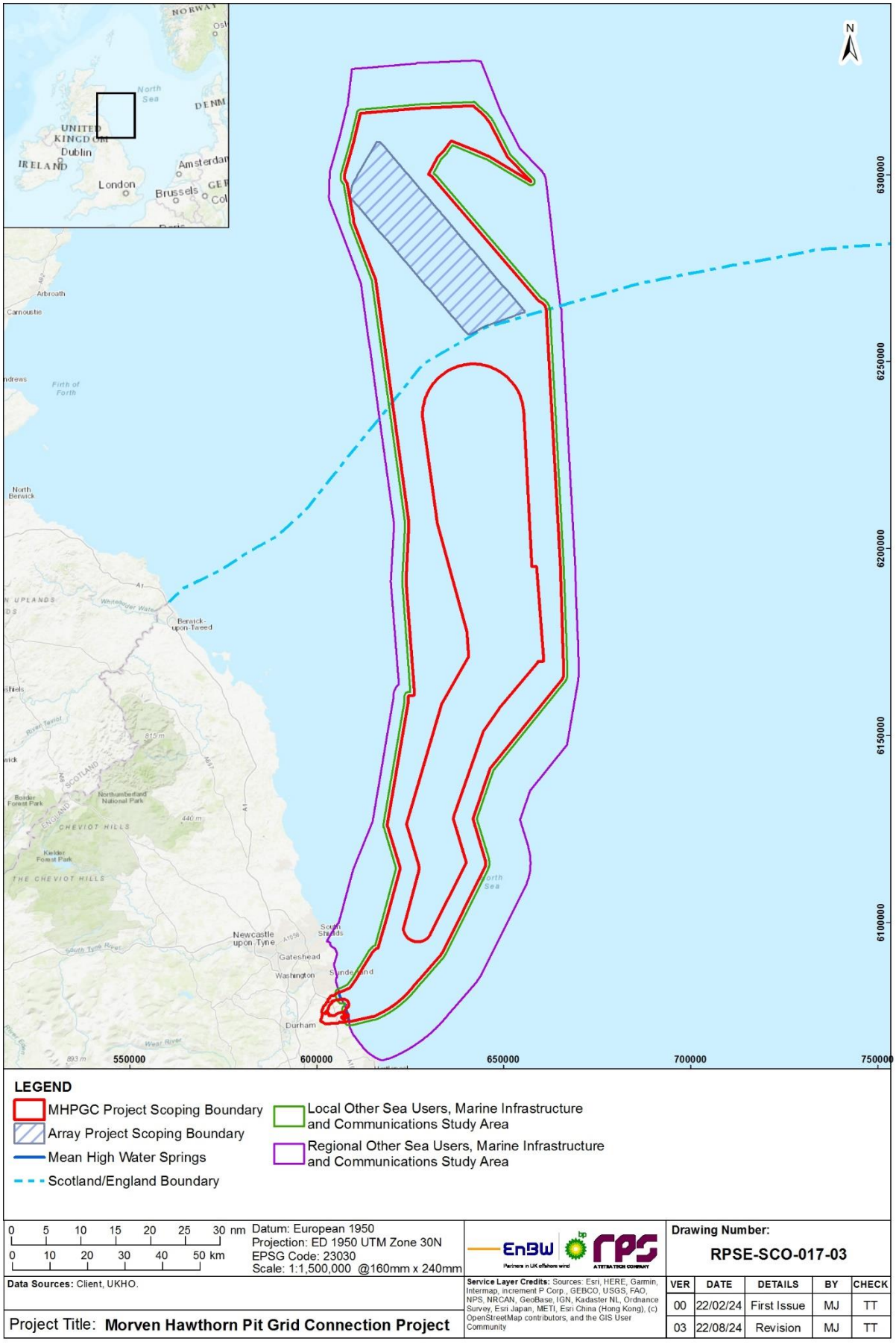


Figure 7.41: The Other Sea Users, Marine Infrastructure and Communications Study Areas.

7.11.4 Data Sources

7.11.5 Desktop Data

7.11.5.1 An initial desk-based review of literature and data sources to support this Scoping Report has identified several data sources which provide coverage of the Other Sea Users, Marine Infrastructure and Communication Study Areas. These are summarised in Table 7.64.

Table 7.64: Summary of Key Desktop Datasets and Reports

Title	Source	Year	Author
International/National (UK)			
Diving sites.	UKDiving.co.uk.	2024.	UK Diving.
Disposal sites.	Cefas; EMODnet.	2024.	Cefas; EMODnet.
Natural gas storage.	The Crown Estate (TCE).	2024.	TCE.
Cable routes.	Kis-Orca; TCE; MMO; Marine Scotland - licensing public register.	2024; 2024; 2024; 2024.	Kis-Orca; TCE; MMO; Scottish Government.
Data from site specific two 14-day Marine Vessel Traffic Surveys (see part 2, Section 5.2: Shipping and Navigation, of the Offshore Wind farm (OWF) Scoping Report).	Anatec (commissioned by the Applicant).	2024.	Anatec.
Offshore wind farms.	Global Offshore Renewable Map; Crown Estate Scotland (CES); TCE.	2024; 2020; 2020.	4C Offshore; CES; TCE.
Recreational fishing.	https://marinescotland.atkinsgeospatial.com/nmpi/; Cefas; British sea fishing.	2024; 2021; 2020.	National Marine Plan Interactive (NMPi) Webmap Service; Cefas; British sea fishing.
Pipelines.	Oil and Gas Authority (OGA); North Sea Transition Authority	2021.	North Sea Transition Authority; OGA.

Title	Source	Year	Author
	https://www.nstauthority.co.uk/?platform=hootsuite.		
Wells.	OGA; North Sea Transition Authority https://www.nstauthority.co.uk/?platform=hootsuite.	2021.	North Sea Transition Authority; OGA.
Oil and gas platforms.	OGA; North Sea Transition Authority https://www.nstauthority.co.uk/?platform=hootsuite.	2021.	North Sea Transition Authority; OGA.
Subsurface structures.	OGA; North Sea Transition Authority https://www.nstauthority.co.uk/?platform=hootsuite.	2021.	North Sea Transition Authority; OGA.
Hydrocarbon fields.	OGA; North Sea Transition Authority https://www.nstauthority.co.uk/?platform=hootsuite.	2021.	North Sea Transition Authority; OGA.
Oil and gas licence block	OGA; North Sea Transition Authority https://www.nstauthority.co.uk/?platform=hootsuite.	2021.	North Sea Transition Authority; OGA.
United Kingdom Continental Shelf (UKCS) block	OGA; North Sea Transition Authority https://www.nstauthority.co.uk/?platform=hootsuite.	2021.	North Sea Transition Authority; OGA.
Recreational vessel traffic.	UK Coastal Atlas of Recreational Boating; Automatic Identification System (AIS) Data; https://marine.gov.scot/data/mmo-ais-data-available-datagovuk.	2019.	Marine Management Organisation; Royal Yachting Association (RYA).
General boating areas.	UK Coastal Atlas of Recreational Boating.	2018.	RYA.
Recreational activities.	UK Coastal Atlas of Recreational Boating.	2018.	RYA.
Aggregate extraction.	Scotland's National Marine Plan.	2015.	Scottish Government.

Title	Source	Year	Author
Aggregate extraction.	The North East Marine Plan; TCE.	2021; 2020.	UK Government; TCE.
Communication links.	Ofcom, communication.	2019.	Ofcom.

7.11.6 Consultation

7.11.6.1 Supporting data and information will also be obtained through consultation with relevant other sea users, marine infrastructure and communications receptors with activities and interests in proximity to the MHPGC Project.

7.11.6.2 The approach to consultation is set out in Chapter 5: Consultation Process, of the Scoping Report. A full record of the consultation undertaken to date and stakeholder plans for future engagement is set out in Chapter 5: Consultation Process, of the Scoping Report.

7.11.7 Baseline Environment

7.11.7.1 This section provides a summary of the baseline environment of the MHPGC Project. The receptors discussed in the sections below have been considered as part of the baseline environment for other sea users, marine infrastructure and communications.

7.11.7.2 Due to availability of suitable data in the public domain, new data or modelling studies will not be required to characterise the other sea users, marine infrastructure and communication baseline for the MHPGC Project EIA Report/Environmental Statement (ES).

Marine Aggregate Extraction

Scottish Waters

7.11.7.3 Although Scotland has a considerable marine sand and gravel resource, the marine aggregate industry has historically been very small due to land supplies and more readily accessible marine resources elsewhere in UK waters. Marine aggregate licences have historically been issued to two sites in Scotland, one site in the Firth of Forth and the second site in the Firth of Tay (Scottish Government, 2015), which do not overlap the Regional Other Sea Users, Marine Infrastructure and Communications Study Area in Scottish waters. Scottish marine aggregate extraction sites have, therefore, not been considered further within this Scoping Report.

English Waters

7.11.7.4 Marine aggregate licences are divided into seven major geographic regions along the UK coast, most of which are located on the east and south coasts of England. Other license blocks are based in the Bristol Channel and the Irish Sea (BMAPA, 2023).

7.11.7.5 There are currently no active licences for marine aggregate extraction in the Regional Other Sea Users, Marine Infrastructure and Communications Study Area in English waters (as shown in Figure 7.42). English Marine aggregate extraction sites have, therefore, not been considered further within this Scoping Report.

Disposal Sites

Scottish Waters

7.11.7.6 There are currently no active disposal sites within the Regional Other Sea Users, Marine Infrastructure and Communications Study Area in Scottish waters (as shown in Figure 7.42). Scottish disposal sites have, therefore, not been considered further within this Scoping Report.

English Waters

7.11.7.7 There are three closed disposal sites overlapping with the Regional Other Sea Users, Marine Infrastructure and Communications Study Area in English waters (see Figure 7.42) (Cefas, 2023; EMODnet, 2023); the Howdon Area, Souter Point (Inner) and Tees (Industrial) disposal sites. A fourth closed disposal site, the Tyne Industrial, is overlapping with both Other Sea Users, Marine Infrastructure and Communications Study Areas and the MHPGC Project Scoping Boundary (see Figure 7.42).

7.11.7.8 It was identified that four open disposal sites overlap the Regional Other Sea Users, Marine Infrastructure and Communications Study Area. These sites are North Tyne, Souter Point (Outer and Inner), Easington Foreshore and Sunderland. Additionally, there are three open disposal site are located in the MHPGC Project Scoping Boundary, which are Noses Point, Bankside Spoil Tip and Seaham Foreshore (see Figure 7.42).

7.11.7.9 Additionally, there is a dumping ground in the south west of the MHPGC Project Scoping Boundary, overlapping with the Regional Other Sea Users, Marine Infrastructure and Communications Study Area (see Figure 7.42).

Scuba Diving

Scottish Waters

7.11.7.10 There are no identified recreational dive sites within the Regional Other Sea Users, Marine Infrastructure and Communications Study Area (UK Diving, 2023). Scuba diving in Scottish waters has, therefore, not been considered further within this Scoping Report.

English Waters

7.11.7.11 There are no identified recreational dive sites within the Regional Other Sea Users, Marine Infrastructure and Communications Study Area (UK Diving, 2023). Scuba diving in English waters has, therefore, not been considered further within this Scoping Report.

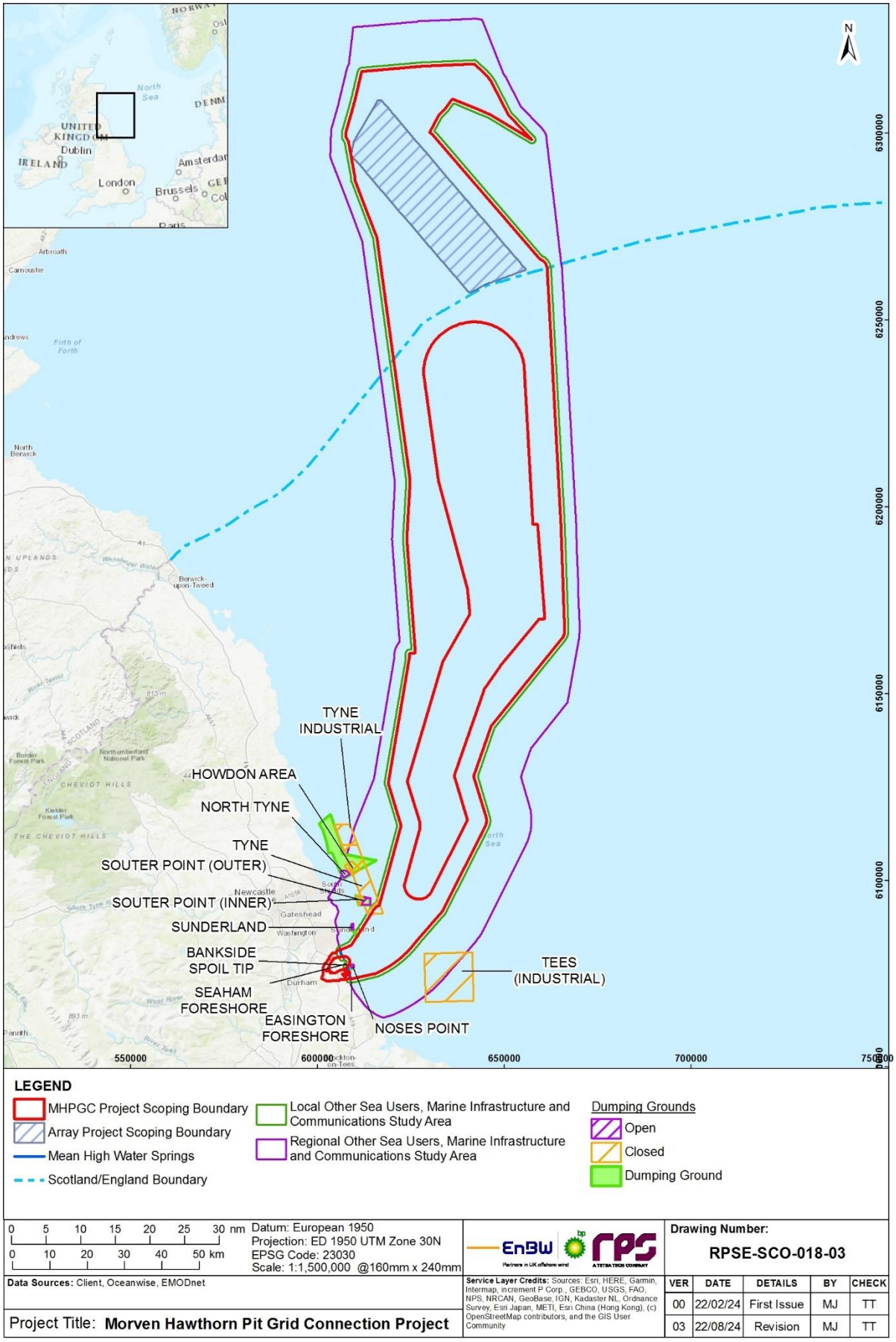


Figure 7.42: Disposal Sites and Marine Aggregate Extraction Sites within the Other Sea Users, Marine Infrastructure and Communications and Communications Study

Recreational Sailing and Motor Cruising

7.11.7.12 Recreational sailing is generally divided into two categories: offshore and inshore. Offshore sailing is usually undertaken by yachts in the form of either cruising or organised offshore racing, although offshore racing can also involve powerboats. Inshore sailing is typically undertaken by smaller vessels including dinghies and recreational craft that are used for either cruising at leisure or racing in near-shore areas, predominantly within sight of a club facility. Cruising may include lengthy voyages, including across the North Sea between Scandinavia and Scotland, or short trips between local ports, harbours, and marinas, which often include a return journey to the home port on the same day. Inshore racing takes place around racing marks and navigational buoyage. Since the MHPGC Project ranges from offshore to inshore, activities that are generally associated with inshore recreational sailing are expected.

7.11.7.13 As noted in paragraph 7.11.1.2, navigational safety and risk to recreational vessels, as well as Ministry of Defence (MoD) training grounds are considered in Chapter 7.9: Shipping and Navigation, of the Scoping Report. Furthermore, the military flight practice areas are considered in Chapter 9.3: Aviation (Military and Civil) and Radar, of the Scoping Report. The Other Sea Users, Marine Infrastructure and Communications Chapter of the MHPGC Project EIA Report/ES will only consider receptors undertaking recreational sailing and motor cruising as an activity.

7.11.7.14 Data from the marine vessel traffic surveys and consultation activities carried out to inform the Navigation Risk Assessment (NRA) (see Section 7.9.8 of Chapter 7.9: Shipping and Navigation, of the Scoping Report) will be used as an additional data source to inform the assessment on recreational sailing and cruising receptors.

Scottish Waters

7.11.7.15 Figure 7.43 illustrates that there is a low intensity of recreational sailing and motor cruising in Local Other Sea Users, Marine Infrastructure and Communications Study Area in Scottish waters. The RYA data is limited to inshore waters, but Automatic Identification System (AIS) data tracks show that recreational vessels also transit through the whole length of Local Other Sea Users, Marine Infrastructure and Communications Study Area (RYA, 2019).

English Waters

7.11.7.16 Figure 7.43 illustrates that recreational sailing and motor cruising within English inshore waters in the Local Other Sea Users, Marine Infrastructure and Communications Study Area is of a low to medium intensity in English waters (RYA, 2019).

7.11.7.17 It is shown (Figure 7.43) that the Local Other Sea Users, Marine Infrastructure and Communications Study Area is overlapping with the general boating area of Sunderland Marina.

Military Practice Areas

7.11.7.18 MoD training grounds are considered in Chapter 7.9: Shipping and Navigation, of the Scoping Report. Military flight practice areas are considered in Chapter 9.3: Aviation (Military and Civil) and Radar, of the Scoping Report.

Scottish Waters

7.11.7.19 There are no MoD practice firing areas identified within Scottish waters. Scottish practice firing areas have, therefore, not been considered further within this chapter of the Scoping Report.

English Waters

7.11.7.20 Chapter 7.9: Shipping and Navigation, of the Scoping Report identifies a Firing practice area, D513, located in the southern half of the MHPGC Project Scoping Boundary (see Figure 7.44).

Recreational Fishing

Scottish Waters

7.11.7.21 There are very low levels of recreational angling in the Scottish section of the Other Sea Users, Marine Infrastructure and Communications Study Area, likely due to the large distance from land (NMPi, 2023). Consultation will take place with local operators to further understand activities and operational range.

English Waters

7.11.7.22 There are high levels of recreational fishing in the English Sections of the Other Sea Users, Marine Infrastructure and Communications Study Area, likely due to the closeness to port Sunderland and Seaham which are overlapping with the Local Other Sea Users, Marine Infrastructure and Communications Study Area (see Figure 7.43) (GFW, 2023). Consultation will take place with local operators to further understand activities and operational range.

7.11.7.23 Commercial fishing is considered in Chapter 7.8: Commercial Fisheries, of the Scoping Report. The chapter that considers other sea users, marine infrastructure and communications in the MHPGC Project EIA Report/ES will only consider recreational fishing receptors.

Offshore Wind Farms

7.11.7.24 OWFs in the North Sea in proximity to the Local Other Sea Users, Marine Infrastructure and Communications Study Area are shown in Figure 7.45.

Scottish Waters

7.11.7.25 There are two OWFs located close to the Local Other Sea Users, Marine Infrastructure and Communications Study Area in Scottish waters. The nearest, in the pre-planning stage at the time of writing, is the Bowdun OWF (formerly Cluaran Deas Ear) located 1.3km northwest from the Local Other Sea Users, Marine Infrastructure and Communications Study Area. The Ossian OWF (Scoping submitted) is abutting northwest of the Local Other Sea Users, Marine Infrastructure and Communications Study Area in Scottish waters (4C Offshore, 2023).

English Waters

7.11.7.26 There are no OWFS within the Local or Regional Other Sea Users, Marine Infrastructure and Communications Study Area in English waters (Figure 7.45). English OWFs have, therefore, not been considered further within the Scoping Report.

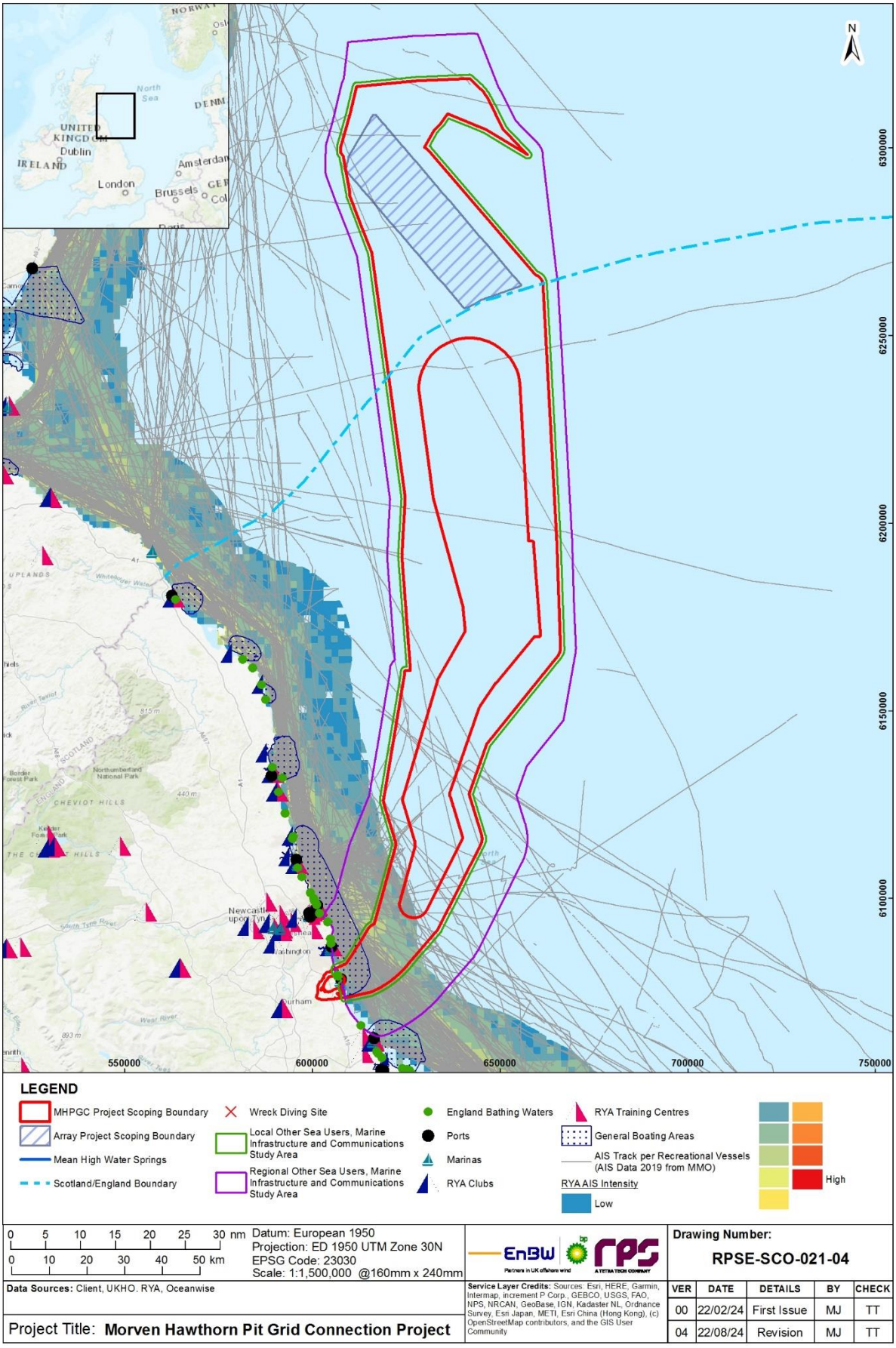


Figure 7.43: Recreational Activities in the Other Sea Users, Marine Infrastructure and Communications and Communications Study Area

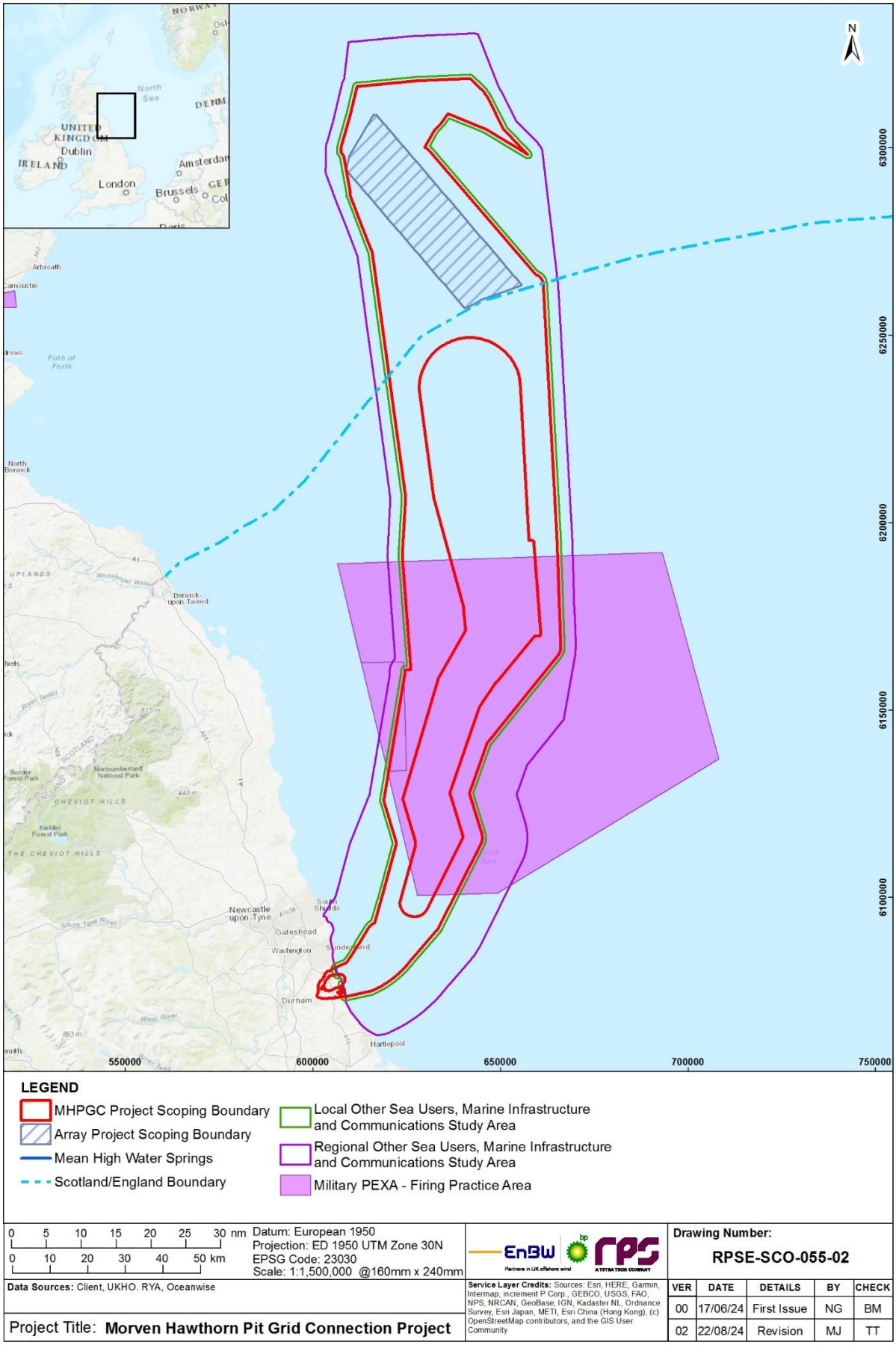


Figure 7.44: Military PEXA Firing Practice Area D513 in the Other Sea Users, Marine Infrastructure and Communications and Communications Study Area

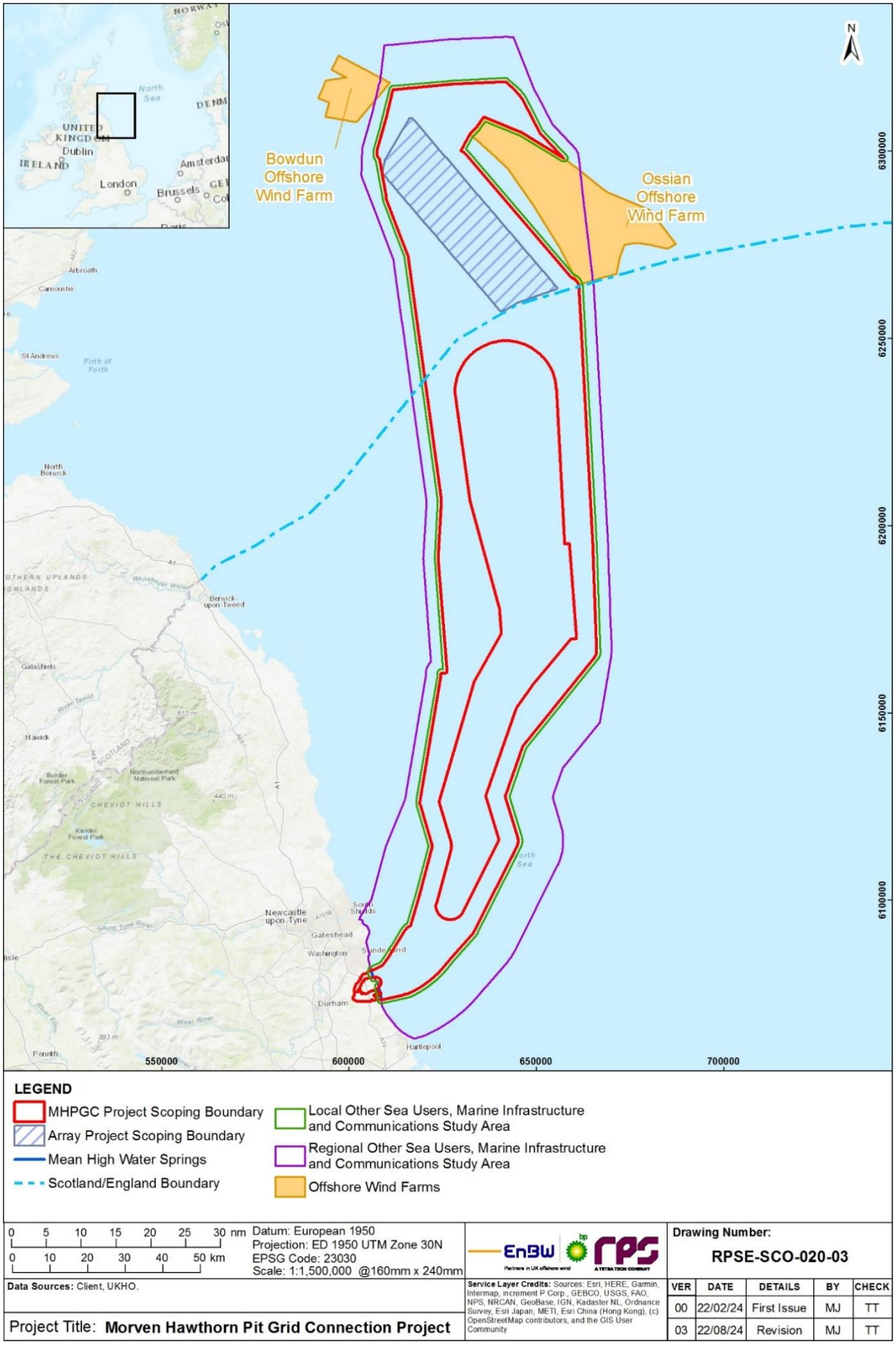


Figure 7.45: Operational OWFs in the Other Sea Users, Marine Infrastructure and Communications and Communications Study Area.

Oil and Gas Operations

7.11.7.27 The following services are associated with the oil and gas industry:

- Helicopters: the oil and gas industry relies on helicopters for personnel transfer and emergency evacuation. Helicopter and associated aviation considerations are addressed separately in Chapter 9.3: Aviation (Military and Civil) and Radar, of the Scoping Report.
- Vessels: the oil and gas industry require supply or support vessels for its operations. Vessels and associated navigational considerations are addressed separately in Chapter 7.9: Shipping and Navigation, of the Scoping Report.

7.11.7.28 In October 2022, the North Sea Transition Authority (NSTA) launched the 33rd Offshore Licensing Round with the potential for over 100 blocks to be consented across the main producing areas of the UKCS.

7.11.7.29 Wells are classified into the following 4 categories: completed wells (ready for production), drilling wells (wells in the process of being drilled), plugged and abandoned wells (where work has ceased because it has become non-productive or non-viable) and suspended wells (a well may be temporarily suspended if an operator intends to carry out further operations at a later date). Completed and drilling wells typically have a 500m safety zone. Plugged and abandoned and suspended wells do not have safety zones attached to their location. There are no plugged and abandoned wells located within the Local Other Sea Users, Marine Infrastructure and Communications Study Area (see Figure 7.46).

7.11.7.30 Subsurface structures (including protective structures, pipe junctions, manifolds, wellheads, trees and valves) are usually protected by a 500m safety zone. There are no subsurface structures located within the Local Other Sea Users, Marine Infrastructure and Communications Study Area, with the closest – the wellhead Seaward- located 3.8km from the Local Other Sea Users, Marine Infrastructure and Communications Study Area (see Figure 7.46).

Scottish Waters

7.11.7.31 There are currently active licence blocks overlapping with the Local Other Sea Users, Marine Infrastructure and Communications Study Area. The active licence blocks in Scotland are Block 27/3 and 27/9 currently licensed by North Sea Natural Resources. These are located next to the MHPGC Project and overlap the Local Other Sea Users, Marine Infrastructure and Communications Study Area (see Figure 7.46).

7.11.7.32 There are no hydrocarbon fields or oil and gas platforms located within the Other Sea Users, Marine Infrastructure and Communications Study Areas (Figure 7.46).

7.11.7.33 The Firth of Forth supports oil and gas activities such as those associated with the Grangemouth refinery, oil storage and tanker terminals.

English Waters

7.11.7.34 There are currently active licence blocks overlapping with the Local Other Sea Users, Marine Infrastructure and Communications Study Area English waters. The overlapping active licence blocks are Block 35/22, Block 35/27 and Block 41/1, currently licensed by Royal Dutch Shell (Figure 7.46).

7.11.7.35 There are no hydrocarbon fields or oil and gas platforms located within the Local or Regional Other Sea Users, Marine Infrastructure and Communications Study Area (Figure 7.46).

Pipelines

Scottish Waters

7.11.7.36 There are no oil and gas pipelines located within the Local Other Sea Users, Marine Infrastructure and Communications Study Areas in Scottish waters. Oil and gas pipelines in Scottish waters have, therefore, not been considered further within the Scoping Report.

English Waters

7.11.7.37 There are no oil and gas pipeline located within the Local Other Sea Users, Marine Infrastructure and Communications Study Areas in English waters. The closest pipeline (CATS Pipeline) is crossing the south eastern section of the Regional Other Sea Users, Marine Infrastructure and Communications Study Area in English waters. Additionally, the EKOFISK 2/4J TO TEESSIDE 34IN OIL LINE gas pipeline is located 602m southeast of the Regional Other Sea Users, Marine Infrastructure and Communications Study Area (Figure 7.46). Pipelines in English waters have, therefore, not been considered further within this Scoping Report.

Carbon Capture and Storage

Scottish Waters

7.11.7.38 There are no CCS projects located within the Local Other Sea Users, Marine Infrastructure and Communications Study Area in Scottish waters. CCS in Scottish waters has, therefore, not been considered further within the Scoping Report.

English Waters

7.11.7.39 There are no CCS projects located within the Local Other Sea Users, Marine Infrastructure and Communications Study Area in English waters. CCS in English waters has, therefore, not been considered further within the Scoping Report.

Offshore Microwave Fixed Communication Links

7.11.7.40 Communication systems considered within this section include offshore microwave fixed links, which may be used to facilitate communications between offshore oil and gas platforms. Marine navigation, communications and position fixing equipment is addressed in Chapter 7.9: Shipping and Navigation, of the Scoping Report.

Scottish Waters

7.11.7.41 There are no oil and gas platforms located within the Local Other Sea Users, Marine Infrastructure and Communications Study Area in Scottish Waters (Figure 7.46). This will be further explored through desk study and consultation for the MHPGC Project EIA Report/ES. Microwave fixed links in Scottish waters has, therefore, not been considered further within the Scoping Report.

English Waters

7.11.7.42 There are no oil and gas platforms located within the Local Other Sea Users, Marine Infrastructure and Communications Study Area in English waters (Figure 7.46). This will be further explored through desk study and consultation for the MHPGC Project EIA Report/ES. Microwave fixed links in English waters has, therefore, not been considered further within the Scoping Report.

Cables

Scottish Waters

7.11.7.43 There are currently no operational cable within the Local Other Sea Users, Marine Infrastructure and Communications Study Area in Scottish waters (as shown in Figure 7.47).

7.11.7.44 The Eastern Link 2 (SEGL2) and 3 (EGL3) High Voltage Direct Current (HVDC) cable is currently in its early development stage and if developed would intersect the MHPGC Project Scoping Boundary in Scottish waters (see Figure 7.47).

7.11.7.45 Cables in Scottish waters have, therefore, not been considered further within the Scoping Report.

English Waters

7.11.7.46 There are three operational cable (Power cable from North Sea Link and Telecom cables from Aquacomms and Altibox) that cross the Local Other Sea Users, Marine Infrastructure and Communications Study Area in English waters (see Figure 7.47) (Kis-Orca, 2023; TCE, 2023).

7.11.7.47 The Eastern Link 1 (SEGL1), 2 (SEGL2), 3 (EGL3) and 4 (EGL4) HVDC cable is currently in its early development stage and the application of the Cambois Connection (Berwick Bank OWF) HVDC cable is currently at the submission stage. If developed, these cables would intersect the MHPGC Project Scoping Boundary in English waters (see Figure 7.47).

7.11.7.48 A comprehensive review of any planned or operational cables within the Other Sea Users and Marine Infrastructure Study Area will be undertaken as part of the EIA process and will be assessed as part of the cumulative assessment.

7.11.7.49 In due course, where the MHPGC Project cables (either inter-array or interconnector cables) will be required to cross an active cable, it is intended that a commercial 'crossing agreement' on standard industry terms will be entered into with the cable operator. This is a formal arrangement that establishes the responsibilities and obligations of both parties and allows operations to be managed safely.

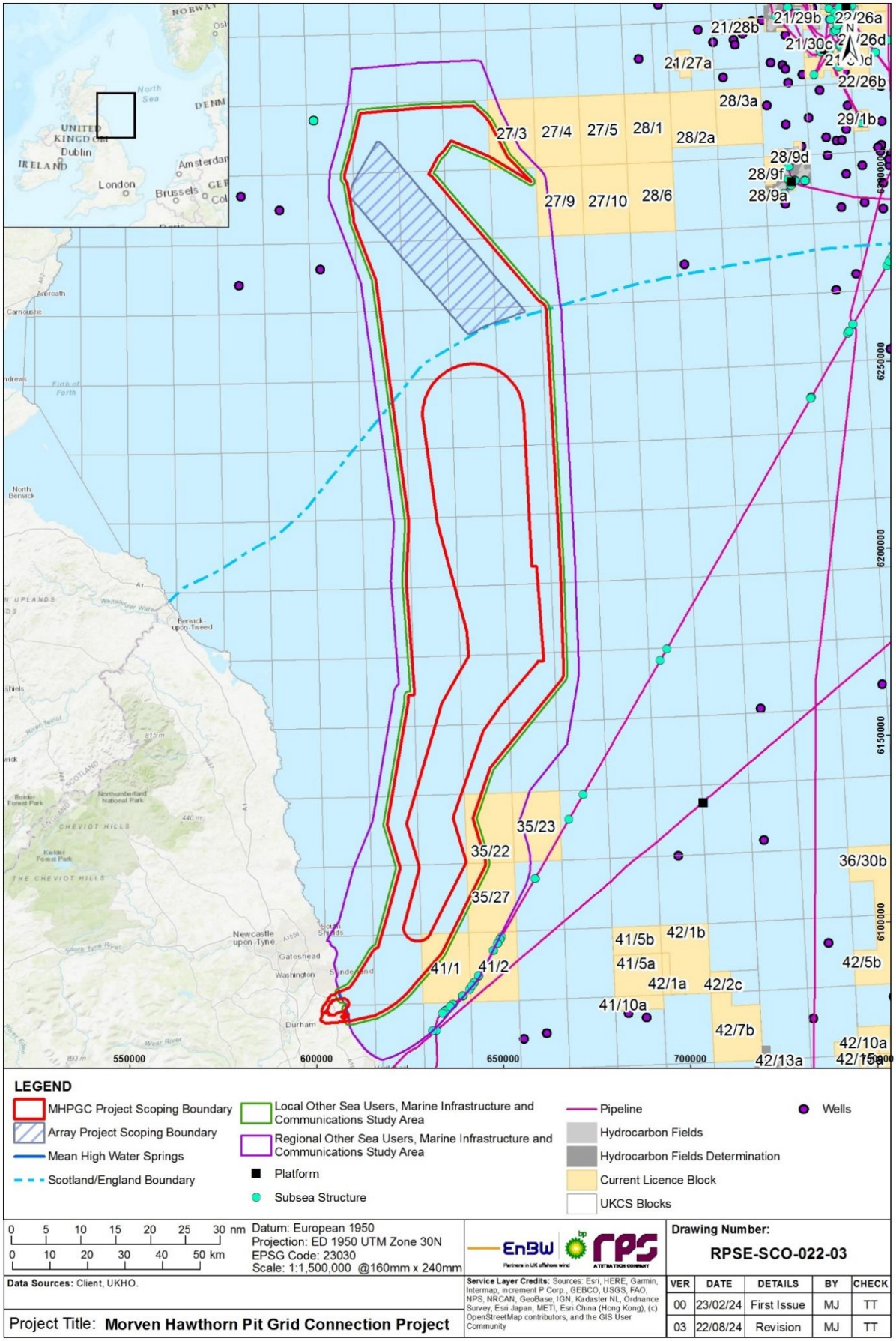


Figure 7.46: Oil and Gas Infrastructure within the Other Sea Users, Marine Infrastructure and Communications and Communications Study Area

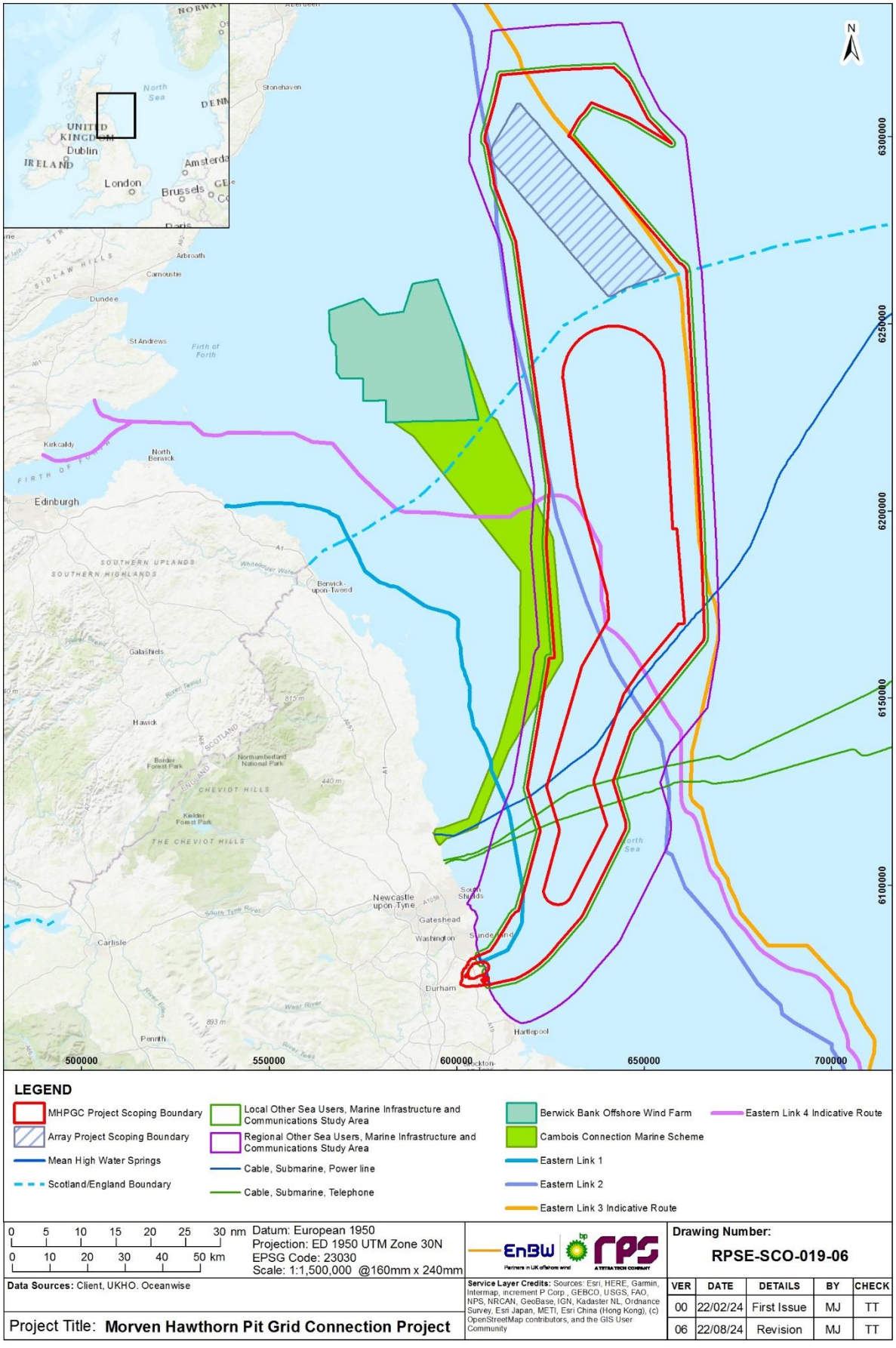


Figure 7.47: Cable within Other Sea Users, Marine Infrastructure and Communications and Communications Study Area

7.11.8 Potential Impacts of the Morven Hawthorn Pit Grid Connection Project

7.11.8.1 A range of potential impacts on Other Sea Users, Marine Infrastructure and Communications has been identified, which may occur during the construction, O&M, and decommissioning phases of the MHPGC Project.

7.11.8.2 The impacts that have been scoped into the assessment are outlined in Table 7.65 together with a description of any additional data collection (e.g. site specific surveys) and supporting analyses (e.g. modelling) that will be required to enable a full assessment of the impacts.

7.11.8.3 Potential impacts scoped out of the assessment are presented in Table 7.66, with justification.

7.11.8.4 The potential impacts from the MHPGC Project have been considered collectively for both English and Scottish waters, as these will not change between these areas given the commonality of the works proposed (offshore cabling).

Table 7.65: Impacts Proposed to be Scoped into the Morven Hawthorn Pit Grid Connection Project Assessment for Other Sea Users and Marine Infrastructure and Communication

* Project phase refers to construction (C), O&M (O), and decommissioning (D)

Impact	Project phase*			Relevant to England or Scotland	Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D				
Displacement of recreational activities (including recreational sailing, cruising and recreational fishing).	✓	✓	✓	Scottish and English Waters.	Safety zones and advisory clearance distances established during construction, maintenance and decommissioning activities may displace recreational activities. Potential impact of accessibility of the Sunderland Marine could arise during the construction and decommission phase through the crossing of the MHPGC Project Scoping Boundary with the general boating area of the Sunderland Marine.	Review of desktop data, including results of the marine vessel traffic surveys, supported by the outcome of consultation.	Qualitative assessment informed from the results of baseline data review and consultation.
Impacts to early development cables or pipelines or restrictions on access to operational cables or pipelines.	✓	✓	✓	Scottish and English Waters.	There is one cable currently at application submission (Cambois Connection HVDC) and four cable consented (Eastern Link 1, 2, 3 and 4 HVDC) crossing the MHPGC Project Scoping Boundary and, therefore, there is potential for	Review of desktop data supported by the outcome of consultation.	Qualitative assessment informed from the results of baseline data review and consultation.

Impact	Project phase*			Relevant to England or Scotland	Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D				
					impacts to existing cables or restrictions on access to cables from installation, maintenance, and decommissioning activities. Crossing and proximity agreements will be established where required with known existing cables operators.		
Impact on marine disposal sites.	✓	✓	✓	Scottish and English Waters.	The presence of marine disposal sites within the MHPGC Project Scoping Boundary may effect the work during construction, operation and decommission.	Review of desktop data supported by the outcome of consultation.	Qualitative assessment informed from the results of baseline data review and consultation.
Reduction or restriction of oil and gas exploration activities (including surveys, drilling and the placement of infrastructure).	✓	✓	✓	Scottish and English Waters.	The overlapping of active oil and gas licenses with the Regional Other Sea Users, Marine Infrastructure and Communications Study Area may effect the work during construction, operation and decommission.	Review of desktop data supported by the outcome of consultation.	Qualitative assessment informed from the results of baseline data review and consultation.
Increased suspended sediment concentrations and associated deposition	✓	✓	✓	Scottish and English Waters.	There are no documented recreational diving sites within the Regional Other Sea Users, Marine	Review of desktop data supported by the	Qualitative assessment informed from the

Impact	Project phase*			Relevant to England or Scotland	Justification	Data collection and analysis required to characterise the baseline environment	Summary of proposed approach to assessment
	C	O	D				
affecting recreational diving sites.					Infrastructure and Communications Study Area. However, the possibility of non-documented diving sites may effect the work during construction, operation and decommission.	outcome of consultation.	results of baseline data review and consultation.
Interference with offshore microwave fixed communication links.	×	✓	×	Scottish and English Waters.	There are no oil and gas platforms located within the MHPGC Project Scoping Boundary. Nevertheless, potential impacts can arise due to the wide range of the microwave fixed communication links from the nearby offshore oil and gas platforms during the operation.	Review of desktop data. Consultation with oil and gas operators to inform the assessment.	Qualitative assessment informed from the results of baseline data review and consultation.

Table 7.66: Impacts Proposed to be Scoped out of the Morven Hawthorn Pit Grid Connection Project Assessment for Other Sea Users, Marine Infrastructure and Communications

Impact	Justification
Increased suspended sediment concentrations and associated deposition affecting aggregate extraction areas.	There are no aggregate extraction areas within the Regional Other Sea Users, Marine Infrastructure and Communications Study Area, as described in Section 7.11.7. As such, there is no potential impact pathway, and, therefore, it is proposed that this impact is scoped out of the MHPGC Project EIA Report/ES.

Impact	Justification
Alterations to sediment transport pathways affecting aggregate extraction areas.	There are no aggregate extraction areas within the Regional Other Sea Users, Marine Infrastructure and Communications Study Area, as described in Section 7.11.7. As such, there is no potential impact pathway, and, therefore, it is proposed that this impact is scoped out of the MHPGC Project EIA Report/ES.
Impacts on CCS.	There are no CCS projects within Local Other Sea Users, Marine Infrastructure and Communications Study Area, as described in Section 7.11.7. As such, there is no potential impact pathway, and, therefore, it is proposed that this impact is scoped out of the MHPGC Project EIA Report/ES.

7.11.9 Designed In Measures and Mitigation

7.11.9.1 As part of the project design process, a number of designed in measures (primary and tertiary) will reduce the potential for impacts on physical processes (Table 7.67). As there is a commitment to implement these measures, they are considered inherent to the design of the MHPGC Project. The determination of magnitude and significance will assume the implementation of such measures. Some of these measures are considered standard industry practice for this type of development.

7.11.9.2 The requirement for any additional (secondary) mitigation measures will be dependent on the significance of the effects on Other Sea User, Marine Infrastructure and Communications receptors. The requirement for and feasibility of any mitigation measures will be consulted upon with statutory consultees throughout the EIA process.

Table 7.67: Designed in measures of the Morven Hawthorn Pit Grid Connection Project, relevant to Other Sea User, Marine Infrastructure and Communications.

Reference number	Measures adopted	Justification	Primary or tertiary
MM-12	Installation of infrastructure over or adjacent to existing or future cables or pipelines will be subject to crossing or proximity agreements between the two parties, prior to the works commencing.	Adherence to agreed safety zones during construction of the Transmission Assets, and certain times during operations	P
MM-75	Consultation with oil and gas operators and other energy infrastructure operators, as required.	Promote and maximise cooperation between parties and minimise both spatial and temporal interactions between conflicting activities.	T
MM-81	Timely and efficient distribution of Notices to Mariners (NtM), Kingfisher notifications and other navigational warnings of the position and nature of works associated with the MHPGC Project.	To maximise awareness of the MHPGC Project, allowing other sea users and marine infrastructure receptors to plan in advance to ensure project vessels are suitably managed to minimise the likelihood of involvement in incidents and maximise the ability to assist in the event of a third-party incident.	T

7.11.10 Proposed Assessment Methodology

7.11.10.1 The assessment for other sea users, marine infrastructure and communications in the MHPGC Project EIA Report/ES will follow the methodology set out in Chapter 4: EIA Methodology, of the Scoping Report. Specific to the other sea users, marine infrastructure and communications EIA Report/ES, the following guidance documents will also be considered, as appropriate:

- The RYA's position on offshore renewable energy developments: Paper 1 (of 4) – Wind Energy, June 2019 (RYA, 2019).
- European Subsea Cables UK Association (ESCA) guideline no. 6, The Proximity of Offshore Renewable Energy Installations and Submarine Cable Infrastructure in UK waters (ESCA, 2016).
- International Cable Protection Committee (ICPC) Recommendations:
  - Recommendation No.2-11B: Cable Routing and Reporting Criteria (ICPC, 2015)
  - Recommendation No.3-10C: Telecommunications Cable and Oil Pipeline/Power Cables Crossing Criteria (ICPC, 2014)
  - Recommendation No.13-2C: The Proximity of Offshore Renewable Wind Energy Installations and Submarine Cable Infrastructure in National waters (ICPC, 2013).
- Pipeline Crossing Agreement and Proximity Agreement pack (Oil and Gas UK, 2021).
- Guidelines for the Abandonment of Wells, Issue 5 (Oil and Gas UK, 2015).

7.11.11 Potential Cumulative Impacts

7.11.11.1 Cumulative effects with the Morven Offshore Wind Array Project and the second grid connection project in the Branxton area Southeast Scotland will be considered, together with cumulative effects with other developments, where relevant.

7.11.11.2 The cumulative effect assessment (CEA) will follow the approach outlined in Chapter 4: EIA Methodology, of the Scoping Report.

7.11.12 Potential Inter-related Effects

7.11.12.1 The EIA will consider inter-related effects arising from the MHPGC Project, across their own phases (project lifetime) and different effects on one receptor in one phase (receptor led). The EIA will consider inter-related effects of multiple impacts from the construction, O&M and decommissioning phases of the MHPGC Project, affecting one receptor. Inter-related effects will be assessed through consideration of all effects on a receptor, considering both spatial and temporal overlap, within the MHPGC Project. This will ensure that the MHPGC Project is appropriately considered within the EIA and in line with Chapter 4: EIA Methodology, of the Scoping Report.

7.11.13 Potential Transboundary Impacts

7.11.13.1 Potential impacts associated with the MHPGC Project identified for other sea users and marine infrastructure receptors include:

- displacement of recreational activities (e.g. sailing, cruising, fishing);
- interference with offshore microwave fixed communication links.

7.11.13.2 Since no potential receptors associated with other EEA States have been identified for this receptor group, the MHPGC Project is not expected to have any transboundary impacts for this topic. Other sea users and marine infrastructure as a receptor group has, therefore, been screened out of further assessment for transboundary impacts in the EIA Report/ES.

8 Environmental Topics and Potential Impacts - Onshore

8.1 Ground Conditions and Contamination

8.1.1 Introduction

8.1.1.1 This chapter of the Scoping Report identifies the onshore ground conditions and land contamination receptors of relevance to the Morven Hawthorn Pit Grid Connection Project (hereafter referred to as 'MHPGC Project') and considers the potential impacts arising from the construction, Operation and Maintenance (O&M), and decommissioning of the MHPGC Project. This scoping chapter adopts a proportionate approach to only those impacts with potential to result in likely significant effects and therefore scopes out other impacts where there is evidence that the effects are not likely to be significant.

8.1.1.2 The receptors considered in this chapter comprise geology/geodiversity, mineral resources, and land contamination receptors. The latter can include human health, controlled waters (groundwater and surface water, including abstractions), sensitive ecological receptors, the built environment, and property (including agricultural crops and livestock, domestic produce, domestic animals, wild animals subject to shooting or fishing rights).

8.1.1.3 This chapter covers impacts associated with the onshore components of the MHPGC Project only and is therefore not applicable to Scotland.

8.1.2 Policy and Legislation

8.1.2.1 This section identifies the relevant legislation, policy and other documentation that will inform the assessment of likely significant impacts with respect to ground conditions and land contamination (Table 8.1). Further information on policies relevant to the Environmental Impact Assessment (EIA) and their status is provided in Chapter 2: Policy and Legislation, of the Scoping Report.

Table 8.1: Relevant Policy and Legislation

Legislation Description	Relevance to the Assessment
Geology/geodiversity policy	
Overarching National Policy Statement for Energy (EN-1), November 2023.	EN1 requires applicants to consider risks from land instability that could affect proposed developments. In relation to geodiversity, applicants should ensure that the Environmental Statement (ES) sets out effects on internationally, nationally, or locally designated sites of ecological or geological conservation importance, and applicants should show how projects have taken advantage of opportunities to conserve and enhance geological conservation interests.

Legislation Description	Relevance to the Assessment
The National Planning Policy Framework (NPPF) (2023).	The NPPF in Policy 15 Conserving and enhancing the natural environment, paragraph 185, states that to protect and enhance biodiversity and geodiversity, development plans should identify, map and safeguard international, national and locally designated sites of importance or areas identified by national and local partnerships for enhancement, restoration or creation, and also should also promote conservation, restoration and enhancement of these sites. Site of geological value are to be protected in a manner commensurate with their statutory status or identified quality in the development plan.
Sunderland Core Strategy and Development Plan 2015-2023, adopted January 2020.	Policy NE2 Biodiversity and geodiversity states that where appropriate, development must demonstrate how it will avoid or minimise adverse impacts on geodiversity in accordance with the mitigation hierarchy. Development that would adversely affect a Site of Special Scientific Interest (SSSI) directly or indirectly will be required to demonstrate that the reasons for the development clearly outweigh the nature conservation value of the site. Dependent on the geodiversity impact, the council may require developers to produce a management strategy to ensure the continued protection of the features of interest. Such management strategies may include monitoring programmes to provide up to date information which will shape future policy reviews as well as inform future site specific plans.
Durham Country Council, The County Durham Plan, adopted 21 October 2020.	Policy 41 states that development proposals will not be permitted if significant harm to geodiversity cannot be avoided, or appropriately mitigated, or, as a last resort, compensated for. Development proposals are expected to protect geological features and have regard to Geodiversity Action Plans, the Durham Geodiversity Audit and where appropriate promote public access, appreciation and interpretation of geodiversity.
Mineral resources policy	
Overarching National Policy Statement for Energy (EN-1), November 2023.	EN1 requires applicants to safeguard mineral resources within proposed development sites as far as possible and where a proposed development will impact upon a Mineral Safeguarding Area (MSA), the Secretary of State should ensure that appropriate mitigation measures have been put in place to safeguard mineral resources.

Legislation Description	Relevance to the Assessment
National Policy Statement for Energy (EN-5), November 2023	Issues for consideration in Environmental Impact Assessments (EIA)include potential sterilisation of mineral resources.
NPPF (2023).	The NPPF Policy 17 Facilitating the sustainable use of minerals, requires planning policies to safeguard mineral resources by defining MSA and Mineral Consultation Areas and ensure that known locations of specific minerals resources of local and national importance are not sterilised by non-mineral development where this should be avoided. The NPPF also requires policies to safeguard existing, planned and potential sites for the transport, handling and processing of minerals.
Durham Country Council, The County Durham Plan, adopted 21 October 2020.	Policy 48 for the safeguarding of minerals sites states that existing and allocated minerals sites will be safeguarded and protected from non-mineral development, and that planning permission will not be granted for non-minerals development next to a safeguarded minerals processing facility, minerals related transportation infrastructure, minerals site or waste management site, or within a defined minerals or waste site safeguarding zone (where defined in the policies map document) other than in certain instances.
Sunderland Core Strategy and Development Plan 2015-2023, adopted January 2020.	Policy M1 MSA and Infrastructure for minerals safeguarding, sets out how planning applications on areas where mineral resources are present or where minerals management takes place will be assessed. This states that planning permission for non-mineral development within a MSA, or affecting safeguarded minerals management activities, will only be granted where certain criteria are met.
Land contamination policy	
Overarching National Policy Statement for Energy (EN-1), November 2023.	EN1 states that where pre-existing land contamination is within a proposed development, the objective is to ensure that the site is suitable for its intended proposed use, through risk assessment in accordance the contaminated land statutory guidance.

Legislation Description	Relevance to the Assessment
NPPF (2023).	In relation to land contamination, the NPPF Policy 15 conserving and enhancing the natural environment, requires planning policies and decisions to ensure that sites are suitable for their proposed use, taking account of ground conditions and risks arising from land instability and contamination. This includes risks arising from former activities such as mining. The policy also states that decisions should contribute to and enhance the natural and local environment by remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate. Adequate site investigation information, prepared by a competent person, is to inform these assessments, and following remediation, as a minimum, land should not be capable of being determined as contaminated land under Part IIA of the Environmental Protection Act 1990.
Environment Agency, Land Contamination Risk Management (LCRM) (2020).	Provides the technical framework for applying a risk management process when dealing with land affected by contamination.
Sunderland Core Strategy and Development Plan 2015-2023, adopted January 2020.	Policy HS3 Contaminated land, sets out conditions that development on contaminated land should meet, including investigation of the nature of any contamination and ultimately demonstrating that the developed site will be suitable for the proposed use without risk from contaminants to people, buildings, services or the environment. The Council notes that Sunderland is a built-up area with a history of heavy industry, where land contamination is known to exist and states that it is therefore important that land known or suspected of being contaminated, or where a sensitive use is proposed, is dealt with appropriately before the development takes place. Policy M3 Land instability and minerals legacy, states that development should give consideration to hazards arising from past coal mining, in particular land instability and mine gas, and notes that where a development is located in an area with a mining legacy, an applicant will be required to prepare and submit a Coal Mining Risk Assessment and/or carry out site investigations, as necessary.

Legislation Description	Relevance to the Assessment
Durham Country Council, The County Durham Plan, adopted 21 October 2020.	Policy 32 Despoiled, Degraded, Derelict, Contaminated and Unstable Land, sets out the requirements for proposed developments on land known to be or potentially affected by contamination. The Plan also notes in relation to land stability that failure to deal with land stability issues could cause risks to human health, local property and associated infrastructure, and the wider environment. Within County Durham the principal issue which relates to ground instability relates to past coal mining. Large parts of County Durham have been identified by the Coal Authority as 'Development High Risk Areas' and 'Development Low Risk Areas' due to the known occurrence of coal mining legacy issues and related hazards. It is necessary for developers to demonstrate that new development will be safe and stable. Where there is reason to believe that unstable land could be present due to coal mining legacy issues a Coal Mining Risk Assessment Report will be required.
Ground conditions and land contamination legislation	
The Environmental Protection Act 1990.	Part 2 of the Environmental Protection Act 1990 makes provision for the improved control of pollution arising from certain industrial and other processes. Part 2A of the Act provides the regulatory basis for the identification, designation, and remediation of contaminated land. The MHPGC Project Scoping Boundary and Ground Conditions and Contamination Study Areas shown in Figure 8.1 and Figure 8.2 include areas known to be affected by land contamination and with potential to be affected by land contamination, which may be disturbed by construction of the MHPGC Project. Under the planning regime, where a site potentially affected by contamination is proposed for development, it must undergo assessment to ensure it is suitable for the proposed land use and, where necessary, remediation must be carried out to ensure the land cannot be determined as Contaminated Land under the Environmental Protection Act 1990.

Legislation Description	Relevance to the Assessment
Water Resources Act 1991 as amended by the Water Act 2003.	The Water Resources Act 1991 makes provisions such that it is an offence to cause or knowingly permit polluting, noxious, poisonous or any solid waste matter to enter controlled waters. The Water Resources Act 1991 was revised by the Water Act 2003, which provides the definition of and regulatory controls for the protection of water resources. The Water Act 2003 sets out the definition of controlled waters which informs the water environment receptors considered in contaminated land assessment and is also relevant in relation to embedded measures to prevent pollution of water during construction activities.
European Union Groundwater Directive (2006/118/European Commission (EC)), 2006.	The aim of the European Union Groundwater Directive 2006 is to protect groundwater against pollution caused by dangerous substances. The directive continues to have effect in England following the end of the Brexit Transition Period. There is potential for the MHPGC Project to have an effect on groundwater bodies through the introduction of dangerous substances during the construction and O&M phases.
Environmental Damage (Prevention and Remediation) (England) Regulations 2015.	Construction and O&M activities associated with the MHPGC Project have the potential to cause pollution. The regulations place emphasis on businesses to proactively implement pollution prevention measures so that damage to the environment does not arise.
Health and Safety at Work etc. Act 1974.	The Health and Safety at Work etc. Act 1974 and regulations made under the Act places responsibilities upon employers to carry out a risk assessment for every work activity and to document it. Besides carrying out a risk assessment, the Act makes provisions for employers also needing to: make arrangements for implementing the health and safety measures identified as necessary by the risk assessment; appoint competent people to help them implement the arrangements; set up emergency procedures; provide clear information and training to employees; and work together with other employers sharing the same workplace. Land contamination and unstable ground pose hazards to groundworkers and potentially others in proximity to construction work. Appropriate risk assessments must be carried out and arrangements made to protect the health and safety of workers directly involved in groundworks and other human receptors who could be affected.

Legislation Description	Relevance to the Assessment
The Construction (Design and Management) (CDM) Regulations 2015.	The CDM Regulations 2015 place specific duties on clients, designers and contractors, so that health and safety is considered throughout the life of a construction project from its inception to its subsequent final demolition and removal. The CDM Regulations 2015 require the appointment of a Principal Designer and Principal Contractor to co-ordinate health and safety aspects during construction. Under the provisions set out in the CDM Regulations 2015, designers must avoid foreseeable risks so far as reasonably practicable by: eliminating hazards from the construction, cleaning, maintenance, and proposed use and demolition of a structure; reducing risks from any remaining hazard; and giving collective safety measures priority over individual measures.

8.1.3 Study Area

8.1.3.1 The Ground Conditions and Contamination Study Area is defined as the MHPGC Project Scoping Boundary with a 250m buffer extending around it, as shown in Figure 8.1. This applies for geology, hydrogeology, minerals, and land contamination.

8.1.3.2 The 250m buffer is considered appropriate based upon professional experience in land contamination assessment, with respect to the potential for contaminants to migrate from the site to off-site receptors through the soil or in groundwater, or to migrate onto the site through soil or in groundwater from off-site sources. It is also considered to be an adequate spatial extent for consideration of potential for effects on geological receptors (e.g. geological Sites of Special Scientific Interest) and geohazards, such as compressible and collapsible ground, to lead to significant effects on receptors within the MHPGC Project Scoping Boundary.

8.1.3.3 A 250m buffer is also applied for mineral resources, as the spatial extent within which mineral sites/resources could be affected by the MHPGC Project.

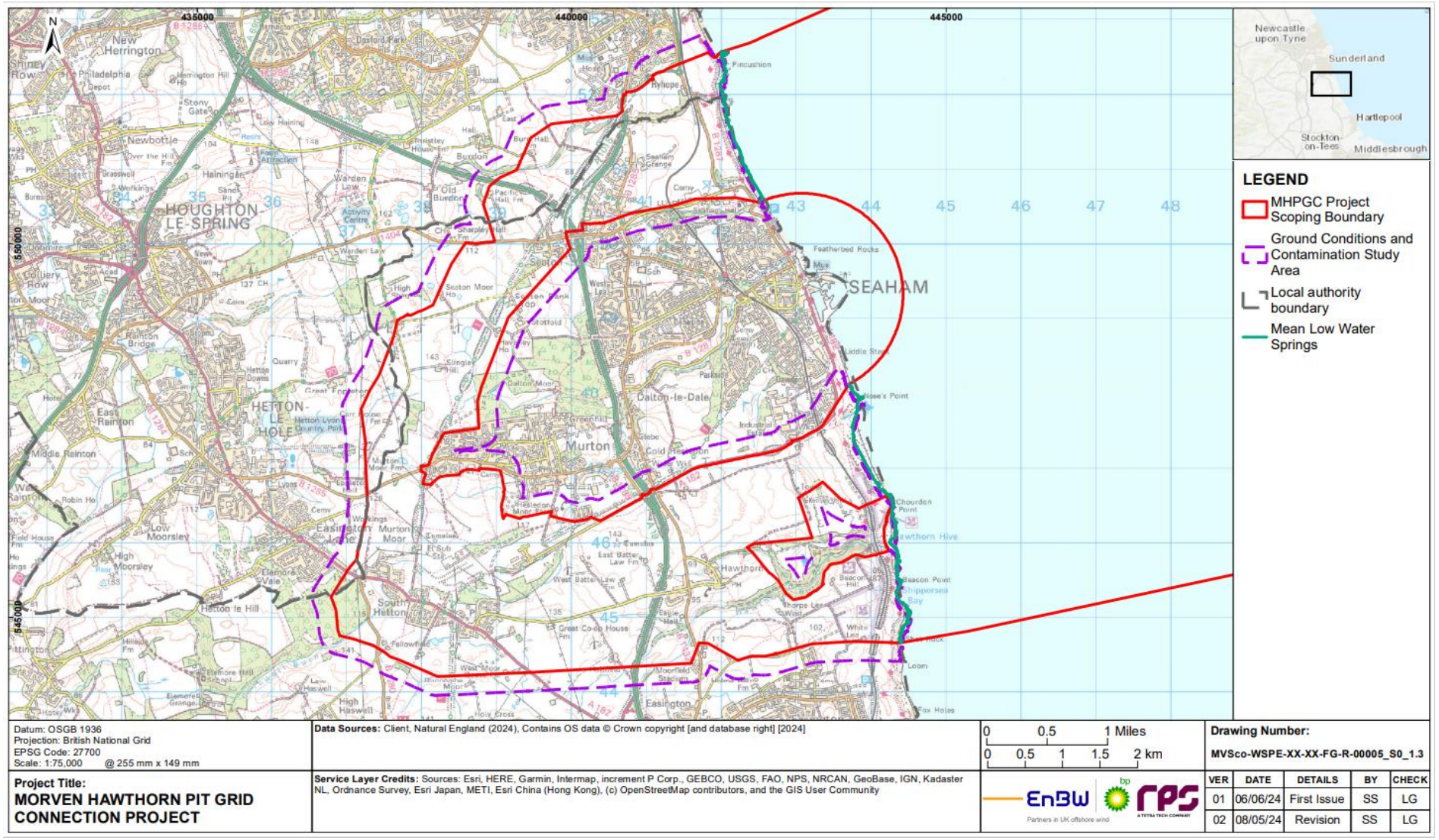


Figure 8.1: Ground Conditions and Contamination Study Area

8.1.4 Data Sources

8.1.4.1 The main data sources used to inform the desk based assessment in the Ground Condition and Contamination Chapter of the Scoping Report are listed in Table 8.2.

Surveys

8.1.4.2 For the next stage of the EIA, a Phase 1 Geo-environmental desk study will be completed for the MHPGC Project. This will form the Preliminary Risk Assessment in accordance with the Environment Agency (2020) LCRM guidance. The report will consider land contamination risks and ground stability risks. Due to the MHPGC Project Scoping Boundary falling within a Coal Authority Reporting Area and including some Development High Risk Areas (see paragraph 8.1.5.17), a Coal Authority Consultants Report will be obtained, and a Coal Mining Risk Assessment will be needed for the affected areas. This will form an appendix to the Phase 1 Geo-environmental Desk Study.

Table 8.2: Key Sources of Ground Conditions and Contamination Data

Title	Source	Year	Author
1:50,000 scale geological mapping, borehole records, mine and quarry data (available at: https://www.bgs.ac.uk/map-viewers/geoindex-onshore/).	British Geological Survey.	2024	British Geological Survey.
Coal Authority Interactive Map (available at: https://mapapps2.bgs.ac.uk/coalauthority/home.html).	Coal Authority.	2021	Coal Authority.
Historical Landfill Sites (Environment Agency, 2024) Catchment Data Explorer – data on water bodies and catchments (available at: https://environment.data.gov.uk/catchment-planning).	Environment Agency.	2024	Environment Agency.
Statutory and non-statutory land designations, information on geology and soils (available at: https://magic.defra.gov.uk/MagicMap.aspx).	Multi-Agency Geographic Information for the Countryside (MAGIC) interactive map.	Various	Defra.
Peaty Soils Location dataset (available at: https://naturalengland-defra.opendata.arcgis.com/search?q=peat).	Natural England.	Various	Natural England.

Title	Source	Year	Author
Recent and historical aerial photography.	Google Earth Pro.	Various	Google.
Provides a detailed evaluation of the county's geodiversity, including identifying Regionally Important Geological/Geomorphological Sites (RIGS) and Locally Important Geological/Geomorphological Sites (LIGS) .	British Geological Survey (BGS) and Durham County Council, Durham Geodiversity Audit.	2004	BGS and Durham County Council, Durham Geodiversity Audit.
Contaminated Land Register. Available at: https://www.sunderland.gov.uk/article/13075/Contaminated-land-register.	Sunderland City Council (SCC).	2009	SCC.
Contaminated Land Register. Available at: https://www.durham.gov.uk/article/3820/Contaminated-land.	Durham County Council (DCC).	2019	DCC.

8.1.5 Baseline Environment

Land Use

8.1.5.1 The main land use within the MHPGC Project Scoping Boundary is agriculture. The coastal areas within the MHPGC Project Scoping Boundary includes public access beaches, notable geological features, and coastal walks including the Durham Coastal Path. The Seaham Grange Industrial Estate and some other localised commercial/industrial land uses lie within the MHPGC Project Scoping Boundary.

8.1.5.2 Within the MHPGC Project Scoping Boundary, onshore corridors to the north and south of Seaham are identified and referred to as Northern Corridor and Landfall, Central Corridor and Landfall and Southern Corridor and Landfall. These corridors are shown in Chapter 6: Site Selection and Consideration of Alternatives (Figure 4.2).

8.1.5.3 Some commercial/industrial land uses are present in the Ground Conditions and Contamination Study Area, including Spectrum Business Park immediately north of the Central Corridor at Seaham, this includes a sewage treatment works c.80m north of the MHPGC Project Scoping Boundary, and the Cold Hesledon Industrial Estate c.60m north of the Central Corridor. The former mining village of South Hetton is in the southwest of the MHPGC Project Scoping Boundary and the village of Hawthorn is in the southeast. Some localised residential properties are present within the MHPGC Project Scoping Boundary, and a new housing estate (Taylor Wimpey Seaham Garden Village) is located south of the A182 southwest of Seaham within the Central Corridor. Housing estates are present at Seaham, Murton, Ryhope, and Easington within the Ground Conditions and Contamination Study Area.

8.1.5.4 The Durham Coast Line railway is within the MHPGC Project Scoping Boundary and is aligned roughly north to south through the Northern and Central Corridors. Several

roads also traverse the MHPGC Project Scoping Boundary, including the B1287 Sea View, the B1285 Stockton Road, the A1018 Stockton Road, the B1404 Seaton Lane, the B1285 Station Road, the A19 by the Cold Hesledon Interchange, the B1432 Stockton Road, the B1280 Salter's Lane and the A182 East Cliff Road. Coal mining has taken place historically within the MHPGC Project Scoping Boundary, the Ground Conditions and Contamination Study Area and surrounding area, and non-coal mineral extraction, including at Hawthorn Quarry which is situated between the north and south coastal extent of the Central Corridor.

Geology and Geodiversity

8.1.5.5 The County Durham Geodiversity Audit describes the landscape as follows: "The Permian rocks of East Durham form a low upland plateau of Magnesian Limestone (dolomite) sloping gently eastwards to the sea. The soft Permian rocks that underlie the plateau are locally well exposed on the escarpment and at the coast, but elsewhere are covered by a mantle of glacial drift. The topography of the plateau is gently undulating and is deeply incised in the east by coastal denes (valleys or ravines). The coastline is one of clay-crested limestone cliffs, giving way in the south to low dunes, with a foreshore of sandy beaches and rock outcrops heavily disfigured in the north by tipping of coal wastes."

8.1.5.6 The BGS 1:50,000 scale mapping shows localised made ground within the MHPGC Project Scoping Boundary. At the northeastern extent of the Northern Corridor, two areas of made ground are present (at grid coordinates 441702, 552418 and 441689, 552137), the northernmost overlaps an area recorded as a historical landfill by the Environment Agency (see details in paragraph 8.1.5.25). The BGS mapping shows made ground (artificial deposit) in the Ground Conditions and Contamination Study Area, immediately north of the MHPGC Project Scoping Boundary by Sharpley Manor (438643, 550037), c.15m south of the Northern Corridor at its coastal end (at 442441, 550468) and c.240m south of the of the Northern Corridor at Seaham (441262, 550244).

8.1.5.7 Made ground, not shown by the BGS, is also likely to be present in developed areas, these include roads, tracks, railways, former mineral railways, infilled former quarries and pits, existing urban and industrial areas and former industrial areas. In addition to these areas, historical landfills are recorded by the Environment Agency in the MHPGC Project Scoping Boundary and the Ground Conditions and Contamination Study Area (see details in paragraph 8.1.5.25).

8.1.5.8 BGS GeoIndex 1:50,000 scale superficial geology mapping shows superficial deposits across most of the land within the MHPGC Project Scoping Boundary and Ground Conditions and Contamination Study Area. These are predominantly Devensian Stage (Late Pleistocene) till (diamicton). Localised glaciofluvial deposits (sand and gravel) are present throughout the MHPGC Project Scoping Boundary, the largest areas are in the southwest corner of the MHPGC Project Scoping Boundary and spanning across the Northern Corridor, at the fields near the coast. Marine beach deposits (sand and gravel) occur at the beaches within the northern, central and Southern Corridors. In the northeast of the Northern Corridor, west of the marine beach deposits, an area of Pelaw Claw Clay Member (clay) is shown. West of this, a large area of glaciofluvial deposits spans the width of the Northern Corridor. Within all corridors, there are localised areas west of the coast where no superficial deposits

are shown, indicating areas where superficial deposits may be thin or potentially absent, and outcropping rock is possible. Alluvium (clay, silt, sand and gravel) is present within the MHPGC Project Scoping Boundary, including along the route of the Sharpley and Seaton Burns in the north, and Dalton Beck, and its tributaries, also along the route of the Coldwell Burn in the southwest of the MHPGC Project Scoping Boundary and at Dalton Beck, which runs roughly southwest to northeast through the centre of Seaham to discharge to the North Sea. Alluvium is also shown in the southeast of the MHPGC Project Scoping Boundary along the route of Hawthorn Burn and one of its tributaries, Hawthorn Burn flows northeast into the Southern Corridor then flows roughly eastwards to the coast. Two areas of lacustrine deposits are present in the southwest of the MHPGC Project Scoping Boundary at South Hetton, these are fine-grained sediments (clay and silt) laid down as deltaic, lake bottom or shore sediments in lakes, and can contain thin layers of organic material and sand.

8.1.5.9 BGS 1:50,000 scale bedrock mapping shows most of the land in the west of the MHPGC Project Scoping Boundary to be underlain by the Permian Period Ford Formation (dolostone). The exception is a small area in the southwest of the MHPGC Project Scoping Boundary where the Raisby Formation (dolostone) is present. The Ford Formation comprises dolomite with three distinct facies: shelf-edge reef that separates a broad belt of back-reef and lagoonal beds to the west from a belt of fore-reef talus aprons and off-reef beds to the east. The map shows the Ford Formation (Shelf-Edge Reef) (limestone) between the north and Central Corridors, west of the town of Seaham, and extending southwards into the Central Corridor at two locations south of Seaham, spanning the full width of the Southern Corridor c.200 – 500m from the coast, and at the cliffs in the southeast of the Southern Corridor. At the coast and as far west as Eastlea, bedrock is mainly the Roker Formation (dolostone), this comprises cream, oolitic dolostone with subordinate thin beds of fine-grained dolomite, and some breccias are also present. The Seaham Formation (dolomitic limestone) occurs locally at the east coast on the Northern Corridor and is also present in the northeast of the town of Seaham by the coast, this is predominantly thin-bedded limestone with some dolostone. The solid geology within the MHPGC Project Scoping Boundary, Ground Conditions and Contamination Study Area and surrounding area is subject to faulting, with approximately 20 faults within the MHPGC Project Scoping Boundary. The cliffs at Seaham's coast are designated for their surface rock exposures, as described in paragraph 8.1.5.10 below. The geology within the MHPGC Project Scoping Boundary is shown in Figure 8.2 (superficial geology) and Figure 8.3 (bedrock geology).

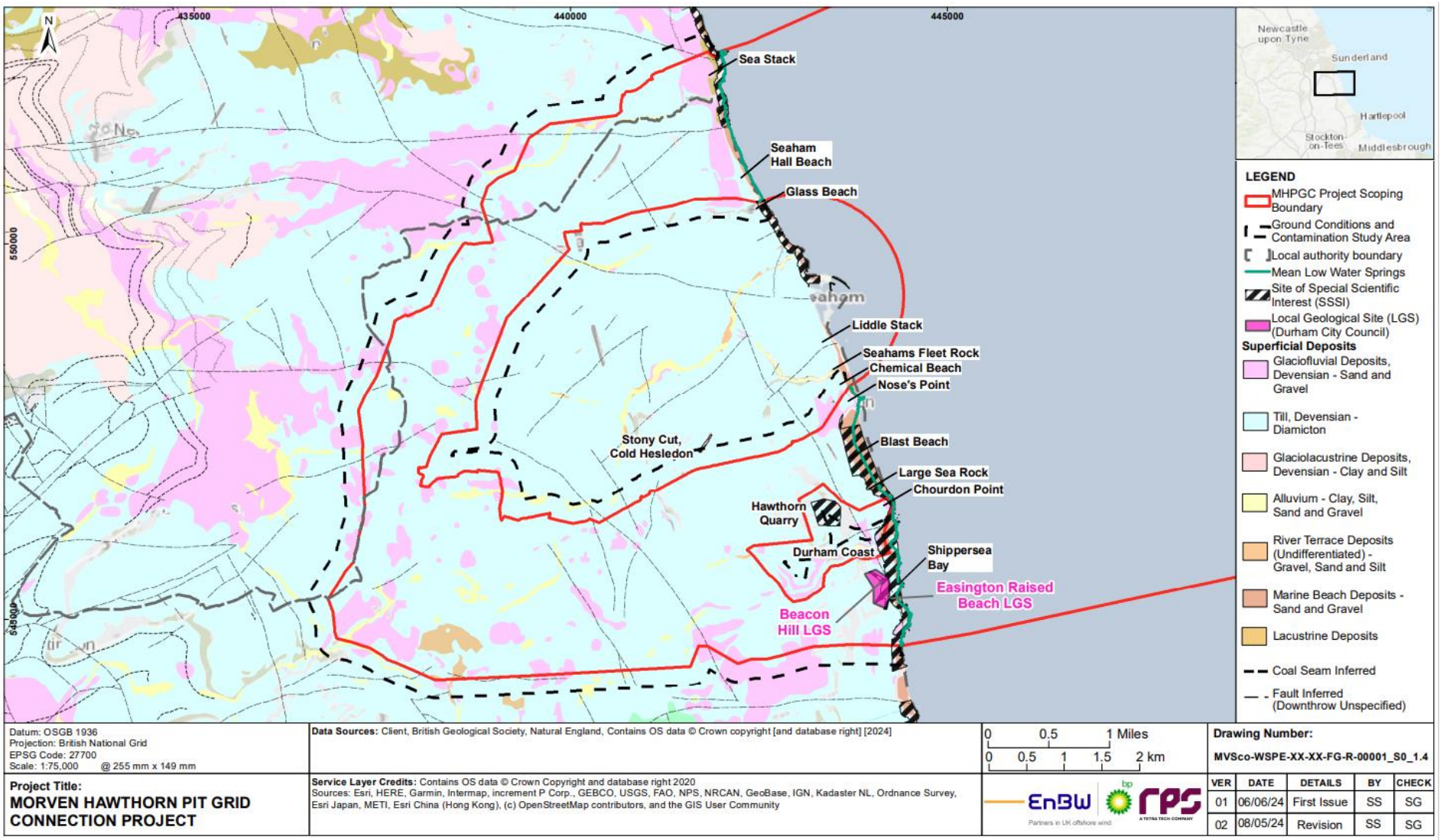


Figure 8.2: Superficial Geology and Geodiversity Sites in the Ground Conditions and Contamination Study Area

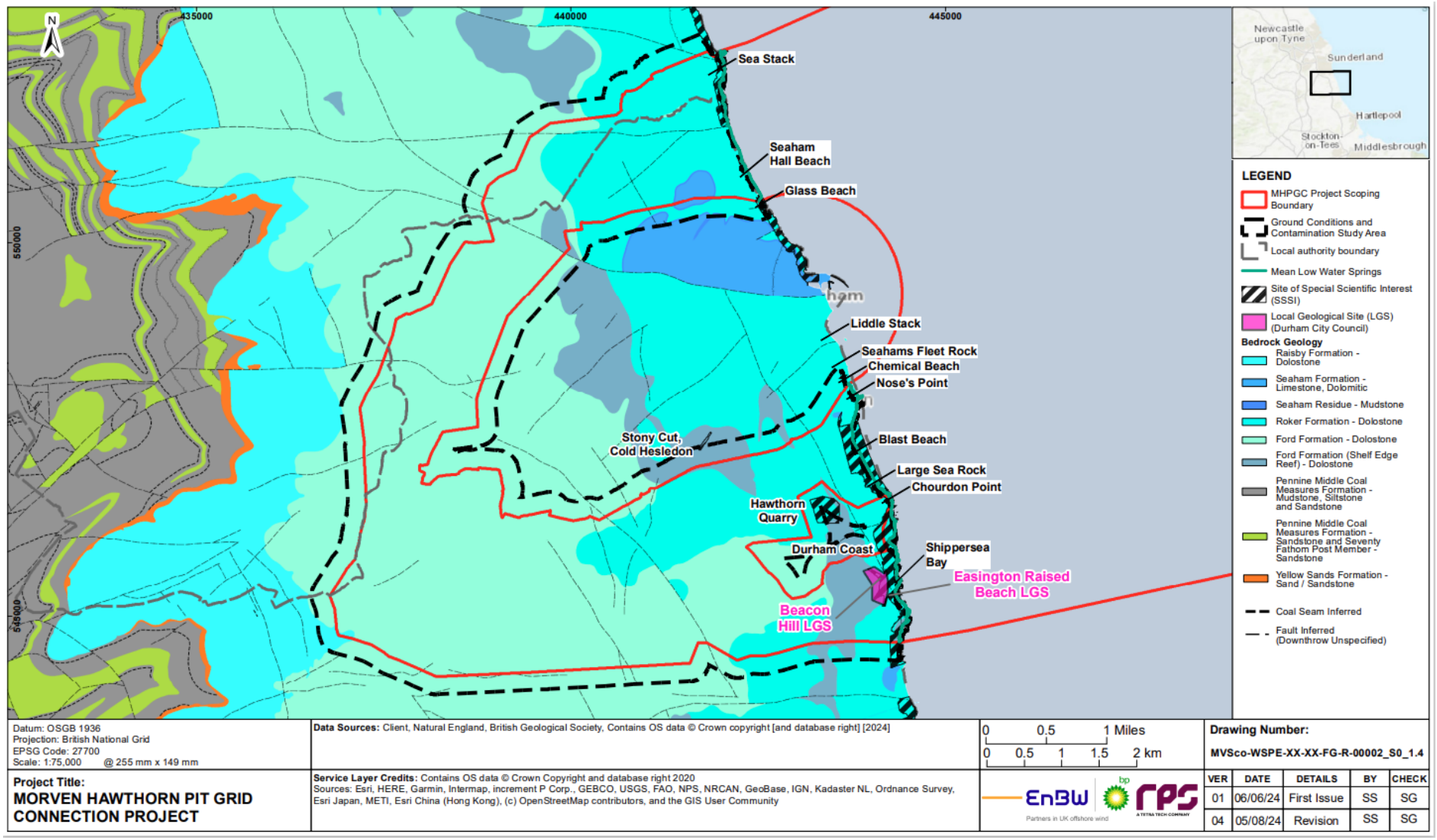


Figure 8.3: Bedrock Geology and Geodiversity Sites in the Ground Conditions and Contamination Study Area

8.1.5.10 The Durham Coast SSSI is partially within the MHPGC Project Scoping Boundary. This SSSI comprises of multiple discrete areas, three of which are partially within the MHPGC Project Scoping Boundary, from north to south, one area overlaps the northern half of the Northern Corridor, the second area overlaps the southern tip of the Northern Corridor , and the third area spans most of the Central Corridor (north and south ends) except for its northern tip at Nose's Point (see Figure 8.2 and Figure 8.3). The SSSI designation relates to geological features and biological and physiographic interests. The coast north of Seaham Harbour provides surface exposures of the Seaham Formation and the Seaham Residue and is one of the best places in Britain for observing the effects of evaporite dissolution, and the best surface exposure of the highest beds of the Roker Dolomite Formation. The southern part of the SSSI includes Blast Beach and is known as Blackhalls Rocks. Blackhalls Rocks forms a 2km section of coastal cliffs and shore platforms on the Durham coast with exposures in the marine Permian. The coastal cliffs and shore platforms constitute the largest and best exposure of the Hesleden Dene Stromatolite Biostrome. The biostrome is almost entirely of dolomite rock and comprises a thick and highly varied boulder conglomerate overlain by a thicker unit of algal laminates ('stromatolites'). There are two Local Geological Sites designated by DCC within the Southern Corridor. These are both near the coast and comprise Beacon Hill (exposure/railway cutting at 444110, 545424) and Easington Raised Beach (exposure at 444248, 545284), as shown on Figure 8.1 and Figure 8.2.

8.1.5.11 At Blast Beach there is a visible 'shelf' of colliery waste, relating to historical large-scale colliery waste disposal activity (Natural History Society of Northumbria, 2024), as described below in paragraph 8.1.5.19. A large clean-up project to address the presence of colliery and industrial waste along the Seaham coast was completed between 1997 and 2002 (Sunderland Echo, 2020; Turning the Tide, 2023; Durham Heritage Coast, 2024). The main focus of this work appears to have been outside the MHPGC Project Scoping Boundary, including at Easington and Horden south of the Ground Conditions and Contamination Study Area. Anecdotal information suggests that the colliery spoil retained on Blast Beach is providing protection to the Magnesian Limestone cliffs from coastal erosion, and that as a result, red and yellow (iron) oxide-coloured pools still appear on the beach (Chronicle Live, 2018). These are visible on 2024 aerial photography in several areas at the foot of the cliffs within the MHPGC Project Scoping Boundary. A sea stack and large sea rock are also present on Blast Beach within the MHPGC Project Scoping Boundary.

8.1.5.12 Hawthorn Quarry is within the Ground Conditions and Contamination Study Area, between the central and Southern Corridors, and is designated as an SSSI for geological features. The quarry and SSSI designated area is approximately 50m southwest of the Central Corridor. Hawthorn Quarry was identified as of national importance in the Geological Conservation Review. The quarry site is described as highly informative in the understanding of the later evolution of carbonate environments in mid-Magnesian Limestone times, with reef carbonates overlain by bedded, non-reef sediments, including boulder beds and stromatolite biostrome of the Ford Formation.

Environmental Setting

8.1.5.13 Details of the hydrogeology and hydrology are provided in Chapter 8.2 Water Resources and Flood Risk, of the Scoping Report. In summary regarding potential groundwater receptors for land contamination, there are superficial aquifers present within the MHPGC Project Scoping Boundary, the till deposits covering most of the MHPGC Project Scoping Boundary are classed by the Environment Agency as a secondary (undifferentiated) aquifer, and the alluvium, glaciofluvial sands and gravels, and marine beach deposits of sand and gravel, are all classed as Secondary A aquifers. The lacustrine deposits in the southwest are classed as unproductive strata. The Magnesian Limestone (dolomite) bedrock beneath the land within the MHPGC Project Scoping Boundary and Ground Conditions and Contamination Study Area is classed as a Principal Aquifer. The MAGIC interactive map shows groundwater Source Protection Zones (SPZs) within the MHPGC Project Scoping Boundary and Ground Conditions and Contamination Study Area. Most of the western and southern areas of the MHPGC Project Scoping Boundary are within Zone III total catchment, some Zone II outer protection is within the MHPGC Project Scoping Boundary, and east of the Northern Corridor, there is a Zone I inner protection zone at the outer edge of the Ground Conditions and Contamination Study Area (439263, 548957). These abstractions are likely to be from the principal aquifer in the Magnesian Limestone. Private water supplies are also possible within the MHPGC Project Scoping Boundary and/or Ground Conditions and Contamination Study Area and the presence of these will be confirmed for the next stage of the assessment.

8.1.5.14 Like groundwater, surface water is a potential receptor considered in land contamination assessment. Surface watercourses and other water features within the MHPGC Project Scoping Boundary and Ground Conditions and Contamination Study Area are detailed in Chapter 8.2 Water Resources and Flood Risk, of the Scoping Report and summarised briefly here. Sharpley Burn runs though Ryhope Dene to the North Sea in the north of the MHPGC Project Scoping Boundary. Seaton Burn is within the Ground Conditions and Contamination Study Area, c.115m southeast of the Northern Corridor. A tributary of Seaton Burn is within the MHPGC Project Scoping Boundary in the south of the Northern Corridor, east of the A1018. The Coldwell Burn is within the Ground Conditions and Contamination Study Area to the southwest of the MHPGC Project Scoping Boundary, and mapping indicates that it may have a tributary within the MHPGC Project Scoping Boundary in a culvert, the burn flows to the west towards the River Wear. The Dalton Beck originates southeast of South Hetton within the MHPGC Project Scoping Boundary and flows to the northeast to confluence with an unnamed tributary that also originates from within the MHPGC Project Scoping Boundary. The Dalton Beck appears to be discontinuous on Ordnance Survey (OS) mapping and at Cold Hesledon becomes a series of small ponds. Given the urban developments present at Seaham, also at South Hetton and Hawthorn, it is likely that culverts will be present. The Hawthorn Burn originates as the Loaming Burn southeast of Easington and flows northeast through Hawthorn Dene, partly within the MHPGC Project Scoping Boundary and then it continues to the sea within the Ground Conditions and Contamination Study Area, running close to the north of the Southern Corridor. The land within the MHPGC Project Scoping Boundary is partly within the Seaham Peterlee Coast Operational Catchment. Within this catchment, the western area of the MHPGC Project Scoping Boundary, around Murton and South Hetton, is partly within the Dalton Beck to North Sea Water Body,

and the central and Southern Corridors are partly within the Hawthorn Burn from Source to North Sea Water Body.

8.1.5.15 Details of sites designated for nature conservation within the MHPGC Project Scoping Boundary and Ground Conditions and Contamination Study Area are provided in Chapter 8.3: Terrestrial Ecology and Ornithology (Figure 8.13), of the Scoping Report and those within the Ground Conditions and Contamination Study Area are shown on Figure 8.2. SSSIs noted for geological interest are described in paragraphs 8.1.5.10 and 8.1.5.12. In addition to these, Hesledon Moor East SSSI is formed of two areas, one of which is within the MHPGC Project Scoping Boundary in the southwest, and the other is partly within the Ground Conditions and Contamination Study Area. Hesledon Moor West SSSI is southwest of the MHPGC Project Scoping Boundary, within the Ground Conditions and Contamination Study Area at South Hetton. Hesledon Moor West is a small site including fen, carr and heathland communities which have developed on acidic glacial drift overlying the Magnesian Limestone. Around its margins, wet heath is present, in which bog mosses Sphagnum spp. feature in the ground flora, and grass heath. Natural England data does not indicate deep peaty soils within the MHPGC Project Scoping Boundary or in the Ground Conditions and Contamination Study Area. The Northumbria Coast, including the Durham Coast SSSI where it overlaps the Northern Corridor, is designated as a Special Protection Area (SPA) and where it overlaps the northern and Central Corridors as a Special Area of Conservation (SAC). There are three Ancient Woodlands that are partially within the MHPGC Project Scoping Boundary, and a further two, within the Ground Conditions and Contamination Study Area (see Chapter 8.3: Terrestrial Ecology and Ornithology, of the Scoping Report).

Military Land Uses and Unexploded Ordnance

8.1.5.16 The Zetica Unexploded Bomb Risk Map was consulted for the MHPGC Project Scoping Boundary. This shows the Northern Corridor from the coast to approximately 2km inland, is within a moderate risk area for Unexploded Ordnance (UXO) associated with World War II (WWII) bombing. The moderate risk area along the Seaham coast extends south as far as the northern tip of the Central Corridor, and slightly overlaps the MHPGC Project Scoping Boundary. The remainder of the land within the MHPGC Project Scoping Boundary is shown as low risk for UXO associated with WWII bombing. Whilst this presents a potential health and safety constraint to development rather than indicating potentially contaminated land, there is anecdotal evidence of WWII military activity in the vicinity of the MHPGC Project Scoping Boundary, including a Royal Air Force (RAF) plane crashing at Slingley Hill (potentially onsite in the west) and OS mapping shows a Vickers machine gun defence post onsite at the coast at the Central Corridor (Seaham Past, 2021). Other military uses may have taken place within the MHPGC Project Scoping Boundary or in the Ground Conditions and Contamination Study Area and could present a localised potential contamination risk.

Minerals: Coal Mining

8.1.5.17 The MHPGC Project Scoping Boundary and the Ground Conditions and Contamination Study Area fall within a coal mining reporting area. Review of the Coal Authority Interactive Map indicates three mine entries (shaft) in the southwest of the MHPGC Project Scoping Boundary, two at South Hetton (at coordinates 438085,

545316, and 438105, 545263) and to the northeast of South Hetton (at 438892, 545852). There are a further four mine entries at the northeast corner of the Central Corridor, comprising two shafts (at 443582, 547823, and 443562, 547849) and two adits (at 443734, 547968, and 443668, 547757). All seven mine entries correspond to Development High Risk Areas. Multiple small Development High Risk Areas are shown in a linear arrangement to the southeast of Hesledon Plantation, these extend into the north of the Central Corridor. A similar cluster of small development high risk areas are shown northwest of South Hetton in the southwest corner of the MHPGC Project Scoping Boundary. These areas correspond to fissures and breaklines identified by the Coal Authority and which may indicate former mining activity. A small Development High Risk Area is located in the north of the MHPGC Project Scoping Boundary on a former railway line, west of the A1018 (at 440244, 551131).

8.1.5.18 The BGS Brit Pits dataset is presented in Figure 8.4, which shows the location of surface and underground mines within the MHPGC Project Scoping Boundary and in the Ground Conditions and Contamination Study Area.

8.1.5.19 Anecdotal information records that Blast Beach at the coast at the Central Corridor, is so named due to its historical industrial use, which included the presence of several blast furnaces and disposal onto the beach of colliery waste from four mines in East Durham to Noses Point (aka Dawdon Colliery), Easington Colliery, Horden Colliery and Blackhall Colliery. Easington Colliery is still shown on OS mapping, over 1.5km south of the Ground Conditions and Contamination Study Area, however, deep coal mining ceased in 1993. Dawdon Colliery was immediately north of the Central Corridor at the coast and associated mineral railway ran through within the MHPGC Project Scoping Boundary. South Hetton Colliery was located at the southwest corner of the MHPGC Project Scoping Boundary, largely beyond but with an associated mineral railway running through the MHPGC Project Scoping Boundary.

8.1.5.20 A review of historical maps available from the National Library of Scotland shows several mineral railways within the MHPGC Project Scoping Boundary. Lines ran from Dawdon Colliery, which was near the coast in the Central Corridor south, to Easington Colliery (outside the Ground Conditions and Contamination Study Area to the south). Mineral railway lines were also present around South Hetton, running from Elemore Colliery (outside the Ground Conditions and Contamination Study Area to the southwest), to Murton Colliery (also outside the Ground Conditions and Contamination Study Area) and crossing through the MHPGC Project Scoping Boundary from east to west to Hetton Le Hole Colliery (west of the outside the Ground Conditions and Contamination Study Area).

8.1.5.21 Aerial imagery of Dawdon Colliery in 1934 shows the colliery activity extending onto the beach.

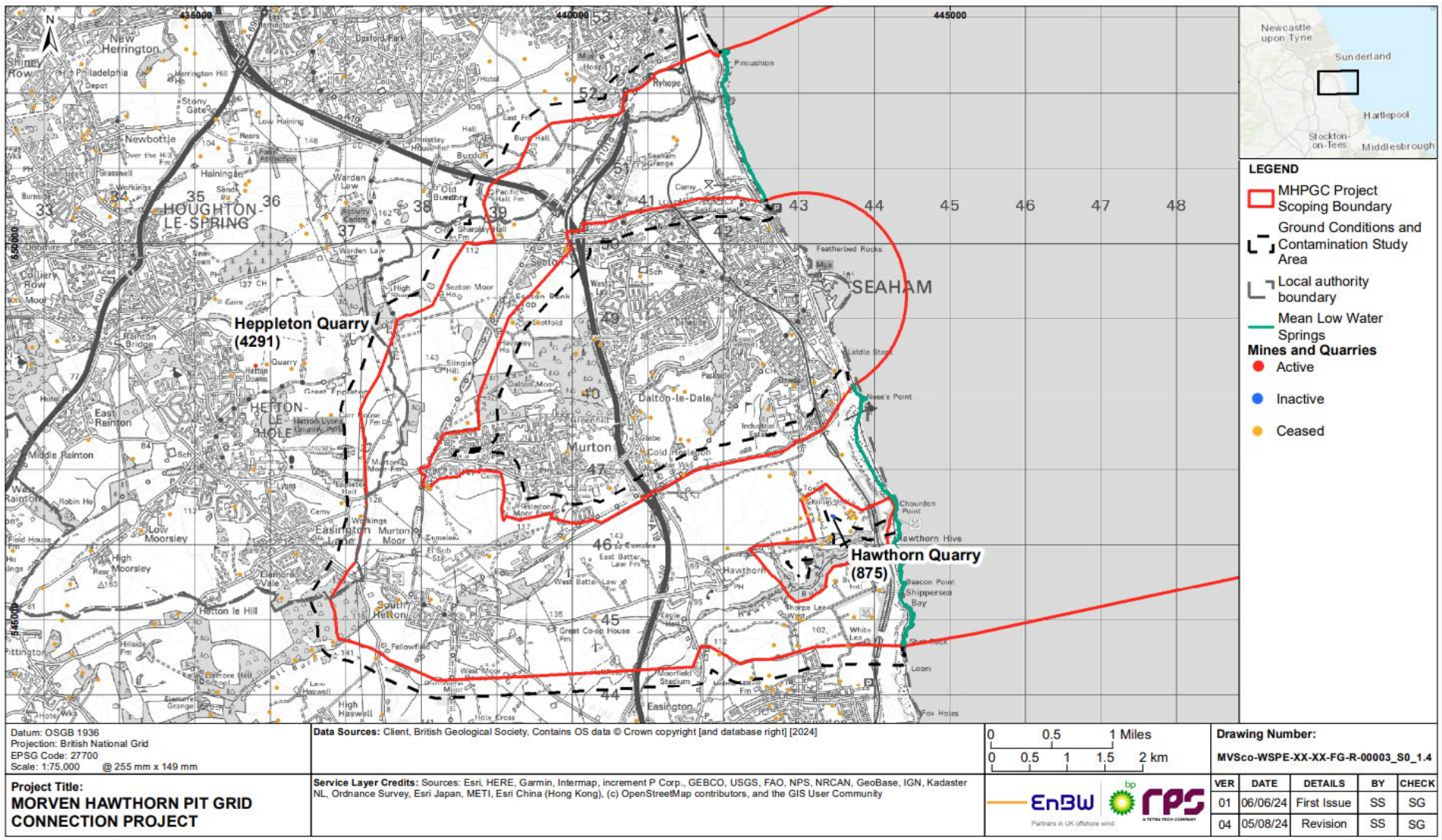


Figure 8.4: Mineral Sites in the Ground Conditions and Contamination Study Area

Minerals: Non-coal

8.1.5.22 Due to its complex geology, County Durham has a long history of mineral extraction, and continues to be a major aggregate producing county, with the two main types of aggregates being crushed rock aggregates including magnesian limestone (with agricultural lime as a by-product); carboniferous limestone and dolerite; and sand and gravel. The BGS Brit Pits dataset is presented in Figure 8.4, which shows the location of surface and underground mineral workings within the MHPGC Project Scoping Boundary and in the Ground Conditions and Contamination Study Area.

8.1.5.23 The County Durham Council 'County Durham Local Plan' (Durham County Council, 2020) interactive map shows there is one Mineral Safeguarded Site within the Ground Conditions and Contamination Study Area, and numerous MSAs. The Mineral Safeguarded Site is the Hawthorn Quarry at Kinley Hill in the south of the Ground Conditions and Contamination Study Area, south of the Central Corridor, near the coast, and this is also identified as a High Grade Dolomite Reserve. Hawthorn Quarry is excluded from the MHPGC Project Scoping Boundary. A minerals and waste safeguarding zone 500m buffer is identified around the Mineral Safeguarded Site. The MSAs within the MHPGC Project Scoping Boundary include:

- three large areas safeguarding Magnesian Limestone are located within the MHPGC Project Scoping Boundary, one south of the A182 in the east of the Central Corridorand extending beyond it, one at the eastern end of the Southern Corridor which is entirely within the MHPGC Project Scoping Boundary, and one in the southwest, west of South Hetton which extends southwest of the MHPGC Project Scoping Boundary;
- numerous sites safeguarding Glacial Sand and Gravel, over 40 of which are entirely within the MHPGC Project Scoping Boundary. The largest of these are in the southwest and south of the MHPGC Project Scoping Boundary and at the eastern end of the Northern Corridor, at least 12 of the safeguarding sites straddle the MHPGC Project Scoping Boundary;
- some small, typically linear-shaped, areas safeguarding River Sand and Gravel, with one larger area at South Hetton, south of the A182;
- four areas at the coast, which are within the eastern extents of the northern, central and Southern Corridors, safeguarding Blown Sand and Raised Beach Deposits.

8.1.5.24 The Sunderland Local Plan shows the land within the Northern Corridor, north of the A19 is within a Limestone MSA 500m buffer (Sunderland County Council, 2024). To the southwest of this, also within the MHPGC Project Scoping Boundary there is a sand and gravel bedrock MSA 250m buffer. Towards the coast on the Northern Corridor at Ryhope the land immediately north of the MHPGC Project Scoping Boundary within the Ground Conditions and Contamination Study Area is also within a sand and gravel bedrock MSA 250m.

Land Contamination

8.1.5.25 SCC's Contaminated Land Register records one site designated as statutory Contaminated Land ('CL1 Halliwell Banks' at NZ41705233, the former Halliwell Banks landfill site). The southern area of this site is within the Northern Corridor of the

MHPGC Project Scoping Boundary, near the coast at Ryhope (see Figure 8.5). The designated site is shown covering around 40ha, of which around 25ha is within the MHPGC Project Scoping Boundary. The landfill is designated as a 'special site' due to its potential impact to groundwater in the Magnesian Limestone principal aquifer (Parallel Parliament, 2021). In 2021, it is recorded that "Appropriate Persons", as defined under the EPA Part 2A regime, have been identified for this land and that a post determination report examining the issues with the Halliwell Banks site was being reviewed by the Environment Agency and Natural England. SCC record that solid and liquid waste including benzene, polycyclic aromatic hydrocarbons (PAHs), volatile organic compounds (VOC), semi-volatile organic compounds (SVOC), total petroleum hydrocarbons (TPH), polychlorinated biphenyls (PCBs), metals and inorganic compounds have been found to pose a Significant Possibility of Significant Harm (ecological system effect) on the Northumbria Coast SPA immediately easy of the Halliwell Banks site. It has been found that pollution of controlled water is likely to be caused by TPH, naphthalene, benzene, toluene, ethylbenzene, xylene (BTEX), SVOC, VOC and PCBs entering the principal aquifer. The landfill is on a section of the east coast which is affected by coastal erosion. A portion of the designated site is identified in Environment Agency records as a historical landfill, see paragraph 8.1.5.27.

8.1.5.26 DCC records one site on their Contaminated Land Register. This is at Spennymoor and is not within the MHPGC Project Scoping Boundary or Ground Conditions and Contamination Study Area and is, therefore, not considered further in this chapter.

8.1.5.27 The Environment Agency maintains a database of historical landfill sites where no environmental permit is in force and the Environment Agency does not regulate the site. Five historical landfills are identified within the MHPGC Project Scoping Boundary, as shown on Figure 8.5, and summarised below:

- Ryhope Dene, at grid coordinates 441598, 552196;
- Eppleton Bridge Railway Cutting, at 437464, 547264. This landfill had a licence held by Messrs A and P Hare, accepting inert waste, and the last input was in 1989;
- Area V Salters Lane, at 437327, 544752;
- Area X South of Hetton Centre, at 437942, 545048;
- Area Y South of Hetton Miner, at 438598, 545094.

8.1.5.28 There are a further five historical landfills in the Ground Conditions and Contamination Study Area. These are shown on Figure 8.5 and occur to the north of the Northern Corridor (Ryhope Dene North, at 441525, 552657), west of the MHPGC Project Scoping Boundary (Murton Lane, at 437174, 546507, and Hetton Moor Farm, at 437156, 546240), and north of the Central Corridor (Area K Murton Miners Welfare, at 439201, 546597, and Area K West of Wheatly Hill, at 441427, 545497). Of the two large former landfill features west of the MHPGC Project Scoping Boundary, located east of Murton Lane and south of the B1285, 'Murton Lane' and 'Hetton Moor Farm', the latter is recorded as having a licence held by G M Pearson and Sons Limited, accepted inert, industrial, commercial and household waste, and the last input was in 1985.

8.1.5.29 Potential sources of land contamination identified within the MHPGC Project Scoping Boundary through this initial desk based review include:

- historical coal mining, colliery spoil and blast furnace waste disposal;
- other historical mineral workings (former quarries, former sand or gravel pits);
- railway land, including historical mineral railway;
- made ground, including for road construction and associated with building demolition;
- the former Murton Station;
- substations;
- tanks;
- current industrial estates (including Seaham Grange Industrial Estate and Jade Business Park);
- a former depot;
- a former laundry;
- the former Easington Brick and Tile Works;
- game shooting areas (including a former pheasantry keepers house);
- a former mill;
- water/sewage pumping stations;
- a service station (Shell, Easington Services);
- large farms (can cause localised contamination associated with the storage and use of fuels, oils, chemicals including pesticides, herbicides etc, asbestos due to ad hoc waste disposal or released as fibres/fragments from farm buildings in poor condition);
- possible military activity (one aircraft crash noted potentially onsite);
- off-site sewage works and industrial estates;
- off-site historical industry including mining, quarrying, iron works (by Blast Beach – north of the MHPGC Project Scoping Boundary);
- off-site historical landfill including a site designated as Contaminated Land.

8.1.5.30 As noted in paragraph 8.1.4.2, a Phase 1 Geo-environmental desk study will be produced for the MHPGC Project to confirm the baseline risks levels associated with known or potential land contamination, and to identify potential ground stability issues associated with former mineral extraction and other geohazards.

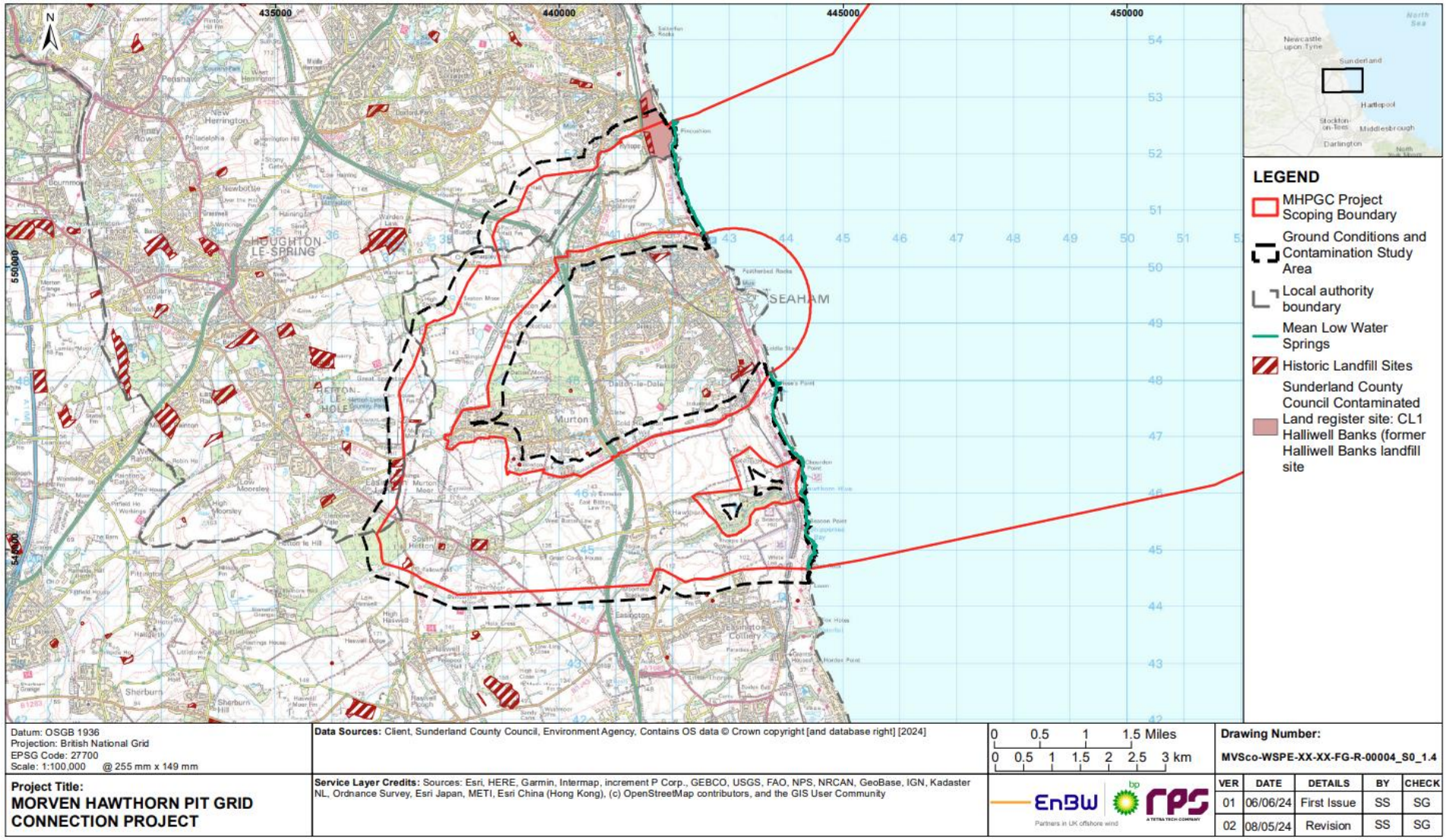


Figure 8.5: Land Contamination and Landfill in the Ground Conditions and Contamination Study Area

8.1.6 Potential Impacts of the Morven Hawthorn Pit Grid Connection Project

8.1.6.1 A range of potential impacts from ground conditions and land contamination have been identified which may give rise to likely significant effects during the construction, O&M, and decommissioning phases of the MHPGC Project.

8.1.6.2 The impacts that have been scoped into the assessment as having the potential to give rise to likely significant effects are outlined in Table 8.3 together with a description of any additional data collection (e.g. site specific surveys) and supporting analyses (e.g. modelling) that will be required to enable a full assessment of the impacts.

8.1.6.3 Potential impacts scoped out of the assessment as there is no potential for them to give rise to significant likely effects are presented in Table 8.4, with justification.

Table 8.3: Impacts Proposed to be Scoped in to the Morven Hawthorn Pit Grid Connection Project Assessment for Ground Conditions and Contamination

*Project phase refers to construction (C), O&M (O) and decommissioning (D).

Impact	Project Phase*			Justification	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D			
Geology/geodiversity						
Permanent loss of or damage to a locally or nationally important geological feature.	✓	×	×	The three corridors and landfall options cross through SSSIs designated for their geological features.	Desk based review, including 'ground conditions and contamination' constraints maps to be used to develop the design of the MHPGC Project to avoid or minimise effects on sensitive geological features resources.	Scoped in for assessment informed by updated baseline information and design information.
Temporary loss of access to geological features with statutory conservation designations.	✓	×	✓	The three corridors and landfall options cross through SSSIs designated for their geological features.	Desk based review, including 'ground conditions and contamination' constraints maps to be used to develop the design of the MHPGC Project to avoid or minimise effects on sensitive geological features resources.	Scoped in for assessment informed by updated baseline information and design information.
Mineral resources						
Sterilisation of mineral resources due to permanent development (including landfall, onshore substation,	✓	×	×	Potential for the MHPGC Project to cross areas of MSA or mineral search areas resulting in the sterilisation of mineral resources. This effect would occur during construction.	Desk based review, including 'ground conditions and contamination' constraints maps to be used to develop the design of the MHPGC Project to avoid or minimise effects on mineral resources.	Scoped in for assessment informed by updated baseline information and design information.

Impact	Project Phase*			Justification	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D			
and buried cables) in or near existing or allocated mineral sites.						
Temporary sterilisation of mineral resources due to construction activities such as presence of temporary construction compounds.	✓	×	✓	Potential for the MHPGC Project to cross areas of MSA or mineral search areas resulting in the sterilisation of mineral resources. This effect could occur during construction or decommissioning.	Desk based review, including 'ground conditions and contamination' constraints maps to be used to develop the design of the MHPGC Project to avoid or minimise effects on mineral resources.	Scoped in for assessment informed by updated baseline information and design information.
Land contamination receptors						
Release of contaminants to ground or surface water due to accidental spills or leaks of chemicals, fuels or oils from vehicles, plant or temporary storage facilities, release of contaminants from	✓	×	✓	Construction (and decommissioning) of the MHPGC Project has the potential to introduce new sources of contamination and cause deterioration of land quality/water quality due to accidental or uncontrolled spills or releases.	Consideration in the design of suitable designed in measures to avoid or minimise the risk of accidental or uncontrolled releases of pollutants to ground or water during construction or decommissioning.	Scoped in for assessment informed by updated design information.

Impact	Project Phase*			Justification	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D			
wastes or other temporarily stored materials by run-off or windblown dust.						
Changes to the level of risk to contaminated land receptors where the MHPGC Project interacts with pre-existing land contamination e.g. to introduce new receptors, and/or change ground cover (e.g. removal of vegetation, ground reprofiling, removal of hardstanding).	✓	✓	✓	Development can result in increased risks to receptors due to land contamination (e.g. mobilising contaminants by removing vegetation, introducing new receptors or pathways to receptors), or alternatively it can remove or lower risks to receptors (e.g. through changes to land use or through remediation).	Desk based review, including ground condition and contamination constraints maps and a Phase 1 Geo-environmental Desk Study. These will be used to develop the design of the Project, such as to avoid, or if that is not possible, minimise adverse effects on land contamination receptors, or to identify suitable opportunities for positive effects on land contamination receptors (e.g. through remediation of pre-existing contamination).	Scoped in for assessment informed by updated baseline information and design information, and on the basis of the change in the level of risk to land contamination receptors as a result of the MHPGC Project – effects may be positive or negative (adverse).

Table 8.4: Impacts Proposed to be Scoped out of the Morven Hawthorn Pit Grid Connection Project Assessment for Ground Conditions and Contamination

Impact	Justification
Accidental release of contaminants to ground (e.g. leaks from oil containing equipment in substation(s), leaks from vehicles or equipment used for day-to-day activities (O&M)).	Effects on receptors caused by accidental release of contaminants to ground during operation (e.g. leakages of oil from substation equipment) are scoped out on the basis that the MHPGC Project will be designed and constructed to comply with industry good practice for pollution prevention, the above ground infrastructure will be secure and only accessible to suitably trained and authorised workers, and all operations will be subject to the Health and Safety at Work Act (1974), and regulations made under this Act. These measures will minimise the risk of accidental or uncontrolled releases of pollutants to ground or water during O&M.
Health effects on groundworkers due to land contamination (construction, O&M, and decommissioning).	Health effects on ground workers during construction, maintenance activities during operation, or decommissioning, caused by direct contact, inhalation and/or ingestion of contaminants in or on the ground, are scoped out, as any work that may bring these workers into contact with contaminants would be subject to The Construction (Design and Management) Regulations 2015 (CDM) and the Health and Safety at Work Act (1974), which require that safe working practices are in place as part of normal construction health and safety management so that risks to these type of workers are controlled. Legal obligations include the requirement for appropriate risk assessments and method statements for all construction related activities and the use of appropriate working methods, training and Personal Protective Equipment (PPE).

8.1.7 Designed In Measures and Mitigation

8.1.7.1 As part of the project design process, a number of designed in measures (primary and tertiary) will reduce the potential for impacts on ground conditions and contamination (Table 8.5). As there is a commitment to implement these measures, they are considered inherent to the design of the MHPGC Project. The determination of magnitude and significance will assume the implementation of such measures. Some of these measures are considered standard industry practice for this type of development.

8.1.7.2 The requirement for any additional (secondary) mitigation measures will be dependent on the significance of the effects on ground conditions and contamination receptors. The requirement for and feasibility of any mitigation measures will be consulted upon with statutory consultees throughout the EIA process.

8.1.7.3 The following designed in measures are relevant to ground conditions and contamination receptors. The designed in measures will evolve over the development process as the EIA progresses.

Table 8.5: Designed in Measures Proposed for Ground Conditions and Contamination

Reference Number	Designed in Measures	Justification	Primary or Tertiary
MM-1	A decommissioning plan will be prepared for MHPGC Project in line with the latest relevant available guidance.	To ensure the MHPGC Project is suitably assessed for environmental impacts.	P
MM-35	All aspects of the construction work will be in accordance with the Health and Safety at Work Act (1974) and regulations made under the Act, and the Construction (Design and Management) Regulations 2015.	To avoid and minimise contamination.	T
MM-69	Compliance with current industry guidance for pollution prevention during construction, including the use, storage and handling of fuels, oils, chemicals and contaminated water, and siting of any necessary storage areas away from sensitive receptors such as surface watercourses.	To avoid and minimise contamination.	T
MM-70	Prior to construction, an unexpected contamination protocol will be produced in line with United Kingdom (UK) statutory guidance (LCRM/CLR 11) to minimise the potential risks to human health and the water environment from any unexpected ground contamination. The protocol will take into account the requirements for the use of PPE and adoption of good practice methods during construction.	To minimise the potential risks to human health and the water environment from any unexpected ground contamination.	T
MM-71	A Phase 1 Geo-environmental desk study will be completed prior to submission of the MHPGC Project EIA Report/Environmental Statement This will develop the preliminary conceptual site model (i.e. the plausible sources,	To identify the potential for the MHPGC Project to encounter areas of potential land contamination.	T

Reference Number	Designed in Measures	Justification	Primary or Tertiary
	pathways and receptors of land contamination) and include a risk assessment. This is in accordance with the LCRM (Environment Agency, 2020) requirement for a Tier 1: preliminary risk assessment as the first stage of land contamination assessment to determine whether there are any potentially unacceptable risks requiring further assessment/actions.	To inform any further actions, such as intrusive ground investigation or remediation, needed to ensure that the land is suitable for the intended future use.	
MM-94	A Soil Management Plan will be implemented which will set out measures in accordance with current industry guidance for sustainable use of soils, including Defra (2009), Construction Code of Practice for the Sustainable Use of Soils on Construction Sites. In line with this guidance topsoil and subsoil will be stored in separate stockpiles. During construction topsoil and subsoil will be stored within the construction working corridor of the onshore export cable construction corridor. Any suspected or confirmed contaminated soils will be separated, contained and tested to allow a suitable use or disposal route for these soils to be identified to minimise the risk of cross contamination, of dust migration from stockpiles, or contaminated run-off/leachate from stockpiles impacting adjacent ground or nearby watercourses.	To avoid and minimise contamination and protect soils.	T
MM-107	Any disposal off-site of excavated material will be undertaken in accordance with the waste legislation including the Environmental Protection Act 1990, The Environmental Protection (Duty of Care) (Scotland) Regulations 2014 SSI 4, and The Waste (Scotland) Regulations 2012, and the waste hierarchy, set out in the Waste (England and Wales) Regulations 2011.	To avoid and minimise contamination.	T

8.1.8 Proposed Assessment Methodology

8.1.8.1 The methodologies for assessing effects on geological/geodiversity receptors and mineral resources are set out from paragraphs 8.1.8.6 and 8.1.8.8 onwards, respectively.

8.1.8.2 The assessment and management of land contamination is usually based on the risk presented by the presence of a hazard (for example, contamination) for a given circumstance (i.e. the probability and consequence of an event occurring). However, EIA seeks to identify the magnitude of a change in status from baseline (impact) caused by a proposed development and the consequences of those changes (effects).

8.1.8.3 Consequently, for the land contamination assessment, the impact and its effect will be defined as a change in risk and the magnitude of the change in risk from baseline, through construction to post-development conditions.

8.1.8.4 The methodology that is proposed for assessing these risks is set out in paragraph 8.1.8.11 onwards and this will be supported by a desk study (Phase 1 Geo-environmental desk study) which will set out the baseline and post-development risks identified for the MHPGC Project.

8.1.8.5 The assessment will consider and apply relevant guidance, including applicable British Standards and industry guidance on the assessment, investigation and remediation of land contamination, as identified in LCRM.

Proposed Assessment Methodology: Geology and Geodiversity

8.1.8.6 The magnitude/consequence of the loss or damage to geological features is based upon the:

- sensitivity of the geological feature (see Table 8.6);
- likely nature and scale of effects (positive, neutral, or negative) during the construction and O&M phases of the project, and during decommissioning (which is anticipated to have the potential for similar effects as the construction phase but smaller in scale) (see Table 8.7);
- likelihood of the MHPGC Project to result in significant effects (see Table 8.8);
- issues requiring further assessment and the methods to be applied.

8.1.8.7 The approach to assigning sensitivity to geological features in Table 8.6, and to assigning impact magnitude classifications in Table 8.7, and evaluating the significance of an effect evaluation matrix in Table 8.8 by combining the sensitivity and magnitude, is based on the Design Manual for Roads and Bridges (DMRB) LA 109 guidance (Highways England, 2019).

Table 8.6: Sensitivity Classification for Geology/Geodiversity

Risk	Definition
Very High.	Very rare and of international importance with no potential for replacement (e.g. United Nations Educational, Scientific and Cultural Organisation (UNESCO) World Heritage Sites, UNESCO Global Geoparks, SSSI's and GCR where citations indicate features of international importance). Geology meeting international designation citation criteria which is not designated as such.
High.	Rare and of national importance with little potential for replacement (e.g. geological SSSI, ASSI, National Nature Reserves (NNR)). Geology meeting national designation citation criteria which is not designated as such.
Moderate.	Of regional importance with limited potential for replacement (e.g. RIGS). Geology meeting regional designation citation criteria which is not designated as such.
Low.	Of local importance/interest with potential for replacement (e.g. non-designated geological exposures, former quarry's/mining sites).
Very Low.	No geological exposures, little/no local interest.

Table 8.7: Magnitude Classifications Geology/Geodiversity

Risk	Definition
Very High.	Loss of geological feature/designation and/or quality and integrity, severe damage to key characteristics, features or elements.
High.	Partial loss of geological feature/designation, potentially adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements.
Moderate.	Minor measurable change in geological feature/designation attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements.
Low.	Very minor loss or detrimental alteration to one or more characteristics, features or elements of geological feature/designation. Overall integrity of resource not affected.
Very Low.	No temporary or permanent loss/disturbance of characteristics features or elements.

Table 8.8: Geology/Geodiversity Effects Significance Evaluation Matrix

Sensitivity of Receptor	Magnitude of Impact				
	No change	**Negligible**	**Minor**	**Moderate**	**Major**
Very high	Neutral	Slight	Moderate or large	Large or very large	Very large
High	Neutral	Slight	Slight or moderate	Moderate or large	Large or very large
Medium	Neutral	Neutral or slight	Slight	Moderate	Moderate or large
Low	Neutral	Neutral or slight	Neutral or slight	Slight	Slight or moderate
Negligible	Neutral	Neutral	Neutral or slight	Neutral or slight	Slight

Note: Significant effects are those identified as 'Very large' or 'Large'. 'Moderate or large' or 'Moderate' effects have the potential to be significant, and they would normally be deemed to be significant, however, in some instances these are deemed to be acceptable based on professional judgement. 'Slight or moderate' or moderate effects would not normally be regarded as significant.

Proposed Assessment Methodology: Mineral Resources (Mineral Safeguarding)

8.1.8.8 There is no established methodology for assessing the environmental effects of a development on mineral safeguarding. The methodology has, therefore, been developed based on the generic approach guidance detailed in Chapter 4: EIA Methodology, of the Scoping Report.

8.1.8.9 A summary of the receptor sensitivity criteria for Mineral Safeguarding is presented in Table 8.9 and the criteria for evaluation of magnitude of effects is summarised in Table 8.10. The combination of the sensitivity and the magnitude defines the significance of an effect, as per the evaluation matrix in Table 8.11.

Table 8.9: Sensitivity Criteria for Minerals Safeguarding

Impact	Justification
High.	Existing minerals sites. Allocated minerals sites.
Medium.	MSAs. Minerals/minerals areas of search.
Low.	No mineral resources identified.
Negligible.	No mineral resources identified.

Table 8.10: Evaluation of Magnitude of Effects for Minerals Safeguarding

Impact	Justification
High.	Development permanently prevents viable exploitation of a resource. Development directly and negatively affects the operation of an ongoing mineral extraction site to the extent that its viability is clearly and demonstrably reduced.
Medium.	Development has permanent effects that will sterilise a significant proportion of a mineral deposit (excluding those under ongoing extraction). Development has temporary effects that sterilise a significant proportion of a mineral deposit (excluding those under ongoing extraction), but which would be expected to be reversed in the short to medium-term.
Low.	Development permanently affects a minor proportion of a mineral deposit, to an extent that is unlikely to significantly affect its overall viability or quality. Development has temporary effects that sterilise minor parts of a mineral deposit (excluding those under ongoing extraction), which would be expected to be reversed in the short to medium-term.
Negligible.	Development has no permanent or temporary effects on mineral deposits that would affect the ability to extract the deposits, their viability or their quality.

8.1.8.10 Table 8.11 combines the sensitivity and magnitude of minerals safeguarding effects as the basis for a significance evaluation matrix for the purposes of EIA.

Table 8.11: Minerals Safeguarding Significance Evaluation Matrix

Sensitivity of Receptor	Magnitude of Impact			
	Negligible	**Low**	**Medium**	**High**
High	Minor	Moderate	Major (significant)	Major (significant)
Medium	Negligible	Minor	Moderate	Major (significant)
Low	Negligible	Negligible	Minor	Moderate
Negligible	Negligible	Negligible	Negligible	Minor

Note: Significant effects are those identified as 'Very large' or 'Large'. 'Moderate or large' or 'Moderate' effects have the potential to be significant, and they would normally be deemed to be significant, however, in some instances these are deemed to be acceptable based on professional judgement. 'Slight or moderate' or moderate effects would not normally be regarded as significant.

Proposed Assessment Methodology: Land Contamination

Land Contamination Risk Assessment

8.1.8.11 The process of managing land contamination, as set out in the Environment Agency (2020) guidance LCRM, is based on risk assessment. The assessment of risks from contaminated land is based upon the identification and subsequent assessment of a contaminant linkage. A contaminant linkage requires the presence of:

- a source of contamination;
- a receptor capable of being adversely affected by the contamination;
- an active pathway capable of exposing a receptor to the contaminant.

8.1.8.12 The risk assessment aims to assess the significance of each potential contaminant linkage. The key to the classification is that the designation of risk is based upon the consideration of both of the following:

- the magnitude of the potential consequence (severity). It takes into account both the potential severity of the hazard and the sensitivity of the receptor (see Table 8.12);
- the magnitude of probability (likelihood). It takes into account both the presence of the hazard and receptor and the potential for a pathway to be realised between them (see Table 8.13).

8.1.8.13 The definitions for the qualitative risk assessment have been taken from Guidance for the Safe Development of Housing on Land Affected by Contamination Annex 4 (National House Building Council (NHBC) *et al*., 2008).

8.1.8.14 The classifications for the consequence of a contaminant linkage being realised are presented in Table 8.12.

Table 8.12: Land Contamination - Classification of Consequence

Classification	Human Health	Controlled Water	Geodiversity	Property/Structures/Crops and Animals	Notes/Examples
Severe.	Highly elevated concentration which is likely to result in "significant harm" to human health as defined by the Environmental Protection Act 1990, Part 2A, if exposure occurs.	Equivalent to Environment Agency Category 1 pollution incident including persistent and/or extensive effects on water quality; leading to closure of a potable abstraction point; major impact on amenity value or major damage to agriculture or commerce.	Major damage to a geodiversity site, which is likely to result in a substantial adverse change in its functioning or harm to a site of special interest that endangers the long-term maintenance of the site.	Catastrophic damage to crops, buildings or property.	Significant harm to humans is defined in the Contaminated Land Statutory Guidance (Defra, 2012) as death, life threatening diseases (for example, cancers), other diseases likely to have serious impacts on health, serious injury, birth defects, and impairment of reproductive functions. Major fish kill in surface water from large spillage of contaminants from site. Highly elevated concentrations of hazardous or priority substances present in groundwater close to small potable abstraction (high sensitivity). Explosion, causing building collapse (can also equate to immediate human health risk if buildings are occupied).

Classification	Human Health	Controlled Water	Geodiversity	Property/Structures/Crops and Animals	Notes/Examples
Medium.	Elevated concentrations which could result in "significant harm" to human health as defined by the Environmental Protection Act 1990, Part 2A if exposure occurs.	Equivalent to Environment Agency Category 2 pollution incident including significant effect on water quality; notification required to abstractors; reduction in amenity value or significant damage to agriculture or commerce.	Significant damage to a geodiversity site, which may result in a substantial adverse change in its functioning or harm to a site of special interest that may endanger the long-term maintenance of the site.	Significant damage to crops, buildings or property.	Exposure could lead to acute or chronic health effects which are significant as defined in the Contaminated Land Statutory Guidance (Defra, 2012). Damage to building rendering it unsafe to occupy, for example, foundation damage resulting in instability. Ingress of contaminants through plastic potable water pipes.
Mild.	Exposure to human health unlikely to lead to "significant harm".	Equivalent to Environment Agency Category 3 pollution incident including minimal or short-lived effect on water quality; marginal effect on amenity value, agriculture or commerce.	Minor or short-lived damage to a geodiversity site, which is unlikely to result in a substantial adverse change in its functioning or harm to a site of special interest that would endanger the long-term maintenance of the site.	Minor damage to crops, buildings or property.	Exposure could lead to slight short-term effects (for example, mild skin rash). Surface spalling of concrete.

Classification	Human Health	Controlled Water	Geodiversity	Property/Structures/Crops and Animals	Notes/Examples
Minor.	No measurable effects on humans.	Equivalent to insubstantial pollution incident with no observed effect on water quality or ecosystems.	Equivalent to insubstantial pollution incident with no observed effect on a geodiversity site or site of special interest.	Repairable effects of damage to buildings, structures.	The loss of plants in a landscaping scheme. Discoloration of concrete.

8.1.8.15 The likelihood classifications for the contaminant linkages being realised is presented in Table 8.13.

Table 8.13: Land Contamination: Likelihood Classification of Contaminant Linkage Being Realised

Classification	Definition	Examples
High Likelihood.	There is a contaminant linkage, and an event would appear very likely in the short-term and almost inevitable over the long-term, or there is evidence at the receptor of harm or pollution.	a) Elevated concentrations of toxic contaminants are present in soils in the top 0.5m of ground where direct contact is possible. b) Ground/groundwater contamination could be present from chemical works, containing a number of Underground Storage Tanks (USTs).
Likely.	There is a contaminant linkage, and all the elements are present and in the right place, which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short-term and likely over the long-term.	a) Elevated concentrations of toxic contaminants are present in soils at depths of 0.5m to 1.0m where direct contact is possible, or the top 0.5m of ground where direct contact is not possible. b) Ground/groundwater contamination could be present from an industrial site containing an UST present between 1970 and 1990. The tank is known to be single skin. There is no evidence of leakage although there are no records of integrity tests.
Low Likelihood.	There is a contaminant linkage, and circumstances are possible under which an event could occur. However, it is by no means certain that even over a long period such an event would take place and is less likely in the shorter term.	a) Elevated concentrations of toxic contaminants are present in soils at depths >1m where direct contact is possible, or 0.5m to 1.0m of ground where direct contact is not possible. b) Ground/groundwater contamination could be present on a light industrial unit constructed in the 1990s containing a UST in operation over the last 10 years – the tank is double skinned but there is no integrity testing or evidence of leakage.

Classification	Definition	Examples
Unlikely.	There is a contaminant linkage, but circumstances are such that it is improbable that an event would occur even in the very long-term.a) Elevated concentrations of toxic contaminants are present below hardstanding.	a) Elevated concentrations of toxic contaminants are present below hardstanding. b) Light industrial unit <10 years old containing a double skinned UST with annual integrity testing results available.

8.1.8.16 The matrix to link the likelihood and consequence and define the level of risk is shown in Table 8.14.

Table 8.14: Land Contamination - Likelihood and Consequence Matrix

Likelihood / Potential Consequence	Unlikely	Low	Likely	High
	Minor	**Mild**	**Medium**	**Severe**
Severe	Moderate/Low Risk.	Moderate Risk.	High Risk.	Very High Risk.
Medium	Low Risk.	Moderate/Low Risk.	Moderate Risk.	High Risk.
Mild	Very Low Risk.	Low Risk.	Moderate/Low Risk.	Moderate Risk.
Minor	Very Low Risk.	Very Low Risk.	Low Risk.	Low Risk.

Note: Significant effects are those identified as 'Very large' or 'Large'. 'Moderate or large' or 'Moderate' effects have the potential to be significant, and they would normally be deemed to be significant, however, in some instances these are deemed to be acceptable based on professional judgement. 'Slight or moderate' or moderate effects would not normally be regarded as significant.

8.1.8.17 The overall risk definitions are summarised in Table 8.15.

Table 8.15: Land Contamination - Risk Definitions

Risk	Definition
Very High.	There is a high probability that severe harm could arise to a designated receptor from an identified hazard at the site without remediation action OR there is evidence that severe harm to a designated receptor is already occurring. Realisation of that risk is likely to present a substantial liability to the site owner/or occupier. Investigation is required as a matter of urgency and remediation works likely to follow in the short-term.

Risk	Definition
High.	Harm is likely to arise to a designated receptor from an identified hazard at the site without remediation action. Realisation of the risk is likely to present a substantial liability to the site owner/or occupier. Investigation is required as a matter of urgency to clarify the risk. Remediation works may be necessary in the short-term and are likely over the longer term.
Moderate.	It is possible that harm could arise to a designated receptor from an identified hazard. However, it is either relatively unlikely that any such harm would be severe, and if any harm were to occur it is more likely that the harm would be relatively mild. Further investigative work is normally required to clarify the risk and to determine the potential liability to site owner/occupier. Some remediation works may be required in the longer term.
Low.	It is possible that harm could arise to a designated receptor from identified hazard, but it is likely at worst that this harm if realised would normally be mild. It is unlikely that the site owner/or occupier would face substantial liabilities from such a risk. Further investigative work (which is likely to be limited) to clarify the risk may be required. Any subsequent remediation works are likely to be relatively limited.
Very Low.	It is a low possibility that harm could arise to a designated receptor, but it is likely at worst, that this harm if realised would normally be mild or minor.

Significance Evaluation Methodology

8.1.8.18 There is no established guidance on how to use the LCRM (Environment Agency, 2020) risk assessment approach as the basis for the evaluation of the significance of effects within the EIA process.

8.1.8.19 The methodology has, therefore, been developed using professional judgement, evaluating the change in risk from baseline conditions to those during and following the MHPGC Project. In order to define the baseline risk, the initial assessment and classification of risk is carried out for the Ground Conditions and Contamination Study Area in its pre-development state. A separate assessment of risk is then conducted for the Ground Conditions and Contamination Study Area post-development (including environmental measures inherently embedded in the development) to enable an evaluation of the change in risk due to the MHPGC Project.

8.1.8.20 In considering the post-development risks, designed in and mitigation measures will be taken into account.

8.1.8.21 Table 8.16 uses the risk classification pre- and post-development as the basis for a significance evaluation matrix for the purposes of EIA.

Table 8.16: Significance Evaluation Matrix for Land Contamination Effects

Sensitivity of Receptor			Risk Post-decommissioning (including embedded environmental measures)					
			Very Low	Low	Moderate/Low	Moderate	High	Very High
Risk Pre-development	Existing Receptors	Very High	Major Positive (Significant)	Major Positive (Significant)	Moderate Positive (Potentially Significant)	Moderate Positive (Potentially Significant)	Minor Positive (Not Significant)	Negligible (Not Significant)
		High	Major Positive (Significant)	Moderate Positive (Potentially Significant)	(Moderate Positive (Potentially Significant)	Minor Positive (Not Significant)	Negligible (Not Significant)	Minor Negative (Not Significant)
		Moderate	Moderate Positive (Potentially Significant)	Moderate Positive (Potentially Significant)	Minor Positive (Not Significant)	Negligible (Not Significant)	Minor Negative (Not Significant)	Moderate Negative (Potentially Significant)
		Moderate/Low	Moderate Positive (Potentially Significant)	Minor Positive (Not Significant)	Negligible (Not Significant)	Minor Negative (Not Significant)	Moderate Negative (Potentially Significant)	Moderate Negative (Potentially Significant)
		Low	Minor Positive (Not Significant)	Negligible (Not Significant)	Minor Negative (Not Significant)	Moderate Negative (Potentially Significant)	Moderate Negative (Potentially Significant)	Major Negative (Significant)
		Very Low	Negligible (Not Significant)	Minor Negative (Not Significant)	Moderate Negative (Potentially Significant)	Moderate Negative (Potentially Significant)	Major Negative (Significant)	Major Negative (Significant)
	No Receptor Present Pre-development	N/A	Minor Negative (Not Significant)	Moderate Negative (Potentially Significant)	Moderate Negative (Potentially Significant)	Major Negative (Significant)	Major Negative (Significant)	Major Negative (Significant)

Risks that remain at moderate, high or very high post-development may require further measures during the construction phase to mitigate those risks depending on the specific circumstances (for example remediation in line with LCRM).

Where effects are indicated to be Potentially Significant in EIA terms based on the change in risk from pre- to post-works, professional judgement will be applied in the MHPGC Project EIA Report/ES to determine whether they are Significant or Not Significant.

8.1.9 Potential Cumulative Impacts

8.1.9.1 Cumulative effects with the Morven Offshore Wind Array Project and the second grid connection project in the Branxton area Southeast Scotland will be considered, together with cumulative effects with other developments, where relevant.

8.1.9.2 The cumulative effect assessment will follow the approach outlined in Chapter 4: EIA Methodology, of the Scoping Report.

8.1.10 Potential Inter-related Effects

8.1.10.1 The EIA will consider inter-related effects arising from the MHPGC Project, across their own phases (project lifetime) and different effects on one receptor in one phase (receptor led). The EIA will consider inter-related effects of multiple impacts from the construction, O&M and decommissioning phases of the MHPGC Project, affecting one receptor. Inter-related effects will be assessed through consideration of all effects on a receptor, considering both spatial and temporal overlap, within the MHPGC Project. This will ensure that the MHPGC Project is appropriately considered within the EIA and in line with Chapter 4: EIA Methodology, of the Scoping Report.

8.1.11 Potential Transboundary Impacts

8.1.11.1 There are no potential transboundary impacts from onshore ground conditions and contamination from the MHPGC Project. This is due to any likely significant effects being experienced locally, rather than a wider geographic scale.

8.2 Water Resources and Flood Risk

8.2.1 Introduction

8.2.1.1 This chapter of the Scoping Report identifies the water resource and flood risk receptors of relevance to the Morven Hawthorn Pit Grid Connection Project (hereafter referred to as 'MHPGC Project') and considers the potential impacts arising from the construction, operation and maintenance (O&M), and decommissioning of the MHPGC Project. This scoping chapter adopts a proportionate approach to only those impacts with potential to result in likely significant effects and therefore scopes out other impacts where there is evidence that the effects are not likely to be significant.

8.2.1.2 The water environment aspect interfaces with many other aspects and as such its scoping should be considered alongside the following Scoping Report chapters:

- Chapter 8.3: Terrestrial Ecology and Ornithology. The terrestrial ecology and ornithology Environmental Impact Assessment (EIA) will be informed by the conclusions of the water environment assessment in relation to these sites. If required a specific water assessment of water-dependent sites will be undertaken to support the terrestrial ecology and ornithology assessment as well as a consideration of water aspects of habitat restoration associated with Biodiversity Net Gain (BNG);
- Chapter 8.1: Ground Conditions and Contamination. The ground conditions and contamination will also have relevance to the water environment.

8.2.1.3 This chapter covers impacts associated with the onshore components of the MHPGC Project only and is therefore not applicable to Scotland.

8.2.2 Policy and Legislation

8.2.2.1 This section identifies the relevant legislation, policy and other documentation that will inform the assessment of likely significant impacts with respect to water resources and flood risk. Further information on policies relevant to the Environmental Impact Assessment (EIA) and their status is provided in Chapter 2: Policy and Legislation.

8.2.2.2 Table 8.17 lists the key legislation relevant to the assessment of the impacts on water environment receptors, whilst Table 8.18 lists the key national planning policies relevant to the assessment of the impacts on water environment receptors.

8.2.2.3 The MHPGC Project crosses the boundaries of two council areas comprising County Durham County Council (DCC) and Sunderland City Council (SCC). Table 8.17 lists the local planning policies relevant to the assessment of impacts on the water.

Table 8.17: Legislation Relevant to the Water Environment

Legislation Description	Relevance to Assessment
International Legislation	
The European Union (EU) Groundwater Directive (2006/118/European Commission (EC)) (European Parliament, 2006)	
The aim of this Directive is to protect groundwater against pollution caused by dangerous substances.	The MHPGC Project has the potential to impact groundwater bodies through the accidental release of potentially polluting substances such as fuels, oils and chemicals, particularly during the construction phase. Appropriate designed in measures and mitigation have been outlined in Section 8.2.7 of this chapter and in Chapter 8.1: Ground Conditions and Contamination of the Scoping Report.
The EU Water Framework Directive (2000/60/EC) (WFD) (European Parliament, 2000), as enacted into domestic law by the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (United Kingdom (UK) Government, 2017)	
The EU Water Framework Directive (WFD) is enacted into domestic law by the Water Environment WFD (England and Wales) Regulations 2017 and protects surface waters (including rivers, lakes, transitional waters and coastal waters) and groundwater. A fundamental requirement of the WFD is to attain Good Ecological Status, or Good Ecological Potential, within each defined water body by December 2027 at the latest and to ensure that any deterioration in status is prevented.	The MHPGC Project has the potential to impact surface water bodies (coastal waters, transitional waters and rivers) and groundwater bodies during its construction, O&M and decommissioning. WFD inshore water body status has been specifically considered in Section 8.2.5 of this chapter and appropriate designed in measures and mitigation have been outlined in Section 8.2.7 of this chapter. The Development Consent Order (DCO) application will be supported by a standalone WFD Assessment (a WFD Screening and Scoping Report is provided in C.1.1.1).
National Legislation	
Environment Act 2021 (UK Government, 2021)	
This Act sets out provisions to establish a post-Brexit set of statutory environmental principles and to ensure environmental governance and binding targets on water quality.	This Act makes provision for targets, plans and policies for improving the natural environment; water; nature and biodiversity and the regulation of chemicals. It informs the characterisation of conservation sites and provide a basis for determining the efficacy of any embedded environmental measures with respect to the MHPGC Project. Appropriate designed in measures and

Legislation Description	Relevance to Assessment
	mitigation have been outlined in Section 8.2.7 of this chapter.
The Water Act (2014)	
The Water Act 2014 aims to encourage innovation within the water industry and to increase water supply resilience against natural hazards.	It provides powers to integrate abstraction, impounding, fish pass approval and flood defence consents into environmental permitting. Appropriate designed in measures and mitigation have been outlined in Section 8.2.7 of this chapter.
Conservation of Habitats and Species Regulations 2017 (UK Government, 2017)	
These Regulations are enacted within England and Wales to transpose the EU Habitats Directive (92/43/EEC) and aspects of the Wild Birds Directive (2009/147/EC). They cover the selection, designation, registration and management of European sites (also known as Natura 2000 sites), and list European protected species of animals and plants. Conservation objectives must ensure that the European protected species identified as qualifying features of a Natura 2000 site remain or reach favourable condition (such as by maintaining the extent and distribution of habitats of qualifying features).	These Regulations inform the characterisation of water-dependent conservation sites and provide a basis for determining the efficacy of any embedded environmental measures with respect to the MHPGC Project. Appropriate designed in measures and mitigation have been outlined in Section 8.2.7 of this chapter.
Private Water Supplies (England) Regulations 2016 (UK Government, 2016b)	
The Regulations require Local Authorities to monitor private water supplies (PWSs).	These Regulations inform the characterisation of PWSs and provide a basis for determining the efficacy of any embedded environmental measures with respect to the MHPGC Project. Appropriate designed in measures and mitigation have been outlined in Section 8.2.7 of this chapter.
Water Quality (Water Supply) Regulations 2016 (UK Government, 2016c)	
These Regulations are primarily concerned with the quality of water supplied in England for drinking, washing, cooking and food preparation, and for food production, and with arrangements for the publication of information about water quality.	These Regulations inform the characterisation of water resources and provide a basis for determining the efficacy of any embedded environmental measures with respect to the MHPGC Project. Appropriate designed in measures and mitigation have been outlined in Section 8.2.7 of this chapter.

Legislation Description	Relevance to Assessment
Water Resources Act 1991 (UK Government, 1991b), Water Act 2003 (UK Government, 2003b) and The Environmental Permitting (England and Wales) Regulations 2016 (UK Government, 2016a)	
The Water Resources Act 1991 states that it is an offence to cause or knowingly permit polluting, noxious, poisonous or any solid waste matter to enter controlled waters. The Act was revised by the Water Act 2003, which sets out regulatory controls for water abstraction, water impoundment and protection of water resources. Provisions for the regulation of water discharges to controlled waters are set out in the Environmental Permitting (England and Wales) Regulations 2016 and have replaced provisions in the earlier Acts.	These Acts and Regulations set out the permitting and compliance framework which will regulate all site emissions, water abstractions and discharges with the potential to interact with the water environment. Particularly important for the MHPGC Project is the requirement to obtain a licence for dewatering in order to carry out engineering works and to ensure that any impact on the environment can be mitigated.
The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015 (UK Government, 2015)	
This Direction sets out the environmental standards to be used for the second cycle of river basin plans. The Direction transposes Directive 2013/39/EC on environmental quality standards for priority substances.	The MHPGC Project has the potential to impact surface water bodies (coastal waters, transitional waters and rivers) and groundwater bodies during its construction, O&M and decommissioning. WFD water body status has been specifically considered in Section 8.2.5 of this chapter and appropriate designed in measures and mitigation have been outlined in Section 8.2.7 of this chapter, The DCO application will be supported by a standalone WFD Assessment (a WFD Screening and Scoping Report is provided in C.1.1.1).
Flood and Water Management Act 2010 (UK Government, 2010)	
This Act sets out the Government's proposals to improve flood risk management, water quality and water resource security. The Act includes consideration and responsibilities for managing flood risk and consideration of drainage including the use of sustainable drainage systems (SuDS).	The MHPGC Project has the potential to impact surface water bodies, including flood risk. Appropriate flood and water management measures have been put forward in Section 8.2.7 of this chapter and the later EIA will be supported by a Flood Risk screening assessment and standalone Flood Risk Assessment (FRA).

Legislation Description	Relevance to Assessment
Priority Substances Directive (2008/105/EC) Revision of the Priority Substances Directive (2013/39/EU) (European Parliament, 2008; 2013)	
These Directives set out environmental quality standards in the field of water policy for Europe, with the aim of minimising the threat to the aquatic environment and impacts such as acute and chronic toxicity to aquatic organisms, accumulation in the ecosystem and losses of habitats and biodiversity, as well as the threat to human health.	These Directives inform the characterisation of water bodies and provide a basis for determining the efficacy of any embedded environmental measures with respect to the MHPGC Project. Appropriate designed in measures and mitigation have been outlined in Section 8.2.7 of this chapter.
Infrastructure Planning (Environmental Impact Assessment) Regulations 2017	
These regulations apply the amended EU directive "on the assessment of the effects of certain public and private projects on the environment" (usually referred to as the 'Environmental Impact Assessment Directive') to the planning system in England.	The Regulation describes the EIA process including the preparation of an environmental statement and the carrying out of any consultation.
Environment Act 1995 (UK Government, 1995)	
This Act established the Environment Agency (EA) and gave it responsibility for environmental protection and flood defence.	The EA is the principal environmental regulator considered throughout this Water Resource and Flood Risk chapter.
Land Drainage Act 1991 (UK Government, 1991a;)	
The Land Drainage Act, in-combination with the Water Resources Act, stipulates that before work on or near an 'Ordinary Watercourse' is carried out, an Ordinary Watercourse Consent is required. Section 23 of the Land Drainage Act (1991) prohibits the construction of certain kinds of obstructions in ordinary watercourses without the prior consent of the regulating body concerned.	The Act imposes constraints and controls with respect to works near watercourses that have been considered in the design of the MHPGC Project including the designed in measures and mitigation have been outlined in Section 8.2.7 of this chapter.
Environmental Protection Act 1990 (UK Government, 1990)	
This Act makes provision for the improved control of pollution arising from certain industrial and other processes.	The MHPGC Project has the potential to impact surface and groundwater bodies through the introduction of polluting substances particularly during the construction phase. Appropriate designed in

Legislation Description	Relevance to Assessment
	measures and mitigation have been outlined in Section 8.2.7 of this chapter.
Reservoirs Act 1975 (as amended by the Flood and Water Management Act, 2010) (UK Government, 1975 as amended by UK Government, 2010)	
This Act provides regulation for the O&M of reservoirs to ensure the design is fit for purpose, and that maintenance (including frequent inspections of reservoir embankments) ensures the condition of the embankments. As such, the chance of them failing and giving rise to flooding problems is remote.	Reservoirs present a potential flood risk to the project. In addition, the MHPGC Project has the potential to impact surface water bodies such as reservoirs through the introduction of polluting substances during the construction phase. Appropriate flood and water management measures have been outlined in Section 8.2.7 of this chapter to protect local populations, maintain/improve water quality and mitigate the risk of flooding. The DCO application will be supported by a Flood Risk screening assessment and a standalone FRA.

Table 8.18: National Planning Policy Relevant to the Water Environment

Legislation Description	Relevance to Assessment
National Policy Statement (NPS) for Energy EN-1 (Department of Energy Security and Net Zero, 2024)	
NPS EN-1 identifies requirements to assess the potential impacts of energy projects on flood risk (Section 5.8) and water quality and water resources (Section 5.16), including consideration of climate change impacts over the proposed development lifetime (Section 4.10). Within Section 5.16 of the NPS EN-1 it states that "Where the project is likely to have effects on the water environment, the applicant should undertake an assessment of the existing status of, and impacts of the proposed project on, water quality, water resources and physical characteristics of the water environment, and how this might change due to the impact of climate change on rainfall patterns and consequently water availability across the water environment, as part of the Environmental Statement (ES) or equivalent."	The MHPGC Project has the potential to impact surface water bodies (coastal waters, transitional waters and rivers) and groundwater bodies during its construction, O&M and decommissioning. Appropriate designed in measures and mitigation have been outlined in Section 8.2.7 of this chapter. During the EIA process, the future baseline accounting for climate change will also be established.

Legislation Description	Relevance to Assessment
NPS EN-1 Section 5.8 identifies a variety of the minimum requirements for FRAs.	A standalone FRA will be provided in support of the DCO application and will follow the requirements set out in the National Policy Statement.
Also within Section 5.8 it states that "Applicants for projects which may be affected by, or may add to, flood risk should arrange pre-application discussions before the official pre-application stage of the Nationally Significant Infrastructure Projects (NSIP) process with the EA or Natural Resources Wales (NRW), and, where relevant, other bodies such as Lead Local Flood Authorities, Internal Drainage Boards, sewerage undertakers, navigation authorities, highways authorities and reservoir owners and operators."	Discussions will be held with the EA and Lead Local Flood Authorities (LLFAs) at the Scoping Opinion and throughout the EIA process. A Flood Risk screening assessment will also be undertaken, and this will form the basis of a standalone FRA which will be provided in support of the DCO application.
Section 5.16 also outlines that "The Secretary of State should be satisfied that a proposal has regard to current River Basin Management Plans and meets the requirements of the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (including regulation 19). The specific objectives for particular river basins are set out in River Basin Management Plans. The Secretary of State must refuse development consent where a project is likely to cause deterioration of a water body or its failure to achieve good status or good potential, unless the requirements set out in Regulation 19 are met. A project may be approved in the absence of a qualifying Overriding Public Interest test only if there is sufficient certainty that it will not cause deterioration or compromise the achievement of good status or good potential."	The MHPGC Project has the potential to impact surface water bodies (coastal waters, transitional waters and rivers) and groundwater bodies during its construction, O&M and decommissioning. WFD water body status has been specifically considered in Section 8.2.5 of this chapter and appropriate designed in measures and mitigation have been outlined in Section 8.2.7 of this chapter. The DCO application will be supported by a standalone WFD Assessment (a WFD Screening and Scoping Report is provided in C.1.1.1).
Section 5.16 states that "The ES should in particular describe: • the existing quality of waters affected by the proposed project and the impacts of the proposed project on water quality, noting any relevant existing discharges,	The MHPGC Project has the potential to impact surface water bodies (coastal waters, transitional waters and rivers) and groundwater bodies during its construction, O&M and decommissioning. The baseline characteristics of the water environment

Legislation Description	Relevance to Assessment
proposed new discharges and proposed changes to discharges; • existing water resources affected by the proposed project and the impacts of the proposed project on water resources, noting any relevant existing abstraction rates, proposed new abstraction rates and proposed changes to abstraction rates (including any impact on or use of mains supplies and reference to Abstraction Licensing Strategies) and also demonstrate how proposals minimise the use of water resources and water consumption in the first instance; • existing physical characteristics of the water environment (including quantity and dynamics of flow) affected by the proposed project and any impact of physical modifications to these characteristics; • any impacts of the proposed project on water bodies or protected areas (including shellfish protected areas) under the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 and source protection zones (SPZs) around potable groundwater abstractions" • how climate change could impact any of the above in the future; • any cumulative effects.	(which includes water quality, water resources, flood risk and WFD water body status) have been described in Section 8.2.5 of this chapter. These descriptions will be refined in the later the EIA process. WFD groundwater bodies and individual groundwater abstractions are identified as potential receptors in the assessment, and a standalone WFD Assessment will also be provided (a WFD Screening and Scoping Report is provided in C.1.1.1).
NPS for Electricity Networks Infrastructure EN-5 (Department for Energy Security and Net Zero, 2023)	
NPS EN-5 restates the requirements of NPS EN-1 that due consideration and assessment is given to the effects of future climate change on flood risk to electricity transmission infrastructure (its Section 2.3). Its paragraph 2.3.2 requires that "Applicants should in particular set out to what extent the proposed development is expected to be vulnerable, and, as appropriate, how it would be resilient to:	An FRA will identify the need to take into account the issue of resilience to flooding and other aspects of climate change in accordance with NPS requirements for climate change, National Planning Policy Framework (NPPF) and Pollution Prevention Guidelines (PPG) where relevant, and EA climate change allowances. It will also address issues of flood vulnerability resilience.

Legislation Description	Relevance to Assessment
flooding, particularly for substations that are vital for the electricity transmission and distribution network; effects of wind and storms on overhead lines; higher average temperatures leading to increased transmission losses; earth movement or subsidence caused by flooding or drought (for underground cables); and coastal erosion – for the landfall of offshore transmission cables and their associated substations in the inshore and coastal locations respectively."	
NPPF (Department for Levelling Up, Housing and Communities, 2023)	
The NPPF sets out planning policy for England and places a general presumption in favour of sustainable development. The policies relating to planning and flood risk are set out in NPPF paragraphs 157 to 175. Paragraph 5 of the NPPF states that the framework "does not contain specific policies for NSIPs". However, it states that "these are determined in accordance with the decision-making framework in the Planning Act 2008 and relevant national policy statements for major infrastructure, as well as any other matters that are relevant (which may include the National Planning Policy Framework)."	The NPPF requirements (Department for Communities and Local Government, 2012a) will be captured within the Flood Risk screening assessment, which presents information on the Sequential and Exception Tests as well as demonstrating that the MHPGC Project will not result in an increase in flood risk from any source of flooding. This assessment will include consideration of climate change in line with NPPF requirements, in consultation with the EA. It will also be carried out in accordance with its supporting technical guidance (Department for Communities and Local Government, 2012b), taking into account associated vulnerability classifications.

Table 8.19: Local Planning Policy Relevant to the Water Environment

Policy Description	Relevance to Assessment
County Durham Plan 2020-2035 (Durham Local Plan) (Durham County Council, 2020)	
Policy 35 - Water Management Considering flood risk and SuDS, "all development proposals will be required to consider the effect of the proposed development on flood risk and taking into account the predicted impacts of climate change for the lifetime of the proposal." It states that any development should include the completion of an FRA where appropriate.	It is noted that DCC is the LLFA, and so responsible for developing, maintaining and applying a strategy for local flood risk management and for maintaining a register of flood risk assets and for the managing the risk of flooding from surface water, groundwater and all watercourses that are not classified as a

Policy Description	Relevance to Assessment
The policy outlines flood zones where development will/will not be permitted and the management of surface water to reduce flood risk. In addition, the policy states that the "quantity and quality of surface and groundwater bodies shall be protected and where possible enhanced." It also states that "….development must demonstrate control of the quality of surface water run-off during construction and for the lifetime of the development". It also states that "Development adjacent to, over or in a watercourse should consider opportunities to improve the river environment and water quality" and that any "Development which could adversely affect the quality or quantity of surface or groundwater, flow of groundwater or ability to abstract water will not be permitted unless it can be demonstrated that no adverse impact would occur or mitigation could be put in place to minimise this impact."	Main River. The LLFA is the statutory consultee for surface water flood risk. A Flood Risk screening assessment will be undertaken and will set out what the various FRA requirements are and how each requirement will be addressed. The screening assessment will form the basis of a standalone FRA which will be provided alongside a standalone WFD Assessment in support of the DCO application (a WFD Screening and Scoping Report is provided in C.1.1.1). Appropriate protection of surface or groundwater are given within the designed in measures and mitigation have been outlined in Section 8.2.7 of this chapter.
Policy 36 - Water Infrastructure Relevantly, the policy considers the disposal of foul water in terms of the hierarchy of drainage options that must be considered and the protection of flood defence infrastructure.	A Flood Risk screening assessment will identify the need to take into account the issue of drainage and the protection of flood defence infrastructure.
Policy 41 - Biodiversity and Geodiversity This considers that new development will not be permitted if significant harm to biodiversity or geodiversity. In addition, it states that "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…". Developments likely to result in the loss or deterioration of irreplaceable habitat(s) (such as peatlands or lowland fen) will not be permitted unless there are wholly exceptional reasons, and a suitable compensation strategy exists. Also new development will be expected to protect geological features and have regard to Geodiversity Action Plans.	Appropriate designed in measures and mitigation with respect to designated conservation sites have been outlined in Section 8.2.7 of this chapter. Enhancements in water-related biodiversity through BNG will be addressed in the BNG Report submitted in support of the DCO application. The assessment has relevance to the water support of conservation sites and implications of impacts on geological features.

Policy Description	Relevance to Assessment
Policy 42 - Internationally Designated Sites[7] This considers that "Development that has the potential to have an effect on internationally designated site(s), either individually or in-combination with other plans or projects, will need to be screened and subject to an Appropriate Assessment." During the assessment consideration can be given to the implementation of identified strategic measures to counteract adverse effects on the integrity of a site.	Appropriate designed in measures and mitigation of relevance to internationally designated conservation sites have been outlined in Section 8.2.7 of this chapter. The assessment has relevance to the water support of conservation sites.
Policy 43 - Protected Species and Nationally and Locally Protected Sites This considers that development likely to adversely impact upon national designations such as SSSIs and National Nature Reserves (NNRs) and/or local designations such as Local Sites (Geology and Wildlife) and Local Nature Reserves (LNRs) will only be permitted where the benefits of development in that location clearly outweigh the impacts on the features of interest of the site and any wider impacts on the network of sites.	Appropriate designed in measures and mitigation of relevance to nationally and locally designated conservation sites have been outlined in Section 8.2.7 of this chapter. The assessment has relevance to the water support of conservation sites.
Core Strategy and Development Plan 2015-2033 (Sunderland City Council, 2020)	
Policy NE2 - Biodiversity and geodiversity This policy considers that any development must demonstrate how it will provide net gains in biodiversity and avoid or minimise adverse impacts on biodiversity and geodiversity.	Appropriate designed in measures and mitigation of relevance to designated conservation sites have been outlined in Section 8.2.7 of this chapter. Enhancements in water-related biodiversity through BNG will be addressed in a BNG Report submitted in support of the DCO application. The assessment has relevance to the water support of conservation sites.

[7] It should be noted that in applying this policy DCC has identified a buffer zone that extends 0.4 kilometres (km) from the perimeter of the Special Protection Area /Special Area of Conservation /Ramsar within which development is likely to have significant impacts on the site and due to issues of proximity DCC considers it may not be possible to sufficiently mitigate for the impacts of proposals within this zone.

Policy Description	Relevance to Assessment
Policy WWE2 - Flood risk and coastal management This policy considers that, to reduce flood risk and ensure appropriate coastal management, developments should: • follow the sequential approach to determining the suitability of land for development; • demonstrate through an appropriate FRA that development will not increase flood risk on site or elsewhere, and if possible, reduce the risk of flooding; • include or contribute to flood mitigation, compensation and/or protection measures to manage flood risk associated with or caused by the development; • will maintain linear coastal flood defences north from Hendon Sea Wall to Seaburn, and managed coastal retreat on the Heritage Coast and north of Seaburn; • required to demonstrate, where • demonstrate that development will not increase flood risk on site or elsewhere, and if possible reduce the risk of flooding; • comply with the Water Framework Directive by contributing to the Northumbria River Basin Management Plan (RBMP); • mitigate again adversely affecting the quantity of surface or groundwater flow or ability to abstract water.	A Flood Risk screening assessment will be undertaken and will set out what the various FRA requirements are and how each requirement will be addressed. The screening assessment will form the basis of a standalone FRA which will be provided alongside a standalone WFD Assessment, which will take into account the Northumbria RBMP, in support of the DCO application (a WFD Screening and Scoping Report is provided in C.1.1.1).
Policy WWE3 - Water management This policy considers that "development must consider the effect on flood risk, on site and off-site" and development must be: • accompanied by a FRA, to demonstrate the development will be safe and will not increase flood risk elsewhere; • demonstrate the development passes the Sequential Test (and Exception Test if necessary);	A Flood Risk screening assessment will be undertaken and will set out what the various FRA requirements are and how each requirement will be addressed. The screening assessment will form the basis of a standalone FRA which will be provided in support of the DCO application, which will also be supported by a standalone WFD Assessment which takes into account the Northumbria RBMP. Appropriate designed in measures and mitigation have been put

Policy Description	Relevance to Assessment
• discharge at greenfield run-off rates for the 1 in 1 and 1 in 100 flood events plus the relevant climate change allowance for greenfield and brownfield sites in accordance with the latest Local Flood Risk Management Strategy; • incorporate a SuDS to manage surface water drainage and follow the SuDS hierarchy to control surface water; • separate, minimise and control surface water run-off by discharging in the following order (if sites are within 250m of a tidal estuary or the sea, surface water can be discharged directly): i. to an infiltration or soak away system; ii. to a watercourse (open or closed); iii. to a surface water sewer; • ensure adequate protection where sites are susceptible to overland flood flows; • incorporate climate change allowances; • ensure drainage capacity can support the development; • demonstrate control of the quality of surface water run-off during construction and for the lifetime of the development; • not have a detrimental impact on the city's water resources, including the Magnesian Limestone aquifer and its ground SPZs. Development along the River Wear and coast should take account of the Northumbria RBMP, to deliver continuing improvements in water quality.	forward in Section 8.2.7 of this chapter. These measures should prevent the MHPGC Project from having any detrimental impacts on the regions water resources, including the Magnesian Limestone aquifer and its SPZs.
Policy WWE4 - Water Quality This policy considers that "The quantity and quality of surface and groundwater bodies and quality of bathing water shall be protected and where possible enhanced in accordance with the Northumbria River Basin Management Plan". The policy requires: • water quality assessments for physical modifications to watercourses and	The MHPGC Project has the potential to impact surface water bodies (coastal waters, transitional waters and rivers) and groundwater bodies during its construction, O&M and decommissioning. WFD water body status has been specifically considered in Section 8.2.5 of this chapter and appropriate designed in measures and mitigation have been outlined in Section 8.2.7 of this chapter, The DCO

Policy Description	Relevance to Assessment
development which could indirectly or adversely affect waterbodies; • appropriate water pollution control measures for developments discharging to a watercourse; • incorporate appropriate water pollution control measures to infiltration based SuDS; • development adjacent to, over or in, a Main River or Ordinary Watercourse should consider opportunities to improve the river environment and water quality by naturalising watercourse channels, improving the biodiversity and ecological connectivity of watercourses and mitigating diffuse agricultural and urban pollution.	application will be supported by a standalone WFD Assessment (a WFD Screening and Scoping Report is provided in C.1.1.1).

8.2.2.4 In terms of other relevant documentation, DCC has undertaken a water cycle study (Aecom, 2018a) to ensure that the growth envisaged for the county can be supported and is not hindered by water infrastructure and resources. This has determined that water resource zones have a supply surplus across the full planning period to 2060. A Strategic Flood Risk Assessment (SFRA) (Aecom, 2018b) also provides an overview of the areas susceptible to flooding and the risk posed by flooding from rivers, the North Sea, groundwater and surface water runoff.

8.2.2.5 DCC has also issued a Surface Water Management Plan (SWMP) (Aecom, 2011) which gives action plans and priorities for Surface Water Risk Areas (SWRAs). Additional attenuation measures are required within these areas including decreasing the volume of surface water entering the combined sewer system by managing this on-site or disposing to a watercourse where flood risk would not be increased. The majority of SWRAs are in the east of the county or around the urban conurbations. Critical Drainage Areas have also been identified and development in these areas will need careful consideration including an FRA where appropriate.

8.2.3 Study Area

8.2.3.1 The Water Resources and Flood Risk Assessment Study Area is defined as the combined area of the WFD surface water bodies (river and transitional) catchments which are intersected by, and are downstream of, the MHPGC Project Scoping Boundary to the WFD surface water body catchment boundary (Figure 8.6).

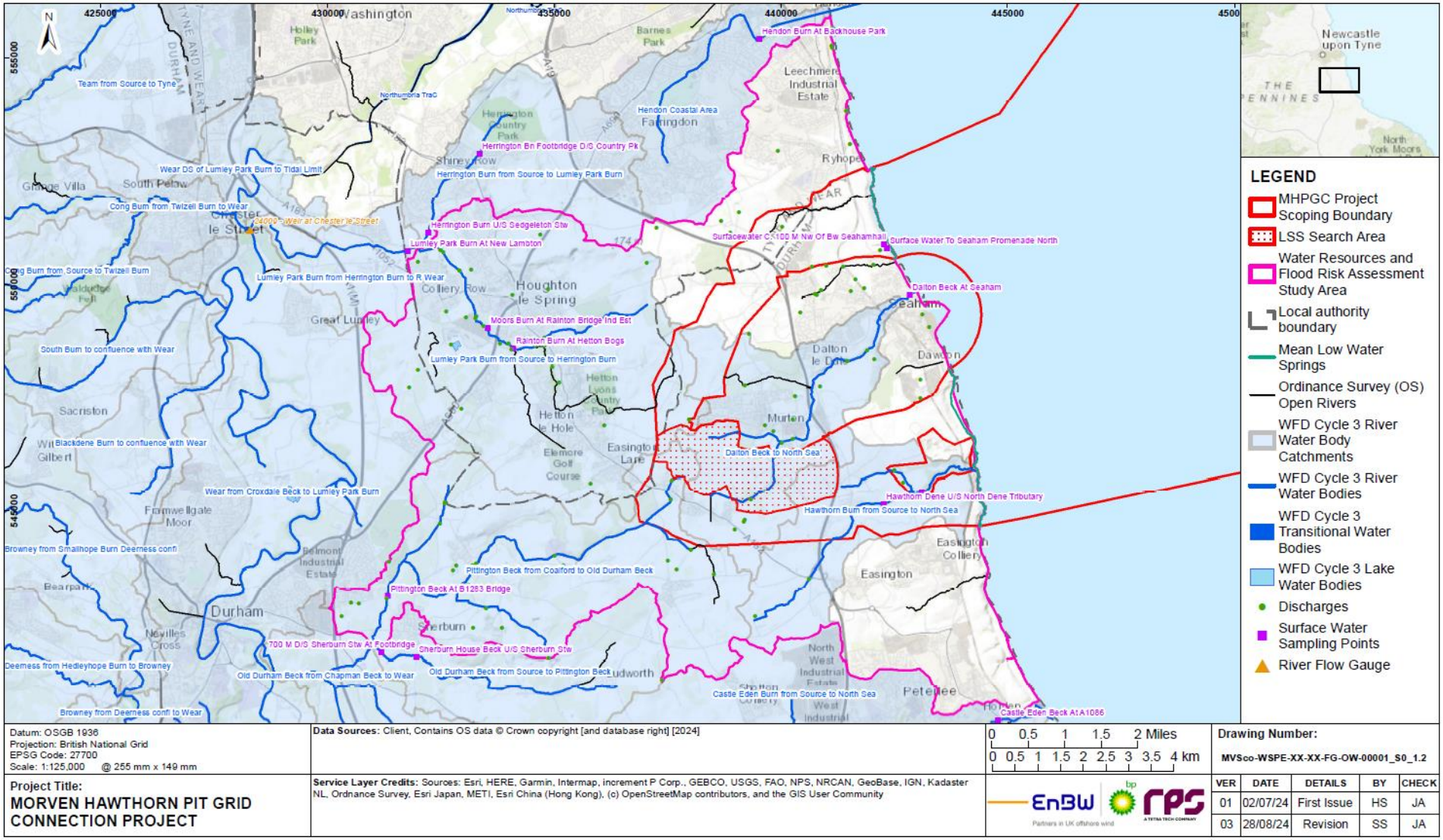


Figure 8.6: Water Framework Directive Surface Waterbodies within the Water Resource and Flood Risk Assessment Study Area

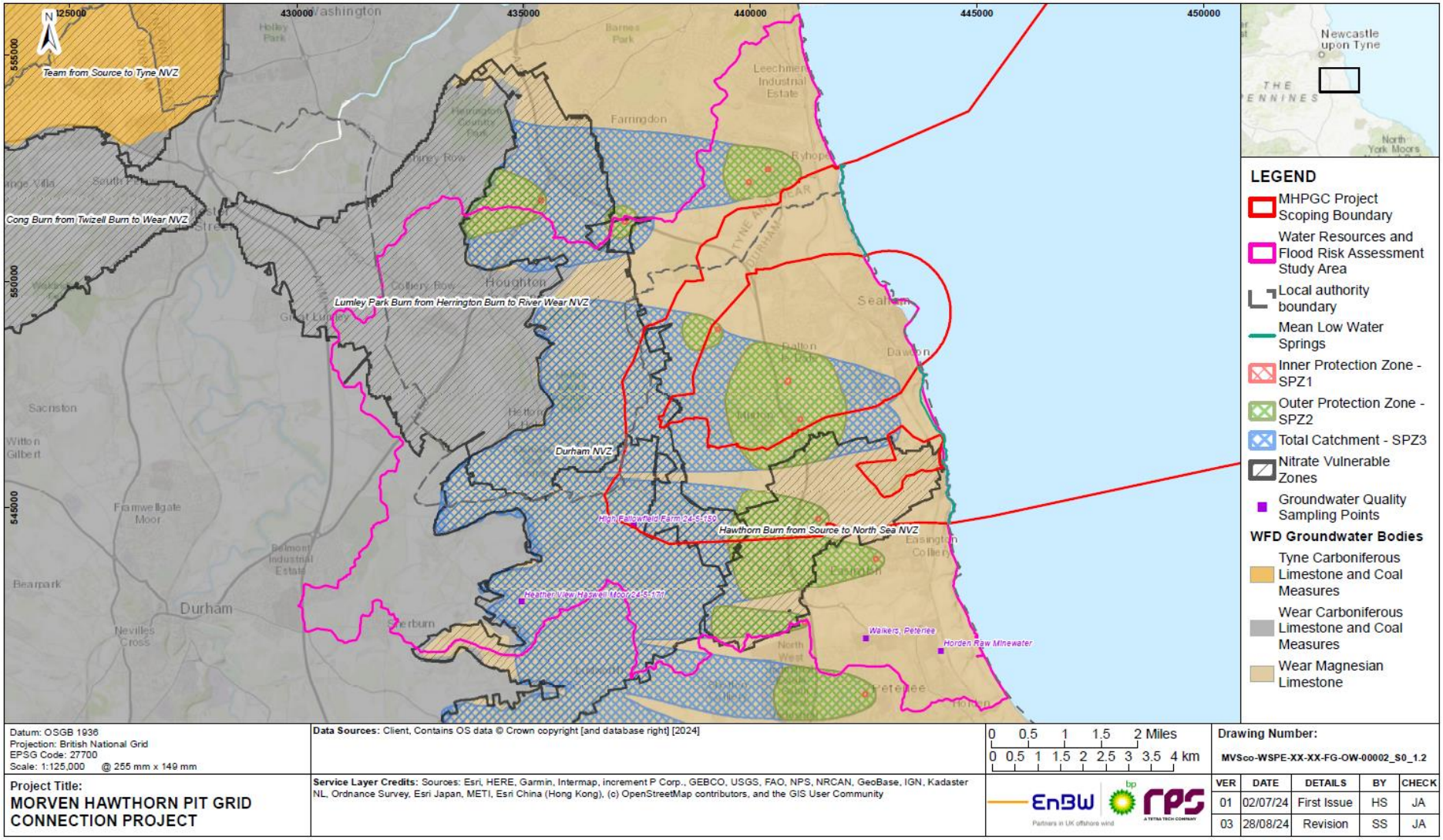


Figure 8.7: Water Framework Directive Groundwater Bodies, Source Protection Zones and Nitrate Vulnerable Zones within the Water Resources and Flood Risk Assessment Study Area

8.2.3.2 The Water Resources and Flood Risk Assessment Study Area will be reviewed and amended as the onshore MHPGC Project design is refined, and any additional impact pathways are identified, as well as also in response to consultation feedback.

8.2.4 Data Sources

8.2.4.1 Data gathering to date has been undertaken primarily via a desk-study exercise in early 2024. The sources of baseline information used are documented in Table 8.20.

8.2.4.2 The table recognises that there is further information regarding the baseline water environment to acquire during the EIA process. This information includes that held within the WSP (2024) North East Magnesian Limestone Conceptual Model report, undertaken on behalf of the EA. As indicated in the table, this report is known to include considerable relevant information, and not just related to the area's hydrogeology.

Table 8.20: Data Sources of Water Environment Data

Title	Source	Year	Author
Digital geological and construction logs from the British geographical society (BGSo) Onshore GeoIndex.	https://www.bgs.ac.uk/map-viewers/geoindex-onshore/	2024	BGSo.
Coal Authority web viewer.	https://mapapps2.bgs.ac.uk/coalauthority/home.html	2024	BGSo.
Defra's Multi-Agency Geographic Information for the Countryside (MAGIC).	http://magic.Defra.gov.uk/	2024	Defra.
BGSo 1:625,000 scale Hydrogeological Map of England and Wales.	https://mapapps2.bgs.ac.uk/geoindex/home.html?layer=BGSHydroMap	2024	BGSo.
Source Protection Zone.	https://www.gov.uk/guidance/groundwater-source-protection-zones-spzs	2024	Gov.uk.
North East Magnesian Limestone Conceptual Model report.	Report on behalf of the EA, not yet publicly available	2024	WSP.
1:625,000 scale Hydrogeological map of England and Wales.	https://www.bgs.ac.uk/datasets/hydrogeology-625k/	2024	BGSo.
EA RBMP (2022 cycle 3) information.	http://environment.data.gov.uk/catchment-planning/	2022	EA.

Title	Source	Year	Author
Data Requests			
Requests will also be made to: • EA for site climate and rainfall data. • EA for available river flow data and river level data. • EA for surface water and groundwater quality data. • EA for groundwater level data; • EA for licensed surface water and groundwater abstractions and discharges; • EA for flood mapping, records and modelling. • PWS for DCC and SCC.			

8.2.5 Baseline Environment

Introduction

8.2.5.1 This section sets out a high level overview of the baseline environment within the Water Resources and Flood Risk Assessment Study Area based on an initial review of the acquired environmental data.

8.2.5.2 Within the MHPGC Project Scoping Boundary, onshore corridors to the north and south of Seaham are identified and referred to as Northern Corridor and Landfall, Central Corridor and Landfall and Southern Corridor and Landfall. These corridors are shown in Chapter 6: Site Selection and Consideration of Alternatives (Figure 4.2).

Topography and Watercourses

8.2.5.3 The topography and surface watercourses in the Water Resources and Flood Risk Assessment Study Area are described below and illustrated in Figure 8.8. WFD surface water bodies and their catchments are presented in Figure 8.6.

8.2.5.4 The northern corridor extends from the Northern Cable Landfall (NCL) at Seaham (NGR NZ 42084 51252) south westwards, passing through the Sharpley Burn and Seaton Burn catchments to a high point (140 metres Above Ordnance Datum, mAOD) to the northwest of Murton (NGR NZ 38217 48360). The corridor covers a variety of terrain, with much of the coastline around Seaham being surrounded by high, steep coastal cliffs, resulting in a rapid increase in elevation from the point of landfall, from sea level to between 22 to 27mAOD on the cliff tops.

8.2.5.5 The Sharpley Burn originates near Old Burdon (NGR NZ 37529 49727) within the Northern Corridor and flows eastward entirely within the Northern Corridor. The river channel is largely constrained by a succession of narrow, steep sided valleys (denes) until it meets the sea directly to the north of the NCL at NGR NZ 41924 51943. The headwaters of Seaton Burn rise south of Seaton (NGR NZ 39296 49613), to the east of the eastern boundary of the Northern Corridor, and the burn flows eastward to the north of Seaham, again being largely constrained by a series of denes.

8.2.5.6 To the southwest of Murton there is an area of high topography (132mAOD, NGR NZ 37730 46536) within the Central Corridor. This high ground forms the catchment

divide between the Dalton Beck catchment (with flows to the east) and the Coldwell Burn and Moors Burn catchments (flows to the west). The Dalton Beck originates southeast of South Hetton (NGR NZ 38458 44754) within the Central Corridor and flows to the northeast to confluence with an unnamed tributary that also originates from within the MHPGC Project Scoping Boundary (NGR NZ 38426 46624), flowing west to east to the south of the residential area of Murton. The Dalton Beck appears to be discontinuous on OS mapping and at Cold Hesledon (southeast of Dalton Park) becomes a series of small ponds (NGR NZ 40268 46582). Dalton Beck continues east of the A19 carriageway and is joined by an unnamed tributary flowing from the Watergate Fishing Lake directly east of the Northern Corridor (NGR NZ 38746 47957). The Dalton Beck then flows northeast through the narrow valley of Dawdon Dene and through Seaham where it discharges to the sea, just north of Seaham Harbour.

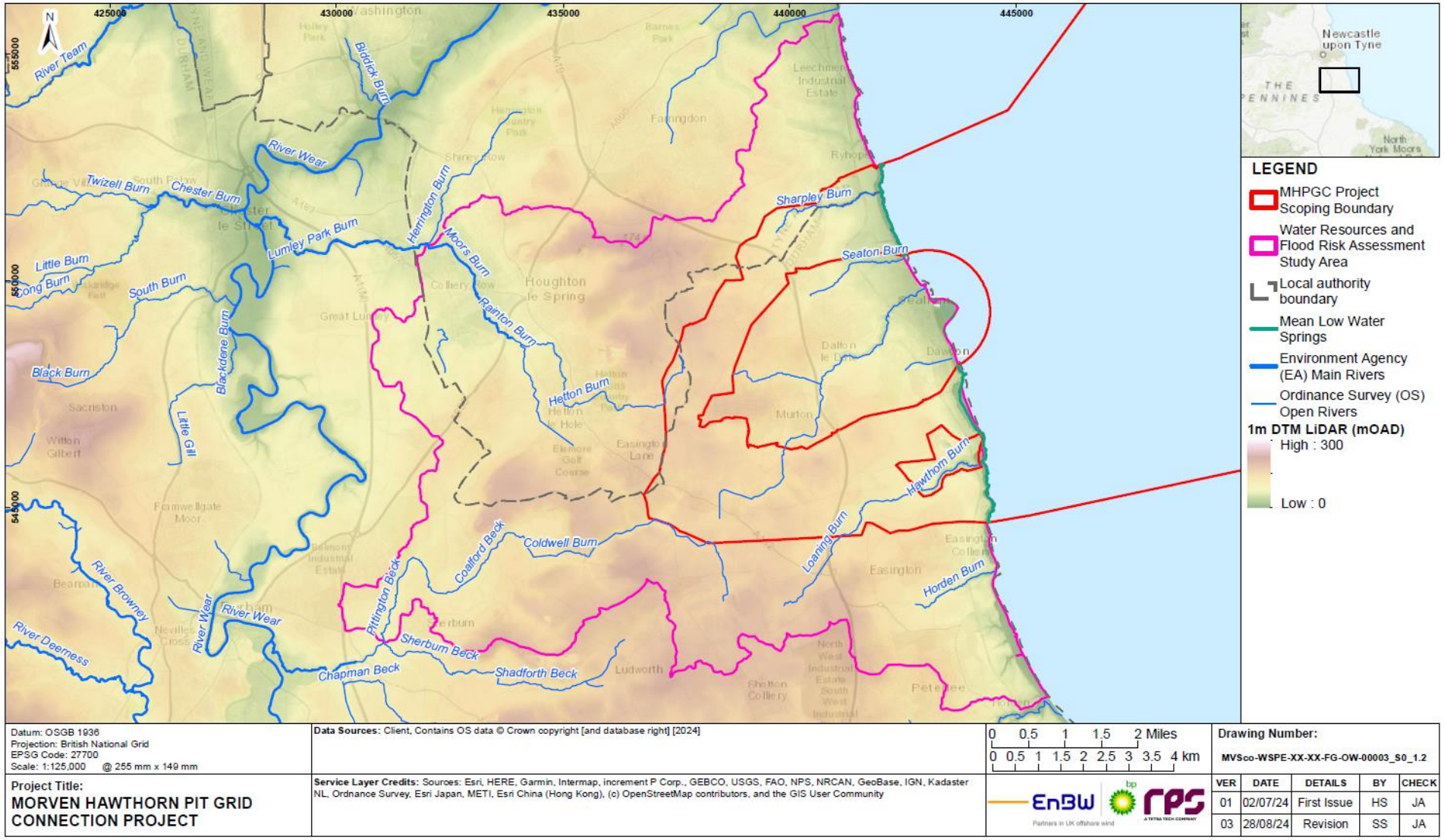


Figure 8.8: Topography and Watercourses within the Water Resources and Flood Risk Assessment Study Area

8.2.5.7 Coldwell Burn originates near Tuthill Quarry (NGR NZ 38539 42942) to the southeast of Haswell to the south of the MHPGC Project Scoping Boundary and flows to the north and then west through a predominantly rural catchment on the southern MHPGC Project Scoping Boundary to later become first the Coalford Beck and then the Pittington Beck before joining the Sherburnhouse Beck (NGR NZ 31024 41996). This is a tributary of the Old Durham Beck which in turn joins the River Wear to the east of Durham, approximately 9.7km to the southwest of the MHPGC Project Scoping Boundary.

8.2.5.8 Hetton Burn originates within rural land (NGR NZ 37561 48363) just within the western boundary of the Northern Corridor and flows into the Stephenson Lake, Blossom Pond and Lyons Lake, which are located on the eastern side of Hetton-le-Hole (NGR NZ 35943 47526) beyond the Northern Corridor . Rough Dene Burn originates to the northeast of Eppleton Quarry (NGR NZ 362450 485200) and joins Hetton Burn to the west of Hetton-le-Hole (NGR NZ 34574 48611). Beyond this the downstream Moors Burn catchment has two large urban areas, Hetton-le-Hole and Houghton-le-Spring. Hetton Burn flows northeast through Hetton-le-Hole where it becomes a Main River called Rainton Burn (NZ 34078 48597). Rainton Burn continues to the west of Houghton-le-Spring, becoming Moors Burn near High Dubmire (NZ 33088 49711) before joining the Lumley Park Burn (NZ 32447 50806) directly downstream of the Water Resources and Flood Risk Assessment Study Area.

8.2.5.9 The topography of the Central Corridor slopes broadly down from a high point of 141mAOD southeast of Murton (NGR NZ 40662 46067) towards the Central Landfall (CCL) 3.4km to the east. The Hawthorn Burn catchment intersects the Central Corridor but the watercourse originates as the Loaming Burn southeast of Easington (NGR NZ 39721 42301) and south of the Central Corridor . It flows northeast through Hawthorn Dene where it meets the sea between the northern and southern bifurcations of the Central Corridor (NGR NZ 44216 45943). The unnamed Ordinary Watercourses flowing south eastwards from within the Central Corridor are tributaries of the Hawthorn Burn.

8.2.5.10 There are no river flow gauges on the watercourses flowing to the east through the MHPGC Project Scoping Boundary, however there is a gauge downstream of the catchments flowing west from the Water Resource and Flood Risk Assessment Study Area at the River Wear at Chester-le-Street. The summary statistics for this gauge are presented in Table 8.21.

Table 8.21: River Gauge Summary Statistics

Gauge Reference	Gauge name	Watercourse	NGR	Catchment Area (km2)	Mean Flow (m3/s)	Q10 (m3/s)	Q95 (m3/s)	BFI	Period of Record
24009	River Wear at Chester-le-Street.	River Wear.	NZ 283 512.	1008.3	14.927	33.3	3.14	0.47	1977 to 2022.

Climate

8.2.5.11 The Met Office website holds the latest set of 30 year rainfall averages, covering the period 1991 to 2020. Average rainfall of 675.65mm/a was recorded for the climate station at Durham, 9.5km southwest of the MHPGC Project Scoping Boundary at NGR NZ 26928 41421, whilst 608.26mm/a was recorded at the Tynemouth climate station, 18km north of the Northern Corridor at NGR NZ 37504 69429. Average rainfall of 596.19mm/a was recorded at the Hartburn Grange climate station within Stockton-On-Tees, 24km south of the Central Corridor at NGR NZ 43846 19831.

8.2.5.12 The Durham climate station is located within the River Wear catchment, whilst the Tynemouth station is within the River Tyne catchment and the Stockton-On-Tees station is within the River Tees catchment. The Durham climate station is the closest to the MHPGC Project and is at an elevation of 102mAOD, close to the highest elevations within the MHPGC Project Scoping Boundary. Overall values for the east and north east of England are given on the Met Office website as 793.09mm/a, and this suggests that the area within the MHPGC Project Scoping Boundary is likely to have a lower-than-average rainfall for the area likely due to its low elevation and eastern coastal location.

Current and Historical Land Use

8.2.5.13 The MHPGC Project Scoping Boundary is situated around an urban area (Seaham) but mainly within a rural river catchment area used for agriculture.

8.2.5.14 In addition, the Coal Measures strata present at depth have been extensively mined for coal in North East England and the Water Resources and Flood Risk Assessment Study Area is within an area of historic coal mining. The Coal Authority web viewer shows the extent of the Development High Risk Areas (DHRAs), mine entries, mine workings and other mining and groundwater constraints, where Coal Authority guidance (Coal Authority, 2014) defines a DHRA as comprising part of a coal mining reporting area that contains one or more recorded coal mining-related features that have the potential for instability or a degree of risk to the surface from the legacy of coal mining operations. There are several mapped mine entries (shafts) within the MHPGC Project Scoping Boundary between Murton and South Hetton (NGR NZ 38879 45851), in the vicinity of the former South Hetton Colliery. Within the vicinity (1km) of the MHPGC Project Scoping Boundary there are numerous other former collieries, including Vale Tempest, Dawdon, Murton and Elemore Collieries and associated mapped mine entries (shafts and adits).

8.2.5.15 As well as DHRAs in the areas of mapped mine entries, there are also multiple DHRAs elsewhere within the MHPGC Project Scoping Boundary, for example southeast of Easington Lane (~NGR NZ 37165 456218). There are also a number in close proximity to the MHPGC Project Scoping Boundary, with clusters located near the A182 south of Dalton-le-Dale (NGR NZ 42443 47166[8]).

8.2.5.16 In the western section of the Water Resources and Flood Risk Assessment Study Area (downstream) west of the Houghton-le-Spring and Hetton-le-Hole there is a significantly high distribution of mine entries, DHRAs, surface mines, probable shallow coal mine workings and coal outcrops. The MHPGC Project Scoping Boundary and entire Water Resources and Flood Risk Assessment Study Area is also within a Category B mining and groundwater constraint area[9], meaning that specific requirements for major development and deep ground works may be required[10].

Soils

8.2.5.17 Landis Soilscapes[11] indicates that the MHPGC Project Scoping Boundary predominantly overlays slowly permeable seasonally wet slightly acid but base rich loam and clayey soils with impeded drainage. In terms of the water environment the mains risks for this soil type are associated with overland flow from compacted fields, as well as organic slurry, dirty water, fertiliser, pathogens and fine sediment in suspension or solution.

8.2.5.18 Additionally, the Central Corridor overlays an area of freely draining lime rich loamy soils. This soil type can be vulnerable to leaching of nitrate to groundwater.

8.2.5.19 The Northern Corridor overlays an area of slightly acid loamy and clayey soils with impeded drainage and the farmed land in these areas can be drained and therefore vulnerable to pollution run off and rapid through flow to streams.

[8] DHRA centroids approximated.

[9] A Category B area means that there are no shallow mine workings, no nearby controlling outflow or shallow mine water present.

[10] If the site is a major development but there are no proposals for boreholes over 30 metres deep, then there is no specific consultation required. However, the impacts of the proposal and suitability of the subsurface coalfield environment should be considered, i.e. refer to the Construction Industry Research and Information Association's (CIRIA's) SuDS manual (C753) for assessing pollution and flood risk on controlled waters, including groundwater, to provide a fully justified risk assessment to support sustainable development.

[11] https://www.landis.org.uk/soilscapes/.

Geology

8.2.5.20 The solid geology (Figure 8.9) beneath the Water Resources and Flood Risk Assessment Study Area comprises the Permian Zechstein Group of limestone and dolomite (Magnesian Limestone) along the coastal area and the Carboniferous Pennine Middle Coal Measures Formation approximately 8km inland, with the unconformable boundary forming a north to south line from Hastings Hill (east of Sunderland) to Hetton-le-Hole (NZ 35809 47601). The Zechstein Group strata becomes progressively older to the west, with the Roker Formation (dolostone) and Seaham Formation (dolomitic limestone) outcropping along the coast and the Ford Formation (dolostone including the shelf edge reef in places) and Raisby Formation (dolostone) outcropping inland to the west beneath the higher ground.

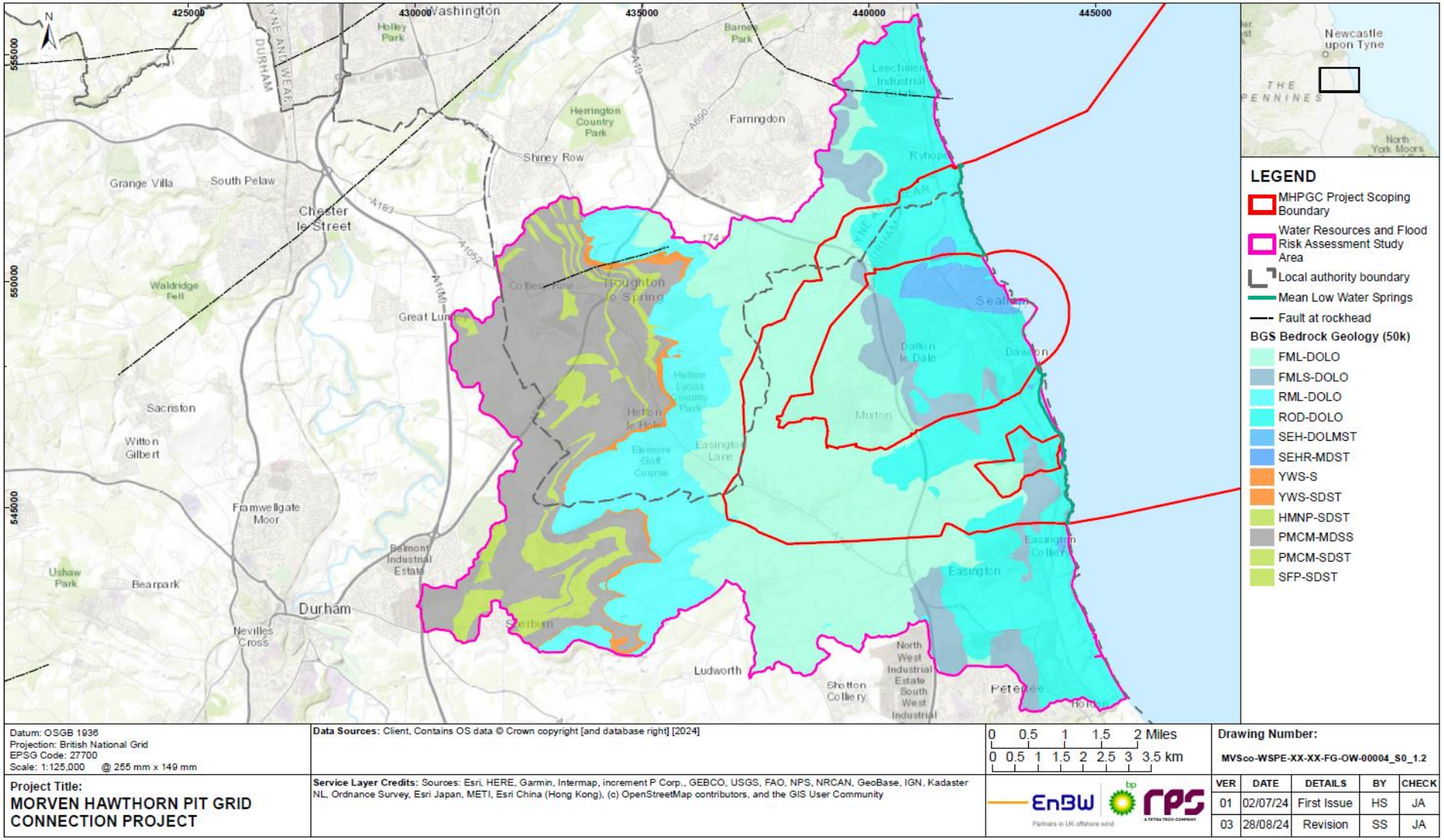


Figure 8.9: Bedrock Geology

8.2.5.21 The MHPGC Project Scoping Boundary does not extend west beyond the Zechstein Group Ford Formation. The Rotliegendes Group (Permian) Yellow Sands Formation (formerly the Basal Permian Sand) is unconformable and overlies the Carboniferous Pennine Middle Coal Measures Formation to the west, with the outcrop of this sand dune unit pinching out in places.

8.2.5.22 Superficial deposits within the Land Substation (LSS) area and the Northern and Central Corridors inland from the NCL and CCL respectively comprise predominantly till (Devension – diamicton) and pockets of glaciofluvial deposits (such as Devension sand and gravel) (Figure 8.10). Other superficial deposits of alluvium (clay, silt and gravel) are present in close proximity to major watercourses in the area and marine beach deposits (sand and gravel) are present along the coast at the NCL and CCL locations. The superficial till deposits form a gently undulating, five to ten m thick sheet across much of the lowland Durham area, becoming patchier across interfluves and thickening locally in the lee of bedrock highs and within concealed valleys, where thicknesses locally exceed 80m (BGSo, 2020). Man-made deposits such as historic spoil from colliery waste are described within Chapter 8.1: Ground Conditions and Contamination of this Scoping Report.

8.2.5.23 The Magnesian Limestone dips gently (8 degrees) to the east whereas the older Pennine Middle Coal Measures Formation is folded. Major faulting is shown across the Water Resources and Flood Risk Assessment Study Area on BGSo mapping forming laterally continuous east to west trending faults (the Seaham and Newbottle Faults). This faulting pattern may have some impact on drainage to the east within the Water Resources and Flood Risk Assessment Study Area, for example the Seaham Fault aligns with drainage of the Seaton Burn. Other faults within the Water Resources and Flood Risk Assessment Study Area comprise a north northwest to south southeast set and a minor fault set trending northeast to southwest.

Aquifers

8.2.5.24 The Defra's MAGIC website aquifer designation map identifies the Magnesian Limestone as a Principal aquifer. The superficial deposits of till are identified as a Secondary (undifferentiated) aquifer, and the fluvioglacial deposits are a Secondary A aquifer. The 1:625,000 scale Hydrogeological Map of England and Wales indicates that the entire Water Resources and Flood Risk Assessment Study Area is within a highly productive aquifer (the Magnesian Limestone) up to 300m thick and locally yields up to 50 litres per second (l/s) of very hard water. It also mentions that in the north the Permian Basal Sand (now Yellow Sands) can supply yields up to 25l/s within properly screened wells. Allen et al. (1997) present a detailed appraisal of Magnesian Limestone aquifer properties within the County Durham area. Transmissivity values vary in the range 11 to 2200 metres squared per day (m2/d) with a data distribution which is positively skewed. The geometric mean of all the location values in the County Durham area is 263m2/d and the median value is lower at 205m2/d.

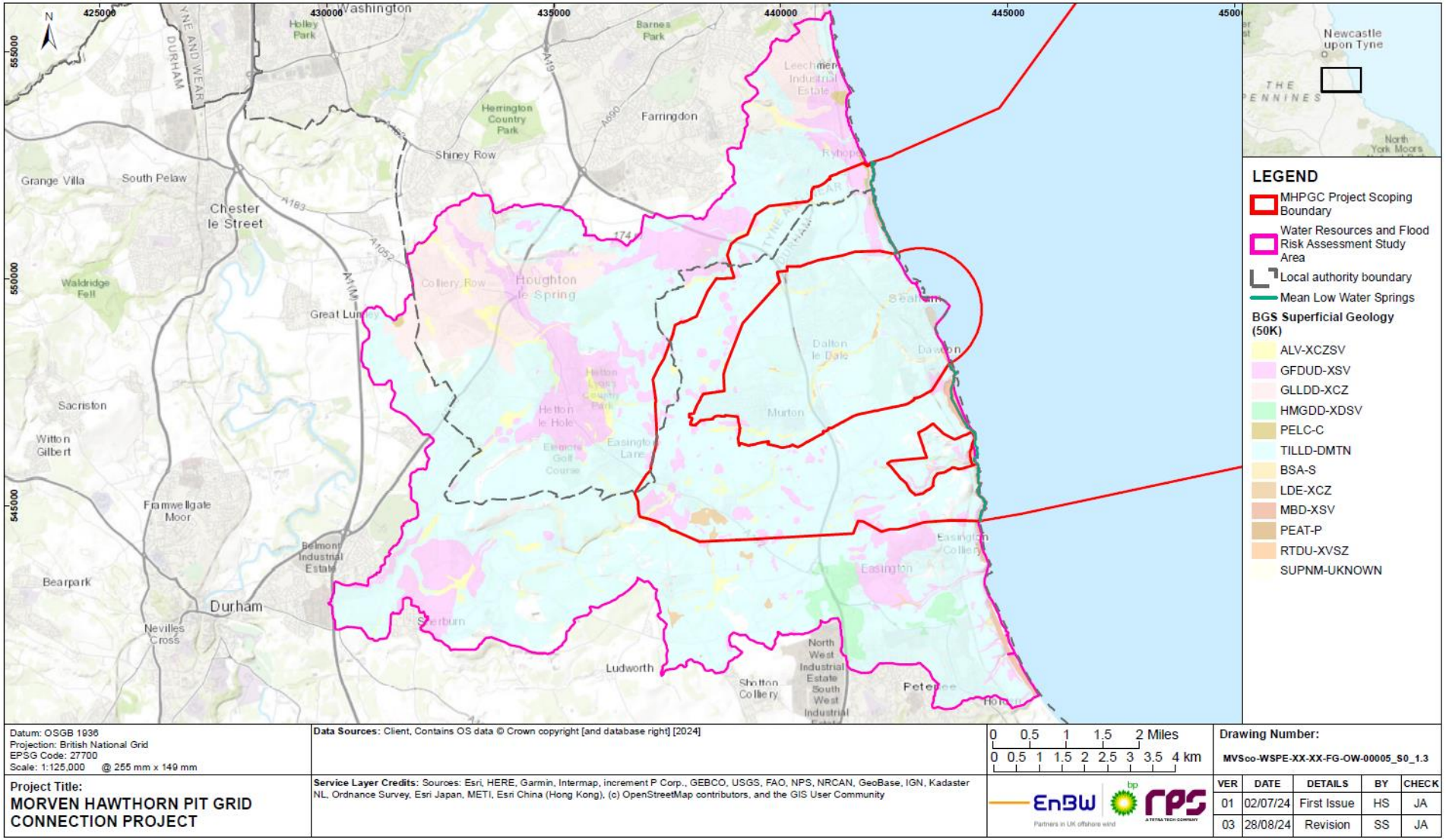


Figure 8.10: Superficial Deposits

8.2.5.25 Local over-pumping has led to saline intrusion within the Magnesian Limestone aquifer near the coast and groundwater vulnerability on the MAGIC website is high to medium and identifies a soluble rock risk. In addition, a higher risk to pollution inputs into the Magnesian Limestone aquifer occurs along the coastline where bedrock is exposed and also beneath more permeable superficial deposits, such as alluvial sands and gravels along river channels.

8.2.5.26 Groundwater level data for the Water Resources and Flood Risk Assessment Study Area will be requested from the EA during the EIA process. There has been a general rise in groundwater water levels in the Durham area in past due to the reduction in public water abstraction along the coast and the cessation of dewatering in underlying coal workings (Allen et al., 1997). This has implications for groundwater quality in the Magnesian Limestone, especially as the underlying Coal Measures water levels continue to rise.

8.2.5.27 A full review of the WSP (2024) North East Magnesian Limestone Conceptual Model report that was completed on behalf of the EA will also be implemented during the EIA process. Information within the report that is of relevance to the MHPGC Project is not just restricted to the aquifer itself, as indicated in Table 8.20.

Abstractions, Private Water Supplies and Discharges

Licensed Abstractions

8.2.5.28 Abstraction licence details for surface and groundwater abstractions in the Water Resources and Flood Risk Assessment Study Area will be requested from the EA during the EIA process. However, the MAGIC website identifies a number of SPZs (five Outer Protection Zones and total catchment zones) (EA, 2019) intercepted by the MHPGC Project Scoping Boundary (Figure 8.7) and within the wider Water Resources and Flood Risk Assessment Study Area, and these have been used to infer the location of several public groundwater supply abstractions in the area. All the abstractions are likely to be from the Magnesian Limestone and the outer protection zones are orientated to the west up the groundwater flow paths towards the high ground outcrop. The abstractions for the truncated outer protection zone areas are located approximately 1.7km northwest of Dalton le Dale (NGR NZ 39299 48972), 250m south of Dalton le Dale (NGR NZ 40834 47798), 500m south of Cold Hesledon (NGR NZ 41100 47108), 850m south west of Hawthorn (NGR NZ 41520 44764) and in the vicinity of Easington Colliery (NGR NZ 42720 43900).

8.2.5.29 Details of the abstractions will be updated following receipt of the EA's response to the licensed abstraction data request. The EA has undertaken refinement of the SPZs in the area of the MHPGC Project (WSP, 2024) but these have yet to be formally issued by the EA, and so the SPZs shown in Figure 8.7 remain in place until further notice. It is anticipated that the new SPZs will be available in time to be incorporated during the EIA process.

Private Water Supplies

8.2.5.30 Historical water well locations are shown within BGSo and historical online mapping and are predominantly drilled to depths of greater than 30m. A number are identified within the MHPGC Project Scoping Boundary, although these sites are possibly historical abstraction wells and no longer used. PWS data will be requested from DCC and SCC for the Water Resources and Flood Risk Assessment Study Area during the EIA process.

Discharges

8.2.5.31 A total of 387 EA consented discharges located within the Water Resources and Flood Risk Assessment Study Area have been identified (Figure 8.6). Most are related to sewage, either water company (Northumbrian Water) or non-water company related i.e. at private and trade premises, but with some linked to coal and lignite reclamation works (the Coal Authority). 36 discharges are located within the MHPGC Project Scoping Boundary, most in the vicinity of South Hetton (NGR NZ 38900 44700).

Conservation Sites

8.2.5.32 A number of statutory and non-statutory designated conservation sites are located within the MHPGC Project Scoping Boundary and the wider Water Resources and Flood Risk Assessment Study Area and those likely to be dependent on the water environment are outlined below. Detailed description of these ecological sites can be found within Chapter 8.3: Terrestrial Ecology and Ornithology, of the Scoping Report.

8.2.5.33 The Northumbria Coast Ramsar/Special Protection Areas (SPAs) and Durham Coast Special Areas of Conservation (SACs)/Sites of Special Scientific Interest (SSSIs) designated conservation sites occur along the North Sea coast within the Water Resources and Flood Risk Assessment Study Area. Other SSSIs within the vicinity of or within the MHPGC Project Scoping Boundary include Hesledon Moor East (NGR NZ 39930 46540) and West (NGR NZ 38666 45325), south of Murton, and Hawthorn Dene, to the east of Hawthorn. In addition, the Stony Cut, Cold Hesledon and Hawthorn Quarry SSSIs, south of Seaham (NGR NZ 43512 46346), have been designated for geological features within the Magnesian Limestone.

8.2.5.34 Ancient woodland is found predominantly along the denes within the lower coastal catchment areas, such as the Sharpley Burn and Hawthorn Burn. Numerous Local Wildlife Sites (LWSs) are also located within and downstream of the MHPGC Project Scoping Boundary. The locations of conservation sites are shown on Figure 8.13 of Chapter 8.3: Terrestrial Ecology and Ornithology, of the Scoping Report.

8.2.5.35 In addition to these designated conservation sites, OS mapping indicates the presence of numerous water features such as ponds, lakes and wetlands within the Water Resources and Flood Risk Assessment Study Area. These water features are most numerous to the northwest of the MHPGC Project Scoping Boundary, in a topographically higher area associated with Devensian glacial fluvial sand and gravel superficial deposits to the east of Houghton-le-Spring, for example at Sharpley Springs (NGR NZ 37731 50430), at the headwaters of the Sharpley Burn. Also, as mentioned earlier, three large lakes, namely Lyons Lake, Stephenson Lake and Blossom Pond, are located near Hetton-le-Hole on alluvial superficial deposits.

Several unnamed lakes are shown on OS mapping within the northern corridor and a collection of smaller lakes are also indicated to the northeast of South Hetton. The headwaters of other watercourses are located in the areas of higher ground within the MHPGC Project Scoping Boundary and associated with patches of fluvial glacial sand and gravel and alluvial deposits. These are possibly spring-fed, for example the Dalton Beck and its tributaries and Seaton Burn, although they are not marked as such on the OS mapping.

Flood Risk

8.2.5.36 This section presents an overview of the baseline flood risk for the purposes of scoping. This initial baseline understanding will be confirmed with the EA and updated during the EIA process.

Fluvial and Tidal Flood Risk

8.2.5.37 The EA Flood Map for planning has been used to identify different flood zone areas and the extent of flooding possible within the MHPGC Project Scoping Boundary, as well as the downstream catchments which make up the Water Resources and Flood Risk Assessment Study Area. The map is shown in Figure 8.11.

8.2.5.38 To the north of Seaham, at the proposed NCL, the northern corridor is within an area of Flood Zone 2 and 3, with high to medium risk areas of flooding from coastal sources. No other extensive areas of Flood Zone 2 or 3 are present within the northern corridor to the west, inland from the coast. The Sharpley Dene instead spatially constrains the flood zones of the Sharpley Burn due to its incised nature.

8.2.5.39 Several areas of Flood Zone 2 and 3 are present in the area between the eastern edge of the MHPGC Project Scoping Boundary and the coast associated with existing watercourses. The Seaton Burn flows through Seaham Dene and a limited part of the urban area of Northlea (NGR NZ 41233 50288) is indicated as being in Flood Zone 2 and 3, upstream of the railway line. Downstream of the railway line the flood zones are spatially constrained by the steep topography of Seaham Dene. Areas of Flood Zone 2 and 3 are also present along the Dalton Beck and largely constrained by Dawdon Dene. Other watercourses to the east of the MHPGC Project Scoping Boundary in this area, also located in steep sided valleys, have areas of Flood Zone 2 and 3.

8.2.5.40 At the proposed CCL, the central corridor is within an area of Flood Zone 2 and 3, with high to medium risk areas of flooding from coastal sources. No other extensive areas of Flood Zone 2 or 3 are present within the central corridor to the west, inland from the coast. The Hawthorn Dene instead spatially constrains the flood zones of the Hawthorn Burn due to its incised nature.

8.2.5.41 The western part of the MHPGC Project Scoping Boundary is intersected by the upstream areas of the Lumley Park Burn catchment and the Pittington Beck catchment, both tributaries of the River Wear. Here, areas of Flood Zones 2 and 3 are present along these watercourses and their tributaries and are generally constrained by topography in the upper catchment. More extensive areas of Flood Zone 2 and 3 are evident where the topography is flatter in the lower reaches of these catchments in the western part of the Water Resources and Flood Risk Assessment Study Area. For example, Moors Burn to the west of Houghton-le-Spring

and Coldwell Burn at High Pittington are both associated with more extensive flood zones. Flood defences are present along Moors Burn in the form of natural high ground.

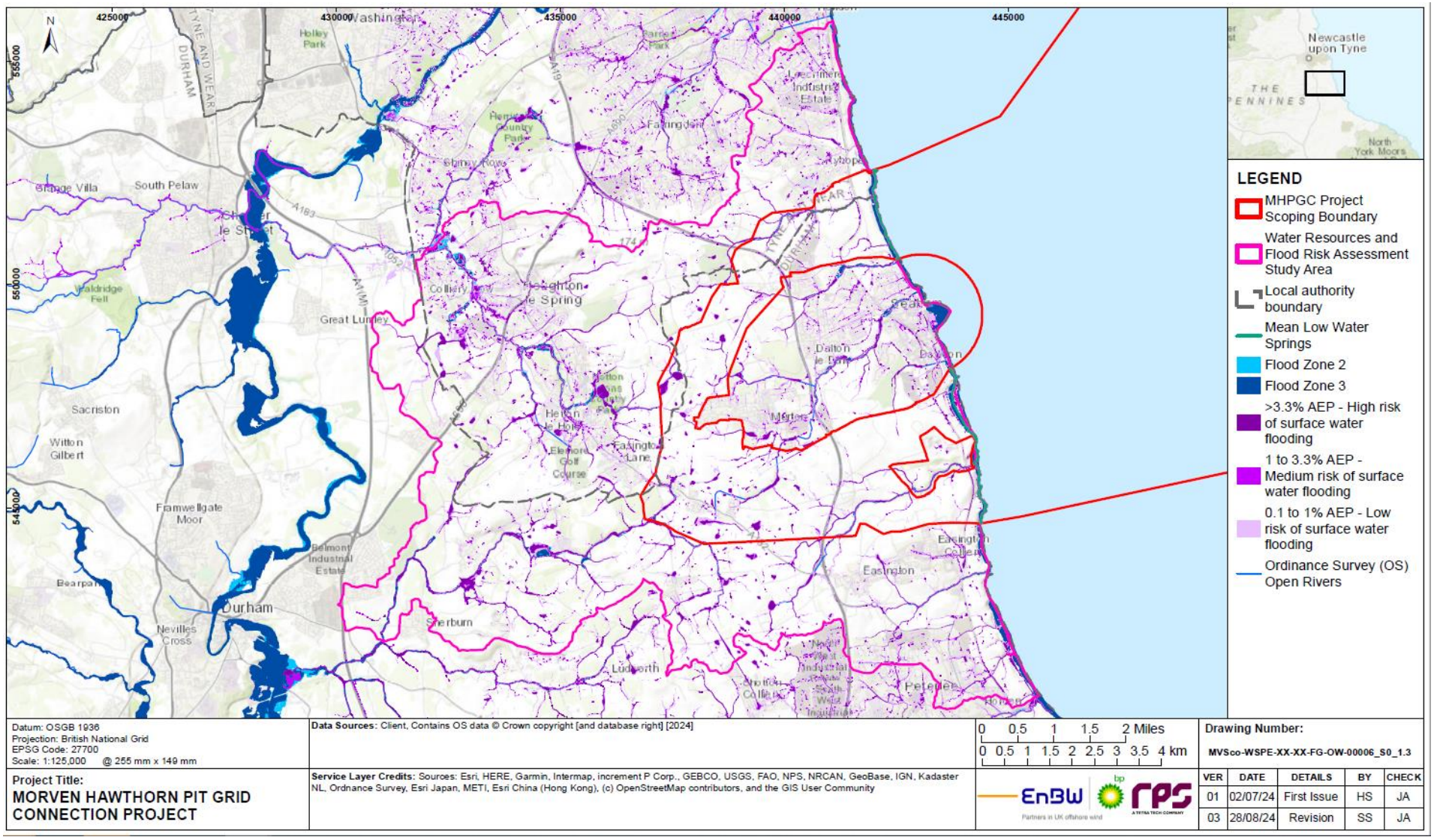


Figure 8.11: Flood Risk within the Water Resources and Flood Risk Assessment Study Area

Groundwater Flood Risk

8.2.5.42 The County Durham SFRA (Aecom (2018b)) states that groundwater flood risk is generally highest in the west of the county which is away from the MHPGC Project Scoping Boundary. The SFRA also presents the Areas Susceptible to Groundwater Flooding (AStGWF) mapping (in the SFRA's Appendix B). The AStGWF mapping suggests that susceptibility to groundwater flooding is generally high in areas where superficial geology comprises alluvium and/or river terrace deposits and follows the routes of existing watercourses within the Water Resources and Flood Risk Assessment Study Area. The AStGWF mapping indicates that groundwater susceptibility is generally highest around Hetton-le-Hole, to the west of the MHPGC Project Scoping Boundary.

8.2.5.43 Also, the AStGWF data is displayed for the part of the Water Resources and Flood Risk Assessment Study Area that lies within Sunderland in the Sunderland Preliminary Flood Risk Assessment (PFRA) (SCC, 2011). High groundwater emergence levels have been identified around Hetton-le-Hole in areas of low elevation at the boundary of the Magnesian Limestone and the Pennine Middle Coal Measures Formation.

Surface Water Flood Risk

8.2.5.44 The EA risk of flooding from surface water mapping shows that low lying areas around river corridors, urban areas, localised depressions and areas of managed drainage are at risk of surface water (rainfall and runoff) flooding across the Water Resources and Flood Risk Assessment Study Area. Areas of surface water accumulation in the narrow denes present in the east of the Water Resources and Flood Risk Assessment Study Area are often upslope of roads or other embanked areas, indicating the presence of probable 'constriction of flow' structures. The ponds and lakes identified on OS mapping are also indicated to be areas of surface water accumulation. The Durham SFRA (pages 28-29) (Aecom, 2018b) notes various sources of surface water flood risk. It highlights that railway and road embankments act as key barriers to surface water flow routes and cause localised areas of deep ponding. Urban areas, including buildings and roads, can restrict infiltration and act as barriers to flows causing localised ponding as well as acting as conveyors for surface water.

Artificial Flood Risk

8.2.5.45 The EA's risk of flooding from reservoirs does not show any mapped flood risk from reservoirs within the Water Resources and Flood Risk Assessment Study Area. Records of sewer flooding within the Water Resources and Flood Risk Assessment Study Area will be requested from Northumbrian Water and provided in the EIA Report/ES.

Water Quality

8.2.5.46 Surface water and groundwater quality data will be requested from the EA and will be assessed during the EIA process.

8.2.5.47 With respect to surface water quality, the EA water quality archive (Open WIMS data) will give historical and current water quality datasets from a range of sampling

points within the Water Resources and Flood Risk Assessment Study Area (see Figure 8.6), comprising the following:

- 'Dalton Beck at Seaham' (ID: NE45500125) at NGR NZ 42840 49770;
- 'Hawthorn Dene D/S North Tributary' (ID: NE-45500161) at NGR NZ 43114 49770;
- 'Hawthorn Dene U/S North Dene Tributary' (ID: NE-45500160) at NGR NZ 42273 45154;
- 'Moors Burn at Rainton Bridge Industrial Estate' (ID: NE-44500458) at NGR 33540 49034;
- 'Pittington Beck at B1283 Bridge' (ID: NE-44500541) at NGR NZ 31340 43120;
- 'Rainton Burn at Hetton Bogs' (ID: NE-44500666) at NGR NZ 34101 48585;
- 'Surface Water to Seaham Promenade North' (ID: NE-45500150) at NGR NZ 42343 50798;
- 'Surface water C. 100 M Nw Of Bw Seahamhall' (ID: NE-45500151) at NGR NZ 42280 50883.

8.2.5.48 Data from these sampling points will be used to determine the surface water quality baseline conditions. In addition, within the vicinity of the MHPGC Project Scoping Boundary the EA's own water quality sampling points are located at High Fallowfield Farm (NGR NZ 37432 44601) in South Hetton, from which 42 groundwater borehole samples have been taken between 2000 and 2023; on the Dalton Beck within Seaham where 207 surface water samples have been taken between 2000 and 2020; and at the former Dawdon Colliery treated mine water (NE-45500276), at NGR NZ 43060 47490, where 303 samples taken between 2009 and 2024. To the west of the Water Resources and Flood Risk Assessment Study Area there is also EA surface water data for watercourses flowing west at Moors Burn upstream of the Herrington Burn confluence (NE-44500229), at NGR NZ 32190 50740, where 183 samples were taken between 2000 and 2021 and on the Pittington Beck at the B1283 bridge (NE-44500541), NGR NZ 31340 43120, where 177 samples taken between 2001 and 2021.

8.2.5.49 The MHPGC Project Scoping Boundary is situated in mainly rural catchments and water quality pressures arise predominantly from diffuse pollution from rural sources. The Water Resources and Flood Risk Assessment Study Area intersects several EA designated Nitrate Vulnerable Zones (NVZs) (Figure 8.7) and the central corridor is located within the historically designated Hawthorn Burn from Source to North Sea (ID: S671) NVZ and the northern corridor and western section of the Water Resources and Flood Risk Assessment Study Area intersect the Lumley Park Burn from Herrington Burn to River Wear NVZ. Further information on catchment water quality can be found with respect to the discussion of WFD water body status presented below.

8.2.5.50 There are also localised pressures on water quality because of historical and current activities within more urban areas and particularly historical coal mining within the area. Chemical quality of the groundwater can be affected by the rise in water levels caused by cessation of dewatering following the abandonment of mining operations.

Water levels have also risen due to a change in pumping patterns in response to past problems of seawater intrusion in boreholes near to the coast (Bearcock and Smedley, 2009).

8.2.5.51 Further information on catchment water quality with respect to WFD water body status can be found in the WFD section below.

Water Framework Directive Water Body Status

8.2.5.52 The current (2023) status of all WFD water bodies within the Water Resources and Flood Risk Assessment Study Area are presented in Table 8.22, together with an indication of which water bodies relate to which parts of the MHPGC Project Scoping Boundary.

Table 8.22: Water Framework Directive Water Bodies Within the Water Resources and Flood Risk Assessment Study Area

Water Body ID/Management Catchment	Water Body Type	Status	Supporting Elements, Less than Good Status/Potential	Issues Preventing the Attainment of Good Status	Area of MHPGC Project Scoping Boundary
Dalton Beck to North Sea Water Body (GB103025075970) Seaham Peterlee Coast.	River.	Moderate Status (2022): Moderate Ecological Potential, Chemical 'Does Not Require Assessment' – classified as Fail in 2019.	Macrophytes and Phytobenthos Combined Ammonia (Phys-Chem) Phosphate	Benzo(g-h-i)perylene Macrophytes and Phytobenthos Combined Polybrominated diphenyl ethers (PBDE) Mercury and Its Compounds Phosphate	Central corridor.
Hawthorn Burn from Source to North Sea Water Body (GB103025075950) Seaham Peterlee Coast.	River.	Poor Status (2022): Poor Ecological, Chemical 'Does Not Require Assessment' – classified as Fail in 2019.	Invertebrates Phosphate	Phosphate Agriculture and rural land management Phosphate Domestic General Public Phosphate Water Industry PBDE Mercury and Its Compounds Invertebrates	Central corridor.
Lumley Park Burn from Source to Herrington Burn Water Body (GB103024077580) Wear Lower and Estuary.	River (Heavily Modified).	Moderate Status (2022): Moderate Ecological, Chemical 'Does Not Require Assessment' –	Macrophytes and Phytobenthos Combined Mitigation Measures Assessment	Macrophytes and Phytobenthos Combined Water Industry Hydrological Regime Urban and transport	Northern corridor.

Water Body ID/Management Catchment	Water Body Type	Status	Supporting Elements, Less than Good Status/Potential	Issues Preventing the Attainment of Good Status	Area of MHPGC Project Scoping Boundary
		classified as Fail in 2019.		Mitigation Measures Assessment Urban and transport Mitigation Measures Assessment Local and Central Government Mercury and Its Compounds PBDE Macrophytes and Phytobenthos Combined Hydrological Regime Abstraction	
Pittington Beck from Coalford to Old Durham Beck Water Body (GB103024077540) Wear Lower and Estuary.	River.	Bad Status (2022): Bad Ecological, Chemical 'Does Not Require Assessment' – classified as Fail in 2019.	Phosphate Fish	Phosphate PBDE Mercury and its Compounds	Northern corridor and Central Corridor.
Wear Magnesian Limestone Water Body (GB40301G703900) Wear Magnesian Limestone.	Groundwater Body.	Poor Overall Status (2019).	Chemical Drinking Water Protected Area	Chemical Drinking Water Protected Area Agriculture and rural land management.	Northern corridor and Central Corridor.

Water Body ID/Management Catchment	Water Body Type	Status	Supporting Elements, Less than Good Status/Potential	Issues Preventing the Attainment of Good Status	Area of MHPGC Project Scoping Boundary
Wear Carboniferous Limestone and Coal Measures Water Body (GB40302G701600) Wear Carboniferous Limestone and Coal Measures.	Groundwater Body.	Poor Overall Status (2019)	Chemical Dependent Surface Water Body Status. General Chemical Test.	Chemical Dependent Surface Water Body Status Mining and Quarrying. General Chemical Test – Mining and Quarrying.	Western Study Area.
Tyne and Wear Water Body (GB650301500002) Tyne and Wear.	Coastal Water.	Good Ecological Status (2022) Chemical Status – 'Does Not Require Assessment' - classified as Fail in 2019.	N/A.	PBDE. Mercury and Its Compounds.	NCL and CCL.

8.2.5.53 The MHPGC Project Scoping Boundary predominantly falls within the Seaham Peterlee Coast Operational Catchment, which comprises the WFD 'Dalton Beck to North Sea' and 'Hawthorn Burn from Source to North Sea' Water Bodies. These water bodies did not attain the WFD target of Good status as a result of impacts upon invertebrates and phytobenthos combined ecology and water quality issues associated with elevated phosphate, polybrominated diphenyl ethers (PBDE), mercury and its compounds, benzo(g-h-i)perylene and macrophytes and are instead of Moderate and Poor status respectively. Areas to the north and south of Seaham are located within the Seaham Peterlee Coast Operational Catchment and have no named WFD water bodies. The watercourses within these areas are likely Ordinary and drain directly into the North Sea.

8.2.5.54 Much of the MHPGC Project Scoping Boundary also overlies the WFD Wear Magnesian Limestone Groundwater Body. This water body did not attain the WFD target of Good status as a result of water quality issues associated with diffuse pollution from agriculture and rural land management and is instead considered Poor status.

8.2.5.55 The western sections of the Water Resources and Flood Risk Assessment Study Area fall within the Wear Lower and Estuary Operational Catchment, which comprises the WFD 'Lumley Park Burn from Source to Herrington Burn' and the 'Pittington Beck from Coalford to Old Durham Beck' Water Bodies and have a Moderate and Bad status respectively. The 'Lumley Park Burn from Source to Herrington Burn' Water Body did not attain the WFD target of Good status as a result of issues associated with macrophytes (Poor) and a reduced mitigation measures assessment value of Moderate or less. This WFD water body has stresses from urban, transport and local and central government impacting modification to the watercourse. The 'Pittington Beck from Coalford to Old Durham Beck' Water Body did not attain the WFD target of Good status as a result of issues associated with fish ecology (Bad) and phosphate (Poor). The reasons for not achieving Good status are unknown and pending investigation.

8.2.5.56 Much of the western sections of the Water Resources and Flood Risk Assessment Study Area overlies the Wear Carboniferous Limestone and Coal Measures Groundwater Body. This water body did not attain the WFD target of Good status as a result of water quality issues associated with mining and quarrying i.e. abandoned mines.

8.2.5.57 Specific groundwater contamination issues are described within Chapter 8.1: Ground Conditions and Contamination of the Scoping Report, but one designated site of statutory Contaminated Land ('CL1 Halliwell Banks') is of note at NGR NZ 4170 5233. This is the former Halliwell Banks Landfill site in Ryhope within the Water Resources and Flood Risk Assessment Study Area and extends into the northern corridor just north of the NCL.

8.2.5.58 With exception to the 'Lumley Park Burn from Source to Herrington Burn' Water Body, none of surface water bodies within these catchment areas are designated as artificial or Heavily Modified Water Bodies (HMWBs), indicating that their physical characteristics have not been substantially modified to accommodate human activities. However, it appears that they are subject to levels of water quality pressure that result in the current failure to attain Good ecological status.

8.2.5.59 Parts of the Water Resources and Flood Risk Assessment Study Area coincide with land not associated with a specific WFD surface water body, due to these land parcels not being contained within a substantial river catchment i.e. they drain directly to the sea. In addition, the eastern section of the Water Resources and Flood Risk Assessment Study Area lies within the 'Tyne and Wear' Water Body. This coastal water body is classified as having Good ecological status.

8.2.6 Potential Impacts of the Morven Hawthorn Pit Grid Connection Project

8.2.6.1 A range of potential impacts on water resources and flood risk have been identified that may occur during the construction, O&M and decommissioning phases of the MHPGC Project. In line with the EIA Regulations 2017, the EIA for the MHPGC Project will consider those impacts where there is a risk of a likely significant impact only. The discussion below draws on industry experience and expertise to identify those impact receptor pathways that may potentially lead to a significant impact. Where experience and available evidence indicates an impact receptor pathway will not lead to a significant impact with regards to the EIA Regulations 2017 the pathway is 'scoped out' from assessment.

8.2.6.2 The impacts that have been 'scoped in' to the assessment are outlined in Table 8.23 together with a description of any additional data collection (e.g. site specific surveys) and supporting analyses (e.g. modelling) that will be required to enable a full assessment of the impacts.

8.2.6.3 Potential impacts 'scoped out' of the assessment are presented in Table 8.24 together with a justification and based on a conclusion of no likely significant impact.

8.2.6.4 Given that the River Wear confluence with watercourses potentially impacted by works within the Water Resources and Flood Risk Assessment Study Area is 10km downstream no impacts are anticipated due to dilution effects, and therefore only the intersected surface WFD water bodies are currently considered within the assessment.

Table 8.23: Impacts Proposed to be Scoped in to the Morven Hawthorn Pit Grid Connection Project Assessment for Water Resources and Flood Risk

* Project phase refers to construction (C), O&M (O) and decommissioning (D).

Impact	Project Phase*			Justification	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D			
Landfall cables and associated earthworks resulting in potential impacts on water quality or flood risk.	✓	×	×	Works within a tidal flood plain and WFD coastal/transitional water body. Potential for water quality impacts and short-term displacement of flood waters. Scoped in as FRA and WFD Assessment are required. Anticipated to be a simple assessment unless further information indicates that flood modelling is required.	Flood risk area mapping and groundwater quality data. Further information on tidal flood levels and local Water Environment from EA and LLFA.	Consultation. Walkover. Further assessment of baseline. Design and mitigation. FRA and WFD Assessment. Other supporting assessments as required.
Onshore cable construction (including watercourse crossings) and associated earthworks resulting in a potential impact on water quality, hydromorphology, groundwater levels and flood risk.	✓	×	×	Subsurface works, surface works within fluvial and tidal floodplains, use of fuels oils and other chemicals on site. Scoped in as FRA and WFD Assessment are required. Anticipated to be a simple assessment unless further information indicates that flood modelling is required.	Further information on historical flooding, flood and flow levels, groundwater levels, water quality, abstractions and hydromorphology of watercourses at proposed crossings points from EA and LLFA and site walkover.	Consultation. Walkover. Further assessment of baseline. Design and mitigation. FRA and WFD Assessment. Other supporting assessments as required.

Impact	Project Phase*			Justification	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D			
Substation construction and associated earthworks resulting in a potential impact on water quality, hydromorphology, groundwater levels and flood risk.	✓	×	×	Subsurface works, surface works potentially within fluvial and tidal floodplains, use of fuels oils and other chemicals on site. Scoped in as FRA and WFD Assessment are required. Anticipated to be a simple assessment unless further information indicates that flood modelling is required.	Further information on historical flooding, flood and flow levels, groundwater levels, water quality, abstractions and hydromorphology of watercourses at proposed crossings points from EA and LLFA and site walkover.	Consultation. Walkover. Further assessment of baseline. Design and mitigation. FRA and WFD Assessment. Other supporting assessments as required.
O&M activities resulting in a potential impact on water quality, hydromorphology and flood risk.	×	✓	×	Surface works potentially within fluvial and tidal floodplains, use of fuels oils and other chemicals and associated with ground disturbance on site. Scoped in as FRA and WFD Assessment are required. Anticipated to be a simple assessment unless further information indicates that flood modelling is required.	Further information on historical flooding, flood and flow levels, groundwater levels, water quality, abstractions and hydromorphology of watercourses at proposed crossings points from EA and LLFA and site walkover.	Consultation. Walkover. Further assessment of baseline. Design and mitigation. FRA and WFD Assessment. Other supporting assessments as required.

Impact	Project Phase*			Justification	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D			
Decommissioning activities (including the potential removal of watercourse crossings) resulting in a potential impact on water quality, hydromorphology and flood risk.	×	×	✓	Subsurface works, surface works potentially within fluvial and tidal floodplains, use of fuels oils and other chemicals on site. Scoped in as FRA and WFD Assessment are required. Anticipated to be a simple assessment unless further information indicates that flood modelling is required.	Further information on historical flooding, flood and flow levels, groundwater levels, water quality, abstractions and hydromorphology of watercourses at proposed crossings points from EA and LLFA and site walkover.	Consultation. Walkover. Further assessment of baseline. Design and mitigation. FRA and WFD Assessment. Other supporting assessments as required.

Table 8.24: Impacts Proposed to be 'Scoped Out' of the Morven Hawthorn Pit Grid Connection Project Assessment for Water Resources and Flood Risk

Impact	Justification
Landfall cable and associated earthworks resulting in potential impacts on groundwater levels.	Cable landfall will be via a trenchless technique. No likely significant impact anticipated as works will be limited to the coastal area and the local water table will be connected to the sea levels, therefore resulting in minimal impact on freshwater groundwater levels.
O&M activities resulting in a potential impact on groundwater levels.	O&M activities will not involve significant dewatering works and therefore no impact on groundwater levels is anticipated.
Decommissioning activities resulting in a potential impact on groundwater levels.	Sub-surface infrastructure will be left in place in the decommissioning phase and there will be no dewatering works, therefore no impacts on groundwater levels are anticipated.

8.2.6.5 The water environment scoping assessment is based on the key assumptions presented in Table 8.25. These assumptions are also set out in Chapter 3: Project Description, of the Scoping Report.

Table 8.25: Development Key Assumptions

Development Element	Assumptions
Landfall.	• cable landfall will be via a trenchless technique; • transition joint bays (TJBs) will be underground.
Onshore Cable.	• the onshore grid connection will be made via an underground cable along the entire length of the route. The cable corridor will be refined during the EIA process to identify a cable corridor alignment which is the most appropriate from an environmental, economic and engineering perspective; • the onshore cable system will be installed in trenches. Other methods for cable installation such as trenchless techniques will be used as required to avoid or minimise potential impacts where constraints are identified, including watercourse crossings; • it is expected that the width of the cable construction corridor for surface trenching will be approximately 50m, increasing to 100m from the LSS to the grid connection. At any sensitive points identified along the route, the working

Development Element	Assumptions
	width of the temporary construction corridor will be reduced as far as practicable to avoid or minimise potential impacts.
Substation.	• the overall site footprint for the proposed LSS is anticipated to be up to 7 hectares (ha), and the exact location of the LSS will be refined through the EIA process; • a temporary construction compound and working area will be provided to facilitate the construction of the LSS.
O&M.	• maintenance activities will be undertaken for both preventive and corrective maintenance requirements; • the operational lifetime is assumed to be a maximum of 35 years.
Decommissioning.	• the decommissioning of the Project is anticipated to be restricted to the removal and reinstatement of the onshore substation site. Electrical cables will be left in situ onshore to minimise environmental impacts associated with removal.

8.2.7 Designed In Measures and Mitigation

8.2.7.1 As part of the Project design process, a number of designed in measures (primary and tertiary) will reduce the potential for impacts on water resource and flood risk (Table 8.26). As there is a commitment to implement these measures, they are considered inherent to the design of the MHPGC Project. The determination of magnitude and significance will assume the implementation of such measures. Some of these measures are considered standard industry practice for this type of development.

8.2.7.2 The requirement for any additional (secondary) mitigation measures will be dependent on the significance of the impacts on physical processes receptors. The requirement for and feasibility of any mitigation measures will be consulted upon with statutory consultees throughout the EIA process.

Table 8.26: Designed in Measures Proposed for Water Resources and Flood Risk

Reference Number	Designed in Measures	Justification	Primary or Tertiary
MM-19	Implementation of a Construction Environmental Management Plan (CEMP) to minimise temporary disturbance to residential properties, recreational users and existing land users and provide details of measures to protect environmental receptors.	To minimise disturbance of watercourses and associated habitats during construction.	P
MM-23	In areas (or during periods of adverse weather) there may be the requirement to import aggregates to create a stable surface for construction traffic movements. Options such as bog matting and geotextiles will be considered by the principal contractor for sensitive sections of the route to reduce impact.	To minimise ground disturbance and sediment loading of nearby watercourses during construction.	T
MM-24	The existing land drainage regime will not be compromised as a result of construction. Land drainage systems will be maintained during construction and reinstated on completion. Temporary cut-off drains will be installed parallel to the trench-line, before the start of construction, to intercept soil and groundwater before it reaches the trench. These field drains will discharge to local drainage ditches through silt traps, as appropriate, to minimise sediment release.	To minimise disturbance and sediment loading of watercourses during construction.	P
MM-25	Geotextiles or other membranes may be used to temporarily control and minimise erosion or transport of sediment from construction sites in areas that are considered unprotected.	To minimise ground disturbance and sediment loading of nearby watercourses during construction.	P
MM-26	Drainage design to manage and, if necessary, treat surface water run-off will be included in all elements of temporary and permanent infrastructure. Drainage design will follow the SuDS hierarchy with preference being given to local infiltration of surface water run-off from new areas of hardstanding, where	To minimise flood risk during O&M.	P

Reference Number	Designed in Measures	Justification	Primary or Tertiary
	possible. Where the MHPGC Project intersects overland flow pathways or areas of known surface water flooding appropriate measures will be embedded into the design.		
MM-27	All subsurface infrastructure will be designed to facilitate subsurface flow pathways to avoid any localised increases in groundwater flooding.	To minimise flood risk during O&M.	P
MM-28	Construction and permanent development in flood plains will be avoided wherever possible. Where this is not possible (for example, the landfall locations) environmental measures will be developed to ensure the works are NPS compliant, including a sequential approach to siting of infrastructure and passing the Exception Test and Sequential Test where appropriate.	To minimise flood risk during construction and O&M.	P
MM-29	Dewatering of excavations will be undertaken in line with good practice. Impacts of dewatering on potential receptors will be incorporated into the proposed approaches for each piece of infrastructure. Appropriate treatment will be installed before discharge to surface or groundwater. This will include the use of 'siltbusters' (or similar) before discharge to surface waters. Appropriate licences and permits will be applied for if required.	To minimise loss and/or pollution of water resource.	T
MM-30	Existing licensed abstractions and PWSs will be avoided where practicable; if any impacts are anticipated then appropriate measures will be put in place to avoid impact on the quantity and quality of the supply.	To minimise loss and/or pollution of water resource.	P
MM-49	Where practicable, sensitive sites will be avoided by the temporary and permanent onshore MHPGC Project footprint, including SSSIs, LNRs, LWSs, ancient woodland, areas of consented development, areas of historic landfill and other known areas of potential contamination, National Trust land, listed buildings and scheduled monuments.	To minimise disturbance of habitats and contaminated ground during construction, O&M and decommissioning.	P

Reference Number	Designed in Measures	Justification	Primary or Tertiary
MM-50	Where practicable micro-siting will be undertaken during detailed design to avoid water and other features.	To minimise disturbance of watercourses and associated habitats during construction and O&M.	T
MM-58	Trenchless installation methods will be used where practicable. Further work will be undertaken once the MHPGC Project has been defined in more detail to identify locations where the underground cable could be installed using trenchless installation methods. Trenchless methods will be used at the landfall.	To minimise disturbance of watercourses and associated habitats during construction.	P
MM-59	The onshore cable route will be completely buried underground for its entire length.	To minimise pollution and flood risk during O&M and decommissioning.	P
MM-60	At sensitive crossing locations the working width will be reduced as far as practicable.	To minimise disturbance of watercourses and associated habitats during construction.	P
MM-61	No blasting is anticipated to be required and trenchless crossings will be undertaken by non-impact methods.	To minimise disturbance of watercourses and associated habitats during construction.	P
MM-62	Where trenchless techniques are not required or are not practical, the crossing of drainage ditches or engineered channels may be achieved by open cut techniques or the installation of culverts or bridges to allow water to continue flowing. Where this is the case, this will be done in accordance with advice notes, guidance documents and EA PPGs. Appropriate environmental permits or land drainage consents will be applied for works from the EA (for Main Rivers,	To minimise pollution and disturbance of watercourses during construction.	T

Reference Number	Designed in Measures	Justification	Primary or Tertiary
	works on or near sea defences/flood defence structures or in a flood plain) or from the LLFA (for Ordinary watercourse crossings).		
MM-63	The onshore cable will be constructed in discrete sections. The trenches will be excavated, the cable ducts will be laid, the trenches backfilled, and the reinstatement process commenced.	To minimise ground disturbance and sediment loading of nearby watercourses during construction.	T
MM-64	The typical construction working area will be 50m along the onshore cable route and 100m from the LSS to the grid connection to minimise the construction footprint.	To minimise ground disturbance and sediment loading of nearby watercourses during construction.	P
MM-68	Target trench depth is 1.6m. Deeper trenches may be required at specific crossing locations (such as watercourses). In sensitive areas, the amount of topsoil removed will be the width of the trenches only rather than across the entire temporary construction corridor.	To minimise ground disturbance, pollution and flood risk during construction, O&M and decommissioning.	P
MM-72	During construction and O&M, refuelling of machinery will be undertaken within a designated area where spillages can be easily contained. Any tanks and pipework will be double skinned and provided with intermediate leak detection equipment. Areas at risk of spillage will be bunded and carefully sited to minimise the risk of hazardous substances entering the drainage system or local watercourses.	To minimise pollution and flood risk during construction and O&M.	T
MM-73	In line with good practice, pollution prevention plans (PPPs) will be drawn up to detail how groundwater and surface waters will be protected in construction, O&M and decommissioning. These will include information on the storage of any fuels, oils and other chemicals and pollution incidence response planning and	To minimise pollution during construction and O&M.	P

Reference Number	Designed in Measures	Justification	Primary or Tertiary
	measures for the protection of licensed abstractions and PWSs. This could include a monitoring regime associated with critical or very proximate receptors.		
MM-94	A Soil Management Plan will be implemented which will set out measures in accordance with current industry guidance for sustainable use of soils, including Defra (2009), Construction Code of Practice for the Sustainable Use of Soils on Construction Sites. In line with this guidance topsoil and subsoil will be stored in separate stockpiles. During construction topsoil and subsoil will be stored within the construction working corridor of the onshore export cable construction corridor. Any suspected or confirmed contaminated soils will be separated, contained and tested to allow a suitable use or disposal route for these soils to be identified to minimise the risk of cross contamination, of dust migration from stockpiles, or contaminated run-off/leachate from stockpiles impacting adjacent ground or nearby watercourses.	To facilitate ground restoration and minimise pollution following construction.	P
MM-95	A Soil Management Plan will be implemented which will set out measures in accordance with current industry guidance for sustainable use of soils, including Defra (2009), Construction Code of Practice for the Sustainable Use of Soils on Construction Sites. In line with this guidance, post construction, the construction work areas (including temporary construction compounds and laydown areas) will be reinstated to pre-existing condition as far as reasonably practicable in line with Defra 2009 Code of Construction Practice (CoCP) for the Sustainable Use of Soils on Construction Sites PB13298.	To minimise disturbance of ground during O&M.	P

8.2.7.3 The designed-in measures will evolve over the development process as the EIA progresses and are proposed to reduce the potential for impacts on the water environment. They will be fed iteratively into the assessment process. These measures typically include those that have been identified as good or standard practice and include actions that will be undertaken to meet existing legislation requirements.

8.2.8 Proposed Assessment Methodology

Introduction

8.2.8.1 The proposed generic project-wide approach to the assessment methodology is set out in Chapter 4: EIA Methodology of the Scoping Report. However, whilst this has informed the approach that has been used in this Water Resources and Flood Risk chapter, it is necessary to set out how this methodology will be applied and adapted as appropriate to address the specific needs of the water environment assessment. Cumulative effects on the water environment resulting from the Project and other developments will also be assessed.

Significance Evaluation Methodology

8.2.8.2 The significance level attributed to each impact will be assessed based on the 'sensitivity' (value) of the affected receptor and the magnitude of change resulting from the development. The level of significance is then determined by the combination of value and magnitude.

8.2.8.3 Value will be assessed on a scale of high, medium, low and very low, whilst magnitude is assessed on a scale of high, medium, low and negligible. These criteria are defined and applied based on professional judgement, using recognised approaches to classification relevant to the receptor types, including WFD, the NPPF and the Design Manual for Roads and Bridges (DMRB), all of which represent good practice for water EIA.

Value of Receptors

8.2.8.4 Definitions of receptor value used in the assessment are provided in Table 8.27, with examples of receptors that will be placed in each class.

Table 8.27: Definitions of Receptor Value

Value	Criteria	Examples
High.	Features with a high yield, quality or rarity, with little potential for substitution.	Conditions supporting a site with an international conservation designation (e.g. SAC, SPA, Ramsar site), where the designation is based specifically on aquatic features. WFD surface water body (or part thereof) with overall Good status/potential. These are High status WFD surface water bodies associated with main 'blue line'

Value	Criteria	Examples
		(Environment Agency (2012))[12] watercourse (all smaller tributary watercourses are not on 'blue line'). WFD groundwater body (or part thereof) with overall Good status.
	Water use supporting human health and economic activity at a regional scale.	Regionally important public surface water or groundwater supply (and associated catchment/SPZ/Groundwater Management Unit (GWMU)). Large-scale permitted discharges e.g. city scale Wastewater Treatment Works (WWTW) treated effluent discharges.
	Features with a high vulnerability to flooding.	Land use type defined as 'Essential Infrastructure' (e.g. critical national infrastructure, such as essential transport and utility infrastructure) and 'Highly Vulnerable' (e.g. police/ambulance stations that are required to operate during flooding, mobile homes intended for permanent residential use) in Annexure 3 of the NPPF: flood risk vulnerability classification.
Medium.	Features with a medium yield, quality or rarity, with a limited potential for substitution.	Conditions supporting a site with a national conservation designation (e.g. SSSI, NNR), where the designation is based specifically on aquatic features. Any WFD surface water body with overall Moderate or lower status. WFD groundwater body (or part thereof) with overall Poor status.
	Water use supporting human health and economic activity at a local scale.	Local public surface water and groundwater supply (and associated catchment/SPZ/GWMU) or permitted discharge. Licensed non-public surface water and local groundwater supply abstraction (and associated groundwater catchment/SPZ/GWMU) which is relatively large relative to available resource, or where raw water quality is a critical issue, e.g. industrial process water, or medium scale permitted discharges e.g. town scale WWTW treated effluent discharges. Unlicensed potable surface water and groundwater abstraction (and associated catchment) where

[12] The WFD "blue line" network can be used to determine if a watercourse is significant. WFD reporting uses a river (blue) line within that catchment derived from the 'detailed river network'. This blue line is used as a reporting network and it is this river line that appears on maps in the RBMPs.

Value	Criteria	Examples
		alternative supply can't easily be provided e.g. PWS, well, spring or permitted discharge.
	Features with a moderate vulnerability to flooding.	Land use type defined as 'More Vulnerable' in Annexure 3 of the NPPF: flood risk vulnerability classification e.g. hospitals and health centres, educational institutions, most types of residential development.
Low	Features with a low yield, quality or rarity, with some potential for substitution.	Conditions supporting a site with a local conservation designation (e.g. LNR, County Wildlife Site (CWS)), where the designation is based specifically on aquatic features, or an undesignated but highly/moderately water-dependent site, including a LWS and a Groundwater Dependent Terrestrial Ecosystem (GWDTE). Non-reportable WFD surface water or groundwater body (or part thereof), or non-WFD water body, such as smaller tributary watercourses within the WFD waterbody not on main 'blue line' (for water bodies at Good status or below).
	Water use supporting human health and economic activity at household/individual business scale.	Licensed non-public surface water and groundwater supply abstraction (and associated catchment/SPZ/GWMU), which is relatively small relative to available resource, or where raw water quality is not critical, e.g. cooling water, spray irrigation, mineral washing or permitted discharge. Unlicensed potable surface water and groundwater abstraction (and associated catchment) e.g. PWS, well, spring or permitted discharge where alternative supply can be relatively easily provided.
	Features with a low vulnerability to flooding.	Land use type defined as 'Less Vulnerable' in Annexure 3 of the NPPF: flood risk vulnerability classification e.g. most types general industrial, commercial, and retail premises, car parks, mineral extraction sites, and buildings used for forestry and agriculture[13].

[13] National Planning Policy Framework - Annex 3: Flood risk vulnerability classification - Guidance - GOV.UK (www.gov.uk)

Value	Criteria	Examples
Very Low	Commonplace features with very low yield or quality with good potential for substitution.	Conditions supporting an undesignated and low water-dependent site, including a LWS, GWDTE, Local Geological Site (LGS), spring and pond. Small, artificial, or heavily modified watercourses with low habitat potential, e.g. agricultural, forestry or road side drainage ditches.
	Water use does not support human health, and of only limited economic benefit.	Unlicensed non-potable surface water and groundwater abstraction (and associated catchment) e.g. livestock supply. Small discharges exempt from permitting subject to adherence to general binding rules e.g. package plants from small residential developments or commercial premises in rural areas.
	Features that are resilient to flooding.	Land use type defined as 'Water-compatible development' in Annexure 3 of the NPPF: flood risk vulnerability classification e.g. flood control infrastructure; water transmission infrastructure) and undeveloped land (such as, rural land such as forestry and agricultural land that does not contain any built development).

Magnitude of Change

8.2.8.5 The magnitude of change from baseline conditions includes a consideration of the duration and reversibility of the change and relevant legislation, policy standards and guidance.

8.2.8.6 Table 8.28 provides examples of how various magnitudes of change will be determined with respect to water features. Magnitude of change may be either positive or negative. The criteria and examples in the table focus on negative changes, but positive changes may also occur and will be considered on a case by case basis as required.

Table 8.28: Definitions of Magnitude of Change

Magnitude	Criteria	Examples
High.	Results in complete loss or major change to feature, of sufficient magnitude to affect its use/integrity.	Deterioration in river flow regime, morphology or water quality, leading to sustained, permanent or long-term breach of relevant conservation objectives or non-temporary downgrading (deterioration) of WFD surface water body status (including downgrading of individual WFD elements), or resulting in the inability of the surface water body to attain Good status by the relevant deadline in line with the measures identified in the RBMP. Deterioration in groundwater levels, flows or water quality, leading to non-temporary downgrading of WFD groundwater body status, or the inability of the groundwater body to attain Good status in line with the measures identified in the RBMP. Complete or severely reduced water availability and/or quality, compromising the ability of water users to abstract. Change in flood risk resulting in potential loss of life or major damage to the property or infrastructure.
Medium.	Results in partial loss or noticeable change to feature, of sufficient magnitude to affect its use/integrity in some circumstances.	Deterioration in river flow regime, morphology or water quality, leading to periodic, short-term and reversible breaches of relevant conservation objectives, or potential temporary downgrading of surface water body status (including potential temporary downgrading of individual WFD elements), although not affecting the ability of the surface water body to achieve future WFD objectives. Deterioration in groundwater levels, flows or water quality, leading to potential temporary downgrading of WFD groundwater body status, although not affecting the ability of the groundwater body to achieve future WFD objectives. Moderate reduction in water availability and/or quality, which may compromise the ability of the water user to abstract on a temporary basis or for limited periods, with no longer term impact on the purpose for which the water is used.

Magnitude	Criteria	Examples
		Change in flood risk resulting in potential for moderate damage to the property or infrastructure.
Low.	Results in minor change to feature, with insufficient magnitude to affect its use/integrity in most circumstances.	Measurable effect on river flow regime, morphology or water quality, but remaining generally within conservation objectives, and with no short-term or permanent change to WFD surface water body status (of overall status or element status). Measurable effect on groundwater levels, flows or water quality, but with no short-term or permanent downgrading of WFD groundwater body status. Minor reduction in water availability and/or quality, but unlikely to affect the ability of a water user to abstract. Change in flood risk resulting in potential for minor damage to property or infrastructure.
Negligible.	Results in little or no change to feature, with insufficient magnitude to affect its use/integrity.	No measurable effect on river flow regime, morphology or water quality, and no consequences in terms of conservation objectives or surface water body status. No measurable effect on groundwater levels, flows or water quality, and no consequences in terms of WFD groundwater body status. No measurable change in water availability or quality and no change in ability of the water user to exercise licensed rights. Increased frequency of flood flows, but which does not pose an increased risk to property or infrastructure.

Significance

8.2.8.7 During the assessment of impacts for each identified receptor the value in Table 8.27 will be combined with the magnitude of change from Table 8.28 to produce an overall significance rating based on the evaluation matrix shown in Table 8.29. A 'significant' impact is assessed as a Major rating whereas a Moderate rating will be considered to be 'potentially significant' at this stage of the EIA process. The latter will be subject to further investigation as part of the EIA process following refinement of design information. This approach will be based on professional judgement and carried out on a precautionary basis.

Table 8.29: Significance Evaluation Matrix

Sensitivity of Receptor	Magnitude of Change			
	High	**Medium**	**Low**	**Negligible**
High	Major (Significant)	Major (Significant)	Moderate (Potentially significant)	Minor (Not significant)
Medium	Major (Significant)	Moderate (Potentially significant)	Minor (Not significant)	Negligible (Not significant)
Low	Moderate (Potentially Significant)	Moderate (Potentially significant)	Negligible (Not significant)	Negligible (Not significant)
Very Low	Moderate (Potentially significant)	Negligible (Not significant)	Negligible (Not significant)	Negligible (Not significant)

Proposed Approach to the EIA Process

Introduction

8.2.8.8 The proposed water environment approach for the EIA process is presented below.

Further Data Collation

8.2.8.9 The desk study baseline collated for scoping will be augmented during the EIA process by further data collections as detailed in Table 8.30.

Table 8.30: Further Third Party Baseline Information to be Collected as Part of the EIA Process

Data Owner	Data to be Requested
EA.	Site climate and rainfall data. Available river flow data and river level data. Surface water and groundwater discharge consents. Licensed abstractions. Hydrogeology groundwater level data and other available hydrogeological parameter data. Surface water and groundwater quality data. WFD measures for all water bodies. Flood mapping, records and modelling.
Local Authorities/LLFA.	PWS data in including available hydrogeological data (groundwater levels and water quality). Records of historical flooding.

8.2.8.10 In addition, a site walkover of the proposed cable routes and substation location will be undertaken to understand hydromorphology at key watercourse crossing points and to support the FRA. It is not currently anticipated that further data collection will be required to support the EIA process.

Stakeholder Engagement

8.2.8.11 Consultation will be held with relevant statutory and non-statutory organisations as necessary and as part of the Evidence Plan Process or the wider stakeholder engagement programme. This will include the EA and LLFA, and SCC as appropriate. Support will also be given to consultation lead by other aspects as required, for example this could include supporting terrestrial ecology consultation with Natural England. It is anticipated that this consultation will be ongoing to support both the EIA process.

Development of Site Specific Environmental Measures

8.2.8.12 The selection of the potential routes and substation location during the EIA process will involve the translation of some of the embedded environmental measures into site-specific measures associated with the micro-siting of infrastructure around flood plains, watercourses and abstractions (including groundwater SPZs). These measures will be developed in consultation with the wider environment team to ensure that the most appropriate environmental and technically feasible option for the proposed infrastructure is selected.

8.2.8.13 This exercise will result in the refinement of the proposed embedded environmental measures and the potential development of some location-specific measures as required to demonstrate how particularly sensitive receptors will be protected.

Undertaking Further Assessments

8.2.8.14 The EIA process will undertake assessments which address specific impacts on receptors and demonstrate how the development will comply with relevant legislation and guidance. These will include the following:

- an FRA which will discuss the potential risk from all sources of flooding and demonstrate how the Project will be compliant with the NPPF, including taking into account climate change allowances and explaining how the development satisfies the Sequential and Exception tests;
- an assessment of the potential impacts on WFD status and supporting elements (including hydromorphology, ecology, water quality and groundwater tests) for all WFD water bodies in the Water Resources and Flood Risk Assessment Study Area to demonstrate how the MHPGC Project will satisfy the requirements of the WFD and not cause derogation in status or prevent the achievement of Good status objectives;
- depending on the findings of the assessment of baseline conditions, a standalone assessment of the potential impacts on surface and groundwater abstractions (including groundwater SPZs and PWSs) and GWDTEs, to demonstrate how the MHPGC Project has been designed to avoid any significant impacts on these receptors; and

- an assessment of in-combination and cumulative effects on receptors (described later).

8.2.9 Potential Cumulative Impacts

8.2.9.1 Cumulative effects with the Morven Offshore Wind Array Project and the second grid connection project in the Branxton area Southeast Scotland will be considered, together with cumulative effects with other developments, where relevant.

8.2.9.2 The cumulative effect assessment will follow the approach outlined in Chapter 4: EIA Methodology.

8.2.10 Potential Inter-related Effects

8.2.10.1 The EIA will consider inter-related effects arising from the MHPGC Project, across their own phases (project lifetime) and different effects on one receptor in one phase (receptor led). The EIA will consider inter-related effects of multiple impacts from the construction, O&M and decommissioning phases of the MHPGC Project, affecting one receptor. Inter-related effects will be assessed through consideration of all effects on a receptor, considering both spatial and temporal overlap, within the MHPGC Project. This will ensure that the MHPGC Project is appropriately considered within the EIA and in line with Chapter 4: EIA Methodology.

8.2.11 Potential Transboundary Effects

8.2.11.1 There are no potential transboundary impacts from onshore water resource and flood risk from the MHPGC Project. This is due to any likely significant effects being experienced locally, rather than a wider geographic scale.

8.3 Terrestrial Ecology and Ornithology

8.3.1 Introduction

8.3.1.1 This chapter of the Scoping Report identifies the terrestrial ecology and ornithology receptors of relevance to the Morven Hawthorn Pit Grid Connection Project (hereafter referred to as 'MHPGC Project') and considers the potential impacts arising from the construction, operation and maintenance (O&M), and decommissioning of the MHPGC Project. This scoping chapter adopts a proportionate approach to only those impacts with potential to result in likely significant effects and therefore scopes out other impacts where there is evidence that the effects are not likely to be significant.

8.3.1.2 This chapter covers impacts associated with the onshore components of the MHPGC Project only and is therefore not applicable to Scotland.

8.3.1.3 The scope and approach to the assessment of potential likely significant impacts on offshore and intertidal ornithology is set out in Chapter 7.7: Offshore and Intertidal Ornithology.

8.3.1.4 The scope will be revised upon confirmation of the Landfall Option.

8.3.1.5 This chapter should be considered alongside the following Scoping Report chapters:

- Chapter 8.1: Ground Conditions and Contamination;
- Chapter 7.7: Offshore and Intertidal Ornithology;
- Chapter 8.2: Water Resources and Flood Risk;
- Chapter 8.4: Archaeology and Cultural Heritage;
- Chapter 8.5: Traffic and Transport;
- Chapter 8.6: Onshore Noise and Vibration;
- Chapter 8.7: Onshore Air Quality;
- Chapter 8.8: Land Use Tourism and Recreation;
- Chapter 9.1: Landscape and Visual Impact Assessment (LVIA).

8.3.2 Policy and Legislation

8.3.2.1 This section identifies the relevant legislation, policy and other documentation that will inform the assessment of likely significant impacts with respect to terrestrial ecology and ornithology. Further information on policies relevant to the Environmental Impact Assessment (EIA) and their status is provided in Chapter 2: Policy and Legislation.

Legislation

8.3.2.2 The relevant legislation for the assessment of biodiversity comprises:

Table 8.31: Legislation Relevant to Ecology and Ornithology

Legislation Description	Relevance to the Assessment
Convention on Wetlands of International Importance especially as Waterfowl Habitat 1971 (United Nations, 1994).	
The United Kingdom (UK) Government is a signatory to the Convention on Wetlands of International Importance 1972 ("the Ramsar Convention"). The Ramsar Convention provides for the listing of wetlands of international importance. UK Government policy is to give sites listed under this convention ("Ramsar Sites") the same protection as European sites and the national site network.	The MHPGC Project has the potential for impacts on internationally designated wetland sites covered by the Convention.
The Convention on the Conservation of European Wildlife and Natural Habitats 1979 (the 'Bern Convention') (Council of Europe, 1979).	
The principal aims of the Bern Convention are the conservation and protection of the wild plant and animal species (and the natural habitats thereof) listed in Appendices I and II of the Convention. It also seeks to increase cooperation between governments and to regulate the exploitation of species listed in Appendix III, which includes migratory fish species, cetaceans and pinnipeds.	The MHPGC Project has the potential for impacts on plant and animal species listed under Appendices I and II of the Convention.
The Convention on Migratory Species of Wild Animals 1979 (The Bonn Convention) (United Nations, 1979).	
Provides protection for endangered migratory species (listed in Appendix I) and their habitats. Appendix II species are those that have an unfavourable conservation status that require international agreements for their conservation and management. The legal requirement for the strict protection of Appendix I and Appendix II species is provided by the Wildlife & Countryside Act (1981) (UK Government, 1981).	The MHPGC Project has the potential for impacts on species listed under Appendices I and II of the Convention.
The Environment Act 2021 (UK Government, 2021).	
The Environment Act 2021 (passed in November 2021) translates aspects of the government's "A Green Future: Our 25 Year Plan to Improve the Environment" into legislation. The Environment Act will make it mandatory, once the relevant secondary legislation is passed pursuant to the Act, for Town and Country Planning Act	Legislation underpinning BNG requirements which are expected to become mandatory for Development Consent Order (DCO) projects in November 2025.

Legislation Description	Relevance to the Assessment
developments (subject to exemptions) to deliver a 10% Biodiversity Net Gain (BNG). A legal requirement for Nationally Significant Infrastructure Projects (NSIPs) consented under the Planning Act 2008 to deliver a biodiversity net gain commitment is expected to come into force in November 2025.	The Act strengthens the duty on public bodies to conserve and enhance biodiversity in discharging their duties (including planning controls).
The Conservation of Habitats and Species Regulations 2017 (the Habitat Regulations) (UK Government, 2017a).	
The Habitat Regulations transpose Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (the Habitats Directive) and elements of Directive 2009/147/European Commission (EC) on the conservation of wild birds ('the Birds Directive') in England. These aim to protect biodiversity through the conservation of natural habitats and species of wild fauna and flora. These regulations provide for the designation and protection of 'European sites', the protection of 'European protected species', and the adaptation of planning and other controls for the protection of European Sites. The regulations are amended by the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 (UK Government, 2019) following the UK's withdrawal from the European Union (EU). These changes allow for new administrative and regulatory arrangements and the creation of a national site network comprising the protected sites already designated under the Nature Directives, and any further sites designated under these regulations.	The MHPGC Project has the potential for impacts on designated sites and protected species covered by the Regulations. The MHPGC Project has the potential to require protected species mitigation which is licensable under the Regulations.
The EU Water Framework Directive (2000/60/EC) (WFD) as enacted into domestic law by the Water Environment (Water Framework Directive) (England and Wales) (Amendment) Regulations 2017 (UK Government, 2017b).	
The Water Framework Directive (WFD) originates from the EU but has been retained in UK law following the UK withdrawal from the EU. A fundamental requirement of the WFD is to attain 'Good Ecological Status', or 'Good Ecological Potential' within each defined water body by December 2027 at the latest and to ensure that any deterioration in status is prevented.	The MHPGC Project has the potential for impacts on freshwater features covered by the Directive.

Legislation Description	Relevance to the Assessment
The Eel (England and Wales) Regulations 2009 (UK Government, 2009).	
Includes legal provisions to avoid actions that impede/obstruct eel migration/passage.	The MHPGC Project has the potential for impacts on species (eel) covered by the Regulations.
Natural Environment and Rural Communities (NERC) Act 2006 (UK Government, 2006).	
The NERC Act places a duty on the Secretary of State to maintain lists of species and habitats which are regarded as being of principal importance for the conservation and enhancement of biodiversity in England. These habitats of principal importance (HPI) and species of principal importance (SPI) are used to guide decision makers in implementing their duties to have regard to the conservation of biodiversity in England when carrying out their normal functions.	The Act underpins lists of HPI and SPI which include species and habitats that could be impacted by the MHPGC Project. The Act places a duty on public bodies to conserve and enhance biodiversity in discharging their duties (including planning controls).
Countryside and Rights of Way Act 2000 ('the CRoW Act') (UK Government, 2000).	
Details further measures for the management and protection of Sites of Special Scientific Interest (SSSI) and strengthens wildlife enforcement legislation.	The MHPGC Project has the potential for impacts on designated sites and wildlife covered by the Act.
The Hedgerow Regulations 1997 (UK Government, 1997).	
Legislation that protects 'important' hedgerows from damage or destruction.	The Regulations include criteria which will be used to identify presence of important hedgerows. The MHPGC Project has the potential for impacts on important hedgerows covered by the Regulations.
Protection of Badgers Act 1992 (UK Government, 1992).	
Provides legal protection for badgers (*Meles meles*) by making it illegal to kill or injure a badger, disturb a badger whilst occupying a sett, or to damage or obstruct a badger sett.	The MHPGC Project has the potential for impacts on species (badger) covered by the Act. The MHPGC Project has the potential to require badger mitigation which is licensable under the Act.

Legislation Description	Relevance to the Assessment
Wildlife and Countryside Act (WCA) 1981 (UK Government, 1981).	
The WCA 1981 is a principal mechanism for the legislative protection of wildlife in England. This legislation is part of a suite of legislation which implements the Convention on the Conservation of European Wildlife and Natural Habitats (the Bern Convention) and the European Union Directives on the Conservation of Wild Birds (2009/147/EC) ('the Birds Directive') and Natural Habitats and Wild Fauna and Flora (92/43/EEFC) (the Habitats Directive) in England.	The MHPGC Project has the potential for impacts on designated sites and species covered by the Act. The MHPGC Project has the potential to require protected species mitigation which is licensable under the Act.
Salmon and Freshwater Fisheries Act 1975 (SAFFA) (UK Government, 1975).	
SAFFA covers regulation of fisheries in England and Wales and includes legislation that restricts the introduction of polluting effluents, the obstruction of fish passage (screens, dams, weirs, culverts etc.), illegal means of fishing, permitted times of legal fishing and fishing licensing (which covers electric fishing).	The MHPGC Project has the potential for impacts on species (e.g. migratory fish) covered by the Act.
The Environmental Targets (Biodiversity) (England) Regulations 2023 (UK Government, 2023).	
Sets out legally binding targets to protect the environment, improve air and river quality, and boost nature. With reference to freshwater and marine biodiversity; Atlantic salmon *Salmo salar*, brown trout *Salmo trutta*, European eel *Anguilla anguilla*, and white-clawed crayfish *Austropotamobius pallipes* are listed as priority species in the framework.	The MHPGC Project has the potential for impacts on species for which there are conservation targets to reverse decline under the Regulations.

Policy

International

8.3.2.3 International policy relevant to the onshore elements of the MHPGC Project is presented in Table 8.32.

Table 8.32: International Policy

Policy Description	Relevance to the Assessment
Habitats Regulations (UK Government, 2017a).	
The Council Directive 92/43/EEC (The Habitats Directive) entered into force in 1992 in the EU and aimed to maintain or restore natural habitats and species of importance	The MHPGC Project has the potential for impacts on designated sites and protected species covered by the Regulations.

Policy Description	Relevance to the Assessment
(listed) to within a favourable conservation status (FCS). The other regulations which transpose into UK and Scottish Law the requirements of the Habitats and Bird Directives and are of relevance to the project, are listed below, and are hence referred to as the 'Habitats Regulations'. • The Conservation of Offshore Habitats and Species Regulations 2017; • The Conservation of Habitats and Species Regulations 2017 . These requirements of the Habitats Regulations are met in the consenting process through the use of Habitat Regulations Assessment (HRA), which requires a project to demonstrate, using evidence, that there will be no Adverse Effects on the Integrity on the overall ecological coherence of the national site network (previously referred to as European sites). The sensitive sites (hosting habitats and species of value) include: • Special Area of Conservation (SAC): designated for Annex 1 habitats; • Special Protection Area (SPA): designated for the protection of valued bird species. Ramsar Sites, which are not explicitly covered by the regulations, but must still be included in the process, owing to National Planning Policy framework guidance.	HRA would be undertaken where relevant in line with the requirements of the Regulations. The MHPGC Project has the potential to require protected species mitigation which is licensable under the Regulations.
European Protected Species Legislation	
European Protected Species (EPS) are animals and plants listed in Annex IV of the Habitats Directive, which are afforded protection under the Habitats Regulations. If an activity is likely to have a risk of disturbance or injury to an EPS, under law, a licence is required. These licences are often sought after consent and prior to construction, where detail of the project design is known, and the actual risk can be more accurately defined.	The MHPGC Project has the potential for impacts on EPS, which may require licensable mitigation under the associated Regulations.

National

8.3.2.4 National policy relevant to the MHPGC Project is shown in Table 8.33.

Table 8.33: National Policy

Policy	Context
Overarching NPS for Energy EN-1 (DESNZ, 2023c).	Paragraph 4.3.20: States the Secretary of State must have regard to the ambitions, goals and targets set out in the Government's Environmental Improvement Plan 2023 for improving the natural environment, including the achievement of 13 legally binding targets for England set under the Environment Act (e.g. biodiversity, tree and woodland cover). Section 4.6: Discusses Environmental and BNG. Paragraph 4.6.2 states "Projects in England should consider and seek to incorporate improvements in natural capital, ecosystem services and the benefits they deliver when planning how to deliver biodiversity net gain". Section 4.6 also notes that Schedule 15 of the Environment Act 2021 contains provisions which, when commenced, mean the Secretary of State may not grant an application for a DCO unless satisfied that a biodiversity gain objective is met. Section 5.4: Discusses the generic biodiversity conservation effects, mitigation, and need to protect the most important biodiversity conservation interests including statutory and non-statutory sites, habitats and species. This section also describes the following: • Habitat Regulations: The highest level of biodiversity protection is afforded to sites identified through international conventions. • SSSIs: For development considered likely to have an adverse effect on a SSSI, consent should not normally be granted, unless the benefits clearly outweigh the impact; • Regional and Local sites: National planning policy expects policies to secure their protection from harm or loss and enhance ecological connection. Given the need for new nationally significant infrastructure, these should not be used in themselves to refuse consent; • Ancient woodland, ancient trees, veteran trees and other irreplaceable habitats: Government policy commits to maintain and enhancing irreplaceable habitat which should not result in loss or deterioration unless outweighed by the benefits and a suitable compensation strategy exists; • Protection and enhancement of habitats and species: Consent is only granted where there is an overriding public interest and other relevant legal tests are met.

Policy	Context
Renewable Energy Infrastructure EN-3 (DESNZ, 2023a).	Paragraph 2.3.6: States that any significant adverse effects on the qualities for which the area has been designated are clearly outweighed by the urgent need for this type of infrastructure; Paragraph 2.4.8: States that any necessary land-side infrastructure will be appropriately resilient to climate change induced weather phenomena; Paragraph 2.8.119 States: An assessment of the effects across the intertidal/coastal zone should demonstrate compliance with mitigation measures and include information, where relevant, about: • Any alternative landfall sites that have been considered by the applicant during the design phase and an explanation for the final choice; • Any alternative cable installation methods that have been considered by the applicant during the design phase and an explanation for the final choice; • Potential loss of habitat; • Disturbance during cable installation, maintenance/repairs and removal (decommissioning); • Potential risk from invasive and non-native species; • Predicted rates at which the intertidal zone might recover from temporary effects, based on existing monitoring data; • Protected sites; • Paragraph 2.8.214 states: At the earliest possible stage, alternative ways of working should be employed to avoid environmental impacts. Where impacts cannot be avoided, measures to reduce and mitigate impacts should be employed.
Electricity Networks Infrastructure EN-5 (DESNZ, 2023b).	Paragraph 2.2.10 states: Applicants must take into account Schedule 9 to the Electricity Act 1989 to preserve natural beauty, conserve flora and fauna and mitigate as is reasonable. In formulating proposals for new electricity networks infrastructure Applicants should "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." Paragraph 2.5.1 states: Electricity networks infrastructure can allow for excellent opportunities to: i.e. reconnect important habitats via green corridors, biodiversity stepping zones, and reestablishment of appropriate hedgerows. Paragraph 2.9.25 states: In such cases the Secretary of State should only grant development if they are satisfied that the benefits accruing from the former proposal clearly outweigh any environmental impacts that it presents, the mitigation hierarchy has been followed, and that any technical obstacles associated with it are surmountable.

Local

8.3.2.5 The MHPGC Project is located within the County Durham and Sunderland City Council areas and is considered alongside the following local policy shown in Table 8.34.

Table 8.34: Local Policy

Legislation	Legislative Context
County Durham.	
County Durham Plan 2020-2035 (Durham Local Plan) (Durham County Council, 2020).	The Durham Local Plan is the overarching statutory development plan for County Durham: • Policy 27: States Proposals will be permitted for new or extensions to existing energy generation, utility transmission facilities, telecommunication masts or other broadcast and broadband equipment which facilitate the electronic transfer of data where it can be demonstrated that the scheme will not cause significant adverse impacts or that its benefits outweigh any adverse negative effects; • Policy 37: States 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, as defined on the policies map, or that have the potential to individually or cumulatively impact on their setting must only be undertaken on the basis of maintaining and enhancing its environmental capital in accordance with the principles of the Marine Policy Statement and other principles of sustainable development; • Policy 41: States proposals for new development will not be permitted if significant harm to biodiversity or geodiversity resulting from the 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,; • Policy 42: States development that has the potential to have an effect on internationally designated site(s), (including all development within 0.4 kilometres of the sites, as shown on Map B of the policies map document), 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;

Legislation	Legislative Context
	• Policy 43: States in all cases where development impacts adversely on a national or local designated site (i.e. SSSI, National Nature Reserve (NNR), Local Nature Reserve (LNR), Local Wildlife Site (LWS)), 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.
County Durham Landscape Strategy (Durham County Council, 2008).	The County Durham Landscape Strategy covers the broad issues of climate change, biodiversity, geodiversity, cultural heritage, tranquillity and green infrastructure. The biodiversity objectives aims are to: • support and encourage the conservation and enhancement of biodiversity; • promote and develop a landscape scale approach to biodiversity in County Durham; • promote an integrated approach to action on landscape and biodiversity and particularly through the use of Natural Area Partnerships; • secure a 'positive audit' for biodiversity in new development; and • promote biodiversity in landscape design; • The overarching aims are: - conserve and enhance the character and diversity of the Durham Landscape; - make development and land management more sustainable by helping to ensure that they respect the character of the landscape and contribute towards wider environmental objectives; - support and complement other environmental strategies to help promote co-ordinated action on the environment.
Sunderland City Council.	
Sunderland Core Strategy and Development Plan 2015 – 2033 (Sunderland Local Plan) (Sunderland City Council, 2023).	The Sunderland Local Plan includes local policies for development management purposes over the period from 2015 to 2033: • Policy NE1: To maintain and improve the Green Infrastructure Network through enhancing, creating and managing multifunctional greenspaces and bluespaces

Legislation	Legislative Context
	that are well connected to each other and the wider countryside; • Policy NE2: States where appropriate, development must demonstrate how it will provide net gains in biodiversity and avoid (through locating on an alternative site with less harmful impacts) or minimise adverse impacts on biodiversity and geodiversity in accordance with the mitigation hierarchy; • Policy NE3: States that significant trees, woodlands and hedgerows should be conserved where feasible.
Wildlife Corridors Network Review (Burton Reid Associates, 2020).	The Wildlife Corridors Network Review covers Gateshead Council, South Tyneside Council and Sunderland City Council. The Wildlife Corridors Networks are consistent with national planning policy and Networks Evidence Handbook (Natural England, 2020) and overlap with the Sunderland Local Plan (Sunderland City Council, (2023) The pertinent policies are: • Policy EA3: To optimise conditions for wildlife, implement the Durham Biodiversity Action Plan and tackle habitat fragmentation through: - securing and enhancing the integrity of designated sites; - maintaining, enhancing, restoring and adding to biodiversity and geological conservation interests; - ensuring that new development would result in not net loss of biodiversity to priority habitats (as named within the policy document); - reduce the fragmentation of, improve or extend existing priority habitats; - protect and strengthen populations of priority or other protected species; and - enhance the biodiversity value of wildlife corridors. • Policy DM7: To protect and enhance the important environmental assets of the borough. All proposals for development: - must ensure that any individual or cumulative detrimental impacts on sites are avoided; - will only be permitted where they would not adversely affect the integrity, natural character or biodiversity and geodiversity value of sites including statutory sites and wildlife corridors.

8.3.3 Study Area

8.3.3.1 The Terrestrial Ecology and Ornithology Study Area incorporates the onshore environment of the MHPGC Project Scoping Boundary (Figure 8.12) including an appropriate buffer(s) (see Table 8.35) up to Mean High Water Spring (MHWS). The Terrestrial Ecology and Ornithology Study Area does not incorporate any areas below MHWS. Impacts affecting ornithological receptors and benthic receptors in the intertidal area are addressed in Chapter 7.7: Offshore and Intertidal Ornithology of the Scoping Report, and Chapter 6: Intertidal and Subtidal Benthic Ecology, of the Scoping Report, respectively.

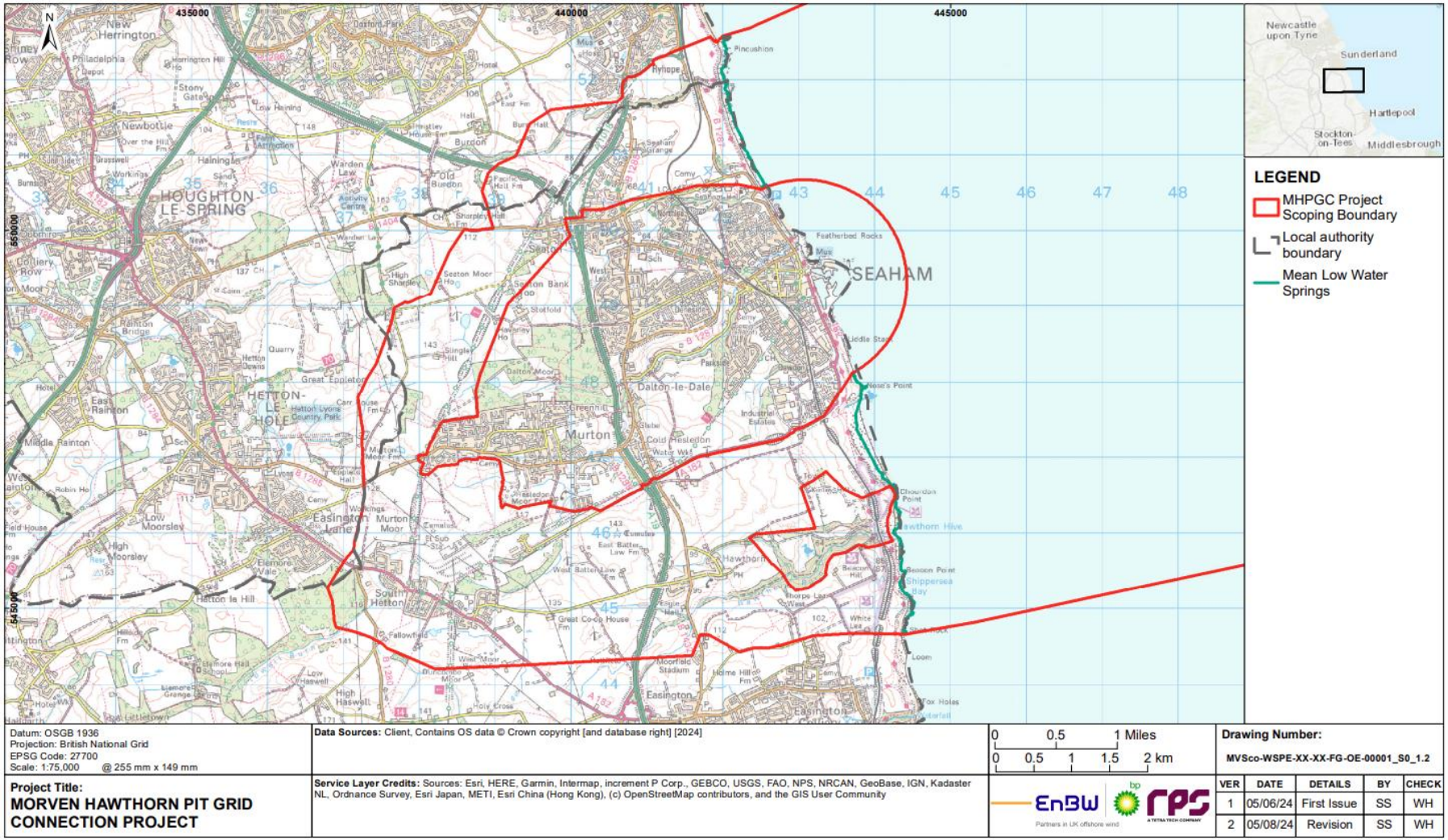


Figure 8.12: Morven Hawthorn Pit Grid Connection Project Scoping Boundary

8.3.3.2 The Terrestrial Ecology and Ornithology Study Area, with regard to biodiversity, is defined as the area in which impacts arising from construction and/or operation could lead to significant effects on ecological features. For the purpose of this assessment, it is necessary to apply several Terrestrial Ecology and Ornithology Study Areas of varying sizes depending on the ecological feature under assessment and, in most cases, these will extend beyond the MHPGC Scoping Boundary itself. These will hereafter be referred to as 'Zones of Influence' (ZoI) for each feature (CIEEM, 2017).

8.3.3.3 The ZoI, summarised in Table 8.35, are considered appropriate based upon professional experience in biodiversity assessment and current best practice guidelines, in relation to the potential for the activities and changes from the construction, O&M and decommissioning of the MHPGC Project to have direct and indirect effects on designated nature conservation sites, habitats and protected and notable species. The ZoI may be subject to refinement later in the project lifecycle as the biodiversity assessment progresses and further information becomes available such as survey results, project details and design development, and consultation feedback, then.

Table 8.35: Biodiversity Zones of Influence

Feature	Zone of Influence[14] (inclusive of the MHPGC Project Scoping Boundary)	Details of Zone of Influence
Statutory designated sites of international importance (SAC, SPA and Ramsar sites).	Within 20km of the MHPGC Project Scoping Boundary.	The ZoI reflects the potential for bird species which are qualifying features of a designated site to depend on functionally linked land located a distance beyond the designated site boundary.
Statutory designated sites of international importance for freshwater species.	Within 10km of the MHPGC Project Scoping Boundary.	The ZoI is industry standard.
Statutory designated sites of national and local importance (SSSI, LNR and NNR).	Within 2km of the MHPGC Project Scoping Boundary.	The ZoI is in line with guidance from the Institute of Environmental Assessment (1995).

[14] The Zones of Influence end at the mean high water springs.

Feature	Zone of Influence[14] (inclusive of the MHPGC Project Scoping Boundary)	Details of Zone of Influence
Statutory designated sites of national and local importance where bats are an interest feature.	Within 10km of the MHPGC Project Scoping Boundary.	The ZoI reflects the potential for effects on mobile species which a site is designated for, for example reflecting the Core Sustenance Zones of bat species in line with guidance from the Bat Conservation Trust (Collins, 2023).
Statutory designated sites of national and local importance where birds are an interest feature.	Within 10km of the MHPGC Project Scoping Boundary.	The ZoI reflects the potential for bird species which are qualifying/assemblage bird features of a designated site to use potentially functionally linked land outside the designated site boundary.
Non-statutory designated sites (LWS).	Within 2km of the MHPGC Project Scoping Boundary.	The ZoI is in line with guidance from the Institute of Environmental Assessment (1995).
Habitats of Principal Importance and woodland/trees listed on the Ancient Woodland Inventory (AWI[15]) and Ancient Tree Inventory (ATI[16]).	Within 1km of the MHPGC Project Scoping Boundary.	The ZoI reflects the potential mechanisms for effects on habitats distant from the MHPGC Project, such as fragmentation of habitat, pollution incidents and changes in air quality.
Historic EPS licences granted.	Within 2km of the MHPGC Project Scoping Boundary.	The ZoI is in line with guidance from the Institute of Environmental Assessment (1995).

[15] The ancient woodland inventory in England lists areas over two hectares in size which have been continuously wooded since at least 1600.

[16] The ATI is a database of ancient and veteran trees administered by the Woodland Trust and is not a definitive database for these features. (online) available at https://ati.woodlandtrust.org.uk/

Feature	Zone of Influence[14] (inclusive of the MHPGC Project Scoping Boundary)	Details of Zone of Influence
Mapped waterbodies[17] and watercourses.	Within 250m of the MHPGC Project Scoping Boundary.	Waterbodies and watercourses may support legally protected species such as great crested newts and otter: in the great crested newt and otter area of search defined in Table 8.47.
Habitats (others).	Within 50m of the MHPGC Project Scoping Boundary.	The ZoI is extended beyond the MHPGC Project boundary to reflect the potential for effects (directly or indirectly) to off-site habitats and species included within the scope of the survey. This was determined based on a combination of best practice guidance and professional judgement.
Protected and notable species.	Various (detailed paragraph 8.3.5.13).	

8.3.4 Data Sources

Data Gathering Methodology

Desk Study Methodology

8.3.4.1 To inform this scoping process, a desk study has been undertaken for the MHPGC Project Scoping Boundary and wider ZoI (see Table 8.36) following best practice guidelines (Chartered Institute of Ecology and Environmental Management (CIEEM) (2018, updated 2019); CIEEM (2017); BSI Group (2013); British Standards Institute (2012); Natural England (2023); Natural England and Forestry Commission (2022); Planning Inspectorate (2022); Planning Inspectorate (2017); Department of Environment, Food and Rural Affairs (Defra) and Environment Agency (2023); CIRIA (2001); Environment Agency (2017a) and NASCO (2020)) in March 2024. Table 8.36 details the data gathered and the sources of desk study information.

[17] In this chapter waterbodies are defined as ditches, ponds and lakes. The WFD uses slightly different terminology to define features of the water environment which are explained in Paragraph 8.3.5.10.

Table 8.36: Desk Study Data and Sources of Information

Title	Source	Year	Author(s)
Statutory designated sites of international, national, and local importance.			
Multi-Agency Geographic Information for the Countryside.	Available at: https://magic.defra.gov.uk/MagicMap.aspx.	2024	• Department for Environment, Food and Rural Affairs; • Historic England; • Natural England; • Environment Agency; • Forestry Commission; • Marine Management Organisation.
UK Protected Areas.	Available at: http://jncc.defra.gov.uk/page-4.	2022.	Joint Nature Conservation Committee (JNCC).
Information on protected areas and designated sites.	Available at: https://designatedsites.naturalengland.org.uk/.	2024.	Natural England.
Non-statutory designated sites.			
Non-statutory designated sites.	Available at: https://ericnortheast.org.uk/	2024.	Environmental Records Centre North East (ERIC).
Habitats of Principal Importance and other conservation notable habitats including ancient woodland/trees.			
Habitats of Principal Importance.	Available at: https://ericnortheast.org.uk/.	2024.	ERIC.
Multi-Agency Geographic Information for the Countryside.	Available at: https://magic.defra.gov.uk/MagicMap.aspx.	2024.	• Department for Environment, Food and Rural Affairs; • Historic England; • Natural England; • Environment Agency;

Title	Source	Year	Author(s)
			• Forestry Commission; • Marine Management Organisation.
Ancient Tree Inventory.	Available at: https://ati.woodlandtrust.org.uk/.	2024.	Ancient Tree Inventory (ATI[18]).
Historic EPS licences granted and great crested newt (GCN) (*Triturus cristatus*) survey licence returns.			
Multi-Agency Geographic Information for the Countryside.	Available at: https://magic.defra.gov.uk/MagicMap.aspx.	2024.	• Department for Environment, Food and Rural Affairs; • Historic England; • Natural England; • Environment Agency; • Forestry Commission; • Marine Management Organisation.
Legally protected species, SPIs or other conservation notable species, including invasive non-native species (INNS).			
Records of legally protected species, SPIs or other conservation notable species, including INNS.	Available at: https://ericnortheast.org.uk/.	2024.	ERIC. Key species records that are returned from ERIC and dated within the last ten years[19] within 2km of the MHPGC Project Scoping Boundary.

[18] The ATI is a database of ancient and veteran trees administered by the Woodland Trust and is not a definitive database for these receptors. (online) available at https://ati.woodlandtrust.org.uk/

Title	Source	Year	Author(s)
The Bird Atlas 2007-11: the breeding and wintering birds of Britain and Ireland.	Balmer, D.E, Gillings, S., Caffrey, B.J., Swann, R.L., Downie, I.S. & Fuller, R.J. (2013). The Bird Atlas 2007-11: the breeding and wintering birds of Britain and Ireland. BTO Books, Thetford, UK.	2013.	Balmer *et al*., 2013.
Mapped waterbodies and watercourses.			
Multi-Agency Geographic Information for the Countryside.	Available at: https://magic.defra.gov.uk/MagicMap.aspx.	2024.	• Department for Environment, Food and Rural Affairs; • Historic England; • Natural England; • Environment Agency; • Forestry Commission; • Marine Management Organisation.
Google Earth Pro.	Google Earth Pro 7.3.3.7721 (64-bit). (Computer program). Google; California, USA.	2021.	Google.
Ordnance Survey (OS) mapping.	Ordnance Survey (2021). Ordnance Survey Maps 3.3.0.900 (Computer program). Ordnance Survey; Southampton, UK.	2021.	OS.
Catchment Data Explorer.	Available at: https://environment.data.gov.uk/catchment-planning	2023.	Environment Agency.

Title	Source	Year	Author(s)
Freshwater species, including legally protected or other conservation notable species and INNS.			
EA Ecology and Fish Data Explorer.	Available at: https://environment.data.gov.uk/ecology/explorer/.	2024.	Department for Environment, Food and Rural Affairs and Environment Agency.

Field Survey Methodology

8.3.4.2 Table 8.37 details the preliminary surveys undertaken to date, which have informed the initial scoping process. A list of likely further surveys that may be required, together with scope and reference to good practice guidance, is provided at the end of this chapter (Table 8.47).

Table 8.37: Preliminary Surveys Undertaken

Survey	Summary	Coverage of Terrestrial Ecology and Ornithology Study Area
Preliminary site walkover.	An initial site walkover was undertaken during March 2023 to give an indication of the habitat types present and their suitability to support sensitive ecological features and to identify further detailed baseline surveys which may be required to inform the MHPGC Project (see Table 8.47).	The survey was undertaken within publicly accessible areas within the MHPGC Project Scoping Boundary and provided partial coverage.
Non-breeding season bird surveys.	Non breeding walkover surveys were undertaken between October 2023 and March 2024, focusing on waders, wildfowl and farmland birds using open farmland and coastal habitats. This involved twice-monthly visits using a protocol aligned to the Common Bird Census (CBC) methodology (see Table 8.47).	Where access permitted, surveys covered the MHPGC Project Scoping Boundary plus a 250m buffer.
Breeding season bird surveys.	A six-visit breeding bird survey was undertaken between April and June 2023 using an adapted version of the CBC methodology, as detailed in best practice guidance (Gilbert *et al.*, 1998; Marchant, 1983), walking three predefined transects that provided representative coverage of the ZoI.	Where access permitted, surveys covered the MHPGC Project Scoping Boundary plus a 100m buffer.

Survey	Summary	Coverage of Terrestrial Ecology and Ornithology Study Area
	For the MHPGC Project, a six-visit approach is considered sufficient to characterise the breeding bird assemblage (see Bird Survey & Assessment Steering Group (2023) guidance). Results of intertidal surveys as reported in Chapter 7.7: Offshore and Intertidal Ornithology, of the Scoping Report will be considered as part of the EIA process.	

8.3.5 Baseline Environment

Existing Baseline

8.3.5.1 The desk study identified multiple internationally and nationally designated sites within the ZoI which are shown in Figure 8.13, Figure 8.14 and described in Table 8.38 and Table 8.39.

8.3.5.2 The desk study identified multiple nationally designated sites within 2km of the MHPGC Project Scoping Boundary, extended to 10km of the MHPGC Project Scoping Boundary where the designated site has bat interest and/or ornithological interest. Those nationally designated sites with biodiversity features are shown on Figure 8.13, Figure 8.14 and detailed within Table 8.39.

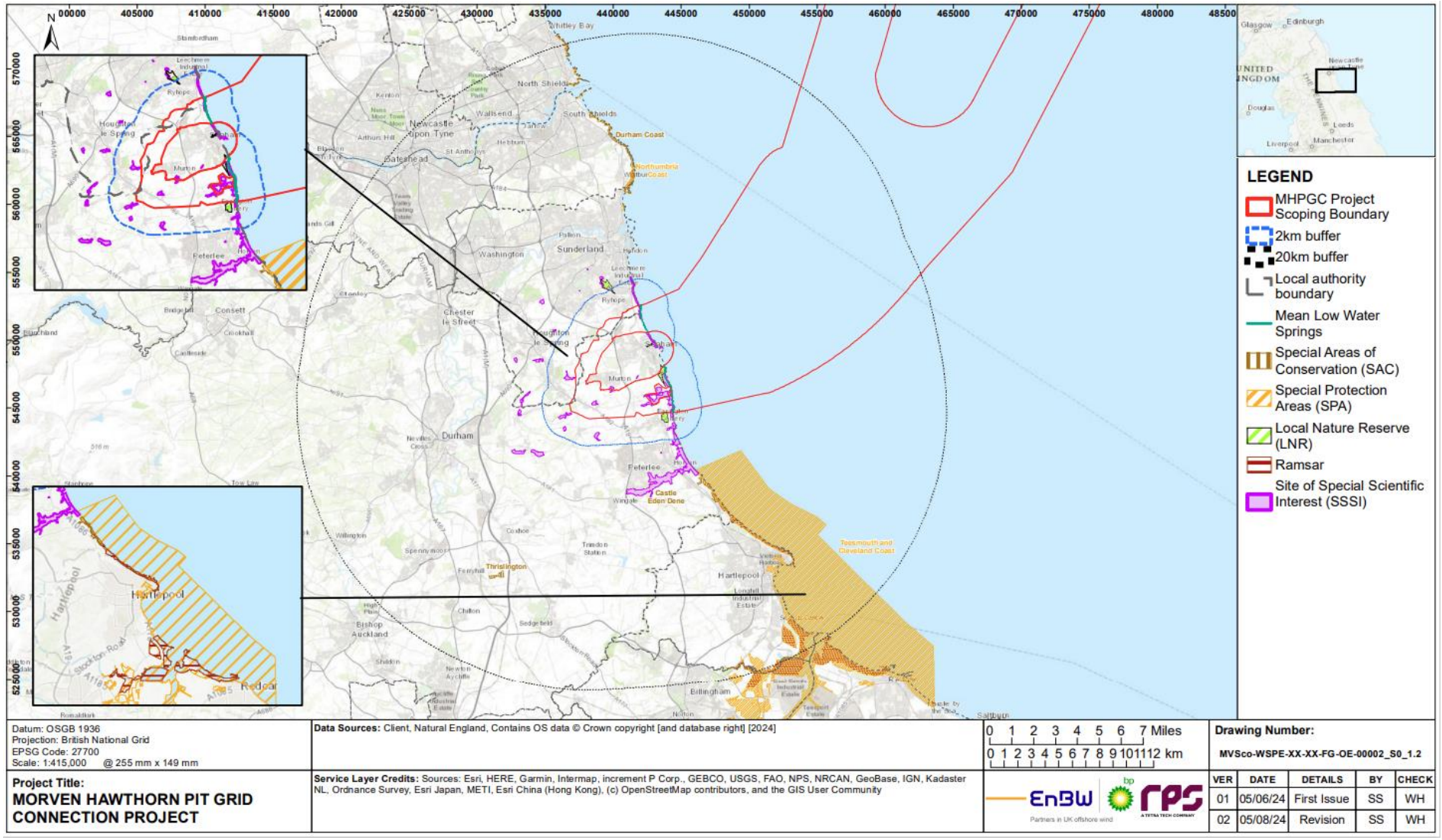


Figure 8.13: Statutory Designated Sites (20km Zone of Influence)

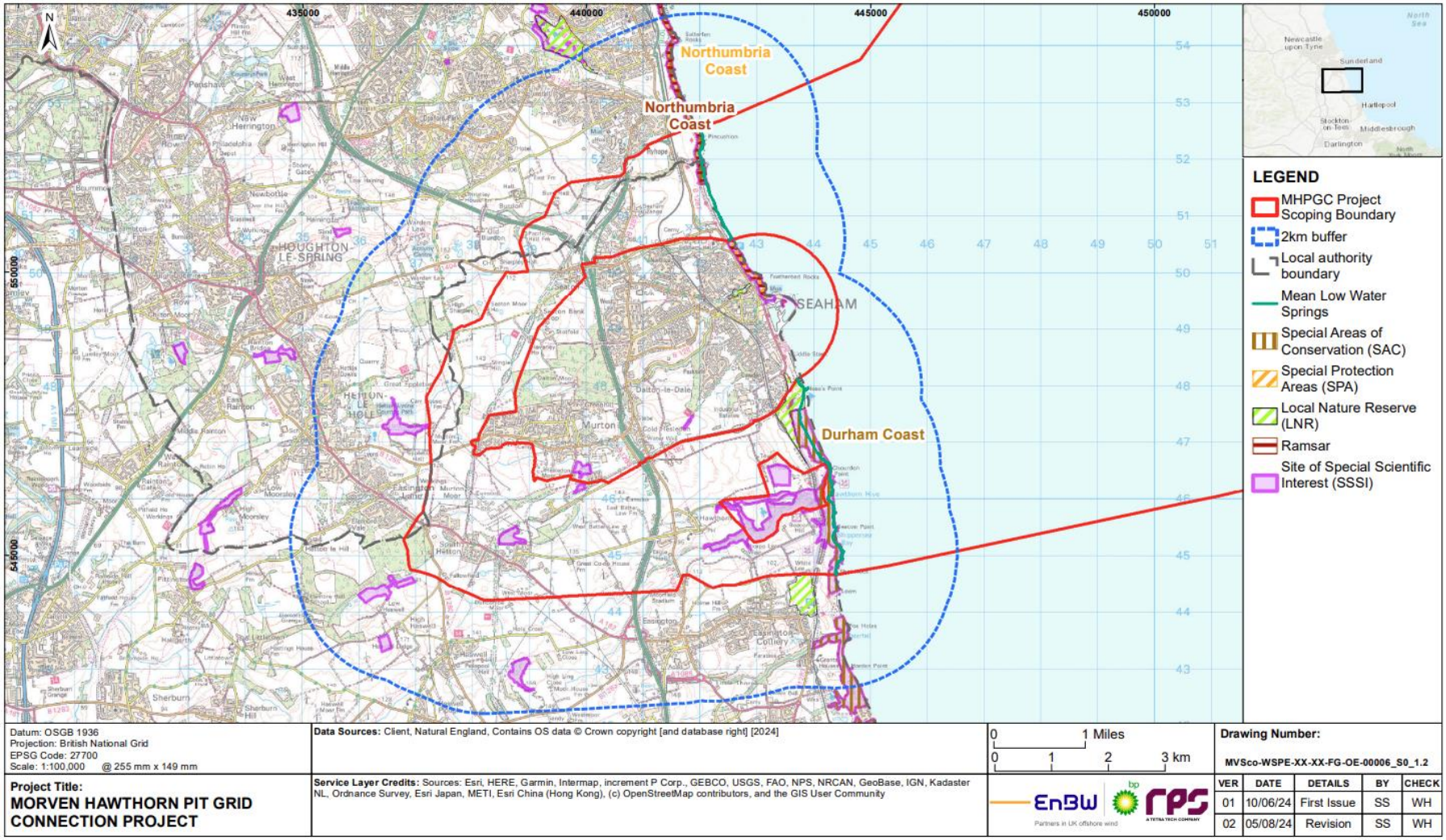


Figure 8.14: Statutory Designated Sites (2km Zone of Influence)

Designated Sites

Table 8.38: Internationally Designated Sites Within 20km of the Morven Hawthorn Pit Grid Connection Project Scoping Boundary

Site Name	Designated Feature Summary	Distance and Direction from MHPGC Project Scoping Boundary
Durham Coast SAC.	The Durham Coast is the only example of vegetated sea cliffs on magnesian limestone exposures in the UK. These cliffs extend along the North Sea coast for over 20km from South Shields southwards to Blackhall Rocks. Qualifying Features: Annex I habitats: • vegetated sea cliffs of the Atlantic and Baltic Coasts, comprising complex mosaic of paramaritime, mesotrophic and calcicolous grasslands, tall-herb fen, seepage flushes and wind-pruned scrub.	Partially within.
Northumbria Coast SPA.	The site consists of mainly discrete sections of rocky shore with associated boulder and cobble beaches. The intertidal rock platform is an important resource used by wintering purple sandpiper *Calidris maritima* and turnstones *Arenaria interpres.* Arctic tern *Sterna paradisaea* and little terns *Sternula albifrons* nest at Newton Links. The site qualifies under Article 4 of the Birds Directive (2009/147/EC) for the following reasons: • the site regularly supports more than 1% of the Great Britian (GB) populations of two species listed in Annex I of the EC Birds Directive; • the site regularly supports more than 1% of the biogeographical population of two regularly occurring migratory species not listed in Annex I of the EC Birds Directive. • Summary of qualifying ornithological interest: - Arctic tern (breeding) (2.92% of GB population); - Little tern (breeding) (1.7% of GB population); - Turnstone (non-breeding) (2.6% of biogeographic population); - Purple sandpiper (non-breeding) (1.6% of biogeographic population).	Partially within.

Site Name	Designated Feature Summary	Distance and Direction from MHPGC Project Scoping Boundary
Northumbria Coast Ramsar.	The Northumbria Coast Ramsar site is contiguous with the Northumbrian Coast SPA and supports three of the same qualifying interest features; little tern, purple sandpiper and turnstone. Ramsar criterion 6 - species/populations occurring at levels of international importance.	Partially within.
Castle Eden Dene SAC.	Castle Eden Dene in northeast England represents the most extensive northerly native occurrence of yew *Taxus baccata* woods in the UK. Extensive yew groves are found in association with ash-elm *Fraxinus-Ulmus* woodland, and it is the only site selected for yew woodland on magnesian limestone in northeast England. Annex I habitats that are a primary reason for selection of this site: • *Taxus baccata* woods of the British Isles.	4.16km south.
Teesmouth and Cleveland Coast Ramsar.	The Teesmouth and Cleveland Coast Ramsar site is contiguous with the Teesmouth and Cleveland Coast SPA. Ramsar criterion 5 - Assemblages of international importance: waterbird assemblage. Ramsar criterion 6 – species/populations occurring at levels of international importance: red knot *Calidris canutus* (non-breeding) and common redshank *Tringa tetanus* (non-breeding).	8.15km southeast.
Teesmouth and Cleveland Coast SPA.	The Teesmouth and Cleveland Coast SPA is a wetland of European importance comprising of 12km² complex of coastal habitats centred on the Tees estuary. These include sandflats, mudflats, rocky foreshore, saltmarsh, sand dunes, wet grassland and freshwater lagoons. Together they support internationally important populations of passage migratory, breeding and non-breeding waterbirds. The SPA is a complex of discrete sites, with additional non-designated areas also used for foraging and roosting. Qualifying Features: • Avocet Recurvirostra avosetta; • Common tern Sterna hirundo;	8.15km southeast.

Site Name	Designated Feature Summary	Distance and Direction from MHPGC Project Scoping Boundary
	• Red knot; • Little tern; • Common redshank; • Ruff Calidris pugnax; • Sandwich tern Thalasseus sandvicensis. Waterbird assemblage including numbers exceeding 1% of the GB non-breeding populations of gadwall *Mareca strepera*, northern shoveler *Spatula clypeata* and sanderling *Calidris alba*. Eurasian wigeon *Mareca penelope*, northern lapwing *Vanellus vanellus*, herring gull *Larus argentatus* and black-headed gull *Chroicocephalus ridibundus* are present in sufficient numbers to warrant their being listed as a major component species of the assemblage as their numbers exceed 2,000 individuals	
Thrislington SAC.	Annex I habitats that are a primary reason for selection of this site. 6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites). Thrislington is a small site but nonetheless contains the largest of the few surviving stands of CG8 *Sesleria albicans – Scabiosa columbaria* grassland. This form of calcareous grassland is confined to the magnesian limestone of County Durham and Tyne and Wear, northeast England. It now covers less than 200ha and is found mainly as small, scattered stands.	12.73km southwest.

Table 8.39: Nationally Designated sites within 2km of the Morven Hawthorn Pit Grid Connection Project Scoping Boundary, extended to 10km of the Morven Hawthorn Pit Grid Connection Project Scoping Boundary where Designated Site has Bat Interest and/or Ornithological Interest

Site Name	Designated Feature Summary	Distance and Direction from MHPGC Project Scoping Boundary
Hesledon Moor West SSSI.	Hesledon Moor West is a small but diverse site which includes fen, carr and heathland communities. These communities are developed on acidic glacial drift overlying magnesian limestone and were once widespread in eastern Durham, but are now confined to small, isolated pockets within the urban/agricultural landscape.	Within.
Hesledon Moor East SSSI.	Hesledon Moor East supports two habitats of particular conservation importance. The majority of the site comprises unimproved neutral pasture, whilst a separate, smaller parcel of land to the south supports a base-rich mire. Scrub and flowing water add further interest to the site.	Partially within.
Durham Coast SSSI.	The Durham Coast between South Shields and Hart Warren is of considerable biological, geological and physiographic interest: • Habitats: It contains most of the paramaritime magnesian limestone vegetation in Britain, as well as a species-rich dune system; • Wintering and breeding birds: The SSSI supports nationally important numbers of wintering shore birds – purple sandpiper and breeding little terns which contribute to the internationally important populations of the northeast coast. Sanderling *Calidris alba* are present in nationally important numbers, and turnstone and knot also use the site for feeding and roosting in winter. The cliffs at Marsden Bay also support a well-known seabird colony which includes kittiwake *Rissa tridactyla*, fulmar *Fulmarus sp*. and cormorant *Phalacrocoracidae sp*. • Invertebrates: The coast is entomologically rich and supports colonies of the northern brown argus butterfly *Aricia artaxerxes salmacis* and the least minor moth *Photedes captiuncula*.	Partially within.

Site Name	Designated Feature Summary	Distance and Direction from MHPGC Project Scoping Boundary
Hawthorn Dene SSSI.	Hawthorn Dene supports one of the most extensive, diverse and least disturbed areas of semi-natural woodland on the magnesian limestone of County Durham (second only to Castle Eden Dene), with additional habitats including magnesian limestone grassland and tall fen.	Partially within.
Eppleton Grassland SSSI.	Eppleton Grassland SSSI supports a diverse mosaic of semi-natural habitats, including unimproved neutral and acid grasslands, fen-meadows and rush-pastures, swamps, tall-herb fens, scrub and woodland.	Immediately west.
Pig Hill SSSI.	The steep slopes of Pig Hill, above the valley of the Coldwell Burn, support one of the most extensive surviving examples of primary magnesian limestone grasslands in Britain.	130m southwest.
Stony Cut, Cold Hesledon SSSI.	Designated for geological features, this site shows exposed reef-flat rocks.	205m north.
Tuthill Quarry SSSI.	Tuthill Quarry is a disused limestone quarry containing areas of primary and secondary species-rich calcareous grassland developed over magnesian limestone, together comprising one of the larger remaining examples of this habitat in East Durham.	1.04km south.
Dabble Bank SSSI.	Dabble Bank faces west in a small valley cut into the magnesian limestone plateau and retains unimproved, species-rich grassland. Dabble Bank is notified for the nationally scarce grassland communities (NVC CG2 Festuca ovina – *Avenula pratensis* and CG6 *Avenula pubescens*) established on magnesian limestone.	1.21km south.
Tunstall Hills and Ryhope Cutting SSSI.	Tunstall Hills is a complex site of considerable geological and botanical interest in an urban setting to the south of Sunderland. Its geological interest centres upon numerous rock exposures and species-rich grassland which has developed on shallow soils overlying the magnesian limestone.	1.78km north
Durham Coast NNR.	The area is noted for coastal and lowland grassland which numerous wildflowers and butterflies. The area also supports many birds and an important breeding population of little terns.	2.56km south.

8.3.5.3 The desk study identified multiple locally statutory designated sites within 2km ZoI of the MHPGC Project Scoping Boundary, extended to 10km where the designated site has bat and/or ornithological interest in line with the ZoI. Those with biodiversity features are shown on Table 8.40.

Table 8.40: Locally statutory designated sites within 2km of the Morven Hawthorn Pit Grid Connection Project Scoping Boundary, extended to 10km of the Morven Hawthorn Pit Grid Connection Project Scoping Boundary where designated site has bat interest and/or ornithological interest

Site Name	Designated Feature Summary	Distance and Direction from MHPGC Project Scoping Boundary
Noses Point LNR.	The magnesian limestone bedrock, laid down in an ancient sea, has given rise to a rare form of grassland with unique populations of plants and animals; the dramatic and rugged coastline with its cliffs and sea stacks was carved out by the action of the waves.	Partially within.
Easington LNR.	The site has high nature conservation value and contains several UK Biodiversity Action Plan Priority Species: common toad *Bufo bufo*, skylark *Alauda Arvensis* and dingy skipper *Erynnis tages* as well as several Durham Biodiversity Action Plan Priority Habitats (woodland, ponds, fen reed bed, brownfield mosaic and lowland meadow.	Partially within.
Rockhouse Dene LNR.	The steep sided Rockhouse Dene offers a mixture of woodland, grassland and streamside wildlife habitats.	815m southeast.
Tunstall Hills LNR.	Gentle slopes on the Maiden Paps support species-rich magnesian limestone grassland and locally uncommon plants such as frog orchid *Coeloglossum viride*.	1.55km northwest.

8.3.5.4 The desk study identified multiple local non-statutory designated sites within the ZoI which are shown in Figure 8.15 and Table 8.41.

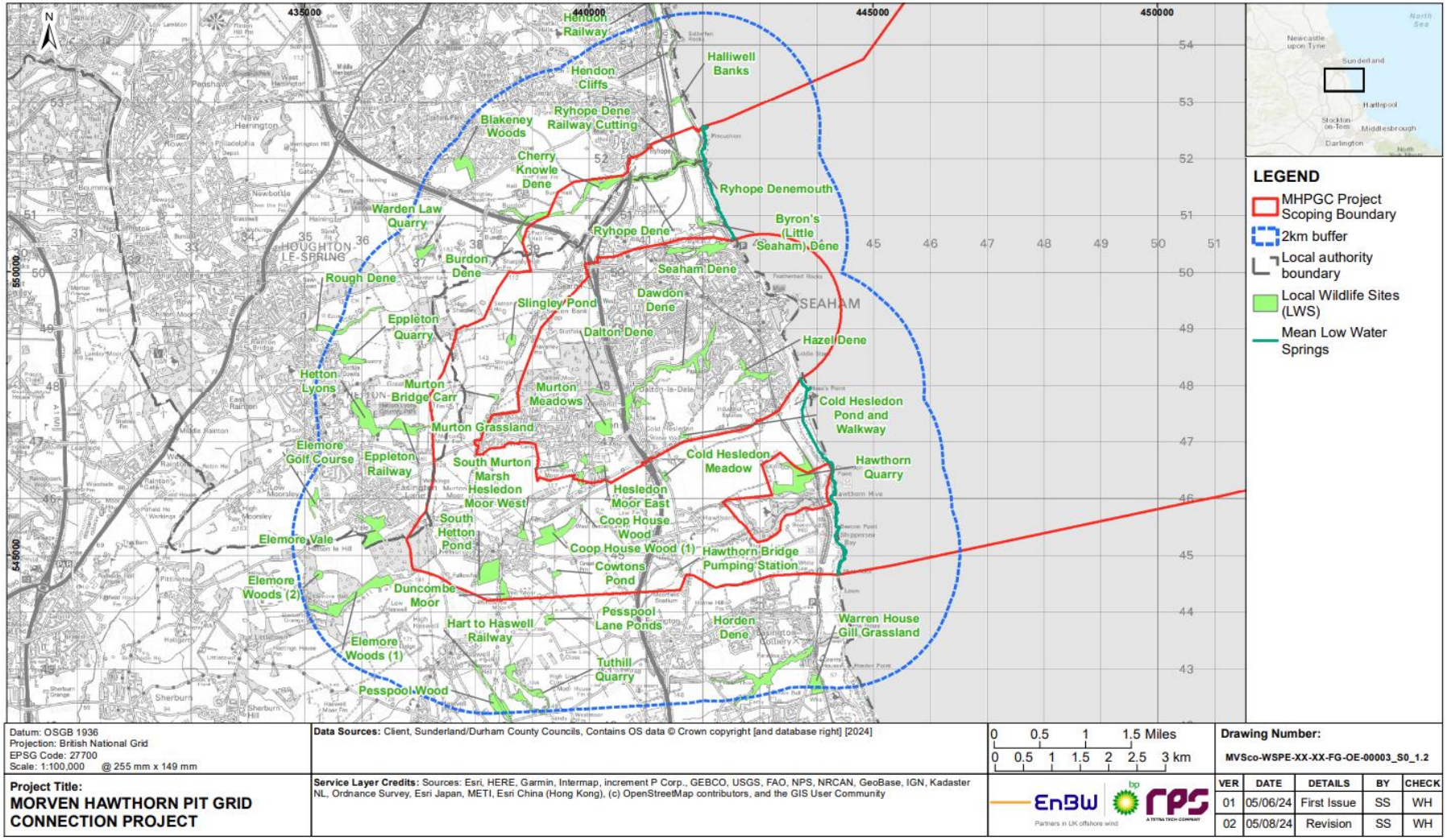


Figure 8.15: Local Non-Statutory Designated Sites

Table 8.41: Local Non-statutory Designated Sites Within 2km of the Morven Hawthorn Pit Grid Connection Project Scoping Boundary

Site Name	Designated Feature Summary	Distance and Direction from MHPGC Project Scoping Boundary
Byron's (Little Seaham) Dene LWS.	Supports a wide variety of herbs. In the wetter areas herbs include common spotted orchid *Dactylorhiza fuchsii*, meadowsweet *Filipendula ulmaria*, hard rush *Juncus inflexus* and hemp-agrimony *Eupatorium cannabinum*. Common blue *Polyommatus icarus* and meadow brown *Maniola jurtina* are abundant and yellowhammers *Emberiza citrinella* frequent the area.	Within.
Cold Hesledon Meadow LWS.	Damp meadow supporting many herbs including fragrant orchid *Gymnadenia conopsea*, twayblade *Listera ovata*, cowslip *Primula veris*, ox-eye daisy *Chrysanthemum leucanthemum*, field scabious *Knautia arvensis*, harebell *Campanula rotundifolia*, burnet saxifrage *Pimpinella saxifraga*, centaury *Centaurium erythrae*a, lady's bedstraw *Galium verum*, knapweed *Centaurea nigra* and quaking grass *Briza media*.	Within.
Coop House Wood and Coop House Wood (1) LWS.	Damp woodland with oak *Quercus petraea*, ash *Fraxinus excelsior*, downy birch *Betula pubescens*, alder *Alnus glutinosa* and rowan *Sorbus aucuparia*. The field layer consists of abundant male fern *Dryopteris filix-mas,* wood anemone *Anemone nemorosa* and honeysuckle *Lonicera periclymenum*.	Within.
Cowtons Pond LWS.	A pond and marsh which retains open water/extensive emergent vegetation and some marsh. The southern aspect supports curlew *Numenius arquata* , snipe *Gallinago gallinago* and common sandpiper *Actitis hypoleucos*. Further investigations for vertebrates/invertebrates are warranted.	Within.
Hawthorn Bridge Pumping Station LWS.	A small sedge meadow/marsh is present and left undisturbed due to its inaccessibility.	Within.
Hesledon Moor West LWS.	Ecologically similar to Hesledon Moor West SSSI. Southern side is acid pasture with species; purple moor grass, sweet vernal grass, heath bedstraw and tormentil *Potentilla erecta*, common spotted orchid, sneezewort *Achillea ptarmica*, sorrel *Rumex acetosa*,	Within.

Site Name	Designated Feature Summary	Distance and Direction from MHPGC Project Scoping Boundary
	autumn hawkbit *Leontodon autumnalis*, cat's ear *Hypochoeris radicata* and slender St John's wort *Hypericum pulchrum.* Common blue, small skipper *Thymelicus sylvestris* and meadow brown butterflies have been recorded.	
Murton Bridge Carr LWS.	Carr and calcareous grassland, predominantly willow carr *Salix cinerea* and *Salix caprea* with the field layer dominated by greater pond sedge *Carex riparia*. The margins are more diverse with meadowsweet and rushes *Juncus sp*.	Within.
Murton Grassland LWS.	Unmanaged herb-rich neutral grassland and abundant leguminous species. It is likely that the LWS could support butterflies.	Within.
Ryhope Dene LWS.	A coastal dene supporting mixed deciduous woodland and rich ground flora; sanicle *Sanicula europaea*, lesser celandine *Ficaria verna*, enchanter's nightshade *Circaea lutetiana*, bluebell *Hyacinthoides non-scripta*, dogs mercury *Mercurialis perennis*, and hedge woundwort *Stachys sylvatica*. Includes a stream with fem-rich rocky exposures supporting an abundance of species. Birds include great spotted woodpecker *Dendrocopos major*, woodcock *Scolopax rusticola* and tawny owl *Strix aluco*. A noctule *Nyctalus noctule* bat roost is present in an ash tree as is the occasional migratory butterfly; clouded yellow *Colias croceus*.	Within.
Ryhope Denemouth LWS.	Herb-rich areas of magnesian limestone grassland. The scrub provides cover for migratory birds along with that for occasional and uncommon continental species; wryneck *Jynx torquilla* and black redstart *Phoenicurus ochruros*.	Within.
Ryhope Dene Railway Cutting LWS.	Grazed magnesian limestone grassland with small rocky outcrops dominated by blue moor grass *Sesleria caerulea*. Supports butterflies including; wall *Lasiommata megera*, meadow brown, small tortoiseshell *Aglais urticae*, common blue and *Coenonympha pamphilus*.	Within.
Slingley Pond LWS.	A pond comprising mainly of open water and well-developed emergent vegetation, especially water	Within.

Site Name	Designated Feature Summary	Distance and Direction from MHPGC Project Scoping Boundary
	horsetail *Equisetum fluviatile* and reedmace *Typha latifolia*. A diverse marshland community exists around the pond with lesser spearwort *Ranunculus flammula*, sedges *Carex otrubae* and *Carex nigra*, water forget-me-not *Myosotis scorpioides* and cuckoo flower *Cardamine pratensis*.	
South Hetton Pond LWS.	A large pond with extensive areas of bulrush *Typha latifolia* on the west side.	Within.
Burdon Dene LWS.	Mixed deciduous woodland over magnesian limestone. Birds including woodcock, spotted flycatcher *Muscicapa striata*, great spotted woodpecker and tawny owl are present.	Partially within.
Cherry Knowle Dene LWS.	Deciduous woodland with rich ground flora dominated by; wood anemone, bluebell, lesser celandine, wild arum *Arum maculatum*, opposite leaved golden saxifrage *Chrysosplenium oppositifolium*, hedge woundwort, sanicle/common valerian *Valeriana officinalis*, dog violet *Viola riviniana*, dogs mercury, primrose *Primula vulgaris*, enchanters night shade and great woodrush *Luzula sylvatica.* Birds present include; willow warbler *Phylloscopus trochilus*, chiffchaff *Phylloscopus collybita*, blackcap *Sylvia atricapilla*, garden warbler *Sylvia borin*, great spotted woodpecker, woodcock, treecreeper *Certhia familiaris*, long-tailed tit *Aegithalos caudatus* and tawny owl.	Partially within.
Duncombe Moor LWS.	A species-rich spring fen containing wetland communities uncommon in the county with a variety of sedges and northern marsh orchid *Dactylorhiza purpurella*. The northern field includes an acid grassland community which includes cat's-ear.	Partially within.
Eppleton Railway LWS.	A disused railway and associated base-rich marshland, stream, heath and scrub woodland habitat support a variety of wetland herbs.	Partially within.
Halliwell Banks LWS.	Magnesian limestone cliffs burdened by thick deposits of slumped boulder clays provide habitat for plant communities of considerate botanical interest.	Partially within.

Site Name	Designated Feature Summary	Distance and Direction from MHPGC Project Scoping Boundary
Hawthorn Quarry LWS.	Quarry with plants typical of the magnesian limestone; bee orchid *Ophrys apifera*, fragrant orchid, common spotted orchid, northern marsh orchid, yellow wort *Blackstonia perfoliata*, field scabious, greater knapweed *Centaurea scabiosa*, wild carrot *Daucus carota*, cowslip, quaking grass and glaucous sedge *Carex flacca*.	Partially within.
Hesledon Moor East LWS.	Largely semi-improved grassland with fringing scrub next to the stream and marsh vegetation occurs particularly in the eastern section.	Partially within.
Seaham Dene LWS.	Historically a disturbed woodland with varied ground flora including large quantities of Japanese Knotweed *Fallopia japonica*. Abundance of birds and barn owls *Tyto alba* are reputed to nest in the wood.	20m south.
Cold Hesledon Pond and Walkway LWS.	A small pond with a marshy area. Supports butterflies including; abundant common blue and meadow brown.	45m north.
South Murton Marsh LWS.	Marsh with largely tall-herb species, that has ditches on both the north and south aspects. The area is used by curlew and lapwing *Vanellinae sp*.	150m north.
Pesspool Lane Ponds LWS.	Silty ponds are situated in rough pasture with soft rush *Juncus effusus* and tufted hair grass *Deschampsia caespitosa*. A population of GCN is identified in the most central pond.	290m south.
Elemore Vale LWS.	A variety of habitats, comprising wetlands, scrub, ungrazed and horse grazed grasslands. Breeding bird species include whitethroat *Sylvia communis*, willow warbler, sedge warbler *Acrocephalus schoenobaenus*, linnet *Linaria cannabina* and yellowhammer, whilst grasshopper warbler *Locustella naevi*a has also been recorded and kestrels *Falco tinnunculus* regularly hunt over the area.	365m west.
Elemore Woods (1) LWS.	A mixed woodland site with conifers interspersed with broadleaved woodland. Ground flora is very patchy with dog's mercury in some areas.	405m southwest.

Site Name	Designated Feature Summary	Distance and Direction from MHPGC Project Scoping Boundary
Hazel Dene LWS.	A remnant of a small dene on ancient woodland; slopes are covered principally by ash with hazel *Corylus avellana* and elder *Sambucus nigra*. A herb-rich grassland is present on the southern aspect.	405m northwest.
Dawdon Dene LWS.	An ancient woodland site dominated by mixed deciduous woodland; including willow, and elder. Common blue, meadow brown and small health *Coenonympha pamphilus* butterflies are abundant.	695m northwest.
Murton Meadows LWS.	Species-rich meadows used for horse grazing. Species include bee orchid, pyramidal orchid *Anacamptis pyramidalis*, common spotted orchid, northern marsh orchid.	730m northwest.
Hetton Lyons LWS.	Semi-improved neutral and acidic grasslands. Breeding wetland birds include; little grebe *Tachybaptus ruficollis*, coot *Fulica sp*., moorhen *Gallinula chloropu*, mallard *Anas platyrhynchos* and reed bunting *Emberiza schoeniclus*. The wetlands are important feeding areas for; grey herons *Ardea cinerea* and a small wintering population of wildfowl, including goldeneye *Bucephala clangula*. Rarer migratory species are present; garganey *Spatula querquedula*, little ringed plover *Charadrius dubius*, black tern *Chlidonias niger* and the largest flock of little gulls *Hydrocoloeus minutus* (150) ever recorded inland in County Durham/Tyne and Wear. Acid and neutral grassland are present and dry meadows have breeding populations of skylark and meadow pipit *Anthus pratensis*.	885m west.
Hart to Haswell Railway LWS.	Calcareous grassland, scrub and ponds covers parts of reclaimed railway, recolonised magnesium limestone rubble and well established woodland embankments. Species include frog orchid, common rock-rose *Helianthemum nummularium* and field scabious. The site supports good populations of several species of butterfly, smooth newts *Lissotriton vulgaris* and water voles *Arvicola amphibius*.	1.10km south.
Tuthill Quarry LWS.	Quarry containing magnesian limestone species.	1.12km south.

Site Name	Designated Feature Summary	Distance and Direction from MHPGC Project Scoping Boundary
Hendon Cliffs LWS.	Cliff tops/ledges support an interesting coastal flora. Cliffs provide nesting opportunities for a variety of seabirds; namely small numbers of fulmars whilst the rocky shores are feeding grounds for various wading birds; turnstone, redshank, oystercatcher *Eurasian oystercatcher* and purple sandpiper.	1.17km north.
Dalton Dene LWS.	A section of woodland on an ancient woodland site; ash, hawthorn *Crataegus monogyna* and elder fringe a small stream. Slopes of the dene support herb-rich grassland. The five-spot burnet moth *Zygaena lonicerae* was abundant.	1.20km east.
Horden Dene LWS.	A narrow belt of broadleaved woodland within a coastal dene, most of which is on the inventory of ancient woodland. Botanically, the ground flora is of main importance which typically contains species including lesser celandine, dog's mercury *Mercurialis perennis*, wood anemone, wild garlic *Allium ursinum* and bluebell.	1.24km south.
Blakeney Woods LWS.	A woodland with old mature sections which are probably ancient. Beech *Fagus sp*. is dominant along with ash, sycamore *Acer pseudoplatanus*, American poplar *Liriodendron tulipifera*, sessile oak *Quercus petraea* and silver birch *Betula pendula*. The presence of a rare moss *Fissidens exilis* is present and presence of sanicle suggests the wood is ancient. Birds include; great spotted woodpecker and warblers such as blackcap and chiffchaff.	1.29km northwest.
Eppleton Quarry LWS.	Small working quarry with geological and palaeontological interest.	1.30km northwest.
Rough Dene LWS.	Mixed deciduous woodland dominated by ash, sycamore, elm and oak. Base-rich soils supporting a rich ground flora. Small amounts of wild basil *Clinopodium vulgare* and black bryony *Dioscorea communis* are present, which are both scarce in Tyne and Wear.	1.35km northwest.
Warden Law Quarry LWS.	Ponds with a variety of plant/animal communities of considerable conservation interest. These are thought to support the largest population of breeding	1.35km northwest.

Site Name	Designated Feature Summary	Distance and Direction from MHPGC Project Scoping Boundary
	amphibians in Sunderland including frogs, toads, smooth newt and palmate newts *Lissotriton helveticus*. Vegetation includes; water forget-me-not *Myosotis scorpioides*, common spikerush *Eleocharis palustris*, water plantain *Alisma plantago-aquatica* and hairy willowherb *Epilobium hirsutum*. Small copper *Lycaena phlaeas*, common blue, small health, wall brown, dingy skipper, orange tip *Anthocharis cardamines* and northern brown argus are present. Two water beetles are also found at these ponds – *Potamonectes depressus* and *Ilybius subaeneus*.	
Elemore Woods (2) LWS.	As Elemore Woods (1) LWS.	1.57km west.
Elemore Golf Course LWS.	Acid grassland with rich flora and associated wetland plants. Small copper butterflies frequent the area. Linnets and yellowhammers are common and lesser whitethroat has been recorded. Sedge Warblers frequent the wetland area.	1.66km west.
Pesspool Wood LWS.	A semi-natural broadleaved woodland site with birch and oak over a relatively species poor ground flora typical of acidic soil conditions.	1.66km south
Warren House Gill Grassland.	A mosaic of unimproved neutral and calcareous grassland with areas of scrub on the northern fringe. Species include common spotted orchid, devil's-bit scabious *Succisa pratensis* and yellow rattle *Rhinanthus minor*.	1.74km south.

Habitats of Principal Importance and Ancient Woodland

8.3.5.5 The desk study identified several HPIs within 1km of the MHPGC Project Scoping Boundary as shown in Figure 8.16.

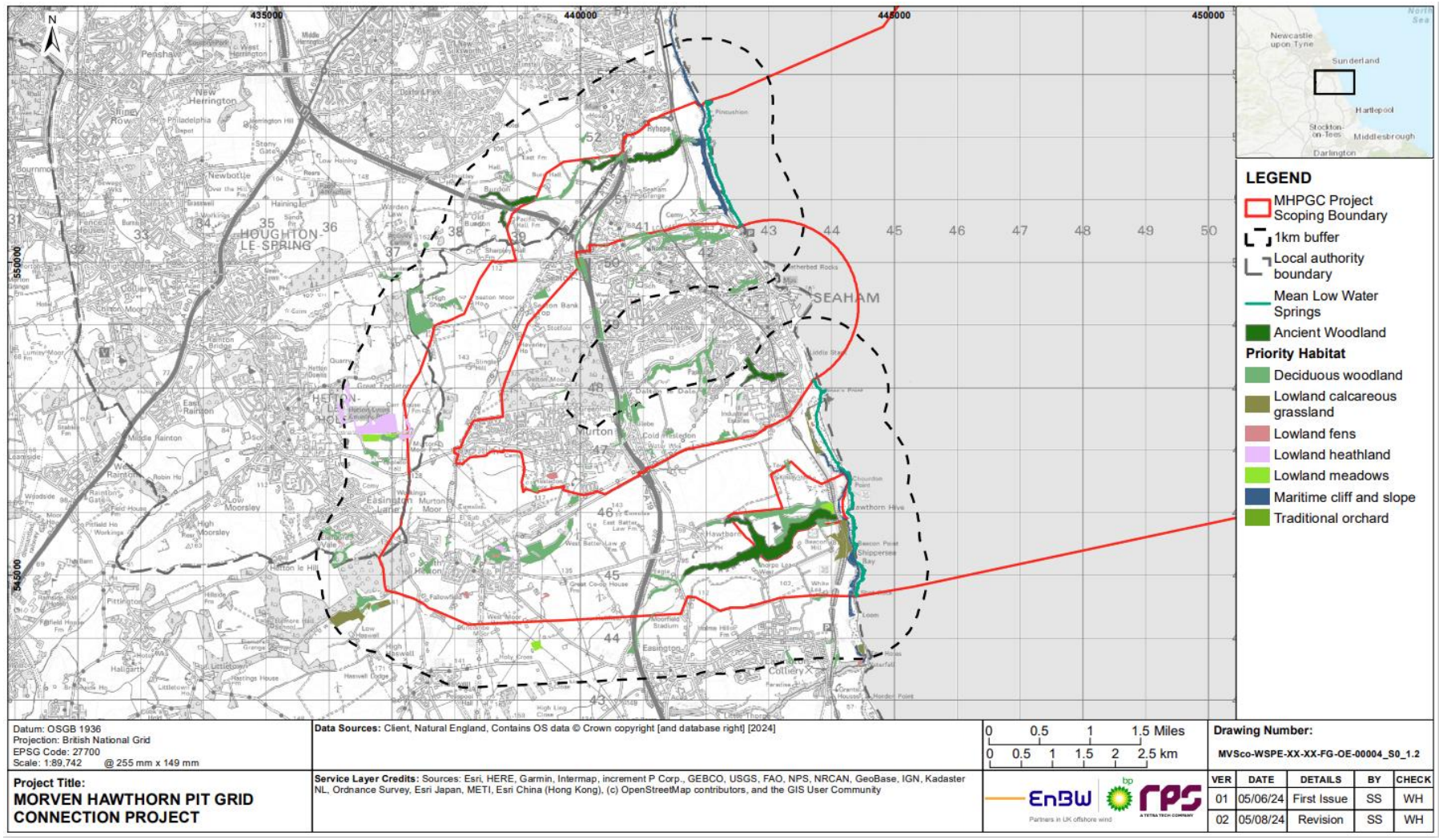


Figure 8.16: Habitats of Principal Importance

8.3.5.6 The desk study identified the following Habitats of Principal Importance within 1km of the MHPGC Project Scoping Boundary:

- Deciduous woodland[20] within the MHPGC Project Scoping Boundary;
- Maritime cliff and slope within the MHPGC Project Scoping Boundary;
- Good quality semi-improved grassland within the MHPGC Project Scoping Boundary;
- Lowland calcareous grassland within the MHPGC Project Scoping Boundary;
- Lowland fens within the MHPGC Project Scoping Boundary;
- Lowland heathland within the MHPGC Project Scoping Boundary;
- Lowland meadows within the MHPGC Project Scoping Boundary;
- Traditional orchard 450m northwest of the MHPGC Project Scoping Boundary.

8.3.5.7 The desk study identified five ancient woodland parcels within 1km of the MHPGC Project Scoping Boundary:

- Cherry Knowle Dene – Partially within;
- Hawthorn Dene – Partially within;
- Ryhope Dene – Partially within;
- Burdon Dene – 5m north;
- Hazel Dene – 420m northwest.

8.3.5.8 The desk study identified eight veteran trees within 1km of the MHPGC Project Scoping Boundary, all within Hawthorn Dene (10m south).

Waterbodies and Watercourses

8.3.5.9 The desk study identified 55 potential ponds (including man-made ponds) and 43 potential ditches within 250m of the MHPGC Project Scoping Boundary. These are shown on Figure 8.17.

[20] The desk study identified that woodland within the Northern Corridor is recorded on the Priority Habitat Inventory (PHI) as being "deciduous woodland" priority habitat. PHI is a spatial dataset, which describes the geographic extent and location of Natural Environment and Rural Communities Act 2006 Section 41 habitats of principal importance in England. Lowland mixed deciduous woodland is the Section 41 habitat type likely to best describe the woodland habitat with the Terrestrial Ecology and Ornithology Study Area. However, the Section 41 habitat definition for lowland mixed deciduous woodland focuses predominantly on semi-natural woodlands. Consequently, until a field survey ground truth the woodland parcels it is unknown whether those habitats recorded within the Terrestrial Ecology and Ornithology Study Area are considered to qualify as either Section 41 or LBAP habitat.

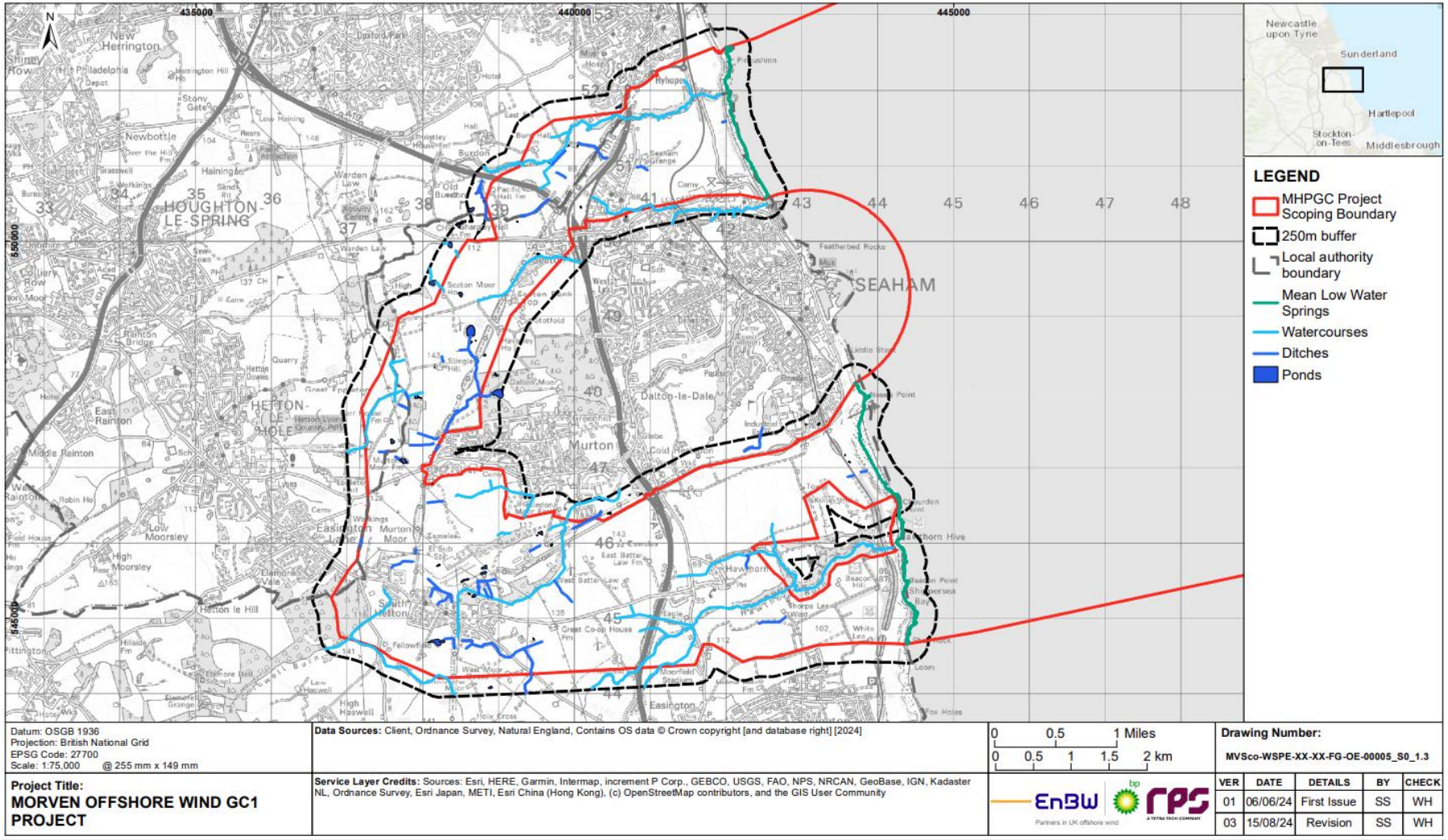


Figure 8.17: Waterbodies Identified by the Desk Study

8.3.5.10 The current WFD status for the Terrestrial Ecology and Ornithology Study Area was obtained from the Environment Agency's Catchment Data Explorer website. There are five WFD designated water bodies[21] located within the Terrestrial Ecology and Ornithology Study Area:

- Dalton Beck to North Sea Water Body (GB103025075970) - This waterbody and drainage basin is located within the MHPGC Project Scoping Boundary and flows into the North Sea. The 2022 WFD ecological status of the water body was classified as being of Moderate Ecological Status overall with a hydromorphological designation of 'not designated artificial or heavily modified.' Reasons for the waterbody failing to achieve Good overall status are currently unknown and under investigation. The following biological quality elements are monitored in the waterbody: invertebrates (high) and macrophytes (moderate);
- Hawthorn Burn from Source to North Sea Water Body (GB103025075950) - This waterbody and drainage basin is located partially within the MHPGC Project Scoping Boundary. The 2022 WFD ecological status of the River Tees water body was classified as being of Poor Ecological Status overall with a hydromorphological designation of 'not designated artificial or heavily modified.' Poor nutrient management, septic tanks diffuse pollution, sewage discharge and misconnections are cited as reasons for the waterbody failing to achieve Good overall status. The following biological quality elements are monitored in the waterbody: invertebrates (poor) and macrophytes (poor);
- Lumley Park Burn from Source to Herrington Burn Water body (GB103024077580) - This waterbody is located approximately 830m northwest of the MHPGC Project Scoping Boundary and the drainage basin is located partially within the MHPGC Project Scoping Boundary. The 2022 WFD ecological status of the water body was classified as being of Moderate Ecological Status overall with a hydromorphological designation of 'heavily modified'. Point source pollution, urban development, invasive non-native species and groundwater abstraction are cited as reasons for the waterbody failing to achieve Good overall status. The following biological quality elements are monitored in the waterbody: invertebrates (high) and macrophytes (poor);
- Castle Eden Burn from Source to North Sea (GB103025075930) - This waterbody is located approximately 3.36km south of the MHPGC Project Scoping Boundary and the drainage basin is located 1.74km south of the MHPGC Project Scoping Boundary. The 2022 WFD ecological status of the water body was classified as being of Bad Ecological Status overall with a hydromorphological designation of 'not designated artificial or heavily modified'. Point source pollution and poor soil management are cited as reasons for the water body failing to achieve Good overall status;

[21] The WFD divides the water environment into water bodies, which includes lakes, reservoirs, streams, rivers, canals, estuaries and coastal waters. The WFD definition of a water body is different to the definition used in this chapter, which uses the term waterbodies to describe a pond or ditch.

- Pittington Beck from Coalford to Old Durham Beck Water Body (GB103024077540) - This waterbody and drainage basin is located partially within the MHPGC Project Scoping Boundary. The 2022 WFD ecological status of the water body was classified as being of Bad Ecological Status overall a hydromorphological designation of 'not designated artificial or heavily modified.' The following biological quality elements are monitored in the waterbody: fish (bad), invertebrates (good) and macrophytes (good).

8.3.5.11 Further details are provided in Chapter 8.2: Water Resources and Flood Risk, and C.1.1.1: Water Framework Directive, of the Scoping Report.

Initial Site Walkover

8.3.5.12 The following habitats were recorded during the initial site walkover:

- arable – recorded as the most dominant habitat;
- grassland – the composition of grasslands appear to mostly constitute modified grassland and other neutral grassland;
- woodland – multiple parcels were recorded and mostly concentrated towards the coast;
- wetland – small, isolated areas were recorded;
- brownfield – mostly identified within the Central Corridor;
- coastal habitat – cliffs, rocky foreshore and beach habitat.

Protected/Notable Species

Badger

Desk Study

8.3.5.13 The desk study returned three records of badger within 2km of the MHPGC Project Scoping Boundary.

Initial Site Walkover

8.3.5.14 The initial site walkover identified hedgerows, woodland, arable, grassland and steep banks, which may be suitable for badger commuting, foraging and sett creation.

Bats

Desk Study

8.3.5.15 The desk study[22] returned two bat roost records within the MHPGC Project Scoping Boundary; one common pipistrelle *Pipistrellus pipistrellus* roost and one roost of unknown bat species *Chiroptera sp*. Eleven bat activity records were recorded within the MHPGC Project Scoping Boundary; one record of myotis bat *Myotis sp*., two

[22] Roost records are stated where known otherwise the records either provide no further information or cite foraging or commuting activities.

records of noctule, one record of unknown bat species and seven records of common pipistrelle foraging.

8.3.5.16 Fifty-four bat records were recorded within 2km of the MHPGC Project Scoping Boundary; seven records of unknown bat species (including four roost records), four records of myotis bat, one record of whiskered bat *Myotis mystacinus*, six records of noctule, seven records of pipistrelle bat *Pipistrellus sp*. (including five roost records), twenty-five records of common pipistrelle (including six roost records), three records of soprano pipistrelle (including one roost record) *Pipistrellus pygmaeus* and one record of brown long-eared bat *Plecotus auritus*.

8.3.5.17 There are ten records of European Protected Species Licence (EPSL) within 2km of the MHPGC Project Scoping Boundary:

- Ref: EPSM2012-4483. Common pipistrelle and soprano pipistrelle: granted in 2012 for the destruction of a resting place located within the MHPGC Project Scoping Boundary;
- Ref: 2015-15760-EPS-MIT. Common pipistrelle and brown long-eared bat: granted in 2015 for the destruction of a resting place located approximately 70m north of the MHPGC Project Scoping Boundary;
- Ref: 2017-31905-EPS-MIT. Soprano pipistrelle: granted in 2017 for the destruction of a resting place located approximately 240m north of the MHPGC Project Scoping Boundary;
- Ref: EPSM2010-2219. Common pipistrelle, soprano pipistrelle and brown long-eared bat: granted in 2011 for impact on a breeding site, the destruction of a breeding site and destruction of a resting place located approximately 240m north of the MHPGC Project Scoping Boundary;
- Ref: 2017-28854-EPS-MIT. Common pipistrelle: granted in 2017 for the destruction of a resting place located approximately 315m south southeast of the MHPGC Project Scoping Boundary;
- Ref: EPSM2011-3556. Common pipistrelle: granted in 2012 for the destruction of a resting place located approximately 395m north of the MHPGC Project Scoping Boundary;
- Ref: EPSM2012-5309. Common pipistrelle: granted in 2013 for the destruction of a resting place located approximately 480m east north of the MHPGC Project Scoping Boundary;
- Ref: 2014-4516-EPS-MIT. Common pipistrelle: granted in 2014 for the destruction of a resting place located approximately 910m south of the MHPGC Project Scoping Boundary;
- Ref: 2018-37684-EPS-MIT. Common pipistrelle: granted in 2018 for the destruction of a resting place located approximately 1.04km northeast of the MHPGC Project Scoping Boundary;
- Ref: 2019-43666-EPS-MIT. Common pipistrelle: granted in 2019 for the destruction of a resting place located approximately 1.83km west of the MHPGC Project Scoping Boundary.

Initial Site Walkover

8.3.5.18 The initial site walkover identified hedgerows, grassland, woodland and waterbodies that could be used by commuting, foraging and/or roosting bats.

Great Crested Newt

Desk Study

8.3.5.19 The desk study returned one record of GCN within 2km of the MHPGC Project Scoping Boundary, which was located within a garden pond 115m north of the MHPGC Project Scoping Boundary.

8.3.5.20 There are three GCN class survey licence returns (with 16 total surveys within those returns) within 2km of the MHPGC Project Scoping Boundary. Of these:

- five surveys on a waterbody recorded GCN presence in 2016, located within the MHPGC Project Scoping Boundary;
- three surveys on a waterbody recorded GCN presence in 2015, located approximately 1.59km west of the MHPGC Project Scoping Boundary;
- eight surveys on a waterbody recorded GCN presence in 2015 and 2016, located approximately 1.45km west of the MHPGC Project Scoping Boundary.

8.3.5.21 There are no EPSL within 2km of the MHPGC Project Scoping Boundary. As per Section 8.3.5, 55 potential ponds (including man-made ponds) and 43 potential ditches were identified within the MHPGC Project Scoping Boundary and a 250m buffer. These are shown on Figure 8.17.

Initial Site Walkover

8.3.5.22 The initial site walkover identified multiple waterbodies within the MHPGC Project Scoping Boundary, as identified within the desk study, which could be used by breeding GCN. These are shown on Figure 8.17.

Otter

Desk Study

8.3.5.23 The desk study returned two records of otter within 2km of the MHPGC Project Scoping Boundary. The closest record is located approximately 720m northwest of the MHPGC Project Scoping Boundary. None of the records returned indicated the presence of a holt.

Initial Site Walkover

8.3.5.24 The initial site walkover identified multiple waterbodies (including linear features such as ditches) within the MHPGC Project Scoping Boundary that could be used by commuting and foraging otter.

Reptiles

Desk Study

8.3.5.25 The desk study returned two records of slow worm *Anguis fragilis* within the MHPGC Project Scoping Boundary and one record of slow worm approximately 40m south of the MHPGC Project Scoping Boundary.

Initial Site Walkover

8.3.5.26 The initial site walkover identified woodland, grassland, embankments and scattered scrub habitats, as well as rabbit *Oryctolagus cuniculus* warrens which could be suitable for foraging, commuting, and refuging reptiles. The grassland and woodland edges are also likely to provide suitable habitat for slow worm.

Water Vole

Desk Study

8.3.5.27 The desk study returned four records of water vole within 2km of the MHPGC Project Scoping Boundary. The closest record is approximately 285m east of the MHPGC Project Scoping Boundary.

Initial site walkover

8.3.5.28 The initial site walkover identified multiple waterbodies (including linear features such as ditches) within the MHPGC Project Scoping Boundary that could be used by water vole.

White-clawed Crayfish

Desk Study

8.3.5.29 The desk study did not return any records of white-clawed crayfish within 2km of the MHPGC Project Scoping Boundary.

Initial Site Walkover

8.3.5.30 The initial site walkover identified multiple waterbodies within the MHPGC Project Scoping Boundary. Further assessment will be required to determine if these are suitable for white-clawed crayfish.

Plants (protected)

Desk Study

8.3.5.31 The desk study did not return any records of protected plants within 2km of the MHPGC Project Scoping Boundary.

Initial Site Walkover

8.3.5.32 The initial site walkover identified habitats including grassland, woodland, coastal and ephemeral habitats where there is potential for protected plant species to be present.

SPI and Other Conservation notable Species (Terrestrial Vertebrates and Plants)

Desk Study

8.3.5.33 The desk study returned the following records within 2km of the MHPGC Project Scoping Boundary:

- terrestrial vertebrates, including:
  - Three records of common toad (two within the MHPGC Project Scoping Boundary), eleven records of brown hare *Lepus europaeus* (six within the MHPGC Project Scoping Boundary), one record of harvest mouse *Micromys minutus* within the MHPGC Project Scoping Boundary, and 89 records of West European hedgehog *Erinaceus europaeus* (twelve within the MHPGC Project Scoping Boundary).
- notable red list plant species in England (Stroh *et al*., 2014) (58 records total), including:
  - Quaking grass, harebell *Campanula rotundifolia* (four records within MHPGC Project Scoping Boundary), flea sedge *Carex pulicaris* (one record within MHPGC Project Scoping Boundary), carline thistle *Carlina vulgaris* (three record within MHPGC Project Scoping Boundary), chicory *Cichorium intybus*, frog orchid *Coeloglossum viride* (two records within MHPGC Project Scoping Boundary), crosswort *Cruciata laevipes* (one record within MHPGC Project Scoping Boundary), an Eyebright *Euphrasia arctica* (one record within MHPGC Project Scoping Boundary), wild strawberry *Fragaria vesca* (three records within MHPGC Project Scoping Boundary), dyer's greenweed *Genista tinctoria* (three records within MHPGC Project Scoping Boundary), autumn gentian *Gentianella amarella* (one record within MHPGC Project Scoping Boundary), bloody crane's-bill *Geranium sanguineum* (eight records within MHPGC Project Scoping Boundary), common rock-rose, field scabious (one record within MHPGC Project Scoping Boundary), wood-sorrel *Oxalis acetosella* (one record within MHPGC Project Scoping Boundary), common butterwort *Pinguicula vulgaris* (one record within MHPGC Project Scoping Boundary), hoary plantain *Plantago media* (three records within MHPGC Project Scoping Boundary), tormentil *Potentilla erecta* (two records within MHPGC Project Scoping Boundary), sanicle, devil's-bit scabious (one record within MHPGC Project Scoping Boundary).

Initial Site Walkover

8.3.5.34 The initial site walkover identified habitats where there is potential for SPI and other conservation notable plant species to be present, as well as other SPI and other conservation notable terrestrial vertebrate species such as brown hare and hedgehog.

SPI and Other Conservation notable Species (Terrestrial Invertebrates)

Desk Study

8.3.5.35 The desk study identified multiple invertebrate records within 2km of the MHPGC Project Scoping Boundary:

- butterflies:
  - Thirty-two records of northern brown argus (14 records within the MHPGC Project Scoping Boundary), 43 records of dingy skipper *Erynnis tages* (19 records within the MHPGC Project Scoping Boundary), three records of grayling *Hipparchia Semele* (two records within the MHPGC

Project Scoping Boundary), 128 records of small health (51 records within the MHPGC Project Scoping Boundary), 68 records of wall (28 records within the MHPGC Project Scoping Boundary) and one record of white-letter hairstreak *Satyrium w-album*;

- hymenopteran:
  - Three records of shimmering ruby-tail *Chrysis fulgida* (one record within the MHPGC Project Scoping Boundary).
  - One record of red-shanked carder bee *Bombus thoracombus ruderarius*.
- moths:
  - One record of chalk carpet *Scotopteryx bipunctaria*, six records of cinnabar *Tyria jacobaeae* (five records within the MHPGC Project Scoping Boundary), three records of ghost moth *Hepialus humuli* and two records of white ermine *Spilosoma lubricipeda* (one record within the MHPGC Project Scoping Boundary).
- odonatan (dragonfly):
  - Two records of common darter *Sympetrum striolatum* (one record within the MHPGC Project Scoping Boundary).

Initial Site Walkover

8.3.5.36 The initial site walkover identified habitats including grassland, woodland fringe and brownfield habitat where there is potential for SPI and other conservation notable species to be present. Further habitat surveys would be required to ascertain the suitability for the above species.

Invasive Non-native Species

Desk Study

8.3.5.37 The desk study returned thirteen records of invasive non-native species within 2km of the MHPGC Project Scoping Boundary:

- two records of giant hogweed *Heracleum mantegazzianum*;
- six records of Himalayan balsam *Impatiens glandulifera* (three records within the MHPGC Project Scoping Boundary);
- three records of Japanese knotweed (one record within the MHPGC Project Scoping Boundary);
- one record of rhododendron *Rhododendron sp*.;
- one record of American mink *Neovison vison* (within the MHPGC Project Scoping Boundary);
- four records of Eastern grey squirrel *Sciurus carolinensis*.

Birds

Desk Study

8.3.5.38 The desk study returned 264 records for 63 Schedule 1 bird species within 2km of the MHPGC Project Scoping Boundary, namely:

- birds of Prey: Barn owl, red kite Milvus *milvus*, merlin *Falco columbarius*, osprey *Pandion haliaetus*, peregrine *Falco peregrinus*, hen harrier *Circus cyaneus* and marsh harrier *Circus aeruginosu;*
- wildfowl: Common scoter *Melanitta nigra*, goldeneye, long-tailed duck *Clangula hyemalis*, pintail *Anas acuta*, scaup *Aythya affinis*, velvet scoter *Melanitta fusca*, whooper swan *Cygnus cygnu;*
- waders: Greenshank *Tringa nebularia*, little ringed plover, purple sandpiper, ruff *Calidris pugnax*, whimbrel *Numenius phaeopus*, wood sandpiper *Tringa glareola*;
- passerines: Black redstart, brambling Fringilla montifringilla, crossbill Loxia curvirostra, fieldfare Turdus pilaris, Lapland bunting Calcarius lapponicus, redwing Turdus iliacus and snow bunting Plectrophenax nivalis;
- gulls and terns: Black tern, little gull, little tern, Mediterranean gull *Ichthyaetus melanocephalus* and roseate tern *Sterna dougallii*;
- herons: Bittern Botaurus stellaris and spoonbill Platalea leucorodia;
- divers: black-throated diver *Gavia arctica*, garganey, great northern diver *Gavia immer* and red-throated diver *Gavia stellata*;
- kingfisher *Alcedo atthis*;
- quail Coturnix coturnix.

8.3.5.39 Results for breeding Annex 1 species noted on Northumbria Coast SPA includes little tern and arctic tern, along with non-breeding turnstone, purple sandpiper.

8.3.5.40 Little tern, purple sandpiper, and ruff are all qualifying features of the Northumbria Coast SPA and Ramsar, and the Teesmouth and Cleveland Coast SPA and Ramsar.

8.3.5.41 A further 14 SPI with breeding evidence were also recorded within 2km of the MHPGC Project Scoping Boundary. These were bullfinch *Pyrrhula pyrrhula*, curlew, dipper *Cinclus cinclus*, dunnock *Prunella modularis*, grasshopper warbler, greenfinch *Carduelis chloris*, kestrel, lapwing, linnet *Carduelis cannabina*, meadow pipit *Anthus pratensis*¸ mistle thrush *Turdus viscivorus,* oystercatcher, reed bunting *Emberiza schoeniclus* and skylark *Alauda arvensis.*

Initial Site Walkover

8.3.5.42 The initial site walkover identified habitats such as grassland, woodland, coastal habitats, waterbodies and watercourses where there is potential for Schedule 1, SPI and other qualifying species previously noted. An assessment of the potential for breeding Schedule 1 species to be present was made using desk study data, habitat present and the known geographical range. The species identified were kingfisher, barn owl and Cetti's warbler.

8.3.5.43 No potential for nesting Annex 1 species associated with Northumbria Coast SPA (little tern and arctic tern) was noted.

8.3.5.44 Potential was noted for wintering Annex 1 species associated with Northumbria Coast SPA (purple sandpiper and turnstone) in the areas of the proposed cable landfall.

Breeding and non-breeding bird surveys

8.3.5.45 Thirty-one SPI were noted as possible, probable or confirmed breeding during the surveys for breeding birds in 2023. No breeding evidence for Schedule 1 species was noted. No breeding qualifying species associated with Northumbria Coast SPA or Ramsar, or Teesmouth and Cleveland Coast SPA or Ramsar were recorded.

8.3.5.46 Two breeding seabirds; fulmar and kittiwake, were recorded within or adjacent to the central landfall. Moorhen *Gallinula Chloropus* and lapwing were the sole breeding wetland species.

8.3.5.47 The remaining twenty-seven SPI recorded with breeding evidence were woodland and farmland species: bullfinch, chaffinch *Fringilla coelebs*, dunnock, cuckoo *Cuculus canorus*, grasshopper warbler, greenfinch, house sparrow *Passer domesticus* , kestrel, lesser whitethroat *Sylvia curruca* , linnet, mistle thrush, meadow pipit, grey partridge *Perdix perdix*, reed bunting, skylark, sedge warbler *Acrocephalus schoenobaenus* , sparrowhawk *Accipiter nisus*, swallow *Hirundo rustica*, sand martin *Riparia riparia* , song thrush Turdus philomelos, tree sparrow *Passer montanus*, whitethroat, wood pigeon *Columba palumbus* , willow tit *Poecile montanus* , willow warbler, yellowhammer and yellow wagtail *Motacilla flava*.

8.3.5.48 Thirty-five SPI were recorded as using the survey are during the non-breeding surveys. No wintering or passage species noted as qualifying features on the Northumbria Coast or Teesmouth and Cleveland Coast SPA or Ramsar were recorded.

8.3.5.49 Twelve wetland and waterbird species were recorded that could be associated with the waterbird assemblage of Northumbria Coast Ramsar or Teesmouth and Cleveland Coast Ramsar and SPA. These species were black-headed gull, common gull, curlew, gadwall, herring gull, lesser black-backed gull, lapwing, moorhen, oystercatcher, snipe, teal and wigeon.

8.3.5.50 Twenty-three woodland and farmland SPI species were recorded: bullfinch, chaffinch, dunnock, fieldfare, greenfinch, kestrel, linnet, redpoll (lesser) *Acanthis sp.*, mistle thrush, meadow pipit, grey partridge, reed bunting, redwing, rook *Corvus frugilegus*, skylark, stock dove *Columba oenas*, starling *Sturnus Vulgaris* , sparrowhawk, song thrush, tree sparrow, wood pigeon, willow tit and yellowhammer.

Fish

Desk Study

8.3.5.51 The desk study did not return records of any fish species within 2km of the MHPGC Project Scoping Boundary.

Initial Site Walkover

8.3.5.52 Despite the findings of the desk study, outlined above, the initial site walkover identified aquatic habitats that potentially support fish populations which may require further assessment.

Aquatic Macroinvertebrates

Desk Study

8.3.5.53 The desk study returned records from Environment Agency aquatic macroinvertebrate sampling conducted within 2km of the MHPGC Project Scoping Boundary. The closest records are from surveys conducted on a stretch of Hawthorn Burn, approximately 600m from the MHPGC Project Scoping Boundary.

8.3.5.54 The most recent survey at this monitoring location was conducted in spring 2018. A total of 22 taxa were recorded in the survey. No legally protected species were identified, however, one INNS, the New Zealand mud snail *Potamopyrgus antipodarum* was recorded. Although the data returned is more than five years old, it is likely to provide an indication of aquatic macroinvertebrates present, and therefore is retained for consideration in this report. However, further surveys will update this baseline data.

Initial Site Walkover

8.3.5.55 The initial site walkover identified aquatic habitats that are likely suitable to support aquatic macroinvertebrate populations.

Macrophytes

Desk Study

8.3.5.56 The desk study returned records from Environment Agency macrophyte surveys conducted within 2km of the MHPGC Project Scoping Boundary. The closest records are from surveys conducted on a stretch of Hawthorn Burn, approximately 700m from the MHPGC Project Scoping Boundary. The most recent survey at this monitoring location was conducted in summer 2015. A total of 14 taxa were recorded in the survey. No legally protected nor any invasive non-native species were recorded in the survey. Although the data returned is more than five years old, it is likely to provide an indication of macrophytes present, and therefore is retained for consideration in this report. If required, further surveys will update this baseline data.

Initial Site Walkover

8.3.5.57 The initial site walkover identified aquatic habitats that are likely suitable to support macrophyte populations.

Ponds

Desk Study

8.3.5.58 No fish, aquatic macroinvertebrate, nor any macrophyte survey data were returned for ponds within the MHPGC Project Scoping Boundary.

Initial Site Walkover

8.3.5.59 Despite the findings of the desk study, outlined above, the initial site walkover identified waterbodies that are likely suitable to support aquatic species, which may require further assessment.

8.3.6 Potential Impacts of the Morven Hawthorn Pit Grid Connection Project

8.3.6.1 Based on the preliminary baseline information available at this stage (see section 8.3.5), the MHPGC Project design (see Chapter 3: Project Description, of the Scoping Report) and consideration of the designed in environmental measures (see Table

8.44), a scoping exercise has been undertaken to identify those ecological features which are potentially present within the ZoI and sensitive to the potential effects of the MHPGC Project.

8.3.6.2 At this stage, all effects, as set out in Table 8.42, are scoped into the assessment for those biodiversity features outlined in the 'Baseline Environment' section of this chapter. Each effect is accompanied by a justification for its inclusion for further assessment based on professional judgement and reference to specific guidance criteria.

8.3.6.3 Where protected species are present and there is the potential for a breach of the legislation, those species are considered to be 'important' features. Except for such species receiving specific legal protection, or those subject to legal control (e.g. certain invasive non-native species). All ecological features determined to be of negligible importance are scoped out of the assessment.

8.3.6.4 It should be noted that depending on the results of the further surveys, the features outlined in this chapter may change. Scoping is an iterative process, and this preliminary scoping will be refined in the EIA Report/Environmental Statement (ES) where relevant and necessary based on further baseline data gathering, refinement of the MHPGC Project design, the Scoping Opinion and other ongoing consultation with relevant technical bodies.

Table 8.42: Impacts Proposed to be Scoped in to the Morven Hawthorn Pit Grid Connection Project Assessment for Terrestrial Ecology and Ornithology

*Project phase refers to construction (C), O&M (O) and decommissioning (D).

Impact	Project Phase*			Justification	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D			
Temporary and permanent impacts, both direct and indirect, to habitats and species within the MHPGC Project Scoping Boundary and relevant ZoIs	✓	×	×	Site clearance and groundworks including cable trenching, trenchless installation methods and grounds works at the Land Substation (LSS) and landfall as well as general construction activities throughout the MHPGC Project have the potential to result in these effects.	Data collection during the desk study, habitat survey and protected species surveys.	Habitat and protected species surveys within the Zone of Influence will identify the baseline environment.
Potential damage, degradation or loss of habitats within designated conservation sites	✓	×	×	These works have the potential for habitat fragmentation through working areas creating barriers to species dispersal, including protected and/or notable species, and species listed on designated site citations and land take involving the direct removal and/or degradation of	Data collection during the desk study, habitat survey and protected species surveys.	Habitat and protected species surveys within the Zone of Influence will identify the baseline environment

Impact	Project Phase*			Justification	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D			
				irreplaceable, protected or notable habitats.		
Disturbance of Schedule 1 breeding birds, other protected and/or notable species, SAC/SPA/Ramsar qualifying features and SSSI designated species using designated sites and/or functionally linked land.	✓	✓	✓	Construction and O&M as well as decommissioning activities at the LSS have the potential to result in noise, vibration, visual disturbance, physical activities, air pollution and water pollution which could result in these effects. Security lighting could also result in light pollution and disturbance effects.	Data collection during the desk study, ornithology surveys and analysis of relevant Scoping Report.	Potential impacts will be assessed following the relevant baseline surveys.
Habitat fragmentation and impacts on species dispersal, including protected and/or notable species, and species listed on designated site citations. Direct	✓	×	×	Such impacts could result from construction working areas acting as barriers to species dispersal and, and land take resulting in direct removal of irreplaceable, protected or notable habitats.	Data collection during the desk study and habitat survey.	Mapping of proposed fragmentation and land take.

Impact	Project Phase*			Justification	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D			
removal and/or degradation of irreplaceable, protected or notable habitats.						
Spread of INNS	✓	✓	✓	These works have the potential to spread INNS (if present) during activities such as vegetation clearance and vehicle movement.	Data collection during the desk study and habitat survey.	Identification of INNS presence and potential for spread.
Damage or destruction of bird nests, and loss of roosting, breeding, foraging, hibernating or resting habitat of protected and/or notable species	✓	✗	✓	Construction works throughout the MHPGC Project and decommissioning of the substation works have the potential to result in these impacts due to activities such as vegetation clearance.	Data collection during the desk study, habitat survey and protected species surveys.	Habitat and protected species surveys within the Zone of Influence will identify the baseline environment.

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Table 8.43: Impacts Proposed to be 'Scoped Out' of the Morven Hawthorn Pit Grid Connection Project Assessment for Terrestrial Ecology and Ornithology

Impact	Justification
Temporary and permanent impacts, both direct and indirect, to habitats and species and designated sites as a result of decommissioning activities along the cable corridor, including at the landfall.	The cable would be left in situ once decommissioned and therefore any habitats and species and designated sites above or in close proximity to the underground cable would remain undisturbed.

8.3.7 Designed In Measures and Mitigation

8.3.7.1 As part of the project design process, a number of designed in measures (primary and tertiary) will reduce the potential for impacts on Terrestrial Ecology and Ornithology (Table 8.44). Primary measures involve modifications to the location or design of the development made during the pre-application phase that are an inherent part of the MHPGC Project and do not require additional action to be taken. Tertiary measures are 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.

8.3.7.2 As there is a commitment to implement these measures, they are considered inherent to the design of the MHPGC Project. The determination of magnitude and significance will assume the implementation of such measures. Some of these measures are considered standard industry practice for this type of development.

8.3.7.3 The requirement for any additional (secondary) mitigation measures will be dependent on the significance of the effects on shipping and navigation receptors. The requirement for and feasibility of any mitigation measures will be consulted upon with statutory consultees throughout the EIA process.

Table 8.44: Designed in Measures of the Morven Hawthorn Pit Grid Connection Project, Relevant to Terrestrial Ecology and Ornithology

Reference Number	Designed in Measures	Justification	Primary or Tertiary
MM-19	Implementation of a Construction Environmental Management Plan (CEMP) to minimise temporary disturbance to residential properties, recreational users and existing land users and provide details of measures to protect environmental receptors.	To minimise disturbance of watercourses and associated habitats during construction. To monitor the effect of MHPGC the	P

Reference Number	Designed in Measures	Justification	Primary or Tertiary
		Project throughout its lifespan.	
MM-20	Implementation of a CEMP which will set out dust and air quality control management measures which would ensure that any risk of material effects on ecological features from dust emission is negligible.	To avoid and minimise loss to species.	T
MM-31	The MHPGC Project will be subject to standard good practice mitigation measures employed to avoid and minimise potential effects to habitats and species under the supervision of an Ecological Clerk of Works (ECoW) . These would include (but not be exclusive to) the establishment of buffer zones to key habitats and species, seasonally sensitive construction, minimising the removal of vegetation, covering excavations overnight or providing a means of escape, and considered location of works. If necessary, suitable screening around working areas to avoid significant human disturbance.	To avoid and minimise loss to species.	T
MM-36	The use of proven invasive species control and biosecurity measures to avoid the spread of INNS and contaminated materials would be applied.	To avoid the spread of invasive species.	T
MM-39	A lighting design of all temporary and permanent lighting proposed onshore will be developed once contractors are appointed; however, the principles of lighting design will be detailed at the time of application and informed by the joint guidance provided by the Bat Conservation Trust and Institution of Lighting Professionals (2018). The lighting design will take measures to minimise lighting usage, minimise light spill, use most appropriate wave lengths of light and locate lighting in the most appropriate locations. To minimise the impacts of night time lighting during construction and O&M on local residents and protected species.	To minimise the impacts of night time lighting during construction and O&M on local residents and protected species.	P

Reference Number	Designed in Measures	Justification	Primary or Tertiary
MM-48	Where practicable, sensitive sites will be avoided when micro-siting the likely working areas by the temporary and permanent MHPGC Project footprint, including Special Protection Areas (SPAs), Special Areas of Conservation (SACs), SSSIs, National Nature Reserve (NNR), Local Nature Reserves, Local Wildlife Sites, Ancient Woodland, RSPB reserves, HPI and areas of consented development.	To avoid and minimise loss to sites and species.	T
MM-100	Vegetation (Trees/Woodland/Hedgerows) will be mapped (Vegetation Retention Plan or similar) to inform the construction works and retained where practicable. Ancient woodland will be retained with a minimum buffer of 25m from any surface construction works (>6m depth from trenchless installation). With regards to other woodland/trees, construction works will be reduced, where practical, to minimise tree loss and ensure protection of root zones. Hedgerows with trees/tree lines (including hedgerows deemed "important"" under the Hedgerows Regulations 1997) which are crossed by the onshore export cable route will be notched (where practicable) to reduce landscape impacts. Vegetation may be coppiced/pruned rather than fully removed to allow access and visibility splays at junctions.	To minimise the loss of and damage to vegetation (Trees/Woodland/Hedgerows).	P
MM-101	Vegetation removal will be undertaken in line with British Standard (BS) 5837-2012 (Trees in relation to design, demolition and construction) including any root protection measures.	To minimise the loss of and damage to vegetation (Trees/Woodland/Hedgerows).	T
MM-102	Onshore condition surveys and inspections of vegetation to be retained (trees, hedgerow, woodland) will be undertaken before, during and after the construction phase. If damage has been identified during the construction phase, the damage will be repaired.	To minimise the loss of and damage to vegetation (Trees/Woodland/Hedgerows).	T
MM-103	The Landscape and Ecological Management Plan (LEMP) will be developed to reinstate	To avoid and minimise loss to	T

Reference Number	Designed in Measures	Justification	Primary or Tertiary
	landscape and ecological elements (e.g. trees, woodland and hedgerows) which have been removed as a result of construction works, including construction compounds and construction access. The LEMP will be developed to mitigate landscape and visual effects and where possible, protect landscape character, key characteristics and elements, and enhance landscape quality through use of sustainable landscape design techniques. In relation to landscape, attention will be given to species selection and landscape patterns within each Landscape Character Areas (LCA)/habitat type. Trees cannot be planted above the cable, but hedgerows and grassland can be reinstated. The LEMP is likely to include the following measures: • Areas of temporary vegetation loss will be reinstated at the first available planting/seeding season following completion; • Reinstatement of vegetation will seek to provide landscape enhancement. Opportunities for enhancement will be identified following further evolution of the MHPGC Project design and with stakeholder engagement. All new planting will be subject to a five-year establishment period with appropriate maintenance and ongoing management. The final form of the onshore substation will be finished to a good standard of design, using quality materials and integrated into the surrounding environment through the adoption of a robust, sustainable landscape planting strategy, taking account of the landscape character and related environmental receptors.	habitats of biodiversity value.	
MM-105	Habitat connectivity to be retained wherever practicable by maintaining links within and to green corridors such as hedgerows and watercourses. Where effects on connectivity	To avoid and minimise loss to ecological functionality.	T

Reference Number	Designed in Measures	Justification	Primary or Tertiary
	are unavoidable, where practicable, the affected habitat would be artificially supplemented by, for instance the creation of temporary brash hedges as appropriate. For watercourses, channel and banks will be reinstated to mimic baseline conditions as far as practicable.		

8.3.8 Proposed Assessment Methodology

8.3.8.1 The proposed generic project-wide approach to the assessment methodology is set out in Chapter 4: EIA Methodology, of the Scoping Report. However, whilst this informs the approach that will be used, it is necessary to set out how this methodology will be applied, and adapted as appropriate, to address the specific needs of the biodiversity assessment in the EIA Report/ES. Cumulative effects resulting from the MHPGC Project and other developments will also be assessed.

8.3.8.2 The assessment methodology will be undertaken in accordance with the CIEEM Ecological Impact Assessment (EcIA) guidelines (CIEEM, 2018, updated 2019). These guidelines represent the current best practice for assessing the ecological impact of development projects. Other industry best practice guidance that will be followed when undertaking the assessment is referenced in Section 8.3.2.

8.3.8.3 Consideration will also be given to standard EIA terminology, where the significance level attributed to each effect has been assessed based on the sensitivity of the affected Important Ecological Features (IEFs) and the magnitude of change arising from the MHPGC Project. The sensitivity of the affected feature is assessed on a scale of very high, high, medium, low, and negligible (as summarised in Table 8.45), and the magnitude of change is assessed on a scale of large, medium, small, negligible and no change.

8.3.8.4 The assessment of likely significant environmental effects as a result of the MHPGC Project will consider the construction, O&M and decommissioning phases. The impact process involves:

- identifying and characterising project activities and their likely effects;
- incorporating measures to avoid and mitigate adverse effects;
- assessing the significance of any residual effects after embedded mitigation;
- identifying appropriate additional mitigation measures and any compensation measures to offset significant residual effects;
- identifying opportunities for ecological enhancement.

8.3.8.5 This assessment will be presented in the form of the EIA Report/ES chapter and adjacent assessments.

8.3.8.6 The assessment includes potential impacts on each feature identified as an IEF (discussed below), identifying potential impacts and effects during the construction, O&M and decommissioning phases of the MHPGC Project, with impacts and effects characterised in accordance with the following criteria:

- positive or negative: whether the effect would improve or reduce the quality of the baseline habitat present;
- extent: the spatial or geographical area over which the effect may occur;
- magnitude: the size, amount, intensity or volume of the effect, defined on a quantifiable basis, such as an area or percentage of habitat to be lost;
- duration: the length of time an effect is expected to last, relative to the particular timeframe for the species or habitat being considered and defined in Chapter 4: EIA Methodology as short-, medium- or long-term and permanent or temporary. Short-term is considered to be up to one year; medium-term is considered to be between one and 10 years and long-term is considered to be greater than 10 years;
- frequency and timing: the frequency of a particular activity may change its effect, (e.g. one-off or infrequent disturbance is less likely to significantly affect a particular species present within a habitat, whereas regular disturbance is more likely to have a significant effect). Similarly, the effect of a particular activity may change significantly depending on its timing, (e.g. tree felling outside of bird nesting season is highly unlikely to directly impact nesting birds, whereas carrying out the same work within nesting season is more likely to have an effect);
- reversibility: an irreversible (permanent) effect is one from which recovery is not possible within a reasonable timescale or there is no reasonable chance of action being taken to reverse it. A reversible (temporary) effect is one from which spontaneous recovery is possible or which may be counteracted by mitigation.

Determining Importance

8.3.8.7 A number of characteristics contribute to the importance of ecological features. These include, for example (but not exclusively):

- the rarity of a species or habitat;
- legal protection or conservation status;
- ability to resist or recover from environmental change;
- whether the species population size is notable in a wider context;
- the richness of assemblages of plants and animals;
- the presence of species on the edge of their range, particularly where their distribution is changing as a result of global trends and climate change.

8.3.8.8 The CIEEM guidelines (CIEEM, 2018, updated 2019) state that ecological features should be considered within a 'defined geographical context' (i.e. spatial scale), with international importance being the highest level, followed by international and European; national; regional; metropolitan, county, vice-county or other local

authority-wide areas; river basin district; estuarine system/coastal cell; and local importance representing the lowest level.

8.3.8.9 Assigning importance to ecological features is based on professional judgement informed by available guidance, information and expert advice.

8.3.8.10 Table 8.45 gives an example classification and sensitivity of ecological features. The level of sensitivity assigned to an IEF is related to its level of importance and the characteristics of the IEF.

Table 8.45: Example Classification and Sensitivity of Important Ecological Features

Scale at which a Feature is Important	Sensitivity	Criteria Examples
International.	Very High.	An internationally designated site (e.g. SAC, SPA), or site meeting criteria for international designation. Species present in internationally important numbers (>1% of biogeographic population).
National (England/UK).	High.	A nationally designated site (SSSI or NNR), or sites meeting the criteria for national designation. Species present in nationally important numbers (>1 % of UK population). Viable areas of priority habitat listed on Annex I of the Habitats Directive and smaller areas of such habitat that is essential to maintain the viability of that ecological resource.
Regional (northeast).	Medium.	Regionally significant and viable areas of key habitat identified as being of regional value. Species present in regionally important numbers (e.g. >1 % of the UK population), and regionally important populations of a species.
County/Borough.	Medium.	LNRs. Habitat areas and species present in populations considered identified as being important at the county scale (for example those identified by the Durham Local Plan, Durham Local Biodiversity Action Plan (LBAP) and Sunderland Local Plan.

Scale at which a Feature is Important	Sensitivity	Criteria Examples
District.	Low.	Non-statutory designated sites, (e.g. LWSs (depending on circumstances)). Habitats considered to be important at the district level and populations of a species considered to be important at the district level.
Local (surrounding areas).	Low.	Non-statutory designated sites, (e.g. LWS (depending on circumstances)). Areas of ancient semi-natural woodland less than 0.25ha in size. Areas of habitat or species considered to appreciably enrich the ecological resource within a local context, (e.g. species-rich flushes or hedgerows).
Site.	Negligible.	Usually widespread and common habitats and species.

Significance of Effect Criteria

8.3.8.11 The CIEEM guidelines define a significant effect in the context of an EcIA as "an effect that either supports or undermines biodiversity conservation objectives for important ecological features or for biodiversity in general". Significant effects, as defined by the CIEEM guidelines, are determined by assessing any deviation in the baseline conditions of a feature of ecological importance that may occur as a result of individual and cumulative impacts during the construction, O&M and decommissioning phases of the MHPGC Project. These effects will be expressed in terms of geographical scale (as outlined in Table 8.46); however, the geographical scale at which an effect is significant can vary from the geographical importance of the ecological feature being assessed. In accordance with the CIEEM guidelines, this will be a function of the assessment.

8.3.8.12 Effects will be defined as either 'significant' or 'not significant'. The assessment will use the CIEEM methodology to describe all significant effects on features of ecological importance.

8.3.8.13 Significant effects will be determined through professional judgement and significance will be concluded as either 'Negligible', 'Minor', 'Moderate' or 'Major', as outlined in Table 8.46. For each IEF, the significance would also be determined as either 'beneficial' or 'adverse'.

Table 8.46: Scale and Significance of Residual Effects

Geographic Scale of Significance in Line with the CIEEM Guidelines	Category of Significant Effect
International, National (England/UK) or Regional (North East).	Major: where the MHPGC Project is likely to cause a considerable change from the baseline conditions and the feature has limited adaptability, tolerance or recoverability or is of the highest sensitivity.
Regional (North East), County/Borough, District.	Moderate: where the MHPGC Project is likely to cause either a considerable change from the baseline conditions at a feature which has a degree of adaptability, tolerance or recoverability or a less than considerable change at a feature that has limited adaptability, tolerance or recoverability.
Local (surrounding areas).	Minor: where the MHPGC Project is likely to cause a small but noticeable change from the baseline conditions on a feature which has limited adaptability, tolerance or recoverability, or is of the highest sensitivity or a considerable change from the baseline conditions at a feature which can adapt, is tolerant of the change or/and can recover from the change.
Effects on features of Site-scale importance or limited effects on features of greater importance. No significant effects on key nature conservation features.	Neutral/Negligible: no perceptible change.

8.3.8.14 As set out in Chapter 4: EIA Methodology, effects that are classified as Moderate or Major are considered significant for the purpose of the EIA Report/ES. Effects classified as below Minor or Neutral/Negligible are considered not significant.

Other Assessments

Habitat Regulations

8.3.8.15 In line with the Planning Inspectorate's Advice Note 10 (Planning Inspectorate, 2022) the relevant Secretary of State is the competent authority for the purposes of the Habitats Regulations under the Planning Act. The Habitats Regulations require competent authorities, before granting consent for a plan or project, to carry out an Appropriate Assessment in circumstances where the plan or project is likely to have a significant effect on a European site (either alone or in-combination with other plans or projects). A separate Habitats Regulations Assessment will be submitted along with the DCO application.

Biodiversity Net Gain

8.3.8.16 Biodiversity net gain is the end result of a process applied to development so that, overall, there is a positive outcome for biodiversity. The process follows the mitigation hierarchy, which sets out that measures must be taken to firstly avoid, secondly minimise and thirdly restore/rehabilitate losses of biodiversity on a site. Once on site habitat creation/enhancement opportunities are exhausted, off-site locations will be considered to achieve the BNG targets. Only as a last resort, if BNG targets cannot be met, will the purchase of statutory credits be considered. The provision of BNG is not currently mandatory (it is expected to be mandatory from November 2025) under the Environment Act 2021 for projects requiring Development Consent, under the Planning Act. The MHPGC Project will be compliant with the regulatory requirements.

Further Surveys

Baseline

8.3.8.17 The Terrestrial Ecology and Ornithology Study Area for the biodiversity assessment and the features present have been identified as far as reasonably practicable at this stage, based on available information. However, as a portion of initial survey work (Table 8.37) is completed and the assessment progresses, the findings may reveal the need for further surveys to determine potential likely significant effects to ecological features more accurately. Any further survey requirements would be clearly identified following the completion of initial survey work. Based on the desk study and field surveys to date, further survey works that are considered to be potentially required are included in Table 8.47. Where relevant, the scope and methodology of any further survey work will be discussed with NE and other relevant statutory consultees.

8.3.8.18 This programme will be regularly reviewed in the light of the results of the surveys, ongoing consultation and the evolution of the design of the MHPGC Project.

8.3.8.19 The surveys set out in Table 8.47 are expected to commence in 2024 to inform the scope and assessment of potentially significant effects on ecological features. The proposed field survey programme is based on the results of the desk study and good practice survey guidance. The approach to surveys will be kept under review based on emerging survey results and evolving design of the MHPGC Project, therefore the type and scope of surveys may be subject to change.

Table 8.47: Field Survey Programme

Survey	Summary	Coverage of Terrestrial Ecology and Ornithology Study Area
Terrestrial Ecology		
Surveys currently planned		
Habitat survey - UKHab NVC Plants (protected).	A UKHab survey following best practice guidance (UKHab Ltd, 2023) will be undertaken during 2024 to provide general information on the type and distribution of habitats present, to establish baseline conditions. Distinct habitat types and parcels will be identified and mapped. A habitat condition assessment (HCA) will be undertaken for each distinct habitat type/parcel in accordance with the condition criteria provided in the technical guidance that accompanies the Statutory Biodiversity Metric (Defra, 2023b). As the standard UKHab survey methodology is, in the main, concerned only with identifying habitat types, the survey will be extended to allow for the provision of information on other ecological features, particularly to identify the presence/potential presence of legally protected species or habitat with suitability for them. An initial site walkover was undertaken in March 2023 to inform the Scoping Report and the requirement for additional feature-specific surveys. The optimal season for UKHab surveys is April to October (weather depending) (i.e. when plants are more readily identifiable during the growing season). The optimal time for undertaking HCA is during the core growing season from May to September, therefore HCA will be undertaken during this period.	Surveys will focus within the MHPGC Project Scoping Boundary and a surrounding 30m buffer. HCA will only be undertaken within the MHPGC Project Scoping Boundary. Where necessary/appropriate, the UKHab survey may be extended locally to include an additional feature-specific buffer (e.g. to map habitat connectivity between the MHPGC Project Scoping Boundary and an off-site feature such as pond which is potentially suitable for GCN).

Survey	Summary	Coverage of Terrestrial Ecology and Ornithology Study Area
	The results of the desk study and aerial imagery suggest that there could be HPI within the MHPGC Project Scoping Boundary. This will be confirmed during the UKHab survey. Should any habitats be identified, that may qualify as HPIs or support plant species which are SPI or otherwise notable, and which could be subject to loss or degradation due to the MHPGC Project, detailed botanical surveys may be undertaken in line with the NVC Users' Handbook (Rodwell, 2006).If required, surveys will focus on targeted areas where direct land take and indirect effects may occur (this will be dependent on the habitat type potentially affected). The survey will record incidental records of INNS.	
Hedgerow survey.	An initial assessment of hedgerows will be made during the UKHab survey to assess whether any of the hedgerows have the potential to classified as 'important' under the Hedgerows Regulations 1997. Those hedgerows identified as having sufficient potential and likely to be impacted by the MHPGC Project will undergo a more detailed assessment, including, size, number of woody species, associated features, connections and flora. The ecological importance of the hedgerow will subsequently be assessed against the set criteria within the Regulations.	Surveys will focus within the MHPGC Project Scoping Boundary and a surrounding 30m buffer.

Survey	Summary	Coverage of Terrestrial Ecology and Ornithology Study Area
Badger surveys.	A badger survey will be undertaken to record evidence of badger including setts, foraging pits, footprints, dung pits/latrines and mammal paths. Where setts are encountered, the sett type (main, annexe, outlier, subsidiary) and status (well used, partially used, disuse) will be determined if possible. These surveys will be completed in line with best practice guidance (Harris *et al*., 1989; Roper, 2010; Andrews, 2013; Scottish Natural Heritage, 2003).	Surveys will focus on suitable habitat and boundary features within a 30m buffer surrounding the MHPGC Project Scoping Boundary, undertaken in conjunction with the UKHab survey.
Bat surveys.	Bat surveys would be undertaken in accordance with best practice guidance (Reason and Wray, 2023; Collins, 2023; Institution of Lighting Professionals and Bat Conservation Trust, 2018). A daytime bat walkover (DBW) will be undertaken during the UKHab survey to assess the quality of habitats for commuting, foraging, and roosting bats, and will inform if further detailed surveys are required. Where potential roost locations are identified during the DBW, and there is potential for direct or indirect effects from the MHPGC Project, a preliminary roost assessment (PRA) of buildings, structures and underground site, and ground level tree assessment (GLTA), will identify the suitability of built structures and trees respectively for roosting bats. The results of these surveys will enable the scoping of any subsequent bat roost (presence/likely absence) surveys that may be required with a view to identifying potential or confirmed bat roosts. If required, bat roost surveys would consist of emergence	Surveys will be targeted within a 50m buffer surrounding the MHPGC Project Scoping Boundary (reflecting potential for indirect effects).

Survey	Summary	Coverage of Terrestrial Ecology and Ornithology Study Area
	surveys and/or climbing inspection surveys in line with best practice guidance. Night time bat walkover (NBW) surveys and automated/static monitoring surveys will record bat activity and target areas of potential key bat habitat features which could be affected by the MHPGC Project.	
GCN surveys.	The desk study and a preliminary walkover survey undertaken during the UKHab survey will assess the quality of terrestrial and aquatic habitats for GCN and will inform if further surveys are required. As outlined in Section 8.3.4, the desk study identified potentially suitable waterbodies for GCN. The approach to GCN surveys, assessment and mitigation is yet to be decided pending discussions with Natural England regarding the use of District Level Licensing (DLL). Conventional GCN survey methodology and mitigation can be used as an alternative to DLL, or to supplement the of DLL. Those waterbodies which are within the ZoI and have connectivity to the MHPGC Project are being considered for further assessment and GCN surveys subject to habitat suitability index (HSI) assessment (Oldham *et al*., 2000; Amphibian and Reptile Groups of the United Kingdom, 2010) to determine their level of suitability for GCN. Once the suitability of ponds has been determined, a cost-benefit analysis would be undertaken to determine whether DLL or conventional surveys/assessment/mitigation would be most appropriate for the MHPGC Project.	Suitable water bodies up to 250m surrounding the MHPGC Project Scoping Boundary (reflecting the distance within which the majority of adult GCN ordinarily remain around breeding ponds (Langton *et al*., 2001), and where waterbodies are not separated from work areas by barriers to GCN dispersal). This may increase to 500m depending on survey findings and where there is potential for GCN to use habitat which is more distant from ponds (e.g. where there is good habitat connectivity with waterbodies which are optimal for GCN) which could be affected by the MHPGC Project.

Survey	Summary	Coverage of Terrestrial Ecology and Ornithology Study Area
	If required, the approach to conventional surveys would be to undertake presence/likely absence surveys using environmental DNA (eDNA) (Biggs *et al.*, 2014) for all waterbodies achieving an HSI score of 'below average' or above. If presence of GCN is confirmed, the requirement for population size-class assessment (PSCA) surveys (English Nature, 2001; Natural England 2015) would be determined based on a review of the potential impacts of the MHPGC Project in accordance Natural England guidance on the required survey effort to inform a licence application[23].	
Otter surveys.	Aerial imagery shows the presence of waterbodies and watercourses within 250m of the MHPGC Project Scoping Boundary. Otter surveys will be undertaken in line with best practice guidance (Chanin, 2003) at those waterbodies, ditches and watercourses up to a 250m buffer identified as providing potentially suitable habitat for this species, where there is potential for significant effects.	Surveys will focus on suitable waterbodies, watercourses, and ditches up to a 250m buffer surrounding the MHPGC Project Scoping Boundary.
Water vole surveys.	Aerial imagery shows the presence of waterbodies and watercourses within 10m of the MHPGC Project Scoping Boundary. Water vole surveys will be in line with best practice guidance (Dean *et al.*, 2016). This will involve two survey visits (one during spring and one during summer) unless a single visit survey can be justified in line with best practice guidance.	Surveys will focus on suitable watercourses and waterbodies within 10m of the MHPGC Project Scoping Boundary.
Further surveys considered potentially required		

[23] As set out in the Natural England template for great crested newt method statement for EPS licence application.

Survey	Summary	Coverage of Terrestrial Ecology and Ornithology Study Area
Reptiles.	Should the UKHab survey identify habitats with the potential to support substantial populations and/or rare species of reptiles, presence/likely absence and population class size assessment surveys may be required in accordance with good practice guidance (Gent and Gibson, 2003; Froglife, 1999).	Where required, surveys will target areas of habitat within the MHPGC Project Scoping Boundary which are suitable to support substantial populations of reptiles.
SPI vertebrate surveys.	Should the UKHab survey identify areas of proposed habitat loss within the MHPGC Project Scoping Boundary which are suitable to support substantial populations of SPI species, surveys would follow best practise guidance which is dependent on the species or selection of species targeted.	Where required, surveys will target areas of habitat within the MHPGC Project Scoping Boundary which are suitable to support substantial populations of SPI vertebrate species.
Terrestrial invertebrate surveys.	Should the UKHab survey identify habitats with the potential to support important species or assemblages of SPI invertebrate species in areas likely to be subject to significant effects, these areas would be surveyed further. Invertebrate survey scope and methods vary between species. In determining site specific survey details, account will be taken of known records, habitat mix, landscape features and potentially significant effects. Survey methods will reflect standard guidance and could include, for example, direct observation, sweep netting, hand searching and pitfall traps. If required, surveys would follow best practise guidance which is dependent on the species or selection of species targeted.	Where required, surveys will target areas of habitat within the MHPGC Project Scoping Boundary which are suitable to support important species or assemblages of SPI invertebrates.

Survey	Summary	Coverage of Terrestrial Ecology and Ornithology Study Area
Ornithology		
Surveys completed		
Non-breeding season surveys.	As outlined in Table 8.37, non-breeding season surveys were completed between October 2023 and March 2024.	See Table 8.37.
Breeding season surveys.	As outlined in Table 8.37, breeding season surveys were completed between April and June 2023 . It is recommended that the survey data is kept up to date and that surveys are repeated in 2025. An assessment of the potential for breeding Schedule 1 species to be present was made using desk study data, habitat present and the known geographical range. The species identified were kingfisher, barn owl and Cetti's warbler. The six-visit survey approach that has been undertaken (see Table 8.37) is considered sufficient to robustly assess the breeding status of these species within the Terrestrial Ecology and Ornithology Study Area .	See Table 8.37.
Freshwater		
Further surveys considered potentially required		
White-clawed crayfish.	If required, surveys will be focused on watercourses/waterbodies assessed to be suitable during the UKHab survey. Surveys would follow best practice guidance (Marshall and Nightingale 2022; JNCC, 2015) and may include presence/likely absence surveys using eDNA and common standards monitoring (CSM).	Where required, surveys will focus on suitable watercourses up to a 30m buffer surrounding the MHPGC Project Scoping Boundary.

Survey	Summary	Coverage of Terrestrial Ecology and Ornithology Study Area
Fish.	Aerial imagery shows the presence of waterbodies and watercourses within the MHPGC Project Scoping Boundary. Surveys will be conducted following best practice guidance (Beaumont *et al.*, 2002; Environment Agency, 2001; 2007; British Standards Institution, 2003). This will involve one survey visit (between June and October) for each surveyed watercourse.	Where required, electric fishing surveys will be carried out on watercourses/waterbodies within the MHPGC Project Scoping Boundary deemed suitable to support fish populations.
Aquatic macroinvertebrates.	Aerial imagery shows the presence of waterbodies and watercourses within the MHPGC Project Scoping Boundary. Surveys will be conducted following best practice guidance (Environment Agency, 2014; 2017b; British Standards Institution, 2012). This will involve two survey visits (one during spring and one during autumn) for each sampled watercourse.	Where required, surveys will be carried out on watercourses/waterbodies within the MHPGC Project Scoping Boundary deemed suitable to support aquatic macroinvertebrate populations.
Macrophytes.	Aerial imagery shows the presence of waterbodies and watercourses within the MHPGC Project Scoping Boundary. Surveys will be conducted following best practice guidance (WFD-UKTAG (United Kingdom Technical Advisory Group), 2014). This will involve one survey visit in summer for each surveyed watercourse.	Where required, surveys will be carried out on watercourses within the MHPGC Project Scoping Boundary deemed suitable to support macrophyte populations.
Ponds.	Aerial imagery shows the presence of waterbodies within the MHPGC Project Scoping Boundary. Surveys will be conducted following best practice guidance including pond Predictive System for Multimetrics (PSYM) (Howard, 2002). This will involve one survey visit in summer for each surveyed waterbody.	Where required, surveys will be carried out on waterbodies within the MHPGC Project Scoping Boundary deemed suitable to support aquatic species.

Licensing

8.3.8.20 The findings of the surveys being completed as part of the biodiversity assessment may determine that there are likely significant effects to certain species or species groups that will result from the MHPGC Project.

8.3.8.21 In some instances (such as in relation to bats, badger, otter, or GCN), potential effects to these species may not be legally permissible without first obtaining a licence from NE. Any requirements for licensing would be clearly set out in the various survey reports to be produced, and licences would be applied for and obtained prior to any works being undertaken that would affect the relevant species. The requirements for any protected species licensing would also be captured within the EIA Report/ES and discussed with NE and other relevant consultees where necessary.

Assumptions and Limitations

8.3.8.22 This Scoping Report is based on information available at the time of writing, which will change upon refinement of the cable corridor and landfall option. Information on the MHPGC Project Scoping Boundary and wider ZoI, as well as the design of the MHPGC Project is therefore subject to change.

8.3.8.23 To ensure transparency within the EIA process, the following limitations and assumptions have been identified:

- Where access restrictions within the MHPGC Project Scoping Boundary prevent a full ecological baseline assessment, a precautionary principle will be applied to the assessment (as has been applied to the scoping assessment) of any important terrestrial ecology, ornithology and freshwater features. The precautionary principle will assume a 'reasonable worst case' scenario informed by professional experience and knowledge, desk based information and field-based evidence (where available) for any feature unable to be accessed or fully surveyed. This approach will ensure that appropriate recommendations and/or mitigation are provided even though these may not later be required. Any recommendations and mitigations can thereafter be amended accordingly once access and surveys have been possible;
- A detailed scope for the assessment has been provided as far as feasible at this stage. The scope will be subject to change as a result of the ongoing data collection, consultation, assessment and/or any forthcoming details relating to the MHPGC Project. This may require additional survey effort and/or assessments to be completed in order to accurately determine likely significant effects resulting from the MHPGC Project;
- Records held by local biological record centres and local recording groups are generally collected on a voluntary basis; therefore, the absence of records does not demonstrate the absence of species, it may simply indicate a gap in recording coverage;
- Ecological survey data is typically valid for two years unless otherwise specified, for example if conditions are likely to change more quickly due to ecological processes or anticipated changes in management (CIEEM, 2019).

8.3.9 Potential Cumulative Impacts

8.3.9.1 Cumulative effects with the Morven Offshore Wind Array Project and the second grid connection project in the Branxton area Southeast Scotland will be considered, together with cumulative effects with other developments, where relevant.

8.3.9.2 The cumulative effect assessment will follow the approach outlined in Chapter 4: EIA Methodology.

8.3.10 Potential Inter-related Effects

8.3.10.1 The EIA will consider inter-related effects arising from the MHPGC Project, across their own phases (project lifetime) and different effects on one receptor in one phase (receptor led). The EIA will consider inter-related effects of multiple impacts from the construction, O&M and decommissioning phases of the MHPGC Project, affecting one receptor. Inter-related effects will be assessed through consideration of all effects on a receptor, considering both spatial and temporal overlap, within the MHPGC Project. This will ensure that the MHPGC Project is appropriately considered within the EIA and in line with Chapter 4: EIA Methodology.

8.3.11 Potential Transboundary Effects

8.3.11.1 There are no potential transboundary impacts from terrestrial ecology and ornithology from the MHPGC Project. This is due to any likely significant effects being experienced locally, rather than a wider geographic scale.

8.4 Archaeology and Cultural Heritage

8.4.1 Introduction

8.4.1.1 This chapter of the Scoping Report identifies the onshore archaeology and cultural heritage receptors of relevance to the Morven Hawthorn Pit Grid Connection Project (hereafter referred to as 'MHPGC Project') and considers the potential impacts arising from the construction, operation and maintenance (O&M), and decommissioning of the MHPGC Project. This scoping chapter adopts a proportionate approach to only those impacts with potential to result in likely significant effects and therefore scopes out other impacts where there is evidence that the effects are not likely to be significant. Archaeology and cultural heritage interfaces with the Landscape and Visual Impact Assessment (LVIA) and as such this chapter should be considered alongside Chapter 9.1: Landscape and Visual Impact Assessment (LVIA). The potential impacts on marine archaeology (seaward of Mean Low Water Spring (MLWS)) are described in Chapter 7.10: Marine Archaeology, of this Scoping Report.

8.4.1.2 This chapter covers impacts associated with the onshore components of the MHPGC Project only and is therefore not applicable to Scotland.

8.4.2 Policy and Legislation

8.4.2.1 This section identifies the relevant legislation, policy and other documentation that will inform the assessment of likely significant impacts with respect to onshore archaeology and cultural heritage. Further information on policies relevant to the Environmental Impact Assessment (EIA) and their status is provided in Chapter 2: Policy and Legislation.

8.4.2.2 A summary of the relevant legislation and planning policies is presented in Table 8.48 and Table 8.49.

Table 8.48: Legislation Relevant to Archaeology and Cultural Heritage

Legislation Description	Relevance to the Assessment
Ancient Monuments and Archaeological Areas Act 1979 (United Kingdom (UK) Government, 1979).	
The Ancient Monuments and Archaeological Areas Act sets out that sites considered to be of national importance are required to be compiled in a Schedule of Monuments. These sites are accorded statutory protection. The Act sets out conditions whereby Scheduled Monument Consent is required. This Act also provides for the designation of Areas of Archaeological Interest in which statutory provisions for access to construction sites for carrying out archaeological works apply.	In relation to Scheduled Monuments, the MHPGC Project has the potential to impact on the three Scheduled Monuments that are within the Extended Archaeology and Cultural Heritage Study Area (3km).

Legislation Description	Relevance to the Assessment
Planning (Listed Buildings and Conservation Areas) Act 1990 (UK Government, 1990).	
The Act covers the registration of listed buildings (buildings that are seen to be of special architectural or historic interest) and the designation of Conservation Areas (areas of special architectural or historic interest the character or appearance of which it is desirable to preserve or enhance). It sets out the conditions under which a listed building consent would be required. The Act sets out at Sections 66 and Section 72 the duties of Local Planning Authorities (LPAs) to give great weight to the desirability of preserving listed buildings and their settings and the character of conservation areas in local planning decisions. Equivalent provisions under the Planning Act 2008 are found in the Infrastructure Planning (Decisions) Regulations 2010 (see below).	The MHPGC Project has the potential to impact on the eight listed buildings within the MHPGC Project Scoping Boundary which are covered by the Act. These are all Grade II listed.
Infrastructure Planning (Decisions) Regulations 2010 (UK Government, 2010).	
These regulations require decision makers to have regard to the desirability of preserving a scheduled monument or its setting; listed buildings, any features which contribute to their special interest and their settings and to have regard for the desirability of preserving the character and appearance of conservation areas.	The MHPGC Project has the potential to impact on the eight Grade II listed buildings within the MHPGC Project Scoping Boundary and further listed buildings, scheduled monuments and Conservation Areas within the vicinity of the MHPGC Project which are covered by these regulations.
Treasure Act 1996 (UK Government, 1996).	
This Act defines what constitutes “treasure”. Any find of “treasure” must be reported to the local Coroner.	Objects which constitute treasure under the Act may be encountered during the construction phase of the MHPGC Project.
Treasure (Designation) Order 2002 (UK Government 2002).	
This Order amends the statutory definition of “treasure”.	Objects which constitute treasure under the Order may be encountered during the construction phase of the MHPGC Project.

Legislation Description	Relevance to the Assessment
The Hedgerow Regulations 1997 (UK Government, 1997).	
These regulations set out criteria to be used to determine the importance of hedgerows and protect important hedgerows from removal. Selection criteria include heritage-based considerations.	Hedgerows deemed to be important under the Regulations may be affected through the MHPGC Project.
Burial Act 1857 (UK Government, 1857).	
It is generally an offence to remove human remains from a place of burial without a licence from the Secretary of State.	Human remains may be encountered during construction of the MHPGC Project.
Protection of Military Remains Act 1986 (UK Government, 1986).	
This Act sets out specific protections for aircraft which have crashed or vessels which have sunk or been stranded whilst in military service. It sets out a general prohibition on any disturbance or removal of such remains without a licence granted by the Secretary of State.	There is evidence of 20th century military remains in the form of coastal defences north and south of Seaham and a Cold War ROTOR (an air defence radar system) domestic site west of Hawthorn within the MHPGC Project Scoping Boundary.

Table 8.49: Relevant Planning Policy to Onshore Archaeology and Cultural Heritage

Policy	Context
National Planning Policy	
Overarching National Policy Statement for Energy (NPS-EN1) (Department of Energy and Climate Change, 2023).	Section 5.9 of NPS EN-1 requires change to the significance of heritage assets to be considered in developing an understanding of the potential effects of a project.
National Planning Policy Framework (NPPF) (Ministry of Housing, Communities and Local Government, 2023).	Section 16 of the NPPF is consistent with EN-1. Paragraphs 195-214 relate to the historic environment and its sustainable management with regards to proposed development. It defines heritage assets and why they should be conserved. Plans should set out a positive strategy for the historic environment, with an emphasis on enhancement. In dealing with planning applications, local authorities should require the significance of an asset to be described, including any contribution made by their setting. As a minimum, Historic Environment Record (HER) data should be consulted and, where there is archaeological interest, a Desk Based Assessment (DBA) should be produced. Great weight should

Policy	Context
	be given to the conservation of heritage assets, irrespective of whether potential harm amounts to substantial harm.
Local Planning Policy	
County Durham Local Plan (adopted 2020) (Durham County Council, (2020).	**Policy 44: Historic Environment** Development will be expected to sustain the significance of designated and non-designated heritage assets, including any contribution made by their setting. In determining applications, particular regard will be given to the following: • Scheduled Monuments: the sustainable management of the monument and its setting; • Listed Buildings: respect for the historic form, setting, fabric, materials, detailing, and, any other aspects including curtilage, which contribute to the significance of the building or structure; and the retention of the character and special interest of buildings when considering alternative viable uses; • Conservation Areas: the demonstration of understanding of the significance, character, appearance and setting of the conservation area and how this has informed proposals to achieve high quality sustainable development, which is respectful of historic interest, local distinctiveness and the conservation or enhancement of the asset; the manner in which the proposal responds positively to the findings and recommendations of conservation area character appraisals and management proposals; and respect for, and reinforcement of, the established, positive characteristics of the area in terms of appropriate design (including pattern, layout, density, massing, features, height, form, materials and detailing); • Non-designated heritage assets: a balanced judgement will be applied where development impacts upon the significance and setting of non-designated heritage assets. In determining applications which would affect a known or suspected non-designated heritage asset with an archaeological interest, particular regard will be given to the following: - ensuring that archaeological features are generally preserved in situ; and - in cases where the balanced judgement concludes preservation in situ should not be pursued, it will be a requirement that they are appropriately excavated and

Policy	Context
	recorded with the results fully analysed and made publicly available. **Strategic objective 10: Built and Historic Environment:** Protect and enhance the significance of County Durham's locally, nationally and internationally important built and historic environment, including its wide range of buildings, sites, archaeology, parks and gardens and other heritage assets.
Sunderland Core Strategy and Development Plan 2015-2033 (adopted 2020) (Sunderland City Council, 2015).	**Priority 7: Built and Historic Environment** To protect, sustain and enhance the quality of our built and historic environment and the delivery of distinctive and attractive places. **Policy BH7 Historic Environment** The council will ensure that the historic environment is valued, recognised, conserved and enhanced, sensitively managed and enjoyed for its contribution to character, local distinctiveness and sustainable communities. **Policy BH8 Heritage Assets** Development affecting heritage assets (both designated and non-designated), or their settings should recognise and respond to their significance and demonstrate how they conserve and enhance the significance and character of the asset(s), including any contribution made by its setting where appropriate. Development affecting non-designated heritage assets should take account of their significance, features and setting. **Policy BH9 Archaeology and recording of heritage assets** Development which adversely affects the archaeological interest or setting of a Scheduled Ancient Monument (or non-designated heritage asset of equivalent significance) will be refused planning permission unless exceptional circumstances exist that satisfy the requirements of the NPPF. Where development affects heritage assets of archaeological interest, preference will be given to preservation in situ. However, where loss of the asset is justified in accordance with national policy, the remains should be appropriately archaeologically excavated and recorded, the findings assessed and analysed, the resulting archive report deposited with the Tyne and Wear HER and the physical archive deposited with the relevant collecting museum. Significant findings will also be published in an archaeological journal to make them publicly accessible and to enhance understanding.

8.4.2.3 Guidance relevant to the archaeology and cultural heritage assessment is summarised as follows:

- Planning practice guidance (Ministry of Housing, Communities and Local Government 2024);
- The Setting of Heritage Assets (Historic England, 2017);
- Statements of Heritage Significance (Historic England 2019);
- Standard and Guidance for Historic Environment DBA (Chartered Institute for Archaeologists 2020).

8.4.3 Study Area

8.4.3.1 The Archaeology and Cultural Heritage Study Areas for the assessment of impacts on archaeology and cultural heritage has been defined through consideration of the nature of the onshore element of the MHPGC Project, principally buried cables and a land substation (LSS), and the sensitivity of the archaeology and cultural heritage receptors. The extent of the study areas identified consider other recent UK infrastructure projects with similar above ground elements, and the application of best practice through professional judgement based on landscape context and the nature of heritage assets in the vicinity of the MHPGC Project. The three study areas are:

- The MHPGC Project Scoping Boundary for designated and non-designated heritage assets which may experience a direct physical effect;
- Archaeology and Cultural Heritage Study Area (1km) to inform the assessment of archaeological potential for previously unrecorded archaeological remains within the MHPGC Project Scoping Boundary and establish archaeological and historical context;
- Extended Archaeology and Cultural Heritage Study Area (3km) is applied only for above ground infrastructure (the LSS) for designated built heritage assets which may experience direct effects arising from change within setting. Selected non-designated built heritage assets will also be considered within this study area.

8.4.3.2 The Archaeology and Cultural Heritage Study Area extends 1km from the MHPGC Project Scoping Boundary, within which all the MHPGC Project elements will be located. The Archaeology and Cultural Heritage Study Area (1km) will include all heritage assets above MLWS. The potential impacts on marine archaeology (seaward of MLWS) are described in Chapter 7.10: Marine Archaeology, of the Scoping Report.

8.4.3.3 An Extended Archaeology and Cultural Heritage Study Area of 3km from the LSS Search Area has been defined which will be used to assess permanent and temporary impacts to designated heritage assets and selected non-designated heritage assets, where appropriate, through change within setting. The Extended Archaeology and Cultural Heritage Study Area has been determined though professional judgement following a review of designated heritage assets within 3km of the MHPGC Project Scoping Boundary. The Archaeology and Cultural Heritage Study Areas are shown on Figure 8.18.

8.4.3.4 Consultation with stakeholders will be undertaken to understand the archaeological constraints and concerns more fully, and to discuss those assets which have been

deemed to have potential to experience change to their setting due to the proposed substation.

8.4.3.5 The Archaeology and Cultural Heritage Study Areas will be reviewed and amended in response to refinement of the MHPGC Project Scoping Boundary and LSS Search Area; desk based and site-based analysis, including the development of a Zone of Theoretical Visibility (ZTV) (see Chapter 9.1: Landscape and Visual Impacts (LVIA) for a detailed description of this); and the identification of additional potential impacts through ongoing consultation.

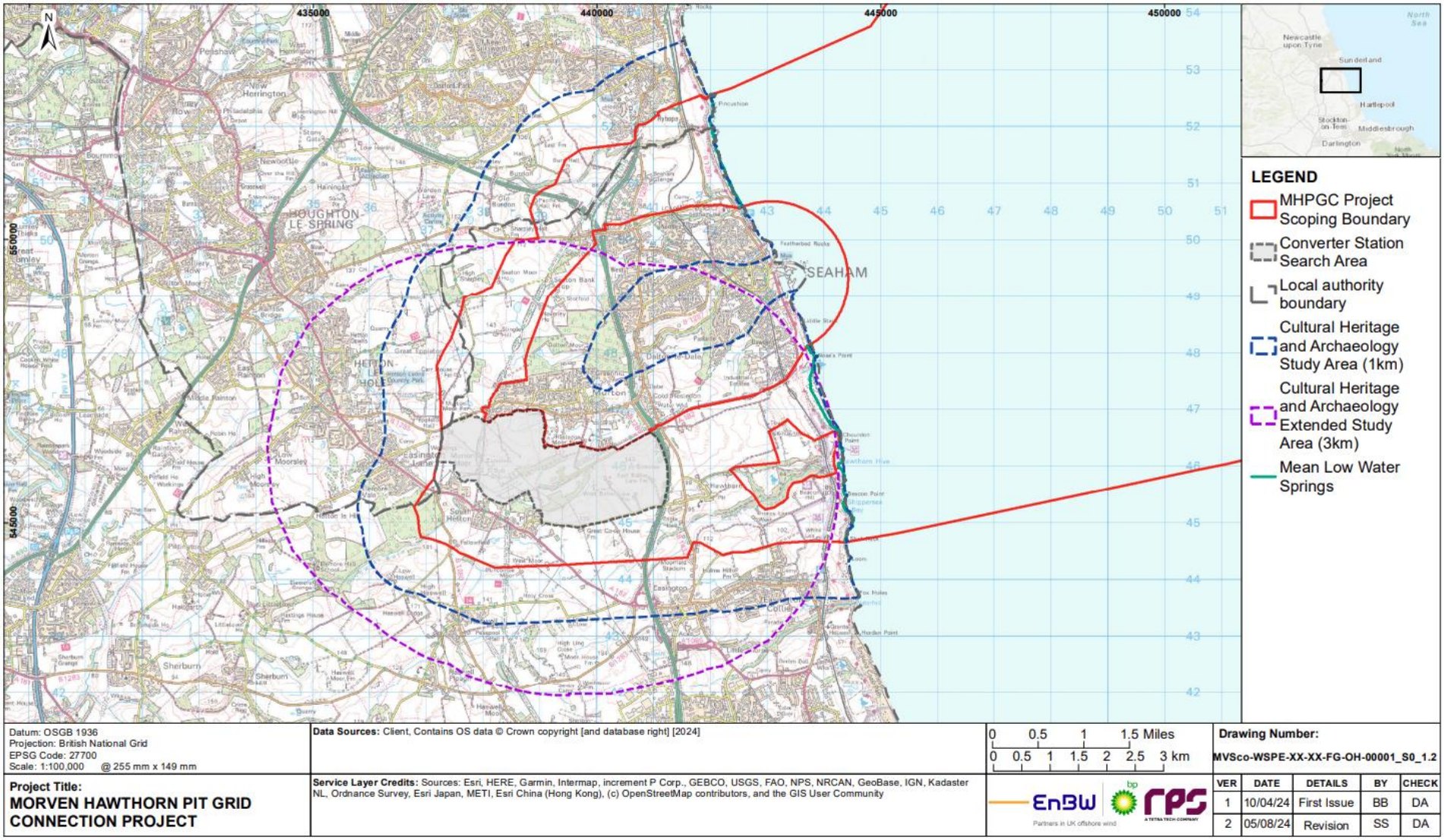


Figure 8.18: The Archaeology and Cultural Heritage Study Areas

8.4.4 Data Sources

8.4.4.1 For this Scoping Report, the archaeology and cultural heritage baseline has been established through a review of the following sources, as shown in Table 8.50.

Table 8.50: Archaeology and Cultural Heritage Data Sources

Title	Source	Year	Author
Open Data Hub.	National Heritage List for England (NHLE) (Historic England, 2024).	2024	Historic England.
Conservation areas.	Historic England, Durham County Council (DCC) and Sunderland City Council (Historic England 2024; DCC 2024a; Sunderland County Council).	2024	Historic England, DCC and Sunderland City Council.
Non-designated heritage assets and archaeological remains and finds, and historic landscape character (HLC) data.	DCC and Tyne and Wear HERs (Durham County Council 2024b; Newcastle City Council 2024).	2024	DCC and Newcastle City Council.
North East Regional Research Framework for the Historic Environment.	North East Regional Research Framework for the Historic Environment (Research Frameworks, 2024).	2024	North East Regional Research Framework.
Maps Home.	National Library of Scotland (NLS) Historic Mapping (National Library of Scotland, 2024).	2024	National Library of Scotland.

8.4.5 Baseline Environment

8.4.5.1 There are no World Heritage Sites or registered battlefields within either the MHPGC Project Scoping Boundary, the Archaeology and Cultural Heritage Study Area, or the Extended Archaeology and Cultural Heritage Study Area. There are no scheduled monuments, or Registered Parks and Gardens within the MHPGC Project Scoping Boundary. Within the Extended Archaeology and Cultural Heritage Study Area there are three scheduled monuments. One of these is representative of prehistoric activity in the form of an enclosed hilltop settlement, with the others being a chapel and a fortified manor house dating to the medieval period.

8.4.5.2 There are eight listed buildings within the MHPGC Project Scoping Boundary. These are all Grade II listed, and comprise:

- Kinley Hill Tower (NHLE 1231817);
- West Farmhouse (NHLE 1232032);
- The Rectory (NHLE 1232033);
- Church Hall (NHLE 1232034);
- Seaton Hall (NHLE 1232456);
- Walls and Gate Piers to east and south east of garden font at Seaton Hall (NHLE 1232457);
- Garden House (NHLE 1277272);
- Hawthorn War Memorial (1438068).

8.4.5.3 There are a further 38 listed buildings located within the Extended Archaeology and Cultural Heritage Study Area. Of these, three are Grade I listed, comprising a medieval period church, a former medieval rectory and an 18th century school. A further four listed buildings are Grade II* listed which include a medieval church, a medieval tower house, post medieval buildings relating to Dalton Pumping Station and a farmhouse. The remaining 31 listed buildings are Grade II listed which represent a range of structures dating mainly to the post medieval and modern periods.

8.4.5.4 There is one Conservation Area within the MHPGC Scoping Boundary, that of Hawthorn. Within the Extended Archaeology and Cultural Heritage Study Area there is a further Conservation Area at Easington.

8.4.5.5 Although the Conservation Areas of Seaham, St Michaels, and Nesham Place are situated outside of the Extended Cultural Heritage Study Area, they are included as potential receptors for assessment. Seaham Conservation Area is included due to its close proximity to the Extended Archaeology and Cultural Heritage Study Area. St Michaels and Nesham Place Conservation Areas are included due to theoretical views of the LSS Search Area identified in the ZTV (Figure 9.2) presented in Chapter 9.1: LVIA, of the Scoping Report .

8.4.5.6 All scheduled monuments, listed buildings, and Conservation Areas within the Extended Archaeology and Cultural Heritage Study Area are shown in Appendix F: Archaeology and Cultural Heritage, of the Scoping Report and Figure 8.19 below.

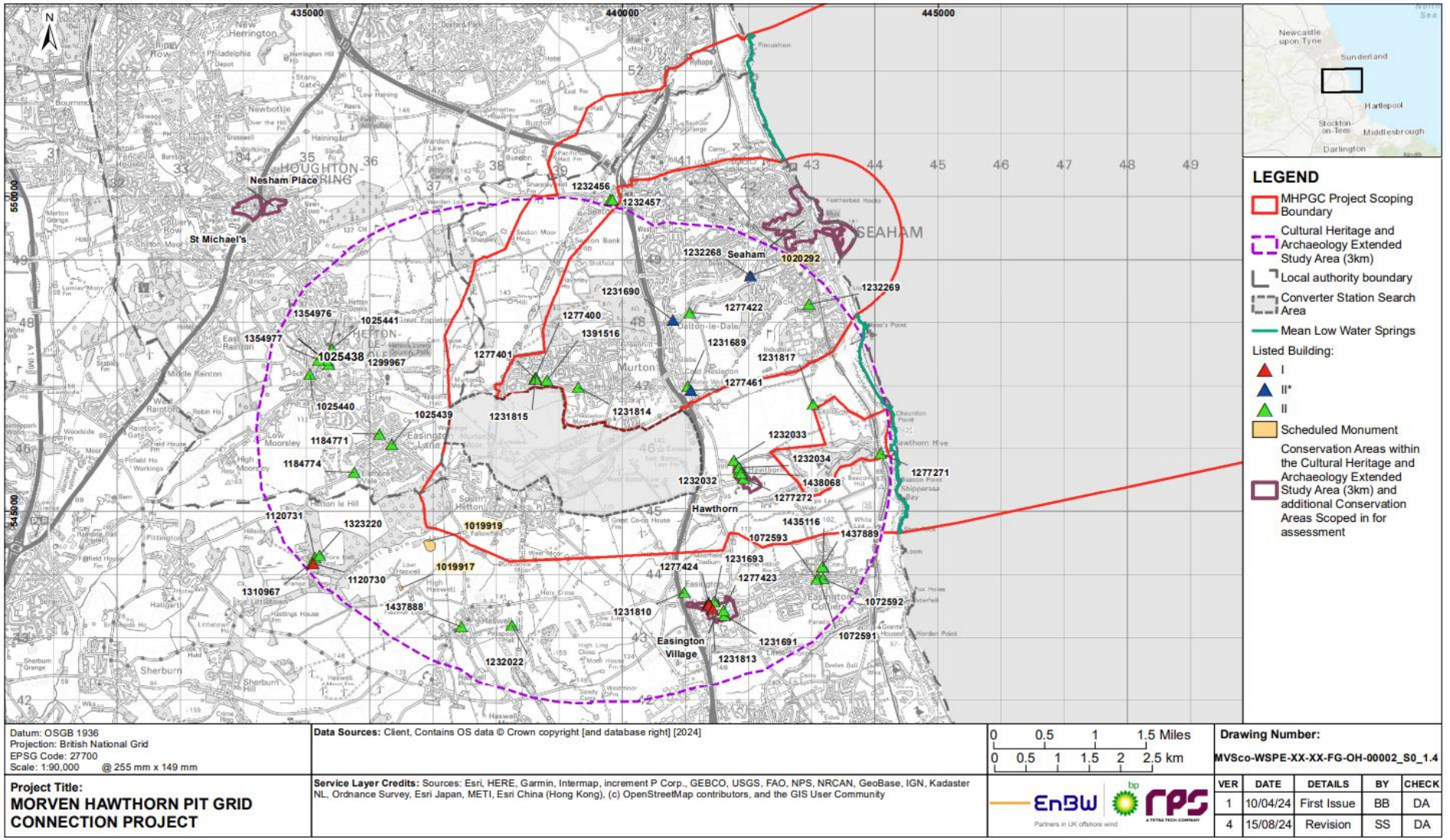


Figure 8.19: Designated Heritage Assets within the Extended Archaeology and Cultural Heritage Study Area (3km)

8.4.5.7 A total of 346 HER entries are located within the MHPGC Project Scoping Boundary. These include:

- prehistoric round barrows and lithic scatters;
- deserted and shrunken Medieval Villages (DMVs);
- medieval and post medieval ridge and furrow;
- historic farmsteads;
- post medieval mineral extraction sites;
- post medieval railway infrastructure;
- a wreck site within the intertidal zone;
- 20th century military remains.

8.4.5.8 There are also numerous findspots of isolated archaeological artefacts dating from prehistory to the post medieval period (from the HERs) within the MHPGC Project Scoping Boundary.

8.4.5.9 A further 653 HER entries are located within the Archaeology and Cultural Heritage Study Area. These represent additional archaeological remains and built heritage which are similar in nature to those recorded within the MHPGC Project Scoping Boundary, with notable exceptions being industrial activity in the form of Seaham Chemical Works and former colliery sites.

8.4.5.10 A full and detailed review of HER data will be included as part of a DBA which will be reported in the MHPGC Project EIA report/ES. The following sections will provide a brief chronological overview of the MHPGC Project Scoping Boundary and the Archaeology and Cultural Heritage Study Area.

8.4.5.11 The early prehistoric period within the Archaeology and Cultural Heritage Study Area is represented by small finds such as lithic scatters discovered around Ryhope Dene, Easington Colliery and south of Batter Law. Archaeological remains relating to Bronze Age activity survive in the form of round barrows such as those recorded close to Kinley Hill, Warden Law, and Batter Law. The scheduled defended hilltop enclosure on Pig Hill is likely to date to the Bronze Age or Iron Age, along with settlement activity around Burdon Lane.

8.4.5.12 Recorded evidence for Roman activity is currently restricted to a workshop and store site at Easington Colliery, settlement activity around Burdon Lane, a burial mound in Seaham Old Town, and isolated findspots such as ceramics recovered at Ryhope Dene and coins found at Ryhope Bridge and Easington Colliery.

8.4.5.13 Evidence for early medieval activity comes in the form of a cemetery site north of Seaham, along with enclosures at Easington and early medieval origins of St Mary's Church, Seaham. Remains of former medieval extents of existing settlements at Hawthorn and Cold Hesledon, along with the possible site of a DMV at Slingley and associated open fields represented by traces of both upstanding and buried remains of ridge and furrow.

8.4.5.14 The post medieval period within the Archaeology and Cultural Heritage Study Area is broadly characterised by mineral extraction of varying scales, from gravel pits to collieries which are typical of the region in which the MHPGC Project is located.

There is also evidence for numerous farmsteads, associated structures and ridge and furrow dating to this period, along with industrial activity in the form of limekilns, gasworks, and a pumping station. HLC data defines large tracts of the Archaeology and Cultural Heritage Study Area as post medieval and modern enclosures.

8.4.5.15 Early modern and modern settlement expansion is often closely associated with industrial development as with Seaham, Murton and Hetton. There is evidence for 20th century military activity in the form of coastal defences north and south of Seaham and a Cold War ROTOR (an air defence radar system) domestic site west of Hawthorn. Further evidence dating to the modern period includes the pit disaster memorial garden at Easington, and miners' housing in Seaham.

8.4.6 Potential Impacts of the Morven Hawthorn Pit Grid Connection Project

8.4.6.1 A range of potential impacts on archaeology and cultural heritage have been identified which may occur during the construction, O&M, and decommissioning phases of the MHPGC Project.

8.4.6.2 The impacts that have been scoped into the assessment are outlined in Table 8.51 together with a description of any additional data collection (e.g. site specific surveys) and supporting analyses that will be required to enable a full assessment of the impacts.

8.4.6.3 In line with The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (UK Government (2017) (hereafter referred to as the EIA Regulations 2017), the EIA for the MHPGC Project will consider those impacts where there is a risk of a likely significant effect only. The following section draws on industry standards and guidance, and professional judgement, to identify those impacts that may potentially lead to a significant effect. Where available evidence indicates an impact receptor pathway will not lead to a significant effect with regards to the EIA Regulations 2017, the pathway is scoped out from assessment.

8.4.6.4 The scoping assessment is based on a combination of the scope and description of the MHPGC Project (see Chapter 3: Project Description, of the Scoping Report), understanding of the baseline conditions at this stage, the evidence base for archaeology and cultural heritage effects, and professional judgement.

8.4.6.5 The final list of archaeology and cultural heritage receptors will be defined following design freeze of the construction and operational components; receipt of the scoping responses; and subsequent informal/formal consultation and engagement with Historic England and the relevant LPA conservation officers.

8.4.6.6 Receptors which have potential to experience significant impacts to their heritage significance due to change within setting will be visited during site-based surveys (site visits) for the purposes of assessment in the EIA Report/ES. The site visits will inform understanding of:

- the nature of the asset and character of its setting;
- how significance is drawn from its setting;
- how the MHPGC Project may impact the significance of a heritage asset through change to its setting.

8.4.6.7 Potential impacts scoped out of the assessment as there is no potential for them give rise to likely significant effects are presented in Table 8.52, with justification.

Table 8.51: Impacts Proposed to be Scoped in to the Morven Hawthorn Pit Grid Connection Project Assessment for Archaeology and Cultural Heritage

*Project phase refers to construction (C), O&M (O) and decommissioning (D).

Impact	Project Phase*			Justification	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D			
Permanent loss of archaeological remains. Loss of historic landscape features. Loss of historic landscape features.	✓	×	×	Land preparation (earthworks, excavation).	Designated and non-designated heritage assets within the Archaeology and Cultural Heritage Study Area.	DBA. LiDAR and aerial imagery analysis.
					Subsurface archaeological remains within the Archaeology and Cultural Heritage Study Area.	DBA. LiDAR and aerial imagery analysis.
					HLC within the Archaeology and Cultural Heritage Study Area.	DBA.
Perceptual change to historic landscape features. Change within the setting of heritage assets during the construction and operational phases (assumed to be the lifecycle of the structure).	×	✓	✓	All above ground infrastructure.	HLC within the Extended Archaeology and Cultural Heritage Study Area.	DBA, site walkover.
					Designated and non-designated heritage assets within the Extended Archaeology and Cultural Heritage Study Area.	DBA, settings assessment.

Table 8.52: Impacts Proposed to be Scoped out of the Morven Hawthorn Pit Grid Connection Project Assessment for Archaeology and Cultural Heritage

Impact	Justification
Construction phase: Adverse physical impacts on archaeological remains, outside of the MHPGC Project Scoping Boundary.	No direct disturbance, damage, or alteration would arise to archaeological remains located outside of the MHPGC Project Scoping Boundary.
All construction phases: temporary change to setting of heritage assets.	Impacts arising through change to setting during the construction phase (both onshore and offshore) will be temporary and as such are not deemed to be significant.
Operational Phase: Adverse physical impacts on archaeological remains within the MHPGC Project Scoping Boundary.	Archaeological remains within the MHPGC Project Scoping Boundary will have been removed, following appropriate mitigation, during the construction phase.
Decommissioning Phase: Adverse physical impacts on archaeological remains within the MHPGC Project Scoping Boundary.	Archaeological remains within the MHPGC Project Scoping Boundary will have been removed, following appropriate mitigation, during the construction phase.

8.4.7 Designed In Measures and Mitigation

8.4.7.1 As part of the project design process, a number of designed in measures (primary and tertiary) will reduce the potential for impacts on archaeology and cultural heritage (see Table 8.53). As there is a commitment to implement these measures, they are considered inherent to the design of the MHPGC Project. The determination of magnitude and significance will assume the implementation of such measures. Some of these measures are considered standard industry practice for this type of development.

8.4.7.2 The requirement for any secondary mitigation measures will be dependent on the significance of the effects on archaeology and cultural heritage receptors. The requirement for and feasibility of any mitigation measures will be consulted upon with statutory consultees throughout the EIA process.

Table 8.53: Designed in Measures of the Morven Hawthorn Pit Grid Connection Project, Relevant to Archaeology and Cultural Heritage

Reference Number	Designed in Measures	Justification	Primary or Tertiary
MM-2	Where practicable, sensitive sites, including known archaeological remains and receptors such as Scheduled Monuments and Registered Parks and Gardens, will be avoided by the temporary and permanent MHPGC Project footprint. Where practicable micro-siting will be undertaken during detailed design to avoid sensitive areas and receptors.	To preserve archaeological remains in situ and avoid sensitive receptors.	T
MM-3	Where adverse effects to heritage assets cannot be avoided through design measures, secondary mitigation will be identified as part of the assessment process. It is anticipated that an overarching Project Design (formerly known as Written Scheme of Investigation (WSI)) would be produced and agreed with relevant consultees to set out a programme of archaeological investigation to mitigate effects to buried archaeological remains and built heritage.	To prevent the total or partial loss of archaeological remains which intersect the MHPGC Project.	T
MM-18	Implementation of a Construction Environmental Management Plan (CEMP) which will set out control and management measures aimed at reducing noise, dust and visual instruction of construction works on historic environment receptors.	To minimise impacts on historic environment features from construction works.	T
MM-104	The Landscape and Ecological Management Plan (LEMP) will set out measures for landscape planting and detail the management of habitats to be reinstated, created and/or enhanced as part of the MHPGC Project Boundary. This will include measures relating to the restoration of historic landscape features (such as hedgerows).	To minimise impacts arising from changes to setting of historic environment features and loss of historic landscape character features.	T

8.4.7.3 Any secondary mitigation requirements for archaeology and cultural heritage will be dependent on the significance of the impacts, as identified during the EIA process. Other additional measures will be identified as appropriate for mitigating impacts arising through change within the settings of heritage assets.

8.4.8 Proposed Assessment Methodology

8.4.8.1 The proposed generic project-wide approach to the assessment methodology is set out in Chapter 4: EIA Methodology, of the Scoping Report. However, whilst this has informed the approach used in this Archaeology and Cultural Heritage Chapter, it is necessary to set out how this methodology will be applied and adapted as appropriate to address the specific needs of the archaeology and cultural heritage assessment in the EIA Report/ES. The EIA Report/ES will be accompanied by a baseline report which will utilise the sources described above in Table 8.50 and will adhere to the Chartered Institute for Archaeology (CIfA) Standard and Guidance for DBA (Chartered Institute for Archaeology, 2020). The desk study will be supported by a walkover survey within the MHPGC Project Scoping Boundary which will include an intertidal survey, with a further survey conducted within the Archaeology and Cultural Heritage Study Areas to enable the assessment of impacts arising from changes to setting.

Assessment of Heritage Significance

8.4.8.2 The significance of a heritage asset (heritage significance) is the product of the value it holds for this and future generations resulting from its historic, archaeological, architectural or artistic interests (Historic England, 2015; 2017) including:

- historic interest through association with past events or past people; or where a heritage asset is illustrative or a particular asset type, theme, or period;
- archaeological interest through the potential to hold evidence about the past that can be retrieved through specialist investigation;
- architectural/artistic interest through value derived from contemporary appreciation of a heritage asset's aesthetic.

8.4.8.3 NPS EN-1 (Department of Energy and Climate Change 2023) notes that setting contributes to a heritage asset's significance but does not provide an explicit definition of setting. Setting is defined in the NPPF and Good Practice Advice in Planning Note 3 as:

8.4.8.4 "The surroundings in which a heritage asset is experienced. Its extent is not fixed and may change as the asset and its surroundings evolve. Elements of a setting may make a positive or negative contribution to the significance of an asset, may affect the ability to appreciate an asset, or may be neutral".

8.4.8.5 For the purposes of this archaeology and cultural heritage assessment, the heritage significance of an asset will be assigned to one of four classes, with reference to the heritage interests described above and professional judgement informed by policy and guidance (Table 8.48 and Table 8.49). In particular, NPS EN-1 distinguishes between the heritage significance of designated and non-designated assets.

8.4.8.6 Classification of sensitivity of receptors is described in Table 8.54.

Table 8.54: Classification of Sensitivity of Receptors

Sensitivity	Criteria	Receptor Type
High.	Assets of national importance, which have significance for an outstanding level of historic, archaeological, architectural, and/or artistic interest.	Designated heritage assets, or non-designated heritage assets of demonstrable equivalence, of national importance.
Medium.	The sensitivity of these assets will largely be dependent upon their current setting and their character. Asset has significance for a high level of historic, archaeological, architectural and/or artistic interest.	Non-designated heritage assets of regional importance.
Low.	Assets of local interest, which have significance for elements of historic, archaeological, architectural and/or artistic interest.	Non-designated heritage assets of local importance.
Negligible.	Due to its nature of form/condition/survival, cannot be considered as an asset.	Non-extant HER asset.

Assessment of Magnitude of Change

8.4.8.7 Magnitude of change is a measure of the extent to which the heritage significance of an asset is affected, which can be influenced by several factors:

- the permanence of the impact (temporary, permanent, or reversible);
- physical changes caused by the impact (positive or negative);
- the extent of the asset or its setting that would be affected and contribution of setting to its heritage significance.

8.4.8.8 Regarding buried archaeological deposits, where no remains are visible above ground, change would arise from direct disturbance or removal of archaeological material resulting in the loss of archaeological interest. In certain instances, elements of architectural and historic interest can also be affected. Direct loss, damage or alteration of a structure would primarily affect architectural interest, although historic and archaeological interest may also be affected.

8.4.8.9 The effects of change within the setting of a heritage asset depends on the contribution of setting to the heritage significance of the asset, and assessments must be, by their nature, specific to the individual assets being considered. Heritage significance is a qualitative measure of value, and any assessments of impact will be drawn from professional judgement exercised within a context defined by statute, policy and guidance.

8.4.8.10 All assessments will be presented as a narrative, setting out the nature and extent of the change to an asset's interests arising from the MHPGC Project, the permanence of change, and the impact, whether positive or negative, of those

changes, before assigning those changes to a magnitude of change as set out in Table 8.55.

8.4.8.11 Change can be beneficial or adverse. NPS EN-1 expects developers to make, where possible, a positive contribution or beneficial impact to the historic environment.

Table 8.55: Classification of Magnitude of Change

Change	Criteria Adverse	Criteria Beneficial
High.	Loss of significance resulting from irreversible total or substantial demolition or disturbance of a heritage asset or from the total disassociation of an asset from its setting.	Sympathetic restoration of an at risk or otherwise degraded heritage asset and/or its setting. Bringing an at risk heritage asset into sustainable use, with robust long-term management secured.
Medium.	Loss of significance arising from partial disturbance or inappropriate alteration of asset which will adversely affect its heritage significance. Change to the key characteristics of an asset's setting, which gives rise to lasting harm to the significance of the asset, but which still allows its historic, archaeological, architectural, and/or artistic interest to be appreciated.	Appropriate stabilisation and/or enhancement of a heritage asset and/or its setting that better reveal the significance of the asset or contribute to a long-term sustainable use or management regime.
Low.	Minor alteration to an asset, which presents minimal change to heritage significance, including minor and/or short-term or reversible change within setting which does not affect key characteristics.	Minor alteration to an asset, which presents minimal change to heritage significance, including minor and/or short-term or reversible change within setting.
Negligible.	Very minor alteration to an asset which presents negligible change to heritage significance, including minor and/or short-term or reversible change within setting which does not affect the significance of the asset.	Very minor alteration to an asset which presents negligible change to heritage significance, including minor and/or short-term or reversible change within setting.

Assessment of Significance of Impact

8.4.8.12 The classification of the significance of an impact is judged by the relationship of the magnitude of change to the assessed heritage significance of an asset (see Table 8.56).

8.4.8.13 As a rule, major and moderate impacts are considered to be significant, whilst minor and negligible impacts are considered to be not significant. However, professional judgement will be applied, and this may be amended as appropriate.

8.4.8.14 All assessments will be presented as narrative descriptions that set out the heritage significance of assets, including, where appropriate, the contribution of its setting to heritage significance, anticipated magnitude of change to heritage significance, and a resulting significance of impact.

Table 8.56: Classification of Impact

Sensitivity of Receptor	Magnitude of Change			
	High	**Medium**	**Low**	**Negligible**
High	Major (significant)	Major (significant)	Moderate (potentially significant)	Minor (not significant)
Medium	Major (significant)	Moderate (potentially significant)	Minor (not significant)	Minor (not significant)
Low	Moderate (potentially significant)	Minor (not significant)	Minor (not significant)	Negligible (not significant)
Negligible	Minor (not significant)	Minor (not significant)	Negligible (not significant)	Negligible (not significant)

Assessment of Harm and Substantial Harm

8.4.8.15 Harm and substantial harm are distinguished in NPS EN-1. For this assessment, adverse change of negligible to medium magnitude to a designated asset or a non-designated asset of equivalent heritage significance would normally be considered as less than substantial harm, whilst a high magnitude of adverse change would normally be considered substantial harm. The fact that the harm may be limited or negligible will contribute to the weight to be afforded to it as part of the planning balance as recognised in Paragraph 5.8.15 in NPS EN-1.

8.4.8.16 Professional judgement will be applied to the case of each individual asset and comments on the magnitude of any harm arising will be noted in the narrative of each assessment.

8.4.9 Potential Cumulative Impacts

8.4.9.1 Cumulative effects with the Morven Offshore Wind Array Project and the second grid connection project in the Branxton area Southeast Scotland will be considered, together with cumulative effects with other developments, where relevant.

8.4.9.2 The cumulative effect assessment will follow the approach outlined in Chapter 4: EIA Methodology, of the Scoping Report.

8.4.10 Potential Inter-related Effects

8.4.10.1 The EIA will consider inter-related effects arising from the MHPGC Project, across their own phases (project lifetime) and different effects on one receptor in one phase (receptor led). The EIA will consider inter-related effects of multiple impacts from the construction, O&M and decommissioning phases of the MHPGC Project, affecting one receptor. Inter-related effects will be assessed through consideration of all effects on a receptor, considering both spatial and temporal overlap, within the MHPGC Project. This will ensure that the MHPGC Project is appropriately considered within the EIA and in line with Chapter 4: EIA Methodology, of the Scoping Report.

8.4.11 Potential Transboundary Impacts

8.4.11.1 There are no potential transboundary impacts from archaeology and cultural heritage from the MHPGC Project. This is due to any likely significant effects being experienced locally, rather than a wider geographic scale, so potential transboundary impacts are scoped out of the assessment.

8.5 Traffic and Transport

8.5.1 Introduction

8.5.1.1 This chapter of the Scoping Report identifies the Traffic and Transport receptors of relevance to the Morven Hawthorn Pit Grid Connection Project (hereafter referred to as 'MHPGC Project') and considers the potential impacts arising from the construction, operation and maintenance (O&M), and decommissioning of the MHPGC Project. This scoping chapter adopts a proportionate approach to only those impacts with potential to result in likely significant effects and therefore scopes out other impacts where there is evidence that the effects are not likely to be significant.

8.5.1.2 This chapter covers impacts associated with the onshore components of the MHPGC Project only and is therefore not applicable to Scotland.

8.5.2 Policy and Legislation

8.5.2.1 This section identifies the relevant legislation, policy and other documentation that will inform the assessment of likely significant effects impacts with respect to Traffic and Transport. Further information on policies relevant to the Environmental Impact Assessment (EIA) and their status is provided in Chapter 2: Policy and Legislation.

Table 8.57: Relevant Policy

Relevant Policy	Relevance to the Assessment
National Policy	
Overarching National Policy Statement (NPS EN-1) (Department for Energy Security & Net Zero, 2023).	Section 5.14 regarding Transport includes the requirement for consideration of assessment of impacts and mitigation and states: "The Secretary of State should only consider refusing development on highways grounds if there would be an unacceptable impact on highway safety, residual cumulative impacts on the road network would be severe, or it does not show how consideration has been given to the provision of adequate active public or shared transport access and provision".
National Planning Policy Framework (Department for Levelling Up, Housing and Communities, 2023).	Section 9: Promoting Sustainable Transport states (Paragraph 115) that in consideration of development proposals "Development should only be prevented or refused on highways grounds if there would be an unacceptable impact on highway safety, or the residual cumulative impacts on the road network would be severe".
Local Policy	
County Durham Plan 2020 to 2035 (Durham County Council, 2020).	Sets out a vision and guidance for the development of the County Durham area including Policy 21 Delivering Sustainable Transport.

Relevant Policy	Relevance to the Assessment
Sunderland Local Plan 2015 to2033 (Sunderland City Council, 2020a)	Sets out a vision and guidance for the development of the Sunderland area including Policy ST2 Local Road Network and ST3 Development and Transport.

8.5.2.2 The key legislation relating to traffic and transport is:

- The Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations 2009: transport of dangerous goods in the United Kingdom (UK) must be in accordance with these regulations.

Technical Guidance

8.5.2.3 This section identifies the relevant legislation, policy and other documentation that will inform the assessment of likely significant impacts with respect to Traffic and Transport. Further information on policies relevant to the Environmental Impact Assessment (EIA) and their status is provided in Chapter 4: EIA Methodology:

- Department for Transport (DfT) Circular: Strategic Road Network and the Delivery of Sustainable Development (DfT, 2022) sets out the ways in which National Highways will engage with communities, public bodies and developers to deliver sustainable development to encourage economic growth and protect the environment whilst safeguarding the primary function and purpose of the Strategic Road Network (SRN).
- Institute of Environmental Management and Assessment (IEMA) Guidelines: Environmental Assessment of Traffic and Movement (EATM) (IEMA, 2023): Current guidance for assessing potentially significant environmental impacts.
- IEMA Major Accidents and Disasters in EIA: A Primer (IEMA, 2020): current guidance for assessing hazards and accidents.

8.5.3 Study Area

8.5.3.1 Figure 8.20 shows the MHPGC Project Scoping Boundary and the roads within and around it. The roads that provide connection between the SRN and the MHPGC Project access points and between MHPGC access points will form the Traffic and Transport Study Area once the MHPGC Project has been refined (referred to as the EIA Traffic and Transport Study Area). For the purpose of scoping, the Traffic and Transport Study Area takes into account the roads that are likely to provide access to the SRN for traffic generated by the MHPGC Project and locations on the transport network that will be crossed by the Onshore MHPGC Project Scoping Boundary. As the design of the MHPGC Project is developed, the Traffic and Transport Study Area will be defined in more detail once access points from the highway network to construction locations and compounds are known and roads to be used for access are confirmed.

8.5.3.2 Appropriate routes for traffic will be based on the following criteria:

- use of the shortest appropriate routes available from the SRN to the MHPGC Project access points. Appropriate routing takes into consideration:
  - use of the 'A' classified highway network as far as practicable, before resorting to lower classifications of highway;
  - avoidance of substandard/narrow roads where alternatives are available;
  - avoidance of settlements and sensitive receptors where possible and where alternatives are possible;
- consideration for height, weight, and other restrictions on access routes (including speed management, gradient, accident hotspots and visibility);
- consideration of sensitivities on a route (for example indicated by congestion level, footways, cycleways, Public Rights of Way (PRoW) and pedestrian crossings).

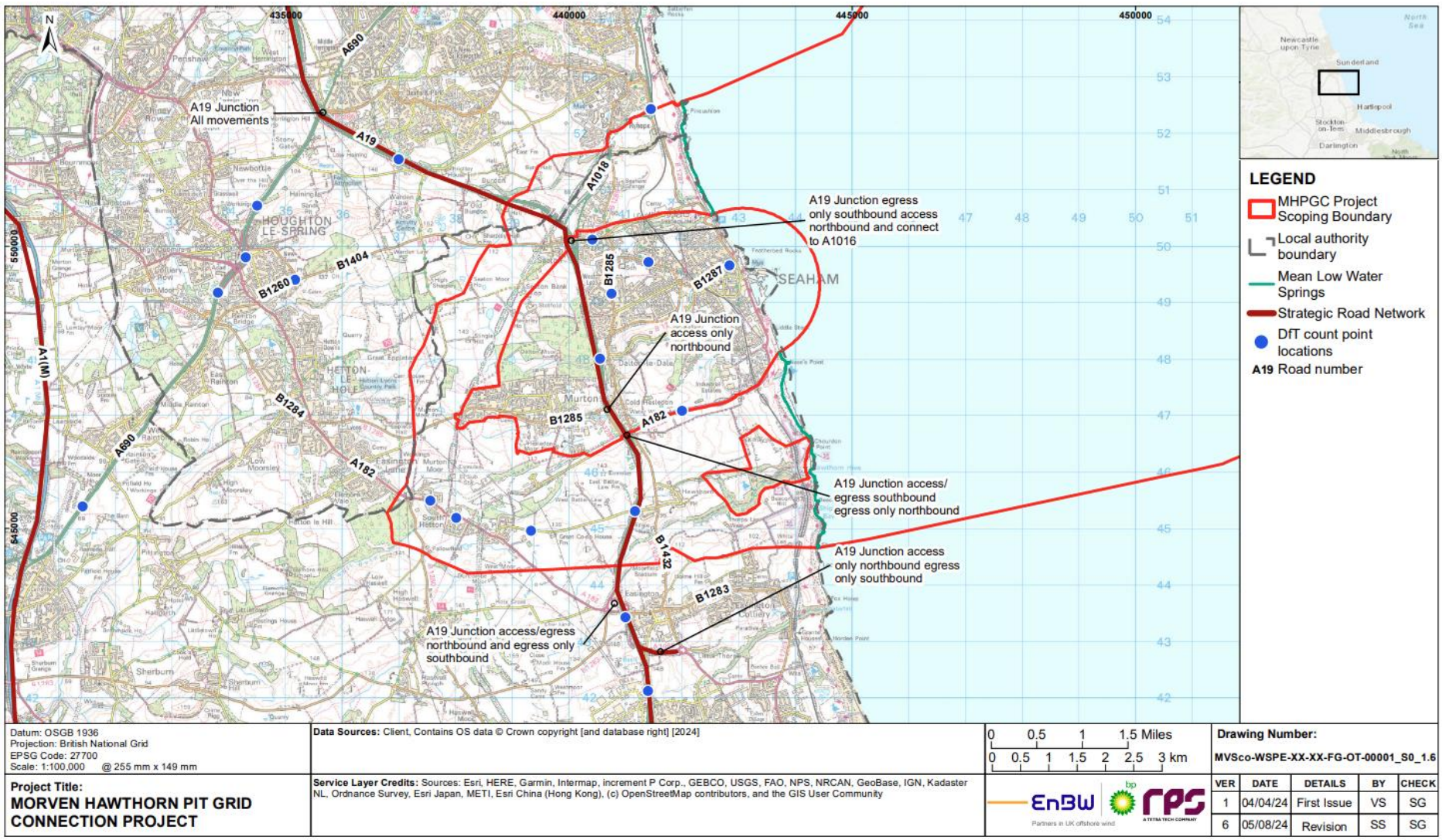


Figure 8.20: Road Network Summary

8.5.4 Data Sources

8.5.4.1 Key data sources for the MHPGC Project relating to traffic and transport are summarised within Table 8.58.

Table 8.58: Key Desktop Data Sources: Traffic and Transport

Title	Source	Year	Author
Online mapping and road network information and Street View.	Google Maps and Google Earth Pro.	2024	Google.
Adopted highways	Durham County Council (DCC).	2024	DCC.
Annual Average Daily Flow (AADF) traffic data.	DfT Road Traffic Statistics.	2024	DfT Road.
Railway network and services information.	National Rail.	2024	National Rail.
Bus service information.	GoNorthEast.	2024	GoNorthEast.
Bus service information.	Arriva.	2024	Arriva.
Navigable waterways information.	Inland Waterways Association.	2024	Inland Waterways Association.
National Cycle Network (NCN) route information.	Sustrans.	2024	Sustrans.
PRoW information for Durham County.	DCC Mapping.	2024a,b	DCC.
Active travel routes for Sunderland City.	Sunderland City Council Mapping.	2020b	Sunderland City Council.
National Trail routes and information.	National Trails.	2024	National Trails.
Accident data.	Crashmap Pro (DfT data published by www.crashmap.co.uk).		
2024	Crashmap.		

Title	Source	Year	Author
Collision data for Great Britain including number of accidents per road type.	DfT average road accident statistics.	2023	DfT.

8.5.4.2 Further data requirements are likely to include traffic count surveys at locations to be agreed with key stakeholders once the MHPGC Project has been refined and the roads to be used for access are identified. This will allow the EIA Traffic and Transport Study Area to be confirmed with the key stakeholders and ensure a robust assessment is undertaken. Traffic count surveys would be undertaken at an appropriate time including on neutral weekdays outside of local school holiday periods, to be agreed with the highway authorities.

8.5.5 Baseline Environment

8.5.5.1 This section sets out a high level overview of the transport network in the vicinity of the Onshore MHPGC Project Scoping Boundary, focusing on the roads likely to form the EIA Traffic and Transport Study Area, and based on desktop data sources. The baseline data will be reviewed and amended as the MHPGC Project develops.

Local Road Network

8.5.5.2 The local road network (LRN) can include 'A', 'B', 'C' class roads and 'unclassified' roads.

8.5.5.3 The LRN will consist of all roads forming routes for the Onshore MHPGC Project traffic between the SRN and the MHPGC Project's access points. A and B class roads in the vicinity of the MHPGC Project Scoping Boundary that are not part of the SRN include: A1018, A182, B1285, B1432, B1404, B1283, B1187, B1284 and B1260. Additionally, within the MHPGC project boundary there are likely to be local roads directly impacted by the MHPGC Project, for example roads crossed by the Project infrastructure, which need be assessed in the EIA. It is currently anticipated that the following roads in the LRN may be crossed by the Project: A1018, B1285, B1432, B1404, Spring Road, Windermere Road and unnamed roads.

8.5.5.4 Construction access locations from the LRN are currently unknown. Once the MHPGC Project has been refined and access points and construction compound locations have been confirmed, the construction traffic routeing will be defined. The traffic and transport EIA assessment will identify the affected local road network roads and provide a description of their characteristics.

8.5.5.5 In addition, when the onshore cable route alignment for the MHPGC Project has been determined, it will be possible to identify the crossing points on the road network.

Strategic Road Network

8.5.5.6 The SRN consists of the roads managed by National Highways. The MHPGC Project Scoping Boundary is highly accessible from the SRN as it is in close proximity to and

crosses the A19 (part of the SRN). The A19 connects Newcastle upon Tyne (in the north) to York (in the south). It routes between the A1 and the A64 via Middlesbrough.

8.5.5.7 Figure 8.20 depicts the wider SRN context and provides a summary of access and egress to/from the A19, in the vicinity of the MHPGC Project Scoping Boundary.

Traffic Flow

8.5.5.8 AADF have been obtained from DfT Road Traffic Statistics (DfT, 2024) for traffic count locations: within, or on, A and B roads near the MHPGC Project Scoping Boundary and that have recent manual/automatic count data. The DfT AADF locations are typically SRN and LRN A and B classification roads; road classes that are most likely to be used for the construction traffic routing.

8.5.5.9 Figure 8.20 shows the identified DfT traffic count locations. Table 8.59 summarises the most recent traffic count available at these locations and the AADF for all motor vehicles and for Heavy Goods Vehicles (HGVs). Traffic count data collected during the Covid19 pandemic will have been potentially impacted by travel restrictions and/or differing travel behaviour at that time and therefore, pre-Covid19 traffic count survey data has not been included in Table 8.59.

8.5.5.10 The need for any additional up to date traffic flow survey data on any of the key links that will form the EIA Traffic and Transport Study Area for the traffic and transport assessment within the EIA will be identified in consultation with the key stakeholders once traffic routes are confirmed.

Table 8.59: Summary of Department for Transport Count Point Annual Average Daily Flow data

*Excluding 2020 and 2021 due to potential impact of Covid19 pandemic.

Link	Count Point ID	Location	Year of Latest Manual/ Automatic Count*	Recent AADF	
				All Motor Vehicles	HGVs Only
A19	93169	Between Shotten Road and the A1086.	2023	60,444	3,989
	37931	Between the A1086 and B1283.	2023	64,692	4,163
	46242	A19 under West Lane.	2023	66,477	3,907
	60069	Between the B1285 and Seaton Lane.	2023	60,813	3,870
	26243	Between Seaton Lane and the A690.	2023	58,482	3,629

Link	Count Point ID	Location	Year of Latest Manual/ Automatic Count*	Recent AADF	
				All Motor Vehicles	HGVs Only
A182	92248	Between A19 and Admiralty Way.	2022	9,186	354
	60070	Between A19 and Admiralty Way.	2019	10,265	502
	943319	Logan Terrace between Conishead Terrace and Derwent Terrace.	2019	262	2
	80692	Between Fredrick Terrace and Regent Court.	2022	7,212	109
A690	57527	Between the A1(M) and Pittington Road.	2019	30,130	990
	57458	Between the B1284 and the A182.	2022	29,033	1,048
	17414	Between the A182 and Dairy Lane.	2022	21,144	907
	47487	Between the A182 and High Lane.	2023	29,742	1,027
B1404	806825	Seaton Lane between A19 and B1285.	2023	13,675	211
	807500	Station Road between Earl Street and Northlea Road.	2019	7,254	52
B1260	943736	Warden Grove between Dene Avenue and Seaham Road (B1404).	2019	3,236	33
A1018	92249	Between the B1287 and Salterfen Road.	2022	15,008	381
	81242	Between the B1287 and Salterfen Road.	2019	13,326	417
B1287	800201	Tempest Road between Henry Street and Back N Terrace.	2023	5,492	36
	809231	Between the A1018 and Regent Road	2019	1,522	10

Link	Count Point ID	Location	Year of Latest Manual/ Automatic Count*	Recent AADF	
				All Motor Vehicles	HGVs Only
B1285	806393	Westlea Road between Eastdene Road and Wells Crescent.	2019	8,550	47
West Lane	807949	West Lane between A182 and A19.	2023	866	2

Data Source: Department for Transport Road Traffic Statistics

Rail Network

8.5.5.11 The nearest railway station to the MHPGC Project Scoping Boundary is Seaham Station, which is managed by Northern Trains and has four cycle and nine car parking spaces. It provides connections to a range of destinations, including approximately hourly services to stations in Middlesbrough and Newcastle (National Rail, 2024).

8.5.5.12 The MHPGC Project Scoping Boundary crosses the railway line both to the north and south of Seaham Station. Seaham Station and the points of intersection between the railway line and the MHPGC Project Scoping Boundary are shown in Figure 8.21.

Navigable Waterways

8.5.5.13 The MHPGC Project Scoping Boundary does not cross any navigable waterways. The nearest navigable waterway to the MHPGC Project is the River Wear (between Chester-le-Street and Sunderland, discharging into the North Sea) which at its nearest point, is approximately 6km north of the MHPGC Project Scoping Boundary (Inland Waterways Association, 2024).

Bus Network

8.5.5.14 Bus services in the locality connect Seaham, Peterlee, Easington, Hetton le Hole, and Sunderland in the local area.

8.5.5.15 Figure 8.21 depicts local bus services that route on roads within or on roads near the MHPGC Project Scoping Boundary.

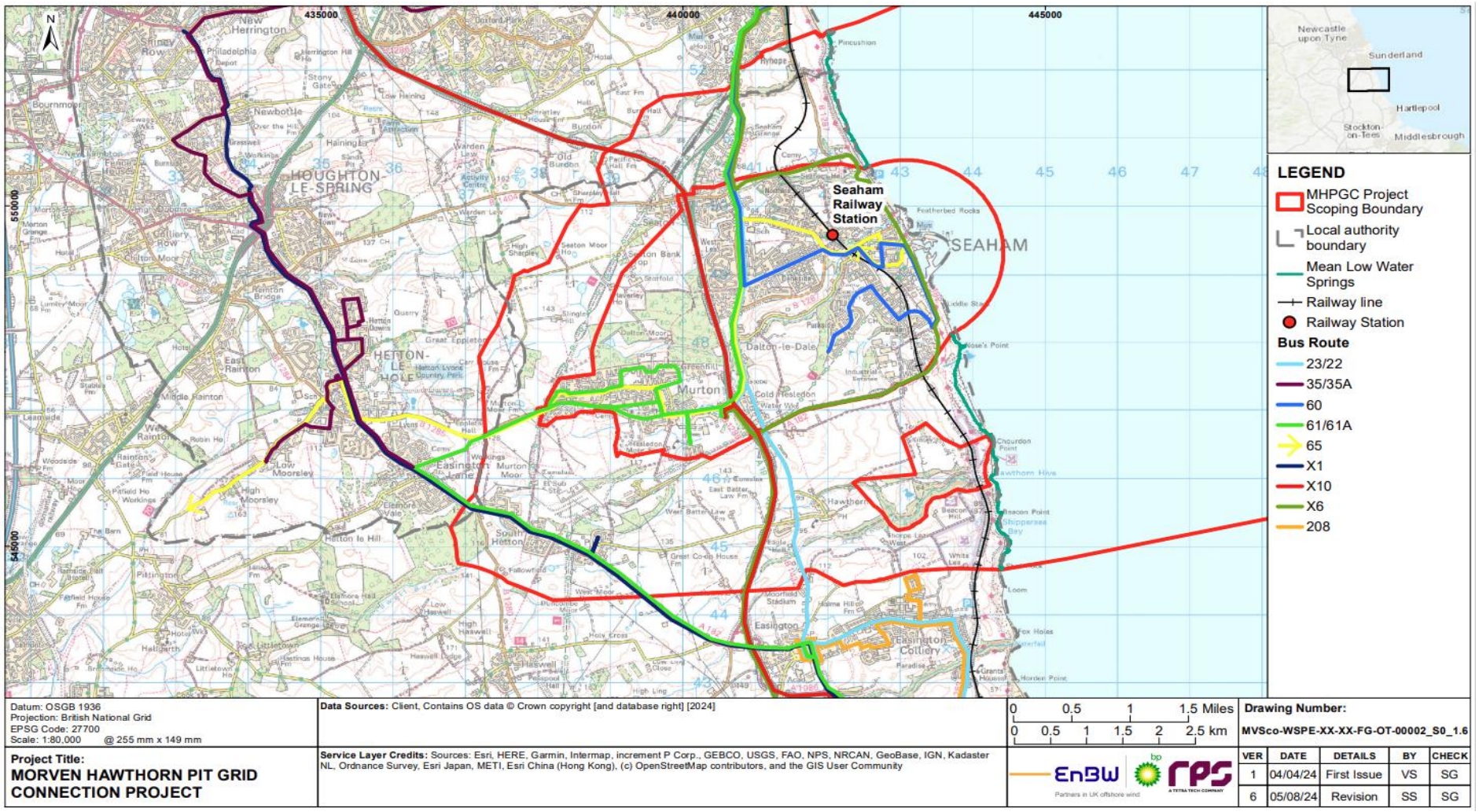


Figure 8.21: Public Transport Network Summary

Cycle Network

8.5.5.16 In the vicinity of the MHPGC Project Scoping Boundary are NCN Route 1 and Route 70 which are shown in Figure 8.22.

8.5.5.17 Any local level cycle infrastructure and/or routes within the EIA Traffic and Transport Study Area will be identified within the assessment of local traffic and transport impacts as part of determining the sensitivity of highways receptors.

Public Right of Way Network

8.5.5.18 The PRoW network is extensive in the vicinity of the MHPGC Project Scoping Boundary and is within DCC and Sunderland City Council boundaries. PRoWs that may be impacted by the MHPGC Project include those that would be crossed by/within the MHPGC Project Boundary and through interactions with the construction traffic routes.

8.5.5.19 Figure 8.22 shows the PRoW network in the vicinity of the MHPGC Project Scoping Boundary.

8.5.5.20 The nearest National Trail (National Trails, 2024) to the MHPGC Project Scoping Boundary is the King Charles III England Coast Path: Northeast with routes between Bridlington and Filey Brigg via settlements including Middlesborough, Seaham and Sunderland.

8.5.5.21 Additionally, the MHPGC Project Scoping Boundary crosses the Hetton Warden Law trail, a recreational route to the east of Houghton Le Spring and north of Hetton Le Hole.

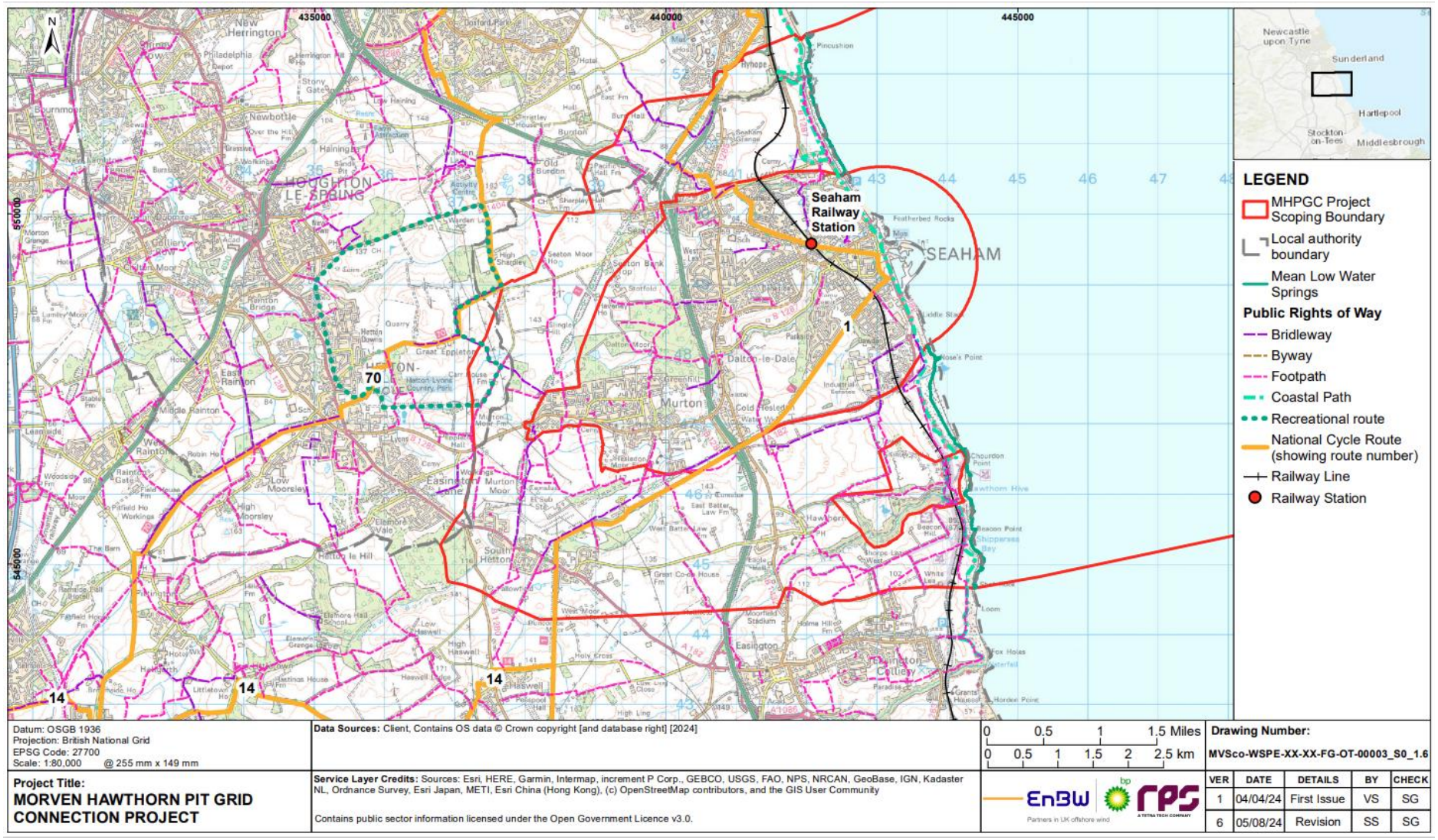


Figure 8.22: Public Rights of Way and National Cycle Network Routes Summary

Accident Audit

8.5.5.22 Crashmap Pro (Crashmap, 2024) provides details of recorded accidents including severity of injury (slight, serious or fatal). It allows the identification of accidents involving vulnerable road user casualties (pedestrians or cyclists). Accident records will be sourced for the most recent five-year period of available and verified data (currently 2018 to 2022) for the roads/junctions that form the EIA Traffic and Transport Study Area.

8.5.5.23 Where relevant and appropriate traffic data is available, detailed assessment of accident rates may include comparison with the average accident rate per million vehicle km compared to the national average for the road type (DfT, 2023b).

8.5.6 Potential Impacts of the Morven Hawthorn Pit Grid Connection Project

8.5.6.1 A range of potential impacts on traffic and transport receptors have been identified which may give rise to likely significant effects during the construction, O&M, and decommissioning phases of the MHPGC project.

8.5.6.2 The impacts that have been scoped into the assessment as having the potential to give rise to likely significant effects are outlined in Table 8.60 together with a description of any additional data collection and supporting analyses that will be required to enable a full assessment of the impacts.

8.5.6.3 Potential impacts scoped out of the assessment as there is no potential for them to give rise to likely significant effects are presented in Table 8.60 with justification.

8.5.6.4 The guidance in EATM (IEMA, 2023), that is followed when assessing the potential significance of road traffic impacts, outlines:

"2.24 The greatest environmental change will generally be when the project traffic is at the largest proportion of the total flow. It is therefore recommended that the environmental assessment should be undertaken at the construction/decommissioning phase, year of opening of the project or the first full year of its operation."

8.5.6.5 The types of construction vehicle movements associated with the MHPGC Project comprise:

- HGV movements to and from the SRN and the MHPGC Project construction accesses and compounds;
- inter-project HGV movements between different construction accesses and compounds;
- construction staff vehicle movements.

8.5.6.6 The anticipated volume of construction traffic movements would be identified within the EIA Report/ES.

8.5.6.7 O&M traffic is anticipated to be minimal, limited to infrequent on site inspections and maintenance activities.

8.5.6.8 Should the MHPGC Project not be repowered, it will be decommissioned. It is anticipated that, subject to regulations, requirements, guidance and best practice relevant at that time, below ground cables would be left in situ. Therefore,

decommissioning traffic is anticipated to be significantly lower than construction traffic as demolition activities would be less than the construction activities.

Table 8.60: Impacts Proposed to be Scoped into the Morven Hawthorn Pit Grid Connection Project Assessment for Traffic and Transport

*Project phase refers to construction (C), O&M (O) and decommissioning (D)

Impact	Project Phase*			Justification	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D			
Severance.	✓	×	✓	Can be affected by MHPGC Project related traffic, as per assessment methodology outlined within EATM (IEMA, 2023).	Streetview imagery. Site visit. Baseline traffic flow data through online database (DfT, 2024) or traffic count surveys, as relevant.	Current baseline traffic growth to future baseline year. MHPGC Project related traffic then compared against predicted future baseline traffic flows. Highway receptors requiring detailed assessment will be identified (as set out in Section 8.5.8) and assessed based on the guidance within EATM and professional judgement.
Driver Delay.	✓	×	✓	Can be affected by MHPGC Project related traffic, as per assessment methodology outlined within EATM (IEMA, 2023).	Google Traffic function. Site visit. Baseline traffic flow data through online database (DfT, 2024) or traffic count surveys, as relevant.	Current baseline traffic growth to future baseline year. MHPGC Project related traffic then compared against predicted future baseline traffic flows. Highway receptors requiring detailed assessment will be identified (as set out in Section 8.5.8) and assessed based on the guidance within EATM and professional judgement.
Non-motorised User Amenity.	✓	×	✓	Can be affected by MHPGC Project related traffic, as per assessment methodology outlined within EATM (IEMA, 2023).	Aerial mapping and Streetview imagery. Site visit. Baseline traffic flow data through online database	Current baseline traffic growth to future baseline year. MHPGC Project related traffic then compared against predicted future baseline traffic flows. Highway receptors requiring detailed assessment will be identified (as set out in Section 8.5.8) and

Impact	Project Phase*			Justification	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D			
					(DfT, 2024) or traffic count surveys, as relevant.	assessed based on the guidance within EATM and professional judgement.
Non-motorised User Delay.	✓	×	✓	Can be affected by MHPGC Project related traffic, as per assessment methodology outlined within EATM (IEMA, 2023).	Aerial mapping and Streetview imagery. Site visit. Baseline traffic flow data through online database (DfT, 2024) or traffic count surveys, as relevant.	Current baseline traffic growth to future baseline year. MHPGC Project related traffic then compared against predicted future baseline traffic flows. Highway receptors requiring detailed assessment will be identified (as set out in Section 8.5.8) and assessed based on the guidance within EATM and professional judgement.
Fear and Intimidation.	✓	×	✓	Can be affected by MHPGC Project related traffic, as per assessment methodology outlined within EATM (IEMA, 2023).	Aerial mapping and Streetview imagery. Site visit. Baseline traffic flow data through online database (DfT, 2024) or traffic count surveys, as relevant.	Current baseline traffic growth to future baseline year. MHPGC Project related traffic then compared against predicted future baseline traffic flows. Highway receptors requiring detailed assessment will be identified (as set out in Section 8.5.8) and assessed based on the guidance within EATM and professional judgement.
Road Safety.	✓	×	✓	Can be affected by MHPGC Project related traffic, as per assessment methodology outlined within EATM (IEMA, 2023).	Streetview imagery. Site visit. Accident data through online database (Crashmap Pro, 2024).	Current baseline traffic growth to future baseline year. MHPGC Project related traffic then compared against predicted future baseline traffic flows. Highway receptors requiring detailed assessment will be identified (as set out in Section 8.5.8) and

Impact	Project Phase*			Justification	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D			
					Baseline traffic flow data through online database (DfT, 2024) or traffic count surveys, as relevant.	assessed based on the guidance within EATM and professional judgement.
Impacts of Abnormal Indivisible Loads (AILs).	✓	×	✓	AIL movements can affect the transport network.	AIL vehicle dimensions. AIL routing strategy and AIL Route Assessment Study	Production of AIL Access Study.
Impacts of Hazardous Loads.	✓	×	✓	Hazardous loads can impact on the transport network, as set out within EATM (IEMA, 2023).	Number, form and routing of hazardous loads and their movements.	Risk/catastrophe assessment of a scope/scale proportionate to the nature and number of the hazardous loads.

Table 8.61: Impacts Proposed to be Scoped out of the Morven Hawthorn Pit Grid Connection Project Assessment for Traffic and Transport

Impact	Justification
O&M traffic and transport impacts.	O&M traffic is anticipated to be minimal, limited to infrequent on site inspections and maintenance activities.

8.5.7 Designed In Measures and Mitigation

8.5.7.1 As part of the project design process, a number of designed in measures (primary and tertiary) will reduce the potential for impacts on traffic and transport (Table 8.62). As there is a commitment to implement these measures, they are considered inherent to the design of the MHPGC Project. The determination of magnitude and significance will assume the implementation of such measures. Some of these measures are considered standard industry practice for this type of development.

8.5.7.2 The requirement for any additional (secondary) mitigation measures will be dependent on the significance of the impacts on traffic and transport receptors. The requirement for and feasibility of any mitigation measures will be consulted upon with statutory consultees throughout the EIA process.

Table 8.62: Designed In Measures Proposed for Traffic and Transport

Reference Number	Designed In Measures	Justification	Primary or Tertiary
MM-58	Trenchless installation methods will be used where practicable. Further work will be undertaken once the MHPGC Project has been defined in more detail to identify locations where the underground cable could be installed using trenchless installation methods. Trenchless methods will be used at the landfall.	To avoid and minimise direct impacts on the road and railway network.	P
MM-74	The Public Rights of Way Management Plan (Prow MP) will identify appropriate management measures, potentially, including signage, condition surveys and diversions during construction and opportunities taken where possible to provide a diversion of similar or enhanced amenity.	To appropriately assess the impact on PRoWs and ensure implementation of management measures during the construction phase.	T

Reference Number	Designed In Measures	Justification	Primary or Tertiary
MM-97	An Outline Construction Traffic Management Plan (CTMP)[24]: outlining measures to mitigate the impact of construction traffic including construction traffic routing, staff travel options, consideration of road, rail, PRoW and watercourse crossings, highway condition surveys, traffic management measures (signage and banksmen for example) and scheduling of works to avoid other highways works if relevant. All road crossings will be agreed with the relevant highway authority. Road closures will be avoided where possible, and where they are required will be scheduled to avoid other local scheduled road works on the highways network.	To appropriately assess the impact of construction traffic and ensure appropriate management measures are implemented during the construction phase.	P
MM-98	An AIL Access Study: This will outline AIL delivery route(s) and appropriate management measures.	To appropriately assess the movement and management of AIL deliveries during the construction phase.	T

8.5.8 Proposed Assessment Methodology

General Approach

8.5.8.1 The guidance in EATM (IEMA, 2023) outlines that the greatest environmental change will generally be when the project traffic is at the largest proportion of the total flow. For the MHPGC Project , this would occur during the construction phase.

8.5.8.2 A construction programme lasting four years is assumed. The assessment year for traffic and transport impacts would be the year when peak construction traffic movements would occur.

8.5.8.3 EATM (IEMA, 2023) states two rules to be used to establish the need for an environmental assessment of traffic and transport impacts on receptors:

[24] The relevant consultation bodies, such as the local highway authorities, will be consulted as part of the development of the CTMP, to seek agreement on the proposed measures.

"Rule 1: Include highway links where traffic flows will increase by more than 30% (or where the number of heavy goods vehicles will increase by more than 30%)

Rule 2: Include highway links of high sensitivity where traffic flows have increased by 10% or more".

Identification of Potential Traffic and Transport Receptors

8.5.8.4 Transport receptors are the users or beneficiaries of the highways network assets and facilities such as pedestrians, cyclists, equestrians, and drivers who travel within the vicinity of the MHPGC Project. EATM (IEMA, 2023) identifies the following key user groups: Non-Motorised Users (NMU), PRoW users, motorists/freight vehicles, public transport and emergency services. It further identifies sensitive locations or users that may be affected:

- "People at home;
- People at work;
- Sensitive and/or vulnerable groups (including young age; older age; income; health status; social disadvantage; and access and geographic factors);
- Locations with concentrations of vulnerable users (e.g. hospitals, places of worship, schools);
- Retail areas;
- Recreational areas;
- Tourist attractions;
- Collision clusters and routes with road safety concerns;
- Junctions and highway links at (or over) capacity".

8.5.8.5 EATM details that the identified sensitive receptors should be assigned to the nearest highway link for assessment, with each highway link then assigned a sensitivity value.

8.5.8.6 Sensitive locations/users within the EIA Traffic and Transport Study Area will be identified once it is further refined.

Receptor Sensitivity

8.5.8.7 As set out in EATM (IEMA, 2023), the impact of development traffic is dependent upon a wide range of factors which include the volume of traffic, traffic speeds and traffic composition (such as percentage of HGVs of total traffic). Additionally, EATM states that the perception of changes in traffic varies according to factors such as:

- "Existing traffic levels;
- The location of traffic movements;
- The time of day;
- Temporal and seasonal variation of traffic;
- Design and layout of the road and pavement;
- Crossing points;

- Landscape/townscape character, designated status, land use activities adjacent to the route;
- Ambient conditions of adjacent land uses".

8.5.8.8 Each highway link included in the assessment will be assigned a sensitivity in accordance with EATM and informed by professional judgement based on factors including the proximity of sensitive receptors to the highway link and the highway environment. Where a road passes through a location, users are considered subject to the highest level of sensitivity defined by either the road or location characteristics.

8.5.8.9 Table 8.63 summarises the classification of Receptor Sensitivity.

Table 8.63: Receptor Sensitivity Summary

Sensitivity	Description/Reason	Receptor
High.	Highway links with a high sensitivity to changes in traffic flows include routes: with sensitive receptors alongside them (such as schools, colleges and playgrounds); and/or where there are land uses which result in high volumes of pedestrian/cycle users and the road is narrow and/or footway provision is poor or non-existent and/or existing traffic volumes are high for the type of road resulting in congestion and road safety issues.	Occupants of land uses alongside the highway link and users of the highway link.
Medium.	Highway links with a medium sensitivity to changes in traffic flows include routes: with some sensitive receptors alongside them (such as retail areas); and/or where there are land uses which result in some pedestrian/cyclist users, road design and footway provision is adequate/appropriate and/or existing traffic volumes can be accommodated for the type of road but approaching capacity.	Occupants of land uses alongside the highway link and users of the highway link.
Low.	Highway links with low sensitivity to changes in traffic flows include routes: with no sensitive receptors and some land uses alongside and no/very limited pedestrian/cyclist users and/or road design and footway provision is appropriate and existing traffic volumes can be accommodated for the type of road.	Occupants of land uses alongside the highway link and users of the highway link.

Sensitivity	Description/Reason	Receptor
Negligible.	Highway links with negligible sensitivity to changes in traffic flows include routes: with no sensitive receptors and very few land uses alongside them, which have no direct access or are sufficiently set back from the carriageway, and no/very limited pedestrian/cyclist users and existing traffic volumes can be accommodated for the type of road.	Users of the highway link.

8.5.8.10 For highway links where the sensitivity is judged as 'High' or 'Medium' Rule 2 (sensitive areas where traffic flows are predicted to increase by 10% or more) is applied. For highway links where the sensitivity is judged as 'Low' or 'Negligible' Rule 1 (areas where traffic flows are predicted to increase by more than 30% or where the number of HGVs is predicted to increase by more than 30%) is applied.

Magnitude

8.5.8.11 The magnitude of change will be determined in accordance with the advice provided in EATM (IEMA, 2023) and based on professional judgement.

8.5.8.12 Table 8.64 sets out the magnitude of change (high, medium, low or negligible) criteria of potential significant impacts of transport, as set out in Table 8.60.

Table 8.64: Magnitude of Change Summary

Traffic and Transport Impact	Magnitude of Change			
	High	Medium	Low	Negligible
Severance.	Change in total traffic or HGV flows over 91%.	Change in total traffic or HGV flow of 61% to 90%.	Change in total traffic or HGV flows of 31 to 60%.	Change in total traffic or HGV flows of less than 30%.
	Context should, also, be considered including the local population and number of local facilities potentially impacted. EATM states caution should be applied with applying these thresholds to highway links with low baseline flows.			
Driver Delay.	High increase in queuing at junctions and/or congestion on road links.	Medium increase in queuing at junctions and/or congestion on road links.	Low increase in queuing at junctions and/or congestion on road links.	Low or no increase in queuing at junctions and/or congestion on road links.

Traffic and Transport Impact	Magnitude of Change			
	High	Medium	Low	Negligible
Non-motorised User Amenity.	A halving or doubling of traffic flow (or HGV flow) can be used as a broad threshold when considered in the local context and applied with caution. Assignment of magnitude is based on a variety of factors including general level of pedestrian activity, visibility, and physical conditions such as traffic flow, traffic composition, crossing points and pavement width/separation from traffic.			
Non-motorised User Delay.	Generally, increases in traffic may lead to greater delay, though is dependent on the level of non-motorised users' activity in the area. Magnitude is assigned on pedestrian delay experienced when crossing highways links considering a range of factors including crossing type, pedestrian flows, traffic levels, visibility and general highway condition.			
Fear and Intimidation.	Magnitude is assigned based on the scoring system provided in EATM (which is dependent on 18hr average traffic flow; 18hr average HGV traffic flow and vehicle speed). The scores comprise extreme (71+); great (41 to 70); moderate (21 to 40) and small (0 to 20).			
	Two step change in level score of fear and intimidation.	One step change in level score of fear and intimidation and >400 average 18hr vehicle increase or >500 HGV 18hr vehicle increase.	One step change in level score of fear and intimidation and <400 average 18hr vehicle increase or <500 HGV 18hr vehicle increase.	No change to step in level score of fear and intimidation.
Road Safety.	Magnitude is assigned by reviewing existing collision patterns and trends based upon existing personal injury accident records and the forecast increase in traffic that may change the risk of serious and fatal injuries.			
Hazardous Loads.	Hazardous loads are assessed, where the number of hazardous loads is significant, based on risk/catastrophe analysis examining the potential for an accident to occur and the likely effect of an accident as per the guidance in EATM and the IEMA Major Accident and Disasters in EIA: A Primer guidance (IEMA, 2020).			

Significance

8.5.8.13 The classification of significance of a likely traffic and transport impact is derived by considering the sensitivity of the receptor (Table 8.63) and the magnitude of change (Table 8.64) as defined in Table 8.65. The shading indicates those significance ratings that are deemed to be 'significant' impacts.

Table 8.65: Traffic and Transport Significance Evaluation Matrix

Receptor Sensitivity	Magnitude of Change			
	High	**Medium**	**Low**	**Negligible**
High	Major (Significant).	Major (Significant).	Moderate (Significant).	Negligible (Not Significant).
Medium	Major (Significant).	Moderate (Significant).	Minor (Not Significant).	Negligible (Not Significant).
Low	Moderate (Significant).	Minor (Not Significant).	Negligible (Not Significant).	Negligible (Not Significant).
Negligible	Negligible (Not Significant).	Negligible (Not Significant).	Negligible (Not Significant).	Negligible (Not Significant).

8.5.8.14 Major and Moderate impacts are considered to be significant in EIA terms, whilst Minor and Negligible impacts are considered not significant for EIA purposes.

8.5.9 Potential Cumulative Impacts

8.5.9.1 Cumulative effects with the Morven Offshore Wind Array Project and the second grid connection project in the Branxton area Southeast Scotland will be considered, together with cumulative effects with other developments, where relevant.

8.5.9.2 The cumulative effect assessment will follow the approach outlined in Chapter 4: EIA Methodology.

8.5.10 Potential Inter-related Effects

8.5.10.1 The EIA will consider inter-related effects arising from the MHPGC Project, across their own phases (project lifetime) and different effects on one receptor in one phase (receptor led). The EIA will consider inter-related effects of multiple impacts from the construction, O&M and decommissioning phases of the MHPGC Project, affecting one receptor. Inter-related effects will be assessed through consideration of all effects on a receptor, considering both spatial and temporal overlap, within the MHPGC Project. This will ensure that the MHPGC Project is appropriately considered within the EIA and in line with Chapter 4: EIA Methodology.

8.5.11 Potential Transboundary Impacts

8.5.11.1 There are no potential transboundary impacts from onshore traffic and transport from the MHPGC Project. This is due to any likely significant effects being experienced locally, rather than a wider geographic scale.

8.6 Onshore Noise and Vibration

8.6.1 Introduction

8.6.1.1 This chapter of the Scoping Report identifies the onshore noise and vibration receptors of relevance to the Morven Hawthorn Pit Grid Connection Project (hereafter referred to as 'MHPGC Project') and considers the potential impacts arising from the construction, operation and maintenance (O&M), and decommissioning of the MHPGC Project. This scoping chapter adopts a proportionate approach to only those impacts with potential to result in likely significant effects and therefore scopes out other impacts where there is evidence that the effects are not likely to be significant.

8.6.1.2 This chapter covers impacts associated with the onshore components of the MHPGC Project only and is therefore not applicable to Scotland.

8.6.2 Policy and Legislation

8.6.2.1 This section identifies the relevant legislation, policy and other documentation that will inform the assessment of likely significant effects with respect to onshore noise and vibration. Further information on policies relevant to the Environmental Impact Assessment (EIA) and their status is provided in Chapter 2: Policy and Legislation.

Legislation

8.6.2.2 Table 8.66 lists the legislation relevant to the assessment of impacts on noise and vibration receptors.

Table 8.66: Legislation Relevant to Noise and Vibration

Legislation Description	Relevance to Assessment
Control of Pollution Act (1974) (UK Government, 1974)	
This Act is the principal legislation covering demolition and construction noise and vibration.	The noise and vibration chapter of the Environmental Statement will conform with this Act by assessing the construction impacts and promoting the management of noise impacts through effective mitigation.
Environmental Protection Act (1990) (UK Government, 1990)	
This Act regulates the emission of noise into the environment and establishes the regime for determining if noise is detrimental to health or constitutes statutory nuisance.	The noise and vibration chapter of the Environmental Statement will conform with this Act by assessing the construction impacts and promoting the management of noise impacts through effective mitigation.

Policy

8.6.2.3 Table 8.67 lists the policy relevant to the assessment of impacts on noise and vibration receptors.

Table 8.67: Policy Relevant to Noise and Vibration

Policy Description	Relevance to Assessment
The Overarching National Policy Statement for Energy (EN-1) (UK Government, 2023)	
National Policy Statements (NPSs) set out the primary policy against which an application for the development consent of the MHPGC Project will be considered.	The noise and vibration chapter of the Environmental Statement will conform with the EN-1 by assessing the impacts on sensitive receptors and by promoting the management of noise and vibration impacts through effective mitigation.
National Policy Statement for renewable energy infrastructure (EN-3) (Department of Energy Security and Net Zero, 2023)	
Planning guidance for developers of nationally significant renewable energy infrastructure.	The noise and vibration chapter of the Environmental Statement will conform with the EN-3 by assessing the impacts on sensitive receptors and by promoting the management of noise and vibration impacts through effective mitigation.
National Policy Statement for electricity networks infrastructure (EN-5) (Department of Energy Security and Net Zero, 2023)	
Planning guidance for developers of nationally significant electricity networks infrastructure.	The noise and vibration chapter of the Environmental Statement will conform with the EN-5 by assessing the impacts on sensitive receptors and by promoting the management of noise and vibration impacts through effective mitigation.
Noise Policy Statement for England (NPSE) (Defra, 2010)	
Sets out the Government's long-term policy vision for noise. With respect to health and quality of life and in the context of Government policy on sustainable development, the NPSE aims to: 1) avoid significant adverse impacts; 2) mitigate and minimise impacts on health and quality of life; and 3) where possible, contribute to the improvement of health and quality of life.	The noise and vibration chapter of the Environmental Statement will conform with the NPSE by assessing impacts on sensitive receptors and by promoting the management of noise and vibration impacts through effective mitigation; and with respect to health and quality of life and in context to Government policy on sustainable development.

Policy Description	Relevance to Assessment
National Planning Policy Framework (NPPF) (UK Government, 2023)	
Sets out the Government's planning policies for England and how these are expected to be applied. Potential adverse impacts from noise should be mitigated and reduced. Significant adverse noise impacts should be avoided. Tranquil areas should be identified and protected.	The noise and vibration chapter of the Environmental Statement will conform with the NPPF by identifying the likely effects from noise and vibration that occur due to the Project during the construction and operation phases.
County Durham Plan, Adopted (Durham County Council, 2020)	
The Local Plan sets out the Council's policies to guide planning decisions and establishes the framework for the sustainable economic growth and development. Policy 31 "Amenity and Pollution" includes reference to noise and that development needs to demonstrate "there will be no unacceptable impact, either individually or cumulatively, on health, living or working conditions or the natural environment."	The noise and vibration chapter of the Environmental Statement will conform with the Local Plan by assessing the impacts on sensitive receptors and by promoting the management of noise and vibration impacts through effective mitigation.
Core Strategy and Development Plan 2015-2033 (Sunderland City Council, 2020)	
Policy HS1 "Quality of life and amenity" includes reference to noise and vibration and that development "must demonstrate that it does not result in unacceptable adverse impacts which cannot be addressed through appropriate mitigation". Policy WWE1 "Decentralised, renewable and low carbon energy" states that this type of development "will be supported subject to satisfactory resolution of all site specific constraints." The policy requires that "appropriate steps should be taken to mitigate any unacceptable significant adverse impacts, such as noise nuisance" and that this should be "through careful consideration of location, scale, design and other measures". Policy HS2 "Noise sensitive development" requires that developments which would result in noise and vibration impacts in areas of existing low noise levels, have a noise assessment. The noise assessment will include details of site noise levels and quantify the impact on existing noise environment and noise sensitive receptors. Where necessary, an appropriate scheme of mitigation will detail measures required to ensure that noise and vibration does not adversely impact receptors.	The noise and vibration chapter of the Environmental Statement will conform with the Core Strategy and Development Plan by reporting site noise levels, assessing the impacts on sensitive receptors and by promoting the management of noise and vibration impacts through effective design and mitigation.

8.6.2.4 The noise and vibration assessment will be undertaken with reference to the following guidance documents:

- BS 5228:2009+A1:2014 Code of Practice for noise and vibration control on construction and open sites, Part 1: Noise (BS 5228-1) (British Standards Institute. (2014a);
- BS 5228-2:2009+A1:2014 Code of Practice for noise and vibration control on construction and open sites - Part 2: Vibration (BS 5228-2) (British Standards Institute. (2014b);
- BS 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound (BS 4142) (British Standards Institute, 2019);
- Design Manual for Roads and Bridges (DMRB) LA 111 - Noise and vibration. Revision 2 (LA 111) (DMRB, 2020);
- BS ISO 9613-2 Acoustics – Attenuation of sound during propagation outdoors – Engineering method for the prediction of sound pressure levels outdoors (British Standards Institute, 2024);
- Planning Practice Guidance: Noise (Department for Levelling Up, Housing & Communities and Ministry of Housing, Communities & Local Government, 2014).

8.6.3 Study Area

8.6.3.1 The following onshore Noise and Vibration Study Areas are considered:

- Construction Noise Study Area – An area extending 300m from the MHPGC Project Scoping Boundary. LA 111 states "A study area of 300m from the closest construction activity is normally sufficient to encompass noise sensitive receptors." Furthermore, BS 5228-1 states "At distances over 300 m noise predictions have to be treated with caution, especially where a soft ground correction factor has been applied, because of the increasing importance of meteorological effects";
- Construction Vibration Study Area – An area extending 100m from the MHPGC Project Scoping Boundary. LA 111 states "A study area of 100m from the closest construction activity with the potential to generate vibration is normally sufficient to encompass vibration sensitive receptors";
- Construction Road Traffic Noise Study Area – An area extending 50m from public roads with the potential to experience an increase in baseline noise level of 1 dB(A) or more. This aligns with guidance provided in DMRB LA 111 in developing construction traffic study areas;
- Operational Noise Study Area – An area extending 600m from the Land Substation (LSS) search area should be sufficient to identify significant effects. This is based on professional judgement, drawing on experience of similar sites.

8.6.3.2 The study areas are shown in Figure 8.23, except for the Construction Road Traffic Noise Study Area which will be defined after appropriate traffic data is received.

8.6.3.3 The study areas are based on the MHPGC Project Scoping Boundary, and these will be amended during the course of the EIA process based on information received.

The Construction Noise Study Area and Construction Vibration Study Area are entirely onshore and the Mean Low Water Springs (MLWS) is the boundary of the onshore area.

8.6.3.4 Offshore sound is considered in Chapter 0: Underwater Sound of the Scoping Report.

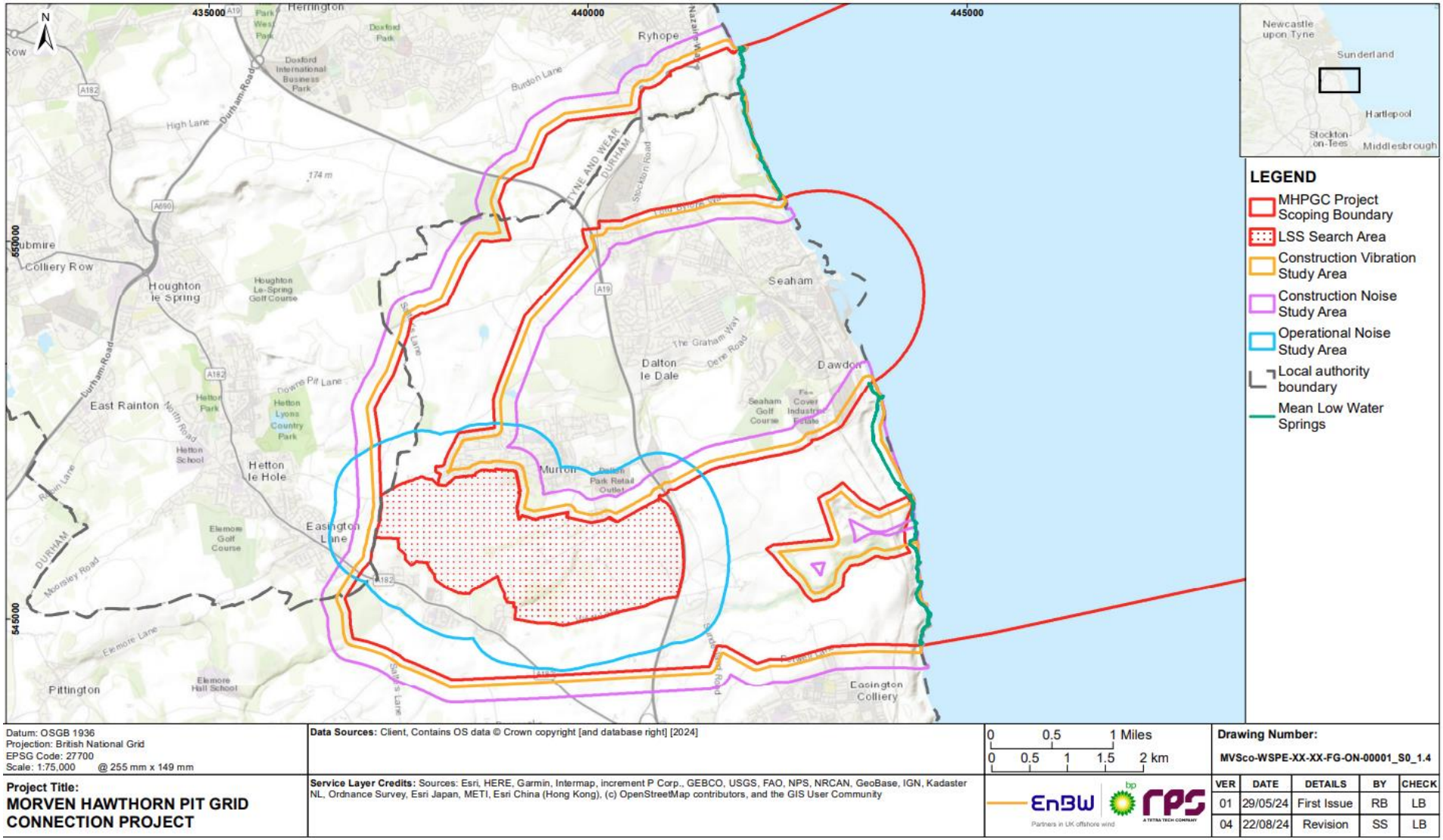


Figure 8.23: Noise and Vibration Study Areas

8.6.4 Data Sources

8.6.4.1 For this Scoping Report, the onshore noise and vibration baseline environment has been established through a review of the data sources listed in Table 8.68.

Table 8.68: Key Sources of Noise and Vibration Data

Title	Source	Year	Author
Strategic Noise Mapping.	Defra.	2017.	Defra.
Noise Action Planning Important Areas Round 3 England.	Defra.	2024.	Defra.
Publicly accessible satellite imagery.	Google Earth Pro.	Various.	Google Earth Pro.

8.6.5 Baseline Environment

8.6.5.1 Human based sensitive receptors identified within the study areas include:

- dwellings;
- public buildings (e.g. schools, health care and community facilities, places of worship);
- Public Rights of Way (PRoW);
- designated sites that are accessed by the public.

8.6.5.2 The study areas include dwellings in Murton, Hawthorn, South Hetton, Seaton and Easington Lane, and several isolated properties. The following public buildings in Murton are within the Noise and Vibration Study Areas: Holy Trinity Parish Church, St Joseph's Roman Catholic Church, St Joseph's Roman Catholic Primary School and Ribbon School. The following public buildings in South Hetton are within the Noise and Vibration Study Areas: The Independent Methodist Church, Holy Trinity Church and South Hetton Primary School. The following public buildings in Easington Lane are within the Noise and Vibration Study Areas: St Mary's Roman Catholic Church, Easington Lane Primary School.

8.6.5.3 The study areas include several PRoW and designated sites accessed by the public, including Durham Coast Special Area of Conservation (SAC), Durham Coast Site of Special Scientific Interest (SSSI), Northumbria Coast Special Protected Area (SPA), Hawthorn Dene SSSI, Hawthorn Quarry SSSI, Hesledon Moor East SSSI, Hesledon Moor West SSSI and Eppleton Grassland SSSI.

8.6.5.4 The MHPGC Project Scoping Boundary includes predominantly rural land surrounding Seaham, County Durham.

8.6.5.5 The existing noise baseline is anticipated to be dominated by road traffic noise from vehicles using the A19 and other local roads.

8.6.5.6 Other transportation noise sources include passenger and freight trains using the Durham Coast Line which runs through the centre of Seaham.

8.6.5.7 In addition, there are several industrial and commercial businesses located around the edges of Seaham which are likely to contribute to the local baseline noise environment in these areas (including businesses on Seaham Harbour, Admiralty Way, Spectrum Business Park, Jade Business Park and Seaham Grange Industrial Estate as well as the existing National Grid Hawthorn Pit Substation and associated infrastructure).

8.6.5.8 Also relevant is the Hawthorn Quarry, operated by Tarmac, which although currently inactive (mineral extraction ceased in 1993), is located south of Seaham and may contribute to the local noise climate in this area if it were to become operational again.

8.6.5.9 The existing vibration baseline at sensitive receptors within the Construction Vibration Study Area is assumed to be zero due to the distances to vibration generating sources (e.g. Durham Coast Line).

8.6.5.10 The EIA process will consider future baseline conditions taking into account proposed developments identified as part of the cumulative effects assessment (section 8.6.9).

8.6.6 Potential Impacts of the Morven Hawthorn Pit Grid Connection Project

8.6.6.1 A range of potential impacts from noise and vibration have been identified which may occur during the construction, O&M, and decommissioning phases of the MHPGC Project.

8.6.6.2 The impacts that have been scoped into the assessment are outlined in Table 8.60 together with a description of any additional data collection (e.g. site specific surveys) and supporting analyses (e.g. modelling) that will be required to enable a full assessment of the impacts.

8.6.6.3 Potential impacts scoped out of the assessment are presented in Table 8.69, with justification.

Table 8.69: Impacts Proposed to be Scoped into the Morven Hawthorn Pit Grid Connection Project Assessment for Noise and Vibration

*Project phase refers to construction (C), O&M (O) and decommissioning (D).

Impact	Project Phase*			Justification	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D			
Increased levels of noise from construction activities at the landfall and along the corridor.	✓	×	×	Sensitive receptors, such as dwellings, are outlined in Section 8.6.5 Baseline Environment and located within the Construction Noise Study Area. The receptors will potentially be impacted by noise from plant and equipment during the construction phase.	Where there is a risk of a likely significant effect occurring, and where existing baseline data coverage is not sufficient, attended noise surveys at up to seven locations covering one daytime and night time period. Number of survey locations are an estimate based on available information, survey durations are based on professional experience. Measurements will be used to determine construction threshold values as per BS 5228-1 Section E.3.2 and Table E.1.	Quantitative assessment in line with the calculation methodologies in BS 5228-1, including the ABC method, for determining potential significance.

Impact	Project Phase*			Justification	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D			
Increased levels of vibration from construction activities at the landfall and along the corridor.	✓	×	×	Sensitive receptors (e.g. dwellings) are in the Construction Vibration Study Area. The receptors will potentially be impacted by vibration generating activities during the construction phase.	Not required, assessment of vibration impact is based on absolute levels.	Quantitative assessment using empirical data and with reference to vibration effect levels in BS 5228-2 for determining potential significance.
Increased levels of noise from the construction and decommissioning of the substation.	✓	×	✓	Sensitive receptors (e.g. dwellings) are in the Construction Noise Study Area. The receptors will potentially be impacted by noise from plant and equipment during construction and decommissioning phases	Where there is a risk of a likely significant effect occurring, and where existing baseline data coverage is not sufficient, unattended noise surveys at up to three locations for minimum period of seven days. Attended noise surveys at up to three locations covering one night time period. Number of	Construction: Quantitative assessment in line with the calculation methodologies in BS 5228-1, including the ABC method, for determining potential significance.

Impact	Project Phase*			Justification	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D			
Increased levels of noise from the O&M of the substation.	×	✓	×	Sensitive receptors (e.g. dwellings) are in the Operational Noise Study Area. The receptors will potentially be impacted by noise from the substation during operation.	survey locations are an estimate based on available information, survey durations are based on professional experience. Measurements will be used to determine construction threshold values as per BS 5228-1 Section E.3.2 and Table E.1; and representative background sound level as per BS 4142.	Operational: Quantitative assessment in line with BS 4142 and with reference to context quantitative assessment.
Increased levels of vibration from the construction and decommissioning of the substation.	✓	×	✓	Sensitive receptors (e.g. dwellings) are in the Construction Vibration Study Area. The receptors will potentially be impacted by vibration generating activities during construction and decommissioning phases.	Not required, assessment of vibration impact is based on absolute levels.	Quantitative assessment using empirical data and vibration impact levels in BS 5228-2.

Impact	Project Phase*			Justification	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D			
Changes in traffic noise on existing road network as a result of construction and decommissioning phase traffic.	✓	×	✓	Sensitive receptors (e.g. dwellings are in the Construction Traffic Road Traffic Noise Study Area. The receptors will potentially be impacted by increased road traffic noise from construction vehicles on the existing road network during construction and decommissioning phases.	Not required, assessment of road traffic will be based on predicted noise levels using traffic data.	Quantitative assessment in line with the LA 111 calculation methodology and assessment of significance.

Table 8.70: Impacts Proposed to be Scoped out of the Morven Hawthorn Pit Grid Connection Project Assessment for Noise and Vibration

Impact	Justification
Noise from the operation of the cable.	The cable will not be a source of noise during operation. Site inspections and maintenance activities associated with the cable are expected to be generate low noise levels; in addition, activities will be intermittent and short-term.
Noise from the decommissioning of the cable.	It is assumed that underground cables would be left in place should decommissioning take place and therefore removal of the cable would not occur.
Vibration from the operation of the cable.	The cable will not be a source of vibration during operation. Site inspections and maintenance activities associated with the cable are not expected to generate vibration; in addition, activities will be intermittent and short-term.
Vibration from the decommissioning of the cable.	It is assumed that underground cables would be left in place should decommissioning take place and therefore removal of the cable would not occur.
Vibration from the O&M of the substation.	The substation will not be a source of vibration during operation. Site inspections and maintenance activities associated with the substation are not expected to generate vibration, in addition, activities will be intermittent and short-term.
Traffic noise on existing road network during O&M.	As identified in Chapter 8.5: Traffic and Transport the operational traffic is anticipated to be minimal, limited to infrequent on site inspections and maintenance activities.
Traffic vibration on existing road network during O&M.	As stated in LA 111 “a maintained road surface will be free of irregularities as part of project design and under general maintenance, so operational vibration will not have the potential to lead to significant adverse effects”.

8.6.7 Designed In Measures and Mitigation

8.6.7.1 The following designed in measures are relevant to noise and vibration. The designed in measures will evolve over the development process as the EIA progresses.

8.6.7.2 Any secondary mitigation requirements for noise and vibration will be dependent on the significance of the impacts, as identified during the EIA process.

8.6.7.3 The measures to control noise and vibration during the decommissioning phase will be the same (or broadly similar) as those identified for the construction phase. Decommissioning works would include removal of all above ground structures.

8.6.7.4 As part of the Project design process, a number of designed in measures (primary and tertiary) will reduce the potential for impacts on noise and vibration (Table 8.71). As there is a commitment to implement these measures, they are considered inherent to the design of the MHPGC Project. The determination of magnitude and significance will assume the implementation of such measures. Some of these measures are considered standard industry practice for this type of development.

8.6.7.5 The requirement for any additional (secondary) mitigation measures will be dependent on the significance of the impacts on noise and vibration receptors. The requirement for and feasibility of any mitigation measures will be consulted upon with statutory consultees throughout the EIA process.

Table 8.71: Designed in Measures Proposed for Noise and Vibration

Reference Number	Designed in Measures	Justification	Primary or Tertiary
MM-52	The MHPGC Project infrastructure will be sited to maximise the distance between permanent and temporary infrastructure and sensitive receptors.	Maximising the distance between infrastructure, and sensitive receptors will increase the distance over which noise and vibration levels dissipate reducing impact on the receptor.	P
MM-53	Development of, and adherence to, a Construction Noise Management Plan (CNMP), including the adoption of Best Practicable Means (BPM) and best practice.	Standard industry practice to apply BPM to all construction activities (including decommissioning) to minimise the generation and impact of noise and vibration.	T
MM-56	Where practicable micro-siting will be undertaken during detailed design to avoid sensitive areas and receptors.	To minimise disturbance during construction, O&M and decommissioning.	P
MM-57	The MHPGC Project land substation will be designed to minimise noise levels during operation.	If needed the design of the substation will incorporate measures to minimise noise levels.	T

8.6.8 Proposed Assessment Methodology

8.6.8.1 As identified in Table 8.60, there is the potential for significant impacts on noise and vibration during the construction, O&M and decommissioning phases of the MHPGC Project.

8.6.8.2 The onshore assessment of noise and vibration will be based on human receptors. Noise and disturbance impacts on biodiversity are set out in Chapter 8.3: Terrestrial Ecology and Ornithology of the Scoping Report

Site Survey

8.6.8.3 Baseline noise surveys will be completed to establish the noise climate at locations considered representative of noise sensitive receptors near to the onshore corridor and substation. The locations and durations of baseline surveys will be agreed with the local authority environmental health departments.

Construction and Decommissioning: Noise

8.6.8.4 The prediction of construction and decommissioning noise levels will be based on the method presented in BS 5228-1 and using available information in conjunction with professional judgement.

8.6.8.5 Quantitative assessment in line with the calculation methodologies in BS 5228-1, including the ABC method, for determining potential significance of noise.

8.6.8.6 Noise predictions will be based on information including the construction and decommissioning programme, working hours, key construction and decommissioning activities, working areas; haul roads, plant list and percentage on times.

8.6.8.7 Mitigation measures will be presented to minimise noise where appropriate, including BPM.

Construction and Decommissioning: Road Traffic Noise

8.6.8.8 The prediction of construction and decommissioning road traffic noise levels will be based on the method presented in LA 111 and using traffic data provided by the traffic engineer. The magnitude of impact will be determined based on predicted noise level change 'with' and 'without' construction traffic.

8.6.8.9 Mitigation measures will be presented to minimise noise where appropriate, including BPM.

Construction and Decommissioning: Vibration

8.6.8.10 A quantitative assessment of construction and decommissioning vibration levels will be based on the empirical data presented in BS 5228-2, using available information in conjunction with professional judgement.

8.6.8.11 Mitigation measures will be presented to minimise vibration where appropriate, including BPM.

Operations and Maintenance: Noise

8.6.8.12 The prediction of operational noise levels will be based on the calculation method presented in BS ISO 9613-2 and using available information in conjunction with professional judgement.

8.6.8.13 Noise predictions will be based on information including details of fixed plant and equipment (including manufacturers' data sheets) and operational hours.

8.6.8.14 The noise level 'with' and 'without' operational activities will be assessed in accordance with BS 4142 (for human receptors).

8.6.8.15 Mitigation measures will be presented where appropriate, including BPM.

Significance of Impact Criteria

8.6.8.16 Construction and decommissioning noise significance will be based on BS 5228-1, including the ABC method. The threshold of potential significance at sensitive receptors will be determined based on the existing ambient noise level, predicted site noise level, duration of impact, time of day, character of the impact and number of affected receptors.

8.6.8.17 Construction and decommissioning vibration significance will be based on BS 5228-2. The threshold of potential significance at sensitive receptors will be determined based on the site vibration level and the duration of impact.

8.6.8.18 Construction and decommissioning road traffic noise significance will be based on LA 111. The threshold of potential significance from public roads used for construction traffic will be determined based on predicted road traffic noise change, magnitude of impact, duration of impact.

8.6.8.19 Operational site noise significance will be based on BS 4142. The threshold of potential significance at sensitive receptors will be determined based on the existing background sound level, predicted site noise level, time of day, magnitude of impact and the context in which the sound occurs, including absolute level of sound, acoustic character of site noise.

8.6.8.20 The significance of impact criteria will be subject to consultation with relevant stakeholders.

8.6.9 Potential Cumulative Impacts

8.6.9.1 Cumulative impacts with the Morven Offshore Wind Array Project and the second grid connection project in the Branxton area Southeast Scotland will be considered, together with cumulative impacts with other developments, where relevant.

8.6.9.2 The cumulative impact assessment will follow the approach outlined in Chapter 4: EIA Methodology, of the Scoping Report.

8.6.10 Potential Inter-related Effects

8.6.10.1 The EIA will consider inter-related effects arising from the MHPGC Project, across their own phases (project lifetime) and different effects on one receptor in one phase (receptor led). The EIA will consider inter-related effects of multiple impacts from the construction, O&M and decommissioning phases of the MHPGC Project, affecting one receptor. Inter-related effects will be assessed through consideration of all effects on a receptor, considering both spatial and temporal overlap, within the MHPGC Project. This will ensure that the MHPGC Project is appropriately considered within the EIA and in line with Chapter 4: EIA Methodology.

8.6.11 Potential Transboundary Impacts

8.6.11.1 There are no potential transboundary impacts from onshore noise and vibration from the MHPGC Project. This is due to any likely significant impacts being experienced locally, rather than a wider geographic scale.

8.7 Onshore Air Quality

8.7.1 Introduction

8.7.1.1 This chapter of the Scoping Report identifies the onshore air quality receptors of relevance to the Morven Hawthorn Pit Grid Connection Project (hereafter referred to as 'MHPGC Project') and considers the potential impacts arising from the construction, operation and maintenance (O&M), and decommissioning of the MHPGC Project. This scoping chapter adopts a proportionate approach to only those impacts with potential to result in likely significant effects and therefore scopes out other impacts where there is evidence that the effects are not likely to be significant.

8.7.1.2 Air quality interfaces with many other topics and as such, this chapter should be considered alongside Chapter 8.3: Terrestrial Ecology and Ornithology, Chapter 8.5 Traffic and Transport and Chapter 9.2: Human Health.

8.7.1.3 This chapter covers impacts associated with the onshore components of the MHPGC Project only and is therefore not applicable to Scotland

8.7.2 Policy and Legislation

8.7.2.1 This section identifies the relevant legislation, policy and other documentation that will inform the assessment of likely significant impacts with respect to onshore air quality. Further information on policies relevant to the Environmental Impact Assessment (EIA) and their status is provided in Chapter 2: Policy and Legislation. Legislation.

8.7.2.2 Table 8.72 lists the legislation relevant to the assessment of impacts on air quality receptors.

Table 8.72: Legislation Relevant to Air Quality

Legislation Description	Relevance to Assessment
Directive 2008/50/EC on Ambient Air Quality and Cleaner Air for Europe (2008).	
Consolidates previously existing European Union (EU)-wide air quality legislation (with the exception of Directive 2004/107/EC relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air) and provides a new regulatory framework for particulate matter (PM) smaller than 2.5µm ($PM_{2.5}$). The Ambient Air Directive sets limit values (for the protection of human health) and critical levels (for the protection of vegetation and ecosystems) for selected pollutants that are to be achieved by specific dates, and details procedures EU Member States should take in assessing ambient air quality. Regulated pollutants include sulphur dioxide (SO_2), nitrogen dioxide (NO_2), oxides of nitrogen (NOx), particulate matter smaller than 10 µm (PM_{10}), particulate matter smaller than 2.5	The MHPGC Project has the potential for impacts on human receptors covered by the Ambient Air Directive.

Legislation Description	Relevance to Assessment
µm ($PM_{2.5}$), lead (Pb), benzene (C_6H_6) and carbon monoxide (CO). The limit values and critical levels are legally binding limits on concentrations of pollutants in the atmosphere which can broadly be taken to achieve a certain level of environmental quality. The values are based on the assessment of the effects of each pollutant on human health, taking into account the effects on sensitive groups such as children, the elderly and those with health conditions, or on vegetation and ecosystems. The limit values and critical levels relate to concentrations in ambient air. The Ambient Air Directive defines ambient air as outdoor air, and explicitly excludes workplaces and other places to which members of the public do not have regular access. EU legislation which applied directly or indirectly to the United Kingdom (UK) before 11.00 p.m. on 31 December 2020 has been retained in UK law as a form of domestic legislation known as 'retained EU legislation'. Directives that have been transposed include the Air Quality Standards Regulations 2010.	
The Environmental Protection Act 1990.	
Provides the framework for the control of nuisance from dust and odour.	The construction phase of the MHPGC Project is associated with emissions of dust which can give rise to potential nuisance concerns.
The Environment Act 2021.	
The Environment Act 2021 establishes a legally binding duty on the UK Government to bring forward at least two new air quality targets in secondary legislation by 31 October 2022, including $PM_{2.5}$. This duty sits within the environmental targets' framework outlined in the Environment Act (Part 1).	The MHPGC Project has the potential to emit $PM_{2.5}$ throughout the construction phase. $PM_{2.5}$ emissions are addressed in the Environment Act 2021. The target has now been formally published and is presented in Table 8.73.
The Environmental Targets (Fine PM) (England) Regulations 2023.	
The Act details the environmental targets that were set out in the Environmental Act 2021.	The regulations set out the new $PM_{2.5}$ Air Quality Objective (AQO) that is to be met by 2040.

Legislation Description	Relevance to Assessment
The Environment Act 1995.	
Requires that local authorities periodically review air quality within their individual areas. This process of Local Air Quality Management (LAQM) is an integral part of delivering the Government's Air Quality Strategy and the AQOs contained in the Strategy.	The Environment Act 1995 sets the framework for setting criteria against which the air quality impacts of the MHPGC Project should be assessed. In addition, the LAQM process is key to the provision of baseline air quality data for the assessment (see section 8.7.5).
The Air Quality Standards Regulations 2010.	
These came into force on 11 June 2010 and transpose Directive 2008/50/EC, including the limit values, into UK legislation. The Air Quality Standards Regulations 2010 impose a duty on the Secretary of State to meet these limit values. Similar to Directive 2008/50/EC, The Air Quality Standards Regulations 2010 define ambient air as outdoor air, and explicitly exclude workplaces and other places to which members of the public do not have regular access. The Air Quality Standards (AQS) and AQOs relevant to the Air Quality Assessment from construction road traffic are reported in Table 8.73.	The MHPGC Project has the potential for impacts on human receptors covered by the Regulations.
Wildlife and Countryside Act 1981.	
This provides the basis for the regulatory framework for the designation of Sites of Special Scientific Interest (SSSIs). Sites in England are designated by Natural England if they have special interest by reason of any of their flora, fauna, or geological or physiographical features.	The MHPGC Project has the potential for air quality impacts on SSSIs.

8.7.2.3 The AQS Regulations 2010 currently set out the AQOs in the UK. Table 8.73 provides the AQS and AQOs relevant to the air quality assessment of impacts from construction road traffic emissions.

Table 8.73: Air Quality Standards and Objectives Relevant to the Construction Road Traffic Assessment

Pollutant	Averaging Period	Value (µg m^{-3})
NO_2 (human receptors).	Annual mean.	40
	1 hour mean, not to be exceeded more than 18 times a year (equivalent to 99.79th percentile).	200
PM_{10} (human receptors).	Annual mean.	40
	24 hours mean, not to be exceeded more than 35 times a year (equivalent of 90.4th percentile).	50
$PM_{2.5}$ (human receptors).	Annual mean.	20
	Annual mean, interim target concentration not to be exceeded by the end of January 2028.	12
	Annual mean, target concentration not to be exceeded by the end of 2040.	10
NOx (ecological receptors).	Annual mean, not to be exceeded (critical level for the protection of vegetation only).	30

8.7.2.4 Table 8.74 lists the national planning policy relevant to the assessment of the impacts on air quality.

Table 8.74: National Planning Policy Relevant to Air Quality

Policy Description	Relevance to Assessment
Overarching National Policy Statement (NPS) for Energy (EN-1) (Department for Energy Security and Net Zero (DESNZ), 2023)	
Sets out overarching guidance and requirements for nationally significant energy infrastructure projects. Section 5.2 discusses air quality and emissions and notes the variety of potential pollutants and impacts on human health and on ecological sites. Paragraph 5.2.8 states: "Where the project is likely to have adverse effects on air quality the applicant should undertake an assessment of the impacts of the Proposed Project as part of	The construction of the MHPGC Project has the potential to result in air quality impacts. For the MHPGC Project air quality emissions, including dust, are associated with construction activities, combustion sources from construction plant equipment and construction traffic. Designed in measures are presented in Table 8.80. These are designed to mitigate significant air quality effects.

Policy Description	Relevance to Assessment
the Environmental Statement (ES).*"* Section 5.2 also explains how the Planning Inspectorate should take air quality into account when making a decision, and how they should consider requirements for mitigation. Paragraph 5.2.8 outlines what the ES should describe in relation to air quality including: "existing air quality levels and the relative change in air quality from existing levels; any significant air emissions, their mitigation and any residual effects distinguishing between the project stages and taking account of any significant emissions from any road traffic generated by the project; the predicted absolute emission levels of the Proposed Project, after mitigation methods have been applied; any potential eutrophication impacts." In addition, section 4.12.2 says: "Pollution control is concerned with preventing pollution through the use of measures to prohibit or limit the releases of substances to the environment from different sources to the lowest practicable level. It also ensures that ambient air and water quality meet standards that guard against impacts to the environment or human health*."* Section 5.7.1 says: "During the construction, operation and decommissioning of energy infrastructure there is potential for the release of a range of emissions such as odour, dust, steam, smoke, artificial light and infestation of insects. All have the potential to have a detrimental impact on amenity or cause a common law nuisance or statutory nuisance under Part III, Environmental Protection Act 1990*."* *Section 5.7.6 details that the assessment should describe* *The type, quantity and timing of emissions*	

Policy Description	Relevance to Assessment
Aspects of the development which may give rise to emissions *Premises or locations that may be affected by the emissions* *Effects of the emission on identified premises or locations* *Measures to be employed in preventing or mitigation the emissions*	
The Air Quality Strategy for England, Scotland, Wales and Northern Ireland (2007) (Department for Environment, Food and Rural Affairs (Defra) *et al.*, 2007).	
Provides a framework for improving air quality at a national and local level and supersedes the previous strategy published in 2000. It imposes a number of obligations on local authorities to manage air quality but does not directly impose obligations on developers.	To carry out an air quality review and assessment under the LAQM process, local authorities produce an Annual Status Report which describes areas identified to be at potential risk of exceeding the objectives in the regulations, and progress towards meeting the objectives. Review and assessments of local air quality aim to identify areas where national policies to reduce vehicle and industrial emissions are unlikely to result in air quality meeting the UK Government's AQOs by the required dates. For the purposes of determining the focus of review and assessment, local authorities should have regard to those locations where members of the public are likely to be regularly present and are likely to be exposed over the averaging period of the objective. Where the assessment indicates that some or all of the objectives may be potentially exceeded, the Local Authority has a duty to declare an Air Quality Management Area (AQMA). The declaration of an AQMA requires the Local Authority to implement an Air Quality Action Plan, to reduce air pollution concentrations so that the required AQOs are met. The LAQM process is key to the provision of baseline air quality data for the assessment (see section 8.7.5).

Policy Description	Relevance to Assessment
Clean Air Strategy 2019 (Defra, 2019).	
Describes the UK Government's approach to tackling air pollution in England.	The MHPGC Project aligns with the priorities set out in the Clean Air Strategy 2019.
National Planning Policy Framework (NPPF) (Ministry of Housing, Communities and Local Government, 2023).	
Paragraph 192 states that policies and plans should sustain and improve air quality. In addition, paragraph 180e indicates that developments should, wherever possible, help to improve local environmental conditions such as air quality.	Section 8.7.7 outlines designed in environmental measures (Table 8.80) to mitigate any potential impacts to local air quality.

Local Planning Policy

8.7.2.5 Table 8.75 lists the local planning policy relevant to the assessment of the potential impacts on air quality.

Table 8.75: Local Planning Policy Relevant to Air Quality

Local Planning Policy	Relevance to Assessment
County Durham Plan Adopted 2020.	
Policy 31: Amenity and Pollution. Development will be permitted where it can be demonstrated that there will be no unacceptable impact, either individually or cumulatively, on health, living or working conditions or the natural environment and that can be integrated effectively with any existing business and community facilities. Development which has the potential to lead to, or be affected by, unacceptable levels of air quality, inappropriate odours, noise and vibration or other sources of pollution, either individually or cumulatively, will not be permitted including where any identified mitigation cannot reduce the impact on the environment, amenity of people or human health to an acceptable level.	Potential Designed in measures are presented in section 8.7.7. These are designed to mitigate against significant air quality, dust or odour effects.

Local Planning Policy	Relevance to Assessment
Sunderland City Council Core Strategy and Development Plan 2015-2033.	
Policy HS1: Quality of life and amenity "1. Development must demonstrate that it does not result in unacceptable adverse impacts which cannot be addressed through appropriate mitigation, arising from the following sources: i) air quality; ii) noise; iii) dust; iv) vibration; v) odour; vi) emissions; vii) land contamination and instability; viii) illumination; ix) run-off to protected waters; or x) traffic. 2. Development must ensure that the cumulative impact would not result in unacceptable adverse impacts on the local community; and 3. Development will not normally be supported where the existing neighbouring uses would unacceptably impact on the amenity of future occupants of the proposed development".	Potential Designed in measures are presented in section 8.7.7 (Table 8.80). These measures are designed to mitigate against significant air quality, dust or odour effects.

Other Relevant Information and Guidance

8.7.2.6 A summary of other relevant information and guidance relevant to the assessment undertaken for air quality is provided in Table 8.76.

Table 8.76: Other Guidance Relevant to Air Quality

Technical Guidance Description	Relevance to Assessment
World Health Organisation (WHO) (2021), Air Quality Guidelines.	
The WHO Air quality guidelines (AQG) serve as a global target for national, regional and city governments to work towards improving their citizen's health by reducing air pollution. The WHO's Air quality guidelines are a set of evidence-based recommendations of limit values for specific air pollutants developed to help countries achieve air quality that protects public health. The first release of the guidelines was in 1987. Since then, several updated versions have appeared, and the latest global version was published in 2005.	The new guidelines are likely to form part of any future updates to the Air Quality Objectives set out in the Air Quality Strategy (see Table 8.73).

Technical Guidance Description	Relevance to Assessment
The 2021 update of the WHO AQG is in response to the real and continued threat of air pollution to public health.	
Defra, LAQM Technical Guidance (TG22) (Defra, 2022).	
The technical guidance is designed to support local authorities in carrying out their duties under the Environment Act 1995 and includes information on monitoring and modelling air quality.	The assessment has consulted the guidance, and it has informed the sensitivity of receptors and the approach to verification of traffic emissions dispersion modelling (see section 8.7.8).
Institute of Air Quality Management (IAQM) and Environmental Protection UK (EPUK), Land use Planning and Development Control: Planning for Air Quality (2017) (IAQM, 2017).	
Suggests how to classify the magnitude and significance of air quality effects from a new development for planning purposes. This guidance also promulgates the term air quality assessment level (AQAL) as a generic term for the various standards, objectives, limit values etc. against which impacts need to be assessed.	The guidance underpins the significance criteria applied to this assessment (see Table 8.81).
Environment Agency and Defra, Air emissions risk assessment for your environmental permit (2023).	
Contains long- and short-term assessment levels for releases to air derived from a number of published UK and international sources. Gives criteria for screening out source contributions in the context of environmental permit applications. Although intended for use in evaluating permit applications, it is often used for planning applications where no better guidance is available (particularly for ecological receptors). This guidance also introduces the terms 'process contribution' (PC), meaning the concentration or deposition rate resulting from the development activities only, excluding other sources, and 'predicted environmental contribution' (PEC), meaning the total modelled concentration, equal to the PC plus the background contribution from all other sources. These terms are commonly used in air quality assessments, even where the term 'process' is not strictly accurate, and so are used in	The Environment Agency screening criteria will be considered in the assessment of potential impacts on ecological receptors due to air pollution (see section 8.7.6).

Technical Guidance Description	Relevance to Assessment
this assessment with 'process' referring to the MHPGC Project.	
IAQM, A guide to the assessment of air quality impacts on designated nature conservation sites (2020) (IAQM, 2020).	
Provides guidance on the assessment of air quality impacts at designated nature conservation sites.	The guidance underpins the approach in assessing air quality impacts on the identified ecological receptors (see section 8.7.8).
IAQM, Guidance on the assessment of dust from demolition and construction (2024) (IAQM, 2024).	
Provides guidance on the assessment of dust from construction activities.	The guidance underpins the approach in assessing construction dust impacts as presented in section 8.7.8.
IAQM, Guidance on the assessment of odour for planning (2018) (IAQM, 2018).	
Provides guidance on the assessment of odour.	The guidance underpins the approach in assessing odour impacts as presented in section 8.7.8.

8.7.3 Study Area

8.7.3.1 The Onshore Air Quality Study Area for the air quality assessment is defined as the area of the MHPGC Project Scoping Boundary together with the Zones of Influence (ZoIs) for air quality. ZoIs for air quality will comprise the area immediately around the MHPGC Project Scoping Boundary (for a distance based on expert judgement and recognised guidance), plus roads on which traffic related to the MHPGC Project may travel. Guidance published by the IAQM (2024) suggests that dust impacts may extend up to 250m from construction site boundaries, and up to 250m from the construction site entrance/exit along roads on which construction traffic is travelling. Guidance published jointly by the IAQM and Environmental Protection UK (EPUK) (2017) recommends a ZoI extending for 200m from roads on which a significant increase in traffic would occur due to the MHPGC Project. The guidance further defines a significant increase in traffic as follows:

- cause a significant change in Light Duty Vehicle (LDV[25]) traffic flows on local roads with relevant receptors:
  - more than 100 annual average daily traffic (AADT) within or adjacent to an AQMA;

[25] LDV = cars and small vans <3.5t gross vehicle weight.

- more than 500 AADT elsewhere;

- cause a significant change in Heavy Duty Vehicle (HDV[26]) flows on local roads with relevant receptors:
  - more than 25 AADT within or adjacent to an AQMA;
  - more than 100 AADT elsewhere;
- realign roads, for instance changing the proximity of receptors to traffic lanes, where the change is 5m or more and the road is within an AQMA;
- introduce a new junction or remove an existing junction near to relevant receptors. This applies to junctions that cause traffic to significantly change vehicle accelerate/decelerate (for example, traffic lights, or roundabouts).

8.7.3.2 At this scoping stage, a buffer of 250m from the MHPGC Project Scoping Boundary has been used to identify the potential scope of air quality impacts, refer to Figure 8.24. The Onshore Air Quality Study Area will be reviewed and amended in response to such matters as refinement of the MHPGC Project components, for example, cable laying, substation construction, etc., along with the identification of additional impact pathways and in response, where appropriate, to feedback from consultation.

[26] HDV = goods vehicles and buses > 3.5t gross vehicle weight.

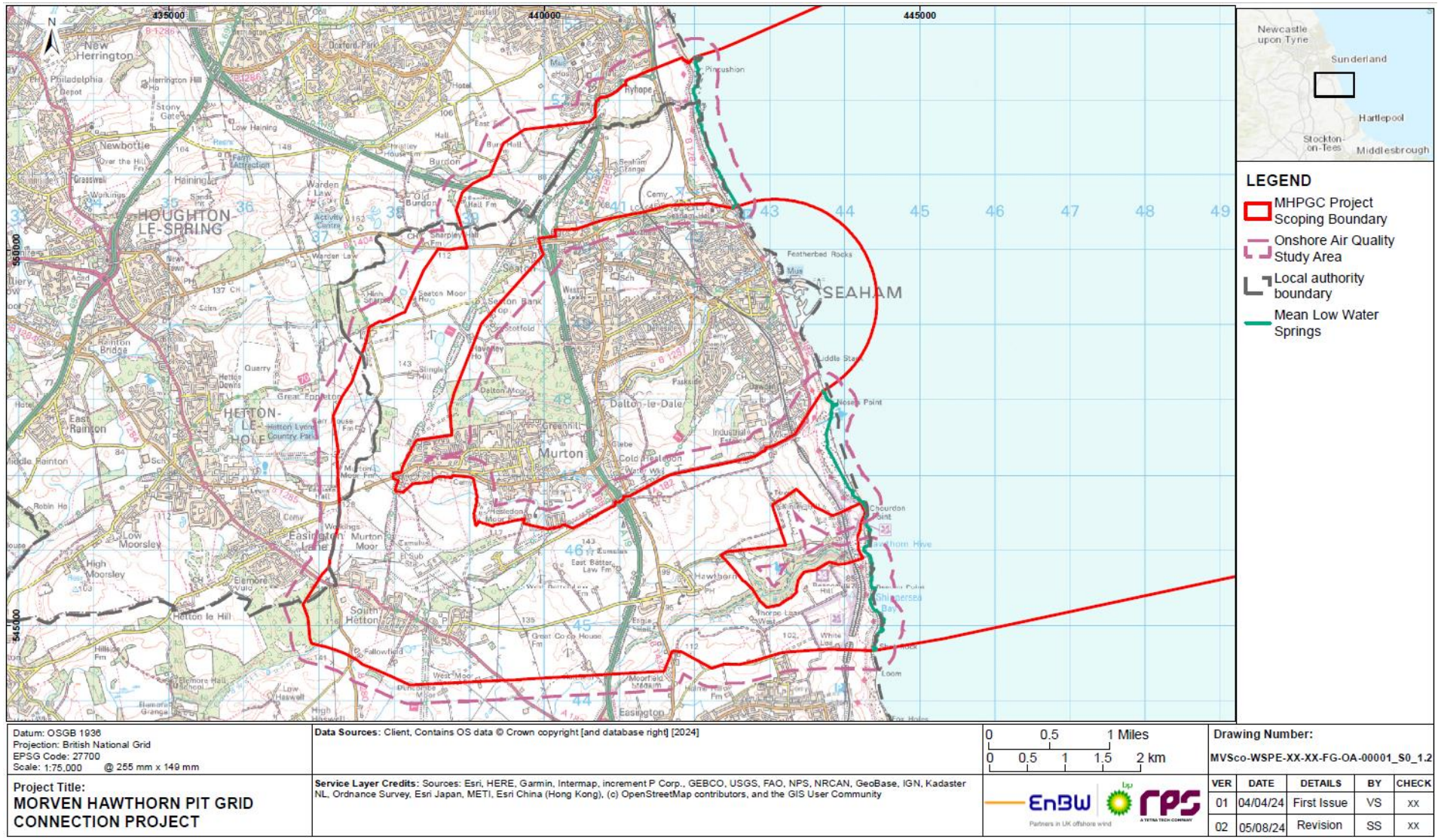


Figure 8.24: Dust Construction Assessment Area

8.7.4 Data Sources

8.7.4.1 The air quality assessment will utilise publicly available data, as presented in Table 8.77.

Table 8.77: Key Sources of Air Quality Data

Title	Source	Date	Author
Defra Background Mapping data for local authorities.	https://uk-air.defra.gov.uk/data/laqmbackground-home	2018	Defra
Durham County Council (DCC) Air Quality Annual Status Report.	https://www.durham.gov.uk/media/31865/2019-Air-Quality-Annual-Status-Report-ASR-/pdf/2019AirQualityAnnualStatusReport.pdf?m=637140031162800000	2019	DCC
Sunderland City Council Air Quality Annual Status Report.	https://www.sunderland.gov.uk/media/30595/Air-Quality-Report-2023/pdf/AirQualityAnnualStatisticsReport2023.pdf?m=1694536095897	2023	Sunderland City Council
Air Pollution Information System (APIS).	https://www.apis.ac.uk/	N/A	APIS

8.7.5 Baseline Environment

8.7.5.1 The Onshore Air Quality Study Area lies within the administrative areas of Durham County Council (DCC) and Sunderland City Council (SCC). Each council produces an Annual Status Report (ASR) which describes air quality in its administrative area, including any AQMAs in force, and the results of air quality monitoring.

Air Quality Emissions Baseline

8.7.5.2 The Sunderland 2023 ASR notes that no NO_2 monitoring location had exceedances of the annual NO_2 AQO. Similarly, the one monitoring station that records $PM_{2.5}$ had no exceedances of the AQO but mentions that the annual $PM_{2.5}$ concentration increased to 8µg m^{-3} in 2021 from 6µg m^{-3} in 2021.

8.7.5.3 The latest DCC ASR publicly available is 2019, a more recent ASR will be requested through consultation with DCC. DCC has one active AQMA due to exceedances in NO_2 annual mean. It was last amended in 2022.

8.7.5.4 There are no AQMAs within the Air Quality Study Area. The nearest is the DCC AQMA located approximately 8.1km west. The AQMA is unlikely to experience any increase in air quality emissions due to construction, O&M and decommissioning due to the distance from the MHPGC Project Scoping Boundary.

8.7.5.5 Defra maintains a nationwide model (the Pollution Climate Mapping (PCM) model) of current and future background air quality concentrations at a 1km grid square resolution. The datasets include annual average concentration estimates for NO_2, as well as other pollutants. The PCM model is semi-empirical in nature: it uses data from the National Atmospheric Emissions Inventory (NAEI) to model the concentrations of pollutants at the centroid of each 1km grid square but then calibrates these concentrations in relation to actual monitoring data. Concentrations represent background locations, not roadside locations or those particularly influenced by point sources.

8.7.5.6 Data is available for years covering 2018 to 2030, with 2018 being used as a reference year. Modelled concentrations generally decrease over that period. For the grid squares covered by the Onshore Air Quality Study Area, concentrations of background annual mean NO_2 in 2024 (baseline) vary between 5µg m^{-3} and 10µg m^{-3}, which is typical of rural areas in England. These concentrations are well within the legal limit of 40µg m^{-3}.

8.7.5.7 The $PM_{2.5}$ concentrations from Defra background mapping show concentrations range from 5µg m^{-3} to 7µg m^{-3} in the Onshore Air Quality Study Area. These are well below the legal limit 25µg m^{-3} .

Dust and Odour Baseline

8.7.5.8 Ambient levels of dust and odour are typically very low and are not routinely monitored in the UK. Elevated levels of dust and odour can result in complaints which may then result in monitoring taking place in the local area to determine if a nuisance is present.

8.7.5.9 No baseline information on dust or odour is available. Levels of these impacts are normally not sufficient to cause nuisance.

Air Quality Receptors

8.7.5.10 Human receptors within the Onshore Air Quality Study Area will be considered in the assessment. Sensitive human receptors include residential properties, schools, medical facilities, prisons and commercial properties. It is considered sufficient to count the number of receptors (e.g. 10 residential, five commercial, etc.) within increasing distance bands from the MHPGC Project Scoping Boundary to consider the impacts from dust. For air quality emission impacts, notional receptors are used to demonstrate if impacts are negligible along the local road network from additional traffic associated with construction. The Onshore Air Quality Study Area includes the urban areas of Hawthorn, South Hetton, Seaham Grange and the outer edges of Murton, Seaham and Easington Colliery. When the construction route has been established and confirmed relevant human receptors can be defined. Further human receptors will be identified when the site entrance and construction route can be determined.

8.7.5.11 Ecological receptors identified using Defra's Multi-Agency Geographic Information for the Countryside (MAGIC) that fall within 50m (screening criteria from the IAQM 2024 guidance) of the MHPGC Project Scoping Boundary are:

- Northumbria Coast Special Protected Areas (SPA);
- Durham Coast SSSI;

- Durham Coast Ramsar site;
- Durham Coast Special Areas of Conservation (SAC);
- Eppleton Grassland SSSI;
- Hawthorn Dene SSSIs;
- Helesdon Moor West SSSIs;
- Helesdon Moor East SSSIs.

8.7.5.12 Local ecological sites identified within the 50m of the MHPGC Project Scoping Boundary as set out in the screening criteria of the IAQM (2024) guidance are:

- Four Ancient Woodlands;
- Noses Point Local Nature Reserve (LNR);
- Easington LNR;
- 12 Local Wildlife Sites (LWS) which are named in Chapter 8.3: Terrestrial Ecology and Ornithology Table 8.41.

8.7.5.13 Consultation with Ornithology and Terrestrial Ecology experts will be undertaken when writing the EIA Report/ES Chapter to ensure all relevant ecological sites are assessed in the air quality assessment.

8.7.5.14 Further ecological receptors may be identified when the site entrance and construction route are determined.

Future Baseline

8.7.5.15 Future air quality conditions can be determined by the Defra PCM model by looking at the construction year and opening year. As part of the EIA process, the NO2 concentration predicted by the Defra PCM model for the construction and commencement periods will be used to assess the magnitude of any potential change.

8.7.6 Potential Impacts of the Morven Hawthorn Pit Grid Connection Project

8.7.6.1 The discussion below draws on industry experience and expertise to identify those impact receptor pathways that may potentially lead to a significant impact. A range of potential impacts on air quality have been identified which may occur during the construction, O&M, and decommissioning phases of the MHPGC Project.

8.7.6.2 The impacts that have been scoped into the assessment are outlined in Table 8.60 together with a description of any additional data collection (e.g. site specific surveys) and supporting analyses (e.g. modelling) that will be required to enable a full assessment of the impacts.

8.7.6.3 Potential impacts scoped out of the assessment are presented in Table 8.78, with justification.

Table 8.78: Impacts Proposed to be Scoped in to the Morven Hawthorn Pit Grid Connection Project Assessment for Air Quality

*Project phase refers to construction (C), O&M (O) and decommissioning (D).

Impact	Project Phase*			Justification	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D			
Emissions of air pollutants from construction traffic on roads.	✓	×	✓	Likelihood of significant impacts during the construction phase will depend on traffic data, which is not yet available and are therefore scoped in.	Monitoring data from Local Authority monitoring programmes. Baseline traffic data (from Transport assessment) to determine which roads are likely to be affected.	Simple air quality assessment to include impact on human and ecological receptors (see Section 8.7.8).
Emissions of air pollutants from construction plant equipment on site.	✓	×	×	Likelihood of significant impacts during the construction phase will depend on the choice of construction plant equipment, which is not yet available and are therefore scoped in.	Location of any construction compounds and drilling locations in relation to sensitive locations and receptors.	Simple air quality assessment to include mitigation measures and using the best available Non-Road Mobile Machinery (NRMM).
Emissions of dust from construction activities.	✓	×	×	Likelihood of significant impacts during the construction phase will depend on the proposed construction traffic route, which is not yet available and are therefore scoped in.	None.	A construction dust assessment will determine good construction practices (see Section 8.7.8).

Table 8.79: Impacts Proposed to be Scoped out of the Morven Hawthorn Pit Grid Connection Project Assessment for Air Quality

Impact	Justification
Emissions of air pollutants from traffic on roads in O&M phase.	Significant impacts are unlikely during the O&M phase, as vehicle movements are expected to be minimal and likely to be limited to monthly maintenance visits based on experience with similar projects. This assumption is based on other infrastructure projects of a similar scale.
Emissions of air pollutants from construction plant equipment on site in O&M and decommissioning phases.	Significant impacts are unlikely during the O&M phase, as there are no emissions associated with the cable or onshore substation and operational, likely significant impacts are therefore scoped out. Decommissioning emissions are assumed to be half or less than half of the construction emissions, as it is assumed that underground cables would be left in place, and therefore impacts during decommissioning are scoped out.
Emissions of dust in O&M and decommissioning phases.	Significant impacts are unlikely during the O&M phase, as there would be no, or very limited dust emissions associated with the O&M of the cable or onshore substation and are therefore O&M impacts scoped out. Decommissioning dust emissions are assumed to be half or less than half of the construction dust emissions, as it is assumed that cables would be left in situ, and therefore dust impacts during decommissioning are scoped out.
Emissions of odour from construction, decommissioning and O&M phases.	The short duration of construction activity at any given location and the avoidance of historic landfill sites and of sensitive receptors along the route mean that the risk of causing significant odour impacts at human receptors is very low. There are no expected sources of odour during the operational phase.

8.7.7 Designed In Measures and Mitigation

8.7.7.1 As part of the Project design process, a number of designed in measures (primary and tertiary) will reduce the potential for impacts on air quality (see Table 8.80). As there is a commitment to implement these measures, they are considered inherent to the design of the MHPGC Project. The determination of magnitude and significance will assume the implementation of such measures. Some of these measures are considered standard industry practice for this type of development.

8.7.7.2 The requirement for any secondary mitigation measures will be dependent on the significance of the impacts on air quality receptors. The requirement for and feasibility of any mitigation measures will be consulted upon with statutory consultees throughout the EIA process.

Table 8.80: Designed in Measures Proposed for Air Quality

Reference Number	Designed in Measure	Justification	Primary or Tertiary
MM-17	Implementation of a Construction Environmental Management Plan (CEMP) which will set out quality control management measures.	To minimise impacts from construction activities by minimising the duration of construction works and minimise dust impacts on sensitive features following IAQM (2024) guidance on the Assessment of Dust from Demolition and Construction.	T
MM-48	Where practicable, sensitive sites will be avoided by the temporary and permanent MHPGC Project footprint, including SPAs, Special Areas of Conservation (SACs), SSSIs, National Nature Reserve (NNR), Local Nature Reserves, LWS, Ancient Woodland, RSPB reserves, HPI and areas of consented development.	To avoid and minimise likely significant impacts during construction and O&M on air quality sensitive receptors.	P

8.7.8 Proposed Assessment Methodology

8.7.8.1 The proposed generic project-wide approach to the assessment methodology is set out in Chapter 4: EIA Methodology. However, whilst this has informed the approach used in this Air Quality Chapter, it is necessary to set out how this methodology will be applied and adapted as appropriate to address the specific needs of the air quality assessment in the EIA Report/ES.

8.7.8.2 Key stakeholders, including the local authorities within the Onshore Air Quality Study Area namely DCC and SCC, will be consulted in relation to the proposed methodology.

Air Quality

8.7.8.3 The air quality assessment will be undertaken in accordance with guidance issued by the IAQM (2024, 2020, 2018 and 20216), IAQM and EPUK (2017), the Environment Agency (EA) (EA, 2016) and Defra (2018).

8.7.8.4 Air quality in the UK is often characterised in terms of key pollutants including: nitrogen dioxide (NO_2), oxides of nitrogen (NO_x), particulates (PM_{10} and $PM_{2.5}$), sulphur dioxide (SO_2) and ozone (O_3). Although many other pollutants are present in

the atmosphere, these key pollutants are recognised for generally being elevated above background levels and most associated with health impacts or impacting on natural habitats. The construction, O&M and decommissioning of the MHPGC Project will include activities that would give rise to emissions of NO_x, particulates and, to a lesser extent, sulphur dioxide (SO_2). These activities are:

- operation of mobile plant and machinery during construction and decommissioning phases (mobile plant machinery is not envisaged to be used during the operational phase);
- use of road vehicles during construction, operation and decommissioning phases.

8.7.8.5 IAQM and EPUK (2017) offers guidance on whether an air quality assessment is required:

"This will need to be a matter of judgement and should take into account:

- the background and future baseline air quality and whether this will be likely to approach or exceed the values set by Air Quality Objectives;
- the presence and location of AQMAs as an indicator of local hotspots where the Air Quality Objectives may be exceeded;
- the presence of a heavily trafficked road, with emissions that could give rise to sufficiently high concentrations of pollutants (in particular NO2), that would cause unacceptably high exposure for users of the new development;
- the presence of a source of odour and/or dust that may affect amenity for future occupants of the development."

8.7.8.6 IAQM and EPUK (2017) outline a quantitative method to assign standard descriptors to impacts depending on the magnitude of the change and the background concentration, in relation to the relevant assessment level. These are shown in Table 8.81. Although these descriptors have no official status, they are widely used and accepted.

Table 8.81: Impact Descriptors for Increases in Annual Mean Concentrations

Absolute Concentration with MHPGC Project, Relative to Assessment Level	Increase in Concentration Relative to Assessment Level				
	0%	1%	2 to 5%	6 to 10%	>10%
75% or less	Negligible	Negligible	Negligible	Slight	Moderate
76 to 94%	Negligible	Negligible	Slight	Moderate	Moderate
95 to 102%	Negligible	Slight	Moderate	Moderate	Substantial
103 to 109%	Negligible	Moderate	Moderate	Substantial	Substantial
110% or more	Negligible	Moderate	Substantial	Substantial	Substantial

8.7.8.7 The IAQM and EPUK guidance then goes on to provide qualitative guidance on the assessment of significance. The descriptors above feed into this assessment, but not in a rigorously prescribed way. Rather, the assessment of significance is based on professional judgement, taking into account the guidance and the various relevant factors. Some of the relevant factors it identifies as needing to be taken into account are:

- "the existing and future air quality in the absence of the development;
- the extent of current and future population exposure to the impacts;
- the influence and validity of any assumptions adopted when undertaking the prediction of impacts."

Dust

8.7.8.8 The dust assessment will follow IAQM (2024) guidance. This guidance provides a procedure for a risk-based assessment of potential dust impacts which should be carried out on the assumption that no control or mitigation measures are applied. This risk-based assessment includes criteria about the dust-generating potential of various activities, the number of potential receptors within various distance bands of the activities and the sensitivity of different types of human and ecological receptors to various impacts. The guidance then suggests suitable control and environmental measures, and advises that with these measures in place, the residual impacts is normally not significant. The guidance sets out the methodology as listed below.

Sensitivity

8.7.8.9 A Receptor is defined as, 'a location that may be affected by dust emissions during demolition and construction. Human receptors include locations where people spend time and where property may be impacted by dust. Ecological receptors are habitats that might be sensitive to dust' within the IAQM guidance.

8.7.8.10 The sensitivity of an area, hence receptor sensitivity, to dust impacts is defined as either low, medium or high and IAQM guidance distinguishes these impacts by:

8.7.8.11 Low - where enjoyment of amenity would not reasonably be expected and exposure would be for limited periods e.g. footpaths, shopping streets and car parks. Locally designated ecological sites.

8.7.8.12 Medium - where users would expect to enjoy a reasonable level of amenity and value could be diminished by dust soiling e.g. parks and places of work. Nationally designated ecological sites; and

8.7.8.13 High - where human receptors expected to be present continuously for extended periods of time e.g. residential properties, hospitals, schools and care homes. Internationally or nationally designated ecological sites

Magnitude

8.7.8.14 The magnitude of the area is determined by the scale and nature of works that will be undertaken using the relevant descriptors outlined within IAQM guidance:

8.7.8.15 Small - demolition volume under 12,000 m^3 less than 6 m above ground level, total site area less than 18,000m^2, soil type with large grain size, construction material

with low potential for dust release, less than 20 HDV trips per day, unpaved road length less than 50 m etc;

8.7.8.16 Medium - demolition activities 6 m – 12 m above ground level with a total volume of 12,000 m^3 – 75,000 m^3, moderately dusty soil type, potentially dusty construction material, total site area of 18,000 m^2 – 110,000 m2, 20 to 50 HDV trips per day, unpaved road length 50 – 100 m etc; and,

8.7.8.17 Large - on site crushing and screening demolition, demolition activities greater than 12 m above ground level and 75,000 m^3, total site area greater than 110,000 m^2, more than 50 heavy earth moving vehicles active at any one time, on site concrete batching, sandblasting, more than 50 HDV trips per day, unpaved road length greater than 100 m etc.

Significance of effects

8.7.8.18 The IAQM guidance on the assessment of dust from demolition and construction recommends that the significance of effects is only assessed after mitigation (in this case, the primary mitigation) is considered and advises that, in the majority of circumstances, no significant effects are likely. The main purpose of the assessment of dust risk is to ensure that any proposed mitigation is appropriate for the Proposed Project.

8.7.9 Potential Cumulative Impacts

8.7.9.1 Cumulative effects with the Morven Offshore Wind Array Project and the second grid connection project in the Branxton area Southeast Scotland will be considered, together with cumulative effects with other developments, where relevant.

8.7.9.2 The cumulative effect assessment will follow the approach outlined in Chapter 4: EIA Methodology.

8.7.10 Potential Inter-related Effects

8.7.10.1 The EIA will consider inter-related effects arising from the MHPGC Project, across their own phases (project lifetime) and different effects on one receptor in one phase (receptor led). The EIA will consider inter-related effects of multiple impacts from the construction, O&M and decommissioning phases of the MHPGC Project, affecting one receptor. Inter-related effects will be assessed through consideration of all effects on a receptor, considering both spatial and temporal overlap, within the MHPGC Project. This will ensure that the MHPGC Project is appropriately considered within the EIA and in line with Chapter 4: EIA Methodology, of the Scoping Report. Influences from Traffic and Transport assessment as well as air quality influences on Terrestrial Ecology and Ornithology and Human Health assessments will be considered.

8.7.11 Potential Transboundary Impacts

8.7.11.1 There are no potential transboundary impacts from onshore air quality from the MHPGC Project. This is due to any likely significant effects being experienced locally, rather than a wider geographic scale.

8.8 Land Use, Tourism and Recreation

8.8.1 Introduction

8.8.1.1 This chapter of the Scoping Report identifies the land use, tourism and recreation receptors of relevance to the Morven Hawthorn Pit Grid Connection Project (hereafter referred to as 'MHPGC Project') and considers the potential impacts arising from the construction, Operation and Maintenance (O&M), and decommissioning of the MHPGC Project. This scoping chapter adopts a proportionate approach to only those impacts with potential to result in likely significant effects and therefore scopes out other impacts where there is evidence that the effects are not likely to be significant.

8.8.1.2 This chapter covers impacts associated with the onshore components of the MHPGC Project only and is therefore not applicable to Scotland.

8.8.1.3 The main land use in England (63.1%) is agriculture (Department for Levelling Up, Housing and Communities, 2022) and this is the predominant land use within the MHPGC Project Scoping Boundary, though other land uses comprise woodland and open water. Land use (including tourism and recreation) interfaces with other aspects of the Scoping Report, as listed below, but not limited to:

- Chapter 8.1: Ground Conditions and Contamination: Ground conditions and land contamination are inter-related with land use as ground conditions may limit or allow certain land uses to take place;
- Chapter 8.2: Water Resources and Flood Risk: Land use interacts with the water environment (e.g. in relation to drainage and flood risk, and specific land uses take place in and around water, which are dependent on water availability, water quality, and flood risk);
- Chapter 8.3: Terrestrial Ecology and Ornithology: Nature conservation is a type of land use, changes to land use can significantly affect wildlife and biodiversity;
- Chapter 8.4: Archaeology and Cultural Heritage: Development can result in limitations to or removal of current or future access to cultural heritage features due to changes in land use;
- Chapter 8.5: Traffic and Transport: Land use interacts with transport routes including the local and regional highway network and recreational routes such as the core path network, Sustrans cycle routes and navigable waterways;
- Chapter 8.6: Onshore Noise and Vibration: Noise from development can affect land use receptors, in particular in relation to tourism and recreation;
- Chapter 9.1: Landscape and Visual: Landscape is in part determined by land use, for example commercial forestry land can undergo rapid change from established forest to felled trees;
- Chapter 9.4: Socio-economics: Land use and socio-economics are closely inter-related (e.g. terms of agricultural production capability, tourism, mineral extraction), and the need to use land for housing or industry, balanced with the need to use natural resources sustainably and to conserve biodiversity and geodiversity;

- Chapter 9.2: Human Health: Similarly to socio-economics, land use and the determinants of human health are closely linked (e.g. changes in access to recreational land, access to jobs and health effects associated with industrial emissions);
- Chapter 9.5: Climate Change: Land use and land management can affect land cover and soil, which in turn affects whether soils are storing or generating (releasing) greenhouse gases.

8.8.2 Policy and Legislation

8.8.2.1 This section identifies the relevant legislation, policy and other documentation that will inform the assessment of likely significant impacts with respect to land use, tourism and recreation. Further information on policies relevant to the Environmental Impact Assessment (EIA) and their status is provided in Chapter 2: Policy and Legislation.

Table 8.82: Policy Relevant to Land Use

Policy Description	Relevance to the Assessment
Overarching National Policy Statement (NPS) for Energy (EN-1) (Department for Energy Security and Net Zero, 2023a).	
Applicants should identify existing and proposed land uses near a proposed development, and effects of changing land use on the site, and assess effects of the proposed development in precluding a new development or use proposed in a development plan. Any open space, sports or recreational buildings and land that are lost should be replaced by new facilities, unless evidence is available which shows they are surplus to requirements. Public Rights of Way (PRoW), National Trails and other rights of access to land are referenced as important recreational facilities, and that appropriate mitigation measures may be required to avoid adverse impacts on them, or to create new access. **Agricultural land and soils** EN1 states that development of land will affect soil resources, including physical loss of and damage to soil resources, through land contamination and structural damage, and recommends that applicants develop and implement a Soil Management Plan to help minimise potential land contamination. The sustainable reuse of soils is to be considered in	The MHPGC Project has the potential to result in impacts to existing and proposed development land use receptors. Table 8.88 presents designed in measures to reduce the potential for impacts on land use receptors, with consideration of this policy.

Policy Description	Relevance to the Assessment
line with good practice guidance where large quantities of soils are surplus to requirements or affected by contamination.	
National Policy Statement for Electricity Networks Infrastructure (EN-5) (Department for Energy Security and Net Zero, 2023b).	
Applicants should consider the land use effects of a proposal when planning the siting of substations and use space effectively to limit the area required for development, with appropriate mitigation measures and to minimise the adverse effects on existing land use and rights of way, whilst also having regard to future extension of the substation. Substation sites should avoid altogether internationally and nationally designated areas of the highest amenity, cultural or scientific value, and areas of local amenity value, important existing habitats including ancient woodland, historic hedgerows, surface and groundwater resources and nature conservation areas should be avoided so far as reasonably practicable. **Agricultural land and soils** Issues for consideration in EIA include potential sterilisation of nationally important land including Grade 1 agricultural land, and effects on land drainage.	The MHPGC Project has the potential to result in impacts to existing and proposed development land use receptors. Table 8.88 presents designed in measures to reduce the potential for impacts on land use receptors, with consideration of this policy.
The National Planning Policy Framework (NPPF) (Department for Levelling Up, Housing and Communities, 2023).	
Agricultural land and soils Policy 11, making effective use of land, states that planning decisions should promote effective use of land, whilst safeguarding and improving the environment, and strategic policies should make as much use as possible of previously developed or 'brownfield' land. Decisions are to encourage multiple benefits from urban and rural land and recognise that some undeveloped land can perform many functions, such as wildlife, recreation, flood risk mitigation, carbon storage or food production. Policy 15, conserving and enhancing the natural environment, states that planning decisions should contribute to and enhance the natural and local environment, by protecting sites of	The MHPGC Project has the potential to result in impacts to existing and proposed development land use receptors. Table 8.88 presents designed in measures to reduce the potential for impacts on land use receptors, with consideration of this policy.

Policy Description	Relevance to the Assessment
biodiversity value and soils (in a manner commensurate with their statutory status or other identified qualities in a development plan) and recognising the benefits from natural capital and ecosystem services, including the economic and other benefits of the best and most versatile (BMV) agricultural land, and trees and woodland. It states in relation to agricultural land that: "Where significant development of agricultural land is demonstrated to be necessary, areas of poorer quality land should be preferred to those of a higher quality. The availability of agricultural land used for food production should be considered, alongside the other policies in this Framework, when deciding what sites are most appropriate for development." BMV land is defined as land in Grades 1 and 2 or Subgrade 3a of the Agricultural Land Classification (ALC) system (Ministry of Agriculture, Fisheries and Food, 1988). Tourism and other rural land uses Policy 6, building a strong, competitive economy, paragraph 88, states that planning decisions should support: "a) the sustainable growth and expansion of all types of businesses in rural areas…; b) the development and diversification of agricultural and other land based rural businesses; c) sustainable rural tourism and leisure developments which respect the character of the countryside; and d) the retention and development of accessible local services and community facilities, such as local shops, meeting places, sports venues, open space, cultural buildings…". Policy 8, promoting healthy and safe communities, states that existing open space, sports and recreational buildings and land should not be built on unless certain criteria are met. Where such facilities would be lost to development they should be replaced by equivalent or better provisions or evidence is available that shows they are surplus to requirements.	

Policy Description	Relevance to the Assessment
Policy 15 requires planning decisions to maintain the character of the undeveloped coast, whilst improving public access to it where appropriate.	
County Durham Plan, (adopted 21 October 2020) (Durham County Council, 2020)	
Agriculture In relation to agricultural land and soils, Policy 14 in the County Durham Plan aims to protect the BMV agricultural land, and, where development is proposed on previously undeveloped land, that soil resources are used sustainability and in line with good practice and includes specific requirements for surveys and soil management during construction. Paragraph 5.97 states that: "All proposals which would have the potential to involve the loss of BMV agricultural land will be expected to be accompanied by an ALC statement." Paragraph 5.98 states that: "Soil is a fundamental and finite resource that fulfils many important functions and ecosystem services. For example it provides a growing medium for food, timber and other crops, as a store for carbon, water and air filtration, support for buildings, as a reservoir of biodiversity and as a buffer against pollution. Some of the most fundamental impacts on this resource occur as a result of construction activity. It is therefore important that the soil resources are managed and conserved in a viable condition and used sustainably in line with best practice. Where development proposals are permanent it is important that soil resources are used effectively on undeveloped areas of the site for landscape, habitat or garden creation or used appropriately on other suitable sites. All proposals over one hectare which have the potential to adversely affect soil resources will be expected to produce a strategy for the use of topsoil and/or subsoil." "Agriculture is the predominant land use in the County and occupies approximately 90% of its land surface. Government guidance requires that the development of agricultural land should only be permitted where no suitable alternative sites	The MHPGC Project has the potential to result in impacts to existing and proposed development land use receptors. Table 8.88 presents designed in measures to reduce the potential for impacts on land use receptors, with consideration of this policy.

Policy Description	Relevance to the Assessment
are available. Where development of agricultural land is unavoidable, the loss of high quality (BMV) ALC (grades 1, 2 and 3a) will be strongly resisted and development directed towards poorer quality land unless other sustainability considerations suggest otherwise."	
Sunderland Core Strategy and Development Plan 2015 to 2023, adopted January 2020. (Sunderland City Council, 2020).	
Agriculture In relation to agricultural land, policy NE12 states that: "Development which would result in the loss of BMV agricultural land should be considered in the context of the agricultural land's contribution in terms of economic and other benefits." The Council states that: "For major developments where land classification is not available, we may require the applicant to undertake work to determine land quality. In assessing such factors, the council will bear in mind that once agricultural land is developed, even for "soft" users such as golf courses, its return to best quality land is seldom practicable. The need to control the rate at which land is taken for development will also be a factor in any assessment."	The MHPGC Project has the potential to result in impacts to existing and proposed development land use receptors. Table 8.88 presents designed in measures to reduce the potential for impacts on land use receptors, with consideration of this policy.
Multifunctional landscapes: informing a long-term vision for managing the United Kingdom's (UK) land. (The Royal Society, 2023).	
The Royal Society report notes the increasing demands on the finite area of land in the UK to perform a range of often competing functions. It recommends consideration of the market outputs of land (such as food, timber, and energy crops) and also the non-market outputs provided by land (such as biodiversity habitats, carbon sequestration, flood alleviation and recreation).	The MHPGC Project has the potential to result in impacts to existing and proposed development land use receptors. Table 8.88 presents designed in measures to reduce the potential for impacts on land use receptors, with consideration of this policy.
Environmental Improvement Plan 2023. (Department for Environment, Food and Rural Affairs, 2023).	
Includes targets and commitments relating to land use including to: Increase tree canopy and woodland cover from 14.5% to 16.5% of total land area in England by 2050, with a new interim target to increase this by 0.26% (equivalent to 34,000 ha) by 31 January	The MHPGC Project has the potential to result in impacts to existing and proposed development land use receptors. Table 8.88 presents designed in measures to reduce the potential for impacts on land use

Policy Description	Relevance to the Assessment
2028, in line with the trajectory required to achieve the long-term target: • Pay farmers and land managers to take care of the natural countryside environment, alongside food and other production, so that collectively; • They will contribute at least 50% of the target of bringing protected sites into favourable condition by 2042; • including peatland restoration and biodiverse woodland, they will contribute at least 80% of the target to restore or create more than 500,000ha of wildlife-rich habitat outside of protected areas by 2042; • 65 to 80% of landowners and farmers will adopt nature friendly farming on at least 10 to 15% of their land by 2030.	receptors, with consideration of this policy.
The England Trees Action Plan 2021 to 2024. (Department for Environment, Food and Rural Affairs, 2021).	
Sets out UK Government's plan to provide foresters, landowners and managers, and investors with the right incentives to establish and maintain healthy trees and woodlands.	The MHPGC Project has the potential to result in impacts to existing and proposed development land use receptors. Table 8.88 presents designed in measures to reduce the potential for impacts on land use receptors, with consideration of this policy.
UK Government Land Use Framework.	
This framework is not yet published however it is noted that it has an anticipated publication timeframe of summer 2024.	

8.8.2.2 Relevant technical guidance is set out in Table 8.83 below.

Table 8.83: Relevant Technical Guidance

Technical Guidance Description	Relevance to the Assessment
Land use statistics: England 2022. (Department for Levelling Up, Housing and Communities, 2022).	
Government statistics showing how different land uses are distributed across England based on 28 land use categories which are aggregated into 13 land use groups, split between developed and non-developed land use types. These categories are useful to inform an assessment of the effects of EIA development on land use. The 13 land use groups are listed in the bullets below: Developed land: • community services; • defence buildings; • industry and commerce; • minerals and landfill; • other developed use; • residential; • transport and utilities. Non-developed land: • agriculture; • forestry, open land and water; • outdoor recreation; • residential gardens; • undeveloped land. Vacant land: • vacant land.	These categories are applied in section 8.8.5.
A New Perspective on Land and Soil in Environmental Impact Assessment. (IEMA, 2022).	
Provides technical information and methodological guidance on how the effects on soils and soil functions due to land use changes resulting from development can be assessed in the context of EIA. Includes information on soil handling that can inform soil management plans.	This guidance underpins the assessment methodology defined in section 8.8.8.

Technical Guidance Description	Relevance to the Assessment
Guide to assessing development proposals on agricultural land. (Natural England, 2021).	
Sets out the policies in place to protect the BMV agricultural land from significant, inappropriate or unsustainable development proposals and to protect all soils by managing them in a sustainable way. Explains the ALC system, and how planning authorities should make decisions about proposed developments on agricultural land and other soils.	This guidance underpins the assessment methodology defined in section 8.8.8.
Agricultural Land Classification: protecting the BMV agricultural land (TIN049). (Natural England, 2009).	
Sets out government policy to protect agricultural land and explains the ALC system used to grade agricultural land quality.	This guidance underpins the assessment methodology defined in section 8.8.8 of this chapter.
Environmental Impact Assessment Handbook. (Scottish Natural Heritage (NatureScot, 2018).	
There is no dedicated UK guidance defining the scope of a land use assessment or providing standards or thresholds for determining significance of effects. However, the NatureScot guidance provides an approach to assessing effects on tourism and recreation receptors. The methodology proposed for use in this assessment is consistent with that guidance. The guidance states that there are very close relationships between the likely effects of development on visual amenity and on outdoor recreation. The land use assessment will deal with issues arising where the MHPGC Project has the potential to physically affect people's ability to engage in outdoor recreation, rather than wider effects on the settings where recreation takes place, which are dealt with in Chapter 9.1: Landscape and Visual Impact Assessment, of the Scoping Report.	This guidance underpins the assessment methodology defined in Section 8.8.8 of this chapter.

8.8.3 Study Area

8.8.3.1 The Land Use, Tourism and Recreation Study Area is defined as the MHPGC Project Scoping Boundary, with a 250m buffer extending around it, to Mean Low Water Springs (MLWS) as shown in Figure 8.25. Most of the identified potentially significant impacts of the MHPGC Project (see Table 8.60) on land use receptors would occur within the MHPGC Project Scoping Boundary, however, a 250m onshore buffer beyond the MHPGC Project Scoping Boundary is included in the Study Area. This is due to the potential for significant impacts to occur beyond the MHPGC Project Scoping Boundary e.g. temporary loss of access to adjacent/nearby land during construction of the MHPGC Project.

8.8.3.2 The Land Use, Tourism and Recreation Study Area will be reviewed and amended in response to such matters as refinement of the onshore infrastructure, the identification of additional impact pathways and in response where appropriate to feedback from consultation.

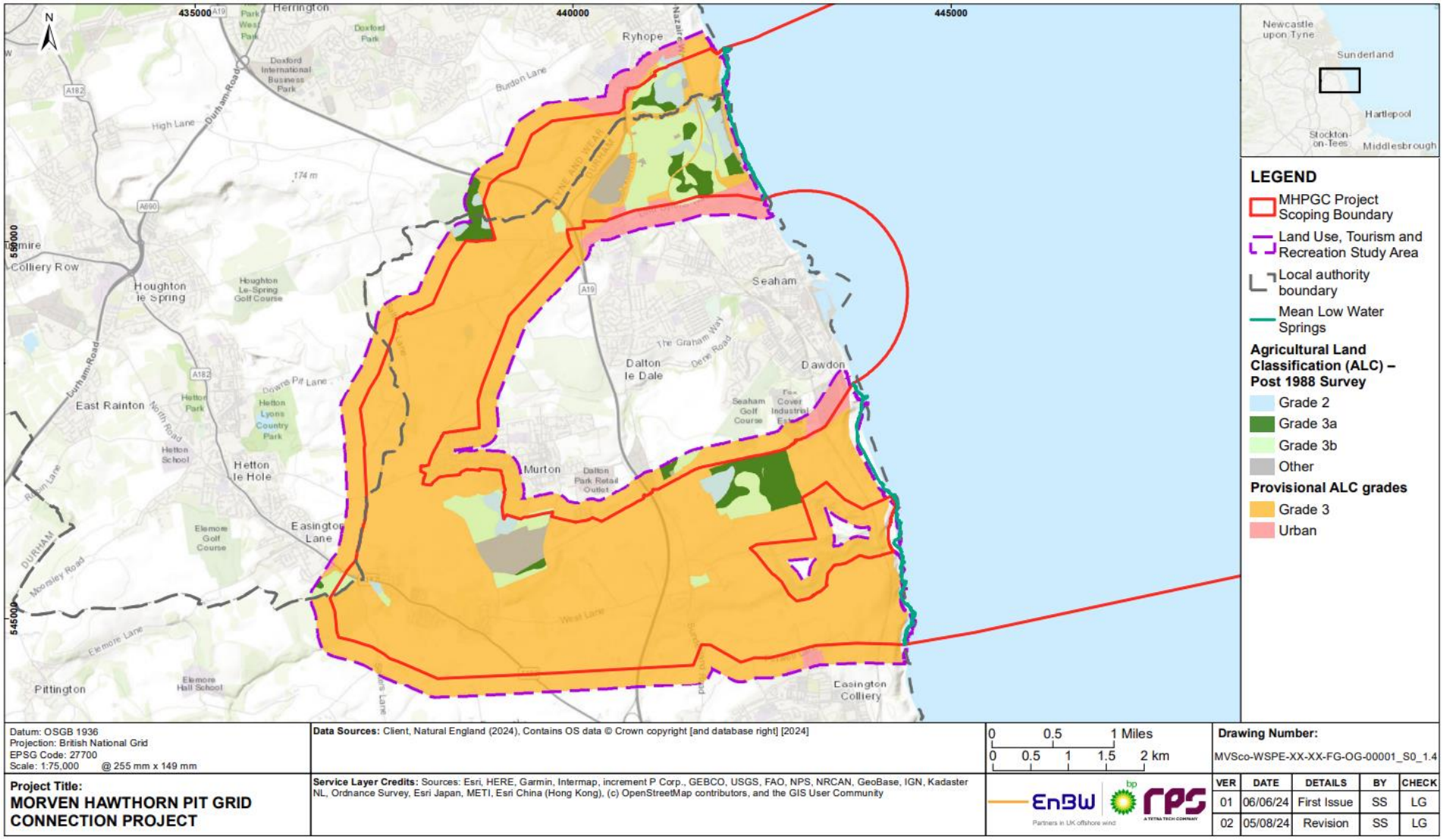


Figure 8.25: The Land Use, Tourism and Recreation Study Area

8.8.4 Data Sources

8.8.4.1 This section sets out the main sources of desktop data for the MHPGC Project regarding land use.

Table 8.84: Land Use, Tourism and Recreation Data Sources

Title	Source	Year	Author
Department for Environment, Food and Rural Affairs (Defra) MAGIC interactive map.	Statutory and non-statutory land designations, information on geology and soils, ALC, designated sites (available at: https://magic.defra.gov.uk/MagicMap.aspx).	Various.	Defra.
Natural England.	Peaty Soils Location dataset (available at: https://naturalengland-defra.opendata.arcgis.com/search?q=peat).	Various.	Natural England.
Google Earth Pro.	Recent and historical aerial photography.	Various.	Google Earth Pro.
Visit County Durham.	Information on visitor attractions in Seaham and the surrounding area. (available at: https://www.visitcountydurham.org/).	2024	Visit County Durham.
LandIS Soilscapes map.	Soil map and information on soil types at the regional level. (available at: https://www.landis.org.uk/soilscapes/).	2024	Cranfield University.

8.8.5 Baseline Environment

8.8.5.1 This section provides an overview of the land use baseline for the MHPGC Project both within the MHPGC Project Scoping Boundary and in the Land Use, Tourism and Recreation Study Area.

8.8.5.2 Within the MHPGC Project Scoping Boundary, onshore corridors to the north and south of Seaham are identified and referred to as Northern Corridor and Landfall, Central Corridor and Landfall and Southern Corridor and Landfall. These corridors are shown in Chapter 6: Site Selection and Consideration of Alternatives (Figure 4.2).

8.8.5.3 Details of the baseline water environment are provided in Chapter 8.2: Water Resources and Flood Risk, of the Scoping Report.

8.8.5.4 Seaham has a history of mineral extraction, both coal and non-coal minerals, and details of the baseline for mineral resources, including mineral extraction sites and mineral safeguarding areas are provided in Chapter 8.1: Ground Conditions and Contamination, of the Scoping Report.

8.8.5.5 Land use can be affected by changes in noise due to development, the baseline environment for noise receptors and potential effects on these receptors are detailed in Chapter 8.6: Onshore Noise and Vibration, of the Scoping Report.

Agricultural Land and Soils

8.8.5.6 Agriculture is the main land use within the MHPGC Project Scoping Boundary, including pasture and arable fields and farm properties shown on OS mapping which include Pacific Hall Farm, Slingley Hill Farm East and Murton Moor Farm in the Northern Corridor, Little Coop House Farm, West Batter Law Farm, East Batter Law Farm, Carr's Farm, Great Coop House Farm, Hallfield Farm and Eagle Hall Farm in the Central Corridor and White Lea Farm in the Southern Corridor.

8.8.5.7 In England, agricultural land is graded according to the ALC system devised by the former Ministry of Agriculture Fisheries and Food (MAFF, 1988), now part of Defra. This system assigns a grade to agricultural land based on various criteria, with Grade 1 being the best land and Grade 5 the least versatile land for agriculture, as outlined in Table 8.85.

Table 8.85: Agricultural Land Classification – Grade Definition

Grade	Details
1	Excellent quality agricultural land: land with no or very minor limitations. A very wide range of agricultural and horticultural crops can be grown. Yields are high and less variable than on land of lower quality.
2	Very good quality agricultural land: land with minor limitations that affect crop yield, cultivations or harvesting. A wide range of agricultural and horticultural crops can usually be grown. The level of yield is generally high but may be lower or more variable than grade 1.
3a	Good quality agricultural land: land capable of consistently producing moderate to high yields of a narrow range of arable crops.
3b	Moderate quality agricultural land: land capable of producing moderate yields of a crop range including grass, oilseed rape, potatoes, sugar beet and less demanding horticultural crops or high yields of grass which can be grazed or harvested over most of the year.
4	Poor quality agricultural land: land with severe limitations which can significantly restrict range of crops and/or level of yields, mainly suited to grass with occasional arable crops (e.g. cereals and forage crops), includes very droughty arable land.
5	Very poor quality agricultural land: land with very severe limitations which restrict use to permanent pasture or rough grazing, except for occasional pioneer forage crops.

8.8.5.8 Other descriptions applied to land during the national ALC surveys include 'Urban' and 'Non-agricultural'. The term 'non-agricultural' was applied to land including 'soft'' uses where land could potentially be turned back to agriculture relatively

easily, such as golf courses, private parkland, public open spaces, sports fields, allotments and soft-surfaced areas on airports/airfields, and potentially also mineral extraction and landfill sites with restoration conditions to a 'soft' use.

8.8.5.9 Post-1988 ALC mapping showing ALC grades and confirms that some of the land within the MHPGC Project Scoping Boundary is BMV land. BMV land is defined as Grade 1, Grade 2 or Subgrade 3a land. Only partial post-1988 ALC map coverage of the land within the MHPGC Project Scoping Boundary is available, mainly at the eastern end of the Northern Corridor between Ryhope and Seaham, and also at a smaller area in the southwest of the MHPGC Project Scoping Boundary, including part of the LSS search area, and a small area in the east of the Central Corridor at its northern edge. Further details are provided below and ALC grades are shown on Figure 8.25.

8.8.5.10 Within the Northern Corridor, land immediately west of the cliff edge at the coast, south of Sharpley Burn, is a combination of Grade 2 (very good quality agricultural land) and Subgrade 3a (good quality agricultural land). North of Sharpley Burn, Grade 2 land is present immediately west of the B1287 (land east of the B1287 up to the coast is a former landfill which has been designated as statutory Contaminated Land by Sunderland County Council), moving inland this becomes a combination of Grade 2, Subgrade 3a and Subgrade 3b. Similar grades are present south of Sharpley Burn where the survey area extends further west up to the A1018 and is mainly Subgrade 3b (moderate quality agricultural land, not BMV land), with localised areas of Grade 2 and Subgrade 3a. Review of aerial photography confirms that most of the onsite land included in the survey (Ministry of Agriculture and Fisheries and Food, 1994) is still in agricultural use except for a grassed area with dirt and gravel tracks east of the B1267 which is used for the Seaham Car Boot sale. At the time of the ALC survey the land was being used for growing oilseed rape or winter cereals or was set-aside. The ALC grades are described in more detail as follows:

- The Grade 2 land was found to be well or moderately well drained, with medium clay loam or sandy clay loam topsoils and subsoils, with permeable heavy clay loam lower subsoils occurring at depth in places. The limiting factors for ALC were slight exposure, and in places slight soil droughtiness or slight soil wetness;
- The Subgrade 3a land was imperfectly drained with medium clay loam topsoils and upper subsoils overlying gleyed and slowly permeable heavy clay loam lower subsoils at between 0.45 and 0.6m below ground level (bgl). The soil wetness limited the land to Subgrade 3a;
- The Subgrade 3b land was poorly drained with medium clay loam topsoils overlying gleyed and slowly permeable heavy clay loam or clay subsoils at between 0.25 and 0.4m. Soil wetness limited the land to Subgrade 3b. An area in the east of the MHPGC Project Scoping Boundary, north of Hough Foot Plantation, described as disturbed land, was noted to consist of 0.3m of topsoil over colliery overburden (based on the location description this is likely to be partly within the current Seaham Car Boot sale area).

8.8.5.11 A small area south of the A19, north of Seaton Lane, in the Northern Corridor was confirmed as Subgrade 3b in a 1998 ALC survey (Ministry of Agriculture and Fisheries and Food, 1998a). The ALC report describes the soils on the site as consisting of very

slightly stony medium clay loam topsoils overlying clay subsoils which showed evidence of gleying.

8.8.5.12 A large area in the southwest of the MHPGC Project Scoping Boundary with post-1988 ALC survey data includes some non-agricultural land (including the Jade Business Park, a substation and former mineral railway), this was recorded in the 1997 ALC survey as 'other land'. Land north of this, to the southwest of Murton, was found to be mainly Subgrade 3b with some Grade 2. A strip of land to the south of the 'other land' was found to be mainly Subgrade 3b with some Subgrade 3a. The report on the survey is not available, only a figure showing the mapped ALC grades (Ministry of Agriculture and Fisheries and Food, 1997).

8.8.5.13 As shown on Figure 8.25, a small area at the south western extent of the MHPGC Project Scoping Boundary, southeast of Hetton le Hole was surveyed in 1999 and confirmed as Subgrade 3b. The same survey also covered two fields southwest of South Hetton, these were found to be Grade 2 and Subgrade 3b. A similarly sized area at Hawthorn was also surveyed in 1999 and found to be Subgrade 3b. The accompanying reports are not available.

8.8.5.14 A post-1988 ALC survey (Ministry of Agriculture Fisheries and Food, 1998b) was completed for land south of Dawdon Link Road, north of Kinley Hill Pumpkin Patch. The onsite land was found to be mainly Subgrade 3a with some Subgrade 3b. The ALC grades are described in more detail as follows:

- The Subgrade 3a land was mainly well drained or imperfectly drained, soil profiles typically consisted of medium clay loam or heavy clay loam topsoils and upper subsoils, overlying heavy clay loam or clay lower subsoils. The land was limited to Subgrade 3a by either slight soil wetness, slight soil droughtiness, or a pattern restriction (soil conditions varying repeatedly over short distances);
- The Subgrade 3b land was imperfectly or poorly drained, with mainly medium clay loam or heavy clay loam topsoils overlying heavy clay loam or clay subsoils. Subsoils generally became gleyed and slowly permeable ay between 0.25 and 0.4m bgl and the ALC grade was limited by the combination of soil wetness and topsoil workability restrictions.

8.8.5.15 For the remainder of the land within the MHPGC Project Scoping Boundary, there is only Provisional ALC coverage, showing the land as Grade 3. Provisional ALC mapping is based on a 1960s system for grading land quality, published by MAFF, which applies five grades: Grades 1 to 5, the best being Grade 1. Grade 3 is assigned to land that could be Subgrade 3a (BMV land) or Subgrade 3b (not BMV land) so it only provides an indication of whether the land is BMV. Additionally, the provisional ALC maps were not produced at sufficient scale to be used on a site or development specific basis, however they provide an indication of the regional ALC grades.

8.8.5.16 The LandIS Soilscape viewer provides regional summary soil information for England including the landcover and habitats associated with the soils, drainage, fertility and carbon storage. This shows most of the land within the MHPGC Project Scoping Boundary and surrounding land at Seaham to have Soilscape type 18 soils: slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils. These have a loamy and clayey texture, impeded drainage and drain to stream networks, moderate fertility and low carbon storage potential. Typical landcover is grassland

and arable farmland with some woodland, providing seasonally wet pasture and woodland habitats. Some other soil types feature locally in the MHPGC Project Scoping Boundary, as described below.

8.8.5.17 Soilscape type 22 soils, loamy soils with naturally high groundwater, are shown in two areas on the Northern Corridor, at the coast at Ryhope and to the southwest of Ryhope, respectively. These soils are loamy in texture. The soils are naturally wet and drain to local shallow groundwater. Soil fertility is low and carbon storage potential low. Typical landcover is arable grassland and woodland, providing wet acid meadow and woodland habitats. This soil type is noted to be quite rare, covering only 1.7% of England.

8.8.5.18 Further southwest on the Northern Corridor, west of Seaton, Soilscape type 8 soils, slightly acid loamy and clayey soils with impeded drainage, are shown. These are loamy in texture, with some clayey soils. The soils have slightly impeded drainage and drain to stream networks, fertility is moderate to high, and carbon storage potential low. Typical landcover is arable farmland and grassland, providing a wide range of pasture and woodland habitats.

8.8.5.19 In the east of the Central Corridor and Southern Corridor, north and east of Hawthorn, the soil is shown as Soilscape type 5, freely draining lime-rich loamy soils. These are loamy in texture, freely draining, and draining to chalk or limestone groundwater, with fertility classed as lime-rich, and low carbon storage potential. Typical landcover is arable grassland at higher altitudes, and these soils provide habitats of herb-rich chalk and limestone pastures and lime-rich deciduous woodlands. These soils are also quite rare, covering only 3.7% of England.

8.8.5.20 At Easington in the Southern Corridor the soils change to Soilscape type 6, these are freely draining slightly acid loamy soils, which are loamy in texture. These soils drain to local groundwater and rivers. The soils are described as having low fertility, and low carbon storage potential. The typical land cover associated with this soil type is arable cropland and grassland, and they can support neutral and acid pasture habitats, also deciduous woodlands, and bracken and gorse in the uplands.

Tourism and Recreation

8.8.5.21 Along the Seaham coastline, within the Land Use, Tourism and Recreation Study Area there are several visitor attractions and areas used by residents for recreation purposes. Seaham town centre and seafront, located between the northern and Central Corridors, is a popular seaside resort, with a seafront promenade, beaches and County Durham's only marina. There is also a harbour and dock area.

8.8.5.22 Seaham, including the coastal parts of the Land Use, Tourism and Recreation Study Area, is part of Durham's Heritage Coast. At the coastline, the Northern Corridor, Central Corridor and the Southern Corridor are crossed by the Durham Heritage Coastal Footpath which runs along the cliffs between Seaham and Crimdon, around 8km south of the MHPGC Project Scoping Boundary. Historic environment features are present in Seaham; the town has a significant mining heritage and Seaham Port was constructed to transport coal from several nearby pits. Tourist attractions in Seaham include the Seaham Hall Hotel (Lord Byron's former home), which is to the south of the Northern Corridor and Land Use, Tourism and Recreation Study Area by the coast. Details of historic environment features within the MHPGC Project

Scoping Boundary and potential effects of the MHPGC Project on the cultural heritage receptors are provided in Chapter 8.4: Archaeology and Cultural Heritage of the Scoping Report.

8.8.5.23 Seaham's beaches, and the beach at Ryhope at the northern extent of the Northern Corridor where rock features include sea arches and a sea stack, are notable for their Magnesian Limestone rock exposures, some of which have Site of Special Scientific Interest (SSSI) status. The Durham Coast SSSI designation occurs within the MHPGC Project Scoping Boundary and extends along around half the coastline in the Northern Corridor, most of the coast in the Central Corridor and all of the coast within the southern landfall (see Chapter 8.1: Ground Conditions and Contamination, of the Scoping Report for more details of geological SSSIs). The beaches at Seaham also have historical interest, notably Glass Beach, Chemical Beach and Blast Beach. Chemical Beach is partly within the Land Use, Tourism and Recreation Study Area, at the northern extent of the Central Corridor, extending south to Nose's Point. Blast Beach is south of Nose's Point and is entirely within the Central Corridor. Glass Beach is associated with a former glass works. Seaham boasted the largest glass bottle works in Britain, known as The Londonderry Bottleworks, operating from the 1850s to 1921 (Visit County Durham, 2024) to the north of Seaham's town centre. It is also known as Seaham Beach, Seaham Hall Beach, Seaham North Beach and Vane Tempest and is largely outside the MHPGC Project Scoping Boundary, though as there is no firm boundary for the beach it may be considered to extend into the Northern Corridor at the coast. The history of Blast Beach and its current condition is described in more detail in Chapter 8.1: Ground Conditions and Contamination, of the Scoping Report. The beach was used as a film location including for Alien 3 (filmed in 1992 prior to clean-up of the beach completed between 1997 and 2002 as part of a project known as Turning the Tide) and is listed as a visitor attraction on the 'This is Durham' website (Visit County Durham, 2024).

8.8.5.24 Two fields by the coast within the Northern Corridor are used (typically on a weekly basis) for car parking for the Seaham Car Boot Sale.

8.8.5.25 The Bunker CQB paintball and outdoor activity centre is located partially within the MHPGC Project Scoping Boundary at the west of the Northern Corridor, south of the B1404.

8.8.5.26 Several PRoWs are present within the Land Use, Tourism and Recreation Study Area. Bridleways used for walking, horse riding, cycling, or other wheeling, and traffic free cycle are detailed in Chapter 9.1: Landscape and Visual Impact Assessment, of the Scoping Report, and Chapter 8.5: Traffic and Transport, of the Scoping Report, where effects of the MHPGC Project on these receptors are also considered. In several areas these run along the routes of former mineral railway lines, and several transect the MHPGC Project Scoping Boundary. The Seaham to Crimdon On-Road Cycle Route crosses through the MHPGC Project Scoping Boundary running from Seaham Hall Car Park, within the Northern Corridor, from Seaview to North Road, where it then continues roughly southwards before leaving Seaham and crossing the Central Corridor on the B1432 Stockton Road.

8.8.5.27 Some diversification of farm businesses into tourism and recreation is evident within the Land Use, Tourism and Recreation Study Area, including rural holiday

accommodation (self-catering and camping/glamping), and annual pumpkin picking offered to members of the public. A riding school located is in the southwest of the MHPGC Project Scoping Boundary and an equestrian centre is to the west of South Hetton within the MHPGC Project Scoping Boundary.

8.8.5.28 Sharpley Golf Course is immediately west of the MHPGC Project Scoping Boundary within the Land Use, Tourism and Recreation Study Area.

8.8.5.29 The western area of the MHPGC Project Scoping Boundary on the Northern Corridor includes woodlands and numerous ponds, most of which can be easily accessed from nearby PRoWs. The Hawthorn Dene Nature Reserve (and SSSI) is partly within the MHPGC Project Scoping Boundary, however, most of the reserve and SSSI designation is on land between the Central Corridor and the Southern Corridor. Footpaths are present within the reserve. The Southern Corridor overlaps the northeastern corner of Easington Local Nature Reserve (LNR) at the former Easington Colliery. There is a car park for visitors within the LNR and the pit cage of the former colliery is still present. Noses Point LNR is partly within the Central Corridor, this has a National Trust car park, adjacent to the former Dawdon Colliery site, for visitors, and connects to the Durham Coastal Path.

Other Land Uses

8.8.5.30 Developed land within the MHPGC Project Scoping Boundary includes:

- The village of South Hetton, a former mining village, is entirely within the southwest of the MHPGC Project Scoping Boundary, the village of Hawthorn is in the southeast of the MHPGC Project Scoping Boundary;
- Farm properties and scattered residential properties;
- The South Sharpley Wind Farm is partly within the Northern Corridor, a wind turbine is present at little Coop Farm and also at Hallfield Farm in the Southern Corridor;
- Housing estates are present including 'The Meadows' and 'Poppyfield Court' estates, to the north and south of the B1404, respectively.
- Various recreation grounds are present at South Hetton to the southwest of the MHPGC Project Scoping Boundary;
- Transport infrastructure comprising roads, railways and historical (disused) mineral railways, and a service station (Easington Services, in the Central Corridor off the A19). The Durham Coast Line railway traverses the MHPGC Project Scoping Boundary in the east roughly north to south through the northern and Central Corridors and Southern Corridor. Several roads traverse the MHPGC Project Scoping Boundary. See details in Chapter 8.5: Traffic and Transport, of the Scoping Report;
- As noted above, there is an area designated as statutory Contaminated Land within the MHPGC Project Scoping Boundary at the coast in the north of the Northern Corridor. Available information (Google, October 2023) indicates that the affected land has been fenced off to prevent public access. There are other historical landfills within the MHPGC Project Scoping Boundary at Eppleton Bridge Railway Cutting, and three areas at South Hetton (one noted to be partly

developed as South Hetton Primary School) which are likely to be associated with historical mineral extraction activity (see details in Chapter 8.1: Ground Conditions and Contamination, of the Scoping Report).

- Commercial and industrial uses include substations and industrial estates, including the 'Jade Business Park' in the southwest of the MHPGC Project Scoping Boundary, Seaham Grange Industrial Estate within the Northern Corridor, and the southern edge of the Spectrum Business Park which overlaps the Central Corridor. A portion of Easington Services is within the MHPGC Project Scoping Boundary by the A19 in the Central Corridor. A caravan storage park ('Woodlands') is in the southwest of the MHPGC Project Scoping Boundary. A construction industry training facility is located at Easington Lea Farm in the Southern Corridor;
- Numerous historical mineral workings (coal and non-coal resources) within the MHPGC Project Scoping Boundary and some Development High Risk Areas are present due to legacy coal mining. Additionally, there are significant mineral reserves (sand and gravel and Magnesian Limestone) within the MHPGC Project Scoping Boundary (see details in Chapter 8.1: Ground Conditions and Contamination, of the Scoping Report). No current mineral extraction has been identified within the MHPGC Project Scoping Boundary, however, two large active quarries are present in the Land Use, Tourism and Recreation Study Area, immediately south and west of the MHPGC Project Scoping Boundary.

8.8.5.31 Non-developed land within the MHPGC Project Scoping Boundary (excluding agriculture which is detailed above in Section 8.8.5) includes:

- woodland is present, including at South Hetton and Coop House Wood in the southwest of the MHPGC Project Scoping Boundary, at Carr House Plantations in the west of the Northern Corridor, from Burdon Dene to Ryhope Dene, along the route of Seaton Burn, and at Hawthorn Dene;
- residential gardens (scattered properties);
- land with nature conservation designations for biological conservation, including Hesledon Moor SSSI which is entirely within the MHPGC Project Scoping Boundary at South Hetton in the southwest (see Chapter 8.3: Terrestrial Ecology and Ornithology, of the Scoping Report).

8.8.5.32 Surrounding the MHPGC Project Scoping Boundary, adjacent land uses in the Land Use, Tourism and Recreation Study Area include a mixture of developed and non-developed land including:

- Agricultural land;
- Coastal paths, beaches, and attractions at Seaham;
- Industrial estates, including Seaham Sewage Treatment Works and Spectrum Business Park, up to the docks at Seaham harbour, and the Cold Hesledon Industrial Estate c.60m north of the Central Corridor.
- A service station at South Hetton Road, west of the MHPGC Project Scoping Boundary;

- Mineral extraction: quarrying, including an active quarry at Murton to the west, and Hawthorn Quarry (which is a SSSI) between the Central Corridor and Southern Corridor (see details of minerals in Chapter 8.1: Ground Conditions and Contamination, of the Scoping Report);
- 'Watergate Fishing Lake' is to the east of the MHPGC Project Scoping Boundary, east of Slingley Hill;
- nature reserves, some partly within the MHPGC Project Scoping Boundary, as described above. Pig Hill SSSI is within the Land Use, Tourism and Recreation Study Area c.135m southwest of the MHPGC Project Scoping Boundary, and Eppleton Grassland is immediately west of the MHPGC Project Scoping Boundary by Hetton le Hole;
- housing estates at South Hetton Road immediately west of the MHPGC Project Scoping Boundary, at Petwell Lane immediately south of the Southern Corridor, at Barwick Street to Oliver Street, immediately north of the Central Corridor, the 'Station Estate' at Murton east of the MHPGC Project Scoping Boundary, and at Seaham adjacent to the Northern Corridor, south of the Seaham Grange Industrial Estate and west of the B1285. The recently constructed Cherry Tree Park estate at Cherry Brooks Way is c.60m north of the Northern Corridor.
- Allotments at Murton immediately east of the MHPGC Project Scoping Boundary;
- community recreation areas adjacent to the MHPGC Project Scoping Boundary, including a playground and bowling green south of Murton, northeast of the Central Corridor.

8.8.6 Potential Impacts of the Morven Hawthorn Pit Grid Connection Project

8.8.6.1 A range of potential impacts on land use, tourism and recreation receptors have been identified which may give rise to likely significant effects during the construction, O&M, and decommissioning phases of the MHPGC Project.

8.8.6.2 The impacts that have been scoped into the assessment as having the potential to give rise to likely significant effects are outlined in Table 8.60 together with a description of any additional data collection (e.g. site specific surveys) and supporting analyses (e.g. modelling) that will be required to enable a full assessment of the impacts.

8.8.6.3 Potential impacts scoped out of the assessment as there is no potential for them give rise to likely significant effects are presented in Table 8.86, with justification.

Table 8.86: Impacts Proposed to be Scoped in to the Morven Hawthorn Pit Grid Connection Project Assessment for Land Use, Tourism and Recreation

*Project phase refers to construction (C), O&M (O) and decommissioning (D)

Impact	Project Phase*			Justification	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D			
Land use (not including effects on soils and agricultural land)						
Temporary change to land use and/or land cover (working corridor/temporary compounds) temporarily restricting access to/use of land) used for public access, public open space, or other community activity.	✓	×	✓	Construction and decommissioning of the MHPGC Project could result in temporary loss of land or public access to land including open space and other land use used by the community/tourists due to construction activity.	Constraints plans will be produced, and further desk based reviews carried out to inform the assessment and optioneering/design decisions in relation to onshore infrastructure. Site visits for landscape and visual, ecological survey, and ground conditions purposes will be undertaken to inform further assessment.	Scoped in for assessment informed by updated baseline information and design information.
Temporary change to land use and/or land cover (working corridor/temporary compounds) temporarily restricting access to/use of land for agriculture,	✓	×	✓	Construction and decommissioning of the MHPGC Project could result in temporary loss of land or access to land or severance of land for farming, forestry or commercial activity.	Constraints plans will be produced, and further desk based reviews carried out to inform the assessment and optioneering/design decisions in relation to onshore infrastructure.	Scoped in for assessment informed by updated baseline information and design information.

Impact	Project Phase*			Justification	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D			
forestry or commercial activity.					Site visits for landscape and visual, ecological survey, and ground conditions purposes will be undertaken to inform further assessment.	
Permanent change to land use due to construction of permanent features (e.g. LSS, transition joint bays, landfall structure).	✓	✓	✓	Construction of the MHPGC Project will require some permanent land use change at the substation and from the landfall along the cable route there will be some (localised) land take at surface to construct access chambers for maintenance of below ground cables, potentially within land that is currently undeveloped.	Constraints plans will be produced, and further desk based reviews carried out to inform the assessment and optioneering/design decisions in relation to onshore infrastructure. Site visits for landscape and visual, ecological survey, and ground conditions purposes will be undertaken to inform further assessment.	Scoped in for assessment informed by updated baseline information and design information.
Permanent limitations to land use due to wayleave and easement conditions along cable routes.	✓	✓	✓	Limiting future land use options on the affected land during operation to maintain access within land subject to servitude (e.g. future tree planting not possible, certain commercial activities may not be possible[1]).	Constraints plans will be produced, and further desk based reviews carried out to inform the assessment and optioneering/design decisions in relation to onshore infrastructure.	Scoped in for assessment informed by updated baseline information and design information.

Impact	Project Phase*			Justification	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D			
					Site visits for landscape and visual, ecological survey, and ground conditions purposes will be undertaken to inform further assessment.	
Soils and agricultural land receptors						
Construction of buildings, infrastructure, hardstanding resulting in permanent loss of agricultural land and soil due to soil removal or soil sealing due to land use change to buildings or hard surfacing (e.g. concrete, paving slabs, tarmac etc.).	✓	×	×	Soils and agricultural land are finite natural resources, where removal of the naturally occurring soil or soil sealing takes place during construction this is considered to be a permanent effect.	Soil mapping (National Soil Map) will be obtained for the Study Area – this provides soil information at a higher resolution than the LandIS Soilscapes map used for Scoping and will inform the studies below. Baseline ALC grades and soil types to be confirmed by ALC and soil resources survey.	Scoped in for assessment informed by updated baseline information and design information.
Use of construction vehicles, materials and equipment laydown and storage, handling and stockpiling of soils resulting in soil damage and damage to agricultural land.	✓	×	✓	Soil compaction damages soil structure meaning that water and air can no longer get into the soil, resulting in loss of soil biodiversity, loss of soil's water filtering/storage function, and loss of flood prevention function,	Soil mapping (National Soil Map) will be obtained for the Study Area – this provides soil information at a higher resolution than the LandIS Soilscapes map used for Scoping	Scoped in for assessment informed by updated baseline information and design information.

Impact	Project Phase*			Justification	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D			
				and plants being unable to grow in the compacted soil.	and will inform the studies below. Baseline ALC grades and soil types to be confirmed by ALC and soil resources survey.	
Soil disturbance and vegetation stripping, excavation and stockpiling of soils resulting in soil erosion and loss of organic matter resulting in soil degradation and damage to agricultural land. Potential for the ALC grade to be lowered.	✓	×	✓	Without appropriate drainage and soil storage/handling measures in place during construction, topsoil and soil organic matter can be lost due to rainfall or wind, potentially also resulting in water pollution.	Soil mapping (National Soil Map) will be obtained for the Study Area – this provides soil information at a higher resolution than the LandIS Soilscapes map used for Scoping and will inform the studies below. Baseline ALC grades and soil types to be confirmed by ALC and soil resources survey.	Scoped in for assessment informed by updated baseline information and design information.
Soil excavation, storage in stockpiles and handling during construction resulting in degradation of topsoil due to mixing with subsoil, or contamination with other materials (e.g. wastes or invasive plant species) resulting in soil	✓	×	✓	Without proper segregation of topsoil and subsoil, and consideration of the presence of contaminants, soil handling during construction can result in soils being degraded when they are placed, either during reinstatement at their original	Soil mapping (National Soil Map) will be obtained for the Study Area – this provides soil information at a higher resolution than the LandIS Soilscapes map used for Scoping and will inform the studies below.	Scoped in for assessment informed by updated baseline information and design information.

Impact	Project Phase*			Justification	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D			
degradation and damage to agricultural land. Potential for the ALC grade to be lowered.				location or to an alternative location.	Baseline ALC grades and soil types to be confirmed by ALC and soil resources survey.	
Ground excavation and use of plant during ground works can result in damage to existing land drainage (agricultural drainage systems which may include buried clay/other drains), resulting in structural damage to soil, waterlogging or erosion of soil around damaged sections, increased surface run-off, and damage to agricultural land. Potential for the ALC grade to be lowered.	✓	×	✓	The soil type information in the review of desk based information includes some soils with impeded drainage and naturally high groundwater.	Soil mapping (National Soil Map) will be obtained for the Study Area – this provides soil information at a higher resolution than the LandIS Soilscapes map used for Scoping and will inform the studies below. Baseline ALC grades and soil types to be confirmed by ALC and soil resources survey.	Scoped in for assessment informed by updated baseline information and design information.

[1] The potential for the MHPGC Project to impact on mineral extraction activities or future mineral resource extraction is addressed in Chapter 8.1: Ground Conditions and Contamination, of the Scoping Report.

Table 8.87: Impacts Proposed to be Scoped out of the Morven Hawthorn Pit Grid Connection Project Assessment for Land Use, Tourism and Recreation

Impact	Justification
Loss of soils or agricultural land during O&M or decommissioning.	There will be no likely significant effect, as any loss of agricultural land will occur during the construction phase. Any disruption due to O&M activities are likely to be minimal and short-lived, with no loss of agricultural land.

8.8.6.4 All likely significant effects identified will be considered at further stages of the assessment as more detail regarding the design becomes available and greater levels of baseline data are collected and analysed. For land use, tourism and recreation receptors (excluding soil and agricultural land resources as specified in Table 8.87), no impacts are being scoped out at this stage, although this is likely to change as the design matures.

8.8.7 Designed In Measures and Mitigation

8.8.7.1 As part of the project design process, several designed in measures (primary and tertiary) will reduce the potential for impacts on land use receptors (Table 8.88). As there is a commitment to implement these measures, they are considered inherent to the design of the MHPGC Project. The determination of magnitude and significance will assume the implementation of such measures. Some of these measures are considered standard industry practice for this type of development.

8.8.7.2 The requirement for any additional (secondary) mitigation measures will be dependent on the significance of the effects on for land use, tourism and recreation receptors. The requirement for and feasibility of any mitigation measures will be consulted upon with statutory consultees throughout the EIA process.

8.8.7.3 The following designed in measures are relevant to for land use, tourism and recreation receptors. The designed in measures will evolve over the development process as the EIA progresses.

Table 8.88: Designed in Measures Proposed for Land Use, Tourism and Recreation

Reference Number	Designed in Measures	Justification	Primary or Tertiary
MM-37	The MHPGC Project will explore the use of previously developed land for permanent infrastructure to avoid land take on undeveloped (agricultural or other) land. Permanent development will be avoided on BMV agricultural land (Grades 1 or 2 or Subgrade 3a) with the aim of preserving the best quality	To avoid land take on undeveloped (agricultural or other) land and to minimise land take of BMV agricultural land.	P

Reference Number	Designed in Measures	Justification	Primary or Tertiary
	agricultural land for its future food/biomass production capability and other soil functions (e.g. carbon storage and flood mitigation) where reasonably practicable.		
MM-38	The MHPGC Project infrastructure will avoid tourist attractions and recreational facilities as far as is practicable.	To minimise impact on tourist attractions and recreational facilities.	P
MM-48	Where practicable, sensitive sites will be avoided by the temporary and permanent MHPGC Project footprint, including Special Protection Areas (SPAs), Special Areas of Conservation (SACs), SSSIs, National Nature Reserve (NNR), Local Nature Reserves, Local Wildlife Sites, Ancient Woodland, and areas of consented development.	To minimise impacts on sensitive sites.	P
MM-51	The permanent footprint of the LSS, landfall infrastructure and transition joint bays will be minimised to that required for the safe O&M of the equipment in order to minimise land take.	To minimise land take.	P
MM-58	Trenchless installation methods will be used where practicable. Further work will be undertaken once the MHPGC Project has been defined in more detail to identify locations where the underground cable could be installed using trenchless installation methods. Trenchless methods will be used at the landfall.	To minimise land take and to minimise impacts on sensitive sites.	P
MM-65	Underground cables will be used to connect from the landfall(s) transition joint bay to the MHPGC Project LSS. Cables will be typically installed in ducts in a standard buried trench arrangement. This enables soils excavated during	Enables soils excavated during construction to be reinstated over the cables, enabling undeveloped agricultural land to return to this use during operation of the MHPGC Project. The use	P

Reference Number	Designed in Measures	Justification	Primary or Tertiary
	construction to be reinstated over the cables, enabling undeveloped agricultural land to return to this use during operation of the MHPGC Project. The use of joint bays along the cable route enables disturbance to soils during O&M to be minimised.	of joint bays along the cable route enables disturbance to soils during O&M to be minimised.	
MM-94	A Soil Management Plan will be implemented which will set out measures in accordance with current industry guidance for sustainable use of soils, including Defra (2009), Construction Code of Practice for the Sustainable Use of Soils on Construction Sites. In line with this guidance topsoil and subsoil will be stored in separate stockpiles. During construction topsoil and subsoil will be stored within the construction working corridor of the onshore export cable construction corridor. Any suspected or confirmed contaminated soils will be separated, contained and tested to allow a suitable use or disposal route for these soils to be identified to minimise the risk of cross contamination, of dust migration from stockpiles, or contaminated run-off/leachate from stockpiles impacting adjacent ground or nearby watercourses.	To protect agricultural land and other undeveloped land where natural soils are present and minimise land take.	T

8.8.8 Proposed Assessment Methodology

8.8.8.1 IEMA has developed a methodology for assessing effects on soils in EIA and it is proposed that this is applied for soils and agricultural land resources potentially affected by the MHPGC Project. Due to the long timescales over which soils are formed, they are effectively non-renewable, and are integral to terrestrial ecosystems. Developments on undeveloped land, including agricultural land, have the potential to cause temporary or permanent damage to, or loss of, soil and agricultural land resources and their associated ecosystem services and functions –

which in turn limits current and future land use options on affected land. The proposed methodology for assessing potential effects of the MHPGC Project on soils and agricultural and receptors is set out below.

8.8.8.2 The land use assessment will also look at how the MHPGC Project will affect land use, tourism and recreation receptors due to temporary or permanent changes to the baseline land use, principally in relation to access to land and temporary or permanent changes or limitations to land use. The proposed methodology is set out from section 8.8.8.

Assessment Methodology: Land Use (Not Including Effects on Soils and Agricultural Land)

8.8.8.3 The assessment will focus on the land use effects of the MHPGC Project and will build on the baseline information collected to date through further desk survey as necessary. This is to provide a full appreciation of any likely significant land use impacts of the MHPGC Project.

8.8.8.4 The methodology adopted for the land use assessment will consider feedback following scoping, and where relevant, ongoing consultation and stakeholder engagement.

8.8.8.5 No quantitative impact assessment on tourism will be undertaken, with the assessment utilising available tourism data and published studies and applying professional judgement to reach conclusions. The assessment will provide a qualitative assessment of the effects on tourism, focusing on tourism related businesses that could be affected by the MHPGC Project along with amenity impacts to tourism and recreation resources.

8.8.8.6 The proposed methodology is relevant for direct effects (where the MHPGC Project would directly encroach on a resource) and isolation effects (where the MHPGC Project would prevent or limit access to a resource such that its activity level is impacted). There is no definitive guidance on significance criteria for land use effects; as such the significance criteria identified has been proposed based on experience gained from other projects.

<u>Receptor Sensitivity</u>

8.8.8.7 The sensitivity of a land use receptor relates to its importance to tourists, recreational users, other land users, and to how much they will be affected by the land take or amenity effects to be generated by the MHPGC Project. For example, a local business that has a reliance on its outdoor setting (a petting zoo or a wedding venue) would be more sensitive than a local business that largely runs in an indoor venue (bowling alley). Table 8.89 details the proposed criteria for assessing receptor sensitivity.

Table 8.89: Receptor Sensitivity: Land Use

Sensitivity	Description
High.	Businesses, individuals or groups who have little or no capacity to experience the impact without incurring a material loss (or gain). A tourism or recreational receptor which is considered nationally significant.
Medium.	Businesses, individuals or groups who have some capacity to experience the impact without incurring a material loss (or gain). A tourism or recreational receptor which is considered regionally significant.
Low.	Businesses, individuals or groups that generally have capacity to experience the impact without incurring a material loss (or gain). A tourism or recreational receptor which is considered to be locally significant.

Assessment of Effects and Determining Significance

8.8.8.8 The significance of a land use effect will be determined by assessing the magnitude of the impact and the sensitivity of the receptor.

8.8.8.9 The magnitude of an impact represents its severity. Key factors when assessing magnitude include the extent (number of groups and/or people affected) and how the impact affects the receptor's ability to fulfil its original function. Table 8.90 details the proposed criteria for assessing the impact magnitude.

Table 8.90: Magnitude of Change (Impacts): Land Use

Magnitude of Impact (change)	Description of Impacts
High.	An impact that will be very adverse/beneficial and very likely to affect a large number of people or prevent the receptor from fulfilling its function.
Medium.	An impact that will be adverse/beneficial and that is likely to affect a moderate number of people or partially prevent the receptor form fulfilling its function.
Low.	An impact that will be adverse/beneficial and that it is likely to affect a small number of people, or which have a limited effect on how the receptor fulfils its function.
Negligible.	An impact that is anticipated to have a slight effect on the receptor.
No impact.	No impact would occur on the receptor.

8.8.8.10 The significance of a land use effect is determined by combining both the magnitude of the effect and the sensitivity of the receptor. The proposed approach to determining significance is summarised in Table 8.91.

Table 8.91: Determining Significance: Land Use

Sensitivity of Receptor		Magnitude of Impact				
		High Impact	**Medium Impact**	**Low Impact**	**Negligible Impact**	**No Impact**
Sensitivity/importance/value	**High**	Major – significant.	Major – significant.	Moderate – potentially significant.	Minor – not significant.	No Impact.
	Medium	Major – significant.	Moderate – potentially significant.	Minor – not significant.	Negligible – not significant.	No Impact.
	Low	Moderate – potentially significant.	Minor – not significant.	Negligible – not significant.	Negligible – not significant.	No Impact.

Assessment Methodology: Soils and Agricultural Land

8.8.8.11 The proposed generic project-wide approach to the assessment methodology is set out in Chapter 4: EIA Methodology, of the Scoping Report. However, whilst this has informed the approach to be used to assess effects on agricultural land and soils receptors, it is necessary to set out how this methodology will be applied, and adapted as appropriate, to address the specific needs of the assessment for soils and agricultural land.

8.8.8.12 The assessment will build on the baseline information collected to date through further desk survey and by soil resources and ALC survey within the MHPGC Project Scoping Boundary. This is to provide a full appreciation of any likely significant land use impacts of the MHPGC Project and to inform the design and the development of suitable embedded mitigation measures to protect soils.

8.8.8.13 The assessment of likely significant effects for soil resources will be based on the extent of soils and agricultural land that may be affected and whether the effects will be temporary or permanent. The assessment is based on the IEMA and will be informed by:

- information about the construction and O&M associated with the MHPGC Project;
- relevant national policy, strategy, legislation, and guidance documents as set out above;
- stakeholder engagement feedback.

8.8.8.14 The assessment will take into consideration the sensitivity of the affected receptor or resource and the magnitude of change from the baseline conditions resulting from the MHPGC Project. This allows an evaluation to be made of significance and an indication of likely significant effects.

Receptor Sensitivity: Soils and Agricultural Land

8.8.8.15 Definitions of receptor sensitivity that will be used in the assessment are provided in Table 8.92. The receptor sensitivity assessment approach is designed to take account of key soil functions and ecosystem services, including as a growing medium for crops, as a store of organic matter including carbon, providing habitat, and supporting biodiversity, and soil's role in the hydrological cycle. There are interactions between soil and receptors covered in other chapters of the Scoping Report; Healthy soil is key to flood mitigation, and flood risk within the boundary of the MHPGC Project and the MHPGC Project's interaction with the water environment is considered in Chapter 8.2: Water Resources and Flood Risk, of the Scoping Report. Healthy and biodiverse soil is integral to healthy terrestrial ecosystems, the MHPGC Project's potential effects on terrestrial ecosystems are considered in Chapter 8.3: Terrestrial Ecology and Ornithology, of the Scoping Report. Soil also preserves archaeological and cultural heritage features. Effects on these receptors are considered in Chapter 8.4: Archaeology and Cultural Heritage, of the Scoping Report.

8.8.8.16 Soil health can be vulnerable to pollution impacts during development where legacy contamination is present (and disturbed by the development) or where the development introduces new potential sources of contamination. This is discussed in Chapter 8.1: Ground Conditions and Contamination, of the Scoping Report.

Table 8.92: Receptor Sensitivity: Soils and Agricultural Land

Sensitivity	Description
Very High.	Soils in Grade 1 and 2 ALC agricultural land. Soils directly supporting a European Union (EU) designated site (e.g. SAC, SPA, Ramsar). Soil carbon: Peat soils, peatlands - blanket bog, raised bog, fen peat soils (mapped peatland and peatland with any statutory designation including SSSI).
High.	Soils in Grade 3a ALC agricultural land. Soils (other than peat) directly supporting a United Kingdom (UK) designated site (e.g. SSSI, LNR). Soils supporting protected features within a UK designated site (e.g. United Nations Educational, Scientific and Cultural Organisation (UNESCO) Geoparks, SSSI or Area of Outstanding Natural Beauty (AONB), Special Landscape Area); Native Forest and woodland soils; Unaltered soils supporting semi-natural vegetation (including UK Biodiversity Action Plan (BAP) Priority habitats). Soil carbon: Organo-mineral soil (soil with <0.4m thickness of organic material – can include humus-iron podzols, peaty podzols, peaty gleys, peaty rankers and podzolic rankers)[27].

[27] As defined by IUCN (2018). UK Peatland Strategy. (online). Available at: https://www.iucn-uk-peatlandprogramme.org/uk-strategy. Accessed March 2024.

Sensitivity	Description
Medium.	Soils in Grade 3b ALC agricultural land. Soils supporting protected or valued features in non-statutory designated sites (e.g. LNRs, Local Geological Sites (LGSs), Sites of Nature Conservation Importance (SNCIs), Special Landscape Areas; Non-Native Forest and woodland soils). Soil carbon: Mineral soils.
Low.	Soils in Grade 4 and 5 ALC agricultural land. Soils supporting non-designated notable or priority habitats, soils on greenfield sites not in agricultural use (e.g. amenity land in urban areas, parks, and gardens). Soils supporting limited community/recreational/educational access to land Soil carbon: Mineral soils.
Negligible.	As for low sensitivity, but with only indirect, tenuous, and unproven links between sources of impact and soil functions.

8.8.8.17 Table 8.92 assigns the highest sensitivity to soils performing key agricultural functions, organic matter (including carbon) storage/cycling functions, flood risk mitigation and biodiversity/wildlife supporting functions at a national level.

8.8.8.18 Disturbance of soil cannot be avoided by the MHPGC Project, and it is acknowledged that soil is vulnerable to damage during handling and storage, even if the effect is only temporary, and that some soil types are less resilient to handling than others. For the purposes of the assessment, soil sensitivity is assessed on a soil function basis, as detailed in

8.8.8.19 Table 8.92, rather than a soil structure basis. However, it is also acknowledged that during the construction phase of the MHPGC Project, the soil type (e.g. topsoil or subsoil, and specific types of each) and its structural qualities can influence its sensitivity to handling, storage and placement (ICE, 2019). The specific structural qualities of soils will be considered and addressed in a site specific Soil Management Plan for construction of the MHPGC Project, which is a designed in measure (see Table 8.88).

8.8.8.20 The Soil Management Plan will include measures for the different soil types potentially impacted by the MHPGC Project, e.g., a sandy loam and a heavy clay loam will have different resilience to structural damage during soil handling (soil stripping, storage in stockpiles, soil placement). During soil handling, the interaction between soil texture and soil moisture is key. Effects on soils during development can vary depending on how and when the soils are handled, notably with soil structure being prone to damage if soils are handled whilst too wet. The main technical guidance for soil handling in England is the Department for Environment, Food and Rural Affairs (2009) Construction Code of Practice on the Sustainable Use of Soils on Construction Sites. Useful guidance to help maintain soil health and soil structure during handling is also available in the Institute of Quarrying (2021) Good Practice Guide for Handling Soils in Mineral Workings. This guidance and the Defra (2009) guidance will inform the measures in the Soil Management Plan.

Magnitude of Change: Soils and Agricultural Land

8.8.8.21 It is recognised that there may be changes to other soil functions in addition to crop/biomass production as a result of the MHPGC Project. However, in general, adverse effects on soil's biomass function will correspond to adverse effects on other key soil functions, and vice versa. For example, a healthy soil capable of performing its biomass function to a high standard should also be capable of other key functions, such as storing flood water and supporting biodiversity, however, compaction of this soil would lead to a reduction in all of these functions. Table 8.93 provides examples of how the magnitude of change is determined with respect to soils and agriculture features.

8.8.8.22 The magnitude of change may be either beneficial or adverse. The criteria and examples in Table 8.93, informed by IEMA (2022), focus on adverse changes, however, beneficial changes may also occur and will be considered on a case-by-case basis as required.

8.8.8.23 Soil health can be vulnerable to pollution impacts during development where legacy contamination is present (and disturbed by the development) or where the development introduces new potential sources of contamination. This is discussed in Chapter 8.1: Ground Conditions and Contamination, of the Scoping Report.

Table 8.93: Magnitude of Change: Soils and Agricultural Land

Magnitude of Impact (change)	Description of Impacts
Major.	Permanent, irreversible loss of one or more soil functions or soil volumes (including permanent sealing or land quality downgrading), over an area of more than 20ha or loss of soil-related features set out in Table 8.92 (including effects from 'temporary developments'[3]), Or, Potential for permanent improvement in one or more soil functions or soil volumes due to remediation or restoration over an area of more than 20Ha; or gain in soil-related features set out in Table 8.92 (including effects from 'temporary developments'[3]).
Moderate.	Permanent, irreversible loss of one or more soil functions or soil volumes, over an area of between 5 and 20ha or loss of soil-related features set out in Table 8.92 (including effects from 'Temporary Developments'[3]), Or, Potential for improvement in one or more soil functions or soil volumes due to remediation or restoration over an area of between 5 and 20Ha, or gain in soil-related features set out in Table 8.92.

Magnitude of Impact (change)	Description of Impacts
Low.	Permanent, irreversible loss over less than 5ha or a temporary, reversible loss of one or more soil functions or soil volumes), or temporary, reversible loss of soil-related features set out in Table 8.92, Or, Potential for permanent improvement in one or more soil functions or soil volumes due to remediation or restoration over an area of less than 5ha or a temporary improvement in one or more soil functions due to remediation or restoration or off-site improvement, or temporary gain in soil-related features set out in Table 8.92.
Negligible.	No discernible loss or reduction or improvement of soil functions or soil volumes that restrict current or proposed land use.

[3] Temporary developments can result in a permanent impact if resulting disturbance or land use change causes permanent damage to soils. Temporary developments could include features such as temporary compounds, or temporary access tracks, required during the construction phase of a project but which can be reinstated back to the original land use prior to the operational phase.

8.8.8.24 Table 8.93 uses the area of land or soil potentially affected by a MHPGC Project to define the magnitude of change. In the absence of policy guidance for soils in relation to quantifying the effects of development on these receptors, Table 8.93 uses areas based on existing technical guidance for developments on agricultural land (Natural England TIN049 and NPPF, see section 8.8.2), since agricultural land represents large areas of land in the UK where the natural in situ soils are still present.

8.8.8.25 Regarding agricultural land, The Town, and Country Planning (Development Management Procedure) (England) Order 2015 only requires Natural England to be consulted on development that involves the loss of greater than 20ha of grades 1, 2 or 3a agricultural land, which are not in accordance with an approved development plan. Consequently, losses smaller than this threshold are considered to have a small magnitude of change on the national stock of BMV land. Losses of over 80ha of BMV land are equivalent to the size of a medium to large farm and consequently the magnitude of change is considered to be very high. At a national policy level, total farm holdings below 20ha in size are generally considered collectively as small farms.

Evaluation of Significance

8.8.8.26 During the assessment of effects for each identified receptor its sensitivity value based on Table 8.92 is combined with the magnitude of change from Table 8.93 to produce an overall significance rating based on the evaluation matrix shown in Table 8.94. A 'significant' effect is assessed as a Major rating whereas a Moderate rating is considered to be 'potentially significant'. This approach is based on professional judgement and carried out on a precautionary basis. Significance of effect can be beneficial, neutral, or adverse, depending on the type of effect and its magnitude.

Table 8.94: Significance Evaluation Matrix: Soils and Agricultural Land

Sensitivity of Receptor		Magnitude of Impact				
		Major	**Moderate**	**Minor**	**Negligible**	**No change**
Sensitivity/importance/value	Very high	Very large (Significant).	Large or very large (Significant).	Moderate or large (Significant).	Slight (Not significant).	Neutral.
	High	Large or very large (Significant).	Moderate or large (Significant).	Slight or moderate (Potentially significant).	Slight (Not significant).	Neutral.
	Medium	Moderate or large (Significant).	Moderate (Potentially significant).	Slight (Not significant).	Neutral or slight (Not significant).	Neutral.
	Low	Slight or moderate (Potentially significant).	Slight (Not significant).	Neutral or slight (Not significant).	Neutral or slight (Not significant).	Neutral.
	Negligible	Slight (Not significant).	Neutral or slight (Not significant).	Neutral or slight (Not significant).	Neutral (Not significant).	Neutral.

8.8.8.27 Where effects are assessed to be potentially significant in EIA terms, professional judgement is applied to determine whether they are Significant or Not Significant.

8.8.9 Potential Cumulative Impacts

8.8.9.1 Cumulative effects with the Morven Offshore Wind Array Project and the second grid connection project in the Branxton area Southeast Scotland will be considered, together with cumulative effects with other developments, where relevant.

8.8.9.2 The cumulative effect assessment will follow the approach outlined in Chapter 4: EIA Methodology, of the Scoping Report.

8.8.10 Potential Inter-related Effects

8.8.10.1 The EIA will consider inter-related effects arising from the MHPGC Project, across their own phases (project lifetime) and different effects on one receptor in one phase (receptor led). The EIA will consider inter-related effects of multiple impacts from the construction, O&M and decommissioning phases of the MHPGC Project, affecting one receptor. Inter-related effects will be assessed through consideration of all effects on a receptor, considering both spatial and temporal overlap, within the MHPGC Project. This will ensure that the MHPGC Project is appropriately considered within the EIA and in line with Chapter 4: EIA Methodology.

8.8.11 Potential Transboundary Impacts

8.8.11.1 There are no potential transboundary impacts from onshore land use, tourism and recreation from the MHPGC Project. This is due to any likely significant effects being experienced locally, rather than a wider geographic scale.

9 Environmental Topics and Potential Impacts -Combined Offshore and Onshore

9.1 Landscape and Visual Impact Assessment (LVIA)

9.1.1 Introduction

9.1.1.1 This chapter of the Scoping Report identifies the landscape and visual receptors of relevance to the Morven Hawthorn Pit Grid Connection Project (hereafter referred to as 'MHPGC Project') and considers the potential impacts arising from the construction, operation and maintenance (O&M), and decommissioning of the MHPGC Project. This scoping chapter adopts a proportionate approach to only those impacts with potential to result in likely significant effects and therefore scopes out other impacts where there is evidence that the effects are not likely to be significant.

9.1.1.2 The MHPGC Project infrastructure components are detailed in Chapter 3: Project Description.

9.1.1.3 The Landscape and Visual Impact Assessment (LVIA) will consider the potential likely significant impacts on the following:

- landscape resource and visual amenity that may arise from the construction, O&M, and decommissioning of the onshore components of the MHPGC Project;
- visual amenity as a result of the construction of the offshore components of the MHPGC Project.

9.1.1.4 Impacts on the landscape resource in relation to the offshore components of the MHPGC Project are proposed to be scoped out as set out in Table 9.5. All seascape impacts in relation to the onshore and offshore components of the MHPGC Project are also proposed to be scoped out as set out in Table 9.5.

9.1.1.5 For Scotland, all landscape and visual receptors associated with the construction, O&M and decommissioning activities of the MHPGC Project are scoped out, as set out in Table 9.5. It is also worth noting here that the entire Seascape, Landscape and Visual Impact Assessment (SLVIA) in relation to the Morven Offshore Wind Array Project has been scoped out of the Environmental Impact Assessment (EIA), as agreed with consultees.

9.1.1.6 This chapter describes: the methodology to be used within the LVIA (see Appendix G: LVIA Methodology of the Scoping Report for the full description); an overview of the baseline conditions; the datasets to be used to inform the LVIA; the potential likely significant impacts to be considered and how these will be assessed for the EIA.

9.1.2 Policy and Legislation

9.1.2.1 This section identifies the relevant legislation, policy and other documentation that will inform the assessment of likely significant impacts with respect to LVIA. Further information on policies relevant to the EIA and their status is provided in Chapter 2: Policy and Legislation.

9.1.2.2 To provide a robust evidence base, Table 8.92 presents a summary of legislation and policies relevant to the LVIA, for which this section takes account of specific

requirements to assess and address likely impacts on receptors and relevant environmental issues.

Table 9.1: Relevant Legislation and Policy

Relevant Legislation	Relevance to the Assessment
International Legislation	
The European Landscape Convention (Council of Europe, 2000).	Provides a people-centred and forward-looking way to reconcile the management of the environment with the social and economic challenges of the future and aims to help people reconnect with the place. The European Landscape Convention (ELC) covers land and water (inland and seas), and natural, rural, urban and peri-urban landscapes. Significantly, it includes everyday or degraded landscapes as well as those that might be considered outstanding. Sets the need to recognise landscapes in law, to establish policies aimed at landscape planning, protection and management and the integration of landscape into other policy areas.
National Legislation (England)	
The Electricity Act (1989) (United Kingdom (UK) Government, 1989).	Requirements to have regard to the desirability of preserving natural beauty. Requirements to mitigate the effect which the proposals would have on the natural beauty of the countryside.
National Policy Statement for Energy (EN-1) (Department for Energy Security and Net Zero, 2023a).	Section 5.10 Establishes the need for Landscape/Seascape/Townscape and Visual factors to be key to the planning process.
National Policy Statement for Renewable Energy Infrastructure (EN-3) (Department for Energy Security and Net Zero, 2023b).	Paragraphs 2.8.35 – 2.8.41 deals specifically with the offshore-onshore connection to existing electricity grid infrastructure, outlining what needs to be considered and process to gain approvals for such projects.
National Policy Statement for Electricity Networks Infrastructure (EN-5)	Paragraphs 2.9.7 – 2.9.19 deals specifically with Landscape/Seascape/Townscape and Visual factors acknowledging that adverse effects may arise from electricity infrastructure and that applicants should assess such through an appropriate impact assessment.

Relevant Legislation	Relevance to the Assessment
(Department for Energy Security and Net Zero, 2023c).	
Wildlife and Countryside Act (1981) (UK Government, 1981).	Requirements to maintain and review Public Rights of Way (PRoW) Definitive Maps and Statements.
Policy England	
NPPF (Department for Levelling Up, Housing and Communities, 2023).	Section 3 – Plan Making • 20d: Conservation and enhancement of the natural, built and historic environment, including landscapes and green infrastructure, and planning measures to address climate change mitigation and adaptation. Section 14: Meeting the challenge of climate change, flooding and coastal change • 155: When determining planning applications for renewable and low carbon development, local planning authorities should: • b) approve the application if its impacts are (or can be made) acceptable. Section 15: Conserving and enhancing the natural environment • 174: Planning policies and decisions should contribute to and enhance the natural and local environment by: - a) protecting and enhancing valued landscapes, sites of biodiversity or geological value and soils (in a manner commensurate with their statutory status or identified quality in the development plan); - b) recognising the intrinsic character and beauty of the countryside, and the wider benefits from natural capital and ecosystem services – including the economic and other benefits of the best and most versatile agricultural land, and of trees and woodland; - c) maintaining the character of the undeveloped coast, whilst improving public access to it where appropriate. • 178: Within areas defined as Heritage Coast, planning policies and decisions should be consistent with the special character of the area and the importance of its conservation. Major development within a Heritage Coast is unlikely to be appropriate, unless it is compatible with its special character.
Regional Policy (England)	

Relevant Legislation	Relevance to the Assessment
County Durham Local Plan (Adopted 2020) (Durham County Council, 2020).	26 - Green Infrastructure • Development will be expected to maintain and protect, and where appropriate improve, the county's green infrastructure network. 27 - Utilities, Telecommunications and other Broadcast Infrastructure • Proposals will be permitted for new or extensions to existing energy generation, where: • it can be demonstrated that the scheme will not cause significant adverse impacts or that its benefits outweigh any adverse negative effects; • it is located at an existing mast or project site, where it is technically and operationally feasible and does not result in visual clutter. Where a new site is required, applicants must demonstrate to the council's satisfaction that the use of existing sites in the area has been fully explored and is not feasible. Equipment must be sympathetically designed and camouflaged and not result in visual clutter. 33 - Renewable and Low Carbon Energy • Renewable and low carbon energy development in appropriate locations will be supported. In determining planning applications for such projects significant weight will be given to the achievement of wider social, environmental and economic benefits. • Proposals should include details of associated developments including access roads, project lines, pylons and other ancillary buildings. 37 - Durham Heritage Coast and Wider Coastal Zone • 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, as defined on the policies map, or that have the potential to individually or cumulatively impact 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;

Relevant Legislation	Relevance to the Assessment
	• not be inconsistent with the purposes of the Heritage Coast and objectives of the Heritage Coast Management Plan. 39 – Landscape • Proposals for new development will be permitted where they would not cause unacceptable harm to the character, quality or distinctiveness of the landscape, or important features or views. • Proposals will be expected to incorporate appropriate measures to mitigate adverse landscape and visual effects. • Development affecting Areas of Higher Landscape Value (AHLV), will only be permitted where it conserves, and where appropriate enhances, the special qualities of the landscape, unless the benefits of development in that location clearly outweigh the harm. • Development proposals should have regard to the County Durham Landscape Character Assessment and County Durham Landscape Strategy and contribute, where possible, to the conservation or enhancement of the local landscape.
The County Durham Landscape Strategy (Durham County Council, 2008a).	Key landscape policy guidance to inform Local Plan policy, particularly concerning: • green Infrastructure; • tranquillity; • Renewable Energy Development; • areas of High Landscape Value
The County Durham Landscape Value Assessment, 2019 (Durham County Council, 2019a).	Assessment of landscape value across the county to inform Local Plan policy.
The County Durham Local Landscape Designations Review, 2019 (Durham County Council, 2019b).	Review of landscape designations, to inform Local Plan policy • Chapter 8 deals specifically with AHLVs which occur within the Site Boundary showing a map of relevant Areas of Higher Landscape Value (AHLVS) within the Local Plan area and the policies that apply to those.
Local Policy (England)	
City of Sunderland Core Strategy and Development Plan 2015-2033 (Adopted 2020)	NE1 – Green and Blue Infrastructure • To maintain and improve the Green Infrastructure Network through enhancing, creating and managing multifunctional

Relevant Legislation	Relevance to the Assessment
(Sunderland City Council, 2020).	greenspaces and bluespaces that are well connected and the wider countryside, development should: - vii. protect and enhance landscape character. NE3 -Woodlands/hedgerows and trees • To conserve significant trees, woodlands and hedgerows, development should follow key principles to guide the design of development where effects to ancient woodland, veteran/aged trees and their immediate surroundings may be possible; • Retain, protect and improve woodland, trees subject to Tree Preservation Orders (TPOs), trees within conservation areas, and 'important' hedgerows as defined by the Hedgerows Regulations 1997. NE4 – Greenspace • Protect, conserve and enhance the quality, community value, function and accessibility of greenspace and wider green infrastructure, especially in areas of deficiency identified in the council's Greenspace Audit and Report. NE9 – Landscape character • Protect, conserve and enhance the varied landscape character (including seascape development). • Proposals should: - demonstrate a high quality of landscape design, implementation and management as an integral part of the new development; - demonstrate how the following elements identified in the city's Landscape Character Assessment are considered; - the key characteristics, assets, sensitivities and vulnerabilities; - measures to protect and/or enhance the landscape in the relevant locality. • Development that causes a significant adverse impact on the distinctive landscape characteristics of an area will not be supported unless the impacts are clearly and demonstrably outweighed by the benefits of the proposed development. NE10 - Heritage coast • The council and partners will seek to conserve, protect and enhance the natural and cultural integrity of the defined Heritage Coast, supporting the Magnesian Limestone landscape and seascape, biodiversity and quality of inshore waters, whilst accounting for the economic and social needs

Relevant Legislation	Relevance to the Assessment
	of adjacent coastal communities. In line with the Heritage Coast Management Plan. NE11 - Creating and protecting views • All development should take account of views into, out of and within the development; • Development should be designed to preserve or enhance key local views and vistas (as identified in the council's Landscape Character Assessment), and create new public views where possible; • Consideration should be given to views of significant buildings, including views to and from heritage assets, and views within landscapes which are more sensitive to change due to their open, exposed nature and extensive indivisibility from various viewpoints.

9.1.3 Study Area

9.1.3.1 Institute of Environmental Management and Assessment (IEMA) Guidance (IEMA, 2015, 2017) recommends a proportionate EIA focused on the potential likely significant impacts of a development. The LVIA Study Area must therefore be large enough to capture all likely significant impacts. However, not so large that it may be considered disproportionate, if it makes understanding the key impacts of the project more difficult by including extraneous baseline information, and hence receptors that are unlikely to be significantly affected by the project.

9.1.3.2 This is supported by the Landscape Institute (*Guidelines for Landscape and Visual Impact Assessment*, 3rd Edition (GLVIA3)) (Landscape Institute, 2013) (paragraph 3.16) which recommends that "The level of detail provided should be that which is reasonably required to assess the likely significant effects". Paragraph 5.2 also states that "The LVIA Study Area should include the site itself and the full extent of the wider landscape around it which the project may influence in a significant manner".

9.1.3.3 The LVIA Study Area therefore is based on professional judgement which aims to include those areas that are potentially and likely to be significantly affected by the MHPGC Project. This judgement is based on an early understanding of the local landscape character and the scale of the construction and development proposed within the MHPGC Project Scoping Boundary as well as a review of LVIA Study Areas for similar projects including onshore elements of the Rampion 2, East Anglia TWO and THREE, and Norfolk Vanguard offshore wind farms.

9.1.3.4 The LVIA Study Area will be reviewed and amended in response to the maturing design and assessment process and where appropriate responses to the consultation. This will result in the confirmation of an LVIA Study Area that will be the focus of the LVIA.

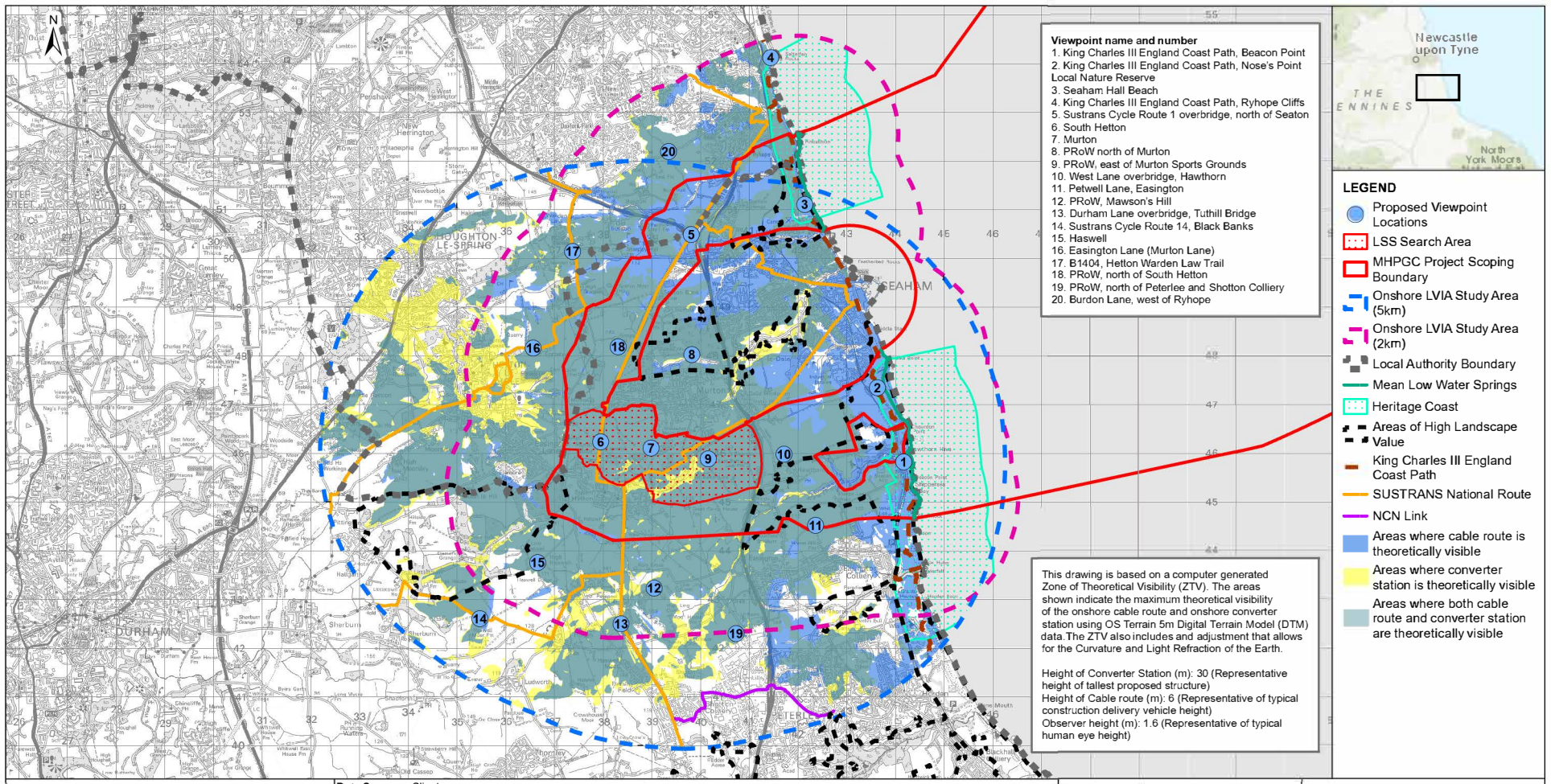
9.1.3.5 The LVIA Study Area is shown in Figure 9.1 and covers the following areas:

- Onshore LVIA Study Area: Landfall and onshore corridor:

- The Onshore LVIA Study Area extends 2km on either side of the onshore part of the MHPGC Project Scoping Boundary, including an area that extends offshore. It is likely to be supported by a small number of elevated, long-distance panoramic viewpoint locations within the wider landscape.

- Onshore LVIA Study Area: Onshore LSS:
  - The Onshore LVIA Study Area extends 5km from the boundary of the LSS Search Area including an area that extends offshore.
- Offshore LVIA Study Area: Offshore cable corridor (specific to offshore construction activities that could affect coastal recreational receptors and nearshore passenger recreational vessels. O&M and decommissioning activities associated with the offshore export cables located below the sea are proposed to be scoped out refer to Table 9.5):
  - The Offshore LVIA Study Area will form part of the MHPGC Project Scoping Boundary extending from the coastline out to 25km offshore (see Figure 9.2). This study area is based on professional experience of similar infrastructure and the potential visibility of offshore construction activities to coastal recreational receptors and nearshore passenger recreational vessels (explained further in paragraph 9.1.5.14).

9.1.3.6 The Onshore and Offshore LVIA Study Areas should be regarded as preliminary at this stage and will be informed by further desk and site-based analysis.



Datum: OSGB 1936
Projection: British National Grid
EPSG Code: 23030
Scale: 1:125,000 @ 255 mm x 149 mm

Data Sources: Client,
Contains OS data © Crown copyright [and database right] [2024]

0 0.5 1 1.5 2 Miles
0 0.5 1 1.5 2 2.5 3 3.5 4 km

Drawing Number:
MVSco-WSPE-XX-XX-FG-OL-00001_S0_1.3

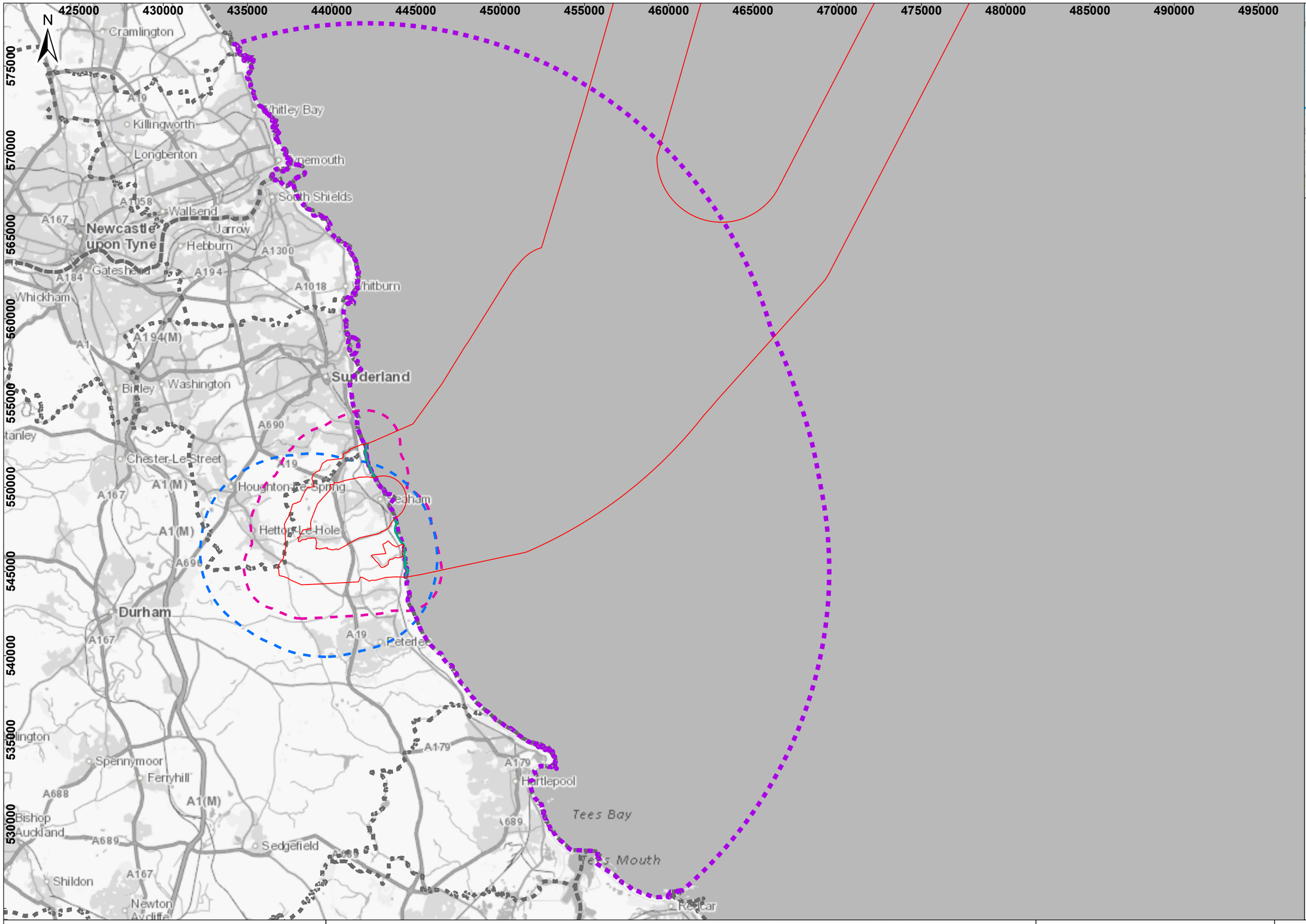
Project Title:
MORVEN HAWTHORN PIT GRID CONNECTION PROJECT

Service Layer Credits: World Topographic Map: Esri, HERE, Garmin, FAO, USGS

Figure 9.1: Landscape and Visual Impact Assessment Study Area

EnBW bp rps
Partners in UK offshore wind
A TETRA TECH COMPANY

VER	DATE	DETAILS	BY	CHECK
01	30/05/24	First Issue	TS	RS
02	09/08/24	Revision	SS	RS



Datum: OSGB 1936
Projection: British National Grid
EPSG Code: 27700
Scale: 1:215,000 @ 255 mm x 149 mm

Data Sources: Client, Natural England, Contains OS data © Crown copyright [and database right] [2024]

0 2 4 6 Miles
0 2 4 6 8 10 km

Drawing Number:
MVSco-WSPE-XX-XX-FG-OL-00002_S0_1.3

Project Title:
MORVEN HAWTHORN PIT GRID CONNECTION PROJECT

Service Layer Credits: World Topographic Map: Esri, HERE, Garmin, FAO, NOAA, USGS
OS Open Greyscale: Contains OS data © Crown Copyright and database right 2020

Figure 9.2: Offshore Landscape and Visual Impact Assessment Study Area of the Morven Hawthorn Pit Grid Connection Project Scoping Boundary Extended from the Coastline Out to 25km Offshore

Partners in UK offshore wind

VER	DATE	DETAILS	BY	CHECK
01	30/05/24	First Issue	TS	RS
03	07/08/24	Revision	SS	RS

9.1.4 Data Sources

9.1.4.1 A range of desk based and site-based data will be sourced to undertake the LVIA, covering landscape and visual receptors and other relevant cumulative development. The desk based data will be drawn from the Ordnance Survey (OS) and a range of document sources, in addition to the relevant planning policy documents outlined in Table 9.1: The principal desk based data sources used to inform this section are set out in Table 9.2.

Table 9.2: Key Sources of Landscape and Visual Impact Assessment Data

Title	Source	Year	Author
Landscape Character Studies (England)			
National Character Area (NCA) 15: Durham Magnesian Limestone Plateau	Available at: https://publications.naturalengland.org.uk/publication/8308038?category=587130 Accessed 07.03.2024	2013	Natural England National Character Areas.
County Durham Landscape Character Assessment.	Available at: https://durhamlandscape.info/durham-landscape/county-durham-landscape-character/ Accessed 08.03.2024	2008b	Durham County Council (DCC).
City of Sunderland Landscape Character Assessment, (Land Use Consultants Ltd, 2015).	Available at: https://www.sunderland.gov.uk/media/18573/SD45-City-of-Sunderland-Landscape-Character-Assessment-September-2015-/pdf/SD45_Sunderland_Landscape_Character_Assessment_Sept_2015.pdf?m=636217387622700000 Accessed 08.03.2024	2015	Sunderland City Council (SCC).
Landscape Designations (England)			
Country Parks *Hetton Lyons Country Park.*	https://magic.defra.gov.uk/MagicMap.aspx	2024	Natural England (Defra, 2024).
Ancient Woodland Inventory *Hawthorn Dene.*	https://magic.defra.gov.uk/MagicMap.aspx	2024	Natural England (Defra, 2024).

Title	Source	Year	Author
Ryhope Dene.			
Heritage Coasts *Durham.*	https://magic.defra.gov.uk/MagicMap.aspx	2001	Natural England (Defra, 2024).
Historic England.	https://historicengland.org.uk/listing/what-is-designation/registered-parks-and-gardens/ GIS dataset available at: https://files.planning.data.gov.uk/dataset/park-and-garden.geojson	2024	Historic England.
Areas of High Landscape Value Durham AHLVs	https://durhamlandscape.info/durham-landscape/areas-of-high-landscape-value/ and https://durhamcc-consult.objective.co.uk/kse/folder/52317	2008/2019	Durham County Council.
Access (England)			
King Charles III England Coastal Path.	https://www.nationaltrail.co.uk/en_GB/trails/england-coast-path-north-east/trail-information/ GIS dataset available at: https://environment.data.gov.uk/explore/4006f956-f491-4ca9-ab01-d8c96e873165?download=true	2024	National Trails.
Sustrans National Routes 1 and 70	https://www.sustrans.org.uk/find-a-route-on-the-national-cycle-network/route-1/ and https://www.sustrans.org.uk/find-a-route-on-the-national-cycle-network/route-70/ GIS dataset available at:	2024	Sustrans and National Cycling Network (NCN).

Title	Source	Year	Author
	https://data-sustrans-uk.opendata.arcgis.com/maps/5defd254e78745bfb12d0456abc1bcf1		
Durham Interactive mapping – Public Rights of Way – Definitive Map.	https://maps.durham.gov.uk/OLBasic2/Index.aspx?appid=66	2024	Durham County Council.
Sunderland City Council – Local Access Map.	https://sunderlandcc.maps.arcgis.com/apps/webappviewer/index.html?id=6a420b7b18bb42bca19e337e7d5fc434	2024	Sunderland City Council.
Mapping (England)			
Google Earth Pro.	Aerial Photography and Site Analysis.	2024	Google Earth Pro.
Ordnance Survey.	Mapping and Terrain 5 Digital Terrain Model (DTM) data.	2024	OS.

9.1.5 Baseline Environment

9.1.5.1 Information on the existing landscape resource or baseline conditions included in the LVIA will be collected from local plans, OS maps, and relevant literature, as well as information gathered from LVIA Study Area surveys. The baseline information will be set out as an inventory of the existing landscape resource and will focus on landscape and visual receptors with the most potential to be significantly affected.

Onshore (England)

Landscape Baseline Within the Onshore LVIA Study Areas

9.1.5.2 Within the Onshore LVIA Study Areas, the topography is varied, defined to the west by the undulating higher ground of East Durham Limestone Plateau which reaches 180m above ordnance datum (AOD) at its highest point and the steep scarp slopes, deeply incised by narrow, heavily wooded river valleys further to the east as it transitions to the sea. The landscape is notably open in nature, with few trees and frequent easterly views across the North Sea. The coastline is largely undeveloped, comprising a mixture of shallow bays and headlands, with limestone cliffs and sand or shingle beaches associated with the Durham Heritage Coast and the rocky foreshores of the Northumbria Coast Ramsar Site. Development is limited to the port at the southern fringe of Sunderland and the port and seafront of Seaham, as well as sporadic caravan parks and leisure facilities. Vegetation is notably sparse, with the landscape generally comprising a mixture of semi-regular arable fields, bordered by low hedgerows. Tree cover is very low across the Onshore LVIA Study Areas, with

woodland restricted almost entirely to sheltered river valleys away from salt-laden winds. There are two areas of woodland protected by a TPO within the Onshore LVIA Study Areas (Coop House Wood and woodland along Hawthorn Dene). Whilst there are no major rivers, there are numerous smaller watercourses within the Onshore LVIA Study Areas, many of which have scoured deep incisions, or denes into the landscape as it transitions eastwards from the high limestone plateau towards the sea.

9.1.5.3 The main settlements are Sunderland, Seaham and its suburbs, Murton, Hetton le Hole, Easington, Easington Lane, South Hetton, Houghton le Spring and Peterlee. There are several other smaller settlements and isolated properties within the Onshore LVIA Study Areas. There are no motorways within the Onshore LVIA Study Areas, however there are several other major highways including the A19, A1018, A690 and A182. The Durham Coast Railway Line runs north-south along the coast through the Onshore LVIA Study Areas.

9.1.5.4 The King Charles III England Coast Path is a National Trail that runs north-south along the coast through the Onshore LVIA Study Areas. There is an extensive network of DCC and SCC PRoW. There are a small number of CRoW Access areas present within the Onshore LVIA Study Areas. There are also two NCN including the Sustrans Cycle Route 1 and 70, and a network of DCC and SCC local cycle routes within the Onshore LVIA Study Areas. Mowbray Park Registered Park and Garden is located within the urban setting of Sunderland at the edge of the Onshore LVIA Study Areas to the north.

Landscape Character Within the Onshore LVIA Study Areas

9.1.5.5 At a national level, the Onshore LVIA Study Areas are overlapped by the Durham Magnesian Limestone Plateau NCA (NCA 15).

9.1.5.6 At a local level, the Onshore LVIA Study Areas are overlapped by several different landscape character assessments, as follows:

- County Durham Landscape Character Assessment:
  - East Durham Limestone Plateau;
  - Wear Lowlands.
- City of Sunderland Landscape Character Assessment:
  - 2. Coalfield Lowland Terraces;
  - 5. Coalfield Villages;
  - 6. Limestone Escarpment;
  - 7. Clay Plateau;
  - 8. Coastal Limestone Plateau;
  - 9. Urban Limestone Plateau;
  - 11. Limestone Coast.

Designated Landscapes Within the Onshore LVIA Study Areas

9.1.5.7 There are no nationally designated landscapes (National Parks and National Landscapes (former Areas of Outstanding Natural Beauty)) within the Onshore LVIA Study Areas.

9.1.5.8 The Durham Heritage Coast extends along much of the coastline to the north and south of Seaham.

9.1.5.9 There a five locally designated AHLV – Durham within the Onshore LVIA Study Areas as illustrated in Figure 9.1.

Visual Baseline Within the Onshore LVIA Study Areas

9.1.5.10 A Zone of Theoretical Visibility (ZTV) has been undertaken for the MHPGC Project as presented in Figure 9.1. The ZTV is calculated using ArcGIS software to generate the ZTV of the MHPGC Project. In the absence of fixed locations for the LSS and cable corridor, a maximum design scenario (MDS) parameter approach has been taken, where heights are applied to the boundaries of the LSS Search Area and MHPGC Project Scoping Boundary, which are then overlaid on a DTM. Computer generated 'lines of sight' are created to show what can be seen from this point thus revealing the places from which any part of the MHPGC Project may be theoretically visible.

9.1.5.11 The ZTV has been produced in such a way as to show a MDS in a 'bare ground' situation (i.e. no allowance for screening from buildings or vegetation).

9.1.5.12 For the purposes of this chapter, the following parameters have been considered:

- terrain data is OS Terrain 5 DTM;
- maximum parameter height for the LSS Search Area is 30m;
- maximum parameter height for the onshore cable, assumes the height of a typical Heavy Goods Vehicle (HGV) delivery vehicle is 6m;
- the ZTV assumes a viewer height of 1.6m above ground level, which represents an average human eye height.

9.1.5.13 The principal visual receptors that are overlapped with the ZTV within the Onshore LVIA Study Areas include:

- Settlements:
  - Ryhope;
  - Seaham and its suburbs;
  - Murton;
  - Hetton le Hole;
  - South Hetton;
  - Easington Lane;
  - Easington;
  - Rainton Bridge;
  - East Rainton;
  - Haswell;
  - Houghton le Spring.
- Transport routes:
  - the A19 which runs north-south between Peterlee and Sunderland;
  - the A1018 which runs north-south along the coast from the north of Seaham to Sunderland;
  - the A690 which runs broadly north-south between Middle Rainton and Sunderland;

- the A182 which runs between Easington and Hetton Le Hole;
- the Durham Coast Line (railway line), which runs north-south along the coast through the Onshore LVIA Study Area;
- there is also a dense network of 'B' class roads and other minor roads.

- Recreational routes:
  - The King Charles III England Coast Path;
  - Sustrans National Route 1;
  - Sustrans National Route 70;
  - Network of DCC and SCC PRoW;
  - Network of DCC and SCC local cycle routes.
- Recreational and tourist destinations:
  - Sharpley Golf Course;
  - Houghton Le Spring Golf Club;
  - Hendon Cliffs and Beach;
  - Ryhope Cliffs and Beach;
  - Seaham Docks and Beach;
  - Chemical Beach;
  - Nose's Point;
  - Blast Beach;
  - Horden Beach;
  - Hawthorn Dene Nature Reserve.

Offshore (England)

Visual Baseline Within the Offshore LVIA Study Area

9.1.5.14 The principal visual receptors relevant for the offshore component within the Offshore LVIA Study Area includes the following:

- Commercial vessels (passenger services only) prevalent in a northwest to southeast orientation along the coast and to/from Seaham and Sunderland. Fishing and cargo vessels are proposed to be excluded from the assessment due to their low sensitivity.
- Coastal recreational receptors with views out to sea including:
  - eastern edge of the settlement of Seaham;
  - the Durham Coast Line;
  - the King Charles III England Coast Path;
  - visitors and recreational water users (paddleboarding, kayaking, canoeing, surfing, swimming) on beaches along the coast including Hendon, Ryhope, Seaham, Chemical, Blast and Horden beaches.

9.1.5.15 Some of the coastal recreational receptors identified above would also have the potential to experience visual impacts as a result of the onshore components, particularly the landfall.

Viewpoint Selection

9.1.5.16 20 viewpoints have been proposed in Table 9.3 to cover a range of receptor locations, considering the following assessment assumptions:

- viewpoints from where there are likely to be significant impacts;
- viewpoints representative of views within the Onshore LVIA Study Area;
- viewpoints representing a range of distances and directions;
- an integrated approach representing several aspects from the same location.

9.1.5.17 The proposed viewpoints have been selected from the ZTV within the Onshore LVIA Study Area. These locations, once agreed, will then be 'ground truthed'. For the avoidance of doubt, if an area on the map is shown to be outside the ZTV then there will be no view of the MHPGC Project from that location.

9.1.5.18 In selecting the viewpoint locations, the following may be noted:

- The NatureScot (former Scottish Natural Heritage) guidance (2017) recognises "the need to limit the list of viewpoints to a reasonable number";
- Over-provision of viewpoints "can be as unhelpful as under-provision" and "may distract attention from where impacts may be significant";
- An appropriate balance must be struck through the LVIA consultation process to agree on a proportionate number of viewpoints;
- Not all receptors require a viewpoint – receptors are still assessed and may refer to representative viewpoints;
- Not all viewpoints require a photomontage – construction works and/or distant viewpoints with no significant impacts may be better illustrated by an annotated photograph only.

Table 9.3: Proposed Landscape and Visual Impact Assessment Viewpoints

Viewpoint Name and Number	GLVIA 3 Viewpoint Type/Receptor	Relevance to Onshore or Offshore Component
1. King Charles III England Coast Path, Beacon Point.	Illustrative[28] - recreational users, adjacent railway users (Durham Coast Line), Durham Heritage Coast.	Onshore and offshore.
2. King Charles III England Coast Path, Nose's Point Local Nature Reserve.	Illustrative – recreational users, and visitors to local nature reserve, Durham Heritage Coast.	Onshore and offshore.
3. Seaham Hall Beach.	Specific[29] – recreational receptors visiting the beach, Durham Heritage Coast.	Onshore and offshore.

[28] Illustrative – Representative of more than one potential receptor type.

[29] Specific – Representative of a single potential receptor type.

Viewpoint Name and Number	GLVIA 3 Viewpoint Type/Receptor	Relevance to Onshore or Offshore Component
4. King Charles III England Coast Path, Ryhope Cliffs	Specific – recreational users along King Charles III England Coast Path, Durham Heritage Coast.	Onshore and offshore.
5. Sustrans Cycle Route 1 overbridge, north of Seaton.	Specific – recreational receptors along the cycle route. Also, illustrative of users of the A19.	Onshore.
6. South Hetton.	Illustrative – residents, recreational users of PRoW.	Onshore.
7. Murton.	Illustrative – residents, recreational users of PRoW.	Onshore.
8. PRoW north of Murton.	Specific – recreational users of PRoW.	Onshore.
9. PRoW, east of Murton Sports Grounds.	Illustrative – residents, recreational users of PRoW.	Onshore.
10. West Lane Overbridge, Hawthorn.	Specific – road users on West Lane overbridge. Also, illustrative of users of the A19.	Onshore.
11. Petwell Lane, Easington.	Illustrative – residents, road users.	Onshore.
12. PRoW, Mawson's Hill.	Specific – recreational users of PRoW.	Onshore.
13. Durham Lane Overbridge, Tuthill Bridge.	Specific – road users. Also, illustrative of users of Sustrans Cycle Route 1/Hasewell to Hart Walkway.	Onshore.
14. Sustrans Cycle Route 14, Black Banks.	Specific – recreational users of cycle route/minor road.	Onshore.
15. Haswell.	Specific – residents.	Onshore.
16. Easington Lane (Murton Lane).	Specific – residents.	Onshore.
17. B1404, Hetton Warden Law Trail.	Illustrative – recreational users, road users.	Onshore.
18. PRoW, north of South Hetton.	Specific – recreational users of PRoW.	Onshore.
19. PRoW, north of Peterlee and Shotton Colliery.	Specific – recreational users of PRoW.	Onshore.
20. Burdon Lane, west of Ryhope.	Specific – road users.	Onshore.

Future Baseline

9.1.5.19 Landscape change is an ongoing process and will continue across the Onshore and Offshore LVIA Study Areas irrespective of whether the MHPGC Project proceeds. Change can arise through natural processes (for example, the maturity of woodlands) and natural systems (for example, river erosion, rising sea water levels) or because of human activity including land use and land management.

9.1.5.20 Both the County Durham Local Plan and Sunderland City Council Core Strategy and Development Plan indicate strategic and economic growth within their boundaries which is likely to affect settlements within the Onshore LVIA Study Areas. Other land management, and consequently landscape character, is dependent on economic and environmental factors including the future impacts of climate change and human adaptation which are difficult to predict at a local level and not a matter for this assessment. It is however likely that mitigation and adaptation in response to changing climate and biodiversity pressures will continue to have an influence on this area in the form of increased renewable energy and other environmental changes such as increased urbanisation and changes to the current levels of woodland.

9.1.5.21 Further information on the future baseline of relevance to the LVIA is provided in Chapter 8.8: Land Use, Tourism and Recreation.

9.1.6 Potential Impacts of the Morven Hawthorn Pit Grid Connection Project

9.1.6.1 In line with the EIA Regulations, the EIA Report/ES for the MHPGC Project will consider those impacts where there is a risk of a likely significant impact only. The following section draws on industry experience and expertise to identify those impact receptor pathways that may potentially lead to a likely significant impact. Where experience and available evidence indicate an impact receptor pathway will not lead to a likely significant impact with regards to the EIA Regulations 2017 the pathway is scoped out from the assessment.

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

9.1.6.3 Viewpoint analysis and site survey, which includes an assessment of sensitivity and magnitude, will be used as part of the assessment to identify those receptors that are most likely to be significantly affected.

9.1.6.4 It is important to note that whilst some impacts can be identified as likely to be significant at this pre-assessment stage, there is the potential for other receptors to be significantly affected and vice versa, subject to evolution in design and further details of the LVIA. As an example, the O&M of the onshore cable is 'scoped in' but it may be scoped out' once further details of the route location are known.

9.1.6.5 The impacts that have been scoped into the assessment are outlined in Table 9.4 together with a description of any additional data collection (e.g. site specific surveys) and supporting analyses (e.g. modelling) that will be required to enable a full assessment of the impacts.

9.1.6.6 Potential impacts scoped out of the assessment are presented in Table 9.5, with justification.

Table 9.4: Landscape and Visual Impacts Proposed to be Scoped into the Morven Hawthorn Pit Grid Connection Project Assessment

*Project phase refers to construction (C), O&M (O) and decommissioning (D)

Activity	Project Phase*			Relevant to Scotland or England	Receptor	Likely Impact	Data Collection and Analysis Required to Characterise the Baseline environment	Summary of Proposed Approach to Assessment
	C	O	D					
Construction Phase								
Onshore LSS /Onshore cable corridor/landfall (England): Land preparation: site clearance and earthworks. Construction activity: including the presence of cranes, people, plant and vehicle movements, contractor's facilities and site access.	✓	×	×	England	Landscape elements within the onshore cable corridor/onshore LSS site e.g. trees, hedges, woodland.	Potential for likely significant impacts assuming some elements cannot be avoided/mitigated. Likely impact could include loss/damage of woodland/tree cover some of which may include high value receptors.	Development of optioneering, targeted site survey, and develop mitigation measures. Use of baseline data source from the Ecology Team covering habitat/vegetation classification and where available tree/woodland survey or important hedgerows, TPO's ancient woodland/veteran trees.	Assess as per Appendix G: LVIA Methodology of the Scoping Report.
				England	Landscape Character.	Potential for likely significant impacts	Development of optioneering,	Local Landscape

Activity	Project Phase*			Relevant to Scotland or England	Receptor	Likely Impact	Data Collection and Analysis Required to Characterise the Baseline environment	Summary of Proposed Approach to Assessment
	C	O	D					
						within and close to the onshore cable corridor and onshore LSS. Likely impact could include alteration of landscape character and key characteristics through the presence of construction activity, including effects on perceptual qualities and characteristics such as 'wildness' or 'tranquillity'.	targeted site survey, and develop mitigation measures and Landscape and Ecology Management Plan (LEMP). Use of baseline data source of landscape character types from NatureScot.	Character Areas (LCA) <2-5km LVIA Study Area and ZTV. Likely to exclude National Character Areas.
				England	Landscape Designations.	Potential for likely significant impacts within and close to the onshore cable corridor and onshore LSS as a result of effects on the special landscape qualities/character underpinning the	Development of optioneering, targeted site survey, and develop mitigation measures and LEMP. Use of baseline reporting Statements of Importance or	Durham AHLVs, Heritage Coast <2-5km LVIA Study Area and ZTV. NatureScot have recently consulted on

Activity	Project Phase*			Relevant to Scotland or England	Receptor	Likely Impact	Data Collection and Analysis Required to Characterise the Baseline environment	Summary of Proposed Approach to Assessment
	C	O	D					
						designation and its integrity.	similar as related to particular national/local landscape designations.	draft Guidance on the Assessment of Effects on Special Landscape Qualities (July 2024) and this may affect the proposed assessment approach.
				England	Settlements/Residents.	Potential for likely significant impacts assuming residents are within approximately 250m of onshore cable corridor with clear views/effects that cannot be mitigated. Likely impact could include alteration/adverse	Development of optioneering, targeted site survey, and develop mitigation measures. Identification of settlement baseline as defined by LDPs. Residential properties defined as those shown on OS 1:25,000 scale map.	Residents <250m of onshore cable corridor/onshore LSS and settlements within 5km LVIA Study Area and ZTV.

Activity	Project Phase*			Relevant to Scotland or England	Receptor	Likely Impact	Data Collection and Analysis Required to Characterise the Baseline environment	Summary of Proposed Approach to Assessment
	C	O	D					
						effects on views and visual amenity experienced from settlements, notably public space/public realm areas within the settlements that would be experienced by residents/visitors.		
				England	Transport and recreational routes.	Potential for likely significant sequential impacts within and close to the onshore cable corridor and onshore LSS. Likely impact could include alteration/adverse effects on views and visual amenity experienced sequentially from transport and recreational routes which may be	Development of optioneering, targeted site survey, and develop mitigation measures and LEMP. Use of baseline OS mapping of transport routes (roads/rail/waterways) and recreational routes from the Core Path Network, Scotland's Great	Receptors within 2-5km LVIA Study Area and ZTV

Activity	Project Phase*			Relevant to Scotland or England	Receptor	Likely Impact	Data Collection and Analysis Required to Characterise the Baseline environment	Summary of Proposed Approach to Assessment
	C	O	D					
						prolonged or affecting key 'gateways' or vistas.	Trails and other promoted routes.	
				England	Visitor/tourist attractions and recreational locations.	Potential for likely significant impacts within the onshore cable corridor and onshore LSS. Likely impact could include alteration/adverse effects on views and visual amenity/visitor experience of the receptor. depending on the particular nature of the receptor and the likely effect.	Development of optioneering, targeted site survey, and develop mitigation measures and LEMP. Use of baseline OS mapping of tourist/recreational destinations that would involve an appreciation of the landscape. Examples include attractions open to the public, picnic sites and popular hill tops. Sources from Visit Scotland and other nationally/locally promoted	Receptors within 2-5km LVIA Study Area and ZTV

Activity	Project Phase*			Relevant to Scotland or England	Receptor	Likely Impact	Data Collection and Analysis Required to Characterise the Baseline environment	Summary of Proposed Approach to Assessment
	C	O	D					
							tourist/recreational sources.	
Operation and Maintenance Phase: Onshore LSS								
Onshore LSS (England): O&M of onshore LSS	×	✓	×	England	Landscape character of LSS site.	Potential for likely significant impacts may be due to the O&M of the onshore LSS. The effect would result in a long-term change to the local landscape of the LSS site	Develop requirements for further baseline data as part of mitigation measures and LEMP – model planting growth rates in 5 Year increments from selected viewpoints.	The assessment will assess the O&M effects against the pre-construction landscape baseline and not the construction phase.
Onshore LSS (England): O&M of onshore LSS.	×	✓	×	England	Landscape elements (e.g. trees, hedges, landscape features).	Potential for likely significant residual impacts remaining from the of the onshore LSS construction phase (including	Develop requirements for further baseline data as part of mitigation measures and LEMP – model planting growth rates in 5	A new pattern of landscape elements will be established because of mitigation

Activity	Project Phase*			Relevant to Scotland or England	Receptor	Likely Impact	Data Collection and Analysis Required to Characterise the Baseline environment	Summary of Proposed Approach to Assessment
	C	O	D					
Implementation of updated landscape design information.						temporary/permanent effects of construction compounds/access), subject to restoration and re-growth of vegetation. Mitigation provided by the implementation of LEMP and the establishment of associated landscaping could also result in beneficial/neutral effects.	Year increments from selected viewpoints.	measures and LEMP. The assessment will assess the O&M effects against the pre-construction landscape baseline and not the construction phase.
				England	Landscape Character within the wider <5km Study Area	As above.	As above.	. LCAs <5km LVIA Study Area and ZTV: A new landscape established because of the mitigation

Activity	Project Phase*			Relevant to Scotland or England	Receptor	Likely Impact	Data Collection and Analysis Required to Characterise the Baseline environment	Summary of Proposed Approach to Assessment
	C	O	D					measures and LEMP. The assessment will assess the O&M effects against the pre-construction landscape baseline.
				England	Landscape Designations within the wider <5km Study Area	As above.	As above.	Durham AHLVs, Heritage Coast <5km LVIA Study Area and ZTV: Natural Sotland (NS) have recently consulted on draft Guidance on the Assessment of

Activity	Project Phase*			Relevant to Scotland or England	Receptor	Likely Impact	Data Collection and Analysis Required to Characterise the Baseline environment	Summary of Proposed Approach to Assessment
	C	O	D					
								Effects on Special Landscape Qualities (July 2024) and this may affect the proposed assessment approach.
				England	Settlements/residents.	Potential for likely significant impacts may be due to the O&M of the onshore LSS. Likely impact could include alteration/adverse effects on views and visual amenity, where effects are not mitigated. Positive or neutral impacts may be likely due to the implementation of	As above.	Residents <250m of onshore cable corridor/onshore LSS and settlements within 5km LVIA Study Area and ZTV. New views were established because of updated

Activity	Project Phase*			Relevant to Scotland or England	Receptor	Likely Impact	Data Collection and Analysis Required to Characterise the Baseline environment	Summary of Proposed Approach to Assessment
	C	O	D					
						LEMP and the establishment of associated landscaping.		design information.
				England	Transport and recreational routes.	As above.	As above.	LCAs <5km LVIA Study Area and ZTV: A new landscape was established because of updated design information.
				England	Visitor/tourist attractions and locations.	As above.	As above.	As above.
Operation and Maintenance Phase: Onshore cable corridor/landfall								
Onshore cable corridor /landfall (England):	×	✓	×	England	Landscape elements (e.g. trees, hedges, landscape features).	Possible residual impacts on landscape elements/patterns	Review requirements for further baseline data as part of	Receptors within the

Activity	Project Phase*			Relevant to Scotland or England	Receptor	Likely Impact	Data Collection and Analysis Required to Characterise the Baseline environment	Summary of Proposed Approach to Assessment
	C	O	D					
O&M of landfall/onshore Cable Corridor.						which may have been permanently disrupted/removed from the onshore cable corridor, subject to design and mitigation.	mitigation measures to ensure avoidance of operational impacts. **The aim will be to scope out where possible as the design matures.**	onshore cable corridor.
Onshore cable corridor /landfall (England): Implementation of updated landscape design information.	×	✓	×	England	Landscape elements (e.g. trees, hedges, landscape features).	Positive or neutral impacts may be likely due to the implementation of LEMP and the establishment of associated landscaping.	Review requirements for further baseline data as part of developing mitigation measures and LEMP – model planting growth rates in 5 Year increments from selected viewpoints where applicable.	A new landscape could be established because of updated design information.
				England	Settlements/residents	Possible residual impacts resulting from loss of landscape elements/features in the view/ongoing	Review mitigation measures to ensure avoidance of operational impacts.	Residents <250m and settlements within 2-5km

Activity	Project Phase*			Relevant to Scotland or England	Receptor	Likely Impact	Data Collection and Analysis Required to Characterise the Baseline environment	Summary of Proposed Approach to Assessment
	C	O	D					
						changes to the view - subject to design and mitigation. Positive or neutral significant impacts may be likely due to the implementation of LEMP and the establishment of associated landscape planting.	**The aim will be to cope out where possible as the design matures.** Develop mitigation measures and LEMP – model planting growth rates in 5 Year increments from selected viewpoints where applicable.	LVIA Study Area and ZTV.
				England	Transport and recreational routes.	As above.	As above.	LCAs within 2-5km LVIA Study Area and ZTV: A new landscape could be established because of updated design information.

Activity	Project Phase*			Relevant to Scotland or England	Receptor	Likely Impact	Data Collection and Analysis Required to Characterise the Baseline environment	Summary of Proposed Approach to Assessment
	C	O	D					
					Visitor/tourist attractions and locations.	As above.	As above.	As above.
	Decommissioning: Onshore LSS							
Onshore LSS (England): Decommissioning activity as per construction period – Restoring site to previous land use.	×	×	✓	England	Landscape elements (e.g. trees, hedges, landscape features).	Positive or neutral significant impacts may be likely due to a new and mature landscape (resulting from the LEMP) and the restoration to previous land use.	Re-survey and review requirements for further baseline data as part of developing an outline strategy for future LEMP/Decommissioning Landscape Plan.	Retain new landscape resulting from updated design information and provide additional landscape in line with the Decommissioning Landscape Plan.
				England	Landscape Character.	As above.	As above.	LCAs <5km LVIA Study Area and ZTV: Retain updated design information

Activity	Project Phase*			Relevant to Scotland or England	Receptor	Likely Impact	Data Collection and Analysis Required to Characterise the Baseline environment	Summary of Proposed Approach to Assessment
	C	O	D					
								and implement a Decommissioning Landscape Plan. The assessment will assess the decommissioning effects against the pre-construction landscape baseline.
				England	Landscape Designations.	As above.	As above.	Durham AHLVs, Heritage Coast <5km LVIA Study Area and ZTV: Retain updated design information

Activity	Project Phase*			Relevant to Scotland or England	Receptor	Likely Impact	Data Collection and Analysis Required to Characterise the Baseline environment	Summary of Proposed Approach to Assessment
	C	O	D					and implement a Decommissioning Landscape Plan. The assessment will assess the decommissioning effects against the pre-construction landscape baseline. NS have recently consulted on draft Guidance on the Assessment of Effects on Special Landscape Qualities (July 2024) and this

Activity	Project Phase*			Relevant to Scotland or England	Receptor	Likely Impact	Data Collection and Analysis Required to Characterise the Baseline environment	Summary of Proposed Approach to Assessment
	C	O	D					
								may affect the proposed assessment approach.
				England	Settlements/residents.	As above.	Re-survey and develop outline strategy for future LEMP/Decommissioning Landscape Plan.	Retain new landscape resulting from updated design information and provide additional landscape in line with a Decommissioning Landscape Plan. The assessment will assess the decommissioning effects against the pre-

Activity	Project Phase*			Relevant to Scotland or England	Receptor	Likely Impact	Data Collection and Analysis Required to Characterise the Baseline environment	Summary of Proposed Approach to Assessment
	C	O	D					
								construction baseline.
					Transport and recreational routes.	As above.	As above.	As above.
					Visitor/tourist attractions and locations.	As above.	As above.	As above.
Construction: Offshore cable corridor								
Offshore cable corridor (England): Construction associated with the offshore cables (primarily related to construction vessels laying the offshore export cable in the nearshore).	✓	×	×	England	Coastal landscape/seascape and visual receptors such as passenger vessels within the offshore and onshore LVIA Study Area.	Although significant impacts are not likely due to the location of cables below the sea, significant impacts could occur during construction, subject to sensitivity of receptor and magnitude (scale/height of development and intervening distance of development from the coastline). Likely	Development optioneering, targeted site survey, and develop mitigation measures. Baseline of relevant on coastal landscape/seascape and visual receptors to be established from ZTV analysis.	Assessment of coastal landscape and visual receptors such as coastal landscape/seascapes and nearshore passenger vessels overlapped by the ZTV.

Activity	Project Phase*			Relevant to Scotland or England	Receptor	Likely Impact	Data Collection and Analysis Required to Characterise the Baseline environment	Summary of Proposed Approach to Assessment
	C	O	D					
						effects from visible offshore construction activity could result in temporary effects on coastal landscape/seascape and visual receptors.		

Table 9.5: Landscape and Visual Receptors Proposed to be Scoped Out of the Morven Hawthorn Pit Grid Connection Project Assessment

Receptor/Impact	Justification
Receptors outside the ZTV (Scotland and England).	All receptors within the LVIA Study Area that are outside the ZTV will have no view of the MHPGC Project and are scoped out.
NCA 15: Durham Magnesian Limestone Plateau (England, not relevant to Scotland).	The scale and nature of the MHPGC Project, relative to the scale of the NCA within which it is located is such that impacts are localised and not likely to significantly affect the character of the landscape.
Operational and decommissioning impacts on landscape receptors in relation to the landfall and onshore cable corridor (England, not relevant to Scotland).	Operational impacts of the landfall and onshore cable corridor on landscape character and designations as there will be no visible elements above ground. Decommissioning impacts of the landfall and onshore cable corridor on landscape character and designations as the cable will be left in situ.
Operational and decommissioning impacts on visual receptors in relation to the landfall and onshore cable corridor (England, not relevant to Scotland).	Operational impacts of the landfall and onshore cable corridor on visual receptors (residents/settlements, transport and recreational routes and tourist/visitor attractions) have the potential to be scoped out as the design matures as there will be no visible structures above ground. Decommissioning impacts of the landfall and onshore cable corridor on visual receptors (residents/settlements, transport and recreational routes and tourist/visitor attractions) as the cable will be left in situ.
Seascape Character Impacts (Scotland and England).	Construction, O&M and decommissioning impacts on seascape character in relation to the onshore and offshore components of the MHPGC Project are scoped out as significant impacts on the key characteristics of the Marine Character Areas (MCA) are unlikely.
Offshore Export Cable (Scotland and England).	O&M and decommissioning activities associated with the offshore export cables located below the sea are scoped out as there will be no visible elements above the sea.
Construction associated with the offshore cables beyond 25km offshore (Scotland and England).	Significant impacts beyond 25km offshore are not likely due to minimal visibility of nearshore works and the transient nature of the offshore cable lay vessel.

9.1.6.7 It is anticipated that all above ground structures onshore will be removed at the end of the operational lifetime, but onshore export cables will be left in situ to minimise the environmental disturbance during decommissioning, including landscape and visual impacts.

9.1.6.8 Although the cables would be underground and not visible following restoration and reinstatement, there remains the possibility of landscape and visual impacts, resulting from the construction works, leading to an ongoing operational impact. For example, the loss of vegetation leading to the opening up a of a view, or the disruption of landscape pattern and character that might be important to a designed landscape or place could result in an ongoing significant impact on the landscape and or visual resource during the operational period. It is recommended that as the design and assessment are developed further, through optioneering and designed in measures, the operational impacts of the landfall and onshore cable on visual receptors have the potential to be scoped out as the design matures, where possible, with the appropriate supporting analysis.

9.1.7 Designed In Measures and Mitigation

9.1.7.1 As part of the MHPGC project design process, several designed in measures (primary and tertiary) will reduce the potential for impacts on landscape and visual receptors (Table 9.6). As there is a commitment to implement these measures, they are considered inherent to the design of the MHPGC Project. The determination of magnitude and significance will assume the implementation of such measures. Some of these measures are considered standard industry practice for this type of development.

9.1.7.2 The requirement for any additional (secondary) mitigation measures will be dependent on the significance of the impacts on landscape and visual receptors. The requirement for and feasibility of any mitigation measures will be consulted upon with statutory consultees throughout the EIA process.

9.1.7.3 Although the measures cannot be fully identified at this stage, the principles proposed to mitigate and reduce potential landscape and visual impacts undertaken as part of the optioneering are outlined below.

Approach to Design and Environmental Measures

9.1.7.4 Landscape and visual assessment work is being undertaken to assist the optioneering and consideration of LSS and route alternatives for the MHPGC Project, within the MHPGC Project Scoping Boundary. This is a key component of the design and environmental measures process and will include use of baseline landscape and visual data, including the location of similar infrastructure and site/field surveys. The design measures will consider the potential to reduce overall landscape and visual impacts as well as the use of other landscape design techniques.

9.1.7.5 Designed in environmental measures in respect of the provisional and then the final LVIA Study Area will involve the sensitive siting and design of the MHPGC Project as part of the ongoing site selection work. The ongoing work will consider constraints and potential impacts relating to physical landscape elements (such as woodlands, trees and hedgerows), and landscape character, landscape designations and visual amenity, together with other environmental and technical constraints. The

sensitivity of the surrounding landscape and of residents, road/rail users, and recreational users of the landscape will be a key consideration in the siting and design of the MHPGC Project within the 'final' LVIA Study Area.

9.1.7.6 An outline landscape strategy (provided as part of the LEMP in relation to the onshore components will be prepared to mitigate the landscape and visual impacts and help to 'fit' or better assimilate the proposed onshore LSS into its landscape setting. The LEMP may include the following:

- advance survey of landscape elements and other environmental receptors;
- retention plans to ensure the protection of particular landscape elements;
- advance landscape works to 'grow' proposed planting as early as possible, where practicable;
- restoration of temporary construction works, (post construction);
- implementation of landscape works which are likely to include earthworks and drainage, fencing/boundary, colour coordination, hard works, soft works/planting and maintenance;
- enhancement works;
- a maintenance period of five years will be implemented to ensure the establishment of proposed landscape planting works;
- a management plan will be implemented to care for the landscape and environmental measures as part of the ongoing operational period.

9.1.7.7 The LVIA proposes to assess the potential landscape and visual impacts of the onshore LSS during the construction period and at Year five post implementation of the landscape planting works.

Table 9.6: Relevant Landscape and Visual Impact Assessment Designed in Measures

Reference Number	Designed in Measures	Justification	Primary or Tertiary
During Construction.			
MM-21	An outline CEMP will be adopted which will include measures to minimise temporary visual disturbance to residential properties and tourists/visitor attractions.	To minimise impacts on visual receptors.	P
MM-39	A lighting design of all temporary and permanent lighting proposed onshore will be developed once contractors are appointed; however, the principles of lighting design will be detailed at the time of application and informed by the joint guidance provided by the Bat Conservation Trust and Institution of	To minimise the impacts of night time lighting during construction and O&M on local residents and protected species.	P

Reference Number	Designed in Measures	Justification	Primary or Tertiary
	Lighting Professionals (2018). The lighting design will take measures to minimise lighting usage, minimise light spill, use most appropriate wave lengths of light and locate lighting in the most appropriate locations.		
MM-54	Where practicable, sensitive sites will be avoided by the temporary and permanent onshore MHPGC Project footprint including Heritage Coasts, AHLV, Ancient Woodland and Registered Parks and Gardens.	To minimise impacts on sensitive receptors and features.	P
MM-55	All temporary construction access and contractor's compounds/laydown areas onshore will be sensitively sited to avoid and/or reduce and mitigate adverse landscape and visual effects. Following construction, these areas will be returned to previous conditions where reasonably possible in line with the measures set out in the Construction Environmental Management Plan (CEMP).	To minimise impacts on sensitive receptors and features.	P
MM-58	Trenchless installation methods will be used where practicable. Further work will be undertaken once the MHPGC Project has been defined in more detail to identify locations where the underground cable could be installed using trenchless installation methods. Trenchless methods will be used at the landfall.	To minimise impacts on sensitive receptors and features.	P
MM-65	Underground cables will be used to connect from the landfall(s) transition joint bay to the MHPGC Project LSS. Cables are typically installed in ducts in a standard buried trench arrangement. This enables soils excavated during construction to be reinstated over the cables, enabling undeveloped agricultural land to return to this use during operation of the MHPGC Project. The use of joint bays along the cable	Enables soils excavated during construction to be reinstated over the cables, enabling undeveloped agricultural land to return to this use during operation of the MHPGC Project. The use of joint bays along the	P

Reference Number	Designed in Measures	Justification	Primary or Tertiary
	route enables disturbance to soils during O&M to be minimised.	cable route enables disturbance to soils during O&M to be minimised.	
MM-66	The working width of the temporary construction corridor will be reduced as far as practicable to avoid or minimise potential environmental effects on sensitive features identified along the onshore cable corridor.	To minimise impacts on sensitive receptors and features.	P
MM-74	The Public Rights of Way Management Plan (ProwMP) will identify appropriate management measures, potentially, including signage, condition surveys and diversions during construction and opportunities taken where possible to provide a diversion of similar or enhanced amenity.	To minimise impacts on users of recreational routes including Public Rights of Way.	P
MM-96	A Soil Management Plan will be implemented which will set out measures in accordance with current industry guidance for sustainable use of soils, including Defra (2009), Construction Code of Practice for the Sustainable Use of Soils on Construction Sites and will set out measures to ensure good practice for handling of topsoil and subsoil in line with the guidance.	To minimise impacts on sensitive receptors and features.	P
MM-100	Vegetation (Trees/Woodland/Hedgerows) will be mapped (Vegetation Retention Plan or similar) to inform the construction works and retained where practicable. Ancient woodland will be retained with a minimum buffer of 25m from any surface construction works (>6m depth from trenchless installation). With regards to other woodland/trees, construction works will be reduced, where practical, to minimise tree loss and ensure protection of root zones. Hedgerows with trees/tree lines (including hedgerows deemed "important" under the Hedgerows	To minimise the loss of and damage to vegetation (Trees/Woodland/ Hedgerows).	P

Reference Number	Designed in Measures	Justification	Primary or Tertiary
	Regulations 1997) which are crossed by the onshore export cable route will be notched (where practicable) to reduce landscape impacts. Vegetation may be coppiced/pruned rather than fully removed to allow access and visibility splays at junctions.		
MM-101	Vegetation removal will be undertaken in line with British Standard (BS) 5837-2012 (Trees in relation to design, demolition and construction) including any root protection measures.	To minimise the loss of and damage to vegetation (Trees/Woodland/ Hedgerows).	T
MM-102	Onshore condition surveys and inspections of vegetation to be retained (trees, hedgerow, woodland) will be undertaken before, during and after the construction phase. If damage has been identified during the construction phase, the damage will be repaired.	To minimise the loss of and damage to vegetation (Trees/Woodland/ Hedgerows).	T
MM-103	The LEMP will be developed to reinstate landscape and ecological elements (e.g. trees, woodland and hedgerows) which have been removed as a result of construction works, including construction compounds and construction access. The LEMP will be developed to mitigate landscape and visual effects and where possible, protect landscape character, key characteristics and elements, and enhance landscape quality through use of sustainable landscape design techniques. In relation to landscape, attention will be given to species selection and landscape patterns within each LCA/habitat type. Trees cannot be planted above the cable, but hedgerows and grassland can be reinstated. The LEMP is likely to include the following measures: • Areas of temporary vegetation loss will be reinstated at the first available planting/seeding season following completion.	To avoid and minimise effects on landscape character and visual receptors.	P

Reference Number	Designed in Measures	Justification	Primary or Tertiary
	• Reinstatement of vegetation will seek to provide landscape enhancement. Opportunities for enhancement will be identified following further evolution of the MHPGC Project design and with stakeholder engagement. All new planting will be subject to a five-year establishment period with appropriate maintenance and ongoing management. The final form of the onshore substation will be finished to a good standard of design, using quality materials and integrated into the surrounding environment through the adoption of a robust, sustainable landscape planting strategy, taking account of the landscape character and related environmental receptors.		
During Operation/Maintenance			
MM-66	The permanent width of the easement for the onshore export cable route will be kept to the minimum width needed for safe access for cable maintenance or replacement purposes during operation of the MHPGC Project.	To minimise impacts on sensitive receptors and features.	P
MM-106	All new planting will be subject to an establishment period with appropriate maintenance and management to a timescale to be agreed as part of the Preliminary Environmental Information Report (PEIR) and ES and will be set out in the LEMP.	To minimise impacts on sensitive receptors and features.	P
During Decommissioning			
MM-1	A decommissioning plan will be prepared for the MHPGC Project in line with the latest relevant available guidance.	To ensure the MHPGC Project is suitably assessed for environmental impacts.	P

9.1.8 Proposed Assessment Methodology

9.1.8.1 The MHPGC project-wide approach to the assessment methodology is set out in Chapter 4: EIA Methodology. However, it is also necessary to set out how this methodology will be applied, and adapted as appropriate, to address the specific needs of the LVIA.

9.1.8.2 The assessment will be undertaken following the Landscape Institute and IEMA (2013) GLVIA3, and other best practice guidance. A full description of the LVIA methodology is provided in Appendix G: LVIA Methodology of the Scoping Report.

Summary of the LVIA Methodology

9.1.8.3 The landscape and visual impacts (and whether they are significant) are determined by an assessment of the nature or 'sensitivity' of each receptor or group of receptors and the nature of the impact or 'magnitude of change' that will result from the MHPGC Project. The evaluation of sensitivity takes account of the value and susceptibility of the receptor to the MHPGC Project. This is combined with an assessment of the magnitude of change which takes account of the size and scale of the proposed change, the geographical extent, and the duration of that change. By combining assessments of sensitivity and magnitude of change, a level of landscape or visual impact can be evaluated and determined.

9.1.8.4 The resulting level of effect is described in terms of whether it is significant or not significant and the type of impact is described as either direct or indirect; temporary or permanent (reversible); cumulative; and beneficial, neutral or adverse.

9.1.8.5 The period for the assessment covers the construction period of the MHPGC Project, their subsequent O&M and decommissioning. The assessment will also include the implementation and establishment of embedded landscape measures which are likely to overlap with the construction and or O&M periods.

9.1.8.6 The landscape and visual assessment involve a combination of quantitative and qualitative assessment and wherever practicable a consensus of professional opinion will be sought through consultation, internal peer review, and the adoption of a systematic, impartial, and professional approach.

Determining the Significance of Effects

9.1.8.7 A matrix presented in Table 9.7 is used as a guide to illustrate the LVIA process. In line with the emphasis placed in GLVIA3 upon the application of professional judgement, an overly mechanistic reliance upon a matrix is avoided through the provision of clear and accessible narrative explanations of the rationale underlying the assessment made for each landscape and visual receptor. Such narrative assessments provide a level of detail over and above the outline assessment provided by use of the matrix alone. Wherever appropriate, cross references will be made to baseline figures and/or to photomontage visualisations to support the rationale. The matrix, as presented in Table 9.7 should therefore be considered as a guide and any deviation from this guide will be clearly explained in the assessment rationale.

Table 9.7: Evaluation of Landscape and Visual Impacts

Magnitude of Change	Landscape and Visual Sensitivity			
	High	**Medium**	**Low**	**Very Low**
High	Substantial	Major	Moderate	Not used
High-Medium	Substantial	Major to Moderate	Moderate to Minor	
Medium	Major	Moderate	Minor	
Medium-Low	Major to Moderate	Moderate to Minor	Minor	
Low	Moderate	Minor	Negligible	
Low-Very Low	Moderate to Minor	Negligible	Negligible	
Very Low	Minor	Negligible	Negligible	
Zero	None/No View			

9.1.8.8 Significant landscape and visual effects are highlighted in bold and shaded in dark grey in Table 9.7 and relate to all those impacts that result in a 'Substantial', 'Major' or a 'Major to Moderate' level of effect. In some circumstances, 'Moderate' levels of effect (shaded light grey also have the potential, subject to the assessor's professional opinion, to be considered as significant and these exceptions are also highlighted in bold and will be explained as part of the assessment, where they occur. White or un-shaded boxes in Table 9.7 indicate a non-significant effect.

9.1.9 Potential Cumulative Impacts

9.1.9.1 Cumulative impacts with the Morven Offshore Wind Array Project and the second grid connection project in the Branxton area Southeast Scotland will be considered, together with cumulative impacts with other developments, where relevant.

9.1.9.2 The cumulative impact assessment will follow the approach outlined in Chapter 4: EIA Methodology, of this Scoping Report.

9.1.10 Potential Inter-related Effects

9.1.10.1 The EIA will consider inter-related effects arising from the MHPGC Project, across their own phases (project lifetime) and different effects on one receptor in one phase (receptor led). The EIA will consider inter-related effects of multiple impacts from the construction, O&M and decommissioning phases of the MHPGC Project, affecting one receptor. Inter-related effects will be assessed through consideration of all effects on a receptor, considering both spatial and temporal overlap, within the MHPGC Project. This will ensure that the MHPGC Project is appropriately considered within the EIA and in line with Chapter 4: EIA Methodology.

9.1.11 Potential Transboundary Impacts

9.1.11.1 There are no potential transboundary impacts identified by the landscape and visual impact assessment for the MHPGC Project. This is due to any likely significant impacts being experienced locally, rather than a wider geographic scale.

9.2 Human Health

9.2.1 Introduction

9.2.1.1 This chapter of the Scoping Report identifies the human health receptors of relevance to the Morven Hawthorn Pit Grid Connection Project (hereafter referred to as 'MHPGC Project') and considers the potential impacts arising from the construction, operation and maintenance (O&M), and decommissioning of the MHPGC Project. This scoping chapter adopts a proportionate approach to only those impacts with potential to result in likely significant effects and therefore scopes out other impacts where there is evidence that the effects are not likely to be significant.

9.2.1.2 The potential for the MHPGC Project to change population health outcomes may arise from various health pathways, and the health assessment will draw inputs from the residual effect conclusions of other Environmental Impact Assessment (EIA) topic chapters, including Chapter 7.3: Water Quality; Chapter 7.8: Commercial Fisheries; Chapter 7.8: Shipping and Navigation; Chapter 8.1: Ground Conditions and Contamination; Chapter 8.5: Traffic and Transport; Chapter 8.6: Onshore Noise and Vibration; Chapter 8.7: Onshore Air Quality; Chapter 8.8: Land Use, Tourism and Recreation; Chapter 9.1: Landscape and Visual Chapter; 9.4: Socio-Economics and population. The health chapter will also be informed by the MHPGC Project-wide scheme description and consultation.

9.2.2 Policy and Legislation

9.2.2.1 This section identifies the relevant legislation, policy and other documentation that will inform the assessment of likely significant impacts with respect to human health. Further information on policies relevant to the EIA and their status is provided in Chapter 2: Policy and Legislation, of the Scoping Report.

9.2.2.2 Table 9.8 lists the legislation relevant to the assessment of impacts on air quality receptors.

Table 9.8: National Legislation Relevant to Human Health (England)

Legislation Description	Relevance to Assessment
Environment Act 2021 (HM Government, 2021).	
The Environment Act 2021 established The Office for Environmental Protection (OEP) as a public body in England and Northern Ireland. The OEP sets targets and takes enforcement action to prevent, or mitigate, serious damage to the natural environment or to human health. This includes reducing adverse impacts on public health. The OEP objective (OEP, 2022) is for environmental law (including EIA legislation) and its implementation to be well designed and delivered, so that positive	The MHPGC Project has the potential for impacts on human receptors covered by the Environment Act.

Legislation Description	Relevance to Assessment
outcomes for the environment and people's health and wellbeing are achieved.	
The AQS Regulations 2010 (HM Government, 2010).	
Sets out statutory health protection standards on ambient air quality	The MHPGC Project has the potential for impacts on human receptors covered by the Regulations.
The Health and Social Care Act 2012.	
Outlines the responsibilities of Local Authorities regarding public health duties and the involvement of Integrated Care Boards (ICBs) in planning local healthcare services (HM Government, 2012).	The MHPGC Project has the potential for impacts on human receptors covered by the Act.
The Environment Act 1995 (HM Government, 1995).	
Sets provisions for protecting certain environmental conditions of relevance to health in the UK.	The MHPGC Project has the potential for impacts on human receptors covered by the Act.
The Environmental Protection Act 1990 (HM Government, 1990).	
Covers contaminated land and the control of emissions (including dust, noise and light) that may be prejudicial to health or a nuisance.	The MHPGC Project has the potential for impacts on human receptors covered by the Act.
The Public Health (Control of Disease) Act 1984 (HM Government, 1984).	
Relates to disease control and establishing of port health authorities.	The MHPGC Project has the potential for impacts on human receptors covered by the Act.
Health and Safety at Work Act 1974 (HM Government, 1974).	
Primary piece of legislation covering occupational health and safety in Great Britain.	The MHPGC Project has the potential for impacts on human receptors covered by the Act.
Bathing Water Regulations 2013.	
Safeguards public health and clean bathing waters (UK Statutory Instruments, 2013).	The MHPGC Project has the potential for impacts on human receptors covered by the Regulations.
The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017.	
Sets out a commitment to protecting water bodies, including bodies of water designated as recreational waters (The Secretary of State and the Welsh Ministers, 2017).	The MHPGC Project has the potential for impacts on human receptors covered by the Regulations.

Legislation Description	Relevance to Assessment
International Convention for the Prevention of Pollution from Ships (MARPOL) 1973 (International Maritime Organisation, 1973).	
Sets out regulations aimed at preventing and minimising pollution from ships.	The MHPGC Project has the potential for impacts on human receptors covered by the Convention.

9.2.2.3 Table 9.9 lists the national planning policy relevant to the assessment of the impacts on air quality.

Table 9.9: Relevant National Policy Relevant to Human Health (England)

Relevant Policy	Relevance to the Assessment
Overarching NPS for Energy (NPS EN-1) (Department for Energy Security and Net Zero, 2023a).	
Sets out the UK Government's policy for the delivery of major energy infrastructure. Section 4.4 regarding Health acknowledges the benefits of new energy infrastructure on health, and also potential negative impacts of construction of such infrastructure. It includes requirements for consideration when assessing health impacts, including cumulative impacts and mitigation.	The construction of the MHPGC Project has the potential to result in air quality impacts. For the MHPGC Project air quality emissions, including dust, are associated with construction activities, combustion sources from construction plant equipment and construction traffic.
NPS for Renewable Energy Infrastructure (NPS EN-3) (Department for Energy Security and Net Zero, 2023c).	
Provides the primary policy for decisions regarding nationally significant renewable energy infrastructure including offshore wind infrastructure.	The EIA will be undertaken in line with the Policy Statement.
NPS for Electricity Networks Infrastructure (NPS EN-5) (Department for Energy Security and Net Zero, 2023b).	
Provides the primary basis for decisions regarding electricity networks infrastructure, including substations.	The EIA will be undertaken in line with the Policy Statement.
National Planning Policy Framework (Department for Levelling Up, Housing & Communities, 2023).	
Sets out government's planning policies for England. Paragraph 92 states "Planning policies and decisions should aim to achieve healthy, inclusive and safe places which:	The EIA will be undertaken in line with the Framework.

Relevant Policy	Relevance to the Assessment
a) promote social interaction, including opportunities for meetings between people who might not otherwise come into contact with each other – for example through… street layouts that allow for easy pedestrian and cycle connections; b) are safe and accessible, so that crime and disorder, and the fear of crime, do not undermine the quality of life or community cohesion – for example through the use of…pedestrian and cycle routes, and high quality public space; and c) enable and support healthy lifestyles, especially where this would address identified local health and wellbeing needs – for example through the provision of safe and accessible green infrastructure, sports facilities, local shops, access to healthier food, allotments and layouts that encourage walking and cycling."	
North East Inshore and North East Offshore Marine Plan June 2021 (Marine Management Organisation, 2021).	
Provides a framework that will shape and inform decisions over how the areas' waters are developed, protected and improved over the next 20 years.	The EIA will be undertaken in line with the Marine Plan.
Sunderland Core Strategy and Development Plan 2015-2033 (Sunderland City Council, 2020).	
A policy framework which guides and shapes development in Sunderland for the next 18 years and sets the parameters for growth.	The EIA will take into consideration the priorities under the Plan.
Sunderland Healthy City Implementation Plan 2020-2030 (Sunderland City Council, 2021).	
Sets the health and wellbeing priorities for Sunderland City including an action plan how these priorities will be achieved.	The EIA will take into consideration the priorities under the Plan.
County Durham Plan (Durham County Council, 2020).	
Sets out a plan to guide the future development of County Durham to improve the lives of its existing and future residents.	The EIA will take into consideration the priorities under the Plan.

Relevant Policy	Relevance to the Assessment
Durham County Council Joint Local Health and Wellbeing Strategy (JLHWS) 2023-28 (Durham County Council, 2023).	
Sets out the health and wellbeing priorities for the local district of County Durham.	The EIA will take into consideration the priorities under the Strategy.

Guidance

- Institute of Environmental Management and Assessment (IEMA) 2022 guidance on health in EIA series, effective scoping (Pyper *et al.*, 2022a) and determining significance (Pyper *et al.*, 2022b). Practitioner guidance on the coverage of human health in EIA for England, Wales, Scotland, Northern Ireland and the Republic of Ireland. This includes methods for determining population health sensitivity, magnitude and significance. This is the key methods citation.
- Institute of Public Health (IPH), Guidance, Standalone Health Impact Assessment and health in environmental assessment (Pyper *et al.*, 2021) sets current good practice for the assessment of human health in EIA, including assessment methods.
- International Association for Impact Assessment (IAIA) and European Public Health Association (EUPHA). A reference paper on addressing human health in EIA (Cave *et al.*, 2020)
- International Association for Impact Assessment. Health Impact Assessment International Best Practice Principles, (Winkler *et al.*, 2021) confirms the application of health impact assessment (HIA) principles when undertaking health in EIA.
- Public Health England (PHE), Health Impact Assessment in spatial planning (Public Health England, 2020). The guidance confirms that where EIA is undertaken the requirements for HIA should be met through the EIA health chapter.
- PHE, Advice on the content of Environmental Statements (ES) accompanying an application under the Nationally Significant Infrastructure Planning (NSIP) Regime (PHE, 2021). Guidance to assist applicants preparing an ES as part of their NSIP submission.
- The Department for Environment Food and Rural Affairs (Defra) Environmental Improvement Plan 2023 (Defra, 2023) amends the national $PM_{2.5}$ standards.

9.2.3 Study Area

9.2.3.1 Some of the MHPGC Project is located offshore, thus remote from the nearest mainland receptor population. For most offshore determinants of health, there is therefore not a localised population impact around which a study area can be defined. The closest population is on the coast of Sunderland. Offshore elements of the MHPGC project have been scoped out of the human health assessment as described below and in Table 9.14.

9.2.3.2 For most of the human health effects the relevant study areas are onshore. The local human health effects will be determined by the site of the landfall location, onshore cable corridor and Land Substation (LSS). The landfall is expected on the coast south of Sunderland; the cable corridor and the LSS are expected in the local authorities of Sunderland and County Durham. The Human Health Study Area will be confirmed when the project design is finalised.

9.2.3.3 The following areas comprise the Human Health Study Area, illustrated in Figure 9.3:

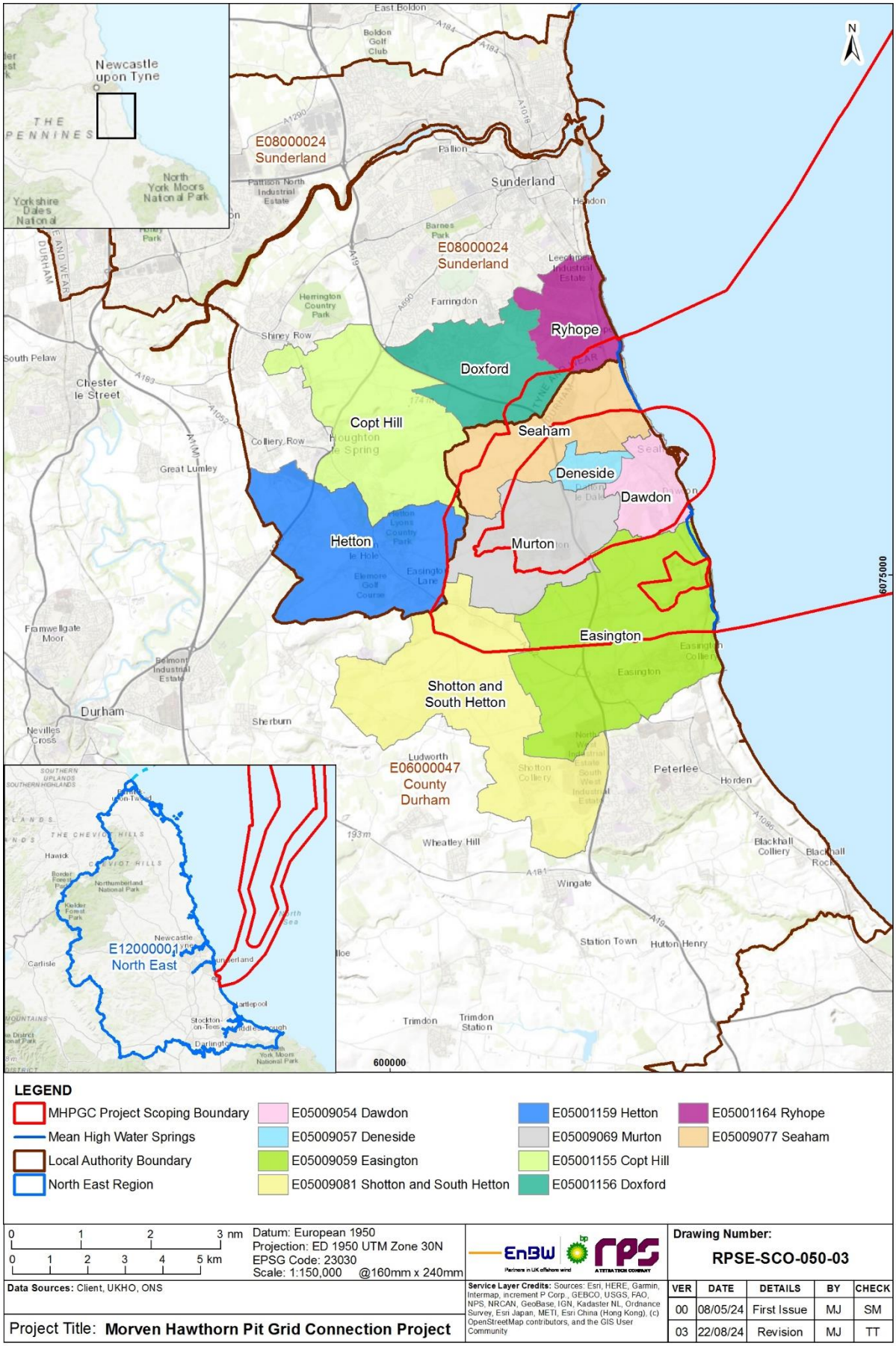
- The site specific population is defined using the following wards:
  - For the landfall location.
- E05009054 Ryhope and E05009057 Seaham if north of Seaham;
- E05009059 Easington if south of Seaham:
  - For the onshore cable corridor (if north of Seaham):
    (i) E05001164 Ryhope.
- E05001156 Doxford;
- E05009054 Dawdon;
- E05009057 Deneside;
- E05001155 Copt Hill and;
- E05009077 Seaham:
  - For onshore cable corridor (if south of Seaham):
    (i) E05009059 Easington and.
- E05009081 Shotton and South Hetton:
  - For Land Substation:
    (i) E05009069 Murton.
- E05001159 Hetton;
- The local population is defined using the district areas of:
  (i) Sunderland metropolitan borough.
- County Durham local government district;
- The regional population is defined using the area of North East;
- The national area is England.

9.2.3.4 Areas of higher deprivation including the Lower Super Output Areas (LSOAs) of County Durham 018F and County Durham 021G, and Sunderland 036D in the expected LSS area; and County Durham 018B and County Durham 018D in the expected landfall area will also be considered in the assessment for Human Health (Ministry of Housing, Communities & Local Government, 2019).

9.2.3.5 The following population groups are present in the Human Health Study Areas and will be considered:

- the ‘general population’ including residents, workers, service providers, and service users;

- the ‘vulnerable group population’ including potential vulnerability due to young age, older age, low income, poor health status, social disadvantage, restricted access, or geographic proximity to the Project’s activities.



LEGEND

- MHPGC Project Scoping Boundary
- Mean High Water Springs
- Local Authority Boundary
- North East Region
- E05009054 Dawdon
- E05009057 Deneside
- E05009059 Easington
- E05009081 Shotton and South Hetton
- E05001159 Hetton
- E05009069 Murton
- E05001155 Copt Hill
- E05001156 Doxford
- E05001164 Ryhope
- E05009077 Seaham

0 1 2 3 nm
0 1 2 3 4 5 km

Datum: European 1950
Projection: ED 1950 UTM Zone 30N
EPSG Code: 23030
Scale: 1:150,000 @160mm x 240mm

Drawing Number: RPSE-SCO-050-03

Data Sources: Client, UKHO, ONS

Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

Project Title: **Morven Hawthorn Pit Grid Connection Project**

VER	DATE	DETAILS	BY	CHECK
00	08/05/24	First Issue	MJ	SM
03	22/08/24	Revision	MJ	TT

Figure 9.3: Human Health Study Area

9.2.4 Data Sources

9.2.4.1 The following data sources will be consulted as part of the EIA baseline.

Table 9.10: Health Baseline Data Sources

Title	Source	Year	Author
National (England)			
Public Health indicators, England (Fingertips resource).	https://fingertips.phe.org.uk/profile/health-profiles.	2024	OHID.
Small area health mapping (Local Health).	https://www.localhealth.org.uk/#view=map12&c=indicator.	2019	OHID.
Small area deprivation mapping (Index of Multiple deprivation).	https://dclgapps.communities.gov.uk/imd/iod_index.html.	2019	Ministry of Housing, Communities & Local Government.

9.2.5 Baseline Environment

Onshore (England)

9.2.5.1 This section sets out a high level overview of the human health receptors in the vicinity of the MHPGC Project Scoping Boundary at landfall (England) based on desktop data sources. The baseline data will be reviewed and amended as the MHPGC Project develops.

Human health baseline

Table 9.11: Population, 2022

(Source: Office for National Statistics (ONS, 2024a)

Indicators	Murton Ward (Site Specific)	Sunderland (Local)	County Durham (Local)	North East (Regional)	England (National)
General Health					
Very good or good health %.	74.5	76.7	77.6	78.1	82.2
Fair health %.	16.7	15.6	15.2	14.9	12.7

Indicators	Murton Ward (Site Specific)	Sunderland (Local)	County Durham (Local)	North East (Regional)	England (National)
Very bad or bad health %.	8.8	7.8	7.3	7.0	5.2
Life Expectancy					
Healthy Life expectancy at birth for males (year).	n/a	56.1	58.8	59.1	63.1
Healthy Life expectancy at birth for females (year).	n/a	56.9	59.9	59.7	63.9
Preventable Mortality					
Under 75 mortality rate for all causes considered preventable (per 100, 000).	n/a	246.7	224.1	215.4	171.4

9.2.5.2 Table 9.11 shows key public health indicators that may be associated with differential effects to the local study area population due to the MHPGC Project. The indicators show the general state of health and the extent to which there are already pressures on the population's health.

9.2.5.3 A representative ward (Murton) with the highest level of deprivation in the site specific Human Health Study Area has been selected and used as worst case scenario for the health baseline profile at scoping stage. Accordingly, health baseline indicators at ward and local authority level are compared against regional and national averages. Full baseline statistics at small area level including ward level will be set out in the Preliminary Environmental Information Report (PEIR) assessment for Human Health. The following baseline has been extracted on the 16th of March 2024 and the 10th of June 2024 from the Office for National Statistics (ONS, 2024a, 2024b)

9.2.5.4 Considering general health in the site specific Human Health Study Area, the majority of the population reported to be in very good or good health, consistent with the national averages. 74.5% of people in Murton ward reported to be in good to very good health, which is lower than the regional average of 78.1% and the national average of 82.2%. 16.7% of the population reported to be in fair health and 8.8% reported to be in bad or very bad health which is higher than the national averages of 12.7% for fair health and 5.2% for bad to very bad health.

9.2.5.5 Similarly, in the local Human Health Study Area, the majority of the population reported to be in very good or good health with less than 10% reporting to be in bad to very bad health. 76.7% of people in Sunderland and 77.6% of people in County Durham reported to be in good to very good health respectively, which are both similar to the regional average of 78.1% and slightly lower than the national average

of 82.2%. Sunderland has a proportion of 15.6% of people who reported to be in fair health and County Durham has a proportion of 15.2% of people who reported to be in fair health. This is slightly higher than the regional average of 14.9% and the national average of 12.7%. Only 8% of the population reported to be in bad to very bad health in Sunderland and 7% in County Durham which are both slightly higher than the national average of 5.2% and similar to the regional average of 7%.

9.2.5.6 Health life expectancy at birth for males and females, (i.e. the average number of years a person can be expected to live in full health) is lower in both Sunderland and County Durham than the national average. Sunderland has a health life expectancy of 56.1 years and County Durham has a life expectancy of 58.8 years respectively, which are both slightly lower than the regional average of 59.1 years and the national average of 63.1 years

9.2.5.7 The under 75 mortality rate from causes that are considered preventable is worse in Sunderland and County Durham than the national average. Sunderland has an under 75 mortality rate from causes considered preventable of 246.7 per 100,000 which is higher than the regional average of 215.4 per 100,000 and the national average of 171.4 per 100,000. County Durham has a rate of 224.1 per 100,000 which is also higher than the regional average and the national average.

9.2.5.8 Using deprivation as a health resilience indicator, Deprivation Mapping shows pockets of deprivation within the Human Health Study Area including County Durham 018F, Sunderland 036D, County Durham 021G LSOAs in the expected LSS area, and County Durham 018B and County Durham 018D in the expected landfall area. These areas of deprivation fall in the coastal area of Sunderland and County Durham Districts.

Vulnerable groups including social disadvantage equality considerations.

9.2.5.9 Relevant protected characteristics are listed in Table 9.12 to consider the potential any disproportionate effects that may arise due to the distribution of such characteristics within the population. Protected characteristics not shown in Table 9.12 have been reviewed and are not considered to have relevant links to health outcomes that may be influenced by the MHPGC Project.

Table 9.12: Relevant Protected Characteristics

Source: Office for National Statistics (ONS, 2024a, 2024b)

	Murton Ward (Site Specific)	Sunderland (Local)	County Durham (Local)	North East (Regional)	England (National)
Sex					
Male %	48.9	48.5	48.9	48.9	51.0
Female %	51.1	51.5	51.1	51.1	49.0
Age					

	Murton Ward (Site Specific)	Sunderland (Local)	County Durham (Local)	North East (Regional)	England (National)
% age 0 to 15	18.0	17.5	16.9	17.1	18.5
% age 16 to 64	61.6	61.9	61.8	61.9	62.9
% aged 65 and over	20.4	20.5	21.3	20.4	18.6
Long-term health problem or disability					
Disabled under the Equality Act: Day-to-day activities limited a lot or little %	25.5	23.5	22.9	21.1	17.3
Not disabled under the Equality Act: Has long-term physical or mental health condition but day-to-day activities are not limited %	6.5	6.7	7.2	7.1	6.8
Not disabled under the Equality Act: No long-term physical or mental health conditions %	67.9	69.8	69.8	71.5	75.9
Lower Income					
Income Deprivation (%)	17.6	19.2	16.5	17.3	12.9
Language proficiency					
Population who cannot speak English well or at all (%)	0.4	0.5	0.3	0.6	1.7
Ethnicity					
Asian, Asian British or Asian Welsh %	0.9	3.0	1.5	3.7	9.6
Black, Black British, Black Welsh, Caribbean or African %	0.1	1.0	0.3	1.0	4.2
Mixed or Multiple Ethnic groups %	0.7	0.9	0.9	1.3	3.0
White %	98.1	94.6	96.8	93.0	81.0
Other ethnic group %	0.2	0.5	0.4	1.0	2.2

Site Specific Human Health Study Area (Representative Ward)

9.2.5.10 The proportion of people aged 0 to 15 years in Murton ward is 18.0% which is slightly higher than the regional average of 17.1% and similar to the national average of 18.5%. The population aged 16 to 64 in Murton is 61.6% which is similar to the regional average of 61.9% and slightly lower than the national average of 62.9. Murton has a proportion of old aged people of 20.4% which is similar to the regional average of 20.5% and slightly higher than the national average of 18.6%.

9.2.5.11 Considering disability and limitations in daily activities, the proportion of disabled people who are limited in their day-to-day activities in Murton is 25.5%, which is relatively higher than the regional average of 21.1% and the national average of 17.3%. 6.5% of people in Murton have reported a long-term physical or mental condition which does not limit them, which is slightly lower than both the regional average of 7.1% and the national average of 6.8%. The proportion of people with no disability or long-term condition in Murton is 67.9% which is lower than the regional average of 71.5% and the national average of 75.9%.

9.2.5.12 Income deprivation is higher in Murton ward compared to the national average. The proportion of people in income deprivation in Murton is 17.6% which is similar to the regional average of 17.3% and significantly higher than the national average of 12.9%.

9.2.5.13 Considering language proficiency, the proportion of the population in Murton who cannot speak English well or at all is 0.4% which is slightly lower than the regional average of 0.6% and significantly lower than the national average of 1.7%.

9.2.5.14 In terms of ethnic background, the majority of the population in Murton are white, consistent with the regional and national averages. The proportion of people from a white ethnic background in Murton is 98.1% which is higher than both the regional average of 93.0% and national average of 81.0%. The proportion of people who are from minority ethnic backgrounds is much lower in Murton compared to regional and national averages, with the largest group (0.9%) being those from Asian, Asian British or Asian Welsh ethnic backgrounds, which is much lower than regional (3.7%) and national (9.6%) averages.

District Human Health Study Area

9.2.5.15 The proportion of people aged 0 to 15 years is 17.5% in Sunderland and 16.9% in County Durham which are both similar to the regional average of 17.1% and slightly lower than the national average of 18.5%. Similarly, the population aged 16 to 64 in Sunderland is 61.9% and 61.8% in County Durham which are both similar to the regional average of 61.9% and slightly lower than the national average of 62.9%. The proportion of old aged people in Sunderland is 20.5% and 21.3% in County Durham, which are similar to the regional average of 20.4% and slightly higher than the national average of 18.6%.

9.2.5.16 The majority of the district Human Health Study Area population reported no disability or long-term condition. Within both Sunderland and County Durham, 69.8% of people have no disability or long-term condition, which is slightly lower than the regional average of 71.5% and the national average of 75.9%. Sunderland

has a proportion of disabled people who are limited in their day-to-day activities of 23.5% and County Durham has a proportion of 22.9% which are both higher than the regional average of 21.1% and the national average of 17.3%. Of those who are not disabled but reported a long-term condition which does not limit them, Sunderland has a proportion of 6.7% and County Durham has a proportion of 7.2% which are similar to the regional average of 7.1% and the national average of 6.8%.

9.2.5.17 Income deprivation is notably higher in the local authorities of Sunderland and County Durham compared to the national average. Sunderland has a proportion of people in income deprivation of 19.2% which is higher than the regional average of 17.3% and the national average of 12.9%. County Durham has a proportion of income deprivation of 16.5% which is slightly lower than the regional average of 17.3% and higher than the national average of 12.9%

9.2.5.18 Considering language proficiency, Sunderland has a proportion of the population who cannot speak English well or at all of 0.5% and County Durham has a proportion of 0.3% which are both slightly lower than the regional average of 0.6% significantly lower than the national average of 1.7%.

9.2.5.19 The majority of the Human Health Study Area population are of a white ethnic background, consistent with the regional and national averages. The proportion of people from a white ethnic background in Sunderland is 94.6% and in County Durham is 96.8%, which are both higher than the regional average of 93.0% and the national average of 81.0%. The proportion of people who are of Asian, Asian British or Asian Welsh ethnic background in Sunderland is 3.0% which is similar to the regional average of 3.7% and significantly lower than the national average of 9.6%. County Durham has a proportion of 1.5% of people who are of Asian, Asian British or Asian Welsh ethnic background which is lower than the regional average of 3.7% and the national average of 9.6%.

9.2.5.20 The groups listed in Table 9.12 will be considered in the human health assessment including the potential for social disadvantage.

9.2.6 Potential Impacts of the Morven Hawthorn Pit Grid Connection Project

9.2.6.1 A range of potential impacts on human health have been identified, which may give rise to likely significant effects during the construction, O&M, and decommissioning phases of the MHPGC Project.

9.2.6.2 The impacts that have been scoped into the assessment as having the potential to give rise to likely significant effects are outlined in Table 9.13, with a description of any additional data collection and supporting analyses that will be required to enable a full assessment of the impacts.

9.2.6.3 The potential impacts that are scoped out of the assessment as there is no potential for them give rise to likely significant effects, and justification for their exclusion, are listed in Table 9.14.

Table 9.13: Impacts Proposed to be Scoped in to the Morven Hawthorn Pit Grid Connection Project Assessment for Human Health

*Project phase refers to construction (C), O&M (O) and decommissioning (D).

Categories	Wider Determinants of Health	Relevant to Scotland or England	Project Phase			Justification (including consideration of embedded mitigation measures)	Data Collection and Analysis Required to Characterise the Baseline Environment for the EIA	Summary of Proposed Approach to Assessment
			C	O	D			
Social environment.	Transport modes, access and connections.	England	✓	×	×	Onshore (England) The impacts arising from construction of any new or amended highway junctions and from changes in traffic flow have been scoped in. There is the potential that construction works (construction site activities as well as vehicle traffic associated with construction activities) may disrupt local vehicle traffic (private and public transport) as well as active travel routes (pedestrians and cyclists). Consideration will be given to the potential for significant population health effects due to changes in: routine or emergency health related journey travel times; access to health promoting goods and services; community severance.	No new surveys. Use of existing public health data sources. Literature and policy review.	Qualitative assessment informed by quantitative analysis in the EIA Report/ES chapters: Traffic and Transport; Shipping and Navigation.
	Open space, play and leisure.	England	✓	✓	✓	Onshore (England) Construction and decommissioning works may lead to temporary disruption of access to public rights of way (PRoW) and open spaces,	No new surveys. Use of existing public health data sources.	Qualitative assessment informed by quantitative

Categories	Wider Determinants of Health	Relevant to Scotland or England	Project Phase			Justification (including consideration of embedded mitigation measures)	Data Collection and Analysis Required to Characterise the Baseline Environment for the EIA	Summary of Proposed Approach to Assessment
			C	O	D			
						potentially affecting recreational activities. Impacts arising from changes to access to PRoW or open space are scoped in. Temporary construction disruption of access to green and blue open space is scoped in. This includes considering the need for any temporary or permanent provision for alternative space or access. This also includes any potential impacts to nearshore recreation for onshore populations, (e.g. bathing, sailing and other water sports) are scoped in. During O&M, there is a potential for impacts to PRoW and access to publicly accessible land, depending on final locations of substations and converter stations. Therefore, this issue has been scoped in and will be reassessed at PEIR/ES stage when further information is available.	Literature and policy review.	analysis in the EIA Report/ES chapter: Land Use, Tourism and Recreation; Other Sea Users, Marine Infrastructure and Communications.
Economic environment.	Employment and income.	England	✓	✗	✓	Onshore (England) The construction and decommissioning of onshore infrastructure such as the cable corridor will generate opportunities for	No new surveys. Use of existing public health data sources.	Qualitative assessment informed by quantitative

Categories	Wider Determinants of Health	Relevant to Scotland or England	Project Phase			Justification (including consideration of embedded mitigation measures)	Data Collection and Analysis Required to Characterise the Baseline Environment for the EIA	Summary of Proposed Approach to Assessment
			C	O	D			
						temporary construction employment. The health chapter of the EIA Report/ES will consider the potential population health effects of direct and indirect employment, including opportunities to enhance benefits for local and vulnerable groups.	Literature and policy review.	analysis in the EIA Report/ES chapters: Socio-economics; Commercial fisheries.
Bio-physical environment.	Air quality.	England	✓	×	✓	Onshore (England) The potential effects resulting from emissions to air, including dust emissions and other pollutants, such as emissions from construction traffic will be considered in the health chapter. The health chapter will be informed by the air quality modelling undertaken for the MHPGC Project. United Kingdom (UK) statutory limits, (i.e. health protection standards), will be used as a benchmark. The potential for non-threshold health effects of some air pollutants will be discussed and taken into account.	No new surveys. Use of existing public health data sources. Literature and policy review.	Qualitative assessment informed by the EIA Report/ES Chapter on Air Quality.
	Water quality.	England	✓	×	✓	Onshore (England)	No new surveys. Use of existing public health	Qualitative assessment informed by the

Categories	Wider Determinants of Health	Relevant to Scotland or England	Project Phase			Justification (including consideration of embedded mitigation measures)	Data Collection and Analysis Required to Characterise the Baseline Environment for the EIA	Summary of Proposed Approach to Assessment
			C	O	D			
						Pollution of surface water or groundwater bodies which are subsequently used as a potable source could result in human effects. The potential health impacts resulting from emissions to water, including run-off or spillages from construction areas to ground or surface water are scoped in.	data sources. Literature and policy review.	EIA Report/ES Chapter: Water Resources and Flood Risk.
	Land quality.	England	✓	✗	✓	Onshore (England) The potential effects of the MHPGC Project on land and soil, including historic contamination disturbance and spillages from construction and decommissioning areas will be considered in the health chapter.	No new surveys. Use of existing public health data sources. Literature and policy review.	Qualitative assessment informed by the EIA Report/ES Chapter: Ground Conditions and Contamination.
	Noise and vibration.	England	✓	✓	✓	Onshore (England) The noise effects resulting from noise emissions and vibration during construction of the MHPGC Project, are scoped in. The potential operational noise effects of the Land Substation are scoped in to consider the potential for a population health effect.	No new surveys. Use of existing public health data sources. Literature and policy review.	Qualitative assessment informed by the EIA Report/ES Chapter: Onshore Noise and Vibration.

Categories	Wider Determinants of Health	Relevant to Scotland or England	Project Phase			Justification (including consideration of embedded mitigation measures)	Data Collection and Analysis Required to Characterise the Baseline Environment for the EIA	Summary of Proposed Approach to Assessment
			C	O	D			
						The health chapter will be informed by the noise and vibration assessment of changes to daytime and night time noise.		
	Understanding of Risk (Risk Perception).	England	×	✓	×	Onshore (England) In line with good practice, public understanding of risk in relation to operational electromagnetic field (EMF) are scoped in. The assessment will provide reassurance on the safety of the electrical infrastructure and avoid/reduce any widespread community concern that could affect mental health. This includes considering the potential for mental health effects and how these can be avoided or reduced through provisions of timely and non-technical information on how actual health risks are mitigated.	No new surveys. Use of existing public health data sources. Literature and policy review.	Qualitative assessment informed by relevant evidence from literature and professional expertise.

Table 9.14: Impacts proposed to be scoped out of the Environmental Assessment for Human Health

Impact	Justification
Health related behaviours- physical activity.	**Onshore (England)** Temporary disruption of access to PRoW and open spaces during construction and decommissioning as well as permanent disruptions during O&M; potentially affecting recreational activities and physical activity levels will be considered under 'Open space, leisure and play' as described in Table 9.13. **Offshore** As for onshore.
Health related behaviours- risk taking behaviour.	**Onshore (England)** Issues of community health behaviours being detrimentally affected by the presence of the construction and operational workforce are scoped out. This reflects the expectation of a relatively small onshore workforce, which is expected to have a high proportion of workers from the regional area. The issue of communicable illness, including in relation to COVID-19 is noted but scoped out. The MHPGC Project will operate appropriate measures to safeguard the project workforce and the public in line with Government guidance of the day, including in relation to vessel crews. Risks are similar to other routine construction and shipping activities. **Offshore (Scottish and English waters)** Issues of community health behaviours being detrimentally affected by the presence of the workforce are scoped out. The workforces comprise those based aboard vessels and those based at the ports. Those aboard vessels may be multinational professionals travelling back to their usual place of residence on a rotational basis. This may involve temporary accommodation, (e.g. in a hotel close to the port or other travel hub), the night following disembarking and the night prior to reembarking. This is usual practice. Extended periods of leave spent within port, or other UK, communities is not expected. The port workforces are assumed to be predominantly existing residents within the regional area, commuting to work and returning home between shifts.
Health related behaviours- diet and nutrition.	**Onshore (England)** Effects on population diet are scoped out. Any loss of farmland, or its reduced access or compaction, that reduces productivity are not expected to have the potential to affect population health through changes in the availability or price of healthy foods. Port activities are neither expected to require agricultural land take, nor disrupt food related production or transport.

Impact	Justification
	Offshore (Scottish and English waters) Potential effects on diet due to impacts to commercial fisheries have been considered. The changes are not considered likely to affect availability or price of food to a degree that could affect population health.
Economic Environment-employment and Income.	**Onshore (England)** There are not anticipated to be employment opportunities during O&M to an extent that would result in significant population health effects. This issue is therefore scoped out. The project's supply chain would be expected to operate appropriate policies that safeguard against significant population challenges to equality, health and safety, for both workers and, as appropriate, the public. These issues are scoped out. The project would operate appropriate employment equality policies but is not expected to influence how employment affects family structures and relationships in local populations. Occupational working conditions include risks that are appropriately managed through health and safety policies and practices. Project activities are not expected to differ from industry norms. These issues are scoped out. **Offshore (Scottish and English waters)** The construction and decommissioning of offshore infrastructure is likely to generate some temporary employment opportunities, and whilst the public health benefit of this is noted, these activities are not anticipated to be of a nature, scale or duration that can result in significant effects to population health. O&M of the MHPGC Project, as detailed above for onshore, is not anticipated to generate employment opportunities offshore to an extent that would result in significant population health effects. These issues are therefore scoped out.
Economic Environment-education and training.	**Onshore (England)** Whilst the MHPGC Project could support upskilling and career development in relation to its workforces, this is not on a scale with the potential for significant population level effects. This issue is therefore scoped out. A large influx for workers, including those bringing families, is not expected, so changes to educational capacity or quality are unlikely and are scoped out. **Offshore (Scottish and English waters)** As for onshore.

Impact	Justification
Social Environment-housing.	**Onshore (England)** Housing related issues are scoped out. No new housing is proposed. The workforce will have housing requirements, but it is expected that a high proportion will be resident in the regional area or would be based aboard their vessels unless travelling to their usual place of residence. Any temporary accommodation requirements would be met through usual capacity for such activities around ports. There is not considered to be a significant effect associated with changes in the availability of housing. Health effects associated with housing are therefore scoped out on the basis of the anticipated capacity in the local housing market. **Offshore (Scottish and English waters)** As for onshore.
Social Environment-relocation.	**Onshore (England)** Neither onshore works nor port activities would involve compulsory land purchases of homes or community facilities. This issue is scoped out. **Offshore (Scottish and English waters)** As for onshore.
Social Environment-open space, leisure and play.	**Offshore (Scottish and English waters)** Offshore infrastructure and construction activities associated with the MHPGC Project is not expected to change recreational or leisure opportunity on a scale that could affect population health. This issue is scoped out.
Social Environment-transport modes, access, and connections.	**Onshore (England)** Once operational, the MHPGC Project infrastructure is expected to have minimal implications for road transport, with activity limited to checks and maintenance. It is unlikely that there would be the potential for significant population health effects due to changes in: routine or emergency health related journey travel times; access to health promoting goods and services; community severance; or road safety. This issue is scoped out during O&M. **Offshore (Scottish and English waters)** The potential impact of changes in shipping access to the mainland during construction and decommissioning of the MHPGC Project are scoped out on the basis that no major shipping routes are expected to be affected. During O&M, offshore infrastructure and activities associated with the MHPGC Project are not expected to change marine access on a scale that could affect population health. This issue is scoped out.

Impact	Justification
Social Environment-community safety.	**Onshore (England)** The MHPGC Project requires skilled technical roles. There are not anticipated to be community safety or security issues associated with worker behaviour in ports or communities. The MHPGC Project would operate appropriate safeguarding and modern slavery policies. The potential for widespread actual or perceived crime that could affect population health is unlikely. This issue is therefore scoped out. Where surface excavations are undertaken these would be within controlled work areas, including use of appropriate fencing and notifications as required. Best practice measures would be secured through suitable management plans. The risk to the public from accidental injury, (e.g. falls or drowning is scoped out). The potential for widespread actual or perceived crime that could affect population health is unlikely. Electrical risks to the public would be avoided though the design, including fencing of above ground electrical infrastructure. These issues are therefore scoped out. **Offshore (Scottish and English waters)** As for onshore.
Social Environment-community identity, culture, resilience and influence.	**Onshore (England)** Changes in community identity are scoped out. Demographic changes that could affect community identity are not anticipated, as there would not be a large in-migration or out-migration of workers to local communities. Visual impacts of the MHPGC Project are expected to be limited. Onshore infrastructure, including at landfall and the LSS, are not expected to be of a scale of visual impact that could affect population health outcomes. Further commitment on visual screening will be factored into optioneering, and additional detail will be provided at PEIR/ES stage. Transient effects along the onshore export cable corridor, including due to temporary lighting and temporary changes in views, are not expected to influence community identity or disrupt community gatherings. **Offshore (Scottish and English waters)** Visual impacts of construction, O&M and decommissioning activities including lighting, are not expected to be of a nature or scale that could affect population health. This issue is therefore scoped out.
Social Environment-Social participation, interaction and support.	**Onshore (England)** The MHPGC Project will not directly affect land used for community interaction (e.g. meeting places, village greens, community centres, etc.) that promote community voluntary,

Impact	Justification
	social, cultural or spiritual participation. This issue is therefore scoped out. Any indirect impacts on access to such spaces is addressed under the "Transport modes, access and connection" health determinant. **Offshore (Scottish and English waters)** As for onshore.
Bio-physical environment- climate change and adaptation.	**Onshore (England)** Embodied carbon and climate altering pollutant emissions associated with construction, O&M and decommissioning activities of the MHPGC Project are not of a scale to have the potential for population level health effects. This issue is therefore scoped out. **Offshore (Scottish and English waters)** As for onshore.
Bio-physical environment- air quality.	**Onshore (England)** During O&M, the MHPGC Project is not expected to generate onshore air quality emissions, even accounting for non-threshold effects, that could affect onshore populations to a degree that there could be potentially significant effects. This issue is therefore scoped out. **Offshore (Scottish and English waters)** During construction, O&M and decommissioning, the MHPGC Project is not expected to generate offshore air quality emissions, even accounting for non-threshold effects, that could affect onshore populations to a degree that there could be potentially significant effects. This issue is therefore scoped out.
Bio-physical environment- noise and vibration.	**Offshore (Scottish and English waters)** The offshore airborne noise effects to human health during construction, O&M and decommissioning are scoped out. Noise associated with offshore cable laying during construction and decommissioning is not anticipated to be of a nature, scale or duration that is likely to cause significant effects to population health. Operational noise levels are expected to be minimal at onshore locations. Port activities would generate noise but this is not expected to be of a scale, timing or character that differs from existing operational port levels. This issue is therefore scoped out.
Bio-physical environment- water quality or availability.	**Offshore (Scottish and English waters)** Offshore pollutant spills have potential to affect coastal bathing water quality, which can result in toxin exposures through dermal contact and ingestion. However, the project would adopt standard best practice, spill avoidance and response

Impact	Justification
	measures that would be secured through management plans. This issue is scoped out on the basis of the anticipated effectiveness of such measures.
Bio-physical environment- land quality.	**Onshore (England)** O&M activities are unlikely to require excavations or result in land quality related risks to public health. Any risks would be managed through standard best practice contamination discover, avoidance and response measures that would be secured through management plans. This issue is therefore scoped out. **Offshore (Scottish and English waters)** Offshore works at all phases of the MHPGC Project would not affect land quality. Port activities are unlikely to result in public exposures to contaminated soils. Any new or historic contamination that may be mobilised by activities will be managed by existing port consents standard best practice contamination avoidance and response measures. This issue is scoped out.
Bio-physical environment- radiation.	**Onshore (England)** Construction and decommissioning works would not include using, or making changes to, active major electrical infrastructure producing EMF. Relevant public and occupational safeguards, secured through management plans, would be followed for the temporary electrical equipment used. Electric and magnetic fields strength reduce rapidly with distance, often requiring only a few metres separation between the source and receptor, to reach background levels. No ionising radiation sources are proposed. These issues are scoped out. During O&M, the 'actual EMF' risks from electrical infrastructure are scoped out on the basis that the MHPGC Project would adopt the International Commission on Non-ionising Radiation Protection (ICNIRP) (ICNIRP, 1998, 2010) guidelines and Government voluntary Code of Practice on EMF public exposure (Department for Energy Security & Net Zero, 2012). Such considerations are inherent to the detailed engineering considerations of cable specification and routing. Relevant public EMF exposure guideline limits are noted in NPS EN-5 and would be complied with by the project. These guidelines are long standing and have a high safety margin. The levels of exposure that they require would not pose a risk to public health. **Offshore (Scottish and English waters)** Non-ionising radiation effects are scoped out on the basis that offshore electrical infrastructure is not located in proximity to

Impact	Justification
	communities, and that relevant occupational safeguards would be followed. No EMF risk is therefore likely for offshore aspects of the MHPGC Project. No ionising radiation sources are proposed. These issues are scoped out.
Institutional and built environment- health and social care services.	**Onshore (England)** Effects on health and social care are scoped out. The MHPGC Project workforce is assumed to include a high proportion of people who are resident in the regional area. The UK workforce would have the National Health Service (NHS) entitlement irrespective of place of residence. UK workers away from their usual place of residence for a prolonged period would be able to register with local primary healthcare on a temporary basis. This would facilitate NHS funding for their care. It is not expected that a high proportion of workers would move to the area with dependants requiring social care. Any multinational workers are assumed to be covered by health insurance provisions that would allow the NHS to recoup costs to an extent that avoided any significant adverse effect on healthcare services. This is routine practice across industries and sectors. The project will operate appropriate occupation health services. Health protection measures such as screening and immunisations are expected to continue from the workers' usual place of residence. Similarly routine dental appointments are assumed to be with the worker's dental practice close to their usual place of residence. Other health services are not expected to be affected as no large-scale in-migration is expected and the workforce of skilled technical roles would return to their usual places of residence when ashore. This issue is therefore scoped out. **Offshore (Scottish and English waters)** As for onshore, the expectation is that the great majority of healthcare needs of the onshore and offshore workforce will be met either by occupational provision aboard their vessel or by their usual healthcare provider when they return to their usual place of residence during rotation.
Institutional and built environment- built environment.	**Onshore (England)** During construction and decommissioning phase, the potential for the project to affect existing features of the built environment that are supportive of population health has been considered and scoped out. The project would have a relatively low impact, including due to the use of trenchless techniques to avoid surface disruption at road crossings. Similarly, the position of existing services, such as water and sewer systems will be taken into account in planning the export cable corridor and

Impact	Justification
	techniques used. Appropriate diversions would occur to avoid disruption to such services. This issue is therefore scoped out. During O&M phase, the project's infrastructure would have a very limited long-term impact on land use patterns, with the main change relating to the converter stations. Appropriate buffer zones would be maintained between infrastructure and communities and the design is resilient to accidents and disasters. These issues are therefore scoped out. **Offshore (Scottish and English waters)** Offshore utilities disruption is unlikely, and any crossing of existing power or communications cables would be managed to avoid interruption. Appropriate waste management practices would be used, including regard to the International Convention for the Prevention of Pollution from Ships (MARPOL) regulations on waste at sea. Significant population health implications are not anticipated and are scoped out. The MHPGC Project would introduce new elements in the built environment; however, the distance offshore means there is very limited direct impacts on human receptors. Port or offshore operational activities are not considered to have waste management, land use or infrastructure use implications on a scale that could affect population health. These issues are scoped out.
Institutional and built environment- wider societal infrastructure and resources.	**Onshore and Offshore** The MHPGC project (given its transmission of renewable energy) provides a significant benefit to public health through contributing to energy security. However, public health benefits from improvements to wider societal infrastructure is scoped out, on the basis that this is covered in the Morven Offshore Array project. It is therefore not assessed as part of the MHPGC Project to avoid double counting.

9.2.7 Designed In Measures and Mitigation

9.2.7.1 The human health assessment will take as its input the residual effect conclusions of the inter-related technical disciplines. In this regard the health assessment relies on the measures adopted as part of the Project set out in those chapters and does not repeat them. This avoids duplication and keeps the assessment proportionate.

9.2.7.2 The MHPGC Project would adopt the International Commission on Non-ionising Radiation Protection (ICNIRP) (ICNIRP, 1998, 2010) guidelines and Government voluntary Code of Practice on EMF public exposure (Department for Energy Security and Net Zero, 2012)

9.2.8 Proposed Assessment Methodology

9.2.8.1 The wider determinants of health and health inequalities are key considerations when undertaking an assessment of human health as part of EIA.

9.2.8.2 A population health approach will be taken, informed by discussion of receptors within other EIA Report/ES Chapters. For each determinant of health, the human health chapter will identify relevant inequalities through consideration of disproportionate or differential effects between the 'general population' of the Human Health Study Area and effects to the 'vulnerable population group' of that study area.

9.2.8.3 The methodology will use best practice as published by the Institute of Environmental Management and Assessment and relevant HIA and health in EIA guidance, listed in Table 9.15

Table 9.15: Relevant guidance for Human Health Assessment

Guidance	Relevance
IEMA 2022 guidance on health in EIA series, effective scoping (Pyper *et al.*, 2022a) and determining significance (Pyper *et al.*, 2022b).	Practitioner guidance on the coverage of human health in EIA for England, Wales, Scotland, Northern Ireland and the Republic of Ireland. This includes methods for determining population health sensitivity, magnitude and significance. This is the key methods citation.
IPH, Guidance, Standalone Health Impact Assessment and health in environmental assessment, 2021 (Pyper *et al.*, 2021).	Sets current good practice for the assessment of human health in EIA, including assessment methods. This updates the 2009 guidance from the IPH. This guidance for Northern Ireland and Republic of Ireland can be applied more broadly in the UK.
IAIA and EUPHA. A reference paper on addressing Human Health in EIA (Cave *et al.*, 2020).	This international consensus piece informed the IPH 2021 guidance. The publication explains EIA for public health stakeholders and sets out transparent assessment approaches adopted by the IPH.

Guidance	Relevance
International Association for Impact Assessment. Health Impact Assessment International Best Practice Principles, 2021 (Winkler et al, 2021).	Confirms the relationship between HIA and EIA. Confirms the application of HIA principles when undertaking health in EIA.

9.2.8.4 The methods use the World Health Organisation (WHO) definition of health, which states that health is a "*state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity*" (World Health Organization, 1948)

9.2.8.5 The methods use the WHO definition for mental health, which is a "a state of mental wellbeing that enables people to cope with the stresses of life, to realise their abilities, to learn well and work well, and to contribute to their communities" (World Health Organization, 2022)

9.2.8.6 A range of data sources will be collated and analysed in line with good practice guidance. Scientific evidence, baseline data and local health priorities will be referenced. Policy analysis, regulatory standards and consultation themes will also inform the significance conclusions. Magnitude and sensitivity considerations will be reported for each determinant of health, including for the general population and vulnerable groups. A qualitative analysis setting out reasoned conclusions will provide an evidence-based narrative for each determinant of health.

9.2.8.7 Where significant adverse population health effects are identified, including for vulnerable groups, then mitigation will be proposed to avoid or reduce the effects. Mitigation will be secured as part of the Projects' design or development consent. In line with good practice, a proportionate approach will be taken for identifying opportunities to enhance beneficial population health effects, including for vulnerable groups.

9.2.8.8 Where proportionate, monitoring will be proposed and governance described, for example, in relation to any residual significant adverse effects or instances where there is high uncertainty on the efficacy of secured mitigation.

9.2.9 Potential Cumulative Impacts

9.2.9.1 Cumulative effects with the Morven Offshore Wind Array Project and the second grid connection project in the Branxton area Southeast Scotland will be considered, together with cumulative effects with other developments, where relevant.

9.2.9.2 The cumulative effect assessment will follow the approach outlined in Chapter 4: EIA Methodology, of the Scoping Report.

9.2.10 Potential Inter-related Effects

9.2.10.1 The EIA will consider inter-related effects arising from the MHPGC Project, across their own phases (project lifetime) and different effects on one receptor in one phase (receptor led). The EIA will consider inter-related effects of multiple impacts from the construction, O&M and decommissioning phases of the MHPGC Project, affecting one receptor. Inter-related effects will be assessed through consideration

of all effects on a receptor, considering both spatial and temporal overlap, within the MHPGC Project. This will ensure that the MHPGC Project is appropriately considered within the EIA and in line with Chapter 4: EIA Methodology, of the Scoping Report.

9.2.11 Potential Transboundary Impacts

9.2.11.1 There are no potential transboundary impacts from human health from the MHPGC Project. This is due to any likely significant effects being experienced locally, rather than a wider geographic scale.

9.3 Aviation (Military and Civil) and Radar

9.3.1 Introduction

9.3.1.1 This chapter of the Scoping Report identifies the aviation (civil and military) and radar receptors of relevance to the Morven Hawthorn Pit Grid Connection Project (hereafter referred to as 'MHPGC Project') and considers the potential impacts arising from the construction, operation and maintenance (O&M), and decommissioning of the MHPGC Project. This scoping chapter adopts a proportionate approach to only those impacts with potential to result in likely significant effects and therefore scopes out other impacts where there is evidence that the effects are not likely to be significant.

9.3.1.2 The MHPGC Project will be located in Scottish offshore waters (beyond 12 nautical miles (nm) from the Scottish coast) and English offshore and inshore waters. The onshore infrastructure will be located wholly within England.

9.3.1.3 As the MHPGC Project offshore infrastructure will be located below mean sea level there will be no impact to aviation activity, therefore impacts from the offshore MHPGC Project infrastructure are scoped out during construction, O&M and decommissioning.

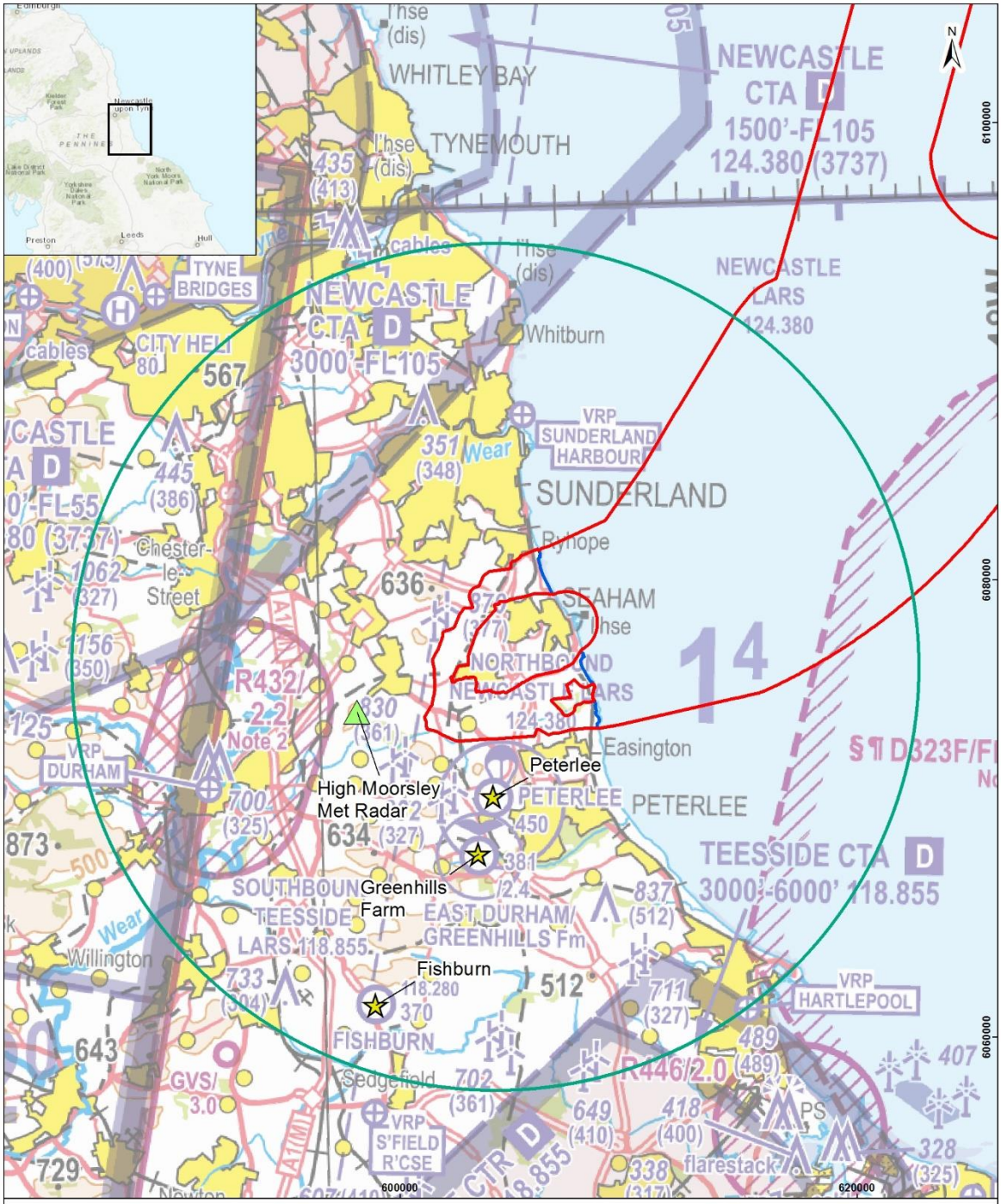
9.3.2 Policy and Legislation

9.3.2.1 This section identifies the relevant legislation, policy and other documentation that will inform the assessment of likely significant impacts with respect to aviation (civil and military) and radar. Further information on policies relevant to the Environmental Impact Assessment (EIA) and their status is provided in Chapter 2: Policy and Legislation, of the Scoping Report.

9.3.2.2 Civil Aviation Authority (CAA) Civil Aviation Publication (CAP) 393: The Air Navigation Order (ANO) (CAA, 2022) sets out the provisions, together with regulations made under the Order. It is prepared for those concerned with day-to-day matters relating to air navigation that require an up to date version of the air navigation regulations and is edited by the legal advisers' department of the CAA. CAP 393 also includes legislation applicable to aerodromes and their operation.

9.3.3 Study Area

9.3.3.1 For the purposes of identifying aviation and radar receptors for the onshore MHPGC Project, an Aviation (Military and Civil) and Radar Study Area has been defined. The MHPGC Project Aviation (Military and Civil) and Radar Study Area is presented in Figure 9.4 and described below.



LEGEND

- MHPGC Project Scoping Boundary
- Mean High Water Springs
- Aviation Study Area
- Met Radar
- Airfield

0 1 2 3 4 5 nm
0 2 4 6 8 10 km

Datum: European 1950
Projection: ED 1950 UTM Zone 30N
EPSG Code: 23030
Scale: 1:275,000 @160mm x 240mm

Data Sources: Client, UKHO. NATS

Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

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VER	DATE	DETAILS	BY	CHECK
00	26/03/24	First Issue	MJ	JL
02	22/08/24	Revision	MJ	TT

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Figure 9.4: Aviation (Military and Civil) and Radar Study Area

9.3.3.2 Radar operates by alternately transmitting a stream of high-power radio frequency pulses and 'listening' to echoes received back from reflective objects within its coverage. The amount of energy that an object reflects back is related to the object's Radar Cross Section which is proportionate to the physical size of the object. Generally, radars employ a rotating antenna which provides 360° coverage subject to terrain and other blocking infringements. The target range is measured based on the overall time taken for the transmitted pulse to arrive back at the receiver. The azimuth of the target is derived from the position of the antenna against a north reference point and where the pulse under consideration is the strongest in signal amplitude.

9.3.3.3 All radars employ processing techniques to reduce or remove targets that are unwanted, for example echoes from birds or fixed structures. These 'unwanted' echoes are commonly known as 'clutter'. One key technique is to identify whether a target is moving or not, this is done through Doppler processing where the phase of the pulse is assessed against the transmitted pulse. If the phases are different, then the target is moving. The radar doppler processing function fitted to most Primary Surveillance Radar (PSR) removes slow speed targets. Doppler filtering is usually set at a threshold of between 40-55 knots.

9.3.3.4 Stationary or near stationary objects are removed from the aviation radar data display during radar signal processing and will therefore not impact aviation PSR systems. As all the surface infrastructure in the onshore MHPGC Project Scoping Search Area will be stationary (apart from the occasional slow movement of cranes), potential effects on aviation radar coverage from aviation (civil and military) PSR are proposed to be scoped out of the assessment.

9.3.3.5 The CAA provide guidance CAP-1096 to crane users which provides instruction that crane users are required to contact all aerodromes whose perimeters are within 10 Nautical miles (nm) of the crane. A 10nm radius buffer centred on the MHPGC Project Scoping Boundary at Dalton-le-Dale (estimated centre point of the MHPGC Project Scoping Boundary) has been utilised to define obstruction effects created using cranes[30] and other infrastructure used during construction, in excess of 10 metres (m) height above ground level (agl). The Aviation (Military and Civil) and Radar Study Area has been defined as the airspace encompassing the MHPGC Project Scoping Boundary plus a 10nm radius buffer as illustrated by the green circle within Figure 9.4.

9.3.4 Data Sources

9.3.4.1 A number of sources were consulted in order to inform this chapter of the Scoping Report, and these will be used to inform the EIA process. These are summarised in Table 9.16. In addition to existing data, the assessment will be informed through aviation stakeholder engagement.

[30] Crane falls into scope if at any point during the planned lifting operation the highest point of the crane structure or load will exceed 10m agl or that of the surrounding structures or trees (if higher). If a crane is located on top of another structure, it is the overall height (structure + crane) agl that is relevant.

Table 9.16: Summary of Desk Top Study Sources used

Title	Source	Year	Author
International/National (UK)			
Document 8168 Ops/611 Procedures for Air Navigation Services Aircraft Operations (PANS-Ops).	International Civil Aviation Authority (ICAO).	2006	ICAO.
CAP 032 United Kingdom (UK) Integrated Aeronautical Information Package (UKIAIP).	CAA.	2024	CAA/NATS.
CAP 168 Licensing of Aerodrome.	CAA.	2022	CAA.
CAP 393 The Air Navigation Order.	CAA.	2022	CAA.
CAP 670 Air Traffic Services Safety Requirements.	CAA.	2019	CAA.
CAP 738 Safeguarding of Aerodromes.	CAA.	2020	CAA.
Civil Aviation Publication (CAP) 1096: Guidance to Crane Users on Aviation Lighting and Notification.	CAA.	2021	CAA.
Ministry of Defence (MoD) United Kingdom Low Flying Handbook.	MoD.	2024	MoD.
Met Office Protecting our Safeguarded Assets.	Met Office.	2024	Met Office.
CAA Visual Flight Rules (VFR) Charts.	NATS.	2023	CAA/NATS.
Distribution of Obstacle Data - Obstacle Notification Overview.	CAA.	2024	CAA.

9.3.5 Baseline Environment

9.3.5.1 The onshore MHPGC Project will be located within the onshore area of the MHPGC Project Scoping Boundary in England. The following sections describe the baseline environment within the MHPGC Project Scoping Boundary, within which the onshore export cables, construction infrastructure, landfall, onshore export cable corridor and Land Substation will be located.

Airspace

9.3.5.2 Data included in Figure 9.4 provides an illustration of the regional airspace construct. The airspace within, above and surrounding the study area is used by both military and civil registered aircraft which observe the airspace rules dependent on the classification of airspace they are operating in as follows:

- Class G uncontrolled airspace: any aircraft can operate in an area of uncontrolled airspace without any mandatory requirement to be in communication with air traffic control (ATC). Pilots of aircraft operating under VFR[31] in Class G airspace are ultimately responsible for seeing and avoiding other aircraft, terrain, and obstructions;
- Controlled Airspace (CAS): all aircraft operating in this airspace must be in receipt of an Air Traffic Service (ATS).

9.3.5.3 The Aviation (Military and Civil) and Radar Study Area Study Area will be located in an area of Class G uncontrolled airspace, which is established from the surface of the Earth up to approximately 19,500 feet (ft). Above this Class G airspace, CAS is established. The Aviation (Military and Civil) and Radar Study Area includes CAS established around Newcastle International Airport to the North (the aerodrome Control Areas (CTA)) and Teesside International Airport to the South (the aerodrome CTA and Control Zone). This airspace is established to provide greater protection to aircraft operating in and out of the airports. To the west of the Aviation (Military and Civil) and Radar Study Area CAS is established at varying levels (with Class G below CAS) for the protection of aircraft descending and climbing into these regional airports.

Aerodromes

9.3.5.4 All known structures with a height of 100m or more above the surface in UK airspace are to be published in relevant aeronautical documents. Details of those obstacles of which the CAA has been notified are published in an electronic file which is updated every 28 days. Temporary obstacles (or changes) of less than 90 days duration will be notified by Notice to Aviators (NOTAM) only. As described in paragraph 9.3.3.5, the CAA provides instruction that crane users are required to contact all aerodromes whose perimeters are within 10nm of a crane.

Meteorological Office Weather Radar

9.3.5.5 The Meteorological Office (Met Office) operate a number of weather radar systems throughout the UK. The High Moorsley weather radar is located within the Aviation (Military and Civil) and Radar Study Area, 1.7nm from the closest boundary of the MHPGC Project Scoping Boundary. It is unlikely that impact will be created; however, confirmation is required from the Met Office.

[31] Visual Flight Rules - A set of regulations under which a pilot operates an aircraft in weather conditions clear enough to allow the pilot to see where the aircraft is going; the pilot must be able to operate the aircraft with visual reference to the ground, and by visually avoiding obstructions and other flying machines.

Military Low Flying

9.3.5.6 Military low flying activities occur in uncontrolled airspace below 2,000ft above mean sea level (amsl) within defined Low Flying Areas (LFA). The Aviation (Military and Civil) and Radar Study Area is located within LFA 12, military low flying will likely occur above and around the MHPGC Project Scoping Boundary. For low flying airspace users operating below 100m and to ensure the safety of airspace users the MoD should be engaged to determine if a temporary structure below 100m in height should be submitted for NOTAM action.

Restricted Airspace

9.3.5.7 There is restricted airspace located within the Aviation (Military and Civil) and Radar Study Area. The facility is known as EGR432 Frankland/Durham, the restriction only applies to helicopters; however, flight inside the airspace (which extends from the surface to an altitude of 2,200ft) is permitted by helicopters operated by or on behalf of a Police Force for any area of the UK. The area is established to prevent certain types of overflights of the prison establishments contained within it. The MHPGC Project Scoping Boundary is located approximately 2.36nm east of the furthest extent of the EGR432 boundary and therefore no impact is expected to occur and is proposed to be scoped out of the assessment.

Military Practice and Exercise Areas

9.3.5.8 There are no Military Practice and Exercise Areas (PEXA) in the Aviation (Military and Civil) and Radar Study Area (Figure 9.4). The closest is the EGD323 complex which is located approximately 5nm offshore from the closest export cable landfall area. The EGD323 complex is utilised for air-to-air combat training. Offshore elements of the MHPGC Project infrastructure will be located below mean sea level therefore, there will be no impact to aviation activity.

9.3.6 Potential Impacts of the Morven Hawthorn Pit Grid Connection Project

9.3.6.1 A range of potential impacts on aviation (military and civil) and radar may give rise to likely significant effects during the construction, O&M, and decommissioning phases of the MHPGC Project.

9.3.6.2 The impacts that have been scoped into the assessment as having the potential to give rise to likely significant effects are outlined in Table 9.17 together with a description of any additional data collection and supporting analysis that will be required to enable a full assessment of the impacts.

9.3.6.3 Potential impacts scoped out of the assessment as there is no potential for them give rise to likely significant effects are presented in Table 9.18, with justification.

Table 9.17: Impacts Proposed to be Scoped into the Morven Hawthorn Pit Grid Connection Project Assessment for Aviation (Military and Civil) and Radar

*Project phase refers to construction (C), O&M (O) and decommissioning (D).

Impact	Project Phase*			Relevant to England or Scotland	Justification	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D				
Use of cranes (above 10m in height) close to airfield flying operation.	✓	×	×	England	As required within CAP 1096: Guidance to Crane Users on Aviation Lighting and Notification. Equipment removed post construction. Remaining above surface infrastructure (electrical substation) less than 30m agl.	Consultation with airfields located within the Aviation (Military and Civil) and Radar Study Area together with those major airfields lying in proximity (Newcastle and Teesside).	The approach to the assessment will be determined based on the outcomes of consultation which will inform significance of potential impact.
Degradation of Met Office weather radar.	✓	×	×	England	It is not known if the weather radar employed by the Met Office removes stationary or slow-moving objects from being processed. Without specific details it is difficult to ascertain affect or otherwise.	Consultation with the Met Office to understand potential for impact.	The approach to the assessment will be determined based on the outcomes of consultation which will inform significance of potential impact.

Impact	Project Phase*			Relevant to England or Scotland	Justification	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D				
Creation of a physical obstacle to low flying aircraft.	✓	×	×	England	The use of cranes and other tall infrastructure may create a physical obstruction of low flying aircraft operating onshore. Equipment removed post construction. Remaining above surface infrastructure (electrical substation) less than 30m agl.	Consultation with the MoD and other potential airspace users to understand potential for impact.	Qualitative assessment informed by consideration of the outcomes of consultation, the provision of an ATS and the rules of the air.

Table 9.18: Impacts Proposed to be Scoped out of the Morven Hawthorn Pit Grid Connection Project Assessment for Aviation (Military and Civil) and Radar

Impact	Justification
Potential impact to users of restricted airspace.	The use of tall infrastructure (maximum 60m agl) within the Aviation (Military and Civil) and Radar Study Area will not restrict helicopter entry and egress from the restricted airspace. The rules of air require pilots operating VFR in Class G airspace to maintain separation from other aircraft, terrain and obstructions.
Potential disruption to military PEXA.	There are no PEXA overlapping with the MHPGC Project Scoping Boundary and therefore the MHPGC Project will not have an impact on any such receptor.
Disturbance as a result of the onshore and offshore cables.	As the MHPGC Project cables will be located below sub-surface there will be no impact to aviation activity, therefore impacts from the cables are scoped out during construction, O&M and decommissioning.

9.3.7 Designed In Measures and Mitigation

9.3.7.1 As part of the project design process, a number of designed in measures (primary and tertiary) will reduce the potential for impacts on Aviation and Radar (Table 9.19). As there is a commitment to implement these measures, they are considered inherent to the design of the MHPGC Project. The determination of magnitude and significance will assume the implementation of such measures. Some of these measures are considered standard industry practice for this type of development.

9.3.7.2 The requirement for any additional (secondary) mitigation measures will be dependent on the significance of the impacts on physical processes receptors. The requirement for and feasibility of any mitigation measures will be consulted upon with statutory consultees throughout the EIA process.

Table 9.19: Designed in Measures of the Morven Hawthorn Pit Grid Connection Project, Relevant to Aviation and Radar

Reference Number	Designed in Measures	Justification	Primary or Tertiary
MM-5	Affected aviation stakeholders will be kept informed of the nature and timing of all phases of the MHPGC Project including construction start and end dates and the maximum height of construction equipment.	Maximum physical onshore physical obstruction from the tallest crane due to size and number of infrastructure above ground level within the MHPGC Project Scoping Boundary.	P

9.3.8 Proposed Assessment Methodology

9.3.8.1 The aviation and radar assessment will follow the methodology set out in Chapter 4: EIA Methodology, of the Scoping Report. Specific to the aviation and radar EIA, the guidance documents listed in Table 9.16 will also be considered.

9.3.9 Potential Cumulative Impacts

9.3.9.1 Cumulative effects with the Morven Offshore Wind Array Project and the second grid connection project in the Branxton area Southeast Scotland will be considered, together with cumulative effects with other developments, where relevant.

9.3.9.2 The cumulative effect assessment will follow the approach outlined in Chapter 4: EIA Methodology, of the Scoping Report.

9.3.10 Potential Inter-related Effects

9.3.10.1 The EIA will consider inter-related effects arising from the MHPGC Project, across their own phases (project lifetime) and different effects on one receptor in one phase (receptor led). The EIA will consider inter-related effects of multiple impacts from the construction, O&M and decommissioning phases of the MHPGC Project, affecting one receptor. Inter-related effects will be assessed through consideration of all effects on a receptor, considering both spatial and temporal overlap, within the MHPGC Project. This will ensure that the MHPGC Project is appropriately considered within the EIA and in line with Chapter 4: EIA Methodology, of the Scoping Report.

9.3.11 Potential Transboundary Impacts

9.3.11.1 In aviation and airspace terms, the world is divided into Flight Information Regions for the allocation of responsibility for the provision of ATS to aircraft. The Aviation (Military and Civil) and Radar Study Area is located solely within the London Fisheries Industry Representative (FIR) which is regulated by the UK CAA. The distance of the MHPGC Project Scoping Boundary from international boundaries has identified that there is no potential for transboundary impacts upon aviation (military and civil) and radar due to construction, O&M and decommissioning impacts of the MHPGC Project.

9.4 Socio-Economics

9.4.1 Introduction

9.4.1.1 This chapter of the Scoping Report identifies the socio-economics receptors of relevance to the Morven Hawthorn Pit Grid Connection Project (hereafter referred to as 'MHPGC Project') and considers the potential impacts arising from the construction, operation and maintenance (O&M), and decommissioning of the MHPGC Project. This scoping chapter adopts a proportionate approach to only those impacts with potential to result in likely significant effects and therefore scopes out other impacts where there is evidence that the effects are not likely to be significant.

9.4.2 Policy and Legislation

9.4.2.1 This section identifies the relevant legislation, policy and other documentation that will inform the assessment of likely significant impacts with respect to socio-economics (Table 9.20). The policy documents listed are the latest available data at the time of preparing this Scoping Report but will be reviewed and updated at the time of preparing the Socio-economic Chapter of the MHPGC Project Environmental Impact Assessment (EIA) Report/Environmental Statement (ES). Further information on policies relevant to the EIA and their status is provided in Chapter 2: Policy and Legislation.

Table 9.20: Relevant Legislation and Policy

Relevant Legislation	Relevance to the Assessment
National (UK)	
Updated National Policy Statement (NPSs) (Department for Energy Security and Net Zero, 2023)	Provides the context on United Kingdom (UK) Government policy on energy infrastructure, including the contribution of energy infrastructure to the economy.
National Planning Policy Framework (Ministry of Housing, Communities and Local Government, 2021)	Provides the context on UK Government planning policies, including how socio-economic issues should be taken into account.
British Energy Security Strategy (Department of Business, Energy and Industrial Strategy, 2022)	Provides the context on UK Government energy policy, including how the energy sector contributes to the economy.
Net Zero Strategy: Build Back Greener (Department of Business, Energy and Industrial Strategy, 2021)	Provides the context on UK Government policy on the economic benefits of Net Zero policies.
National (Scotland)	
National Strategy for Economic Transformation (Scottish Government, 2022)	Provides the context on Scottish Government economic policy, including the contribution of the renewable energy sector and energy infrastructure.

Relevant Legislation	Relevance to the Assessment
National Performance Framework (Scottish Government, 2018)	Provides the context on Scottish Government overall aims, including socio-economic outcomes.
National Planning Framework 4 (Scottish Government, 2023)	Provides the context on Scottish Government planning policies, including how socio-economic issues should be taken into account.
Offshore Wind Policy Statement (Scottish Government, 2020)	Provides the context on Scottish Government policy on offshore wind, including economic opportunities.
Sectoral Marine Plan for Offshore Wind (Scottish Government, 2020)	Provides the context on Scottish Government on marine development, including the economic opportunities associated with the renewable energy sector and energy infrastructure.
Draft Energy Strategy and Just Transition Plan (Scottish Government, 2023)	Provides the context on Scottish Government energy policy, including how the energy sector contributes to the economy and social outcomes.
Local (England)	
County Durham Inclusive Economic Strategy 2022 – 2035 (County Durham Economic Partnership, 2022)	Provides the context on County Durham Economic Partnership's aspirations for the development of the County Durham economy.
Draft Destination Management Plan (Visit County Durham, 2023)	Provides the context on Visit County Durham's aspirations for the County Durham tourism economy.
Sunderland City Plan 2023-2035 (City of Sunderland, 2023)	Provides the context on Sunderland City Council's aspirations for the development of the Sunderland economy.

9.4.3 Study Area

9.4.3.1 Whilst much of the MHPGC Project is located offshore, for most of the socio-economic impacts the relevant Socio-economic Study Areas are onshore. The socio-economic impacts will be assessed at the level of the local study (as per paragraph 9.4.3.3) as well as the English, Scottish and UK economies.

9.4.3.2 Although the onshore infrastructure and majority of offshore infrastructure is located in England, the Scottish Government guidance on identifying the Local Socio-economic Study Area for assessing the impact of marine developments (Scottish Government, 2022a) will be used, since there is no similar guidance for England and the principles are transferable.

9.4.3.3 The guidance identifies six principles for identifying relevant Local Socio-economic Study Areas for offshore development:

- Principle 1 (Dual Geographies): The local area for the supply chain and investment impacts should be separate from the local area(s) for wider socio-economic impacts, including tourism and recreation;
- Principle 2 (Appropriate Impacts): The appropriate impacts to be considered for assessments should be identified before defining the local areas;
- Principle 3 (Epicentres): The local areas should include all the epicentres of the appropriate impacts;
- Principle 4 (Accountability): The local areas used in the assessment should comprise of pre-existing economic or political geographies (community councils, local authorities, development agencies) to enhance accountability;
- Principle 5 (Understandable): The local areas should be defined in such a way that they are understandable to the communities they describe;
- Principle 6 (Connected Geography): The local area for the supply chain and investment impacts should consist of connected (including coastal) pre-existing economic or political geographies.

9.4.3.4 The local socio-economic impacts will be determined by the site of the landfall location, which is considered one of the epicentres of impact. Given that landfall is expected on the Durham Coast near Seaham, the following local authorities (hereafter referred to as the local area) have been identified: Durham County Council and Sunderland City Council (see Figure 9.5).

9.4.3.5 These Local Socio-economic Study Areas have been chosen because the infrastructure associated with the MHPGC Project (Principle 3 (Epicentres)) will be located within the predefined (Principle 4 (Accountability)) local authorities (Principle 5 (Understandable)), of County Durham, and near the border of Sunderland (Principle 6 (Connected Geography)).

9.4.3.6 The socio-economic impacts will also be assessed at the level of the local area and the Scottish, English and UK economies.

9.4.3.7 For the tourism economy, the main focus will be on the areas around the landfall, onshore cable and land substation. The Socio-economic Study Area that will be considered will be the same as that for the Land Use, Tourism and Recreation assessment.

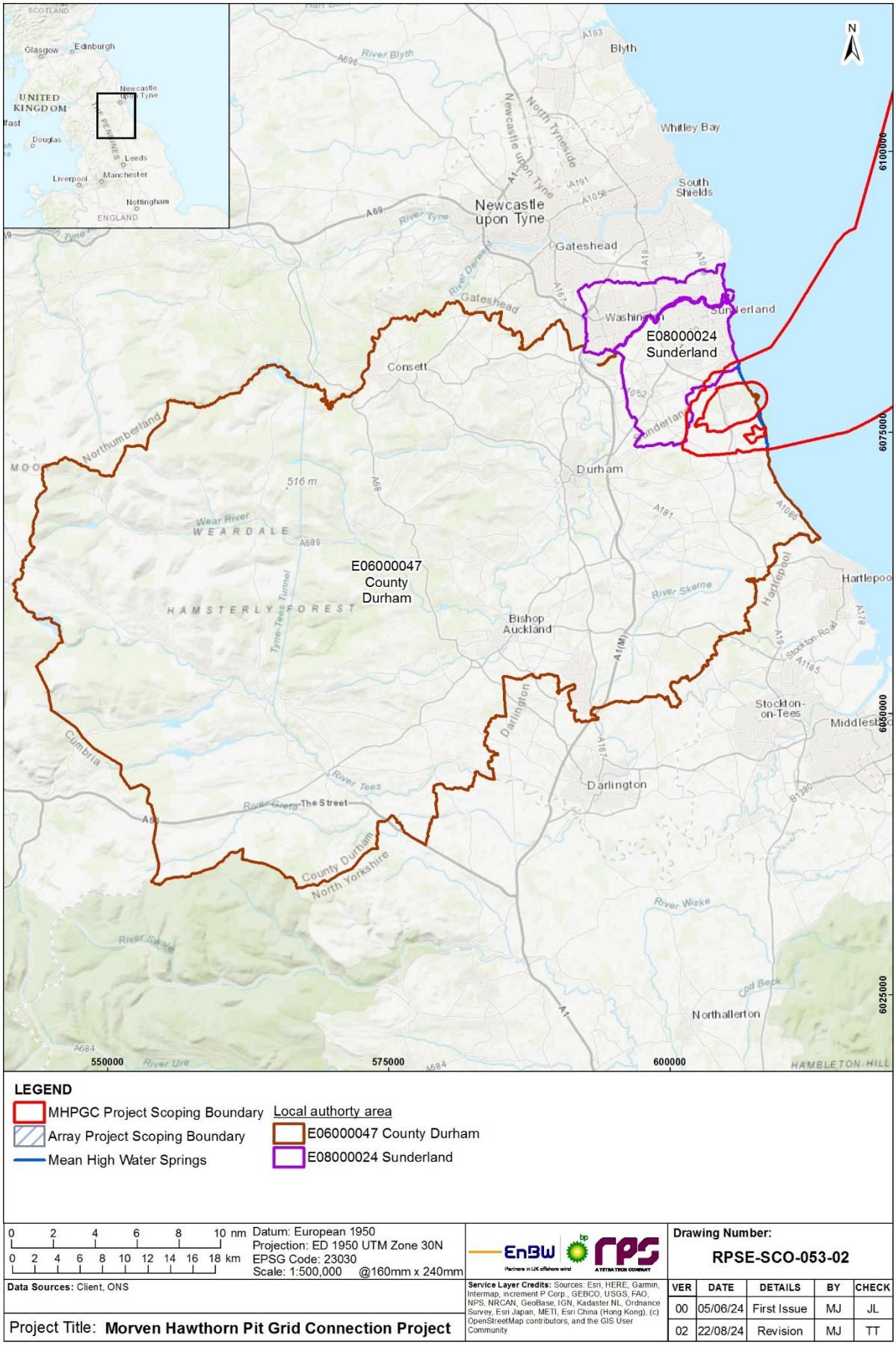


Figure 9.5: Local Socio-economic Study Area with the two Local Authority Areas: Durham County Council and Sunderland City Council.

9.4.4 Data Sources

9.4.4.1 The baseline environment for socio-economics has been characterised through a review of key desktop datasets and reports (Table 9.21). The sources listed are the latest available data at the time of preparing this Scoping Report but will be reviewed and updated at the time of preparing the Socio-economic Chapter of the MHPGC Project EIA/ES.

Table 9.21: Key Sources of Socio-economic Data

Title	Source	Year	Author
England			
Mid-Year Population Estimates 2022	(ONS, 2023a)	2023	Office of National Statistics (ONS)
Principal Population Projections 2020-based	(ONS, 2022)	2022	ONS
Business Register and Employment Survey 2022	(ONS, 2023b)	2023	ONS
Annual Population Survey 2023-4	(ONS, 2024a)	2024	ONS
Annual Survey of Hours and Earnings 2022	(ONS, 2023c)	2023	ONS
Scotland			
2020-based Principal Population Projections	(National Records of Scotland, 2022)	2022	National Records of Scotland
GB Day Visitor 2023	(Kantar Taylor Nelson Sofres (TNS), 2024a)	2024	Kantar TNS
GB Tourism Survey 2023	(Kantar TNS, 2024b)	2024	Kantar TNS
International/National (UK)			
International Passenger Survey 2023	(ONS, 2024b)	2024	ONS

9.4.5 Baseline Environment

Socio-economics baseline

9.4.5.1 As shown in Table 9.22, the local area had a population of 805,500 in 2022, representing 1.4% of the total population of England (ONS, 2023a).

9.4.5.2 Between 2022 and 2043, the local area's population is projected to increase by 3.9%, compared to the 7.0% increase projected for the UK as a whole (ONS, 2022). In the local area, it is expected that the share of the population accounted for by people of working age will decrease from 61.7% in 2022, to 58.4% in 2043. This follows a similar

trend to England and the UK, which are projected to have population shares of working age people equal to 58.9% and 59.0% by 2043, respectively (ONS, 2023a).

Table 9.22: Population Projections by Age, 2022 and 2043

	Local Area		England	
	2022	2043	2022	2043
Population	**805,500**	**836,909**	**57,106,400**	**61,744,098**
% under 16	17.0%	16.1%	18.5%	17.2%
% age 16-64	61.7%	58.4%	62.9%	58.9%
% aged 65+	21.3%	25.6%	18.6%	23.9%
	Scotland		UK	
	2022	2043	2022	2043
Population	**5,479,900**	**5,574,819**	**67,652,999**	**72,417,950**
% under 16	16.6%	14.8%	18.4%	17.0%
% age 16-64	63.8%	60.3%	62.8%	59.0%
% aged 65+	19.6%	24.9%	18.8%	24.0%

Sources: Mid-Year Population Estimates 2021 (ONS, 2023a), Principal Population Projections 2020-based (ONS, 2022)

9.4.5.3 The Annual Population Survey 2021 (ONS, 2024a) estimates that the economic activity rate of the local area (74.0%) was lower than England (78.9%) and the UK as a whole (78.7%).

9.4.5.4 According to the Annual Survey of Hours and Earnings 2022 (ONS, 2023c), the median annual gross wage was £26,272 in the local area, which is lower than across the UK as a whole (£29,669).

9.4.5.5 The proportion of employment in sectors relevant to the MHPGC Project in each of the Socio-economic Study Areas is shown in Table 9.23. The local area accounts for 1% of England's total employment, 301,320 (ONS, 2023b). Manufacturing is one of the main sectors in the local area, accounting for 13.6% of employment compared to 7.4% in England and 7.5% in the UK.

Table 9.23: Industrial Structure

Industry	Local Area	England	Scotland	UK
Professional, scientific and technical activities.	3.6%	9.4%	7.4%	9.0%
Accommodation and food service activities.	6.8%	7.9%	8.2%	7.9%
Manufacturing.	13.6%	7.4%	6.6%	7.5%
Construction.	5.1%	4.9%	5.6%	5.0%
Transportation and storage.	5.6%	5.1%	4.0%	4.9%
Electricity, gas, steam and air con supply.	0.7%	0.3%	0.7%	0.4%
Mining and quarrying.	0.1%	0.1%	1.0%	0.2%
Total employment	**301,320**	**27,952,000**	**2,621,000**	**32,729,841**

Sources: Business Register and Employment Survey 2021 (ONS, 2023b)

9.4.5.6 The socio-economic assessment will also consider the tourism economy. As per Table 9.23, accommodation and food services activities (which are often associated with tourism) accounts for 6.8% of total employment in the local area, a lower proportion than average for England (7.9%).

9.4.5.7 Eight attractions were identified within 5km of the MHPGC Project Scoping Boundary using various online sources, including VisitEngland (VisitEngland, 2024), This is Durham (This is Durham, 2024) and MySunderland (My Sunderland, 2024). This includes several outdoor attractions, such as Durham Heritage Coastal Trail, Seaham Beach, Chemical/Blast Beach, and Hetton Lyons County Park. Other attractions identified include two golf courses (Sharpley Golf and Houghton Le Spring Golf Club), Seaham country house and spa, and the Ryhope Engines Museum.

9.4.5.8 In addition to visitor attractions, other tourism assets, such as recreational paths and accommodation providers, will also be identified within the EIA Report/ES.

9.4.6 Potential Impacts of the Morven Hawthorn Pit Grid Connection Project

9.4.6.1 A range of potential impacts on socio-economics have been identified which may give rise to likely significant effects during the construction, O&M, and decommissioning phases of the MHPGC Project. The impacts that have been scoped into the assessment as having the potential to give rise to likely significant effects are outlined in Table 9.13 together with a description of any additional data collection (e.g. site specific surveys) and supporting analyses (e.g. modelling) that will be required to enable a full assessment of the impacts.

9.4.6.2 The potential impacts from the MHPGC Project have been considered collectively for both English and Scottish waters, as these will not change between these areas given the commonality of the works proposed (offshore cabling).

9.4.6.3 Impacts that have been scoped out are outlined in Table 9.25. Whilst impacts on commercial fisheries and on shipping and navigation could have socio-economic implications, such impacts will be considered in the Commercial Fisheries and Shipping and Navigation chapters and have been scoped out of the socio-economics assessment.

Table 9.24: Impacts Proposed to be Scoped into the Morven Hawthorn Pit Grid Connection Project Assessment for Socio-economics

*Project phase refers to construction (C), O&M (O) and decommissioning (D).

Impact	Project Phase*			Relevant to England or Scotland	Justification	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D				
Increased employment and Gross Value Added (GVA).	✓	✓	✓	Both	The activity required to manufacture and install the infrastructure will generate economic impacts in both Scotland and England. The assessment will consider the potential impacts in the local area and on the Scottish, English and UK economies.	A desk based study will be used to assess the socio-economic baseline of the area, including population and labour market statistics.	Economic impact modelling will assess the total expenditure in each Socio-economic Study Area, as well as the employment and GVA in each Socio-economic Study Area.
Impact on visitor behaviour.	✓	✓	✓	England	Onshore transmission works may affect visitor attractions and accommodation providers. Local tourism assets within 5km of the land substation will be identified as receptors. The receptors will be based on the Land Use, Tourism and Recreation Chapter.	Local tourism statistics will be collected and local tourism assets will be identified through desk based surveys. This will be supplemented by the Land Use, Tourism and Recreation Chapter of the EIA Report/ES.	Key features of tourism assets will be identified and potential impacts on these assets will be assessed based on their importance to the local tourism economy. Important considerations are likely to include access and visual impacts. The assessment will therefore draw on the findings of the Use, Tourism and Recreation Chapter and the onshore Landscape and Visual Impact Assessment Chapter of the EIA Report/ES.

Table 9.25: Impacts Proposed to be Scoped Out of the Morven Hawthorn Pit Grid Connection Project Assessment for Socio-economics

Impact	Justification
Impact on commercial fisheries.	Impacts on commercial fisheries could have socio-economic implications if they were of a scale and nature that would result in a noticeable change in the contribution of commercial fisheries to the economy. For example, a substantially change in landings would have implications for the onshore fish processing sector and fishing communities. Impacts of such a scale or nature are not expected, either during construction and decommissioning, or the O&M phase. Impacts on commercial fisheries will be considered in the Commercial Fisheries Chapter of the EIA Report/ES.
Impact on shipping and navigation.	Impacts on shipping and navigation could have socio-economic implications. For example, if shipping was diverted to the extent that shipping costs of goods increased, this would impact on the sectors of the economy importing and exporting goods via sea. Impacts of such an extent are not expected either during construction and decommissioning, or the O&M phase. Impacts on shipping and navigation will be considered in the Shipping and Navigation of the EIA Report/ES.

9.4.7 Designed In Measures and Mitigation

9.4.7.1 As part of the project design process, a number of designed in measures (primary and tertiary) will reduce the potential for impacts on socio-economics (Table 9.26). As there is a commitment to implement these measures, they are considered inherent to the design of the MHPGC Project. The determination of magnitude and significance will assume the implementation of such measures. Some of these measures are considered standard industry practice for this type of development.

9.4.7.2 The requirement for any additional (secondary) mitigation measures will be dependent on the significance of the effects on socio-economic receptors. The requirement for and feasibility of any mitigation measures will be consulted upon with statutory consultees throughout the EIA process.

Table 9.26: Designed in Measures of the Morven Hawthorn Pit Grid Connection Project Relevant to Socio-economics

Reference Number	Designed in Measures	Justification	Primary or Tertiary
MM-92	Supply Chain Development Statement (SCDS) (bp/EnBW, 2022).	To analyse the commitments underpinning the SCDS support economic growth with a commitment to approximately £1.2bn of spend in Scotland and £2.3bn to the UK, subject to market assumptions. These commitments will be updated over time, in agreement with the Crown Estate Scotland.	P
MM-93	Local Engagement Strategy.	To mitigate any adverse socio-economic effects in the area around landfall and enhance any beneficial effects.	P

9.4.8 Proposed Assessment Methodology

Socio-economics

9.4.8.1 The assessment of the socio-economics impacts identified in Table 9.13 will comply with the EN-1 Overarching National Policy Statement for Energy (Department for Energy Security and Net Zero (DESNZ), 2023) and EN-3 Overarching National Policy Statement for Renewable Energy (DESNZ, 2023).

9.4.8.2 This guidance outlines the impacts which need to be considered as part of any socio-economic impact assessment of an energy project in England. These include:

- the creation of jobs and training opportunities;
- the contribution to the development of low carbon industries at the local and regional level as well as nationally;

- the provision of additional local services and improvements to local infrastructure, including the provision of educational and visitor facilities;
- any indirect beneficial impacts for the region hosting the infrastructure, in particular in relation to use of local support services and supply chains;
- impact on tourism;
- the impact of a changing influx of workers during the different construction, O&M and decommissioning phases of the energy infrastructure;
- cumulative effects.

9.4.8.3 Socio-economic impacts will be assessed for each of the Socio-economic Study Areas, and the sensitivity will be considered based on the relative size of the economy. For example, a larger economy with more employment will be less sensitive to an absolute change on the number of jobs that a smaller economy with lower levels of employment.

9.4.8.4 The impacts will be reported in terms of:

- GVA - this is a measure of economic value added by an organisation or industry and is typically estimated by subtracting the non-staff operational costs from the revenues of an organisation;
- Years of Employment - this is a measure of employment which is equivalent to one person being employed for an entire year and is typically used when considering short-term employment impacts, such as those associated with the development and construction phase of the MHPGC Project;
- Jobs - this is a measure of employment which considers the headcount employment in an organisation or industry. This measure is used when considering long-term impacts such as the jobs supported during the operational phase of the MHPGC Project.

9.4.8.5 The economic impacts associated with the supply chain will be assessed in line with the approach considered in the UK Offshore Wind Sector Deal (UK Government, 2020) which focuses on the direct and indirect (supply chain) impacts. In addition to this, the assessment will also consider the impacts of staff spending and the economic impact this subsequent increase in demand stimulates (the induced effect).

9.4.8.6 The socio-economic assessment will consider the 'worst case scenario' as the lowest, realistic levels of expenditure associated with the MHPGC Project, in line with the Applicant's Commitment Scenario in the SCDS, though this may be subject to change as the Applicant refines the MHPGC Project.

9.4.8.7 Where impacts are expected to occur over a number of years, such as the O&M phase, or will take place in the future, such as decommissioning, a discount rate will be applied. This allows impacts that occur sooner to be valued more highly than impacts that occur in the future, a concept known as time preference. In this instance a discount rate of 3.5% will be chosen, which is in line with the HM Treasury's Green Book (HM Treasury, 2022).

9.4.8.8 Once the economic impact of the MHPGC Project has been assessed in terms of GVA and employment, an assessment will be made about the relative magnitude of the

impact. Using the methodology outlined in Chapter 4: EIA Methodology, the significance of the effect will then be assessed.

Tourism Economy

9.4.8.9 Visitor attractions will be identified within the Socio-economic Study Area, and the sensitivity of each asset will be determined by the contribution that it makes to the overall tourism economy of the area.

9.4.8.10 The key features associated with a visitor attraction will also be considered, and specifically whether the MHPGC Project will have an impact on these key features leading to a change in visitor behaviour, for example related to visual impact or access. It will also consider the magnitude of impacts considered in other chapters of the EIA Report/ES, such as Land Use, Tourism and Recreation and Landscape and Visual Impact Assessment (LVIA).

9.4.8.11 The effect on each tourism asset will then be determined based on their sensitivity and the magnitude of each impact, using the methodology outlined in Chapter 4: EIA Methodology.

9.4.9 Potential Cumulative Impacts

9.4.9.1 Cumulative effects with the Morven Offshore Wind Array Project and the second grid connection project in the Branxton area Southeast Scotland will be considered, together with cumulative effects with other developments, where relevant.

9.4.9.2 The cumulative effect assessment will follow the approach outlined in Chapter 4: EIA Methodology, of this Scoping Report.

9.4.9.3 Interactions with other projects include other export cables associated with offshore wind farm developments and interconnector developments, which may contribute to a critical mass of projects, encouraging international investors to set up manufacturing facilities in the UK. It may also lead to competition for limited resources, such as skilled labour and cable laying vessels, which may have adverse impacts.

9.4.9.4 It may also include other onshore infrastructure in County Durham and the North East, which could lead to increased expertise in the area and a higher share of contracts being secured.

9.4.10 Potential Inter-related Effects

9.4.10.1 The EIA will consider inter-related effects arising from the MHPGC Project, across their own phases (project lifetime) and different effects on one receptor in one phase (receptor led). The EIA will consider inter-related effects of multiple impacts from the construction, O&M and decommissioning phases of the MHPGC Project, affecting one receptor. Inter-related effects will be assessed through consideration of all effects on a receptor, considering both spatial and temporal overlap, within the MHPGC Project. This will ensure that the MHPGC Project is appropriately considered within the EIA and in line with Chapter 4: EIA Methodology.

9.4.11 Potential Transboundary Impacts

9.4.11.1 There are unlikely to be significant socio-economic transboundary impacts due to the construction, O&M and decommissioning of the MHPGC Project.

9.5 Climate Change

9.5.1 Introduction

9.5.1.1 This chapter of the Scoping Report identifies the climate change receptors of relevance to the Morven Hawthorn Pit Grid Connection Project (hereafter referred to as 'MHPGC Project') and considers the potential impacts arising from the construction, operation and maintenance (O&M) and decommissioning of the MHPGC Project. This scoping chapter adopts a proportionate approach to only those impacts with potential to result in likely significant effects and therefore scopes out other impacts where there is evidence that the effects are not likely to be significant.

9.5.1.2 This chapter of the Scoping Report also sets out the proposed scope of the Environmental Impact Assessment (EIA) and the methodology to be used in the assessment of climate change impacts for the MHPGC Project.

9.5.1.3 In accordance with the EIA Regulations, the EIA Guide to Assessing Greenhouse Gas Emissions and Evaluating their Significance (IEMA, 2022) and the EIA Guide to Climate Change Resilience and Adaptation (IEMA, 2020), the following aspects of climate change are relevant to the assessment:

- the emission of greenhouse gases (GHGs) contributing to climate change, including cumulative impacts with other development;
- the potential risks to the MHPGC Project arising from a changing climate and its vulnerability to climate change;
- the potential inter-related impact of climate change with other environmental impacts assessed.

9.5.1.4 This scoping chapter adopts a proportionate approach to only those impacts with potential to result in significant effects and therefore scopes out other impacts where there is evidence that the impacts are not significant.

9.5.2 Policy and Legislation

9.5.2.1 This section identifies the relevant legislation, policy and other documentation that will inform the assessment of likely significant impacts with respect to climate change. Further information on policies relevant to the EIA and their status is provided in Chapter 2: Policy and Legislation, of the Scoping Report. The following key legislation and policy documents relevant to climate change will be considered within the assessment process:

- Climate Change Act (2019);
- National Planning Policy Framework (Department for Levelling Up, Housing and Communities, 2023);
- Overarching National Policy Statement (NPS) for Energy (NPS EN-1) (Department for Energy Security and Net Zero (DESNZ), 2024a);
- NPS for Renewable Energy Infrastructure (NPS EN-3) (DESNZ, 2024b);
- NPS for Electricity Networks Infrastructure (NPS EN-5) (DESNZ, 2024c);
- Scottish Marine Plan (Scottish Government, 2015);

- The North East Inshore and North East Offshore Marine Plan (HM Government, 2021);
- County Durham Plan 2020-2035 (Durham County Council, 2020);
- Sunderland Core Strategy and Development Plan 2015-2033 (Sunderland City Council, 2020).

9.5.2.2 Table 9.27 to Table 9.30 below, provide additional detail regarding the NPSs, Marine Plans, and local policy, and their relevance to the assessment.

Table 9.27: Summary of the National Policy Statements England EN-1, EN-3, and EN-4 Requirements Relevant to this Chapter

Relevant Legislation	Relevance to the Assessment
NPS EN-1 (DESNZ, 2024a)	
GHG assessments should include 'A whole life GHG assessment showing construction, operational and decommissioning GHG impacts.' and 'Where there are residual emissions, the level of emissions and the impact of those on national and international efforts to limit climate change, both alone and where relevant in-combination with other developments at a regional or national level, or sector level, if sectoral targets are developed' (paragraph 5.3.4 of NPS EN-1).	This scoping chapter proposes an assessment of the construction, O&M and decommissioning emissions associated with the MHPGC Project. Emissions associated with the MHPGC Project are proposed to be contextualised within the UK carbon budgets. This scoping chapter proposes to assess the cumulative impact of the MHPGC Project on climate change, in-combination with relevant developments, including the Morven Offshore Wind Array Project.
With regards specifically to mitigation, a GHG assessment should be used to drive down GHG emissions at every stage of the proposed development and ensure that emissions are minimised as far as possible for the type of technology taking into account the overall objectives of ensuring our supply of energy always remains secure, reliable and affordable, as we transition to net zero (Paragraph 5.3.5 of NPS EN-1).	Mitigation measures (Commitments) to reduce emissions associated with the MHPGC Project, particularly by embodied carbon reductions will be investigated during the assessment of emissions associated with the construction, O&M and decommissioning of the MHPGC Project.
With regards to climate change adaptation, applicants must consider the impacts of climate change. An ES should set out how the proposal will take account of the projected impacts of climate change (paragraph 4.10.9 of NPS EN-1).	This scoping chapter proposes a climate change risk assessment for the relevant elements of the MHPGC Project. The maximum climate change scenario would be informed by climate projections using the representative concentration pathway (RCP) 8.5, a high emissions scenario assuming 'business as usual' growth
Where energy infrastructure has safety critical element (for example… electricity	

Relevant Legislation	Relevance to the Assessment
substations, the applicant should apply a credible maximum climate change scenario (paragraph 4.10.12 of NPS EN-1)).	globally with little additional mitigation. This represents a maximum credible scenario.
NPS EN-3 (DESNZ, 2024b)	
Offshore wind farms will not be affected by flooding. However, applicants should demonstrate that any necessary land-side infrastructure (such as cabling and onshore substations) will be appropriately resilient to climate change induced weather phenomena. Similarly, applicants should particularly set out how the proposal would be resilient to storms (paragraph 2.4.8 of NPS EN-3).	This scoping chapter proposes an assessment of climate risk and resilience for the MHPGC Project. Consideration of onshore flood risk will be assessed within the relevant onshore Flood Risk Assessment (Chapter 8.2: Water resources and Flood Risk, of the Scoping Report).
NPS EN-5 (DESNZ, 2024c)	
With regards to climate change adaptation, applicants must consider how the development is vulnerable to, and how it has been designed to be resilient to the increased risks of flooding, wind and storm events, heightened temperatures, and subsidence resulting from climate change (paragraph 2.3.2 of NPS EN-5).	This scoping chapter proposes an assessment of climate risk for the relevant elements of the MHPGC Project.

Table 9.28: Summary of the Scottish National Marine Plan Requirements Relevant to this Chapter

Relevant Legislation	Relevance to the Assessment
General Climate Change Policies	
Gen 5 Climate Change: Marine planners and decision makers must act in the way best calculated to mitigate, and adapt to, climate change. Marine planners and decision makers should seek to facilitate a transition to a low carbon economy. They should consider ways to reduce emissions of carbon and other greenhouse gases. Marine planners and decision makers should be satisfied that developers and users have sufficient regard to the impacts of a changing climate and, where appropriate, provide	This scoping chapter proposes an assessment of GHG emissions associated with the MHPGC Project alongside an assessment of climate risk and resilience for the relevant elements the MHPGC Project.

Relevant Legislation	Relevance to the Assessment
effective adaptation to its predicted impacts. Offshore and coastal developments should be appropriately sited and designed, and use technologies and equipment appropriate for local conditions, now and in the future, giving particular consideration to vulnerability, scale and longevity of operation.	
Offshore Wind and Marine Renewable Energy Policies	
Renewables 7: Marine planners and decision makers should ensure infrastructure is fit for purpose now and in future. Consideration should be given to the potential for climate change impacts on coasts vulnerable to erosion.	This scoping chapter proposes an assessment of climate risk and resilience for the relevant elements the MHPGC Project.
A changing climate may result in changes in extreme weather events which could create difficult operating conditions for offshore installations. Offshore and onshore infrastructure supporting renewable energy developments should account for the potential impact of climate change.	
Submarine Cable Policies	
Climate change and associated sea level rise is expected to increase the incidences of coastal flooding and erosion, which may have limited implications for the landfall of cables in the near-term. Changes in sedimentation and increase in currents due to climate change may change depositional regimes leading to potential change in the condition of initially buried cables.	This scoping chapter proposes an assessment of climate risk and resilience for the relevant elements the MHPGC Project. Consideration of onshore flood risk will be assessed within the relevant onshore Flood Risk Assessment (Chapter 8.2: Water resources and Flood Risk, of the Scoping Report). Consideration of sedimentation and currents will be provided within Chapter7.1: Physical Processes, of the Scoping Report. In combination impacts will be considered where relevant.

Table 9.29: Summary of the North East Inshore and North East Offshore Marine Plan Requirements in the UK Relevant to this Chapter

Relevant Legislation	Relevance to the Assessment
NE-CC-1 Proposals that have significant adverse impacts on habitats that provide carbon sequestration ecosystem service must demonstrate that they will, in order of preference: avoid; minimise; mitigate; and compensate for significant adverse impacts that cannot be mitigated.	This scoping chapter proposes the assessment of GHG emissions associated with the construction, O&M, and decommissioning of the MHPGC Project, considering the impact on carbon stored in soil and the seabed.
NE-CC-2 Proposals should demonstrate for the lifetime of the project that they are resilient to the impacts of climate change and coastal change.	This scoping chapter proposes an assessment of climate risk for the relevant elements of the MHPGC Project.
NE-CC-3 Proposals that are likely to have significant adverse impacts on climate change adaptation measures inside and outside of the proposed project areas, should only be supported if they will, in order of preference: avoid; minimise; and mitigate such impacts.	This scoping chapter proposes an assessment of climate risk for the relevant elements of the MHPGC Project.

Table 9.30: Summary of Local Planning Policy Requirements Relevant to this Chapter

Description	How this will be considered in the EIA Report Climate Change Chapter
County Durham Plan, adopted 2020	
Sustainable design – all development proposals will be required to achieve well designed buildings and places, which minimise greenhouse gas emissions by seeking to achieve zero carbon buildings and providing renewable and low carbon energy generation. All development proposals will be required to create buildings and spaces that are adaptable to changing environmental conditions, and include appropriate and proportionate measures to reduce vulnerability and increase resilience.	This scoping chapter proposes an assessment of GHG emissions associated with the MHPGC Project alongside an assessment of climate risk and resilience for the relevant elements the MHPGC Project.
Sunderland Core Strategy and Development Plan 2015-2033	
SP1 Development Strategy – sustainable patterns of development are prioritised, minimising and mitigating the likely impacts of climate change is expected.	This scoping chapter proposes an assessment of climate risk and resilience for the relevant elements the MHPGC Project.

9.5.3 Study Area

9.5.3.1 GHG emissions have a global impact rather than directly affecting any specific local receptor. The impact of GHG emissions occurring due to the MHPGC Project on the global atmospheric concentration of the relevant GHGs, expressed in CO_2 equivalents (CO_2e), will therefore be considered in the climate change assessment.

9.5.3.2 The GHG emissions will be assessed on a life cycle basis for activities required for the construction, O&M and decommissioning of the MHPGC Project. GHG emissions will be caused directly and indirectly from sources at a variety of locations, including onsite activities and the associated supply chain. The Climate Change Study Area is therefore defined in terms of an assessment boundary rather than geographical area. The assessment boundary and relevant sources of GHG emissions are set out in the methodology sections below.

9.5.3.3 The Climate Change Study Area is defined as both the onshore and offshore components of the MHPGC Project (the MHPGC Project Scoping Boundary) alongside the global atmosphere, based on established guidance of the Institute of Environmental Management & Assessment (IEMA) (IEMA, 2022). This Climate Change Study Area is also applicable for the assessment of risks to the MHPGC Project arising from a changing climate. The Climate Change Study Area is shown in Figure 9.6.

9.5.4 Data Sources

9.5.4.1 The data sources used to inform the baseline assessment will draw from published material. No baseline surveys would be required to support the climate change assessment for the MHPGC Project. Examples of key information sources are listed in Table 9.31; in each case where a date or edition is specified, this is the current edition but the latest at the time of assessment would be used.

9.5.4.2 Published Environmental Product Declarations (EPDs, the outputs of Lifecycle Analysis Studies – LCAs) will also be used to establish the embodied carbon emissions for switchgear and transformers.

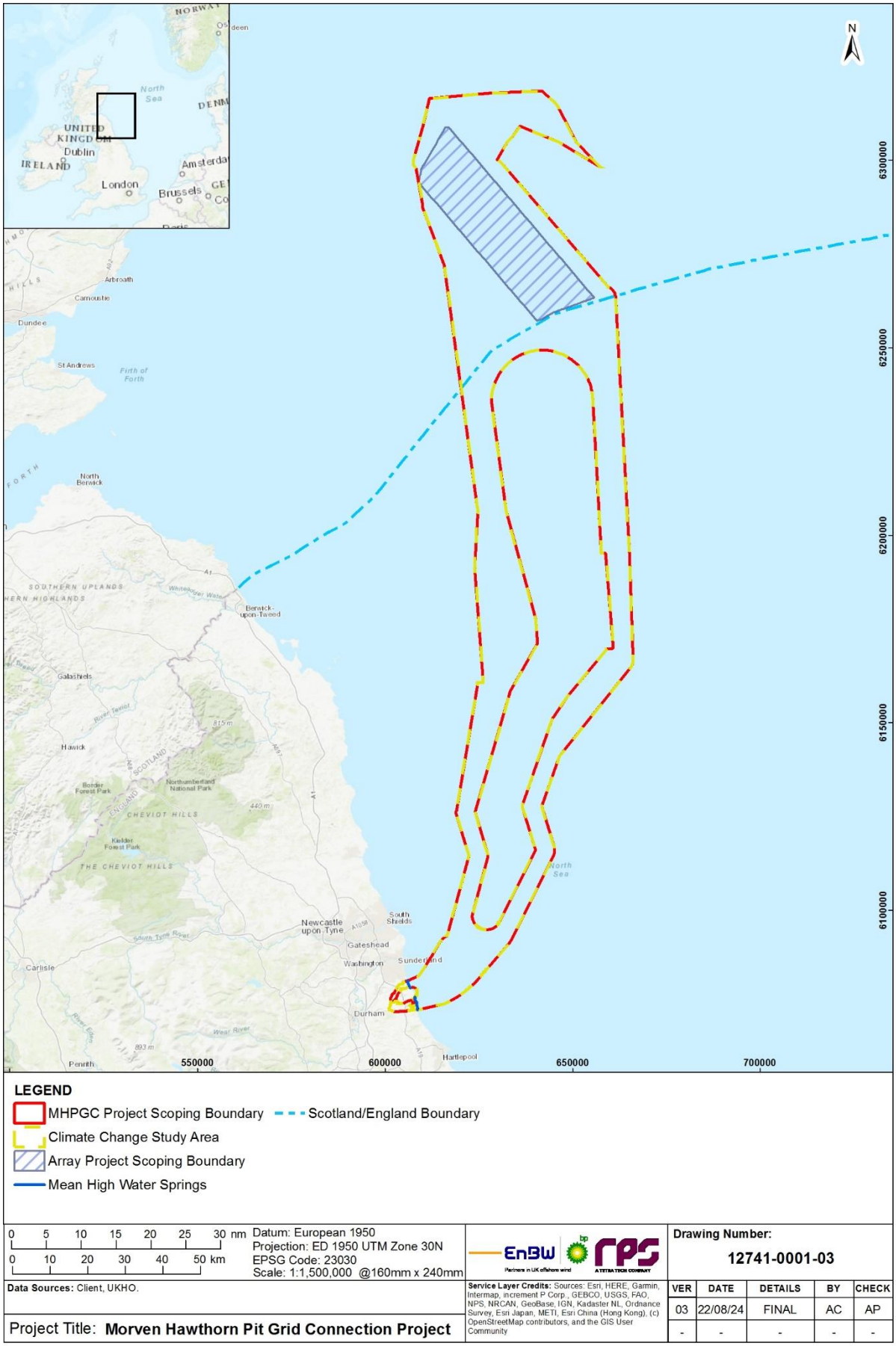


Figure 9.6: Climate Change Study Area

Table 9.31: Baseline Data Sources

Title	Source	Year	Author
National (UK)			
UK Government GHG Conversion Factors for Company Reporting	www.gov.uk	2023	DESNZ and Defra
Methodology to calculate embodied carbon of materials.	https://www.igbc.ie	2012	RICS
Published GHG emissions factors for building materials.	https://circularecology.com/embodied-carbon-footprint-database.html	2019	Jones and Hammond
Met Office UK climate averages	https://www.metoffice.gov.uk/research/climate/maps-and-data/uk-climate-averages	2024	Met Office
The Met Office Hadley Centre UK Climate Projections 2018 (UKCP18). probabilistic projections	https://ukclimateprojections-ui.metoffice.gov.uk/ui/home	2024	MOHC
The Met Office Hadley Centre (MOHC) 'UKCP18' marine report	www.metoffice.gov.uk	2018	Palmer *et al*.
UK Climate Change Risk Independent Assessment (CCRA3), Chapter 4: Infrastructure	Jaroszweski *et al*. (2021)	2021	Jaroszweski *et al.*
National (Scotland)			
Re-evaluating Scotland's Sedimentary Carbon Stocks	https://data.marine.gov.scot	2020	Smeaton *et al.*

9.5.5 Baseline Environment

9.5.5.1 The baseline environment for this climate change section is concerned with two areas:

- GHG emissions from the MHPGC Project associated land use and seabed change affecting existing carbon stores;
- the current climate and future climate projections within the areas local to the MHPGC Scoping Boundary.

Impact on Climate Change

9.5.5.2 The current baseline will be accounted for within the assessment through the consideration of blue carbon in the offshore environment (organic carbon that has been captured and stored through biological processes in the coastal and marine

environment), and soil carbon (particularly within peaty soils if present) in the onshore environment. The assessment will be informed by information provided in the following MHPGC Project EIA Report/ES chapters, in addition to publicly available mapping information, including:

- benthic subtidal ecology considering the potential habitat that could contain carbon stores along the relevant areas of the seabed;
- marine archaeology considering any potential ancient woodland now buried along the relevant areas of the seabed;
- onshore ecology considering the potential habitat that could contain carbon stores along the relevant areas;
- UK Soil Observatory and Natural England mapping considering onshore soil quality and presence (or absence) of peaty soils.

Climate Change Resilience and Adaptation

9.5.5.3 The assessment of climate risks will consider the potential climatic conditions specific to the MHPGC Project.

9.5.5.4 Consideration of offshore climate will be based on the Met Office Hadley Centre UKCP18 marine report (Palmer *et al.*, 2018), which is subsequently reviewed within the UK Climate Risk Independent Assessment (CCRA3), Chapter 4: Infrastructure (Jaroszweski *et al.*, 2021). The mentioned resources will be utilised to examine future trends for wind speed, wave height and sea level change.

9.5.5.5 Consideration of the onshore climate will be sourced from Met Office UK climate averages observational data from a climate station local to the MHPGC Project MHPGC Project Scoping Boundary (Met Office, 2024). The closest onshore climate station the MHPGC Project Scoping Boundary is in Durham; associated observational data will be used to inform the onshore baseline environment. The observational data available has been collected and averaged over 30 years and will be reviewed against regional observational data averaged over the same reporting period. Met Office Hadley Centre UKCP18 probabilistic climate change projections published at 25km grid cell scale (MOHC, 2024) will be used to assess future climate change over the lifetime of the MHPGC Project.

9.5.5.6 The projections are based on Representative Concentration Pathway (RCP) 8.5 (which is a high emissions scenario, providing a conservative worst case scenario for the purpose of the CCRA), with data available over the MHPGC Project's operational lifetime.

9.5.6 Potential Impacts of the Morven Hawthorn Pit Grid Connection Project

9.5.6.1 A range of potential impacts on climate change have been identified which may give rise to likely significant effects during the construction, O&M, and decommissioning phases of the MHPGC Project.

9.5.6.2 The impacts that have been scoped into the assessment as having the potential to give rise to likely significant effects are outlined in Table 9.32 together with a description of any additional data collection (e.g. site specific surveys) and

supporting analyses (e.g. modelling) that will be required to enable a full assessment of the impacts.

9.5.6.3 The potential impacts from the MHPGC Project have been considered collectively for both English and Scottish waters, as these will not change between these areas given the commonality of the works proposed (offshore cabling).

9.5.6.4 Potential impacts scoped out of the assessment as there is no potential for them give rise to likely significant effects are presented in Table 9.32, with justification.

Table 9.32: Impacts Proposed to be Scoped into the Morven Hawthorn Pit Grid Connection Project Assessment for Climate Change

*Project phase refers to construction (C), O&M (O) and decommissioning (D).

Impact	Project Phase*			Relevant to English or Scottish Waters	Justification	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D				
Impact on climate change							
The impact of GHG emissions arising from land use and seabed change.	✓	✓	✓	Both	GHG emissions arising from land use and seabed change during the construction, O&M, and decommissioning phases through disturbance to stored carbon.	The current baseline with regard to offshore land use is the seabed. This baseline environment may contain blue carbon that would be subject to disturbance by the construction of the MHPGC Project. This will be confirmed by benthic surveys and accounted for within the assessment if relevant. The current baseline with regard to onshore land use is its existing use as Grade 3 agricultural land. It is anticipated that this baseline environment does not have high soil or vegetation carbon stocks that would be subject to disturbance by the construction of the MHPGC	Use of published data on subsea soil carbon stocks, agricultural land use classes and soil carbon stocks, and GHG fluxes.

Impact	Project Phase*			Relevant to English or Scottish Waters	Justification	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D				
						Project. This will be confirmed through review of UK Soil Observatory and Natural England mapping considering onshore soil quality and presence (or absence) of peaty soils, alongside ecology survey results.	
The impact of GHG emissions arising from the manufacturing and installation of the MHPGC Project, including vessel and vehicle movements.	✓	×	×	Both	GHG emissions arising from the manufacturing (i.e. embodied carbon) and installation of the MHPGC Project would contribute to the lifecycle total and net GHG balance of the MHPGC Project.	Significant development within the MHPGC Project Scoping Boundary includes: Hawthorn Solar Farm (Consented), BESS Facility (Consented), Jade Business Park (Consented) Seaham Garden Village (Consented) EGL1 Converter Station (Consented), 80 Unit Residential Development at South Hetton (consented)	Use of published emissions factors scaled by activities required for the MHPGC Project. The emissions factors relate to a given level of activity, or amount of fuel, energy or materials used, to the mass of GHGs released as a consequence. This includes an assessment of embodied carbon
The impact of GHG emissions arising from the consumption of materials and activities required to facilitate the O&M phase.	×	✓	×	Both	GHG emissions arising from the consumption of materials and activities required to facilitate the O&M phase would contribute to the lifecycle total and net GHG balance of the MHPGC Project.		

Impact	Project Phase*			Relevant to English or Scottish Waters	Justification	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D				
The impact of GHG emissions arising from decommissioning works (e.g. plant, fuel and vessel use) and the recovery (or disposal) of materials.	✗	✗	✓	Both	GHG emissions arising from decommissioning works (e.g. plant, fuel and vessel use) and the recovery (or disposal) of materials would contribute to the lifecycle total and net GHG balance of the MHPGC Project. Options for either recycling the transmission infrastructure, or re-powering the generation and transmission elements of the Project will be assessed at end of life.		associated with materials used. Use of published carbon intensity benchmark values for buildings and/or project specific materials estimates together with published EPD's concerning Life Cycle Assessment research into embodied carbon associated with construction of the substation building and associated infrastructure including switchgear, and transformers.
Climate change resilience and adaptation							
The vulnerability of the MHPGC Project to climate change during the O&M	✗	✓	✓	Both	Onshore and offshore assets are designed to be resilient to storm events	The future offshore baseline environment will be based on the potential climatic	An assessment of potential risks arising from projected

Impact	Project Phase*			Relevant to English or Scottish Waters	Justification	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D				
and decommissioning phases.					with factors of safety incorporated into the design. However, as the impacts of climate change are likely to increase over time, risks posed by climate change to the MHPGC Project during its O&M and decommissioning phases will be assessed.	conditions specific to the MHPGC Project, based on the Met Office Hadley Centre UKCP18 marine report (Palmer *et al.,* 2018), which is subsequently reviewed in the UK Climate Risk Independent Assessment (CCRA3), Chapter 4: Infrastructure (Jaroszweski *et al*., 2021). These resources will be utilised to examine future trends for wind speed, wave height and sea levels. The future onshore baseline environment will be based on the potential climatic conditions specific to the MHPGC Project, based on the Met Office Hadley Centre UKCP18 probabilistic projections (MOHC, 2024).	climatic changes will be presented in a matrix format, considering the hazard, severity of impact on the MHPGC Project and its users, probability of that impact, and level of influence the MHPGC Project design can have on the risk. This will inform potential resilience measures to be considered within the detailed design.
The in combination climate impacts of the MHPGC Project.	✗	✓	✗	Both	Changing climatic parameters can exacerbate a potential	The future offshore baseline environment will be based on the potential climatic	The in combination climate impacts assessment would

Impact	Project Phase*			Relevant to English or Scottish Waters	Justification	Data Collection and Analysis Required to Characterise the Baseline Environment	Summary of Proposed Approach to Assessment
	C	O	D				
					impact on an environmental receptor. Impacts identified in other environmental topic chapters shall be considered where relevant.	conditions specific to the MHPGC Project, based on the Met Office Hadley Centre UKCP18 marine report (Palmer *et al.,* 2018), which is subsequently reviewed in the UK Climate Risk Independent Assessment (CCRA3), Chapter 4: Infrastructure (Jaroszweski *et al*., 2021). These resources will be utilised to examine future trends for wind speed, wave height and sea levels. The future onshore baseline environment will be based on the potential climatic conditions specific to the MHPGC Project, based on the Met Office Hadley Centre UKCP18 probabilistic projections (MOHC, 2024).	follow the same approach to assessing impacts and determining significance as for each of the other environmental disciplines, but with the added consideration of future climate change projections.

Table 9.33: Impacts Proposed to be Scoped out of the Morven Hawthorn Pit Grid Connection Project Assessment for Climate Change

Impact	Justification
The vulnerability of the MHPGC Project to climate change during the construction phase.	The construction phase for the onshore and offshore infrastructure (total expected duration of 4 years) will not be lengthy enough for significant climate change risks compared to the present-day baseline to occur. Industry standard health and safety practices with respect to risks such as heatstroke or storm events will be employed.
The in combination climate impacts of the MHPGC Project during the construction and decommissioning phases.	The construction phase for the onshore and offshore infrastructure (total expected duration of 4 years) are not considered to be lengthy enough for significant in combination impacts with climate change to occur. As with the construction phase, it is considered unlikely that the decommissioning phase would be lengthy enough for significant in combination impacts with climate change, beyond those considered for the operation and maintenance phase assessment.

9.5.7 Designed In Measures and Mitigation

9.5.7.1 As part of the project design process, a number of designed in measures (primary and tertiary) will reduce the potential for impacts on climate change (Table 9.34). As there is a commitment to implement these measures, they are considered inherent to the design of the MHPGC Project. The determination of magnitude and significance will assume the implementation of such measures. Some of these measures are considered standard industry practice for this type of development.

9.5.7.2 The requirement for any additional (secondary) mitigation measures will be dependent on the significance of the impacts on climate change receptors. The requirement for and feasibility of any mitigation measures will be consulted upon with statutory consultees throughout the EIA process.

Table 9.34: Designed in Measures of the Morven Hawthorn Pit Grid Connection Project, Relevant to Climate Change

Reference Number	Designed in Measures	Justification	Primary or Tertiary
MM-16	Incorporate circular economy considerations into the MHPGC Project via a Construction Environmental	The MHPGC Project will adopt a circular economy approach (such as: recycled and reuse of materials, waste management, consolidation of vessel movements), with infrastructure elements to be recycled	T

Reference Number	Designed in Measures	Justification	Primary or Tertiary
	Management Plan (CEMP).	where practicable at the end of the operational lifetime.	

9.5.7.3 As the MHPGC Project constitutes energy transmission infrastructure associated with the Morven Offshore Wind Array Project, enabling the supply and transmission of renewable energy, climate change mitigation is an inherent aim and result of the MHPGC Project.

9.5.8 Proposed Assessment Methodology

9.5.8.1 The assessment methodology for the climate change chapter of the MHPGC EIA Report/ES will be as set out in Chapter 4: EIA Methodology, of the Scoping Report. Additionally, the following guidance will also be considered:

- Environmental Impact Assessment Guide 'Assessing Greenhouse Gas Emissions and Evaluating Their Significance' (IEMA, 2022);
- IEMA Guidance on Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation (IEMA, 2020).

Impact on Climate Change

9.5.8.2 The climate change assessment will take into account the IEMA EIA Guide 'Assessing Greenhouse Gas Emissions and Evaluating their Significance' (IEMA, 2022) and any updates to this guidance that may be published by IEMA at the time of assessment. It will be undertaken on a lifecycle basis, calculating the GHG emissions associated with the construction, O&M and decommissioning of the MHPGC Project.

9.5.8.3 GHG emissions would contribute to the impact of global climate change. The guidance suggests that, in principle, any additional GHG emissions may be considered significant and recommends that GHG emissions should be reported using an appropriate and proportionate level of detail.

9.5.8.4 The sensitive receptor will be defined as the global atmospheric concentration of GHGs, and it will be characterised as having a 'high' sensitivity, given the severe consequences of climate change.

9.5.8.5 There are no clear, generally agreed, thresholds or methods for evaluating the significance of GHG impacts in EIA. The IEMA guidance recommends contextualising a development's GHG impacts, for example on a sectoral basis or compared to the UK's national carbon budget.

9.5.8.6 It is considered that broadly speaking, the significance of the MHPGC Assets GHG emissions can be contextualised in the following ways:

- with reference to the absolute magnitude of net GHG emissions as a percentage of the UK's national carbon budget;
- through considering any increase/reduction in absolute GHG emissions compared with baseline scenarios;

- with reference to whether the MHPGC Project contributes to and is in line with the UK's national carbon budget sectoral goals for GHG emissions reduction, which are consistent with science-based commitments to limit global climate change to an internationally agreed level.

9.5.8.7 Considering these factors, impacts may be described as: major adverse, moderate adverse, minor adverse, negligible, or beneficial. Minor adverse and negligible impacts are considered to be not significant in EIA terms. The remaining levels of impact (major adverse, moderate adverse, beneficial) are considered to be significant in EIA terms. The evaluation of significance will be carried out in accordance with the guidance (listed at paragraph 9.5.8.1), which will include the application of professional judgement to contextualise and determine levels of significance in a way that makes clear the relationship between the MHPGC Project's net GHG balance, and a reduction trajectory consistent with measures required in the UK to meet our Nationally Determined Contribution (NDC) towards the Paris Agreement's 1.5°C target (HM Government, 2020), as reaffirmed in 28th Conference of the Parties to the United Nations Framework Convention on Climate Change (COP28) (United Nations Framework Convention on Climate Change, 2023).

9.5.8.8 The main sources of GHG emissions arising from the construction, O&M and decommissioning of the MHPGC Project would be:

- embodied carbon of materials used for construction and maintenance of the MHPGC Project;
- fuel/energy use by vessels and vehicles associated with the construction, O&M and eventual decommissioning of the MHPGC Project;
- GHG emissions arising from land use and seabed change as a result of the MHPGC Project.

Climate Change Resilience and Adaptation

9.5.8.9 The IEMA Guidance on EIA Guide to: Climate Change Resilience and Adaptation (IEMA, 2020) identifies that there are two key strands to addressing climate adaptation issues within the MHPGC Project's EIA Report/ES;

- the risks from changes in the climate to the project (i.e. the resilience or conversely the vulnerability of the MHPGC Project to future climate changes);
- the extent to which climate exacerbates or ameliorates the impacts of the MHPGC Project on the environment (i.e. 'in combination' impacts).

9.5.8.10 A high level screening risk assessment would be undertaken, considering the hazard, potential severity of impact on the MHPGC Project and its users, probability of that impact, and level of influence the design can have on the risk. Where potentially significant risks are identified at the high level screening stage prior to any mitigation, further assessment would be undertaken with consideration of appropriate designed in mitigation to determine whether significant residual risks are likely.

9.5.8.11 Consideration of the in combination climate impacts shall be considered within each topic chapter as to how potential climatic changes may affect the future baseline, including the sensitivity or resilience of receptors. The Climate Change Chapter will

cross-reference other relevant chapters as necessary to indicate where impacts are addressed.

9.5.9 Potential Cumulative Impacts

9.5.9.1 Cumulative effects with the Morven Offshore Wind Array Project and the second grid connection project in the Branxton area Southeast Scotland will be considered, together with cumulative effects with other developments, where relevant.

9.5.9.2 All developments which emit GHGs have the potential to impact the atmospheric mass of GHGs as a receptor, and so may have a cumulative impact on climate change. Consequently, cumulative impacts due to other development projects are not individually identified but would be taken into account when evaluating the impact of the MHPGC Project by defining the atmospheric mass of GHGs as a high sensitivity receptor.

9.5.9.3 However, consideration of the net impact of the MHPGC Project's transmission infrastructure alongside the Morven Array Project's offshore wind turbines and associated infrastructure will be necessary to ensure the cumulative carbon and net emissions associated with both the generation and transmission elements of the OWF Project are assessed. As such, the MHPGC Project will need to consider the cumulative impacts of the MHPGC Project together with the Array Project it enables. This cumulative assessment will consider the whole life emissions arising from each Project, including the avoided emissions associated with the displacement of marginal electricity generation sources that would be enabled by the MHPGC Project, contributing towards the UK's net zero target.

9.5.10 Potential Inter-related Effects

9.5.10.1 The EIA will consider inter-related effects arising from the MHPGC Project, across their own phases (project lifetime) and different effects on one receptor in one phase (receptor led). The EIA will consider inter-related effects of multiple impacts from the construction, O&M and decommissioning phases of the MHPGC Project, affecting one receptor. Inter-related effects will be assessed through consideration of all effects on a receptor, considering both spatial and temporal overlap, within the MHPGC Project. This will ensure that the MHPGC Project is appropriately considered within the EIA and in line with Chapter 4: EIA Methodology, of the Scoping Report.

9.5.10.2 The inter-related effects (i.e. in combination climate impacts) of climate change during the construction, O&M and decommissioning of the MHPGC Project will be considered individually within the relevant topic chapters of the MHPGC Project EIA Report/ES. Each topic chapter will assess how climate change may affect the future baseline scenario, including the sensitivity and/or resilience of identified receptors.

9.5.11 Potential Transboundary Impacts

9.5.11.1 There is potential for transboundary impacts upon climate change due to construction, O&M and decommissioning impacts of the MHPGC Project.

9.5.11.2 All developments which emit GHGs have the potential to impact the atmospheric mass of GHGs as a receptor, and so may have a transboundary impact on climate change. Each country has its own policy and targets concerning carbon and climate

change which are intended to limit GHG emissions to acceptable levels within that country's defined budget and international commitments.

10 Other Environmental Topics

10.1 Topics Covered Elsewhere

10.1.1 Introduction

10.1.1.1 To avoid duplication and ensure a proportionate Environmental Impact Assessment (EIA) process, the following topics are not proposed to be subject to stand alone chapters or appendices within the EIA Report/Environmental Statement (ES). These environmental topics are already covered within other chapters of the Morven Hawthorn Pit Grid Connection Project (hereafter referred to as 'MHPGC Project') Scoping Report. Therefore, no further assessment is required.

10.1.2 Other Residues and Emissions

10.1.2.1 The potential impacts of residues and emissions (e.g. dust, pollutants, light, noise, vibration) arising from the construction, Operation and Maintenance (O&M), and decommissioning of the offshore and onshore elements of the MHPGC Project will be considered in the following topic chapters of the EIA Report/ES where relevant:

- Ground Conditions and Contamination: (impacts of emissions/residues to land on soil quality);
- Water Resources and Flood Risk (impacts of surface water run-off on water quality and flood risk);
- Terrestrial Ecology and Ornithology (intertidal and onshore) (impacts of emissions to water, land or air and noise emissions on ecological receptors);
- Benthic Subtidal and Intertidal Ecology; fish and shellfish ecology; marine mammals and offshore ornithology (impacts of emissions to water and noise emissions on ecological receptors);
- Onshore Noise and Vibration (impacts of noise emissions and vibration);
- Onshore Air Quality (impacts of emissions to air, including dust and other pollutants).

10.1.2.2 On the basis that the potential impacts will be assessed in the relevant topic chapters of the EIA Report/ES, and in the interest of supporting proportionate EIA, it is proposed that a standalone chapter addressing the likely effects of emissions and residues is not required.

10.1.3 Material Assets

10.1.3.1 The potential impacts on material assets arising from the construction, O&M, and decommissioning of the MHPGC Project will be considered in the following topic chapters of the EIA Report/ES:

- Other Sea Users, Marine Infrastructure and Communications;
- Archaeology and Cultural Heritage;
- Land Use, Tourism and Recreation;
- Socio-economics.

10.1.3.2 On the basis that the potential impacts will be assessed in the relevant topic chapters of the EIA Report/ES, and in the interest of supporting proportionate EIA, it is proposed that a standalone chapter addressing the likely significant effects of the MHPGC Project on material assets is not required and should be scoped out of the EIA process.

10.1.4 Major Accidents and Disasters

10.1.4.1 The 2017 EIA Regulations require that significant effects be assessed on population and human health, biodiversity, land, soil, water, air and climate, material assets, cultural heritage and the landscape. These assessments will include, where relevant, significant effects arising from the vulnerability of the MHPGC Project to major accidents and disasters.

10.1.4.2 A major accident is an event that threatens immediate or delayed serious environmental effects to human health, welfare and/or the environment and requires the use of resources beyond those of the client or its appointed representatives to manage. Whereas a disaster is a natural or man-made hazard that has the potential to meet the definition of a major accident (IEMA, 2020).

10.1.4.3 A description of how major accidents and disasters have been considered in the design of the MHPGC Project will be outlined in the project description chapter of the Preliminary Environmental Information Report (PEIR) and EIA Report/ES.

Physical Environment

10.1.4.4 The physical environment topic chapters of the EIA Report/ES will consider the risk of major accidents and disasters relating to:

- Reduction in groundwater quality and quantity from spillages and presence of UXO:
  - Chapter 8.1: Ground Conditions and Contamination.
- Impact on quality of surface water and watercourses:
  - Chapter 8.2: Water Resources and Flood Risk.
- Increased flood risk:
  - Chapter 8.2: Water Resources and Flood Risk.
- The vulnerability of the MHPGC Project to climate change:
  - Chapter 9.5: Climate change.

Biological Environment

10.1.4.5 The biological environment topic chapters of the EIA Report/ES will consider the risk of major accidents and disasters relating to:

- Accidental pollution:
  - Chapter 7.4: Benthic Subtidal and Intertidal Ecology;
  - Chapter 7.5: Fish and Shellfish Ecology;
  - Chapter 7.6: Marine Mammals;
  - Chapter 8.3: Terrestrial Ecology and Ornithology.

Human Environment

10.1.4.6 The human environment topic chapters of the EIA Report/ES will consider the risk of major accidents and disasters relating to:

- Risk of vessel anchor and gear snagging:
  - Chapter 7.9: Shipping and Navigation.
- Reduction of under keel clearance:
  - Chapter 7.9: Shipping and Navigation.
- Reduction of emergency response capability and reduced access for Search and Rescue (SAR) responders:
  - Chapter 7.9: Shipping and Navigation.
- Impact of construction traffic on accidents and safety;
  - Chapter 8.5: Traffic and Transport;
  - Chapter 7.9: Shipping and Navigation.
- Impact of Abnormal Indivisible Loads on safety;
  - Chapter 8.5: Traffic and Transport.
- Impact of vessel to vessel collision;
  - Chapter 7.9: Shipping and Navigation.
- Impact of vessel allision;
  - Chapter 7.9: Shipping and Navigation.

10.1.5 Offshore Airborne Noise

10.1.5.1 The potential impacts from airborne noise arising from the construction, O&M, and decommissioning of the MHPGC Project will be considered in the following topic chapters of the EIA Report/ES:

- Offshore and Intertidal Ornithology;
- Human Health.

10.2 Topics Proposed to be Scoped Out

10.2.1 Introduction

10.2.1.1 This section summarises the approach for topics where an EIA Report/ES chapter is not proposed. It is proposed that these topics will not have standalone chapters as these topics have been scoped out of the EIA process, justifications are provided below.

10.2.2 Offshore Air Quality

10.2.2.1 Airborne pollutants (e.g. particulates) from offshore vessels associated with cable installation and maintenance activities are considered insignificant and greenhouse gas emission will be dealt with in Chapter 9.5: Climate Change, of the Scoping Report.

10.2.3 Daylight, sunlight and microclimate

10.2.3.1 The MHPGC Project will comprise offshore export cables, landfall, onshore export cables, a land substation (LSS) and associated infrastructure.

10.2.3.2 The above ground elements will not exceed 30m for permanent infrastructure and thus would not be sufficiently tall or close to other buildings to result in significant effects in relation to daylight and sunlight. In addition, given the nature of the offshore and onshore elements of the MHPGC Project, these are not likely to result in microclimate changes and therefore this topic is proposed to be scoped out of the EIA.

10.2.3.3 The effects of the MHPGC Project on climate change would be considered separately in a Climate Change chapter of the EIA Report/ES, as described in Chapter 9.5: Climate Change, of the MHPGC Scoping Report.

10.2.4 Heat and Radiation

Heat

10.2.4.1 Construction, O&M, and decommissioning of the MHPGC Project are unlikely to generate significant levels of heat.

10.2.4.2 The technical specification of the LSS will consider any heat generated within the design and this would, as is usual practice, prevent any overheating or heat effects.

10.2.4.3 With these measures in place, it is not considered likely that significant effects in relation to heat will occur.

Radiation

10.2.4.4 Electromagnetic Fields (EMFs) are part of the natural world, and are also produced wherever electricity is generated, transmitted or used. Public exposure to power-frequency EMFs comes from a range of sources and exposure to static EMFs comes from the earth's natural magnetic field, atmospheric electrical field, and human sources. It is considered that activities required to facilitate construction and decommissioning of the offshore and onshore elements of the MHPGC Project would generate negligible levels of EMFs.

10.2.4.5 O&M of the offshore and onshore export cables and LSS would produce EMFs due to the voltage and flow of current through electrical infrastructure.

10.2.4.6 The United Kingdom (UK) Government (DECC, 2012) has adopted the 1988 Guidelines for Limiting Exposure to Electromagnetic Fields produced by the International Commission on Non-ionising Radiation Protection (ICNIRP, 1988). This guidance was subsequently updated in the form of the 2020 Guidelines (ICNIRP, 2020).

10.2.4.7 EMF strengths drop rapidly with distance from the source. The distances will depend on voltage but, in general, the strength of a magnetic field is well within international guidelines within a few metres. Underground cables do not produce an external electric field at ground level due to the shielding of the cable sheath and burial material.

10.2.4.8 Due to the distance between the LSS components and the closest publicly accessible point (the perimeter fence), the greatest EMFs exposure in the vicinity of substations

is typically from the overhead lines or underground cables entering and exiting them. Perimeter fencing provides screening of the electric field and this would not be expected to exceed the public exposure guidelines.

10.2.4.9 All of the electrical infrastructure associated with the offshore and onshore elements of the MHPGC Project would be designed to comply with current guidelines on levels of public exposure and design of electrical infrastructure.

10.2.4.10 Based on the information above it is proposed that a standalone chapter addressing heat and radiation is not required and should be scoped out of the EIA process.

10.2.5 Major Accidents and disasters

10.2.5.1 Potential impacts from the Onshore MHPGC Project that are scoped out of the assessment are outlined below, with justification as to why effects are not likely to be significant. Impacts that are assessed as part of other environmental assessments are outlined in section 10.1.4.

Accidents during Construction and Decommissioning

10.2.5.2 The potential for accidents to occur during the construction or demolition processes will be identified and dealt with through appropriate risk assessment and mitigation (applying the hierarchy of controls) as required to comply with UK health and safety legislation and environmental legislation. The CoCP will require risk assessment of construction activities (including any necessary earthworks or demolition activities) and this assessment shall identify and mitigate, where necessary, the potential impact of all major accidents or disasters, including those affecting non-human receptors. These risk assessments shall account for adverse weather and prevailing environmental conditions.

10.2.5.3 The potential major accidents arising from construction and decommissioning activities on the environment and human populations include collapse of excavations, fire during construction, accidents during testing/commissioning or the collapse of a crane/piling rig. Whilst most of these accidents would affect, at most, one or two workers, a structural collapse or fire during construction could affect more workers (up to 10), (although they are unlikely to affect members of the public as the construction activities will be segregated).

10.2.5.4 Under the Construction Design and Management (CDM) Regulations, all structures must be designed so that they can be built and maintained safely, the designer must also 'design out' hazards where possible, by applying the hierarchy of controls and will produce a designer's risk assessment to inform the construction contractors. The construction process must be managed to take account of the risks to people affected by the work, including the public. These include measures to manage fire risk, electrical hazards, structural integrity (including excavations). This must be documented in a CDM Design Risk Register. This ensures that the risk of such effects occurring is extremely low and will be reduced to As Low As Reasonably Practicable (ALARP). This process will be managed by the construction contractor.

10.2.5.5 Construction or decommissioning accidents are also work-related accidents that could generally affect only one or two workers carrying out the task, the effects of which, do not extend to receptors within the wider environment. Under UK Health

and Safety legislation, employers are required to manage the risk to their employees and others who could be affected by their activities and ensure that the risk is reduced to ALARP. The ALARP principle requires compliance with good practice as a minimum.

10.2.5.6 Therefore, the assessment of construction and decommissioning accidents is scoped out.

Accidents during O&M

10.2.5.7 The cable will be buried during normal operation and as such the cable route will be unoccupied. The LSS will be monitored during periods of maintenance and during normal operation to ensure the safe and effective operation of the MHPGC Project.

10.2.5.8 Maintenance accidents are work-related accidents that could affect only one or two workers carrying out the task, the effects of which, do not extend to receptors within the wider environment. Under UK Health and Safety legislation, employers are required to manage the risk to their employees and others who could be affected by their activities and ensure that the risk is reduced to ALARP. The ALARP principle requires compliance with good practice as a minimum.

10.2.5.9 The facility will be designed with consideration of the potential occupational health and safety hazards such as electrocution, falls from height and trip hazards. These will be mitigated through application of the hierarchy of controls such as hazards will be designed out or minimised where practicable, and appropriate measures to prevent and mitigate residual risks implemented. All staff who undertake maintenance on the system will be suitably qualified and experienced professionals, with appropriate training for work on high voltage (HV) electrical equipment. The location of the LSS has no material impact on the residual risk of a workplace accident occurring during maintenance, and the risk is comparable to the several hundred other HV substations in use around the country.

10.2.5.10 Therefore, the assessment of O&M accidents is scoped out.

Construction Impacts on Existing Services

10.2.5.11 The excavation of the trench for the cable route has the potential to impact on existing buried services including power, water, telecommunications, gas and sewer. The construction working areas will be secured so that there is no public access which will protect them from harm, however in the event of impacting an existing service, a small number of project workers could suffer serious or fatal injuries.

10.2.5.12 There are two existing gas pipelines located within the MHPGC Project Scoping boundary (one running parallel to the B1280 near White Hill and the other in the vicinity of the A1018 near Ryhope, both operated by Northern Gas Networks). No other Major Accident Hazard Pipelines have been identified. There are likely to be an array of local services, including water, sewer, gas and power, which will need to be avoided or relocated as part of the cable route design. In line with Industry Good Practice and the CDM requirements described above, a competent Principal Designer will be appointed who will ensure that all existing services have been identified and that the design of the cable route will provide a safe means of crossing, which shall be agreed with the asset owner.

10.2.5.13 Therefore, the assessment of construction impact on existing services has been scoped out.

Impacts on Transport Networks and Network Impacts on Cable

10.2.5.14 The cable route will cross several roads and a railway line in the northern and central cable route corridors. It is anticipated that other than for minor (unclassified) roads, these will likely be crossed using trenchless techniques, where practicable, to minimise the potential impact on these networks.

10.2.5.15 At a crossing point the MHPGC Project would be designed, such that the underground cables would be protected from any rail or road accidents, and likewise that the cables would not lead to rail or road accidents. It is noted that there are a large number of electrical cables which are buried in public highways in the UK, and experience gained over many decades ensures that the risk of damage by traffic collisions on the road surface is negligible.

10.2.5.16 On this basis, it is proposed to scope out the impact for the potential for transport networks to cause a major accident, or for the cable installation and presence to cause any rail or road accidents.

Impacts on Mines and Storage Caverns

10.2.5.17 There have been no storage caverns identified or past/possible previous shallow coal working areas or any past or current surface mining according to the Coal Authority Maps, so there is no receptor to affect. Therefore, impacts on mines and storage caverns is scoped out.

Third Party Damage

10.2.5.18 The onshore cables will be buried from the landfall to the LSS and will come above the surface within the fenced perimeter of the LSS compound. Except where trenchless crossings are used, the buried cables will have a burial depth of between 1 and 3m for the majority of the cable route, which will provide a significant level of protection against accidental damage. Where trenchless crossings are used, the burial depth could be up to 25m below the surface.

10.2.5.19 In line with Industry Good Practice for HV electricity distribution, protective provisions will be taken over the cables which will prevent the construction of structures, planting of trees or hedgerows and the use of deep farming equipment to prevent accidental damage. The whole cable will also be subject to periodic inspection to ensure these provisions are adhered to. The route of the cable will also be available for utilities searches to ensure that any persons undertaking construction works in the area are able to identify the cable route and avoid it.

10.2.5.20 These provisions are comparable to the extensive existing HV electrical network in the UK, and therefore the risk of third party damage is not considered to be significantly different in this location than any other comparable location. Assessment of third party damage is therefore, scoped out of the assessment.

Aircraft Crash

10.2.5.21 The risk of an aircraft crash impacting the MHPGC Project is considered to be low. The MHPGC Project will be located 4km from the closest (civil) airfield.

External Major Accident - Chemicals

10.2.5.22 There are no control of major accident hazards (COMAH) establishments located within 5km if the MHPGC Project Scoping Boundary. There are no Major Accident Hazard Pipelines within the MHPGC Project Scoping Boundary according to the Health, Safety and Environment (HSE) Planning Web App.

External Major Accident - Nuclear

10.2.5.23 The nearest licensed nuclear site is the Hartlepool Nuclear Power Station which is 23km away from the MHPGC Project Scoping Boundary, and the Outline Emergency Planning Zone applied by Hartlepool Borough Council on the basis of risk to the public is 2.7km. Therefore, the risk of an external major accident from a nuclear facility is scoped out.

Loss of Utilities

10.2.5.24 During the construction and operation of the MHPGC Project, there will be a reliance on utility systems to provide services to the MHPGC Project. For example, electricity will be required for lighting, and powering control systems for operation of the LSS, it may also be used to provide heating and welfare facilities during construction. However, the loss of utility systems including water, power or telecommunications will only lead to construction phase/operational inconvenience, but it will not lead to major accident level consequences, as all items will be designed to 'fail-safe' in the event of loss of utilities. Therefore the assessment of loss of utilities is scoped out.

Cyber-Attack

10.2.5.25 The National Risk Register (NRR) (HM Government, 2023) includes cyber-attacks as one of the types of terrorism which may affect the UK. The NRR highlights electricity infrastructure as one of the key potential targets. In recent years, other countries have seen successful cyber-attacks against power stations or grid infrastructure and the UK National Health Service (NHS) has also been a victim of a ransomware attack.

10.2.5.26 The MHPGC Project would have little cyber infrastructure which could be attacked; the only foreseeable consequence would be a malicious actor attempting to take control of the LSS and shut the system down, leading to a reduction in supply to the energy grid.

10.2.5.27 The design of the LSS and control systems would ensure that someone gaining access to the system could not remotely cause a major accident hazard by discharging electricity or causing a fire. It is anticipated that modern encryption methods would be embedded in the design of this facility and would therefore present a more difficult target than existing electrical grid infrastructure. There are several hundred existing HV substations across the grid network in the UK, on the basis that the MHPGC Project will comply with National Grid design standards, it is expected that the risk of cyber-attack at the MHPGC Project is no greater than any other part of the Grid. Therefore the assessment of cyber-attack is scoped out.

Terrorism

10.2.5.28 Terrorism is the act of inflicting violence as a means of inflicting terror for political reasons. At the time of writing (August 2024), MI5 rates the current UK-wide threat level as Substantial which means an attack in the UK is considered 'likely'. The NRR for the UK lists various types of terrorist attack as potential major accidents including attacks on publicly accessible locations, transport systems, infrastructure, as well as Chemical, Biological, Radiological or Nuclear (CBRN) or Cyber-attacks.

10.2.5.29 The MHPGC Project is not a publicly accessible location or transport system; it is also does not represent a potential target or vector for a CBRN attack.

10.2.5.30 The Centre for the Protection of National Infrastructure (CPNI) sets the definition of Critical National Infrastructure (CNI). Security provisions have already been allowed for within the design of the MHPGC Project and consideration will be given to the appropriate additional measures if the MHPGC Project is designated as CNI (see DESNZ, 2024). Therefore the assessment of terrorism is scoped out.

Widespread Public Disorder

10.2.5.31 The National Risk Register states that public disorder 'may be caused by a combination of long standing grievances and a spontaneous response to a single incident.'

10.2.5.32 The UK is a developed economy with a stable democratic political regime, such that prolonged civil unrest is considered extremely unlikely. Periodically, political protests may turn violent, but these are rarely widespread and are usually in response to a 'precipitating event'.

10.2.5.33 As the MHPGC Project represents a fundamental element in increasing the contribution of renewable technologies to the UK energy mix and a step forward in the UK's drive to a Net Zero Carbon economy, it is not considered that the MHPGC Project is likely to be either a target or a precipitating event for widespread public disorder. Therefore the assessment of widespread public disorder is scoped out.

Biological Threats (e.g. Disease Epidemics, Animal Diseases)

10.2.5.34 The MHPGC Project will not materially alter the populations who may be exposed to biological threats, nor will it increase or decrease their likelihood, as the construction populations will be small. The MHPGC Project will not therefore materially alter the background risk of biological threats.

10.2.5.35 Any impacts that these threats may have on the MHPGC Project such as temporary cessation of construction or requirements for social distancing measures as were required for the Coronavirus pandemic are not considered to be major accidents. Therefore, the assessment of biological threats is scoped out.

Lightning

10.2.5.36 The majority of the infrastructure will be buried and therefore at negligible risk of a lightning strike.

10.2.5.37 The potential consequences of a lightning strike on the LSS are likely to be restricted to damage to the building and potential injury to any workers who may be present.

10.2.5.38 The MHPGC Project will be provided with adequate lightning protection designed to a recognised industry standard. Therefore, the assessment of lightning is scoped out.

Seismic

10.2.5.39 The UK does not typically experience significant seismic activity. The design of the MHPGC Project will account for any foreseeable loads (e.g. due to seismic activity in line with British Standards). It is therefore considered there are no significant effects arising from seismic hazards. Therefore the assessment of seismic hazards is scoped out.

Space Weather

10.2.5.40 Severe space weather is divided into three categories in the NRR: Solar flares, solar energetic particles and coronal mass ejections. These have the capacity to cause a loss of power or interference with satellite or radio based communication technologies. Whilst these events affecting the UK are extremely rare, they are known to have occurred multiple times in the last century (Malik, 2022).

10.2.5.41 The only foreseeable impact to the MHPGC Project is a temporary loss of power or telemetry systems. Good engineering design practices will ensure that in the event of loss of services (power or communications), the MHPGC Project will be maintained in a safe condition.

10.2.5.42 It is noted that the MHPGC Project is no more vulnerable than other similar infrastructure which comprises the UK electrical grid across the UK, and much less than vulnerable than other industries which have a more onerous reliance on satellites such as aviation.

10.2.5.43 As space weather does not have the capacity to cause a major accident which may impact the MHPGC Project it is therefore not considered further.

11 Conclusions and Next Steps

11.1 Overview

11.1.1.1 An Environmental Impact Assessment (EIA) is being progressed for the Morven Hawthorn Pit Grid Connection Project (hereafter referred to as 'MHPGC Project') to understand the likely significant environmental effects of the proposal, supported by environmental and survey studies. This Scoping Report has been produced as part of that process. It has identified potentially significant effects associated with the construction, operation and maintenance (O&M) and decommissioning phases of the MHPGC Project on a range of receptors. These are detailed in chapters 7 to 10 of this Scoping Report.

11.1.1.2 Topics scoped in and out at this stage are summarised in Table 11.1.

Table 11.1: Overview of Technical Topics within this Scoping Report that have been Scoped In/Out

Topic	Scoped in (✓)/Scoped out (✖)
Environmental Topics and Potential Impacts- Offshore	
Physical Processes.	✓
Underwater Sound.	✓
Water Quality.	✖
Benthic Subtidal and Intertidal Ecology.	✓
Fish and Shellfish Ecology.	✓
Marine Mammals.	✓
Offshore and Intertidal Ornithology.	✓
Commercial Fisheries.	✓
Shipping and Navigation.	✓
Marine Archaeology.	✓
Other Sea Users, Marine Infrastructure and Communications.	✓
Environmental Topics and Potential Impacts- Onshore	
Ground Conditions and Contamination.	✓
Water Resources and Flood Risk.	✓
Terrestrial Ecology and Ornithology.	✓
Archaeology and Cultural Heritage.	✓
Traffic and Transport.	✓
Onshore Noise and Vibration.	✓

Topic	Scoped in (✓)/Scoped out (×)
Onshore Air Quality.	✓
Land Use, Tourism and Recreation.	✓
Combined Offshore and Onshore	
Landscape and Visual Impact Assessment.	✓
Aviation (Military and Civil) Radar.	✓
Socio-economics.	✓
Climate Change.	✓
Human Health.	×
Major Accidents and Disasters.	×

11.2 Cumulative Effects Summary

11.2.1.1 A cumulative effects assessment will be undertaken per the methodology outlined in Chapter 4: EIA Methodology of this Scoping Report to support the EIA Report/Environmental Statement (ES).

11.2.1.2 Projects and activities that will be considered within the cumulative effects assessment include:

- assessment with the Morven Offshore Wind Array Project and the second grid connection project in the Branxton area Southeast Scotland;
- other offshore wind projects and their associated cabling and infrastructure;
- onshore wind and solar farms;
- other forms of cabling (e.g. telecommunications and interlinks);
- shipping and navigation;
- marine aggregate extraction and dredge disposal;
- coastal developments.

11.3 Transboundary Impacts

11.3.1.1 Topics that have been screened for further consideration in the ES/EIA Report include:

- fish and shellfish ecology;
- marine mammals;
- offshore and intertidal ornithology;
- shipping and navigation;
- climate change;
- commercial fisheries.

11.4 Consultation

11.4.1.1 Before an application for a Development Consent Order (DCO) is submitted to the Secretary of State extensive consultation with key stakeholders (local authorities, statutory bodies, local communities and interest groups) is required. The proposed approach to stakeholder consultation during the pre-application phase is outlined in Chapter 5: Consultation Process, of the Scoping Report.

11.4.1.2 Feedback provided within the Scoping Opinion, co-ordinated by the Secretary of State and Marine Directorate Licensing Operations Team (MD-LOT) in their respective Scoping Opinions, will be taken into account as part of the EIA process for the MHPGC Project. In addition to seeking a Scoping Opinion from each of the regulators, the Applicant has carried out non-statutory consultation, and plans follow up consultation. Details of the consultation event as well as the virtual exhibition is accessible via the project website: www.morvenoffshorewind.com/. A number of future events are proposed, which are likely to include online events, public exhibitions and pop-up events. Anyone who could potentially be affected by, or may have an active interest in, the MHPGC Project are encouraged to participate.

11.5 Next Steps

11.5.1.1 Consultees are invited to consider the information presented in this Scoping Report and advise on whether or not they agree with the conclusions. Several broad questions are presented below to encourage reflection of the key elements discussed in this Scoping Report:

- Are there any additional baseline data sources available that could be used to inform the EIA?
- Does the reader agree that the proposed study areas are appropriate for each of the EIA topics?
- Have all potential impacts likely to give rise to significant effects resulting from the MHPGC Project been identified for each of the EIA topics within this Scoping Report?
- Does the reader agree with the impacts to be scoped in, and out, of the assessment?
- For those impacts scoped in, does the reader agree that the methods described are sufficient to inform a robust impact assessment?
- Are there any specific developments or infrastructure schemes which should be taken into account when considering potential cumulative impacts?

11.5.1.2 Following receipt of Scoping Opinions from the Secretary of State and MD-LOT, a Preliminary Environmental Information Report (PEIR) is planned to be produced and consulted upon within England. The PEIR will provide an initial statement of the environmental information available for the MHPGC Project, including descriptions of the likely environmental effects and measures adopted as part of the project. The PEIR is intended to allow statutory consultees, local communities and interested parties to understand the nature, scale, location and likely significant environmental effects of the MHPGC Project, such that they can make an informed contribution to

the process of pre-application consultation under the Planning Act 2008 and to the EIA process.

11.5.1.3 The EIA will have regard to consultation responses and expects it will further refine the MHPGC Project based upon the consultation responses received from the pre-application consultation in addition to environmental constraints identified during the EIA process. The final results of the EIA will be presented in an ES/EIA Report and a summary of all consultation responses received will be presented in a Consultation Report, both of which will accompany the applications for development consent and marine licence which are planned to be submitted to the Secretary of State and MD-LOT, respectively, in 2026.

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Appendix A Designed in Measures and Mitigation Log

A.1 Introduction

A.1.1.1 This appendix provides a summary of the designed in measures and mitigation measures which have been committed to by the Applicant and considered in the Morven Hawthorn Pit Grid Connection Project (hereafter referred to 'MHPGC Project') Scoping Report. These are detailed in each technical chapter and summarised in Table A. 1 below.

A.1.1.2 Therefore, the Environmental Impact Assessment (EIA) can be undertaken assuming these measures will be implemented and as a result, potential effects that might arise prior to the implementation of designed in measures do not need to be identified as potential effects as there is no potential for them to arise (Institute of Environmental Management and Assessment (IEMA), 2016).

A.1.1.3 It is expected that the MHPGC Project Scoping Opinion and future stakeholder engagement will inform the development of mitigation measures. Therefore, the designed in measures and mitigation log will be updated throughout the EIA process.

Table A. 1: Morven Hawthorn Pit Grid Connection Project Designed In Measures and Mitigation Log

Reference	Proposed Development Phase	Mitigation and Monitoring Commitment	OFFSHORE											ONSHORE								COMBINED					Mitigation category (primary (P) or tertiary (T))
			Physical processes	Underwater sound	Offshore water quality	Benthic subtidal ecology	Fish and shellfish ecology	Marine mammals	Offshore ornithology	Other sea users and marine infrastructure	Shipping and navigation	Commercial fisheries	Marine archaeology	Ground Conditions and Contamination	Water Resources and Flood Risk	Terrestrial Ecology and Ornithology	Archaeology and Cultural Heritage	Traffic and Transport	Onshore Noise and Vibration	Onshore Air Quality	Land Use Tourism and Recreation	Seascape, Landscape and Visual Impact Assessment	Aviation and Radar	Socio-economics	Human Health	Climate Change	
MM-1	Decommissioning	A decommissioning plan will be prepared for the MHPGC Project in line with the latest relevant available guidance.												✓								✓					P
MM-2	Pre-construction	Where practicable, sensitive sites, including known archaeological remains and receptors such as Scheduled Monuments and Registered Parks and Gardens, will be avoided by the temporary and permanent MHPGC Project footprint. Where practicable micro-siting will be undertaken during detailed design to avoid sensitive areas and receptors.															✓										T
MM-3	Pre-construction	Where adverse effects to heritage assets cannot be avoided through design measures, secondary mitigation will be identified as part of the assessment process. It is anticipated that an overarching Project Design (a Written Scheme of Investigation (WSI)) would be produced and agreed with relevant consultees to set out a programme of archaeological investigation to mitigate															✓										T

Reference	Proposed Development Phase	Mitigation and Monitoring Commitment	OFFSHORE											ONSHORE								COMBINED					Mitigation category (primary (P) or tertiary (T))
			Physical processes	Underwater sound	Offshore water quality	Benthic subtidal ecology	Fish and shellfish ecology	Marine mammals	Offshore ornithology	Other sea users and marine infrastructure	Shipping and navigation	Commercial fisheries	Marine archaeology	Ground Conditions and Contamination	Water Resources and Flood Risk	Terrestrial Ecology and Ornithology	Archaeology and Cultural Heritage	Traffic and Transport	Onshore Noise and Vibration	Onshore Air Quality	Land Use Tourism and Recreation	Seascape, Landscape and Visual Impact Assessment	Aviation and Radar	Socio-economics	Human Health	Climate Change	
		effects to buried archaeological remains and built heritage.																									
MM-4	Construction, operation and maintenance, and decommissioning	Prior to the start of construction, the UK Hydrographic Office (UKHO) will be informed of the locations and estimated and actual dates of construction and operation activities, and the maximum height of any equipment to be used, to facilitate the promulgation of maritime safety information and updating of nautical charts and publications and to allow inclusion on Aviation Charts.										✓															T
MM-5	Construction, operation and maintenance, and decommissioning	Affected aviation stakeholders will be kept informed of the nature and timing of all phases of the MHPGC Project including construction start and end dates and the maximum height of construction equipment.																					✓				P
MM-6	Construction, operation and maintenance, and decommissioning	Development of, and adherence to, an Environmental Management Plan (EMP), including actions to minimise Invasive Non-Native Species (INNS), and a Marine Pollution Contingency Plan (MPCP), which will include planning for accidental spills,					✓																				T

Reference	Proposed Development Phase	Mitigation and Monitoring Commitment	OFFSHORE											ONSHORE								COMBINED					Mitigation category (primary (P) or tertiary (T))
			Physical processes	Underwater sound	Offshore water quality	Benthic subtidal ecology	Fish and shellfish ecology	Marine mammals	Offshore ornithology	Other sea users and marine infrastructure	Shipping and navigation	Commercial fisheries	Marine archaeology	Ground Conditions and Contamination	Water Resources and Flood Risk	Terrestrial Ecology and Ornithology	Archaeology and Cultural Heritage	Traffic and Transport	Onshore Noise and Vibration	Onshore Air Quality	Land Use Tourism and Recreation	Seascape, Landscape and Visual Impact Assessment	Aviation and Radar	Socio-economics	Human Health	Climate Change	
		address all potential contaminant releases and include key emergency details.																									
MM-7	Operation and maintenance	Placement of cable protection will be minimised as far as possible; however, a level of protection may be required at certain locations. Where rock protection is used, this will be evaluated and follow industry standard guidelines in terms of slope angle and rock grading. Secured through the Operation & Maintenance Plan (OMP).					✓					✓																P
MM-8	Construction, operation and maintenance, and decommissioning	Development of, and adherence to, an EMP, including actions to minimise INNS, and a MPCP, which will include planning for accidental spills, address all potential contaminant releases and include key emergency details.			✓																						T
MM-9	Construction, operation and maintenance, and decommissioning	Development of, and adherence to, an Environmental Management Plan (EMP), including actions to minimise Invasive Non-Native Species (INNS), and a Marine Pollution Contingency Plan (MPCP), which will include planning for accidental spills, address all potential				✓																					T

Reference	Proposed Development Phase	Mitigation and Monitoring Commitment	OFFSHORE											ONSHORE								COMBINED					Mitigation category (primary (P) or tertiary (T))
			Physical processes	Underwater sound	Offshore water quality	Benthic subtidal ecology	Fish and shellfish ecology	Marine mammals	Offshore ornithology	Other sea users and marine infrastructure	Shipping and navigation	Commercial fisheries	Marine archaeology	Ground Conditions and Contamination	Water Resources and Flood Risk	Terrestrial Ecology and Ornithology	Archaeology and Cultural Heritage	Traffic and Transport	Onshore Noise and Vibration	Onshore Air Quality	Land Use Tourism and Recreation	Seascape, Landscape and Visual Impact Assessment	Aviation and Radar	Socio-economics	Human Health	Climate Change	
		contaminant releases and include key emergency details.																									
MM-10	Construction, operation and maintenance, and decommissioning	Development and adherence to a Cable Specification and Installation Plan (CSIP) .	✓		✓	✓	✓					✓															T
MM-11	Construction, operation and maintenance, and decommissioning	Implementation, management and monitoring of cable protection (via burial or external protection where adequate burial depth, as identified via risk assessment, is not feasible) with any damage, destruction or decay of cables notified to MCA, NLB, Kingfisher and United Kingdom Hydrography Office (UKHO) no later than 24 hours after discovered.	✓		✓						✓	✓															P
MM-12	Construction	Installation of infrastructure over or adjacent to existing or future cables or pipelines will be subject to crossing or proximity agreements between the two parties, prior to the works commencing.								✓																	P
MM-13	Construction, operation and maintenance, and decommissioning	Development of, and adherence to, an Environmental Management Plan (EMP), including a Marine Pollution Contingency Plan							✓																		T

Reference	Proposed Development Phase	Mitigation and Monitoring Commitment	OFFSHORE											ONSHORE								COMBINED					Mitigation category (primary (P) or tertiary (T))
			Physical processes	Underwater sound	Offshore water quality	Benthic subtidal ecology	Fish and shellfish ecology	Marine mammals	Offshore ornithology	Other sea users and marine infrastructure	Shipping and navigation	Commercial fisheries	Marine archaeology	Ground Conditions and Contamination	Water Resources and Flood Risk	Terrestrial Ecology and Ornithology	Archaeology and Cultural Heritage	Traffic and Transport	Onshore Noise and Vibration	Onshore Air Quality	Land Use Tourism and Recreation	Seascape, Landscape and Visual Impact Assessment	Aviation and Radar	Socio-economics	Human Health	Climate Change	
		(MPCP), which will include planning for accidental spills, address all potential contaminant releases and include key emergency details.																									
MM-14	Construction	Cable installation in the nearshore will be undertaken using trenchless methods.							✓																		P
MM-15	Pre-construction	The MHPGC project will seek to minimise cable crossings through cable route selection.										✓															P
MM-16	Pre-Construction	Incorporate circular economy considerations into the MHPGC Project via a Construction Environmental Management Plan (CEMP).																								✓	T
MM-17	Construction	**I**mplementation of a CEMP which will set out quality control management measures.																		✓							T
MM-18	Pre-construction	Implementation of a CEMP which will set out control and management measures aimed at reducing noise, dust and visual instruction of construction works on historic environment receptors.															✓										T
MM-19	Pre-Construction, Construction	Implementation of a CEMP to minimise temporary disturbance to residential properties, recreational users												✓	✓												P

Reference	Proposed Development Phase	Mitigation and Monitoring Commitment	OFFSHORE											ONSHORE								COMBINED					Mitigation category (primary (P) or tertiary (T))
			Physical processes	Underwater sound	Offshore water quality	Benthic subtidal ecology	Fish and shellfish ecology	Marine mammals	Offshore ornithology	Other sea users and marine infrastructure	Shipping and navigation	Commercial fisheries	Marine archaeology	Ground Conditions and Contamination	Water Resources and Flood Risk	Terrestrial Ecology and Ornithology	Archaeology and Cultural Heritage	Traffic and Transport	Onshore Noise and Vibration	Onshore Air Quality	Land Use Tourism and Recreation	Seascape, Landscape and Visual Impact Assessment	Aviation and Radar	Socio-economics	Human Health	Climate Change	
		and existing land users and provide details of measures to protect environmental receptors.																									
MM-20	Construction	Implementation of a CEMP which will set out dust and air quality control management measures which would ensure that any risk of material effects on ecological features from dust emission is negligible.														✓											T
MM-21	Construction	An outline CEMP will be adopted which will include measures to minimise temporary visual disturbance to residential properties and tourists/visitor attractions.																				✓					T
MM-22	Construction	Development and adherence to a Construction Method Statement (CMS).			✓	✓	✓																				P
MM-23	Construction	In areas (or during periods of adverse weather) there may be the requirement to import aggregates to create a stable surface for construction traffic movements. Options such as bog matting and geotextiles will be considered by the principal contractor for sensitive sections of the route to reduce impact.													✓												T

Reference	Proposed Development Phase	Mitigation and Monitoring Commitment	OFFSHORE											ONSHORE								COMBINED					Mitigation category (primary (P) or tertiary (T))
			Physical processes	Underwater sound	Offshore water quality	Benthic subtidal ecology	Fish and shellfish ecology	Marine mammals	Offshore ornithology	Other sea users and marine infrastructure	Shipping and navigation	Commercial fisheries	Marine archaeology	Ground Conditions and Contamination	Water Resources and Flood Risk	Terrestrial Ecology and Ornithology	Archaeology and Cultural Heritage	Traffic and Transport	Onshore Noise and Vibration	Onshore Air Quality	Land Use Tourism and Recreation	Seascape, Landscape and Visual Impact Assessment	Aviation and Radar	Socio-economics	Human Health	Climate Change	
MM-24	Construction, Post-Construction	The existing land drainage regime will not be compromised as a result of construction. Land drainage systems will be maintained during construction and reinstated on completion. Temporary cut off drains will be installed parallel to the trench-line, before the start of construction, to intercept soil and groundwater before it reaches the trench. These field drains will discharge to local drainage ditches through silt traps, as appropriate, to minimise sediment release.													✓													P
MM-25	Construction	Geotextiles or other membranes may be used to temporarily control and minimise erosion or transport of sediment from construction sites in areas that are considered unprotected.													✓													P
MM-26	Construction	Drainage design to manage and, if necessary, treat surface water run off will be included in all elements of temporary and permanent infrastructure. Drainage design will follow the SuDS hierarchy with preference being given to local infiltration													✓													P

Reference	Proposed Development Phase	Mitigation and Monitoring Commitment	OFFSHORE											ONSHORE								COMBINED					Mitigation category (primary (P) or tertiary (T))
			Physical processes	Underwater sound	Offshore water quality	Benthic subtidal ecology	Fish and shellfish ecology	Marine mammals	Offshore ornithology	Other sea users and marine infrastructure	Shipping and navigation	Commercial fisheries	Marine archaeology	Ground Conditions and Contamination	Water Resources and Flood Risk	Terrestrial Ecology and Ornithology	Archaeology and Cultural Heritage	Traffic and Transport	Onshore Noise and Vibration	Onshore Air Quality	Land Use Tourism and Recreation	Seascape, Landscape and Visual Impact Assessment	Aviation and Radar	Socio-economics	Human Health	Climate Change	
		of surface water run off from new areas of hardstanding, where possible. Where the MHPGC Project intersects overland flow pathways or areas of known surface water flooding appropriate measures will be embedded into the design.																									
MM-27	Construction	All subsurface infrastructure will be designed to facilitate subsurface flow pathways to avoid any localised increases in groundwater flooding.												✓													P
MM-28	Construction	Construction and permanent development in flood plains will be avoided wherever possible. Where this is not possible (for example, the landfall locations) environmental measures will be developed to ensure the works are National Policy Statement compliant, including a sequential approach to siting of infrastructure and passing the Exception Test and Sequential Test where appropriate.												✓													P
MM-29	Construction	Dewatering of excavations will be undertaken in line with good practice. Effects of												✓													T

Reference	Proposed Development Phase	Mitigation and Monitoring Commitment	OFFSHORE											ONSHORE								COMBINED					Mitigation category (primary (P) or tertiary (T))
			Physical processes	Underwater sound	Offshore water quality	Benthic subtidal ecology	Fish and shellfish ecology	Marine mammals	Offshore ornithology	Other sea users and marine infrastructure	Shipping and navigation	Commercial fisheries	Marine archaeology	Ground Conditions and Contamination	Water Resources and Flood Risk	Terrestrial Ecology and Ornithology	Archaeology and Cultural Heritage	Traffic and Transport	Onshore Noise and Vibration	Onshore Air Quality	Land Use Tourism and Recreation	Seascape, Landscape and Visual Impact Assessment	Aviation and Radar	Socio-economics	Human Health	Climate Change	
		dewatering on potential receptors will be incorporated into the proposed approaches for each piece of infrastructure. Appropriate treatment will be installed before discharge to surface or groundwater. This will include the use of 'siltbusters' (or similar) before discharge to surface waters. Appropriate licences and permits will be applied for if required.																									
MM-30	Construction	Existing licensed abstractions and PWSs will be avoided where practicable; if any impacts are anticipated then appropriate measures will be put in place to avoid impact on the quantity and quality of the supply.													✓												P
MM-31	Construction	The MHPGC Project will be subject to standard good practice mitigation measures employed to avoid and minimise potential effects to habitats and species under the supervision of an Ecological Clerk of Works (ECoW). These would include (but not be exclusive to) the establishment of buffer zones to key habitats and species, seasonally														✓											T

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		sensitive construction, minimising the removal of vegetation, covering excavations overnight or providing a means of escape, and considered location of works. If necessary, suitable screening around working areas to avoid significant human disturbance.																									
MM-32	Construction, operation and maintenance, and decommissioning	Adherence to good practice guidance with regards to fisheries liaison (e.g. FLOWW, 2014;2015) including ongoing consultation with the fishing industry and Fisheries Industry Representatives (FIRs), as appropriate, and the appointment of a Fisheries Liaison Officer (FLO).									✓	✓															T
MM-33	Construction, operation and maintenance, and decommissioning	Development of a Fisheries Management and Mitigation Strategy (FMMS) and a Fisheries Liaison and Coexistence Plan (FLCP). The FMMS and FLCP will include details on the measures which are proposed to be implemented to minimise impacts on commercial fishing.										✓															T
MM-34	Operation and maintenance	Undertaking of post-lay and cable burial inspection surveys										✓															P

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		and monitoring with provision of “as installed” infrastructure locations to the Kingfisher Information Service, Offshore Renewable and Cable Awareness project (KISORCA). Secured through the Cable Specification and Installation Plan (CSIP), as part of the Operation & Maintenance Plan (OMP).																										
MM-35	Construction	All aspects of the construction work will be in accordance with the Health and Safety at Work Act (1974) and regulations made under the Act, and the Construction (Design and Management) Regulations 2015.												✓														T
MM-36	Construction, operation and maintenance, and decommissioning	The use of proven invasive species control and biosecurity measures to avoid the spread of INNS and contaminated materials would be applied.														✓												T
MM-37	Construction	The MHPGC Project will explore the use of previously developed land for permanent infrastructure to avoid land take on undeveloped (agricultural or other) land. Permanent development will be avoided on best and most																			✓							P

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		versatile agricultural land (Grades 1 or 2 or Subgrade 3a) with the aim of preserving the best quality agricultural land for its future food/biomass production capability and other soil functions (e.g. carbon storage and flood mitigation) where reasonably practicable.																									
MM-38	Construction	The MHPGC Project infrastructure will avoid tourist attractions and recreational facilities as far as is practicable.																			✓						P
MM-39	Construction	A lighting design of all temporary and permanent lighting proposed onshore will be developed once contractors are appointed; however, the principles of lighting design will be detailed at the time of application and informed by the joint guidance provided by the Bat Conservation Trust and Institution of Lighting Professionals (2018). The lighting design will take measures to minimise lighting usage, minimise light spill, use most appropriate wave lengths of light and locate lighting in the most appropriate locations.														✓						✓					P

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MM-40	Construction, operation and maintenance, and decommissioning	The implementation of Archaeological Exclusion Zones (AEZs) around sites identified as having a known important archaeological potential.											✓														P
MM-41	Pre-construction	All anomalies of archaeological potential to be considered during pre-construction activities and final design. If they are likely to be impacted, these anomalies would undergo further archaeological investigation. Should these anomalies prove to be of archaeological importance then future Archaeological Exclusion Zones (AEZs) may be implemented following consultation with Heritage Environment Scotland (HES) and Historic England (HE). Micro-siting of infrastructure and mooring lines to avoid known wrecks if practicable.											✓														P
MM-42	Pre-construction	Archaeologists to be consulted in advance of preconstruction site preparation activities and, if appropriate, to carry out watching briefs of such work.											✓														T
MM-43	Pre-construction and construction	Mitigation of unavoidable direct impacts on known sites of archaeological importance											✓														P

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		during pre-construction and construction activities. Options include i) preservation by record, ii) stabilisation and iii) detailed analysis and safeguarding of otherwise comparable sites elsewhere.																									
MM-44	Construction, operation and maintenance, and decommissioning	Development and adherence to a Written Scheme of Investigation (WSI) and Protocol for Archaeological Discoveries (PAD). Operational awareness of the location of those archaeological anomalies identified as having a low potential. Reporting through the agreed Protocol for Archaeological Discoveries (PAD) will be undertaken should material of potential archaeological interest be encountered.											✓														T
MM-45	Pre-construction	The identification and implementation of Temporary Archaeological Exclusion Zones (TAEZs) based on all available information including the stated positional accuracy, the recorded size of the target and the potential archaeological significance around those records for wrecks and obstructions outside of the											✓														P

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		survey data coverage but within the MHPGC Project boundary.																									
MM-46	Pre-construction	Archaeologists engaged by the Applicant to be consulted on survey specifications for, and data analysis of, future pre-construction geophysical surveys, geotechnical surveys, pre-construction Remotely Operated Vehicle (ROV) or diver surveys, and preconstruction site preparation activities. If appropriate, in monitoring/checking of data.											✓														P
MM-47	Pre-construction	Commitment to the ongoing monitoring, where appropriate, of known archaeological receptors through the acquisition of relevant spatial survey data. This monitoring will include the appropriateness of, and necessary adjustments to, AEZs through the lifetime of the MHPGC Project.											✓														P
MM-48	Pre-construction, construction	Where practicable, sensitive sites will be avoided by the temporary and permanent MHPGC Project footprint, including Special Protection														✓				✓	✓						P

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		Areas (SPAs), Special Areas of Conservation (SACs), SSSIs, National Nature Reserve (NNR), Local Nature Reserves, Local Wildlife Sites, Ancient Woodland, RSPB reserves, HPI and areas of consented development.																									
MM-49	Pre-construction, construction	Where practicable, sensitive sites will be avoided by the temporary and permanent onshore MHPGC Project footprint, including SSSIs, LNRs, LWSs, ancient woodland, areas of consented development, areas of historic landfill and other known areas of potential contamination, National Trust land, listed buildings and scheduled monuments.												✓													P
MM-50	Pre-construction, construction	Where practicable micro-siting will be undertaken during detailed design to avoid water and other features.												✓													T
MM-51	Construction	The permanent footprint of the land substation, landfall infrastructure and transition joint bays will be minimised to that required for the safe O&M of the equipment in order to minimise land take.																			✓						P

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MM-52	Pre-Construction	The MHPGC Project infrastructure will be sited to maximise the distance between permanent and temporary infrastructure and sensitive receptors.																	✓								P
MM-53	Pre-construction, construction	Where practicable micro-siting will be undertaken during detailed design to avoid sensitive areas and receptors.																	✓								P
MM-54	Pre-construction, construction	Where practicable, sensitive sites will be avoided by the temporary and permanent MHPGC Project footprint, including Heritage Coasts, AHLV, Ancient Woodland and Registered Parks and Gardens.																				✓					P
MM-55	Construction	All temporary construction access and contractor's compounds/laydown areas onshore will be sensitively sited to avoid and/or reduce and mitigate adverse landscape and visual effects. Following construction, these areas will be returned to previous conditions where reasonably possible in line with the measures set out in the CEMP.																				✓					T
MM-56	Pre-Construction	Development of, and adherence to, a Construction Noise Management Plan																	✓								T

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		(CNMP), including the adoption of Best Practicable Means (BPM) and good practice.																									
MM-57	Pre-Construction	The MHPGC Project land substation will be designed to minimise noise levels during operation.																	✓								P
MM-58	Construction	Trenchless installation methods will be used where practicable. Further work will be undertaken once the MHPGC Project has been defined in more detail to identify locations where the underground cable could be installed using trenchless installation methods. Trenchless methods will be used at the landfall.													✓			✓			✓	✓					P
MM-59	Construction	The onshore cable route will be completely buried underground for its entire length.													✓												P
MM-60	Construction	At sensitive crossing locations the working width will be reduced as far as practicable.													✓												P
MM-61	Construction	No blasting is anticipated to be required and trenchless crossings will be undertaken by non impact methods.													✓												P

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MM-62	Construction	Where trenchless techniques are not required or are not practical, the crossing of drainage ditches or engineered channels may be achieved by open cut techniques or the installation of culverts or bridges to allow water to continue flowing. Where this is the case, this will be done in accordance with advice notes, guidance documents and EA Pollution Prevention Guidelines (PPGs). Appropriate environmental permits or land drainage consents will be applied for works from the EA (for Main Rivers, works on or near sea defences/flood defence structures or in a flood plain) or from the LLFA (for Ordinary watercourse crossings).												✓													T
MM-63	Construction	The onshore cable will be constructed in discrete sections. The trenches will be excavated, the cable ducts will be laid, the trenches backfilled, and the reinstatement process commenced.												✓													T
MM-64	Construction	The typical construction working area will be 50m along												✓													P

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		the onshore cable route and 100m from the LSS to the grid connection to minimise the construction footprint.																									
MM-65	Construction	Underground cables will be used to connect from the landfall(s) transition joint bay to the MHPGC Project LSS. Cables are typically installed in ducts in a standard buried trench arrangement. This enables soils excavated during construction to be reinstated over the cables, enabling undeveloped agricultural land to return to this use during operation of the MHPGC Project. The use of joint bays along the cable route enables disturbance to soils during O&M to be minimised.																			✓	✓					P
MM-66	Construction	The working width of the temporary construction corridor will be reduced as far as practicable to avoid or minimise potential environmental effects on sensitive features identified along the onshore cable corridor.																				✓					P
MM-67	Operation and maintenance	The permanent width of the easement for the onshore																				✓					P

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		export cable route will be kept to the minimum width needed for safe access for cable maintenance or replacement purposes during operation of the MHPGC Project.																									
MM-68	Construction	Target trench depth is 1.6m. Deeper trenches may be required at specific crossing locations (such as watercourses). In sensitive areas, the amount of topsoil removed will be the width of the trenches only rather than across the entire temporary construction corridor.												✓													P
MM-69	Construction	Compliance with current industry guidance for pollution prevention during construction, including the use, storage and handling of fuels, oils, chemicals and contaminated water, and siting of any necessary storage areas away from sensitive receptors such as surface watercourses.												✓													T
MM-70	Pre-Construction	Prior to construction, an unexpected contamination protocol will be produced in line with UK statutory guidance (LCRM/CLR 11) to minimise the potential risks to human health												✓													T

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		and the water environment from any unexpected ground contamination. The protocol will take into account the requirements for the use of Personal Protective Equipment (PPE) and adoption of good practice methods during construction.																									
MM-71	Pre-construction	A Phase 1 Geoenvironmental Desk Study will be completed prior to submission of the EIA Report/ES to identify the potential for MHPGC Project to encounter areas of potential land contamination, this will develop the preliminary conceptual site model (i.e. the plausible sources, pathways and receptors of land contamination) and include a risk assessment to inform any further actions, such as intrusive ground investigation or remediation, needed to ensure that the land is suitable for the intended future use. This is in accordance with the LCRM requirement for a Tier 1: preliminary risk assessment as the first stage of land contamination assessment to determine whether there are											✓														T

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		any potentially unacceptable risks requiring further assessment/actions.																									
MM-72	Construction, O&M	During construction and O&M, refuelling of machinery will be undertaken within a designated area where spillages can be easily contained. Any tanks and pipework will be double skinned and provided with intermediate leak detection equipment. Areas at risk of spillage will be bunded and carefully sited to minimise the risk of hazardous substances entering the drainage system or local watercourses.													✓												T
MM-73	Pre-Construction, Construction, O&M, Decommissioning	In line with good practice, pollution prevention plans (PPPs) will be drawn up to detail how ground and surface waters will be protected in construction, O&M and Decommissioning. These will include information on the storage of any fuels, oils and other chemicals and pollution incidence response planning and measures for the protection of licenced abstractions and PWSs. This could include a monitoring													✓												P

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		regime associated with critical or very proximate receptors.																									
MM-74	Pre-construction, construction	The Public Rights of Way Management Plan (Prow MP) will identify appropriate management measures, potentially, including signage, condition surveys and diversions during construction and opportunities taken where possible to provide a diversion of similar or enhanced amenity.																✓				✓					P
MM-75	Construction, operation and maintenance, and decommissioning	Consultation with oil and gas operators and other energy infrastructure operators, as required.								✓																	T
MM-76	Construction, operation and maintenance, and decommissioning	Compliance of Project vessels with international marine regulations as adopted by the Flag State, including the International Regulations for Preventing Collisions at Sea (COLREGs) (International Maritime Organization (IMO), 1972/77) and the International Convention for the Safety of Life at Sea (SOLAS) (IMO, 1974) through the Navigation Safety and Vessel Management Plan.									✓																T
MM-77	Construction, operation and	Development of, and adherence to, an EMP,						✓																			T

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	maintenance, and decommissioning	including actions to minimise INNS, Marine Mammal Mitigation Protocol (MMMP) and a Marine Pollution Contingency Plan (MPCP), which will include planning for accidental spills, address all potential contaminant releases and include key emergency detail																								
MM-78	Construction, operation and maintenance, and decommissioning	A Vessel Management Plan (VMP) will be developed to reduce disturbance to marine mammal receptors from transiting vessels. Vessels will transit slowly through the MHPGC Project, and all vessel operators will adhere to the Scottish Marine Wildlife Watching Code (NatureScot, 2023) and Defra Marine and Coastal Wildlife Code (Defra, 2023).						✓																		T
MM-79	Construction, operation and maintenance, and decommissioning	A Vessel Management Plan (VMP) will be developed which will determine vessel routing to and from construction areas and ports to avoid areas of high risk.							✓																	P
MM-80	Construction, operation and maintenance,	Development of, and adherence to, a VMP and Navigational Safety Plan (NSP).										✓														T

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	and decommissioning																										
MM-81	Construction, operation and maintenance, and decommissioning	Timely and efficient distribution of Notices to Mariners (NtM), Kingfisher notifications and other navigational warnings of the position and nature of works associated with the MHPGC Project.								✓	✓	✓															T
MM-82	Pre-construction	Relevant policy guidance on water depth reduction will be followed during the planning and installation of the cable.									✓																T
MM-83	Pre-construction	Communication with relevant harbour authorities such as the Port of Sunderland will be undertaken when full details of the construction works are known, and a cable lay plan will be in place detailing specific procedures relating to cable installation works in busy shipping channels.									✓																T
MM-84	Construction, operation and maintenance, and decommissioning	Cable installation vessels and support vessels will display appropriate marks and lights, and, where possible, will broadcast their status on AIS at all times.									✓																T

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MM-85	Construction	Temporary aids to navigation will be deployed (if required).									✓															T
MM-86	Construction, operation and maintenance, and decommissioning	Passing vessels will be requested to maintain a ‘safe’ distance from installation vessels restricted in manoeuvrability. This will be monitored by guard vessels.									✓															T
MM-87	Construction	Guard vessel(s) will be deployed as required by risk assessment.									✓															T
MM-88	Construction	Compliance with Marine Guidance Note (MGN) 654 (Maritime and Coastguard Agency (MCA), 2021) and its annexes, where applicable.									✓															T
MM-89	Construction	Suitable cable design, including burial and cable separation distance, to minimise impact of Electromagnetic Field (EMF) and limit compass deviation to three-degrees for 95% of the MHPGC Project, and five-degrees for the remaining 5% of the MHPGC Project.									✓															P
MM-90	Operation and maintenance	Appropriate marking on UKHO Admiralty charts.									✓															T
MM-91	Construction	Marine coordination and communication to manage Project vessel movements.									✓															P

Reference	Proposed Development Phase	Mitigation and Monitoring Commitment	OFFSHORE											ONSHORE								COMBINED					Mitigation category (primary (P) or tertiary (T))
			Physical processes	Underwater sound	Offshore water quality	Benthic subtidal ecology	Fish and shellfish ecology	Marine mammals	Offshore ornithology	Other sea users and marine infrastructure	Shipping and navigation	Commercial fisheries	Marine archaeology	Ground Conditions and Contamination	Water Resources and Flood Risk	Terrestrial Ecology and Ornithology	Archaeology and Cultural Heritage	Traffic and Transport	Onshore Noise and Vibration	Onshore Air Quality	Land Use Tourism and Recreation	Seascape, Landscape and Visual Impact Assessment	Aviation and Radar	Socio-economics	Human Health	Climate Change	
MM-92	Construction, operation and maintenance, and decommissioning	Supply Chain Development Statement (SCDS) (bp/EnBW, 2022).																						✓			P
MM-93	Pre-Construction	Local Engagement Strategy.																						✓			P
MM-94	Pre-construction, construction	A Soil Management Plan will be implemented which will set out measures in accordance with current industry guidance for sustainable use of soils, including Defra (2009), Construction Code of Practice for the Sustainable Use of Soils on Construction Sites. In line with this guidance topsoil and subsoil will be stored in separate stockpiles. During construction topsoil and subsoil will be stored within the construction working corridor of the onshore export cable construction corridor. Any suspected or confirmed contaminated soils will be separated, contained and tested to allow a suitable use or disposal route for these soils to be identified to minimise the risk of cross contamination, of dust migration from stockpiles, or contaminated												✓	✓						✓						T

Reference	Proposed Development Phase	Mitigation and Monitoring Commitment	OFFSHORE											ONSHORE								COMBINED					Mitigation category (primary (P) or tertiary (T))
			Physical processes	Underwater sound	Offshore water quality	Benthic subtidal ecology	Fish and shellfish ecology	Marine mammals	Offshore ornithology	Other sea users and marine infrastructure	Shipping and navigation	Commercial fisheries	Marine archaeology	Ground Conditions and Contamination	Water Resources and Flood Risk	Terrestrial Ecology and Ornithology	Archaeology and Cultural Heritage	Traffic and Transport	Onshore Noise and Vibration	Onshore Air Quality	Land Use Tourism and Recreation	Seascape, Landscape and Visual Impact Assessment	Aviation and Radar	Socio-economics	Human Health	Climate Change	
		runoff/leachate from stockpiles impacting adjacent ground or nearby watercourses.																									
MM-95	Post-Construction	A Soil Management Plan will be implemented which will set out measures in accordance with current industry guidance for sustainable use of soils, including Defra (2009), Construction Code of Practice for the Sustainable Use of Soils on Construction Sites. In line with this guidance, post construction, the construction work areas (including temporary construction compounds and laydown areas) will be reinstated to pre-existing condition as far as reasonably practicable in line with DEFRA 2009 CoCP for the Sustainable Use of Soils on Construction Sites PB13298.												✓													T
MM-96	Construction	A Soil Management Plan will be implemented which will set out measures in accordance with current industry guidance for sustainable use of soils, including Defra (2009), Construction Code of Practice for the Sustainable Use of Soils on Construction Sites and will set out measures to ensure																				✓					T

Reference	Proposed Development Phase	Mitigation and Monitoring Commitment	OFFSHORE											ONSHORE								COMBINED					Mitigation category (primary (P) or tertiary (T))
			Physical processes	Underwater sound	Offshore water quality	Benthic subtidal ecology	Fish and shellfish ecology	Marine mammals	Offshore ornithology	Other sea users and marine infrastructure	Shipping and navigation	Commercial fisheries	Marine archaeology	Ground Conditions and Contamination	Water Resources and Flood Risk	Terrestrial Ecology and Ornithology	Archaeology and Cultural Heritage	Traffic and Transport	Onshore Noise and Vibration	Onshore Air Quality	Land Use Tourism and Recreation	Seascape, Landscape and Visual Impact Assessment	Aviation and Radar	Socio-economics	Human Health	Climate Change	
		good practice for handling of topsoil and subsoil in line with the guidance.																									
MM-97	Pre-construction, construction	An Outline Construction Traffic Management Plan (CTMP): outlining measures to mitigate the impact of construction traffic including construction traffic routing, staff travel options, consideration of road, rail, PRoW and watercourse crossings, highway condition surveys, traffic management measures (signage and banksmen for example) and scheduling of works to avoid other highways works if relevant. All road crossings will be agreed with the relevant highway authority. Road closures will be avoided where possible, and where they are required will be scheduled to avoid other local scheduled road works on the highways network.																✓									T
MM-98	Construction	An Abnormal Indivisible Loads (AIL) Access Study: This will outline AIL delivery route(s) and appropriate management and mitigation measures.																✓									T

Reference	Proposed Development Phase	Mitigation and Monitoring Commitment	OFFSHORE											ONSHORE								COMBINED					Mitigation category (primary (P) or tertiary (T))
			Physical processes	Underwater sound	Offshore water quality	Benthic subtidal ecology	Fish and shellfish ecology	Marine mammals	Offshore ornithology	Other sea users and marine infrastructure	Shipping and navigation	Commercial fisheries	Marine archaeology	Ground Conditions and Contamination	Water Resources and Flood Risk	Terrestrial Ecology and Ornithology	Archaeology and Cultural Heritage	Traffic and Transport	Onshore Noise and Vibration	Onshore Air Quality	Land Use Tourism and Recreation	Seascape, Landscape and Visual Impact Assessment	Aviation and Radar	Socio-economics	Human Health	Climate Change	
MM-99	Construction, operation and maintenance, and decommissioning	A low-order UXO disposal method (e.g. deflagration) will be considered for UXO disposal where appropriate.		✓																							P
MM-100	Construction	Vegetation (Trees/Woodland/Hedgerows) will be mapped (Vegetation Retention Plan or similar) to inform the construction works and retained where practicable. Ancient woodland will be retained with a minimum buffer of 25m from any surface construction works (>6m depth from trenchless installation). With regards to other woodland/trees, construction works will be reduced, where practical, to minimise tree loss and ensure protection of root zones. Hedgerows with trees/tree lines (including hedgerows deemed "important" under the Hedgerows Regulations 1997) which are crossed by the onshore export cable route will be notched (where practicable) to reduce landscape impacts. Vegetation may be coppiced/pruned rather than fully removed to allow access													✓							✓						P

Reference	Proposed Development Phase	Mitigation and Monitoring Commitment	OFFSHORE											ONSHORE								COMBINED					Mitigation category (primary (P) or tertiary (T))
			Physical processes	Underwater sound	Offshore water quality	Benthic subtidal ecology	Fish and shellfish ecology	Marine mammals	Offshore ornithology	Other sea users and marine infrastructure	Shipping and navigation	Commercial fisheries	Marine archaeology	Ground Conditions and Contamination	Water Resources and Flood Risk	Terrestrial Ecology and Ornithology	Archaeology and Cultural Heritage	Traffic and Transport	Onshore Noise and Vibration	Onshore Air Quality	Land Use Tourism and Recreation	Seascape, Landscape and Visual Impact Assessment	Aviation and Radar	Socio-economics	Human Health	Climate Change	
		and visibility splays at junctions.																									
MM-101	Pre-construction, construction	Vegetation removal will be undertaken in line with British Standard (BS) 5837-2012 (Trees in relation to design, demolition and construction) including any root protection measures.														✓						✓					T
MM-102	Pre-construction, construction	Onshore condition surveys and inspections of vegetation to be retained (trees, hedgerow, woodland) will be undertaken before, during and after the construction phase. If damage has been identified during the construction phase, the damage will be repaired.														✓						✓					T
MM-103	Pre-construction, Construction	The LEMP will be developed to reinstate landscape and ecological elements (e.g. trees, woodland and hedgerows) which have been removed as a result of construction works, including construction compounds and construction access. The LEMP will be developed to mitigate landscape and visual effects and where possible, protect landscape character, key characteristics and elements,														✓						✓					P

Reference	Proposed Development Phase	Mitigation and Monitoring Commitment	OFFSHORE											ONSHORE								COMBINED					Mitigation category (primary (P) or tertiary (T))
			Physical processes	Underwater sound	Offshore water quality	Benthic subtidal ecology	Fish and shellfish ecology	Marine mammals	Offshore ornithology	Other sea users and marine infrastructure	Shipping and navigation	Commercial fisheries	Marine archaeology	Ground Conditions and Contamination	Water Resources and Flood Risk	Terrestrial Ecology and Ornithology	Archaeology and Cultural Heritage	Traffic and Transport	Onshore Noise and Vibration	Onshore Air Quality	Land Use Tourism and Recreation	Seascape, Landscape and Visual Impact Assessment	Aviation and Radar	Socio-economics	Human Health	Climate Change	
		and enhance landscape quality through use of sustainable landscape design techniques. In relation to landscape, attention will be given to species selection and landscape patterns within each LCA/habitat type. Trees cannot be planted above the cable, but hedgerows and grassland can be reinstated. The LEMP is likely to include the following measures: •Areas of temporary vegetation loss will be reinstated at the first available planting/seeding season following completion. •Reinstatement of vegetation will seek to provide landscape enhancement. Opportunities for enhancement will be identified following further evolution of the MHPGC Project design and with stakeholder engagement. All new planting will be subject to a five-year establishment period with appropriate maintenance and on-going management. The final form of the onshore substation will be finished to a																									

Reference	Proposed Development Phase	Mitigation and Monitoring Commitment	OFFSHORE											ONSHORE								COMBINED						Mitigation category (primary (P) or tertiary (T))
			Physical processes	Underwater sound	Offshore water quality	Benthic subtidal ecology	Fish and shellfish ecology	Marine mammals	Offshore ornithology	Other sea users and marine infrastructure	Shipping and navigation	Commercial fisheries	Marine archaeology	Ground Conditions and Contamination	Water Resources and Flood Risk	Terrestrial Ecology and Ornithology	Archaeology and Cultural Heritage	Traffic and Transport	Onshore Noise and Vibration	Onshore Air Quality	Land Use Tourism and Recreation	Seascape, Landscape and Visual Impact Assessment	Aviation and Radar	Socio-economics	Human Health	Climate Change		
		good standard of design, using quality materials and integrated into the surrounding environment through the adoption of a robust, sustainable landscape planting strategy, taking account of the landscape character and related environmental receptors.																										
MM-104	Pre-construction	The Landscape and Ecological Management Plan (LEMP) will set out measures for landscape planting and detail the management of habitats to be reinstated, created and/or enhanced as part of the MHPGC Project Boundary. This will include measures relating to the restoration of historic landscape features (such as hedgerows).															✓											T
MM-105	Construction, operation and maintenance, and decommissioning	Habitat connectivity to be retained wherever practicable by maintaining links within and to green corridors such as hedgerows and watercourses. Where effects on connectivity are unavoidable, the affected habitat would be artificially supplemented by, for instance the creation of temporary brash hedges as appropriate.														✓												T

Reference	Proposed Development Phase	Mitigation and Monitoring Commitment	OFFSHORE											ONSHORE								COMBINED					Mitigation category (primary (P) or tertiary (T))
			Physical processes	Underwater sound	Offshore water quality	Benthic subtidal ecology	Fish and shellfish ecology	Marine mammals	Offshore ornithology	Other sea users and marine infrastructure	Shipping and navigation	Commercial fisheries	Marine archaeology	Ground Conditions and Contamination	Water Resources and Flood Risk	Terrestrial Ecology and Ornithology	Archaeology and Cultural Heritage	Traffic and Transport	Onshore Noise and Vibration	Onshore Air Quality	Land Use Tourism and Recreation	Seascape, Landscape and Visual Impact Assessment	Aviation and Radar	Socio-economics	Human Health	Climate Change	
		For watercourses, channel and banks will be reinstated to mimic baseline conditions as far as practicable.																									
MM-106	Operation and maintenance	All new planting will be subject to an establishment period with appropriate maintenance and management to a timescale to be agreed as part of the PEIR and ES and set out in the LEMP.																				✓					P
MM-107	Construction	Any disposal off-site of excavated material will be undertaken in accordance with the waste legislation including the Environmental Protection Act 1990, The Environmental Protection (Duty of Care) (Scotland) Regulations 2014 SSI 4, and The Waste (Scotland) Regulations 2012, and the waste hierarchy, set out in the Waste (England and Wales) Regulations 2011.												✓													T

A.2 References

IEMA (2016). Environmental Impact Guide to: Delivering Quality Development.

Appendix B Underwater Sound Impact Modelling Methodology

B.1 Introduction

B.1.1.1 This appendix of the Morven Hawthorn Pit Grid Connection Project (hereafter referred to as 'MHPGC Project') outlines the methodology for modelling the impact of underwater sound generated during construction, operation and maintenance (O&M) of the MHPGC.

B.1.1.2 The impact of underwater sound will be assessed using a combination of source and propagation models, as appropriate for the activity under consideration. The sound generated from the following sources will be modelled:

- disposal of unexploded ordnance (UXO);
- non-impulsive sound sources (e.g., vessel sounds, cable-laying and cable protection installation);
- geophysical surveys.

B.2 Acoustic Impact Criteria

B.2.1 Overview

B.2.1.1 Underwater sound can affect marine fauna in several ways, and the criteria on which impact assessments are based can be complex. At least three primary severity levels for how sound affects marine fauna should be considered when assessing impacts: chronic and cumulative effects, auditory injury, and disturbance. Chronic and cumulative effects are hard to quantify, however, and evaluating them is complex; hence, there is little consensus at the moment on how to perform those assessments (Hague *et al.*, 2022). The underwater sound modelling assessment is therefore limited to predicting ranges at which auditory injury and disturbance may occur.

B.2.1.2 One important concept in the assessment of impact of underwater sound on marine fauna is auditory threshold shift, or hearing loss. There are two categories of auditory threshold shifts

- permanent threshold shift (PTS): an irreversible loss of hearing sensitivity;
- temporary threshold shift (TTS): a temporary reduction in an animal's hearing sensitivity.

B.2.1.3 PTS is considered auditory injury, while TTS onset (though not a behavioural effect in itself) is more associated with disturbance since any reduction in hearing sensitivity, even temporarily, has the potential to affect communication and detection (Southall *et al.*, 2007).

B.2.1.4 The impact criteria to be used represent the most recent guidance and best available science.

B.2.2 Marine Mammals

Auditory Injury and Temporary Threshold Shift (TTS)

B.2.2.1 Historical approaches to assessing the impact of sound on marine mammals considered solely root-mean-square (rms) sound pressure level ($L_{p,\mathrm{rms}}$), referred to

as Sound Pressure Level (SPL). These approaches allowed for no consideration of overall duration of the sound or its frequency content. Since 2007, however, several expert groups have developed assessment approaches for evaluating auditory injury considering Sound Exposure Level ($L_{E,p}$; SEL) criteria for non-impulsive sounds and dual metric criteria considering both SEL and peak sound pressure level ($L_{p,\mathrm{pk}}$; PK) for impulsive sounds. Key works include Southall *et al.* (2007); Finneran and Jenkins (2012), United States National Marine Fisheries Service (NMFS, 2018) and Southall *et al.* (2019). To help assess the potential for the possible injury and hearing sensitivity changes in marine mammals, the criteria recommended by Southall *et al.* (2019) will be applied, considering both PTS and TTS.

B.2.2.2 Southall *et al.* (2019) specifies injury criteria for both impulsive and non-impulsive sources. For impulsive sources, dual auditory injury criteria are applied considering both PK and cumulative SEL (SEL_{24h}); the subscript 24h indicates the duration of accumulation is 24 hours. The PK criterion is not frequency weighted, whereas the SEL criterion is frequency weighted according to marine mammal species hearing group. For non-impulsive sounds, only SEL criteria are applied, similarly frequency weighted by hearing group.

B.2.2.3 Marine mammal hearing groups are defined for cetaceans, pinnipeds, sirenians and other marine carnivores, and further categorised based on the generalised frequency range of hearing. The marine mammal hearing groups defined in Southall *et al.* (2019) under consideration are:

- low-frequency (LF) cetaceans: comprising all mysticetes (baleen whales);
- high-frequency (HF) cetaceans: comprising odontocetes (toothed whales) including most delphinid species, beaked whales, sperm whales, and killer whales;
- very high-frequency (VHF) cetaceans: comprising true porpoises and other odontocetes specialised at using very high frequencies (primarily 100 kHz and above);
- phocid carnivores in water (PCW): comprising all true seals including harbour seal (*Phoca vitulina)* and grey seal (*Halichoreus grypus).*

B.2.2.4 PTS and TTS onset criteria from Southall *et al.* (2019) are presented in Table B. 1 and Table B. 2 for impulsive and non-impulsive noise respectively.

Table B. 1: Permanent Threshold Shift (PTS_ and Temporary Threshold Shift (TTS) Onset Criteria for Effects of Impulsive Sound on Marine Mammals (Southall *et al.* (2019)

Hearing Group	PTS Onset Thresholds		TTS Onset Thresholds	
	Weighted SEL_{24h} (dB re 1 μPa^2s)	PK (dB re 1 µPa)	Weighted SEL_{24h} (dB re 1 μPa^2s)	PK (dB re 1 µPa)
Low-frequency (LF) cetaceans	183	219	168	213
High-frequency (HF) cetaceans	185	230	170	224
Very high-frequency (VHF) cetaceans	155	202	140	196
Phocid carnivores in water (PCW)	185	218	170	212

Table B. 2: Permanent Threshold Shift (PTS_ and Temporary Threshold Shift (TTS) Onset Criteria for Effects of Non-impulsive Sound on Marine Mammals from Southall *et al.* (2019)

Hearing Group	Weighted SEL_{24h} (dB re 1 μPa^2s)	
	PTS Onset Thresholds	TTS Onset Thresholds
Low-frequency (LF) cetaceans	199	179
High-frequency (HF) cetaceans	198	178
Very high-frequency (VHF) cetaceans	173	153
Phocid carnivores in water (PCW)	201	181

Disturbance

B.2.2.5 Numerous studies on marine mammal behavioural responses to sound exposure have not resulted in a consensus in the scientific community regarding the appropriate metric and associated levels for assessing behavioural reactions due to the complexity and variability of those reactions. However, it is recognised that the context in which the sound is received affects the nature and extent of responses to a stimulus (Southall *et al.*, 2007; Ellison and Frankel, 2012; Southall *et al.*, 2016).

B.2.2.6 Various means of assessing marine mammal behavioural responses to sound are being developed and are in use, including:

- step function (all or none) thresholds, whereby all animals exposed to sound above a specified level are assumed to respond;

- probabilistic response, whereby a series of step functions are applied assuming an increasing percentage of animals will respond when exposed to increasing sound levels at specified discrete thresholds (Wood *et al.*, 2012);
- dose-response relationships, whereby the percentage of animals responding to a given sound is a continuous function of the received level (dose), which is combined with the spatial distribution of the sound and receivers to estimate affected population (Tyack and Thomas, 2019).

B.2.2.7 In English and Scottish waters there are currently no established acoustic metrics or criteria against which to assess likelihood of disturbance. Other underwater sound assessments for offshore wind projects in UK waters have employed a dose-response methodology, e.g. Mona and Morgan Offshore Wind Projects. For offshore wind projects in the Dutch North Sea, a dose-response methodology is also applied as specified in the Framework for Assessing Ecological and Cumulative Effects (KEC 4.0; Heinis *et al.*, 2022). However, in these instances the methodology is applied only to sound generated by single strikes during underwater piling.

B.2.2.8 On an internationally recognised regulatory level, National Oceanic and Atmospheric Administration (NOAA) Fisheries currently uses step function SPL thresholds to assess and regulate level B sound-induced behavioural impacts for marine mammals (NOAA, 2019). The recommended SPL thresholds are 160dB re 1 µPa for impulsive sounds and 120dB re 1 µPa for non-impulsive sounds. Whilst the more recently published Southall *et al.* (2021) provides recommendations and discusses the nuances of assessing behavioural response, the authors do not recommend new numerical thresholds for onset of behavioural responses for marine mammals. The NOAA (2019) criteria for assessing behavioural responses to underwater sound will, therefore, be applied.

B.2.3 Fish (Adults, Eggs, and Larvae)

B.2.3.1 In 2006, the Working Group on the Effects of Sound on Fish and Turtles, sponsored by the Acoustical Society of America, was formed to continue developing sound exposure criteria for fish and sea turtles, work that a NOAA panel began two years earlier. The guidelines developed by this working group (Popper *et al.*, 2014) provide received sound levels based on the best available science that are suitable as provisional criteria for assessing onset of injury to fish from various sources. Several more recent publications have identified knowledge gaps and research needs regarding the effect of underwater sound on fish (Popper and Hawkins, 2019; Popper *et al.*, 2022) but do not recommend revised numerical thresholds.

B.2.3.2 Popper *et al.* (2014) categorise fish into three groups based on their hearing capabilities, which are typically determined by whether a swim bladder is present and, if it is, whether it is directly used to hear. Thus, different thresholds are proposed for:

- group 1: fish without a swim bladder (also appropriate for sharks and applied to whale sharks in the absence of other information);
- group 2: fish with a swim bladder not used for hearing;
- group 3: fish that use their swim bladders for hearing;

- fish eggs, and fish larvae.

B.2.3.3 Popper *et al.* (2014) proposed separate criteria for explosions and continuous sound sources, both of which will be applied in this assessment. Within each source category, criteria are outlined for the following effects:

- mortality and potential mortal injury;
- recoverable injury (including injuries unlikely to result in mortality, such as hair cell damage and minor haematoma);
- TTS;
- masking;
- behaviour.

B.2.3.4 Where numerical thresholds are not defined, risks of effect are instead assessed qualitatively with relative risk rather than specific sound level thresholds. Risks are assessed subjectively based on the proximity of the receiver to the source: near, intermediate or far, terms that loosely correspond to near being tens of metres, intermediate being hundreds of metres and far being thousands of metres. Risks are then categorised as high, moderate, or low.

B.3 Methods

B.3.1 Environmental Parameters

B.3.1.1 In shallow environments, interactions between the acoustic field, the sea surface, and the seabed are important, hence accurate parameterisation of the environment is needed for detailed acoustic modelling. The primary environmental parameters used for modelling are the wide area bathymetry, water column sound speed profile, and geoacoustic properties of the seabed.

B.3.1.2 Bathymetric data for the Underwater Sound Study Area will be generated from the best available data. This will be a combination of high resolution data obtained during the pre-construction site investigation surveys within the MPHGC Project Scoping Boundary, and publicly available data outside of it, for example the EMODnet European bathymetry grid (EMODnet Bathymetry Consortium, 2022).

B.3.1.3 The water column sound speed profile is a function of changes in water temperature and salinity with depth, which vary between seasons. The derived sound speed profile must span the full water range of depth within the Underwater Sound Study Area. Where site specific measured profiles for temperature and salinity are available from survey these will be used, and where unavailable, public datasets such as the Copernicus European North West Shelf-Ocean Physics Reanalysis dataset (E.U. Copernicus Marine Service Information (CMEMS), 2023) will be used.

B.3.1.4 The geoacoustic parameters of the seabed used in the acoustic modelling are the speed and attenuation of both compressional and shear waves in the medium, as well as substrate density. Profiles will be defined based on data provided by the Applicant, which may include desk studies, sediment grabs, and boreholes. Where the exact geoacoustic parameters are not available, values will be determined from publicly available data or based on the predicted lithology using models such as Hamilton (1980); Buckingham (2005); or Holzer *et al.* (2005).

B.3.2 Acoustic Source Modelling

Unexploded ordnance (UXO)

B.3.2.1 Modelling detonation (shock) waves is challenging because the theory governing wave propagation close to a blast is nonlinear due to the high pressures. Most modelling solutions use linear approximations of pressure wave propagation and consequently have limited accuracy close to the detonation. These models can, however, be accurate beyond a few metres from a blast, so they are suitable for biological impact assessments.

B.3.2.2 The modelled UXO disposal techniques to be modelled are separated into high-order (detonation) and low-order (deflagration) methods. High-order UXO disposal is historically the traditional method and involves the deliberate detonation of the UXO using a donor charge, thereby producing a shock wave. Conversely, low-order UXO disposal is a technique whereby a donor charge is used only to rupture the external case of the UXO without generating enough energy to cause detonation, instead inducing a rapid burn (deflagration) in the remaining explosive material (Pedersen *et al.*, 2002; Cheong *et al.*, 2020; Lepper *et al.*, 2024).

B.3.2.3 The peak pressure and acoustic source spectra will be modelled using the empirical equations defined in Cheong *et al.* (2020). This method predicts the pressure signal and spectrum using a number of empirical equations based on the charge weight, geometry of the detonation and geoacoustic parameters of the substrate. Evidence suggests that only the size of the donor charge is necessary to adequately model the acoustic source signature from low-order UXO disposal (Cheong *et al.*, 2020; Lepper *et al.*, 2024).

Non-impulsive sound sources

B.3.2.4 Sources of non-impulsive sound are likely to be related to construction, O&M of the installation, including (but not limited to) vessels, cable laying and cable protection installation.

B.3.2.5 Underwater sound radiated from vessels is produced mainly by propeller and thruster cavitation (Ross, 1976) with a smaller fraction of sound transmitted through the hull, such as by engines, gearing, and other mechanical systems. A vessel's sound signature, therefore, depends on the vessel's size, power output and propulsion system characteristics (e.g. blade shape and size). These characteristics differ greatly between vessels depending on the vessel's purpose. Suitable proxy source levels will be selected for each modelled vessel considering both the type of vessel and the specific characteristics where known. The types of vessel which may be used include:

- various construction vessels (e.g. cable installation, rock placement);
- boulder clearance vessels;
- tugs and anchor handlers;
- survey and support vessels;
- guard vessels;
- crew transfer vessels;

- seabed preparation/installation vessels.

B.3.2.6 Where possible, source levels for other sources of non-impulsive sound will be derived from measurements of the exact activity or similar. Where such data are unavailable, an appropriate proxy source level will be selected based on characteristics of the activity.

Geophysical sources

B.3.2.7 Geophysical sources are a broad category of acoustic sources which may be used to determine characteristics of the seabed and substrata (Bureau of Ocean Energy Management (BOEM), 2023). They typically operate at mid to high frequencies to produce high-resolution data of seafloor and sub-bottom features.

B.3.2.8 Geophysical sources vary in their source characteristics, but such characteristics are generally well defined by the manufacturer. The parameters which will be considered when modelling these sources include:

- source level;
- operating frequency;
- pulse length;
- pulse repetition rate;
- transducer shape and beamwidth;
- beam count;
- swath coverage (directionality).

B.3.3 Sound Propagation Modelling

Propagation loss

B.3.3.1 The propagation of sound through the environment will be modelled by predicting the acoustic propagation loss — a measure, in decibels, of the decrease in sound level between a source and a receiver some distance away. Geometric spreading of acoustic waves is the predominant way by which propagation loss occurs. Propagation loss also happens when the sound is absorbed and scattered by the seawater and absorbed, scattered, and reflected at the water surface and within the seabed. Propagation loss depends on the acoustic properties of the ocean and seabed; its value changes with frequency.

Unexploded ordnance (UXO)

B.3.3.2 For impulsive sounds generated by UXO disposal, time-domain representations of the pressure waves generated in the water are required for calculating SPL and PK levels.

B.3.3.3 For this study, synthetic pressure waveforms will be computed using a time-domain acoustic model based on a wide-angle parabolic equation (PE) solution to the acoustic wave equation (Collins, 1993). Synthetic pressure waveforms are computed for receivers increasing in range from the source and at depths throughout the water column and seabed taking into account the environmental parameters discussed in Section B.3.1. The synthetic pressure waveforms will be post-processed, after

applying a travel time correction, to calculate standard SEL, SPL, and PK metrics versus range and depth from the source.

B.3.3.4 Acoustic fields will be modelled in three dimensions by calculating received levels within multiple two-dimensional vertical planes. Vertical planes will be aligned along radials eminating outwards from the source with sufficiently dense angular separation to be representative of the sound field in a full 360° swath from the source.

Non-impulsive sources

B.3.3.5 Propagation loss for non-impulsive sound sources will be modelled using a combination of a PE model and Gaussian beam acoustic ray-trace model. The combined model similarly accounts for the site-specific environmental properties outlined in Section B.3.1. Propagation loss is modelled at centre frequencies of decidecade bands as a function of range and depth in vertical planes, and the three-dimensional sound field for each frequency is assembled as described in paragraph B.3.3.4. Received levels are calculated by subtracting propagation loss values from the source level in that frequency band and composite broadband levels are calculated by summing the received decidecade band levels.

B.3.3.6 The PE model is based on the same underlying algorithm as for impulsive sources and will be used for modelling frequencies of 1kHz and below. The Gaussian beam acoustic ray-trace model (Porter and Liu, 1994) will be used to model frequencies above 1kHz. This model accounts for sound attenuation due to energy absorption through ion relaxation and viscosity of water in addition to acoustic attenuation due to reflection at the medium boundaries and internal layers (Fisher and Simmons, 1977). The former type of sound attenuation is important for frequencies higher than 1kHz and cannot be neglected without noticeably affecting the model results.

Geophysical sources

B.3.3.7 The acoustic source signatures of some geophysical sources have clear impulsive characteristics (e.g. sparkers and boomers). Other geophysical sources may utilise short single frequency pulses, frequency sweeps or chirps (e.g. multi-beam echosounders and sub-bottom profilers) meaning that their acoustic source signatures are difficult to categorise as purely impulsive or non-impulsive.

B.3.3.8 The likely geophysical sources to be used have not yet been defined. These sources may therefore be modelled using any of the acoustic propagation models mentioned in paragraph B.3.3.2 to B.3.3.4 and paragraph B.3.3.5 to B.3.3.6, including the acoustic ray-trace model on its own if appropriate, depending on the source characteristics and available acoustic source data.

B.3.3.9 Where the acoustic signature of a geophysical source may not clearly be defined as either impulsive or non-impulsive, the more stringent assessment criteria from Section B.2 will be applied.

B.3.4 Conservative Assumptions in Assessment

B.3.4.1 When modelling potential impacts on marine fauna from underwater sound, a balance must be struck between a realistic representation of the proposed activities and minimising the risk of underestimating sound exposure. As such, a number of

assumptions are incorporated into the underwater sound modelling and subsequent assessment of results to ensure a conservative approach.

B.3.4.2 The modelled environment will be selected based on conditions likely to result in longest range acoustic propagation. This will involve consideration of the combination of water depth, seasonal sound speed profile, and geoacoustic parameters at any given site.

B.3.4.3 Several quantitative metrics exist by which acoustic signals may be classified as either impulsive or non-impulsive, such as kurtosis, crest factor, and Harris impulse factor (Harris, 1998; Martin *et al.*, 2020). Definitions of impulsivity based on these metrics have not yet been incorporated into any internationally recognised guidelines, however, and as such there is no definitive method for categorising, for example, certain geophysical sources which are potentially ambiguous. Where such ambiguity exists, the more stringent acoustic impact criteria from Section B.2 will be applied. Similarly, the nature of an impulsive pressure waveform changes to become less impulsive as it propagates through the underwater environment due to seafloor and surface reflections, and other waveguide dispersion effects. Since there is no definitive method for determining where the transition to non-impulsivity may occur the impulsive injury criteria (which are numerically lower, see Section B.2) are, therefore, conservatively applied for the sound generated from UXO clearance at ranges where the received signal may be better characterised as non-impulsive.

B.3.4.4 Distances reported for sound level isopleths will be reported as maximum-over-depth results, i.e. maximum value that occurs over all sampled depths within the water column. The reported level may only, therefore, occur at a specific depth in the water column and a receiver at a different depth may not, therefore, be exposed at that level.

B.4 Summary

B.4.1.1 The impact of underwater sound generated during construction and O&M of the MHPGC will be assessed through predictive modelling of generated sound fields. Sound generated from UXO disposal, non-impulsive sound sources, and geophysical surveys will be modelled.

B.4.1.2 The acoustic environment (bathymetry, water column sound speed profile, and geoacoustic properties of the seabed) will be parameterised to allow detailed acoustic modelling for all sources. The data required to parameterise the environment will be obtained through a combination of site-specific survey data where available and publicly available datasets.

B.4.1.3 Source levels for UXO disposal will be determined through empirical equations (Cheong *et al.*, 2020), and sound propagation modelling will be conducted using a time-domain PE model. Non-impulsive and geophysical sound sources are yet to be defined, but source levels will be determined via direct measurement if available, or by appropriate proxy if not. Sound propagation modelling for non-impulsive and geophysical sound sources will be modelled using a combination of a PE model and Gaussian beam acoustic ray-trace model.

B.4.1.4 Impacts on marine fauna will be assessed according to the following criteria:

- PTS and TTS onset criteria for marine mammals from impulsive and non-impulsive sound sources from Southall *et al.* (2019)
- NOAA (2019) step function criteria for assessing marine mammal behavioural responses to underwater sound
- Popper *et al.* (2014) injury and impairment criteria for impacts on fish, fish eggs and fish larvae.

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Appendix C Gazetteers of Marine Archaeology

C.1.1.1 Data has been Compiled from the Datasets as listed in Section 7.10.4 of Chapter 7.10: Marine Archaeology and the Data is Presented in ED50 UTM30N.

Table C. 1: Gazetteer of Marine Archaeology Identified Within the Desktop Data in Scottish Waters

ID	Name	Easting (ED50 UTM 30N)	Northing (ED50 UTM 30N)	Description
UKHO3168 HES322378	Unknown	623870	6290085	The degraded remains of an unknown small vessel.
UKHO3170 HES322380	Unknown	609250	6293283	The upright but collapsed remains of an unknown vessel.
UKHO3177 HES313037	*Baysoto*	617598	6311911	A steam ship, built in 1905, that was torpedoed and sunk on 06 August 1917. The remains on the seabed appear intact and upright.
UKHO3199 HES322394 HERNP84NE0001	*Ailsa*	647061	6276096	A steam ship that was captured by a German submarine and scuttled on 18 June 1915.
UKHO3202 HES322397	*Valiant*	624898	6271021	The upright and intact remains of a fishing vessel that sunk on 13 May 1992.
UKHO70419 HES324310	Unknown	626133	6278850	The upright remains of an unknown small vessel.
UKHO70421 HES324312	Unknown	623299	6296709	The upright and intact remains of an unknown vessel.
UKHO71574 HES324370	Unknown	632716	6260904	The highly degraded remains of an unknown vessel.
UKHO71576 HES324371	Unknown	628159	6300883	The upright remains of an unknown small vessel.
UKHO71577 HES324372	Unknown	617360	6254384	The upright but degraded remains of an unknown vessel. Possible fishing gear is visible above the wreck.
UKHO73633 HES324447	Unknown	607237	6305625	The upright and intact remains of an unknown vessel.

ID	Name	Easting (ED50 UTM 30N)	Northing (ED50 UTM 30N)	Description
UKHO75090 HES324516	Unknown	613824	6303077	The upright and intact remains of an unknown vessel.

C.1.1.2 Data has been Compiled from the Datasets as listed in section 7.10.5 of Chapter 7.10: Marine Archaeology and the Data is Presented in WGS84.

Table C. 2: Gazetteer of Marine Archaeology Identified Within the Desktop Data in English Waters

ID	Name	Easting (WGS84 Long.)	Northing (WGS84 Lat.)	Description
UKHO3196	Bogo	663960	6242836	A wooden-hulled steam ship sunk by a mine on 17 December 1939. It appears partially buried but its mast is visible.
UKHO4248	Eventide	617992	6098030	A fishing vessel that started taking on water. It was abandoned by its crew and sank on 19 June 1976 while en route to the Tyne.
UKHO4266	H C Flood (Possibly)	619356	6099519	A steam ship, built in 1917, and sank after striking a mine on 15 December 1939. The wreck appears upright and intact.
UKHO4267	Unknown	619652	6099063	The remains of an unknown vessel. The wreck appears on its side or inverted.
UKHO 4281 NRHE 908763 Newcastle 14664	John M Smart (Possibly).	621133	6100804	A trawler that was sunk on 12 October 1917 by a German torpedo boat destroyer. The remains are possibly in two pieces.
UKHO4328 NRHE 1525529	Hans Hoth (Probably)	624004	6110593	A steam ship that sank on 10 February 1952. It took on a heavy list when cargo shifted; it later sank while under tow. The remains are represented by a probable area of wreckage.
UKHO4340	Unknown	619227	6124870	The wrecked remains of an unknown vessel with a possible surrounding cargo spill.

ID	Name	Easting (WGS84 Long.)	Northing (WGS84 Lat.)	Description
UKHO4350	Unknown	620219	6129635	The upright and intact remains of an unknown vessel.
UKHO4370	Unknown	621220	6150667	The upright and intact remains of an unknown vessel. The superstructure appears visible.
UKHO4521	Quest (Probably)	621408	6123284	The remains of a fishing vessel. The remains appear represented by a probable debris field.
UKHO4533	Unknown	624011	6096925	The intact remains of an unknown vessel. The possible mast appears at the southeastern end.
UKHO4534	Unknown	623546	6097685	The intact remains of an unknown vessel.
UKHO4535	Unknown	620992	6109273	The intact remains of an unknown vessel. The wreck appears on its side.
UKHO4536	Unknown	622793	6107591	The well broken up remains of an unknown vessel. The wreck is possibly majority buried.
UKHO4551	Triumph	623004	6108957	A fishing vessel that sank on 23 May 1993 after a collision with a drifting tree.
UKHO4567	U (Possibly)	642368	6107246	A fishing vessel that sank on 06 September 1914 after striking a mine. The wreck appears intact but possibly on its side.
UKHO4577	Unknown	638382	6116183	The remains of an unknown vessel. The wreck appears almost totally buried.
UKHO4580	Runo	646454	6117277	A steam ship that was sunk on 05 September 1914. The wreck appears mostly intact.

ID	Name	Easting (WGS84 Long.)	Northing (WGS84 Lat.)	Description
UKHO4584	Gjeso (Probably)	646280	6118817	A steam ship built in 1912 and sank on 29 June 1915. The wreck appears upright, intact, but with collapsed superstructure.
UKHO4591	Unknown	643536	6125409	The wrecked remains of an unknown vessel. The wreck appears intact and probably upright.
UKHO4594	Unknown	643318	6130506	The wrecked remains of an unknown vessel. The wreck appears intact and probably on its side.
UKHO4677	Unknown	627618	6111871	The wrecked remains of an unknown vessel. The wreck itself is indistinct and surrounded by an area of debris.
UKHO4678	Unknown	642355	6107091	The intact remains of an unknown vessel.
UKHO4680	Unknown	643442	6110775	The intact remains of an unknown vessel.
UKHO4681	Unknown	639221	6119333	The remains of an unknown vessel. The wreck appears virtually entirely buried.
UKHO4682	Unknown	646370	6118759	The remains of an unknown vessel. The wreck appears well decayed and partly buried.
UKHO4683	Unknown	641865	6142482	The intact and upright remains of an unknown submarine.
UKHO4684	San Bernando (Possibly)	632220	6149769	A three-boiler steam ship that was captured by UB-19 during passage from Norway for South Shields. The wreck appears intact but broken amidships.
UKHO4685	Unknown	643179	6130966	The intact remains of an unknown vessel.

ID	Name	Easting (WGS84 Long.)	Northing (WGS84 Lat.)	Description
UKHO4686	Unknown	641639	6132772	The intact remains of an unknown vessel. The wreck appears partially buried and on its side.
UKHO4688	Unknown	642381	6129455	The remains of an unknown vessel.
UKHO4690	Unknown	643897	6125699	The intact remains of a fishing vessel. The wreck appears listed to starboard with a collapsing superstructure.
UKHO4692	St Paul	641912	6126996	A steam ship built in 1906 and sank on 02 September 1921. The wreck appears intact and upright with a collapsing superstructure.
UKHO4693	Unknown	641268	6127254	The well decayed remains of an unknown vessel.
UKHO5652 Durham2861450	Azira	618241	6075046	A steam ship that was built in 1907 in Trondheim, Norway and torpedoed by UB-22 on 04 September 1917. All crew were recovered. The wreck appears to be lying on its starboard side, bow to the north but broken up.
UKHO5655	Unknown	618322	6075341	The remains of an unknown iron-built collier steam ship, originally thought to be the Thames. The wreck appears to be upright and intact.
UKHO5656 NRHE1001750 Durham2861377	Llwyngwair (Possibly)	618459	6076953	The partially buried remains of Llwyngwair, a steam ship built in 1913 that sank on 26 April 1918.

ID	Name	Easting (WGS84 Long.)	Northing (WGS84 Lat.)	Description
UKHO5657 Durham2301716	Carmarthen Coast (Possibly)	618557	6077264	The partially buried, decayed remains of Carmarthen, a steam ship built in 1921 that sank on 09 November 1939.
UKHO5658 NRHE1001754 Durham2861482	Helvetia (Possibly)	615415	6082944	The probable remains of Helvetia, a trawler that was captured and scuttled on 08 January 1916. The wreck appears to comprise two separate objects lying perpendicular to each other
UKHO5660 NRHE1001751 Durham2311076 Newcastle13954	Vianna (Probably)	616498	6078200	The well broken up probable remains of Vianna, a steam ship torpedoed and sunk by German submarine UC 64 on 31 March 1918.
UKHO5662	None – Debris field	617176	6078913	A wide spread of equipment cargo or debris.
UKHO5663 NRHE1001751 Durham2311076 Newcastle13954	Vianna (Possibly)	613830	6075720	Another record for the well broken up remains of Vianna. See above.
UKHO5664 NRHE1606892 Durham2301716	Carmarthen Coast	612037	6079489	Another record for the remains of Carmarthen. See above.

ID	Name	Easting (WGS84 Long.)	Northing (WGS84 Lat.)	Description
UKHO5665 NRHE1606892 Durham2301716	Carmarthen Coast (Possibly)	612587	6080318	Another record for the remains of Carmarthen. See above.
UKHO5667	Unknown	622998	6080723	The remains of an unknown vessel. The wreck appears broken in two.
UKHO5668	Unknown	620092	6081294	The well decayed remains of an unknown vessel.
UKHO5669 NRHE1001752 Durham2880981	RFA Creosol	615701	6082107	A British tanker built in 1916 as one of 18 Admiralty-designed vessels. RFA Creosol was sunk on 07 February 1918 by the German submarine UC-17, with the loss of two lives. The wreck appears to be upright and intact. The wreck site is a Protected Place for the purposes of the Protection of Military Remains Act 1986.
UKHO5670 NRHE1001753 Durham2880774 Newcastle13877	Intent	614475	6082280	The well broken up remains of Intent, a steam ship that was torpedoed and sunk by submarine UC40 on 08 March 1918.
UKHO5672 NRHE1001770 Durham2880813	Saga (Possibly()	613289	6082806	The well broken up but discernible remains of Saga, a steam ship that was torpedoed and sunk by UB 64 on 14 February 1918.
UKHO5675	Gateshead (Possibly)	622650	6084950	The intact but partially buried remains of Gateshead, a steam ship that foundered on 23 December 1932.

ID	Name	Easting (WGS84 Long.)	Northing (WGS84 Lat.)	Description
UKHO5677	None – Debris field	617143	6084958	Possible cargo or equipment.
UKHO5679	HMS Snaefell (Probably)	619577	6085238	The possibly partly buried remains of HMS Snaefell, a steam ship that was bombed and sunk on 06 July 1941.
UKHO5680	Unknown	615301	6085346	The intact remains of an unknown vessel. The wreck appears to be lying on its side with its wheelhouse clearly visible.
UKHO5682	Unknown	612541	6085521	The intact remains of an unknown steam ship. The wreck appears to be lying on its side with surrounding scattered debris.
UKHO5687	Unknown	611649	6086189	The remains of an unknown barge. The wreck appears to be in two sections with surrounding scattered debris.
UKHO5693 Durham2880803 Newcastle14670	Narcissus (Possibly)	621499	6087980	The remains of Narcissus, a trawler that was captured and scuttled by a German submarine on 06 August 1917. The wreck appears to lie with a debris field.
UKHO5708	Hogarth	616958	6092715	The remains, in two parts, of Hogarth, a steam ship that was built in 1893 and sank after striking a mine on 07 June 1918.
UKHO5717	Unknown	619203	6093269	The remains, in two parts, of an unknown vessel. The masts are apparently clearly visible.
UKHO5718 Newcastle13812	Ravensbourne (Possibly)	615931	6093677	The well broken up remains of Ravensbourne, a steam ship that was built in 1916 and sank on 31 January 1917. The wreck appears to be probably netted and lying in two main sections.

ID	Name	Easting (WGS84 Long.)	Northing (WGS84 Lat.)	Description
UKHO5720 Durham2880847 Newcastle13811	Zeeland (Possibly)	616881	6094321	The remains of Zeeland, a steam ship that was built in 1907 and sank on 01 August 1916. The wreck appears to be lying on its side.
UKHO5721	Stag 5 (Probably)	616465	6094516	The remains of Stag 5, a tug that was built in 1897 and sank on 11 February 1950.
UKHO5723	Unknown	618237	6094140	The well broken up remains of an unknown vessel.
UKHO5726	Unknown	614564	6085529	The broken up but visible outline of an unknown vessel.
UKHO5729	Unknown	619282	6079572	The remains of an unknown vessel of possible lattice construction.
UKHO5736	Grit	613351	6077007	The intact remains of Grit, a motor vessel that was built in 1934 and sank following a collision on 05 November 1943.
UKHO5737	Unknown	626537	6081749	The remains of an unknown vessel, possibly lying on its side.
UKHO5743	Adams Beck (Probably)	619974	6079714	The very badly broken up remains of Adams Beck, a steam ship that was bombed and sunk by German aircraft on 30 July 1941.
UKHO5744	Eagle III	617162	6078743	The intact and upright remains of Eagle III, a motor vessel that sprang a leak and sank while under tow on 17 November 1917.
UKHO5748	Unknown	619136	6084392	The intact and probably upright remains of an unknown vessel.
UKHO5750	Unknown	619612	6085920	The intact remains of an unknown vessel.

ID	Name	Easting (WGS84 Long.)	Northing (WGS84 Lat.)	Description
UKHO5769	Jenny M (Possibly)	629529	6084370	The possible remains of Jenny M, a fishing vessel that took on water on 06 September 1983 and quickly sank.
UKHO5779	Unknown	630097	6094902	The partially buried remains of an unknown vessel.
UKHO5783 Durham2301483	The Stewarts Court (Probably)	612415	6073737	The well broken-up remains of The Stewarts Court, a steam ship built in 1909 and torpedoed by UB 112 on 21 August 1918.
UKHO5785 NRHE1001769 Durham2861431	Teal (Probably)	631506	6092933	The mainly collapsed and inverted remains of Teal, a steam ship that was built in 1876 and sank on 29 April 1916.
UKHO5786	Unknown	620440	6112072	The intact remains of an unknown vessel. The wreck appears to be lying on its side.
UKHO5788 NRHE1001770 Durham2861417	Thames (Probably)	613766	6089303	The remains of Thames, a steam ship that was built in 1887 and was torpedoed by UC 17 on 26 May 1918. The wreck appears to be in two parts.
UKHO5789 Newcastle13804	Denham (Probably)	612070	6087947	The probably partly buried remains of Denham, an iron steam ship that was built in 1878 and foundered on 22 February 1894.
UKHO5795	Clare (Possibly)	612135	6085295	The intact remains of Clare, a steam ship that was reportedly mined in 1939.
UKHO6370 Durham2880788	King James (Possibly)	624051	6131890	The partially buried remains of King James, a trawler built in 1900 and sank on 31 July 1916.

ID	Name	Easting (WGS84 Long.)	Northing (WGS84 Lat.)	Description
UKHO6371	Unknown	630351	6167045	The intact remains of an unknown vessel with masts or superstructure visible.
UKHO6387	Lucida	625654	6143414	The remains of Lucida, a trawler that sank after hitting a mine on 11 January 1940.
UKHO6388	Unknown	620108	6145072	The remains of an unknown vessel.
UKHO57012	Unknown	617684	6088096	The probable partially buried remains of an unknown vessel. Possibly only debris.
UKHO57017	Unknown	621214	6113125	The broken but in line and upright remains of an unknown vessel.
UKHO57057	Unknown	613768	6089303	The intact, upright, and probably netted remains of an unknown vessel.
UKHO57065 Newcastle12934	Presto (Possibly)	612073	6087947	The probably upright but well broken-up remains of Presto, a steam ship built in 1905 and sunk after striking a mine.
UKHO57069 NRHE1606981	Loch-Na-Gar (Probably)	611682	6080354	The intact and well-buried remains of Loch-Na-Gar, an iron barque built in 1861.
UKHO57777 Newcastle14052	Norman	607036	6080334	The fully rigged remains of Norman, a steam ship built in 1854 that stranded in good weather. The crew were recovered.
UKHO 57778	Abasota	608041	6083682	A small area of wreckage belonging to Abasota, a steam ship built in 1903. Ran aground in poor weather while on passage to Algiers.

ID	Name	Easting (WGS84 Long.)	Northing (WGS84 Lat.)	Description
UKHO57829	Unknown	635268	6096818	The upright and intact steel hull of a tug that sank on 11 February 1950 while assisting SS City of Manchester in a Force 8 Gale. Four of the six crew were lost.
UKHO57876	Ada Jean (Possibly)	617060	6095369	The intact remains of Ada Jean, a fishing vessel that sank on 22 September 1978. The nets appear to be floating above the wreck.
UKHO58007	Unknown	609531	6076022	The intact and upright remains of an unknown vessel with mast or attached trawl.
UKHO58015	Unknown	611681	6080354	The intact and upright remains of an unknown vessel with mast attached.
UKHO58016	Unknown	619644	6084597	A significant seabed mound, possibly a buried wreck of an unknown vessel.
UKHO60724	Golden Boy II	629985	6147138	A wooden vessel built in 1966 that sank due to an unknown cause.
UKHO64121	Blue Dawn	616547	6087250	An ex-Navy pinnace that sank on 13 February 2004 from an unknown cause. The crew of two were recovered.
UKHO65632	Unknown	635585	6169149	The fairly intact remains of an unknown vessel.
UKHO65635	Unknown	631303	6172215	The intact remains of an unknown vessel.
UKHO65636	Unknown	621101	6221237	The intact remains of an unknown vessel.

ID	Name	Easting (WGS84 Long.)	Northing (WGS84 Lat.)	Description
UKHO65637	Acantha (Possibly)	625362	6182146	The intact but collapsed remains of Acantha, a trawler that was torpedoed and sunk on 05 January 1919.
UKHO71400	Unknown	642398	6107401	The remains of an unknown vessel.
UKHO71998	Unknown	635671	6165659	The upright but collapsed remains of an unknown vessel.
UKHO71999	Unknown	642678	6146326	The upright but degraded remains of an unknown vessel.
UKHO73367	Unknown	645150	6142343	The intact remains of a small vessel or cargo container.
UKHO73368	Unknown	646752	6145740	The intact and upright remains of an unknown vessel.
UKHO73371	Unknown	661476	6190254	The intact but degraded remains of an unknown vessel.
UKHO81138	Rachael Jayne IV	640581	6122739	The remains of Rachael Jayne IV, a fishing vessel that took on water and sank. The crew of four were recovered.
UKHO87132	Unknown	612116	6078899	A discarded anchor and chain from an unknown vessel.
UKHO89472	Unknown	607407	6080411	A seabed feature that may be the remains of an unknown vessel.
UKHO89474	Unknown	608692	6074432	A seabed feature that may be the remains of an unknown vessel.
UKHO92598	Unknown	609225	6082511	Two linear seabed features that may be the remains of an unknown vessel. A small field of debris lies to the southwest.
UKHO92600	Unknown	609333	6082844	The heavily broken up remains of a possible wreck.

C.1.1.3 Data has been Compiled from the Datasets as listed in section 7.10.4 of Chapter 7.10: Marine Archaeology.

Table C. 3: Gazetteer of Recorded Losses Identified Within the Desktop Data in Scottish Waters

NRHEID	Name	Description
322395	G-ASNM helicopter	A helicopter that crashed on 14 November 1970 *en route* from Dyce Airport to the Oil Rig Staflo. It is suggested that the helicopter may have floated for a while before finally sinking.
322396/313039	F-4 Phantom	A McDonnell Douglas F-4 Phantom II aircraft that crashed on 04 August 1978. Wreckage was sighted by another helicopter en route to oil rigs, but it was impossible to relocate due to bad visibility.
200463	*Bosphorous*	Classified as iron paddle steam trawler: date of loss cited as). Bosphorus foundered approximately 37 miles southeast of Girdle Ness on 05 May 1904.
248583	*Competitor*	Classified as wooden schooner with cargo of wheat. Competitor was abandoned 70 miles east of Montrose on 28 November 1852.
942558	Unknown 1920	Derelict seen 19 July 1920 north east of the Firth of Forth.
312790	*Sceptre*	A steel trawler that was sunk by a submarine on 05 May 1915.
328048	Unknown 1843	A vessel reported waterlogged and abandoned on 29 January 1843.
325975	A/C Jaguar	A Jaguar T2 aircraft that crashed into the see on 22 June 1979.
312803	*Duke of York*	An iron steam trawler sunk by gunfire from a submarine on 09 February 1917.
282591	*Christina*	A schooner that sank during a gale on 26 November 1852.
324917	Unknown 1920	A derelict seen on 19 July 1920.

NRHEID	Name	Description
327606	Unknown 1920	A floating wreck seen on 08 February 1920.
314560	Unknown	A net snag possibly indicating a wreck.
326310	A/C Short	A 74 type seaplane that failed to return from North Sea patrol on 29 September 1914.
201808	HMS *Rockingham*	A destroyer that struck a mine; it was towed but later abandoned and sank on 27 September 1944.
256039	*South Gyle*	Sprung a leak and sank on 09 July 1872.
307481	*Standard*	A steel steam trawler that sank on 22 March 1922.
315784	Mary Felker: North Sea	Mary Felker: North Sea
201619	Anton: North Sea	Anton: North Sea
256039	South Gyle: North Sea	South Gyle: North Sea
329213	Hope	Hope

C.1.1.4 Data has been Compiled from the Datasets as listed in section 7.10.4 of Chapter 7.10: Marine Archaeology.

Table C. 4: Gazetteer of Recorded Losses Identified Within the Desktop Data in English Waters

NRHE ID	HER ID	Name	Description
1391411		Betsey	1791 wreck of English sloop which sprung a leak and foundered off Sunderland on her departure, laden with coal; a wooden sailing vessel.
1357328		HURRICANE MK I W9147	British Fighter, 1941
1398484		DO217	1942 wreck of German Dornier bomber which was shot down in flames east of Roker while it was participating in an attack on Sunderland.
1313338		Janet and Mary	English Barge, 1880
1391559			1792 wreck of English keel which foundered off Sunderland in bad weather; a wooden sailing vessel.
1342751		WHITLEY MK V BD353	1942 wreck of British Armstrong Whitworth Whitley bomber which ditched 10 miles SE of Tynemouth, returning from a raid on Hamburg.
1402221		HE111	1940 wreck of German Heinkel bomber which was shot down 25 miles off Sunderland while on a bombing raid from Stavanger to Northumberland, having originally intended to bomb sites in Lincolnshire.
1404661		JUNKERS JU88A-4 (144146) 3Z+CB	1942 wreck of a German Junkers Ju88 which was shot down and crashed off Sunderland. It was part of StabI/KG77.
1367822		Doreen	1921 wreck of an English trawler which foundered off Sunderland following a collision with the cargo vessel WYNCOTE. She was a steel-hulled steamer. See 1607760 for the site of her possible remains.
971461		Thetis	1796 wreck of English cargo vessel which stranded near Sunderland, after springing a leak en route from Klaipeda to London with timber; a wooden sailing vessel.

NRHE ID	HER ID	Name	Description
1365157		Victoria	English Barque, 1877
1392348			1795 wreck of English keel which foundered off Sunderland on being driven out of the River Wear by ice, while laden with stones; a wooden sailing vessel.
1390137			1788 wreck of English keel which foundered off Sunderland on departure to offload coal and being driven to sea; a wooden sailing vessel.
1311037		Messenger	English Brig, 1856
1365953		Quickstep	English Tug, 1899
1607819		Sunniva	1918 wreck of a English cargo vessel, torpedoed by the German submarine UC 17 approximately 4 miles east of Sunderland. She was a steel-hulled steamer, en route from London to the Tyne, in ballast. See 908723 for the site of her possible remains.
1404480			1820 wreck of craft which foundered off Sunderland during a gale; a wooden sailing vessel.
1401584			1813 wreck of English keel which foundered after being driven out of Sunderland harbour "in a strong fresh"; a wooden sailing vessel.
1393910		Good Intent	1800 wreck of British craft which was scuttled and foundered off Sunderland, after being captured by a Dutch privateer. En route from King's Lynn to the Firth of Forth, she was a wooden sailing vessel.
1365932		Challenge	British Lugger, 1897
1002332		Zeeland	1916 wreck of a Dutch cargo vessel, sunk in August 1916 approximately 7 miles east of Sunderland, by gunfire from German U-boat UB-39. The remains of the ZEELAND may be the wreck described by record 1001779.

NRHE ID	HER ID	Name	Description
1407464			1825 wreck of English keel which foundered off Sunderland in a gale, after leaving that port in order to dump ballast offshore; a wooden sailing vessel.
1316425		Richard And Clementia	English Cargo Vessel, 1751
996874		Edward And James	English Dandy, 1867
1367914	13167	Pink Rose	1937 wreck of an English cargo vessel, which foundered following a collision approximately 11 miles south-east of Tynemouth. She was a steel-hulled steamer, en route from Dunston-on-Tyne to Shoreham with a cargo of coke.
1367108		Narcissus	British Trawler, 1917
1365627		No 1	English Hopper Barge, 1896
1407873		Myrtle	1826 wreck of Scottish cargo vessel which capsized and foundered off Sunderland en route from Klaipeda to London with oats; a wooden sailing vessel.
971407			1763 wreck of cargo vessel which foundered off Sunderland in a gale while carrying a cargo of coal; a wooden sailing vessel.
1393336			1797 wreck of English keel which foundered after being driven out to sea from Sunderland, laden with coal; a wooden sailing vessel.
1367489		Intent	1918 wreck of an English cargo vessel which foundered 4 miles NE of Seaham after being torpedoed by the German submarine UC 40. She was a steel-hulled steamer, en route from Sheerness for the Tyne, in ballast. See record 1001753 for the wreck site believ
971406		Friends Goodwill	1763 wreck of British collier which foundered off Sunderland in a gale while on a voyage with coal; a wooden sailing vessel.

NRHE ID	HER ID	Name	Description
1607837		Poltava	1917 wreck of a British cargo vessel which foundered 3 miles ENE of Souter Point, after detonating a mine laid by the German submarine UC 44. She was an iron-hulled steam cargo vessel, en route from the Tyne to an unknown destination with a cargo of coal
1362136		Jane	1841 wreck of English craft which stranded at Sunderland after a collision with an ice floe which rushed down the river and broke several ships from their moorings there.
			Constructed of wood, she was a sailing vessel.
1365323		Hannah	English Schooner, 1884
1400461			1812 wreck of English coble which foundered after a collision at sea off Sunderland; a wooden sailing vessel.
1407470			1825 wreck of English keel which foundered off Sunderland in a gale, after leaving that port in order to dump ballast offshore; a wooden sailing vessel.
1313236		M	English Sloop, 1875
1312043		Providence	English Cutter, 1872
1401583			1813 wreck of English keel which foundered after being driven out of Sunderland harbour "in a strong fresh"; a wooden sailing vessel.
1432512		Eliza Ann	1864 wreck of Scottish schooner which foundered 6 miles SE of North Shields following a collision; a wooden sailing vessel.
1365984		Lile	English Barquentine, 1901
1364855		George William	English Coble, 1864
1390239			1789 wreck of English keel which foundered off Sunderland after being carried away from her moorings there, laden with coal; a wooden sailing vessel.

NRHE ID	HER ID	Name	Description
1393311		Free Briton	1797 wreck of English craft which foundered off Sunderland, following a collision; a wooden sailing vessel.
1394161			1800 wreck of English foy boat which foundered off Sunderland on leaving that port to seek pilotage work; a wooden sailing vessel.
1313334		Robert Stephenson	English Drifter, 1880
1002345		Presto	1917 wreck of an English cargo vessel which was mined 4 miles east of Roker Point en route from London for Newcastle-upon-Tyne in ballast. She was towed towards Sunderland, but the fore section stranded a mile from Roker lighthouse. Constructed of steel
971560		Henrietta	1815 wreck of English brig which foundered off Sunderland while making for that harbour; a wooden sailing vessel.
996849		Wave	British Schooner, 1861
1365328		Belmont	English Tug, 1884
1401582			1813 wreck of English keel which foundered after being driven out of Sunderland harbour "in a strong fresh"; a wooden sailing vessel.
1367454		Folmina	1918 wreck of a Dutch cargo vessel, torpedoed by the German submarine UB 34 approximately 2 miles south-east of Roker lighthouse, Sunderland. She was a steel-hulled steamer, en route from Rotterdam to Leith in ballast.
1407459			1825 wreck of English keel which foundered off Sunderland in a gale, after leaving that port in order to dump ballast offshore; a wooden sailing vessel.

NRHE ID	HER ID	Name	Description
971585		Beaver	1818 wreck of Scottish cargo vessel which foundered off Sunderland en route from London to Sunderland and/or Banff. Laden with timber, she was a wooden sailing vessel.
1606961		Hildawell	1916 wreck of an English cargo vessel which foundered off Sunderland after detonating a mine. She was a steel-hulled steamer en route from Bilbao to Middlesbrough with a cargo of iron ore.
1607031		Saga	1918 wreck of a Norwegian cargo vessel, operating under the British flag, torpedoed by the German submarine UB 64 approximately 4 miles ENE of Sunderland. She was a steel-hulled steamer, en route from Sunderland to Rouen with a cargo of coal.
1486166		Ilios	1898 wreck of British cargo vessel which foundered off Souter Point following a collision en route from Shields for the Mediterranean with coal. Constructed of iron in 1882, she was a steam-driven vessel.
1313508		Atlantic	1902 wreck of the Russian steam cargo ship ATLANTIC, which foundered three miles SSE 0.25 E of Souter light, following a collision with the 1,717-ton steamer TWIZELL.
			She was an iron-hulled steamer, en route from Sunderland to Kronstadt.
1365446		Estremadura	Scottish Schooner, 1892
1312886		Phoenix	1826 wreck of British packet which foundered off Souter Point following a collision. En route from Sunderland to Leith, she was a wooden sailing vessel.
1401578			1813 wreck of English keel which foundered after being driven out of Sunderland harbour "in a strong fresh"; a wooden sailing vessel.
1407468			1825 wreck of English keel which foundered off Sunderland in a gale, after leaving that port in order to dump ballast offshore; a wooden sailing vessel.

NRHE ID	HER ID	Name	Description
1394512			1802 wreck of English pilot vessel which capsized on leaving Sunderland harbour to seek pilotage work; a wooden sailing vessel.
1365497		Osprey	English Schooner, 1895
1390237			1789 wreck of English keel which foundered off Sunderland after being carried away from her moorings there, laden with coal; a wooden sailing vessel.
971570		Shipwright	1817 wreck of British cargo vessel which foundered off Sunderland en route from Kingston-upon-Hull to Newcastle-upon-Tyne, after springing a leak; a wooden sailing vessel.
1365619		Pinta	English Brig, 1896
1313585		Trim	English Ketch, 1907
1365130		Premier	English Sloop, 1876
1394514			1802 wreck of English pilot vessel which capsized on leaving Sunderland harbour to seek pilotage work; a wooden sailing vessel.
1391554			1792 wreck of English keel which foundered off Sunderland in bad weather; a wooden sailing vessel.
1390238			1789 wreck of English keel which foundered off Sunderland after being carried away from her moorings there, laden with coal; a wooden sailing vessel.
1313079		Blossom	Scottish Schooner, 1857
1365451		D	English Barge, 1892
1312824		Dove	English Craft, 1794

NRHE ID	HER ID	Name	Description
1407474			1825 wreck of English keel which foundered off Sunderland in a gale, after leaving that port in order to dump ballast offshore; a wooden sailing vessel.
1365477		Cordova	1893 wreck of English barque which foundered 5 miles NE of Sunderland following a collision en route from Sunderland for Iquique with coal. Constructed of iron, she was a sailing vessel.
1607759		Maindy Bridge	1917 wreck of a British collier, torpedoed by the German submarine UC 49, approximately 4 miles ENE of Sunderland. She was an iron-hulled steamer, en route from Middlesbrough to the River Tyne, in ballast. See 908722 for the site of her possible remains.
1401585			1813 wreck of English keel which foundered after being driven out of Sunderland harbour "in a strong fresh"; a wooden sailing vessel.
1365499		Vine	British Lugger, 1895
1403419			1818 wreck of sloop which foundered off Sunderland while northbound in ballast; a wooden sailing vessel.
1366709		Bovic	British Trawler, 1917
971542		John And Hannah	1813 wreck of British cargo vessel which foundered off Sunderland after springing a leak. En route from Newcastle-upon-Tyne to Whitby with coal and goods, she was a wooden sailing vessel.
1401588			1813 wreck of English keel which foundered after being driven out of Sunderland harbour "in a strong fresh"; a wooden sailing vessel.
1365489		Denham	1894 wreck of an English cargo vessel which foundered 7 miles south-east of Souter Point, following a collision with the Danish vessel SS ROLF. She was an iron-hulled steamer, en route from the Tyne to Rochester with a cargo of coal.

NRHE ID	HER ID	Name	Description
1607035		Stag 5	1950 wreck of an English tug which capsized and foundered while towing the newly built steamship CITY OF MANCHESTER from Wallsend to the river Wear. She was a steel-hulled steamer. See record 908629 for the site of her possible remains.
1390135			1788 wreck of English keel which foundered off Sunderland on departure to offload coal and being driven to sea; a wooden sailing vessel.
1607057		Samso	1918 wreck of a Danish cargo vessel which foundered 3 miles south east of the Roker Light, Sunderland, after detonating a mine laid by the German submarine UC 49. She was an iron-hulled motor vessel, en route from Aarhus to London with a cargo of machine
1362417		Tophill	Scottish Sloop, 1852
1365493		Clematis	1894 wreck of an English cargo vessel which foundered following a collision with the English cargo vessel BEAMISH approximately 6 miles SSE of Souter Point. She was a iron-hulled steamer, en route from Stockton-on-Tees to Blyth, in ballast.
1393338			1797 wreck of English keel which foundered after being driven out to sea from Sunderland, laden with coal; a wooden sailing vessel.
1400718			1812 wreck of English pilot vessel which foundered following a collision off Sunderland; a wooden sailing vessel.
971583		Vrow Annegina	1818 wreck of Dutch galliot which foundered off Hendon after a collision, having just left Sunderland. Bound for Delfziel and Groningen with coal, she was a wooden sailing vessel.
1366348		Lady	British Trawler, 1916

NRHE ID	HER ID	Name	Description
1367465		Elfi	1918 wreck of Norwegian cargo vessel which foundered 3 miles SE of Sunderland after being torpedoed en route from Jarrow for Rouen with coal. Constructed of steel in 1908, she was a steam-driven vessel.
1406286		Severn	1830 wreck of English craft which stranded between Sunderland pier and Hendon Dean; a wooden sailing vessel
1525529		Hans Hoth	The probable wreckage of a West German cargo steamer which foundered approximately 15.5 miles NE of Tynemouth Harbour Entrance while under tow for Tynemouth, having developed a list due to cargo shift further off shore in heavy weather.

Appendix D Water Framework Directive Screening and Scoping

D.1 Introduction

D.1.1.1 This section of the Scoping Report identifies the water bodies and receptors of relevance to the Morven Hawthorn Pit Grid Connection Project (hereafter referred to as 'MHPGC Project') in relation to the Water Framework Directive (WFD). It considers the potential impacts arising from the construction, operation and maintenance (O&M) and decommissioning of the MHPGC Project on the environmental objectives of the water bodies that could be affected in the context of the WFD. This scoping chapter adopts a proportionate approach to only those impacts with potential to result in likely significant effects and therefore scopes out other impacts where there is evidence that the effects are not likely to be significant.

D.1.1.2 This appendix provides screening and scoping to identify the activities, water bodies and receptors that need to be considered within a site specific WFD Compliance Assessment that will be prepared for the MHPGC Project.

D.1.1.3 This appendix also outlines the approach that will be taken for the WFD Compliance Assessment of the MHPGC Project.

D.2 Policy and Legislation

D.2.1.1 Policy and legislation on renewable energy infrastructure is presented in Chapter 2: Policy and legislation, of the Scoping Report. Policy and legislation specifically in relation to WFD is provided below.

D.2.2 Legislative Context

D.2.2.1 The WFD (Council Directive 2000/60/EC establishing a framework for community action in the field of water policy) was adopted by the European Commission in December 2000. The WFD is transposed into law in England and Wales by The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (the 2017 WFD Regulations) and into Scotland by the Water Environment and Water Services (Scotland) Act 2023 and the Water Environment (Controlled Activities) (Scotland) Regulations 2011.

D.2.2.2 The implementation of the WFD establishes a legislative framework for the prevention of deterioration and the protection of surface water (including rivers, lakes, transitional waters and coastal waters) and groundwater out to 3nm in Scotland and 1nm in England.

D.2.2.3 Given the location of the MHPGC Project, there are no water bodies within 3nm of Scottish coast and therefore there are no Scottish-based water bodies that could be affected. As a result, no Scottish baseline is presented.

D.2.2.4 Whilst Environmental Impact Assessment (EIA) is an efficient mechanism to gather the relevant information for a WFD Compliance Assessment, this information needs to be interpreted in relation to the WFD. The Environment Agency (EA) guidance states that impacts on biology, chemistry and hydromorphology need to be considered specifically in relation to WFD status classes and to be reported under a specific WFD section in any EIA Report/Environmental Statement (ES) or report produced or in a separate WFD compliance report (EA, 2010).

D.2.2.5 Therefore, as part of the application for development consent, a WFD Compliance Assessment will be undertaken to demonstrate how any impact on WFD receptors caused by activities associated with the MHPGC Project fits with the objectives of any affected WFD water bodies. The WFD Compliance Assessment will also provide the opportunity to inform the detailed design of the MHPGC Project to avoid, minimise, mitigate, or compensate for the risks to WFD water body receptors where risk assessment determines that the activities have the potential to:

- cause surface water bodies, including coastal water bodies, or groundwater bodies to deteriorate from one WFD status class to another or cause significant localised effects that could contribute to this happening;
- prevent or undermine action to get surface water bodies or groundwater bodies to good status (e.g., compromise the programme of measures put in place to achieve the ultimate water body objective).

D.2.3 Water Body Classification

D.2.3.1 The WFD specifies the quality elements that are used to assess the ecological and chemical status of a water body. Quality elements are generally biological (e.g., fish, invertebrates, macrophytes) or chemical (e.g., heavy metals, pesticides, nutrients). The quality of the environment is classified using five categories of high, good, moderate, poor and bad to give a water body status. Classifications indicate where the quality of the environment is good, where it may need improvement, and what may need to be improved. They can also be used, over the years, to plan improvements, show trends and to monitor the effectiveness of the programme of measures identified. There are three status classifications which are commonly reported: chemical, ecological and quantitative.

D.2.3.2 Chemical status is assessed from compliance with environmental standards for chemicals that are priority substances and/or priority hazardous substances for surface water and groundwater bodies. These are known as ‘Annex X’ substances listed in the 2017 WFD Regulations. Chemical status is recorded as ‘good’ or ‘fail’. The chemical status of groundwater also considers electrical conductivity. Chemical status for a water body is determined by the worst scoring chemical (‘one-out-all-out’ approach).

D.2.3.3 Ecological status classifications can be composed of up to four different assessments and apply to surface water bodies only. These are as follows:

- an assessment of status indicated by a biological quality element such as fish, invertebrates, or algae. The presence of invasive species is also assessed as a separate test;
- an assessment of compliance with environmental standards for supporting physio-chemical conditions, such as dissolved oxygen, phosphorus, or ammonia;
- an assessment of compliance with environmental standards for concentrations of specific pollutants, such as zinc, cypermethrin or arsenic (these are known as ‘Annex VIII’ substances);
- in determining high status only, a series of tests is included to make sure that hydromorphology is largely undisturbed.

D.2.3.4 Ecological status is recorded as high, good, moderate, poor or bad. 'High' represents 'largely undisturbed conditions'. Other classes show increasing deviation from undisturbed or reference conditions. This deviation must be expressed as an Ecological Quality Ratio (EQR) which ranges from zero for bad status to one for high status. As with chemical status, ecological status is determined by the worst scoring component (one-out-all-out approach).

D.2.3.5 Biological status is a sub-set of ecological status where the results of the biological quality elements are assessed (and so ignore physio-chemical and Annex VIII substances and hydromorphology). The one-out-all-out rule is applied again here to give a biological status classification.

D.2.3.6 Quantitative status measures the degree to which a body of groundwater is affected by direct and indirect abstractions (i.e. the available groundwater resource must not be exceeded by the long-term annual average rate of abstraction). Groundwater abstraction must also not cause failure of 'Good' ecological status in dependent surface waters. This also applies to surface water bodies.

D.2.3.7 Overall status is a composite measure that looks at ecological status, chemical status and quantitative status dependent on the water body type. So, overall status considers all four assessment types under ecological status (biology, physio-chemical, Annex VIII substances and hydromorphology) as well as incorporating the results of the chemical status assessment (priority substances) and quantitative status (for groundwater bodies). The one-out-all-out rule is applied again here, so a water body must be of good (pass) or better ecological status, good chemical status and good quantitative status assessment to be given a good overall status.

D.2.4 Water Body Objectives

D.2.4.1 The completion of a WFD Compliance Assessment is a staged process where data on a study area and work proposals are assessed with respect to the requirements of the WFD to ascertain whether the proposals will or will not have a detrimental impact on the status of water bodies associated with a development or project. If the assessment concludes, after taking account of the mitigation proposed, that a project may either reduce the quality status of the water bodies or prevent them from reaching the required status, then this represents a failure to achieve the WFD objectives. Therefore, the guidance is that a project that should not go ahead unless justification for the new modification is demonstrated under Article 4.7 of the Directive. The four objectives of the WFD Compliance Assessment are as follows:

- Objective 1: To prevent deterioration in the ecological status of the water body;
- Objective 2: To prevent the introduction of impediment to the attainment of Good WFD status for the water body;
- Objective 3: To ensure the attainment of the WFD objectives for the water body is not compromised;
- Objective 4: To ensure the achievement of WFD objectives in other water bodies within the same catchment is not permanently excluded or compromised.

D.2.5 Water Framework Directive Compliance Assessment Scope

D.2.5.1 The WFD Compliance Assessment to be undertaken as part of the EIA process will draw upon a number of other disciplines in determining the potential impact to the environmental objectives of the water bodies that have the potential to be impacted. These will include hydrology and water quality, terrestrial and aquatic ecology, hydrogeology and the Habitat Regulations Assessment.

D.2.5.2 A staged approach will be adopted in undertaking the WFD Compliance Assessment in accordance with guidance from the EA on WFD assessment of estuarine (transitional) and coastal waters, 'Clearing the Waters for All' (Environment Agency, 2023) and the Planning Inspectorate's Advice Note 18: The Water Framework Directive (Planning Inspectorate, 2017). SEPA does not issue specific guidance on the WFD assessment and although Environment Agency jurisdiction does not extend to Scottish waters, the guidance contained within 'Clearing the Waters for All' provides an appropriate outline for WFD assessment in Scotland.

D.2.5.3 The WFD Compliance Assessment is typically undertaken in three stages:

- Screening – excludes any activities associated with the MHPGC Project that do not need to go through the scoping or impact assessment stages as they represent low risk activities;
- Scoping – identifies the receptors of water bodies that are potentially at risk from an activity associated with the MHPGC Project and need impact assessment;
- Impact assessment – considers the potential impacts of an activity associated with the MHPGC Project, identifies ways to avoid or minimise impacts, and shows whether an activity may cause deterioration or jeopardise the water body achieving good status.

D.2.5.4 A flow chart, taken from Advice Note 18 (Planning Inspectorate, 2017) for assessing activities and projects for compliance with the WFD has been included in Figure D. 1. This provides an overview of the recommended process to address the WFD during the pre-application process. This process will be followed for the WFD Compliance Assessment to be undertaken as part of the EIA process for the MHPGC Project.

D.2.5.5 An initial screening and scoping exercise has been undertaken in this appendix to review the MHPGC Project in terms of potential impact to the water environment. This initial screening summarises the potential impact to the WFD receptors with regard to the following (as per Defra, 2023):

- hydromorphology;
- biology – habitats (higher and lower sensitivity);
- biology – fish;
- water quality and quantity;
- protected areas.

D.2.5.6 This screening will assist in defining the scope of the detailed assessment. It identifies potential issues and provides an opportunity to engage with the EA (as a key consultee on the WFD as part of the Planning Act 2008 process) to agree the scope

of the detailed assessment. As there are no water bodies within 3nm of Scottish coast and therefore there are no Scottish-based water bodies that could be affected, consultation with SEPA is not expected.

D.2.5.7 The detailed WFD Compliance Assessment for the MHPGC Project will then examine the potential impact on water bodies (including cumulative impacts) and suggest mitigation measures and enhancements where appropriate. The WFD Compliance Assessment will also consider whether the MHPGC Project has the potential to affect the objectives of the WFD in protecting the water environment as set out in the Northumbria River Basin Management Plan (RBMP).

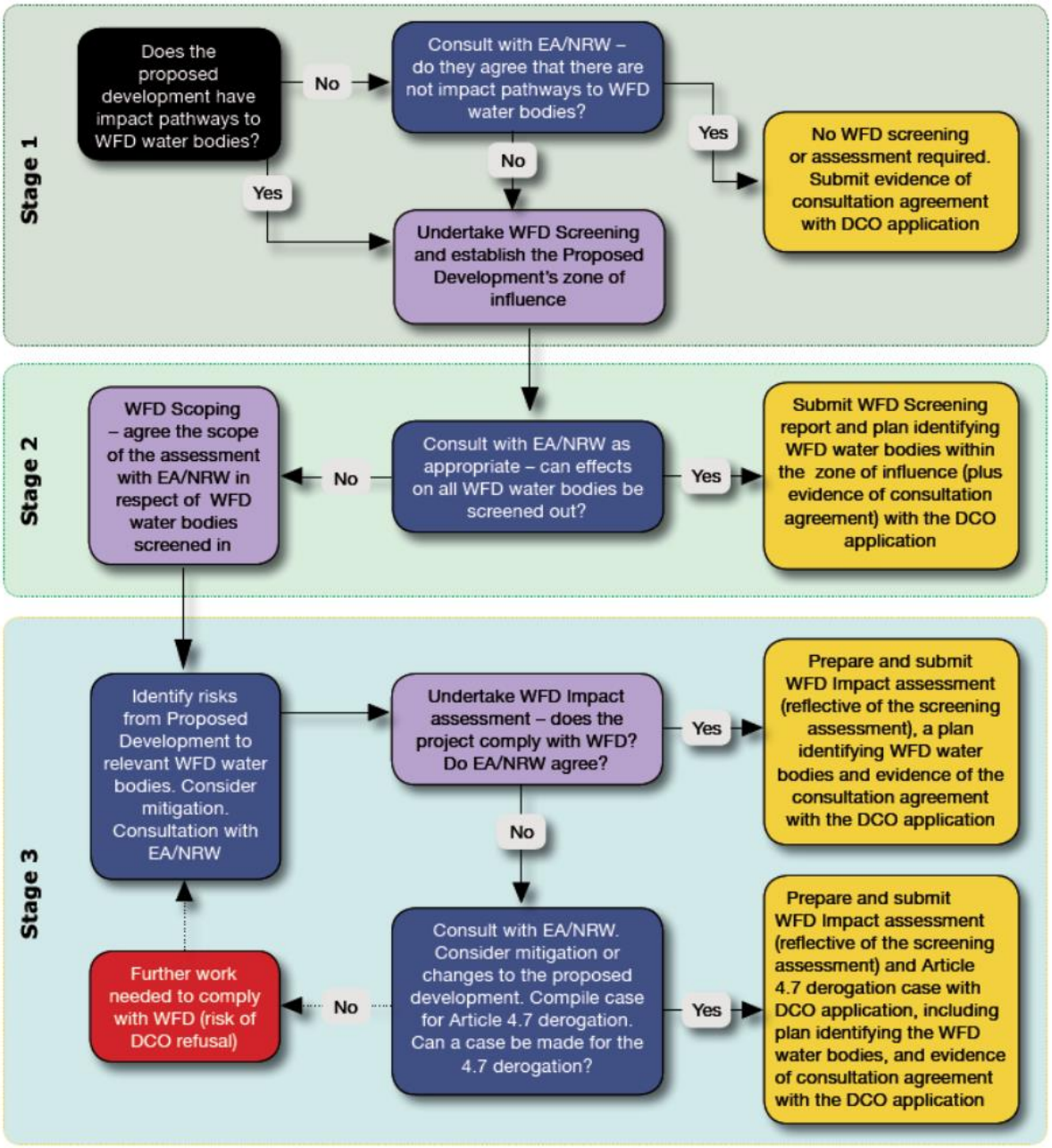


Figure D. 1: Flow Chart Illustrating the WFD Compliance Assessment Process (Planning Inspectorate, 2017)

D.3 Study Area

D.3.1.1 For the purpose of this Scoping Report, the Water Framework Directive Study Area has been defined for the offshore environment as the MHPGC Project Scoping Boundary plus a buffer extending circa 5km to 9km from the MHPGC Project Scoping Boundary, extending up to Mean High Water Springs (MHWS) at the top of the intertidal zone(Figure D. 2). The 5km to 9km equates to one maximum tidal ellipse[32] over a large spring tide around the MHPGC Project Scoping Boundary representing the dominant tidal currents. This buffer is designed to incorporate the Zone of Influence (ZoI) from indirect impacts (e.g. increases in Suspended Sediment Concentrations (SSCs) and potential changes in physical processes). Beyond the tidal excursion extent of 5km to 9km, any effects from the MHPGC Project on WFD receptors would be minimal.

D.3.1.2 For the onshore environment, the Water Framework Directive Study Area makes reference to a Water Resources and Flood Risk Assessment Study Area. The Water Resources and Flood Risk Assessment Study is defined as follows:

- the WFD surface water bodies (river and transitional) which are intersected by, and are downstream of, the MHPGC Project Scoping Boundary (Figure 8.6);
- the WFD groundwater bodies and associated Source Protection Zones (SPZs) and Nitrate Vulnerable Zones (NVZs)which the MHPGC Project Scoping Boundary intersects (Figure 8.7).

D.3.1.3 The offshore buffer and the extent of the onshore Water Resources and Flood Risk Assessment Study Area are intended to incorporate the zone of influence from indirect effects. Beyond these areas, any effects from the MHPGC Project on WFD water bodies would be minimal.

D.3.1.4 Given the location of the MHPGC Project, there are no water bodies within 3 nm of Scottish coast and therefore there are no Scottish-based water bodies that could be affected. As a result, no Scottish baseline is presented.

[32] One spring tidal excursion has been identified through interim numerical modelling techniques and is defined as the distance that suspended sediment is transported before being carried back on the returning tide. The interim model, and the resulting buffer range, was informed from bathymetric datasets available as part of the Marine Environmental Data Information Network (MEDIN, 2024), and is in line with the Atlas of UK Marine Renewable Energy Resources (ABPmer, 2017).

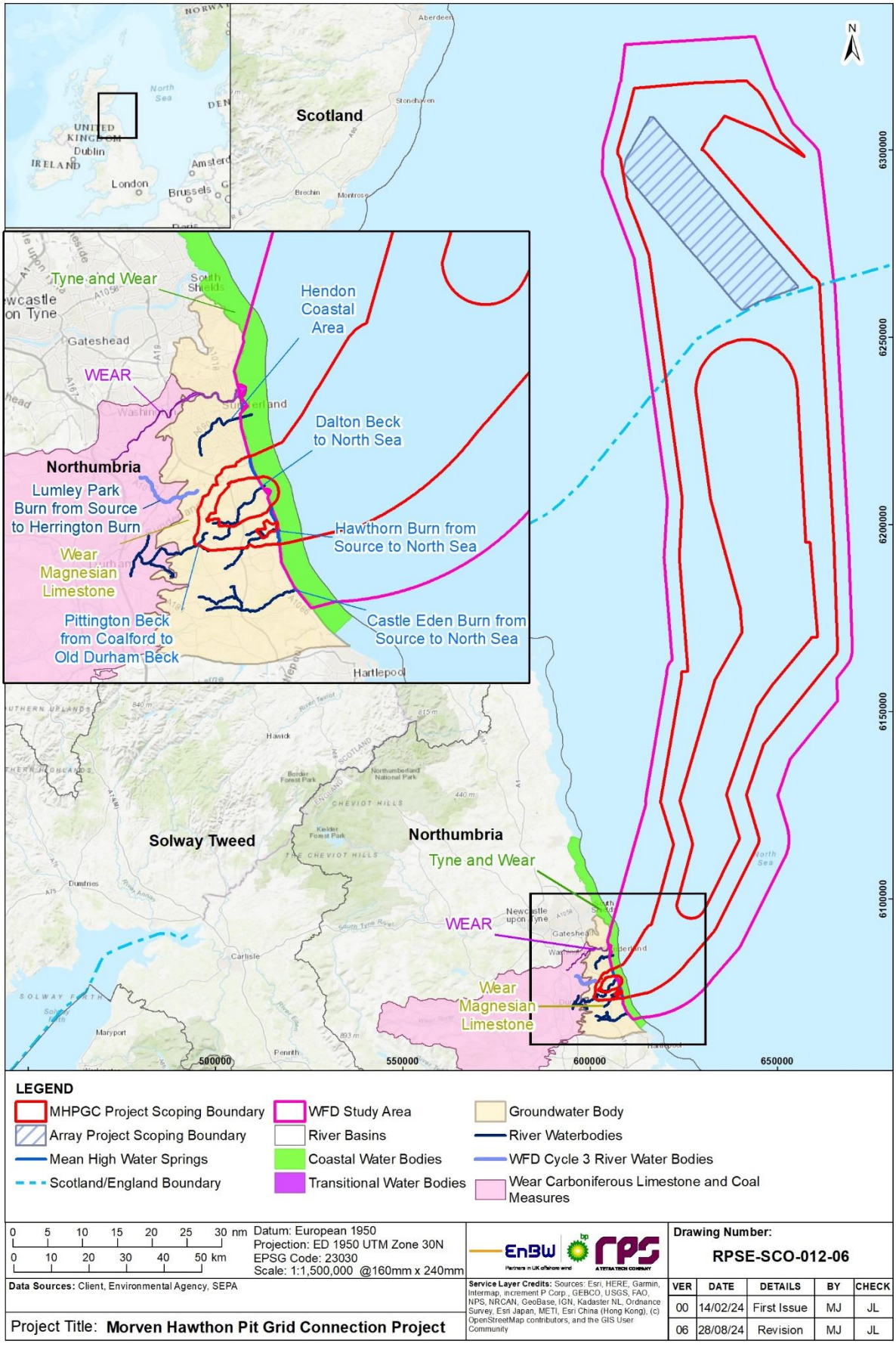


Figure D. 2: Water Framework Directive Water Bodies within the Water Framework Directive Study Area Study Area

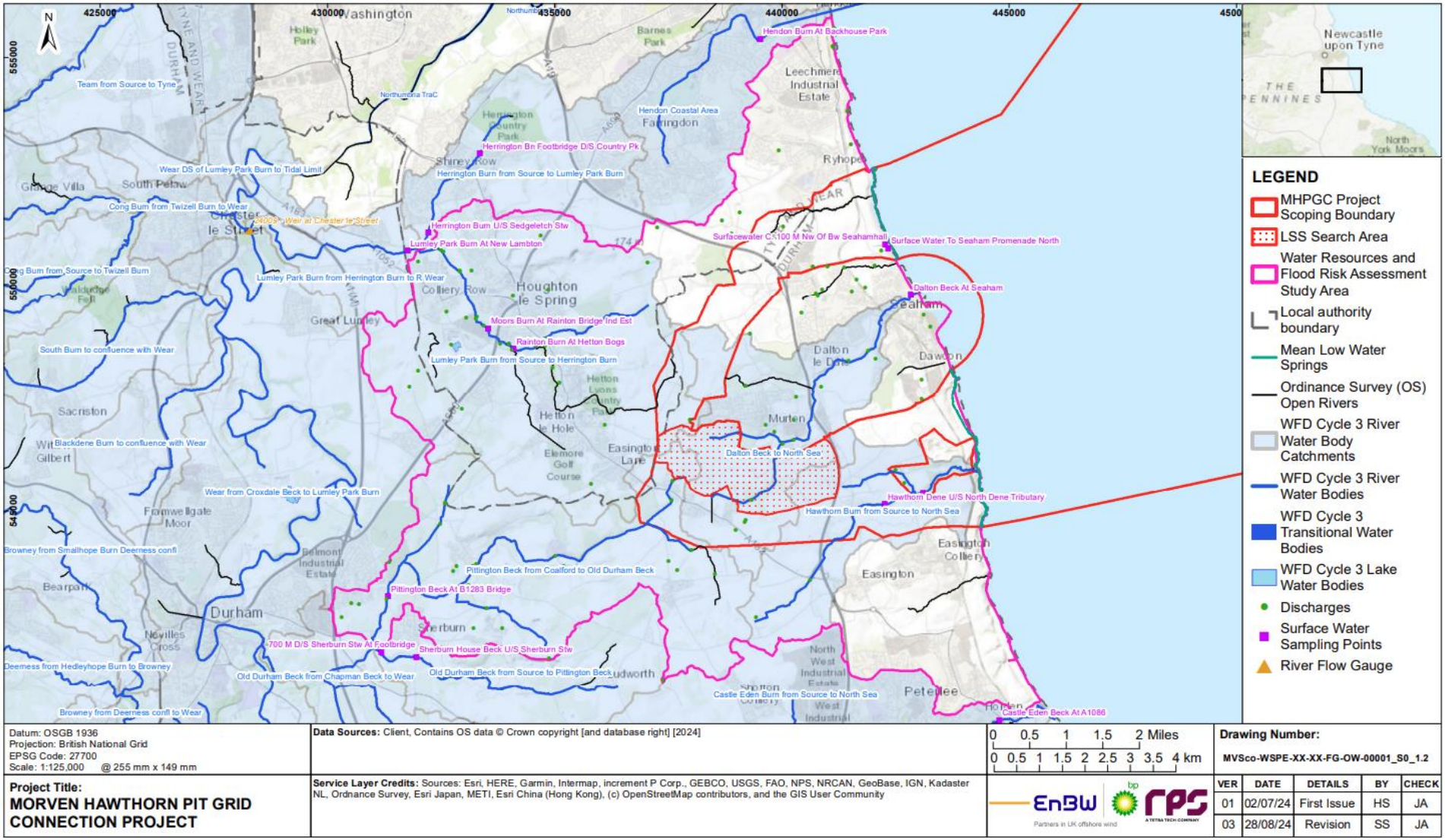


Figure D. 3: Water Framework Directive Surface Waterbodies within the Water Resource and Flood Risk Assessment Study Area

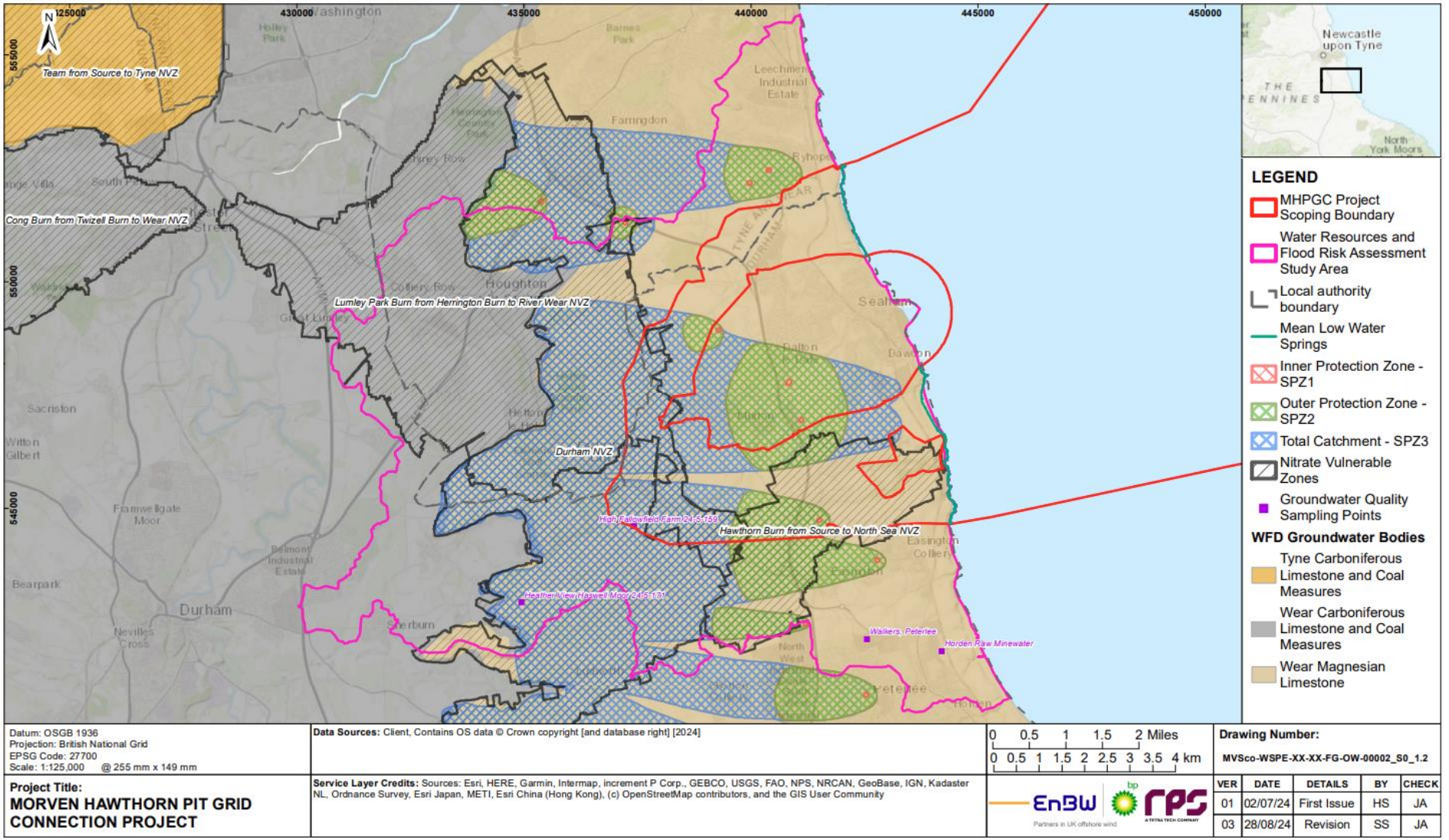


Figure D. 4: Water Framework Directive Groundwater Bodies, Source Protection Zones and Nitrate Vulnerable Zones within the Water Resources and Flood Risk Assessment Study Area

D.4 Baseline Environment

D.4.1 Water Bodies within Water Framework Directive Study Area

D.4.1.1 The water bodies within the Water Framework Directive Study Area are shown on Figure D. 2, with onshore detail in Figure 8.6 and Figure 8.7. These water bodies will be refined in discussion with consultees once the design for the MHPGC Project has been refined. This refinement may mean that some of the water bodies identified in this report would not be affected by the final design. The impacts of the different elements of the MHPGC Project on these water bodies will be considered in the WFD Compliance Assessment.

D.4.1.2 Figure D. 5 highlights the overall, ecological, and chemical status as well as the contributing elements to the status classification from the EA Catchment Data Explorer (EA, 2021).

Table D. 1: Water Framework Directive Status Classification for Surface Water (River, Transitional and Coastal) and Groundwater Bodies that are Present within the Water Framework Directive Study Area, and the Key Elements Driving Status Classification

Operational Catchment	Water Body Name & ID	Water Body Type	Heavily Modified Water Body (HMWB)	Overall Ecological Status	Biological Quality Elements	Physio-Chemical Quality Elements	Hydromorphological Supporting Elements	Supporting Elements (Surface Water)	Overall Groundwater Status	Quantitative Groundwater Status	Chemical Groundwater Status
Tyne and Wear	Tyne and Wear GB650301500002	Coastal	N	Good	Good	High	Support Good	-	-	-	-
Wear Lower and Estuary TraC	Wear GB510302402900	Transi-tional	Y	Moderate	High	Moderate	Support Good	Mode-rate.	-	-	-
Wear Lower and Estuary	Hendon Coastal Area GB103024077640	River	Y	Moderate	Bad	High	Support Good	Mode-rate.	-	-	-
Wear Lower and Estuary	Pittington Beck from Coalford to Old Durham Beck GB103024077540	River	N	Bad	Bad	Moderate	Support Good	-	-	-	-
Wear Lower and Estuary	Lumley Park Burn from Source to Herrington Burn Water Body GB103024077580	River	Y	Moderate	High	Good	Support Good	Mode-rate.	-	-	-

Operational Catchment	Water Body Name & ID	Water Body Type	Heavily Modified Water Body (HMWB)	Overall Ecological Status	Biological Quality Elements	Physio-Chemical Quality Elements	Hydromorphological Supporting Elements	Supporting Elements (Surface Water)	Overall Groundwater Status	Quantitative Groundwater Status	Chemical Groundwater Status
Seaham Peterlee Coast.	Dalton Beck to North Sea GB103025075970	River	N	Moderate	Moderate	Moderate	Support Good	-	-	-	-
Seaham Peterlee Coast	Hawthorn Burn from Source to North Sea GB103025075950	River	N	Poor	Poor	Moderate	Support Good	-	-	-	-
Seaham Peterlee Coast	Castle Eden Burn from Source to North Sea GB103025075930	River	N	Bad	Bad	Good	Support Good	-	-	-	-
Wear Magnesian Limestone.	Wear Magnesian Limestone GB40301G703900	Ground water	N/A	-	-	-	-	-	Poor	Good	Poor
Wear Carboniferous Limestone and Coal Measures.	Wear Carboniferous Limestone and Coal Measures Water Body GB40302G701600	Ground water	N/A	-	-	-	-	-	Poor	Good	Poor

D.4.2 Water Framework Directive Protected Areas

D.4.2.1 Figure D. 5 shows the WFD protected areas within the context of the Water Framework Directive Study Area.

D.4.2.2 Durham Coast Special Area of Conservation (SAC), which lies partly within the MHPGC Project Scoping Boundary, is designated for the Annex I habitat 'Vegetated sea cliffs of the Atlantic and Baltic Coasts', with Durham coast being the only example of vegetated sea cliffs on Magnesian Limestone exposures in the UK. A number of Sites of Special Scientific Interest (SSSIs) are also associated with this coast.

D.4.2.3 Northumbria Coast Ramsar and Special Protection Area (SPA) also lies partly within the MHPGC Project Scoping Boundary. The site qualifies under Article 4 of the Birds Directive (2009/147/EC) as the site regularly supports more than 1% of the Great Britian populations of two species listed in Annex I of the EC Birds Directive (Arctic tern *Sterna paradisaea* and little tern *Sternula albifrons*) and because it regularly supports more than 1% of the biogeographical population of two regularly occurring migratory species (turnstone *Arenaria interpres* and purple sandpiper *Calidris maritima*).

D.4.2.4 There are also two Bathing Water sites within 2km of the MHPGC Project: Seaham Hall Beach which is within the MHPGC Scoping Boundary and Seaham Beach which is 81.6m from the MHPGC Scoping Boundary. No other types of WFD protected area are found within 2km of the MHPGC Project.

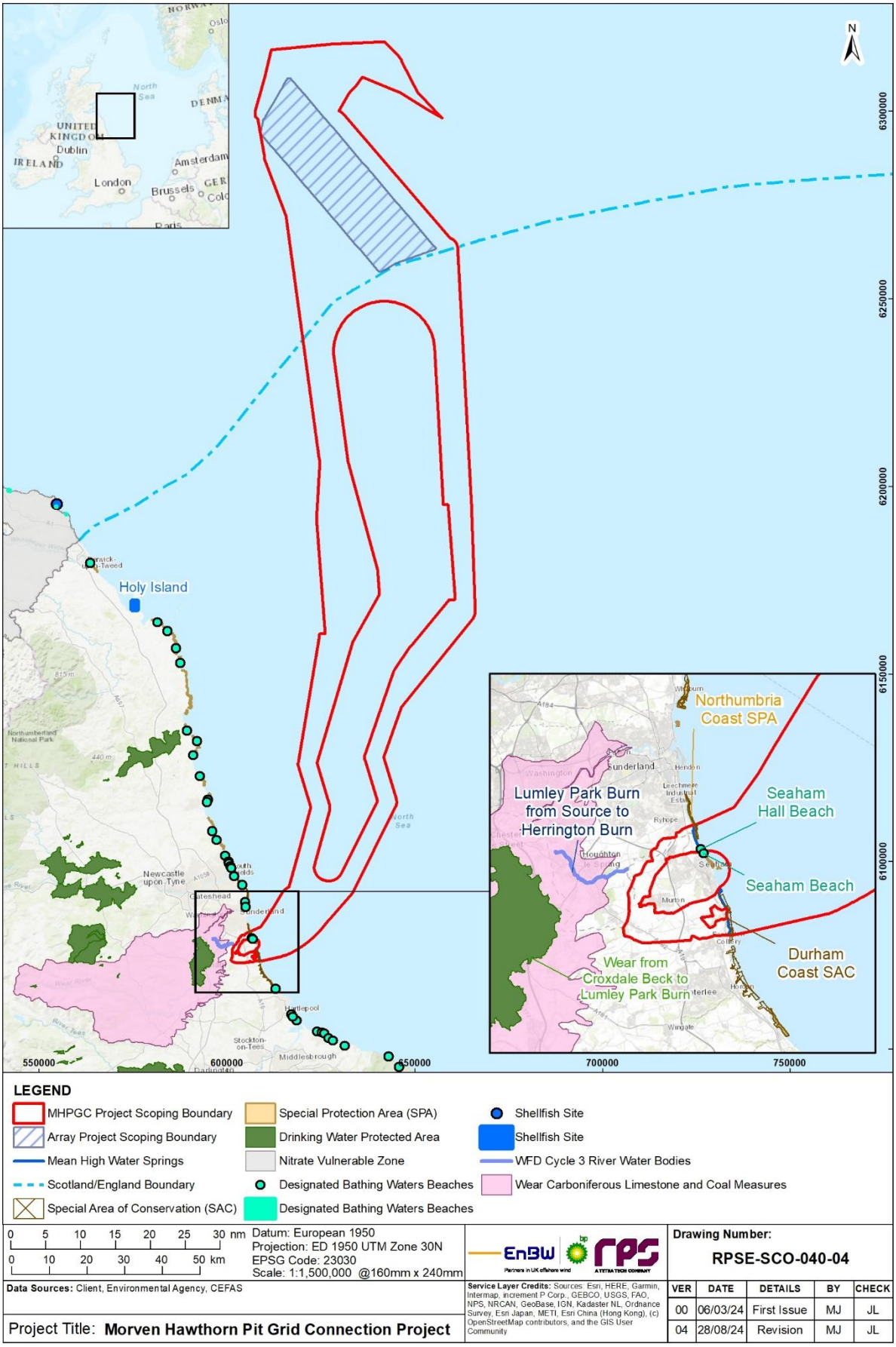


Figure D. 5: Water Framework Directive Protected Areas within the Water Framework Directive Study Area

D.4.3 Water Framework Directive Sensitive Habitats

D.4.3.1 Higher sensitivity WFD habitats within the Water Framework Directive Study Area are shown on Figure D. 6Figure D. 6 below. There is an area of polychaete reef outside the mouth of the River Tyne, partially within the Water Framework Directive Study Area and the Tyne and Wear water body (GB650301500002). Another area of polychaete reef is located off the coast of Seaham, which falls partially within the MHPGC Project Scoping Boundary and wholly within the Water Framework Directive Study Area, but outside of any WFD water body.

D.4.3.2 The WFD higher sensitivity habitat 'subtidal kelp beds' runs along the coast from South Shields almost to Sunderland, within the Tyne and Wear water body (GB650301500002) and the Wear water body (GB510302402900). This kelp bed partially overlaps with the MHPGC Project Scoping Boundary and is partially within the Water Framework Directive Study Area.

D.4.3.3 The following lower sensitivity WFD habitats fall within the Tyne and Wear water body (GB650301500002) and the MHPGC Project Scoping Boundary and Water Framework Directive Study Area (Figure D. 7):

- gravel and cobbles (intertidal coarse sediment (A2.1) and subtidal coarse sediment (A5.1));
- intertidal soft sediment (sand (A2.2), mud (A2.3) and mixed sediments (A2.4));
- subtidal soft sediment (sand (A5.2), mud (A5.3) and mixed sediments (A5.4));
- rocky shore (intertidal rock (A1));
- subtidal rocky reef (infralittoral (A3) and circalittoral rock (A4)).

D.4.3.4 The lower sensitivity WFD habitats intertidal soft sediment, subtidal soft sediment, and subtidal rocky reef are also found within the Wear water body (GB510302402900), within the Water Framework Directive Study Area.

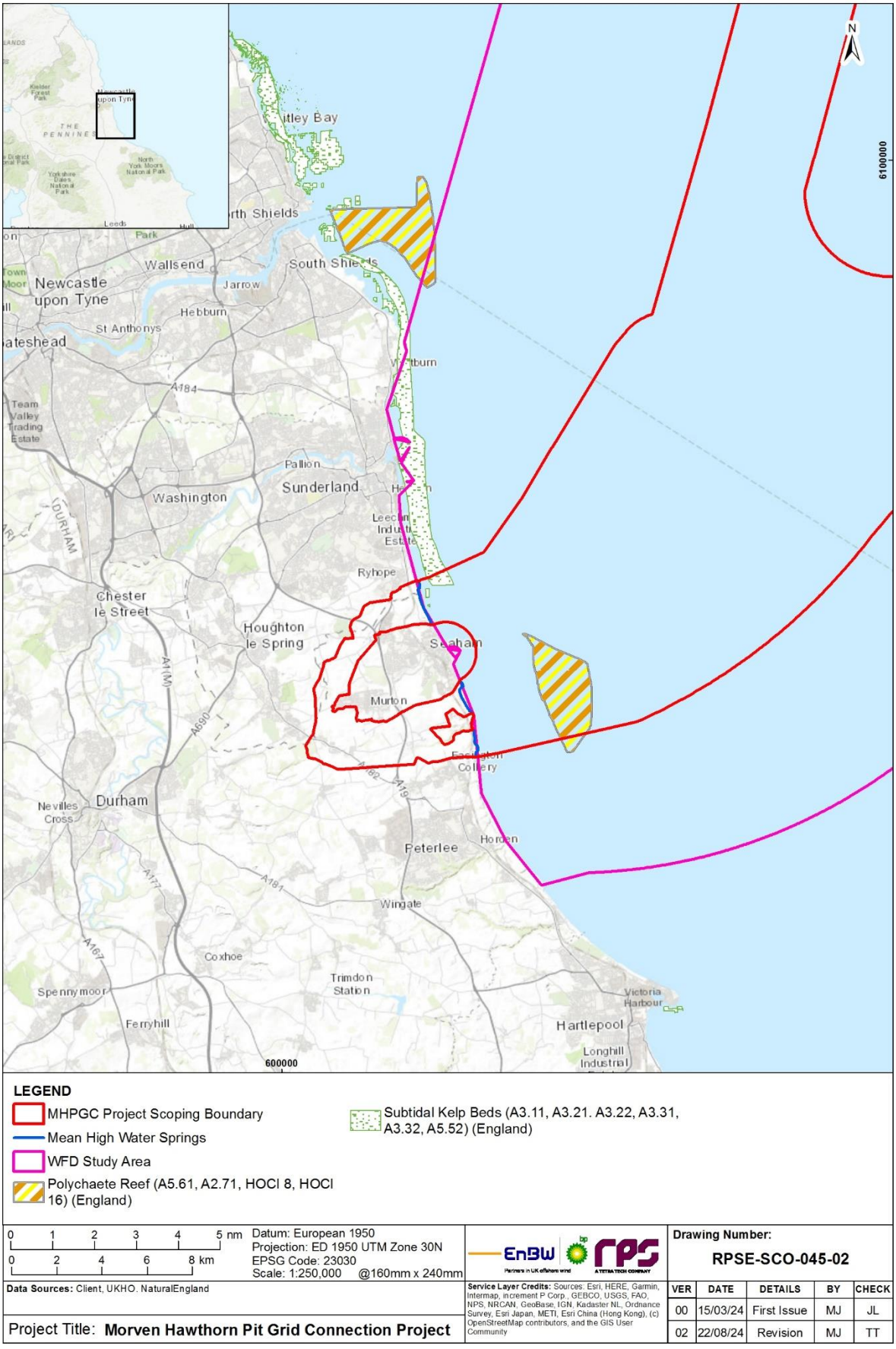


Figure D. 6: Water Framework Directive Higher Sensitivity Habitats

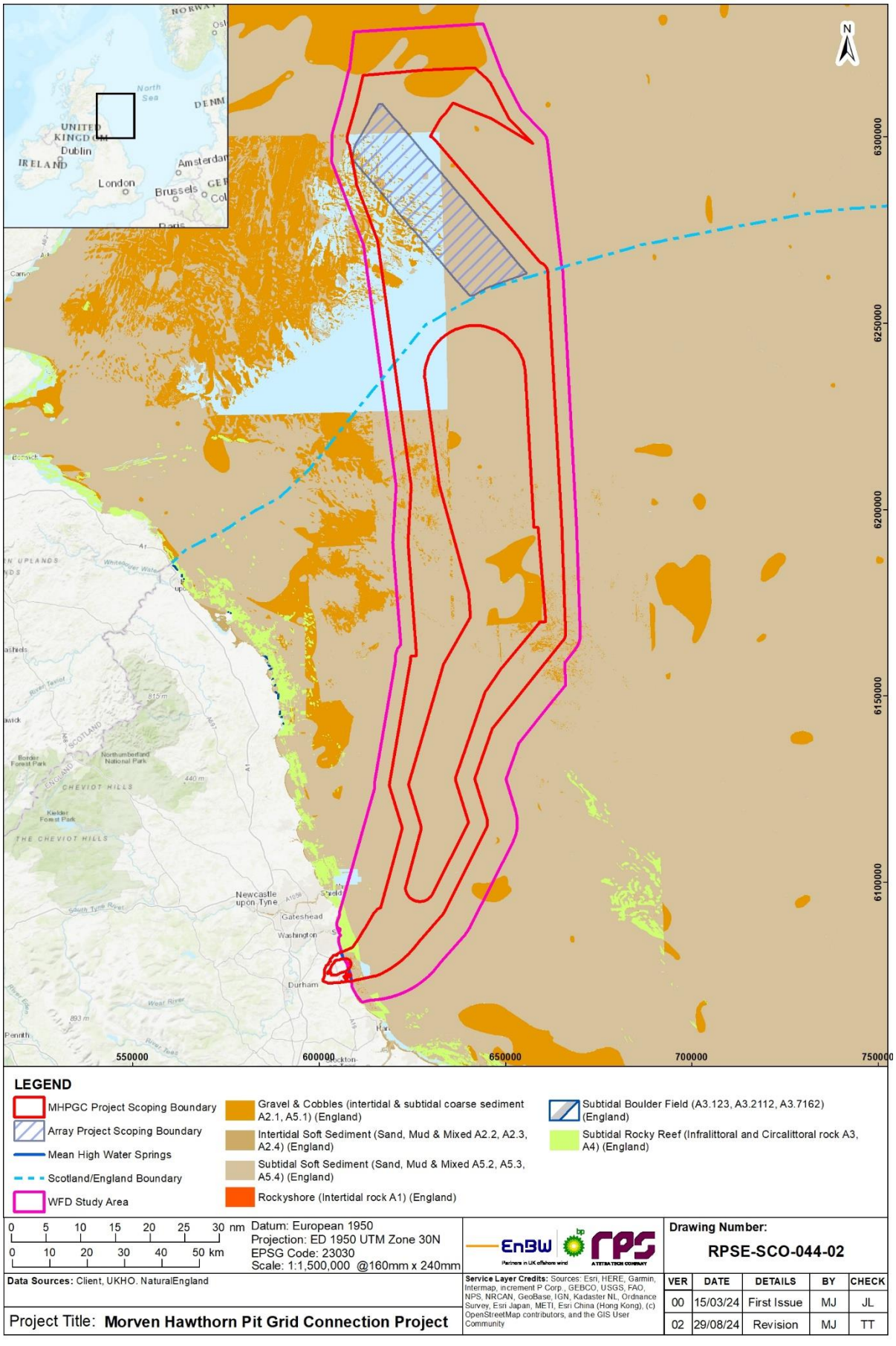


Figure D. 7: Water Framework Directive Lower Sensitivity Habitats

D.5 Risks to Water Framework Directive Receptors

D.5.1.1 The activities associated with the MHPGC Project cannot be screened out as they do not qualify as low risk activities.

D.5.1.2 Table D. 2 identifies the WFD receptors at risk from the activities associated with the MHPGC Project for each water body identified in Table D. 1 These risks will be screened into the WFD Compliance Assessment for impact assessment.

Table D. 2: Scoping Exercise Required for the Water Framework Directive Assessment under the Environment Agency Guidance 'Clearing the Waters for All' (Environmental Agency, 2023)

Receptor	Water Body	Potential Risk to Receptor?	Note the Risk Issue(s) for Impact Assessment
Hydromorphology	Tyne and Wear.	Yes	Activities associated with the MHPGC Project, such as cable installation, may cause increased SSC and associated sediment deposition. Further assessment on impacts to hydromorphology is required.
	Wear.		
	Hendon Coastal Area.		
	Pittington Beck from Coalford to Old Durham Beck.		
	Dalton Beck to North Sea.		
	Hawthorn Burn from Source to North Sea.		
	Castle Eden Burn from Source to North Sea.		
	Lumley Park Burn from Source to Herrington Burn.		
	Wear Magnesian Limestone.	No	Not applicable for groundwater bodies.
	Wear Carboniferous Limestone and Coal Measures.		

Receptor	Water Body	Potential Risk to Receptor?	Note the Risk Issue(s) for Impact Assessment
Biology: habitats	Tyne and Wear.	Yes	Lower sensitivity habitats are likely to be impacted as the MHPGC Project Scoping Boundary traverses these areas. The higher sensitivity habitats polychaete reef and subtidal kelp beds are found within the Water Framework Directive Study Area and within the MHPGC Project Scoping Boundary, respectively, and therefore may also be affected. Further assessment is required to account for these higher and lower sensitivity habitats.
	Wear.	Yes	The lower sensitivity WFD habitats intertidal soft sediment, subtidal soft sediment, and subtidal rocky reef are found within this water body and may be affected by as the MHPGC Project. Further assessment is required to account for these lower sensitivity habitats.
	Hendon Coastal Area.	No	No WFD higher or lower sensitivity habitats present within these water bodies.
	Pittington Beck from Coalford to Old Durham Beck.		
	Dalton Beck to North Sea.		
	Hawthorn Burn from Source to North Sea.		
	Castle Eden Burn from Source to North Sea.		

Receptor	Water Body	Potential Risk to Receptor?	Note the Risk Issue(s) for Impact Assessment
	Lumley Park Burn from Source to Herrington Burn		
	Wear Magnesian Limestone.	No	Not applicable for groundwater bodies.
	Wear Carboniferous Limestone and Coal Measures.		
Biology: fish	Tyne and Wear.	Yes	There is potential for increased SSC and associated deposition to have an effect on fish spawning habitats (through changes to sediment composition, smothering of eggs etc.) and cause disturbance to diadromous fish species migration. Further assessment is required to assess the potential impact of the MHPGC Project on fish.
	Wear.		
	Hendon Coastal Area.		
	Castle Eden Burn from Source to North Sea.		
	Dalton Beck to North Sea.		
	Hawthorn Burn from Source to North Sea.		
	Pittington Beck from Coalford to Old Durham Beck.	No	Inland water body so no potential impact to fish movement, migration or spawning.
	Lumley Park Burn from Source to Herrington Burn.		
	Wear Magnesian Limestone.	No	Not applicable for groundwater bodies.
	Wear Carboniferous Limestone and Coal Measures.		

Receptor	Water Body	Potential Risk to Receptor?	Note the Risk Issue(s) for Impact Assessment
Water quality and quantity	Tyne and Wear.	Yes	Activities required for the construction and decommissioning of the MHPGC Project may result in accidental spills/contaminant release which could adversely affect water quality, and/or altered surface water and groundwater flows. The laying of the cable in marine water bodies by the cable laying vessels represents the greatest risk of spills and contamination to coastal and marine water bodies. Construction of the landfall and run-off from the onshore cable corridors to the marine environment also represent risks of pollution. During decommissioning, the use of heavy vehicles and the removal of infrastructure may lead to an increased risk of contaminated run-off, reducing water quality in surrounding watercourses. The potential pollutants may be included on the Environmental Quality Standards Directive (EQSD) list. The risks cannot be discounted at scoping stage and will therefore be assessed further.
	Wear.		
	Hendon Coastal Area.		
	Pittington Beck from Coalford to Old Durham Beck.		
	Dalton Beck to North Sea.		
	Hawthorn Burn from Source to North Sea.		
	Castle Eden Burn from Source to North Sea.		
	Lumley Park Burn from Source to Herrington Burn.		
	Wear Magnesian Limestone.		
	Wear Carboniferous Limestone and Coal Measures.		
Protected areas	Durham Coast SAC.	Yes	Activities associated with the MHPGC Project may affect WFD protected areas within 2 km of the Project, for example through increased SSC and associated sediment deposition. Further assessment on impacts to WFD protected areas is required.
	Northumbria Coast SPA.		
	Seaham Hall Beach Bathing Waters.		
	Seaham Beach Bathing Waters.		

Receptor	Water Body	Potential Risk to Receptor?	Note the Risk Issue(s) for Impact Assessment
Invasive Non-Native Species (INNS)	Tyne and Wear.	Yes	Activities associated with the construction and decommissioning of the Offshore Export Cables may cause the spread of INNS, which could adversely affect the status of native protected or notable habitats and species and present a risk in the achievement of the environmental objectives of the water bodies affected.
	Wear.		
	Hendon Coastal Area.		
	Pittington Beck from Coalford to Old Durham Beck.		
	Dalton Beck to North Sea.		
	Hawthorn Burn from Source to North Sea.		
	Castle Eden Burn from Source to North Sea.		
	Lumley Park Burn from Source to Herrington Burn.		
	Wear Magnesian Limestone.	No	Not applicable for groundwater bodies
	Wear Carboniferous Limestone and Coal Measures.		

D.6 Conclusion

D.6.1.1 This appendix has identified that there is the potential for the MHPGC Project to impact the following water bodies:

- Tyne and Wear GB650301500002;
- Wear GB510302402900;
- Hendon Coastal Area GB103024077640;
- Pittington Beck from Coalford to Old Durham Beck GB103024077540;
- Dalton Beck to North Sea GB103025075970;
- Hawthorn Burn from Source to North Sea GB103025075950;
- Castle Eden Burn from Source to North Sea GB103025075930;
- Lumley Park Burn from Source to Herrington Burn GB103024077580;
- Wear Magnesian Limestone GB40301G703900;
- Wear Carboniferous Limestone and Coal Measures GB40302G701600.

D.6.1.2 There is also the potential for the MHPGC Project to impact the following WFD protected areas:

- Durham Coast SAC;
- Northumbria Coast SPA;
- Seaham Hall Beach Bathing Waters;
- Seaham Beach Bathing Waters.

D.6.1.3 The water bodies and risks to receptors that have been initially screened in this WFD Screening and Scoping will be further refined alongside the design for the MHPGC Project. This refinement will be undertaken in discussion and agreement with consultees. A full WFD Compliance Assessment following the stages outlined in Figure D. 1 will be presented in the EIA Report/ES.

D.7 References

ABPmer (2017). UK Renewables Atlas. Available at: https://www.renewables-atlas.info/explore-the-atlas/. (Accessed: August 2024).

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Appendix E Marine Protected Area Screening

E.1 Introduction

E.1.1 Background

E.1.1.1 There are several types of Marine Protected Area's (MPA) in the UK, which in combination are intended to form an ecologically coherent and well-managed network as a contribution to the effective conservation and sustainable use of the UK's marine environment. They include Marine Conservation Zones (MCZs), Nature Conservation MPAs (ncMPAs), Special Areas of Conservation (SACs), Special Protection Areas (SPAs), Highly Protected Marine Areas (HPMAs), and Ramsar sites. This MPA Screening considers potential impacts to MCZs and HPMAs in English waters and impacts to ncMPAs in Scottish waters from the Morven Hawthorn Pit Grid Connection Project (hereafter referred to as 'MHPGC Project').

E.1.1.2 The requirement for consideration of potential impacts of the MHPGC Project upon SACs, SPAs and Ramsar sites is derived from the Habitats Directive (92/43/EEC) and the Council Directive (2009/147/EC), respectively, and will be addressed separately in the Habitat Regulations Appraisal.

E.1.1.3 ncMPAs in Scotland create a network of sites for nature conservation, the protection of marine biodiversity, sustainable management and protecting marine heritage. In England, MCZs protect a range of nationally important, rare, or threatened habitats and species. In 2023, HPMAs were designated to protect all species and habitats and associated ecosystem processes within their site boundaries.

E.1.1.4 The Marine and Coastal Access Act 2009 and the Marine (Scotland) Act 2010 introduced requirements to consider provisions to support the designation and management of MPAs. Under section 83 of the Marine (Scotland) Act 2010 and section 126 of the Marine and Coastal Access Act 2009 ('the 2009 Act'), public authorities have specific duties in relation to MPAs. The public authority is required to consider whether a proposed activity that is the subject of the application in the marine environment (i.e. marine licensable activities subject to a marine licence application) can affect, other than insignificantly, an MPA or any ecological or geomorphological processes on which the conservation of any protected feature of an MPA is dependant.

E.1.1.5 In Scottish waters, the Marine Directorate Licensing and Operations Team (MD-LOT) operating on behalf of the Scottish Ministers are the relevant authority and, in English waters between 12 nautical miles (nm) and 200nm, it is the Marine Management Organisation (MMO). The Statutory Nature Conservation Bodies (SNCBs) have responsibility under the 2009 Act to give advice to these authorities on how to identify the activities that are capable of affecting designated features and the processes upon which they are dependent. In Scotland, NatureScot is the SNCB responsible for advice on MPAs within 12nm of the Scottish coast. In England, Natural England is the SNCB responsible for advice on MPAs within 12nm of the coast. The Joint Nature Conservation Committee (JNCC) is responsible for advice on all MPAs beyond 12nm in both English and Scottish waters.

E.1.1.6 Public authorities must only grant authorisation for the activity if the application satisfies the relevant authority that there is no significant risk of the activity hindering the achievement of the conservation objectives for the MPA. If the public authority is not satisfied that there is no significant risk of the licensable activity hindering the achievement of conservation objectives, then a licence will only be granted if the following criteria are met (MMO, 2013; Marine Scotland, 2014):

E.1.1.7 the public authority is satisfied that there are no other means of proceeding with the licensable activity that would create a substantially lower risk of hindering the achievement of those objectives (to include proceeding in another manner or at another location);

E.1.1.8 the public authority is satisfied that the benefit to the public of proceeding with the licensable activity clearly outweighs the risk of damage to the environment that will be created by proceeding with it;

E.1.1.9 the public authority is satisfied that the person seeking the authorisation will undertake, or make arrangements for undertaking, measures of equivalent environmental benefit to the damage that the activity will, or is likely to have, in or on the MPA concerned.

E.1.1.10 This appendix to the Scoping Report provides a summary of the approach to the MPA assessment that is proposed for the MHPGC Project, and which will be presented, in full, as an Appendix to the MHPGC Project Environmental Impact Assessment (EIA) Report/Environmental Statement (ES). This report also presents the results of a preliminary screening of designated MCZs and HPMAs in English waters and ncMPAs in Scottish waters, which are proposed to be carried forward for consideration in the MPA main assessment (Stage 1) in the MHPGC Project EIA Report/ES.

E.2 Methodology

E.2.1.1 An MPA main assessment (Stage 1) will be prepared and presented as an appendix to the MHPGC Project EIA Report/ES, if required due to one or more MPAs being screened in through this screening report. The following sections outline the proposed approach to the MHPGC Project MPA assessment, which will cover MCZs and HPMAs in English waters and ncMPAs in Scottish waters. This includes the methodology for the preliminary screening, results of which are presented in this report.

E.2.1.2 The proposed approach to the MPA assessment described in the following sections has been informed by the approach adopted on other Offshore Wind Farm (OWF) and transmission projects in Scotland and England and accepted by MD-LOT and NatureScot/JNCC for Scotland, and the Secretary of State and MMO and Natural England for England, such as the Berwick Bank OWF MPA assessment (SSE Renewables, 2023). This approach is consistent with the methodology outlined in Marine Scotland's Nature Conservation Marine Protected Areas: Draft Management Handbook (Marine Scotland, 2014) and the Marine Conservation Zones and Marine Licensing guidance published by the MMO (MMO, 2013).

E.2.1.3 While the Marine Scotland draft guidance has not been formally adopted, it nonetheless outlined a potential approach that satisfies the requirements of the Marine (Scotland) Act 2010 and the Marine and Coastal Access Act 2009 as outlined in section E.1.1 above.

E.2.1.4 As recommended in the guidance, a staged approach to the MPA assessment will be adopted consisting of a preliminary screening stage, followed by the main assessment(s).

E.2.1.5 Consultation with regards to the MHPGC Project, including the MPA, are outlined in Chapter 5: Consultation Process, of the Scoping Report.

E.2.2 Preliminary Screening Methodology

E.2.2.1 In the first instance, an initial screening stage will be undertaken to focus on what impacts can reasonably be predicted to occur because of the MHPGC Project and whether the project can affect (other than insignificantly) a protected feature of an MPA. The screening will use the available information on proposed activities for the MHPGC Project and consider aspects such as the scale, timing and duration of those activities. These considerations will include proposals for activities beyond the boundaries of an MPA, which may indirectly affect the MPA.

E.2.2.2 Firstly, consideration of capability of affect should result in removing from further consideration all proposals/functions that are not connected to the protected feature(s). A capability that is both remote (in terms of likelihood of occurrence) and hypothetical should not be the basis of a conclusion that further assessment is required. This can be determined by considering whether the activity will exert pressures to which the protected feature(s) is sensitive; this information is provided in the conservation advice for each MPA.

E.2.2.3 Secondly, if the conclusion is that proposed Project activities are capable of affecting an MPA, the focus of the MPA screening will then be on considering whether the activity will affect the protected features of an MPA other than insignificantly. Consideration of the degree of pressure that could be exerted by a proposed activity or function associated with the MHPGC Project on a spatial basis will help to establish what level of effect might occur. Where it is concluded that the proposed activity or function is capable of affecting, other than insignificantly, the protected features of an MPA, then a main assessment (Stage 1) will be required considering the conservation objectives.

E.2.2.4 To determine the capability of activities associated with the MHPGC Project to affect the features of any MPA, the following spatial screening criteria are proposed:

- Does the MHPGC Project Scoping Boundary overlap with the boundary of an ncMPA, MCZ or HPMA?
- Do any ncMPAs, MCZs or HPMAs lie within the Zone of Influence (ZoI) of the MHPGC Project for individual topics as follows:
  - Marine ecosystem features of HPMAs – HPMAs take a ‘whole site approach’, therefore the entire marine ecosystem within the boundary of a HPMA is considered a protected feature (Defra, 2023a). The ZoI for the MHPGC Project has been defined as a 100km buffer from the MHPGC Project Scoping Boundary, based upon professional experience in offshore ecology (Figure E. 1);

- Benthic habitats/species and geodiversity features of MPAs – ZoI defined as one maximum tidal ellipse over a spring tide[33] around the MHPGC Project, which equates to circa 5km to 9km (depending on the orientation). A precautionary approach has been adopted for MPA screening and this ZoI has been increased to 15km (Figure E. 1);
- Fish features of MPAs – ZoI defined as a 100km buffer from the MHPGC Project Scoping Boundary (Figure E. 1) based upon professional experience in offshore ecology, on the basis that this is sufficiently precautionary to capture the ZoI on fish features of MPAs from long ranging impacts;
- Marine mammal features of MPAs – ZoI defined as the English and Scottish waters of the Regional Marine Mammal Study Area illustrated in Figure 7.21 of Chapter 7.6: Marine Mammals, of the Scoping Report (Figure E. 1) based upon professional experience in offshore ecology, on the basis that this is sufficiently precautionary to capture the ZoI on fish features of MPAs from long ranging impacts;
- Ornithology features of MPAs – ZoI defined as a 100km buffer from the MHPGC Project Scoping Boundary (Figure E. 1) based upon professional experience in offshore ecology, on the basis that this is sufficiently precautionary to capture the ZoI on bird features of MPAs from long ranging impacts.

E.2.2.5 These ZoIs are sufficiently precautionary to capture all sites that may be affected by indirect effects associated with proposed activities of all phases of the MHPGC Project.

E.2.2.6 Section E.3 of this Appendix presents the results of the preliminary screening of designated ncMPAs, MCZs and HPMAs. Those with features assessed as potentially being affected (other than insignificantly) by the MHPGC Project are proposed to be carried forward for consideration in the MPA main assessment (Stage 1) in the MHPGC Project EIA Report/ES.

E.2.2.7 The preliminary outputs of early assessment work undertaken to inform the Scoping Report (e.g. desk based assessment in Chapter 7.1: Physical Processes), together with expert opinion and experience of impacts arising from other transmission projects, have been used in this preliminary MPA Screening to determine the potential for associated activities to affect (other than insignificantly) the protected features of sites identified through the application of the spatial screening criteria outlined in paragraph E.2.2.4.

[33] One spring tidal excursion has been identified through interim numerical modelling techniques described in Chapter 7.1: Physical Processes. It is defined as the distance that suspended sediment is transported before being carried back on the returning tide. The interim model was informed from bathymetric datasets from the Marine Environmental Data Information Network (MEDIN). The area is asymmetrical due to the orientation of the tidal currents compared to the MHPGC Project Scoping Boundary.

E.2.3 Main Assessment Methodology

E.2.3.1 The main assessment (if/as required) will be presented as an Appendix to the MHPGC Project EIA Report/ES and will consider the extent of the potential impact of the MHPGC Project on the ncMPAs, MCZs and HPMAs screened into the assessment in more detail. The main assessment stage focuses on determining whether there is, or may be, a significant risk of the MHPGC Project hindering the achievement of the conservation objectives of screened in ncMPA(s), MCZ(s) and HPMA(s).

E.2.3.2 As with the initial screening process described in Section E.2.2, aspects such as scale, timing and duration of the proposed activities or function associated with the MHPGC Project are considered. However, whilst the initial screening focuses on the protected features of MPAs, the main assessment will focus on the potential impact on achieving the conservation objectives of those protected features. Therefore, the main assessment will also include consideration of the scale of the potential impact. Consideration of cumulative effects with other activities and functions will also be undertaken.

E.2.3.3 The conservation objectives for ncMPA and MCZ features are high level criteria describing the desired condition of the feature. The objectives are that the protected features:

- so far as already in favourable condition, remain in such condition;
- so far as not already in favourable condition, be brought into such condition, and remain in such condition.

E.2.3.4 For HPMAs, the entire marine ecosystem within the HPMA boundary is considered a protected feature and the conservation objective is to:

'achieve full recovery of the protected feature, including its structure and functions, its qualities and the composition of its characteristic biological communities… to a natural state, and prevent further degradation and damage to the protected feature, subject to natural change' (JNCC, 2023a).

E.2.3.5 The MPA main assessment for the MHPGC Project (if/as required) will, therefore, consider whether the MHPGC Project could potentially affect these conservation objectives for each MPA screened into the assessment. An assessment will be made of whether the MHPGC Project could potentially impact the MPA so that the features are no longer in favourable condition or prevent the features from recovering to a favourable condition.

E.2.3.6 A Stage 2 Assessment will also be required if the main assessment (Stage 1) determines there may be a significant risk of the MHPGC Project hindering the achievement of the conservation objectives of an MPA(s). The Stage 2 Assessment would include consideration of alternative methods of proceeding with the licensable activity that have a lesser environmental impact and therefore a lower risk of hindering the conservation objectives of an MPA(s). Stage 2 then considers whether the benefit to the public clearly outweighs the environmental risk associated with the licensable activity. Stage 2 may also include the commitment by the Applicant to undertake measures of equivalent environmental benefit to the damage which the licensable activity will, or is likely to have, in or on the MPA(s) concerned.

E.3 Results of the Preliminary Marine Protected Area/Marine Conservation Zone Screening

E.3.1 Preliminary Screening for Marine Protected Areas in Scottish waters

Preliminary screening for HPMAs with marine ecosystem features

E.3.1.1 There are currently no HPMAs in Scottish waters, therefore none to screen in for further assessment.

Preliminary screening for ncMPAs with benthic habitats/species and geodiversity features

E.3.1.2 Direct impacts to benthic habitats and species (e.g. those arising from temporary habitat disturbance, long term habitat loss, thermal effects from cabling etc.) will be confined to within the MHPGC Project Scoping Boundary. There is no physical overlap between the MHPGC Project Scoping Boundary and any ncMPA designated for benthic and/or geodiversity features (illustrated in Figure E. 1). As such, no ncMPAs are screened in for this criterion.

E.3.1.3 There is the potential for indirect effects to ncMPAs designated for benthic features and geodiversity features within the 15km ZoI around the MHPGC Project Scoping Boundary. Indirect impacts on benthic features may be associated with increased suspended sediment concentrations (SSC) arising from construction activities. A single ncMPA, the Firth of Forth Banks Complex ncMPA, has been identified within the 15km ZoI for benthic receptors (Figure E. 1).

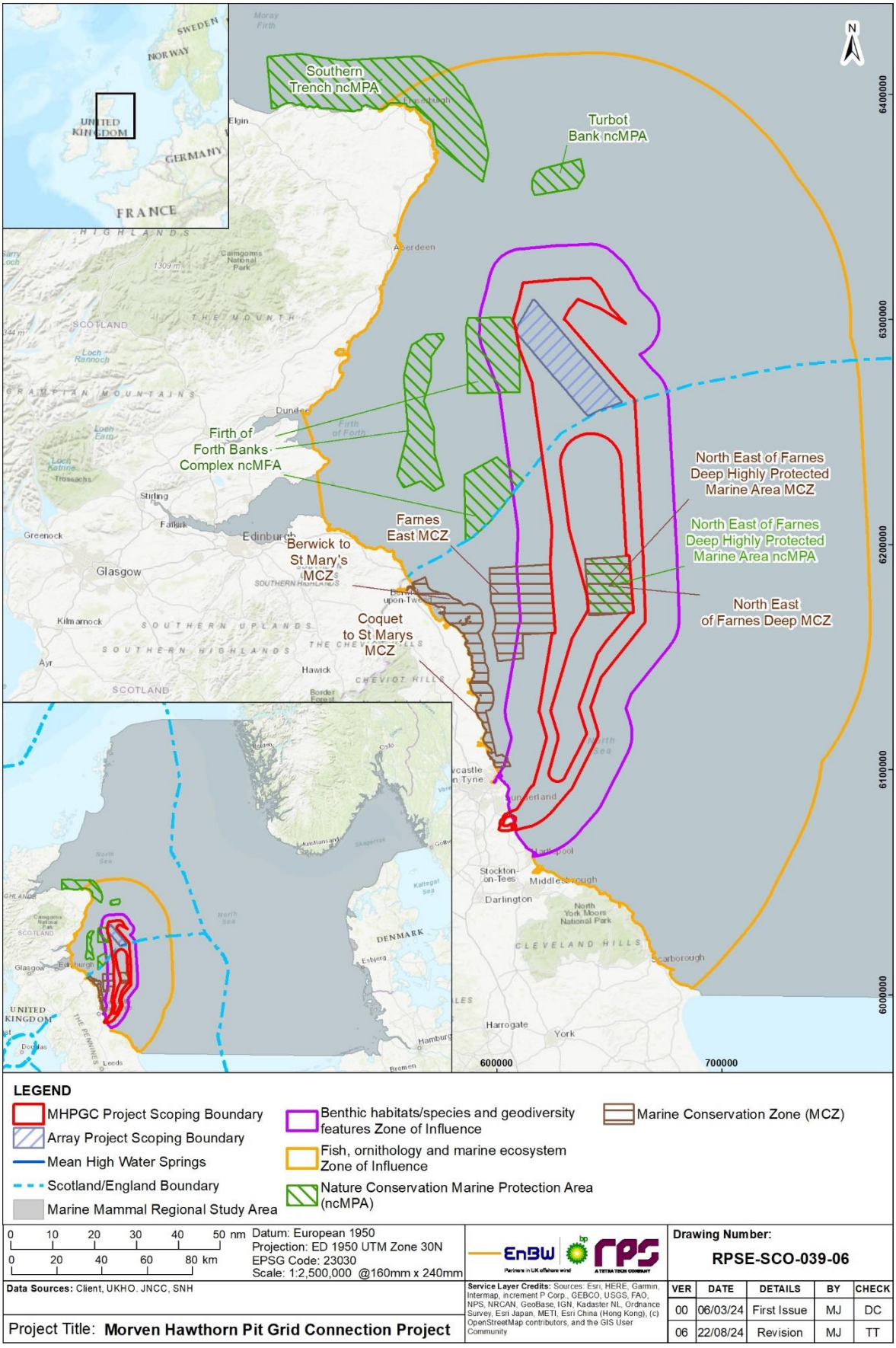


Figure E. 1: Marine Protection Areas within the Zones of Influence of the Morven Hawthorn Pit Grid Connection Project

Firth of Forth Banks Complex ncMPA

E.3.1.4 The Firth of Forth Banks Complex ncMPA is located off the east coast of Scotland and partially overlaps with the MHPGC Project ZoI for benthic receptors. The Firth of Forth Banks Complex ncMPA is a composite site and the boundaries of each of the three areas (Berwick Bank, Scalp Bank and Wee Bankie and Montrose Banks) were determined by the presence and extent of the features contained within them.

E.3.1.5 The Firth of Forth Banks Complex ncMPA covers an area of 2,130km^2 and was designated by Marine Scotland in 2014 for four protected features; offshore subtidal sands and gravels, ocean quahog *Arctica islandica* aggregations, shelf banks and mounds, and moraines representative of the Wee Bankie Key Geodiversity Area (JNCC, 2018). Details of the conservation objectives and condition of these features is provided below in Table E. 1.

Table E. 1: Designated Features of the Firth of Forth Banks Complex Nature Conservation Marine Protection Area, their Conservation Objectives and Condition

Protected Feature	Type of Feature	Conservation Objective (JNCC, 2018)	View of Condition (JNCC, 2020)
Offshore subtidal sands and gravels.	Habitat.	Recover to favourable condition. With respect to the offshore subtidal sands and gravels within the ncMPA, this means that: • extent is stable or increasing; and • structures and functions, quality, and the composition of characteristic biological communities (which includes a reference to the diversity and abundance of species forming part of or living within the habitat) are such as to ensure that they remain in a condition which is healthy and not deteriorating. Any temporary deterioration in condition is to be disregarded if the habitat is sufficiently healthy and resilient to enable its recovery from such deterioration. Any alteration to that feature brought about entirely by natural processes is to be disregarded.	Unfavourable.

Protected Feature	Type of Feature	Conservation Objective (JNCC, 2018)	View of Condition (JNCC, 2020)
Ocean quahog aggregations.	Low or limited mobility species.	Recover to favourable condition. For the ocean quahog aggregations within the ncMPA, this means that the quality and quantity of its habitat and the composition of its population in terms of number, age and sex ratio are such to ensure that the population is maintained in numbers which enable it to thrive. Any temporary reduction of numbers is to be disregarded if the population of ocean quahog aggregations is sufficiently thriving and resilient to enable its recovery. Any alteration to that feature brought about entirely by natural processes is to be disregarded.	Unfavourable.
Shelf banks and mounds	Large-scale feature.	Maintain in favourable condition. With respect to the shelf banks and mounds large-scale feature within the ncMPA, this means that: • the extent, distribution and structure are maintained; • the function is maintained so as to ensure that it continues to support its characteristic biological communities (which includes a reference to the diversity of any species associated with the large-scale feature) and their use of the site for, but not restricted to, feeding, courtship, spawning, or use as nursery grounds; and • the processes supporting that feature are maintained. Any alteration to that feature brought about entirely by natural processes is to be disregarded.	Favourable.

Protected Feature	Type of Feature	Conservation Objective (JNCC, 2018)	View of Condition (JNCC, 2020)
Moraines representative of the Wee Bankie Key Geodiversity Area.	Geomorphological.	Maintain in favourable condition. For the moraines representative of the Wee Bankie Key Geodiversity Area within the ncMPA, this means that: • the processes supporting that feature are maintained; • its extent, component elements and integrity are maintained; • its structure and functioning are unimpaired; • its surface remains sufficiently; and • unobscured for the purposes of determining whether the above criteria are satisfied. Any obscuring of that feature entirely by natural processes is to be disregarded. Any alteration to that feature brought about entirely by natural processes is to be disregarded.	Favourable.

E.3.1.6 As explained in paragraph E.2.2.4, the ZoI of the MHPGC Project for benthic and geodiversity features has been increased to 15km from the MHPGC Project scoping boundary, on a precautionary basis, from the modelled 5km to 9km (one maximum spring tidal ellipse). The Montrose Bank and Berwick Bank sections of the ncMPA overlap with the ZoI, with the extent of the overlap between the potential ZoI and the ncMPA equating to approximately 464km^2 and 27km^2 for the Montrose Bank and Berwick Bank, respectively (Figure E. 2).

E.3.1.7 Figure E. 2 also illustrates the known distribution of designated features within the Firth of Forth Banks Complex ncMPA. It should be noted that the offshore subtidal sands and gravels feature, together with suitable habitat for the ocean quahog aggregations feature, are assumed to extend across the entirety of the Firth of Forth Banks Complex ncMPA (JNCC, 2018). Figure E. 2 demonstrates that the moraines geodiversity feature lies approximately 5km outside the benthic and geodiversity features ZoI. The shelf banks and mounds feature overlaps with the ZoI by approximately 200m (Figure E. 2). However, this is at the furthest point of the precautionary ZoI used for screening for MPAs and would be outside of the modelled 5km to 9km tidal ellipse (see paragraph E.2.2.4). This means it is highly unlikely these designated features will be affected by any direct or indirect impacts. Furthermore,

as sedimentary features, they will not be affected by longer range impacts such as underwater sound. Therefore, these features have been screened out of further assessment due to a lack of potential impact pathways.

E.3.1.8 Figure E. 2 indicates that the ocean quahog aggregations and offshore subtidal sands and gravels features have the potential to overlap with the ZoI and, therefore, may be directly or indirectly affected by the MHPGC Project.

E.3.1.9 In summary, impacts on two benthic features (ocean quahog and offshore subtidal sands and gravels) within the Firth of Forth Banks Complex ncMPA may occur, for example due to increases in SSC and associated deposition or remobilisation of sediment-bound contaminants. Based on these conclusions, only the ocean quahog and offshore subtidal sands and gravels features of the Firth of Forth Banks Complex ncMPA are proposed to be screened in to the main assessment (Stage 1).

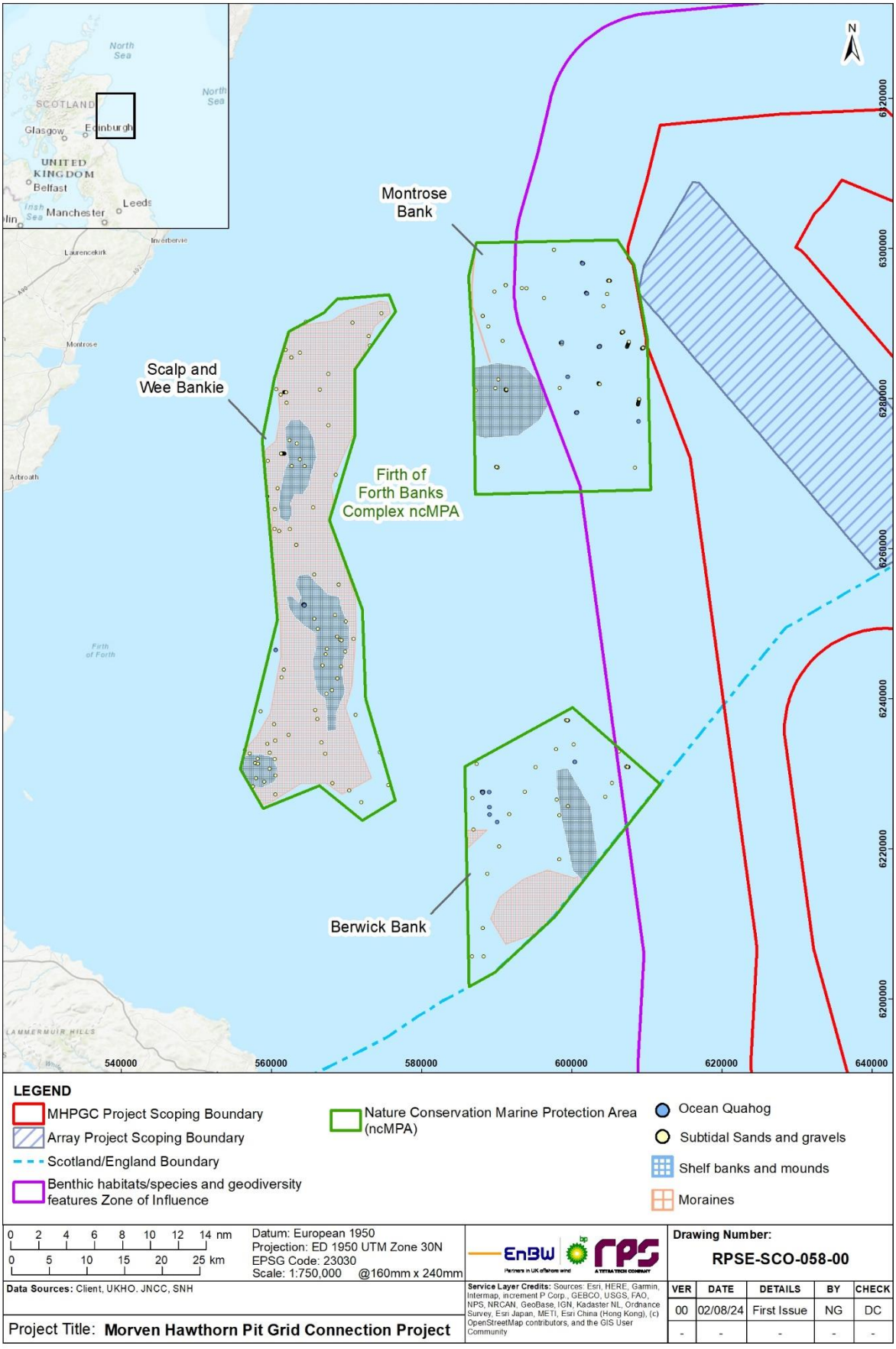


Figure E. 2: Distribution of Protected Features within the Firth of Forth Banks Complex Nature Conservation Marine Protection Area

Preliminary screening for ncMPAs with fish features

E.3.1.10 Direct impacts to fish features of ncMPAs (e.g. arising from temporary habitat disturbance, long term habitat loss, thermal effects from cabling etc.) will generally be confined to the area within the MHPGC Project Scoping Boundary. There is no physical overlap between the MHPGC Project Scoping Boundary and any ncMPA designated for fish features (Figure E. 1). As such, no ncMPAs are screened in for this criterion.

E.3.1.11 Direct impacts due to increased underwater sound to fish features of ncMPAs may occur, with effects potentially extending beyond the MHPGC Project Scoping Boundary. The ZoI for ncMPAs with fish features has therefore been defined as 100km (see paragraph E.2.2.4). A single ncMPA with fish features, the Turbot Bank ncMPA, which is designated for sandeels (Ammodytidae), has been identified within this ZoI (Figure E. 1).

E.3.1.12 The Turbot Bank ncMPA is located 38km from the MHPGC Project Scoping Boundary. At this distance, and using experience gained on other OWF projects in the Firth of Forth, such as the Berwick OWF (SSE Renewables, 2023), the ncMPA will be located outside the area within which mortality and recoverable injury to sandeels within the Turbot Bank ncMPA could potentially occur. The upper ranges hypothesised for particle motion levels which may result in adverse effects on marine organisms without a swimbladder, such as sandeels, are thought to be less than 1km (Thomsen *et al.*, 2015, Miller *et al.*, 2016). The Turbot Bank ncMPA is also considered likely to be beyond the zone within which Temporary Threshold Shift (i.e. a temporary reduction in hearing sensitivity) may be experienced by sandeels, which is likely to be within less than 10km. At a distance of 38km, the risk to sandeels from behavioural effects (e.g. a startle reaction, changes in schooling patterns and avoidance (Popper *et al.*, 2014)) is also considered to be low. The extent of underwater sound contours associated with sound pressure levels above 150 dB re 1µPa (root mean square (RMS)), the criterion typically used for indicating the extent of onset of potential behavioural effects due to impulsive piling, is considered unlikely to extend to the Turbot Bank ncMPA.

E.3.1.13 It is therefore concluded that underwater sound would not be capable of resulting in anything other than insignificant effects on the protected sandeel feature of the Turbot Bank ncMPA. On this basis, no ncMPAs are screened in for underwater sound impact pathways.

E.3.1.14 Indirect impacts on fish features of ncMPAs may occur due to increases in SSC and associated deposition. The ZoI for the effect of SSC and sediment deposition on fish is a precautionary 15km, as for benthic features (see E.2.2.4). The Turbot Bank ncMPA is located 23km from the limit of this ZoI. On this basis, no ncMPAs are screened in for indirect impacts on fish features.

Preliminary screening criteria for ncMPAs with marine mammal features

E.3.1.15 Direct impacts to marine mammal features of ncMPAs (e.g. arising from temporary habitat disturbance, long term habitat loss, etc.) will be confined to the area within the MHPGC Project Scoping Boundary. There is no physical overlap between the MHPGC Project Scoping Boundary and any ncMPA designated for marine mammal features. As such, no ncMPAs are screened in for this criterion.

E.3.1.16 Direct impacts on marine mammal features of ncMPAs may also occur due to increased underwater sound, with effects potentially extending beyond the boundaries of the MHPGC Project Scoping Boundary. The marine mammal ZoI has been defined as the UK waters of the Regional Marine Mammal Study Area (see paragraph E.2.2.4 and Figure 7.21 of Chapter 7.6: Marine Mammals, of the Scoping Report). A single ncMPA designated for marine mammal features, the Southern Trench ncMPA, is within the Regional Marine Mammal Study Area designated for minke whale *Balaenoptera acutorostrata.*

E.3.1.17 The Southern Trench ncMPA is 48km from the MHPGC Project Scoping Boundary. At this distance, and using experience gained on other OWF projects in the Firth of Forth, such as the Berwick OWF (SSE Renewables, 2023), the ncMPA will be located outside the area within which injury to minke whales could potentially occur as a result of the MHPGC Project. Regarding behavioural effects, at a distance of 48km, the risk to minke whales is considered low. The extent of underwater sound contours associated with sound pressure levels above 140dB re 1µPa (RMS), the criterion typically used for indicating the extent of onset of potential low-level marine mammal disturbance effects from impulsive sound (NMFS, 2005), is considered unlikely to extend to the Southern Trench ncMPA.

E.3.1.18 It is therefore concluded that underwater sound would, therefore, not be capable of resulting in anything other than insignificant effects on the protected minke whale feature of the Southern Trench ncMPA. On this basis, no ncMPAs are screened in for underwater sound impact pathways.

E.3.1.19 Indirect impacts on marine mammal features of ncMPAs may occur due to changes in prey availability. The indirect effect of impacts such as SSC and sediment deposition on prey species (i.e. fish and shellfish) has been considered above (see E.3.1.14). No ncMPAs were screened in on the basis of effects on fish features, therefore no ncMPAs are screened in for indirect impacts on marine mammals due to changes in prey availability.

Preliminary screening criteria for ncMPAs with ornithological features

E.3.1.20 There is no physical overlap between the MHPGC Project Scoping Boundary and any ncMPA designated for ornithology features. There is also no overlap between the MHPGC Project ornithological ZoI of 100km and any ncMPAs designated for ornithological features (Figure E. 1). Therefore, no ncMPAs designated for ornithological features have been screened into the assessment.

E.3.2 Preliminary Screening for Marine Protected Areas in English waters

Preliminary screening for HPMAs with marine ecosystem features

E.3.2.1 The North East of Farnes Deep HPMA was designated in 2023, following an open consultation regarding HPMAs by Defra in 2022 (JNCC, 2023b). The site is located off the north east coast of England, with the HPMA overlapping entirely with the North East of Farnes Deep MCZ, an area of approximately 492km^2 (JNCC, 2023a). The site is approximately 0.2km from the MHPGC Project Scoping Boundary, which extends on either side of the MCZ and HPMA (illustrated in Figure E. 1).

E.3.2.2 Species of conservation importance that have been recorded in the HPMA include phosphorescent seapen *Pennatula phosphorea*, ocean quahog, European smelt *Osmerus eperlanus*, Harbour porpoise *Phocoena phocoena* and white-beaked dolphin *Lagenorhynchus albirostris*. The variety of seabed habitats represent spawning and nursery habitats for fish species of commercial importance, such as haddock *Melanogrammus aeglefinus*, striped red mullet *Mullus surmuletus* and whiting *Merlangius merlangus*. Nationally important seabird species have also been recorded in the area (JNCC, 2023a).

E.3.2.3 As the North East of Farnes Deep HPMA lies entirely within the potential ZoI for marine ecosystem features, there is the potential for direct or indirect impacts, for example due to underwater sound, or increases in SSC and associated deposition, to the marine ecosystem feature. The North East of Farnes Deep HMPA is therefore screened in for further assessment.

Preliminary screening for MCZs with benthic habitats/species and geodiversity features

E.3.2.4 Direct impacts to benthic habitats and species (e.g. those arising from temporary habitat disturbance, long term habitat loss, thermal effects from cabling etc.) will be confined to within the MHPGC Project Scoping Boundary. There is no physical overlap between the MHPGC Project Scoping Boundary and any MCZs designated for benthic and/or geodiversity features. As such, no MCZs are screened in for this criterion.

E.3.2.5 There is the potential for indirect effects to MCZs designated for benthic and geodiversity features within the 15km benthic habitats/species and geodiversity features ZoI. Indirect impacts on benthic features may be associated with increased SSC arising from construction activities. The North East of Farnes Deep MCZ and HPMA lies within the 15km ZoI for benthic and geodiversity receptors, along with two other MCZs; the Farnes East MCZ and the Coquet to St Mary's MCZ (seeFigure E. 1).

North East of Farnes Deep MCZ

E.3.2.6 The North East of Farnes Deep MCZ and HPMA is located off the north east coast of England, within the 15km ZoI for benthic and geodiversity features, approximately 0.2km from the MHPGC Project Scoping Boundary, with the MHPGC Project Scoping Boundary extending on either side of the MCZ and HPMA site (Figure E. 1).

E.3.2.7 The MCZ covers an area of approximately 492km^2 and was designated as an MCZ in 2013 for the broadscale habitats subtidal coarse sediment and subtidal sand, with additional features designated in January 2016; the broadscale habitats subtidal mixed sediments and subtidal mud and the species feature of conservation ocean quahog (JNCC, 2023b).

E.3.2.8 Following the designation of the site as a HPMA (E.3.2.1), it is assumed that the MCZ features still stand, although no specific reference to the condition of these features is currently available.

E.3.2.9 As the MCZ site lies entirely within the ZoI for benthic and geodiversity features, there is the potential for indirect impacts to the benthic features of the MCZ, for

example due to increases in SSC and associated deposition. The North East of Farnes Deep MCZ is therefore screened in for further assessment.

Farnes East MCZ

E.3.2.10 The Farnes East MCZ is located off the north east coast of England and overlaps partially with the 15km ZoI for benthic habitats/species and geodiversity features (Figure E. 1). The MCZ is a joint inshore and offshore site, which was designated in 2016. The seabed is predominantly composed of subtidal coarse sediment, subtidal sand and subtidal mixed sediments, with a scattering of small patches of moderate energy circalittoral rock. A glacial trench, which forms the deepest part of the MCZ, contains subtidal mud (JNCC, 2024). The MCZ covers a total area of 945km^2, of which circa 465km^2 overlaps with the ZoI for benthic habitats/species and geodiversity features (JNCC, 2024).

E.3.2.11 Details of the conservation objectives and condition of these features is provided in Table E. 2. Where the protected features are the same type, have the same conservation objective and view of condition, these have been grouped.

Table E. 2: Designated Features of the Farnes East MCZ, their Conservation Objectives and Condition

Protected Feature	Type of Feature	Conservation Objective (JNCC, 2024)	View of Condition (JNCC, 2024)
Moderate energy circalittoral rock. Subtidal coarse sediment. Subtidal mixed sediments. Subtidal sand.	Broadscale marine habitats.	Maintain in favourable condition. With respect to the listed broadscale marine habitats within the MCZ, this means that: • extent is stable or increasing; and • structures and functions, quality, and the composition of characteristic biological communities (which includes a reference to the diversity and abundance of species forming part of or living within the habitat) are such as to ensure that they remain in a condition which is healthy and not deteriorating. Any temporary deterioration in condition is to be disregarded if the habitat is sufficiently healthy and resilient to enable its recovery from such deterioration. Any alteration to that feature brought about entirely by natural processes is to be disregarded.	Favourable.

Protected Feature	Type of Feature	Conservation Objective (JNCC, 2024)	View of Condition (JNCC, 2024)
Subtidal mud.	Broadscale marine habitat.	Be brought into favourable condition. With respect to the subtidal mud within the MCZ, this means that: • extent is stable or increasing; and • structures and functions, quality, and the composition of characteristic biological communities (which includes a reference to the diversity and abundance of species forming part of or living within the habitat) are such as to ensure that they remain in a condition which is healthy and not deteriorating. Any temporary deterioration in condition is to be disregarded if the habitat is sufficiently healthy and resilient to enable its recovery from such deterioration. Any alteration to that feature brought about entirely by natural processes is to be disregarded.	Unfavourable.
Seapen and burrowing megafauna communities.	Habitat feature of conservation importance.	Be brought into favourable condition. With respect to the subtidal mud within the MCZ, this means that: • extent is stable or increasing; • structures and functions, quality, and the composition of characteristic biological communities (which includes a reference to the diversity and abundance of species forming part of or living within the habitat) are such as to ensure that they remain in a condition which is healthy and not deteriorating.	Unfavourable.

Protected Feature	Type of Feature	Conservation Objective (JNCC, 2024)	View of Condition (JNCC, 2024)
		Any temporary deterioration in condition is to be disregarded if the habitat is sufficiently healthy and resilient to enable its recovery from such deterioration. Any alteration to that feature brought about entirely by natural processes is to be disregarded.	
Ocean quahog aggregations.	Low or limited mobility species.	Recover to favourable condition. For the ocean quahog aggregations within the MCZ, this means that: • The quality and extent of its habitat is stable or increasing; • The population structure allows numbers to be maintained or increase. Any temporary reduction of numbers is to be disregarded if the population of ocean quahog aggregations is sufficiently thriving and resilient to enable its recovery. Any alteration to that feature brought about entirely by natural processes is to be disregarded.	Unfavourable.

E.3.2.12 As the Farnes East MCZ overlaps with the proposed ZoI for benthic habitats/species and geodiversity features, there is the potential for indirect impacts to the benthic features, for example due to increases in SSC and associated deposition. The Farnes East MCZ is therefore screened in for further assessment.

Coquet to St Mary's MCZ

E.3.2.13 The Coquet to St Mary's MCZ is an inshore site located along the north east coast of England, overlapping partially with the ZoI for benthic habitats/species and geodiversity features (Figure E. 1). The MCZ covers 192km^2 of intertidal and offshore waters, with circa 6km^2 overlapping with the benthic habitats/species and geodiversity features ZoI (Natural England, 2022).

E.3.2.14 The MCZ was designated in 2016 for numerous broadscale marine habitats and habitat features of conservation importance. Details of the conservation objectives and condition of these features is provided in Table E. 3. Where the protected features are the same type, have the same conservation objective and view of condition, these have been grouped.

Table E. 3: Designated Features of the Coquet to St Mary's MCZ, their Conservation Objectives and Condition

Protected Feature	Type of Feature	Conservation Objective (Natural England, 2022)	View of Condition (Natural England, 2022)
Moderate energy intertidal rock. Low energy intertidal rock. Intertidal coarse sediment. Intertidal sand and muddy sand. Intertidal mud. Intertidal mixed sediments. High energy infralittoral rock. Moderate energy infralittoral rock. Moderate energy circalittoral rock. Subtidal coarse sediment. Subtidal sand. Subtidal mud. Subtidal mixed sediments.	Broadscale marine habitats.	Maintain in favourable condition. With respect to the broadscale marine habitats within the MCZ, this means that: • extent is stable or increasing; and • structures and functions, quality, and the composition of characteristic biological communities (which includes a reference to the diversity and abundance of species forming part of or living within the habitat) are such as to ensure that they remain in a condition which is healthy and not deteriorating. Any temporary deterioration in condition is to be disregarded if the habitat is sufficiently healthy and resilient to enable its recovery from such deterioration. Any alteration to that feature brought about entirely by natural processes is to be disregarded.	Favourable.
Intertidal underboulder communities. Peat and clay exposures.	Habitat features of conservation importance.	Maintain in favourable condition. With respect to the habitat features of conservation importance within the MCZ, this means that: • extent is stable or increasing; and • structures and functions, quality, and the composition of characteristic biological communities (which includes a reference to the diversity and abundance of species forming	Favourable.

Protected Feature	Type of Feature	Conservation Objective (Natural England, 2022)	View of Condition (Natural England, 2022)
		part of or living within the habitat) are such as to ensure that they remain in a condition which is healthy and not deteriorating. Any temporary deterioration in condition is to be disregarded if the habitat is sufficiently healthy and resilient to enable its recovery from such deterioration. Any alteration to that feature brought about entirely by natural processes is to be disregarded.	

E.3.2.15 As the MCZ site overlaps with the benthic habitats/species and geodiversity features ZoI, there is the potential for indirect impacts to the benthic features, for example due to increases in SSC and associated deposition. Coquet to St Mary's MCZ is therefore screened in for further assessment.

Preliminary screening for MCZs with fish features

E.3.2.16 There is no physical overlap between the MHPGC Project Scoping Boundary and any MCZ designated for fish features. There is also no overlap between the fish ZoI of 100km and any MCZs designated for fish features (Figure E. 1). Therefore, no MCZs designated for fish features have been screened into the assessment.

E.3.2.17 There is, however, an overlap between the benthic habitats/species and geodiversity features ZoI and the North East of Farnes Deep HPMA, which has been screened for further assessment due to the potential for indirect impacts to the marine ecosystem feature, which includes numerous fish species (see paragraphs E.3.2.1 to E.3.2.3).

Preliminary screening criteria for MCZs with marine mammal features

E.3.2.18 There is no physical overlap between the MHPGC Project Scoping Boundary and any MCZ designated for marine mammal features. There is also no overlap between the MHPGC Project marine mammal ZoI and any MCZs designated for marine mammal features (Figure E. 1). Therefore, no MCZs designated for marine mammal features have been screened into this assessment.

E.3.2.19 There is, however, an overlap between the benthic habitats/species and geodiversity features ZoI and the North East of Farnes Deep HPMA, which has been screened for further assessment due to the potential for indirect impacts to the marine ecosystem feature, which includes numerous marine mammal species (see paragraphs E.3.2.1 to E.3.2.3).

Preliminary screening criteria for MCZs with ornithological features

E.3.2.20 The Berwick to St Mary's MCZ lies 12km from the MHPGC Project Scoping Boundary (Figure E. 1). This is within the ZoI of 100km for MCZs with seabird features. The MCZ is designated for the common eider *Somateria mollissima*, a seaduck rarely found far from the coast. This is due to their dependence on coastal habitats as a food source, with their diet consisting primarily of molluscs such as mussels (RSPB, 2024), and on coastal habitats for nesting habitats, with their preferred habitat being sheltered shallow coves, bays and islets (British Waterfowl Association, 2022). Common eider are known to migrate; however, these routes are closely tied to the coast (Milne and Robertson, 1965).

E.3.2.21 Based on the distance of the MHPGC Project Scoping Boundary to the Berwick to St Mary's MCZ and the coastal habitat of the common eider, there is no realistic capability of the MHPGC Project impacting this feature of this MCZ (e.g. via temporary habitat loss, increased SSC, barrier to movement, collision risk or changes in prey availability). Therefore, due to the lack of impact pathway, this MCZ has been screened out of the assessment.

E.3.2.22 There is an overlap between the ZoI for ornithological features and the North East of Farnes Deep HPMA, which has been screened for further assessment due to the potential for indirect impacts to the marine ecosystem feature, which includes nationally important seabird species (see paragraphs E.3.2.1 to E.3.2.3).

E.3.3 Summary of Preliminary Marine Protected Area Screening Conclusions

E.3.3.1 Three ncMPAs, four MCZs and one HPMA were considered in this MPA screening for the MHPGC Project, which comprised those located within the ZoI for individual receptors, as detailed in paragraph E.2.2.4.

E.3.3.2 A single ncMPA, the Firth of Forth Banks Complex ncMPA, has been identified for initial inclusion in the MPA assessment on the basis that the MHPGC Project is deemed to be potentially capable of affecting (other than insignificantly) two of the protected features of the site: ocean quahog aggregations and offshore subtidal sands and gravels (Table E. 4).

E.3.3.3 The North East of Farnes Deep HPMA has been screened in for further assessment as the MHPGC Project may affect (other than insignificantly) the marine ecosystem protected feature, which includes numerous fish species. The North East of Farnes Deep MCZ has also been screened in due to the potential for impacts on the benthic features of the site (Table E. 4).

E.3.3.4 The Farnes East MCZ and the Coquet to St Mary's MCZ have both also been screened in for further assessment as both sites overlap with the 15km ZoI for benthic features and therefore the MHPGC Project may affect (other than insignificantly) the benthic features of the sites (Table E. 4).

Table E. 4: Summary of Screening Conclusions for Marine Protected Areas

Designated Site	English waters or Scottish waters	Distance to MHPGC Project (km)	Feature	Potential Impact Pathway	Screening Conclusion and Justification
Firth of Forth Banks Complex MPA.	Scottish.	Overlaps with ZoI.	Ocean quahog aggregations. Offshore subtidal sands and gravels. Shelf banks and mounds. Moraines representative of the Wee Bankie Key Geodiversity Area.	Potential pathways identified.	**Screened in** – the Firth of Forth Banks Complex MPA does not spatially overlap with the MHPGC Project Scoping Boundary. The site does, however, overlap with the ZoI associated with indirect impacts on benthic ecology features. Based on current knowledge regarding the distribution of designated features within the Firth of Forth Banks Complex MPA, only the offshore subtidal sands and gravels and ocean quahog aggregations features are considered to have the potential to occur in area of the Firth of Forth Banks Complex MPA which overlaps with the MHPGC Project ZoI. These two features of the Firth of Forth Banks Complex MPA are, therefore, proposed to be screened in and are considered likely to require a main (Stage 1) assessment. All of the other features of the MPA (i.e. Shelf banks and mounds and Moraines representative of the Wee Bankie Key Geodiversity Area) are proposed to be screened out of the main assessment.
Turbot Bank MPA.	Scottish.	38km from MHPGC Project Scoping Boundary.	Sandeels.	No potential pathways identified.	**Screened out** – the Turbot Bank MPA does not spatially overlap with the MHPGC Project Scoping Boundary. The site also falls outside the likely ZoI for significant behavioural disturbance to sandeels, as determined by the assessment presented in paragraph E.3.1.12 on the likely impact zone

Designated Site	English waters or Scottish waters	Distance to MHPGC Project (km)	Feature	Potential Impact Pathway	Screening Conclusion and Justification
					for underwater sound. The Turbot Bank MPA also falls outside the 15km ZoI identified for impact pathways associated with increased SSC that have the potential to affect fish features. The Turbot Bank MPA is, therefore, proposed to be screened out and is not considered likely to require a main assessment.
Southern Trench MPA.	Scottish.	48km from MHPGC Project Scoping Boundary.	Minke whale[34].	No potential pathways identified.	**Screened out** – the Southern Trench MPA does not spatially overlap with the MHPGC Project Scoping Boundary. The site also falls outside the likely ZoI for injury to minke whale, as determined by the assessment presented in paragraph E.3.1.17 on the likely impact zone for underwater sound. The Southern Trench MPA also falls outside the 15km ZoI identified for impact pathways associated with increased SSC that have the potential to indirectly affect marine mammal features. The Southern Trench MPA is, therefore, proposed to be screened out and is not considered likely to require a main assessment.

[34] The Southern Trench MPA is also designated for three other biodiversity features: burrowed mud, fronts and shelf deeps and two geodiversity features: Submarine Mass Movement and Quaternary of Scotland. However, these are all outside the respective screening ranges applied in the preliminary screening (see section E.2.3).

Designated Site	English waters or Scottish waters	Distance to MHPGC Project (km)	Feature	Potential Impact Pathway	Screening Conclusion and Justification
North East of Farnes Deep HPMA.	English.	0.2km from MHPGC Project Scoping Boundary.	Marine ecosystem.	Potential pathways identified.	**Screened in** – the MHPGC Project Scoping Boundary extends on either side of the HPMA, approximately 0.2km away at the closest point, meaning the HMPA site lies entirely within the ZoI for the MHPGC Project. Therefore, there is the potential for indirect impacts to the marine ecosystem feature, which includes numerous fish, marine mammal and seabird species. The North East of Farnes Deep HMPA is therefore screened in for further assessment.
North East of Farnes Deep MCZ.	English.	0.2km from MHPGC Project Scoping Boundary.	Subtidal coarse sediment. Subtidal sand. Subtidal mixed sediments. Subtidal mud. Ocean quahog.	Potential pathways identified.	**Screened in** – as the MCZ site lies entirely within the ZoI for the MHPGC Project, there is the potential for indirect impacts to the benthic features of the MCZ. The North East of Farnes Deep MCZ is therefore screened in for further assessment.
Farnes East MCZ.	English.	0.2km from MHPGC Project Scoping Boundary.	Moderate energy circalittoral rock. Subtidal coarse sediment, sand, mixed sediments and mud .	Potential pathways identified.	**Screened in** – as the MCZ site overlaps with the ZoI for the MHPGC Project, there is the potential for indirect impacts to the benthic features. The Farnes East MCZ is therefore screened in for further assessment.

Designated Site	English waters or Scottish waters	Distance to MHPGC Project (km)	Feature	Potential Impact Pathway	Screening Conclusion and Justification
			Seapen and burrowing megafauna communities. Ocean quahog aggregations.		
Coquet to St Mary's MCZ.	English.	12km from MHPGC Project Scoping Boundary.	Moderate and low energy intertidal rock. Intertidal coarse sediment, sand and muddy sand, mud, and mixed sediments. High and moderate energy infralittoral rock. Moderate energy circalittoral rock. Subtidal coarse sediment, sand, mud, and mixed sediments. Intertidal underboulder communities. Peat and clay exposures.	Potential pathways identified	**Screened in** – as the MCZ site overlaps with the ZoI for the MHPGC Project, there is the potential for indirect impacts to the benthic features. The Coquet to St Mary's MCZ is therefore screened in for further assessment.

Designated Site	English waters or Scottish waters	Distance to MHPGC Project (km)	Feature	Potential Impact Pathway	Screening Conclusion and Justification
Berwick to St Mary's MCZ.	English.	12km from MHPGC Project Scoping Boundary.	Common eider.	No potential pathways identified.	**Screened out** – the Berwick and St Mary's MCZ does not spatially overlap with the MHPGC Project Scoping Boundary. The MCZ falls within the 100km ZoI for ornithological features and is located 12km from the OWF Project Scoping Boundary. The MCZ is designated for common eider, and considering the distance from the OWF Project Scoping Boundary as well as migratory, feeding and nesting patterns of the species, identified in paragraph E.3.2.20, it is considered highly unlikely there will be any significant impact on the designated feature of this MCZ. The Berwick and St Mary's MCZ also falls outside the 15km ZoI identified for impact pathways associated with indirect impacts, such as increased SSC that have the potential to affect ornithology features. The Berwick and St Mary's MCZ is, therefore, proposed to be screened out and is not considered likely to require a main assessment.

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Appendix F Archaeology and Cultural Heritage Scheduled Monuments and Listed Buildings

F.1 Introduction

F.1.1.1 This appendix presents all scheduled monuments (Table F. 1), listed buildings (Table F. 2), and Conservation Areas (Table F. 3) within the Extended Cultural Heritage and Archaeology Study Area (3km). Figure F. 1 shows their location.

Table F. 1: Scheduled Monuments

NHLE Number	Name	Easting	Northing
1019917	High Haswell Chapel 300m south east of Low Haswell	436493	543782
1019919	Enclosed hilltop settlement on Pig Hill, 600m south west of High Fallowfield	436950	544464
1020292	Dalden Tower: a medieval fortified manor house and related earthworks	442006	548732

Table F. 2: Listed Buildings

NHLE Number	Name	Grade	Easting	Northing
1231813	CHURCH OF ST MARY	I	441428	543445
1120730	ELEMORE HALL SCHOOL AND DOORWAY AND ARCHWAY ATTACHED	I	435100	544168
1231692	SEATON HOLME	I	441364	543520
1231690	CHURCH OF ST ANDREW	II*	440797	548034
1232268	DALDEN TOWER	II*	442024	548742
1277461	DALTON WATER PUMPING STATION	II*	441082	546918
1277424	FARMHOUSE AND ADJACENT BARN 15 METRES TO NORTH OF SEATON HOLME	II*	441365	543549
1354977	AREA OFFICES OF SUNDERLAND DISTRICT COUNCIL	II	435182	547399
1120731	BARN CIRCA 50METRES NORTH OF ELEMORE HALL	II	435126	544263
1232034	CHURCH HALL	II	441847	545694
1232269	CHURCH OF ST HILD AND ST HELEN	II	442959	548284

NHLE Number	Name	Grade	Easting	Northing
1231814	CHURCH OF THE HOLY TRINITY	II	439296	546962
1277422	DALTON BRIDGE	II	441066	548157
1437889	Easington Colliery Disaster Memorial (including memorial screens, communal grave areas, raised beds and former colliery equipment)	II	443166	544125
1435116	Easington Colliery War Memorial	II	443178	544114
1277400	EAST FARMHOUSE	II	438603	547100
1072591	FORMER BOYS BLOCK NORTH AT EASINGTON COLLIERY SCHOOL	II	443106	543936
1072592	FORMER GIRLS BLOCK SOUTH AT EASINGTON COLLIERY SCHOOL	II	443174	543927
1277272	GARDEN HOUSE	II	441922	545521
1231815	GRANARY AND MEAL HOUSE TO NORTH OF EAST FARMHOUSE	II	438618	547131
1437888	Haswell War Memorial	II	437447	543165
1277271	HAWTHORN DENE VIADUCT	II	444094	545913
1438068	Hawthorn War Memorial	II	441875	545610
1323220	ICE HOUSE CIRCA 100 METRES NORTH EAST OF ELEMORE HALL	II	435196	544310
1231810	JACKSON'S MILL 150 METRES NORTH OF WEETWOOD HOUSE	II	440978	543712
1231817	KINLEY HILL TOWER, 200 METRES NORTH WEST OF LINLEY HILL FARMHOUSE	II	443014	546709
1354976	LABURNUM HOUSE	II	435306	547393
1231689	LODGE, 80 METRES NORTH OF ENGINE HOUSE AT DALTON PUMPING STATION	II	441036	546983
1277423	MILESTONE 75 METRES NORTH OF THE MANOR HOUSE	II	441601	543432
1184771	MONUMENT 13.8 METRES SOUTH OF CHURCH OF ST MICHAEL	II	436144	546227
1025439	MONUMENT 30 METRES WEST OF JUNCTION WITH ELEMORE LANE	II	436346	546058
1072593	NUMBER 65 (MASTER'S HOUSE), MANUAL INSTRUCTION BLOCK,	II	443075	543918

NHLE Number	Name	Grade	Easting	Northing
	BICYCLE SHEDS, WALLS, GATES, PIERS AND RAILINGS AT EASINGTON COLLIERY SCHOOL			
1232022	PIGEON COTE 40 METRES NORTH EAST OF PESSPOOL HALL	II	438248	543190
1184774	PITHEAD BATHS (PREMISES OF ELEMORE AUTO PARTS LIMITED) AND WALL AND RAILINGS IN FRONT	II	435750	545618
1025441	PRIMATIVE METHODIST CHURCH	II	435398	547579
1232456	SEATON HALL	II	439813	544950
1025440	SMITHY	II	435048	547172
1299967	ST NICHOLAS HOUSE	II	435314	547394
1277401	STABLE AND ATTACHED BYRES 1 METRE TO EAST OF EAST FARMHOUSE	II	438618	547100
1310967	STABLE YARD ARCHWAY TO NORTH OF ELEMORE HALL	II	435088	544194
1231691	THE MANOR HOUSE	II	441614	543346
1232033	THE RECTORY	II	441765	545807
1025438	TOMB OF NICHOLAS WOOD, 32 METRES TO SOUTH OF CHURCH OF ST NICHOLAS	II	435343	547331
1231693	WALLS, 10 METRES EAST OF BARN TO NORTH OF SEATON HOLME	II	441454	543562
1232457	WALLS AND GATE PIERS TO EAST AND SOUTH EAST OF GARDEN FONT OF SEATON HALL	II	439842	549952
1391516	WAR MEMORIAL, VILLAGE GREEN	II	438800	547083
1232032	WEST FARMHOUSE	II	441844	545627

Table F. 3: Conservation Areas

NAME	x	y
Hawthorn	441948	545524
Easington Village	441512	543441
Seaham	442880	549598

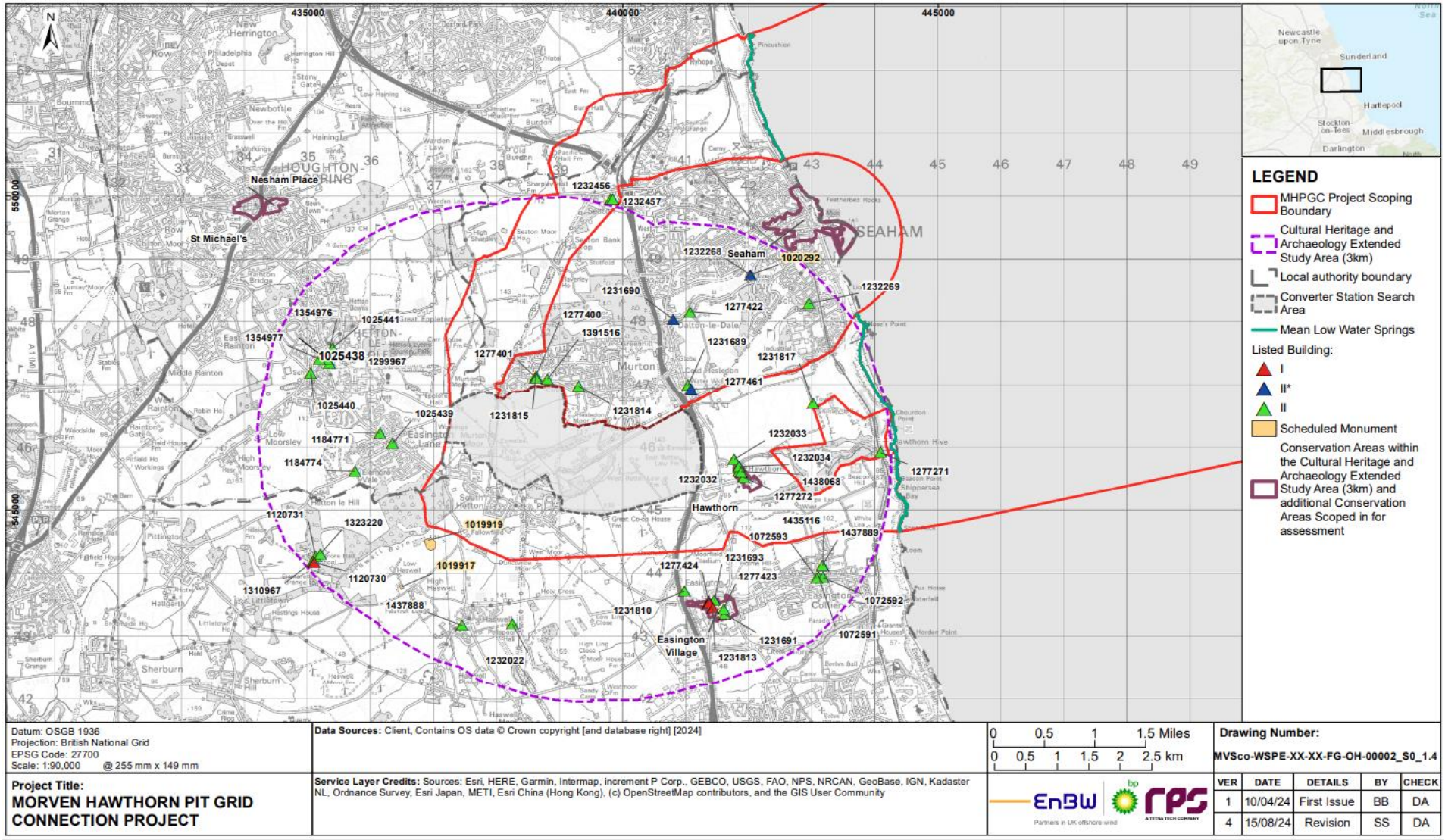


Figure F. 1: Designated Heritage Assets within the Extended Archaeology and Cultural Heritage Study Area (3km)

Appendix G Landscape and Visual Impact Assessment Methodology

G.1 Introduction

G.1.1.1 The Morven Hawthorn Pit Grid Connection Project (hereafter referred to as 'MHPGC Project') Project-wide approach to the assessment methodology is set out in Chapter 4: EIA Methodology. This appendix describes the proposed methodology for the landscape and visual impact assessment (LVIA) for the MHPGC Project.

G.1.1.2 The methodology, presented here as part of the scoping process, may be subject to change as a result of consultation and further development of the assessment process.

G.1.1.3 This appendix has been structured as follows:

- overview of LVIA methodology;
- iterative assessment and design;
- guidance, data sources and site surveys;
- assessing landscape effects;
- assessing visual effects;
- assessing cumulative landscape and visual effects;
- evaluation of significance;
- nature of effect;
- visual representations.

G.2 Overview of the LVIA methodology

G.2.1.1 The assessment will be undertaken in accordance with the Landscape Institute and The Institute of Environmental Management and Assessment (IEMA) (2013) Guidelines for Landscape and Visual Impact Assessment, 3rd Edition (GLVIA3), and other best practice guidance. An overview of the LVIA process is illustrated in Figure G. 1**.**

G.2.1.2 The LVIA will assess the likely effects of the MHPGC Project on the landscape and visual resource, encompassing effects on landscape elements, characteristics and landscape character, designated landscapes, visual effects and cumulative effects.

G.2.1.3 Essentially, the landscape and visual effects (and whether they are significant) is determined by an assessment of the nature or 'sensitivity' of each receptor or group of receptors and the nature of the effect or 'magnitude of change' that would result from the MHPGC Project. The evaluation of sensitivity takes account of the value and susceptibility of the receptor to the MHPGC Project. This is combined with an assessment of the magnitude of change which takes account of the size and scale of the proposed change, the geographical extent and the duration of that change. By combining assessments of sensitivity and magnitude of change, a level of landscape or visual effect can be evaluated and determined. The resulting level of effect is described in terms of whether it is significant or not significant and the type of effect

is described as either direct or indirect; temporary or permanent (reversible); cumulative; and beneficial, neutral or adverse.

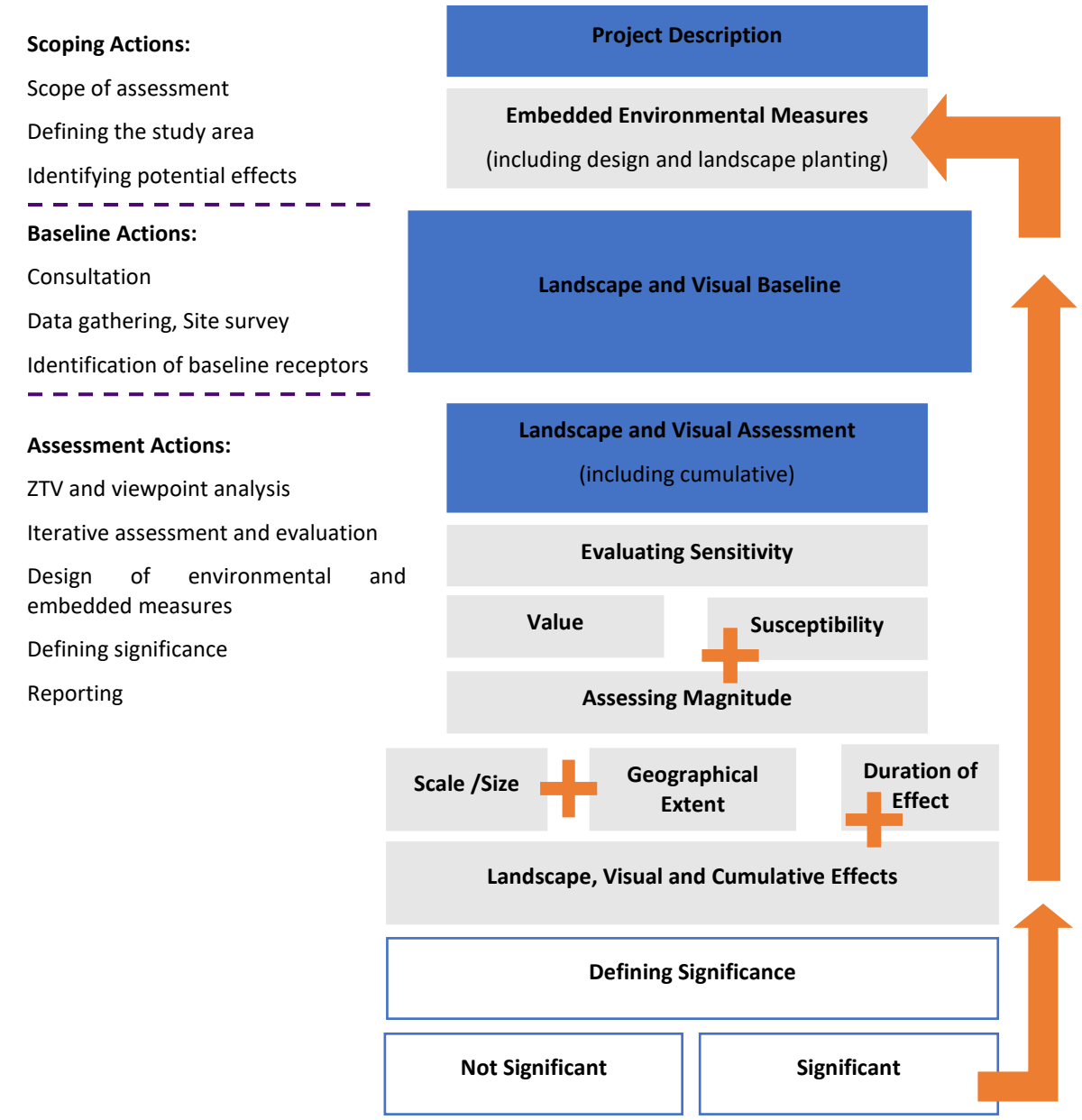


Figure G. 1: Overview of Approach to Landscape and Visual Impact Assessment

G.2.1.4 The assessment also considers the Morven Offshore Wind Project (hereafter, the Project) as a 'whole project' and considers the combined effects of the offshore and onshore MHPGC Project and the Morven Offshore Wind Array Project (hereafter referred to as the 'Array Project'). The assessment also considers the cumulative effects likely to result from the MHPGC Project, and other similar proposed developments.

G.2.1.5 In each case an appropriate and proportionate level of assessment has been undertaken and agreed through consultation at the scoping stage. The level of assessment may be 'simple' (requiring desk based data analysis) or 'detailed'

(requiring site surveys and investigations in addition to desk based analysis). Due to the nature of landscape and visual assessment, the LVIA will be subject to detailed assessment with only the Operation and Maintenance (O&M) of the underground cable and landfall elements of the onshore Project scoped out. The landscape and visual assessment unavoidably involves a combination of quantitative and qualitative assessment and—wherever possible—a consensus of professional opinion has been sought through consultation, internal peer review, and the adoption of a systematic, impartial, and professional approach.

G.2.2 Interface Between Seascape and Landscape Assessment

Introduction

G.2.2.1 The offshore elements and the onshore elements of the MHPGC Project are assessed in Chapter 9.1: Landscape and Visual Impact Assessment (LVIA). Both the SLVIA and the LVIA follow a broadly similar assessment methodology that uses the same glossary and terminology.

G.2.2.2 The LVIA will refer to potential inter-related effects likely to result from any areas where the construction, O&M and decommissioning of the offshore and onshore elements combine, or inter-relate to affect receptors within the LVIA study area. An example could include effects on views where both offshore and onshore elements are visible, potentially resulting in landscape and visual effects as a result of the construction, O&M and decommissioning of the onshore and offshore elements. In those instances, where there is overlap between the onshore and offshore effects, the LVIA will provide whole project assessment.

Assessment of the Foreshore

G.2.2.3 In England, landscape character "principally applies to terrestrial areas lying to the landward side of the high water mark" and seascape character "principally applies to coastal and marine areas seaward of the low water mark" (Natural England, 2012, p7, Box 1). Although these definitions are clear in the guidance, the importance of the interaction of sea, coastline and land as perceived by people is also highlighted in subsequent definitions of seascape in the guidance (Natural England, 2012), indicating a subtler transition between seascape and landscape than defined in the guidance.

G.2.2.4 In order to avoid under-valuing, the intertidal area between the high and low water mark, the LVIA assesses landscape character areas (LCAs) lying to the landward side of the mean low water springs (MLWS) and the SLVIA assesses offshore seascape effects on Marine Character Areas (MCAs) where they are seaward of the mean high water springs (MHWS); and the effect on terrestrial landscape character, assessed as part of the SLVIA, will be assessed on landscape character areas lying to the landward side of the MLWS.

G.2.2.5 This approach means that the 'foreshore', which includes beaches, intertidal areas and coastlines between the MLWS and the MHWS, will be considered in both the landscape and seascape character assessments. This ensures adequate consideration will be given to assessing the relationship between terrestrial and marine areas and interactions across the land/sea interface. This is consistent with the published Marine Management Organisation (MMO) Seascape Assessment

(MMO, 2014) which extends to the MHWS; and published landscape character assessments.

G.2.3 Defining the Study Area

G.2.3.1 IEMA Guidance (IEMA, 2015 and 2017) recommends a proportionate Environmental Impact Assessment (EIA) focused on the potential likely significant effects of a development.

G.2.3.2 The LVIA study area must therefore be large enough to capture all likely significant effects. However, not so large that it may be considered disproportionate, if it makes understanding the key impacts of the MHPGC Project more difficult by including extraneous baseline information, and hence receptors which are unlikely to be significantly affected by the MHPGC Project.

G.2.3.3 This is supported by the Landscape Institute (GLVIA3) (Landscape Institute and IEMA, 2013) (paragraph 3.16) which recommends that "The level of detail provided should be that which is reasonably required to assess the likely significant effects'. Paragraph 5.2 also states that 'The study area should include the site itself and the full extent of the wider landscape around it which the Project may influence in a significant manner".

G.2.3.4 The study area therefore is based on professional judgement which aims to include those areas which are potentially and likely to be significantly affected by the MHPGC Project. This judgement is based on early understanding of the local landscape character and the scale of the construction and development proposed within the Site Boundary as well as a review of study areas for similar projects.

G.2.3.5 The study area has been defined as an area 5km from the Site Boundary. This is illustrated in Figure 9.1: ZTV and Viewpoint Locations.

G.2.3.6 The study area will be reviewed and amended in response to the MHPGC Project evolution and refinement of the onshore components, the identification of any additional effects pathways, and in response to consultation.

<u>Landscape and Visual Impact Assessment Study Areas</u>

G.2.3.7 The LVIA study area will therefore cover the following areas:

- onshore cable route:
  - the study area will extend 2km either side of the selected onshore cable route option. It is likely to be supported by a small number of elevated, long-distance panoramic viewpoint locations within the wider landscape.
- Land Substation (LSS):
  - the study area will extend 5km from the site boundary of the selected LSS location.
- offshore cable route:
  - the study area for these components is anticipated to be based on a maximum of 25km distance. A 25km study area is deemed appropriate for the offshore elements outwith the MHPGC Project Scoping Boundary based on professional experience of similar infrastructure. As the

locations of these are not defined, the study area extends 25km from the coast towards the Morven Offshore Wind Array Project.

G.3 Iterative Assessment and Design

G.3.1 Introduction

G.3.1.1 The LVIA is part of an iterative EIA process which aims to 'design out' significant effects via a range of design and environmental measures including avoidance of effects through the site selection process and subsequent use of landscape design techniques to reduce or eliminate significant effects. Design is an integrated part of the LVIA process and environmental measures related to landscape design and management can be an important tool to mitigate significant effects as well as providing enhancement.

G.3.1.2 In addition to the EIA process, Schedule 9 of the Electricity Act (1989) includes duties to preserve the natural beauty of the countryside and provide reasonable mitigation.

G.3.1.3 The EIA process can also call on a range of environmental and technical specialists that contribute other forms of mitigation that may also bring a range of benefits to the MHPGC Project. Potentially significant landscape and visual effects and the constraints and opportunities connected with their resolution are identified through the LVIA process. Where possible, mitigation such as design modification or landscape planting schemes are incorporated into the MHPGC Project to mitigate landscape and visual effects – these are termed 'embedded environmental measures'.

G.3.1.4 Designed in measures will be recorded and an explanation will be provided of how the measures will be secured as well as documenting the design evolution of the MHPGC Project.

Site Selection

G.3.1.5 Site selection is a key component of the design and environmental measures process and includes the use of baseline landscape and visual data and site/field surveys in order to inform corridor and site selection through the application of relevant design guidance such as the National Grid's (2009) Horlock Rules for converter station site selection. The design measures will consider the potential to reduce overall landscape and visual effects, as well as the use of other landscape design techniques that can be used during construction, O&M and decommissioning.

G.3.2 Potential Effects During Construction

G.3.2.1 A range of potential effects on the landscape and visual resource are likely during the construction of the MHPGC Project. This appraisal of the potential effects helps define the scope and nature of the LVIA methodology. The potential effects likely to result from construction are described below.

- landscape effects:
  - effects on landscape elements, features and patterns (including, but not limited to soils, landform, ground vegetation, hedgerows/field boundaries, trees, woodland and buildings) as a result of land preparation including site clearance and earthworks;

- effects on landscape character and key characteristics, including perceptual characteristics and qualities as a result of construction activities. The construction activities are likely to include the presence of construction staff and machinery, cranes, vehicle movements, contractors' facilities and site access associated with the onshore LSS and cable corridor. Landscape works to implement the landscape design strategy for the LSS and reinstatement works along the cable corridor will also need to be accounted for in the assessment;
- Effects on the special landscape qualities and integrity of designated landscapes as a result of the above construction activities.

- visual effects:
  - effects on the views and visual amenity experienced by people undertaking various activities at various locations, distances and directions from the proposed land preparation and construction activities. These visual effects could be experienced from one location or sequentially as part of a route through the landscape such as a Core Path.
- whole project effects:
  - whole project effects could occur as a result of multiple construction activities related to the Project collectively affecting a landscape or visual receptor;
  - Whole project effects could also result from the construction phasing of the Project and influence the nature and type of effect. For example, construction works on the onshore export cable corridor are likely to occur sequentially, resulting in relatively short bursts of construction activity and reinstatement occurring at different locations along the cable corridor. Construction activity at the landfall and/or LSS may also be programmed to occur sequentially or concurrently with other Project activities.

G.3.3 Potential Effects During Operation/Maintenance

G.3.3.1 The potential effects during O&M relate principally to the presence of the LSS, its ongoing maintenance and the establishment of planting associated with the landscape design strategy, which forms part of the embedded environmental measures to mitigate significant landscape and visual effects.

G.3.3.2 The operational period of the LSS is likely to result in a long-term (reversible) effect on landscape and visual receptors. These effects would be partly and increasingly mitigated by the implementation and establishment of the landscape design strategy which will typically be assessed during Years one to five (implementation and establishment) and typically years five to 15 to allow for the growth of vegetation and the prediction of any alteration to the operational effects on landscape and visual receptors. The periods of assessment will be agreed with consultees.

G.3.4 Potential Effects During Decommissioning

G.3.4.1 The LSS would be decommissioned. This would lead in principle to a reversal of the landscape and visual effects.

G.4 Guidance Data Sources and Site Surveys

G.4.1 Guidance on Methodology

G.4.1.1 This methodology accords with the guidance set out in the GLVIA3 (Landscape Institute and IEMA, 2013). Where it clarifies or diverges from specific aspects of the guidance, in a small number of areas, reasoned professional justification for this is provided as follows:

- GLVIA3 sets out an approach to the assessment of magnitude of change in which three separate considerations are combined within the magnitude of change rating. These are the size or scale of the effect, its geographical extent and its duration and reversibility. This approach is to be applied in respect of both landscape and visual receptors. The Applicant considers that the process of combining all three considerations in one rating can distort the aim of identifying significant effects of the MHPGC Project. For example, a high magnitude of change, based on size or scale, may be reduced to a lower rating if it occurred in a localised geographical area and for a short duration. This might mean that a potentially significant effect could be overlooked if due to their limited geographical extents and/or short duration or reversibility;
- The Applicant has chosen to ensure that the description of the assessment of magnitude is therefore clearly explained and decisions regarding the weight to be given to the size or scale of the effect, its geographical extent and its duration and reversibility are fully explained in turn, starting with the size or scale, the geographical extents of the effects, and their duration and reversibility separately. A conclusion is then provided on the overall level of effect by combining with other judgements on sensitivity, to allow a final judgement to be made on whether an effect is significant or not significant;
- the assessment methodology utilises six word scales to describe the magnitude of change – high, medium-high, medium, medium-low, low, low-very low and zero; which are preferred to the 'maximum of five categories' suggested in GLVIA3 (3.27), as a means of clearly defining and summarising magnitude of change judgements.

G.4.1.2 These are not new deviations from GLVIA 3 (Landscape Institute and IEMA, 2013) and follow practice established on other similar Nationally Significant Infrastructure Projects (NSIP) such as East Anglia TWO, East Anglia THREE, Norfolk Vanguard and Thanet Extension.

G.4.2 Data Sources

G.4.2.1 A list of the data sources used for this assessment is provided in Chapter 9.1: Landscape and Visual Impact Assessment of the Scoping Report.

G.4.3 Desk based and Site Survey Work

G.4.3.1 A preliminary desk based assessment will be undertaken of landscape and visual receptors using a range of map based data and related computer and digital analysis including Zone of Theoretical Visibility (ZTV), digital and/or surface terrain modelling and wireframe and street view software. This information will be used to inform

initial assessments and focus the site survey work and likely locations for viewpoint photography and sequential route assessment.

G.4.3.2 A series of site surveys will be undertaken to verify the initial desk based assessments which may only require simple assessment techniques to complete. This may be due to receptors falling outside the ZTV or confirmation of screening from vegetation and/or built form that means there would be no view of the MHPGC Project.

G.4.3.3 Site surveys (referring to the MHPGC Project) and field surveys (referring to the wider LVIA study area) are likely to include the following.

- site survey verification of landscape elements within the LSS site and cable corridor and recommendations for embedded environmental measures where potentially significant effects are identified;
- field survey verification of the ZTV from landscape and visual receptor locations and transport and recreational routes through the LVIA study area;
- micro-siting of viewpoint locations and recording of panoramic baseline photography and subsequent visual assessment from the assessment viewpoints;
- identification of interactions between onshore and offshore elements of the Project such as whole project visibility or landscape and seascape effects.

G.4.3.4 The viewpoint photography and visual assessment surveys are planned during 2024. Further visual assessment verification surveys are then likely to be undertaken prior to the application, using visualisations for each relevant viewpoint or particular receptor location.

G.4.3.5 All site survey work will be undertaken in fair weather conditions with good to excellent visibility.

G.5 Assessing Landscape Effects

G.5.1 Introduction

G.5.1.1 Landscape Effects are defined by the Landscape Institute in GLVIA 3, Appendix G.5.1 and Appedix G.5.2 as follows:

G.5.1.2 “An assessment of landscape effects deals with the effects of change and development on landscape as a resource. The concern ... is with how the proposal will affect the elements that make up the landscape, the aesthetic and perceptual aspects of the landscape and its distinctive character.”

G.5.1.3 In accordance with GLVIA 3 the term ‘landscape’ encompasses areas of ‘townscape’ and coastal areas of ‘seascape’. In this assessment, the term ‘landscape’ is used to describe landscape and seascape unless otherwise noted. Areas of landscape and seascape are relevant to this assessment and they are described as follows.

G.5.2 Landscape Character

G.5.2.1 GLVIA 3, paragraph 5.4, advises that Landscape Character Assessment should be regarded as the main source for baseline studies and identifies the following factors which combine to create areas of distinct landscape character:

- "the elements that make up the landscape in the study area including:
  - physical influences – geology, soils, landform, drainage and water bodies;
  - landcover, including different types of vegetation and patterns and types of tree cover; and
  - the influence of human activity, including land use and management, the character of settlements and buildings, and pattern and type of fields and enclosure.
- The aesthetic and perceptual aspects of the landscape – such as, for example, its scale, complexity, openness, tranquillity or wildness;
- The overall character of the landscape in the study area, including any distinctive Landscape Character Types or Areas that can be identified, and the particular combinations of elements and aesthetic and perceptual aspects that make each distinctive, usually by identification as key characteristics of the landscape."

<u>Seascape Character</u>

G.5.2.2 GLVIA 3 paragraph 5.6, advises that where LVIA is carried out in coastal or marine locations baseline studies must take account of seascape. Seascape is defined in the United Kingdom (UK) Marine Policy Statement, (HM Government, Northern Ireland Executive, Scottish Government and Welsh Assembly Government, 2011) as "landscapes with views of the coast or seas, and coasts and the adjacent marine environment with cultural, historical and archaeological links with each other."

G.5.2.3 GLVIA 3 paragraph 5.6, identifies the following different factors which together determine seascape character:

- "coastal features;
- views to and from the sea;
- particular qualities of the open sea;
- the importance of dynamic changes due to weather and tides;
- changes in seascapes due to coastal processes;
- cultural associations;
- contributions of coastal features to orientation and navigation at sea."

<u>Landscape Effects</u>

G.5.2.4 The potential landscape effects, occurring during the construction, O&M and decommissioning periods of the MHPGC Project may therefore include, but are not restricted to the following.

- changes to landscape elements: the addition of new elements (LSS, landfall and cable corridor) or the removal of existing elements such as trees, vegetation and

buildings and other characteristic elements or valued features of the landscape character;

- changes to landscape qualities: degradation or erosion of landscape elements and patterns and perceptual characteristics, particularly those that form key characteristic elements of the landscape character or contribute to the landscape value;
- changes to landscape character: landscape character may be affected through the incremental effect on characteristic elements, landscape patterns and qualities (including perceptual characteristics) and the addition of new features, the magnitude of which is sufficient to alter the overall landscape character within a particular area;
- changes to designated landscapes, including the Special Landscape Areas (SLA) that would affect the special landscape qualities underpinning the designation and its integrity;
- cumulative landscape effects: where more than one development of a similar type may lead to a cumulative landscape effect.

G.5.2.5 Development may have a direct effect on the landscape as well as an indirect effect which would be perceived from the wider landscape, outside the immediate site area and its associated landscape character.

G.5.3 Evaluating Landscape Sensitivity to Change

G.5.3.1 The assessment of sensitivity takes account of the landscape value and the susceptibility of the receptor to the MHPGC Project.

G.5.3.2 Landscape sensitivity often varies in response to both the type and phase of the development proposed and its location, such that landscape sensitivity needs to be considered on a case-by-case basis. It should not be confused with 'inherent sensitivity' where areas of the landscape may be referred to as inherently of 'high' or 'low' sensitivity. For example, a National Park may be described as inherently of high sensitivity on account of its designation and value, although it may prove to be less sensitive or susceptible to particular development, and of variable sensitivity across its geographical area. Alternatively, an undesignated landscape may be of high sensitivity to a particular development regardless of the lack of local or national designation.

Value of the Landscape Receptor

G.5.3.3 The value of a landscape receptor is a reflection of the value that society attaches to that landscape. The assessment of the landscape value will be classified as high, high-medium, medium, medium-low or low and the basis for this assessment will be made clear using evidence and professional judgement, based on the following range of factors:

- Landscape designations - A receptor that lies within the boundary of a recognised landscape related planning designation will be of increased value, depending on the proportion of the receptor that is affected and the level of importance of the designation which may be international, national, regional or local. The absence of designation does not however preclude value, as an

undesignated landscape receptor may be valued as a resource in the local or immediate environment;

- Landscape quality - The quality of a landscape receptor is a reflection of its attributes, such as scenic quality, sense of place, rarity and representativeness and the extent to which its valued attributes have remained intact. A landscape with consistent, intact, well-defined and distinctive attributes is considered to be of higher quality and, in turn, higher value, than a landscape where the introduction of elements has detracted from its character;
- Landscape experience - The experiential qualities that can be evoked by a landscape receptor can add to its value. These responses relate to a number of factors including cultural associations that may exist in art, literature or history; the recreational value of the landscape, or the iconic status of the landscape in its own right; and its contribution of other values such as nature conservation or archaeology.

Landscape Susceptibility to Change

G.5.3.4 The susceptibility of a landscape receptor to change is a reflection of its ability to accommodate the changes that will occur as a result of the addition of the MHPGC Project without undue consequences for the maintenance of the baseline situation and/or the achievement of landscape planning policies and strategies. Some landscape receptors are better able to accommodate development than others due to certain characteristics that are indicative of capacity to accommodate change. These characteristics may or not also be special landscape qualities that underpin designated landscapes.

G.5.3.5 The assessment of the susceptibility of the landscape receptor to change will be classified as high, high-medium, medium, medium-low or low and the basis for this assessment will be made clear using evidence and professional judgement. Indicators of landscape susceptibility to the type of development proposed (construction, O&M and decommissioning of the LSS, landfall and cable corridor) are based on the following criteria:

- Overall Strength and Robustness - Collectively the overall characteristics and qualities of a particular landscape result in a strong and robust landscape that is capable of reasonably accommodating the MHPGC Project without undue adverse effects on the special landscape qualities (in the case of a designated landscape) or the key characteristics for which an area of landscape character or a particular element it is valued;
- Landscape Scale and Topography - The scale and topography are large enough to physically accommodate the development footprint without the requirement of invasive earthworks or drainage. Topographical features such as narrow valleys or more complex and small-scale landforms such as drumlins, incised river valleys/gorges, cliffs or rock outcrops are likely to be more susceptible to this type of development than broad, homogenous topography;
- Openness in the landscape may increase susceptibility to change because it can result in wider visibility of the MHPGC Project, with enclosed landscapes able to offer a landscape framework with more screening potential, limiting visibility to

a smaller area, although they may also be smaller scale and more complex which would increase susceptibility. In general, landscapes with greater enclosure are likely to be less susceptible to the MHPGC Project, than more open landscapes which may be less able to accommodate the onshore LSS and landscape mitigation in the form of planting schemes;

- Land Cover Pattern - Ancient and mature or long-established vegetation such as mature trees, woodland and protected hedgerows are likely to be more susceptible to the proposed development, particularly where these elements form part of a valued characteristic landscape pattern or feature. Conversely grassland/or arable crops and field boundaries comprising post and wire fencing, small, gappy hedges or young pioneer trees are likely to be less susceptible because they can be readily reinstated in the case of the cable corridor and are likely to be of lower landscape value;
- Skyline - Prominent and distinctive skylines and horizons with important landmark features that are identified in the landscape character assessment, are generally considered to be more susceptible to development such as the LSS in comparison to broad, simple skylines which lack landmark features or contain other infrastructure features;
- Relationship with other Development and Landmarks - Contemporary landscapes where there are existing similar developments (converter stations and pylons) or other forms of development (industry, mineral extraction, masts urban fringe/large settlement, major transport routes) that already have a characterising influence result in a lower susceptible to development in comparison to areas characterised by smaller scale, historic development and landmarks (historic villages with dense settlement patterns and associated buildings such as church towers);
- Rationale - Some site locations have an obvious visual rationale for the MHPGC Project in terms of the available space, access, simplicity and relationship to other similar forms of development. The design quality and embedded environmental measures will be high. Conversely a site may appear overly constrained and require greater engineering or additional construction activity to accommodate the MHPGC Project with lower design quality and few embedded environmental measures;
- Remoteness, Naturalness, Wildness/Tranquillity - Notably landscapes that are acknowledged to be particularly scenic, wild or tranquil are generally considered to be more susceptible to development in comparison to ordinary, cultivated or farmed/developed landscapes where perceptions of ‘wildness’ and tranquillity are less tangible. Landscapes which are either remote or appear natural may vary in their susceptibility to development;
- Landscape Context and Adjacent Landscapes - The extent to which the MHPGC Project will influence landscape receptors across the study area relates to the associations that exist between the landscape receptor within which the MHPGC Project is located and the landscape receptor from which the MHPGC Project are being experienced. In some situations, this association will be strong, where the landscapes are directly related. For example, adjacent areas of landscape

character may share or 'borrow' a high number of common characteristics. Landscape elements may be linked to or associated with wider landscape patterns such as individual trees forming part of an avenue or pattern of woodland copses, for example. In other situations, the association between adjacent landscapes will be weak. The context and visual connection to areas of adjacent landscape character or designations has a bearing on the susceptibility to development.

Landscape Sensitivity Rating

G.5.3.6 A sensitivity assessment of the landscape receptor will be made by combining the assessment of the value of the landscape character receptor and its susceptibility to change. The evaluation of landscape sensitivity is described as 'High', 'High-medium' 'Medium' 'Medium-low' or 'Low' and is drawn from the consideration of a range of criteria that indicate landscape value and susceptibility. The basis for the assessment (for example whether it is an overall assessment, or specific to the location) will be made clear using evidence and professional judgement in the evaluation of sensitivity for each receptor. Criteria that tend towards higher or lower sensitivity are set out in Table G. 1.

Table G. 1: Landscape Sensitivity to Change

Value/Susceptibility Criteria	Level of Value/Susceptibility Ranging from High to Medium to Low	
	High ⟷ Medium ⟷ Low	
Value – Landscape Value is determined by consideration a range of indicators/criteria with examples as follows:		
Designation:	Designated landscapes/elements with national policy level protection or defined for their natural beauty. Evidence that the landscape/element is valued or used substantially for recreational activity.	Landscapes without formal designation. Despoiled or degraded landscape with little or no evidence of being valued by the community. Elements that are uncharacteristic such as non-natives or self-seeded vegetation that may need to be cleared.
Quality	Higher quality landscapes/elements with consistent, intact and well-defined, distinctive attributes.	Lower quality landscapes/elements with indistinct elements or features that detract from its inherent attributes.
Rarity	Rare or unique landscape character types, features or elements.	Widespread or 'common' landscape character types, features or elements.

Value/Susceptibility Criteria	Level of Value/Susceptibility Ranging from High to Medium to Low	
	High ⟷ Medium ⟷ Low	
Aesthetic/scenic	Aesthetic/scenic or perceptual aspects of designated wildlife, ecological or cultural heritage features that contribute to landscape character.	Limited wildlife, ecological or cultural heritage features, or limited contribution to landscape character.
Perceptual qualities	Landscape with perceptual qualities of wildness, remoteness or tranquillity.	Limited or no evidence that the landscape is used for recreational activity.
Cultural associations	Landscape with strong cultural associations that contributes to scenic quality.	Landscape with few cultural associations.
Susceptibility to change – Landscape Susceptibility is determined by consideration a range of indicators/criteria with examples as follows:		
Strength and robustness	Fragile landscape vulnerable and lacking the ability to accommodate change.	Robust landscape, able to accommodate change or loss of features without undue adverse effects.
Landscape Scale	A smaller scale landscape that may require further engineering to accommodate the development.	A landscape of a suitably large enough scale to accommodate the development.
Openness/Enclosure	An open landscape with limited screening or potential may be of higher susceptibility to the MHPGC Project.	An enclosed landscape with screening or potential for mitigation may be of lower susceptibility to the MHPGC Project.
Reinstatement	Higher value, characteristic landcover and elements that cannot be easily reinstated or replaced.	Lower value, non-characteristic landcover and elements capable of rapid reinstatement.
Skyline	Distinctive undeveloped skylines with landmark features.	Developed, nondistinctive skylines.
Association	Weak and indirect association. Other	Strong or direct association other similar contemporary

Value/Susceptibility Criteria	Level of Value/Susceptibility Ranging from High to Medium to Low	
	High ⟷ Medium ⟷ Low	
	development may be of a smaller scale or historic.	developments/landscape character.
Rationale	Strong landscape rationale and opportunity with high degree of design quality and/or embedded environmental measures.	Landscape with numerous environmental and technical constraints with lower design quality and/or embedded environmental measures.
Perceptual Qualities	Perceptual qualities associated with particular scenic qualities, wildness or tranquillity.	Contemporary, cultivated/settled or developed landscapes are likely to have a lower susceptibility.
Landscape Context	Adjacent landscape character context connected by borrowed character and views.	Host landscape character is separate from surrounding/adjacent landscape character.
Sensitivity to change	**Sensitivity drawn from consideration of the above Value and Susceptibility criteria with the final conclusion on the level of Sensitivity ranging from 'High' to 'Medium' to 'Low'.**	

G.5.4 Landscape Magnitude of Change

G.5.4.1 The magnitude of change affecting landscape receptors is an expression of the scale of change that would result from the MHPGC Project. In assessing the magnitude of change the assessment has focused on the size or scale of change and its geographical extent.

Size or Scale of Change

G.5.4.2 This criterion relates to the size or scale of change to the landscape that would arise as a result of the MHPGC Project, based on the following factors:

- Landscape Elements: The degree to which the landscape elements or pattern of elements that makes up the landscape character would be altered by the MHPGC Project, through the loss, alteration or addition of elements in the landscape. The magnitude of change would generally be higher if the features that make up the landscape character are extensively removed or altered, and/or if many new components are added to the landscape;
- Landscape Characteristics: The extent to which the effect of the MHPGC Project change, (physically or perceptually) the key characteristics of the landscape which may be important to its distinctive character. This may include, for example, the scale of the landform, its relative simplicity, complexity or

irregularity, the nature of the landscape context, the grain or orientation of the landscape, the degree to which the receptor is influenced by external features and the juxtaposition of the MHPGC Project in relation to these key characteristics;

- Landscape Character/Designation: The degree to which landscape character receptors would be changed by the addition of the MHPGC Project. If the MHPGC Project are located in a landscape receptor that is already affected by other similar development, this may reduce the magnitude of change if there is a high level of integration and the developments form a unified and cohesive feature in the landscape. In the case of designated landscapes, the degree of change is considered in light of the effects on the special landscape qualities which underpin the designation and the effect on the integrity of the designation;
- All landscapes change over time and much of that change is managed or planned. Often landscapes will have management objectives for 'protection' or 'accommodation' of development. The scale of change may be localised, or occurring over parts of an area, or more widespread affecting whole landscape character areas and their overall integrity;
- Distance: The size and scale of change is also strongly influenced by the proximity of the MHPGC Project to the receptor and the extent to which the development can be seen as a characterising influence on the landscape. Consequently, the scale or magnitude of change is likely to be lower in respect of landscape receptors that are distant from the MHPGC Project and/or screened by intervening landform, vegetation and built form to the extent that the scale of their influence on landscape receptors is small or limited. Conversely, landscapes closest to the development are likely to be most affected. Host landscapes (where the development is located within a 'host' landscape character unit) would be directly affected whilst adjacent areas of landscape character would be indirectly affected.

Geographical Extent

G.5.4.3 Landscape effects are described in terms of the geographical extent or physical area that would be affected (described as a linear or area measurement). This should not be confused with the scale of the development or its physical footprint. The manner in which the geographical extent of the landscape effect is described for different landscape receptors is explained as follows.

- landscape elements:
  - the geographical extent of landscape elements may be objectively measured in terms of numbers, area or linear measurement. For example, the number of trees, area of woodland/or length of hedgerow affected may be recorded.
- landscape character/characteristics:
  - the extent of the effects on landscape character will vary depending on the specific nature of the MHPGC Project. This is not simply an expression of visibility or the extent of the ZTV. It is a specific assessment of the

extent of landscape character that would be changed by the MHPGC Project in terms of its character, key characteristics and elements.

- landscape designations:
  - in the case of a designated landscape, this refers to the extent the special landscape qualities of the designation are affected and whether this can be defined in terms of area or linear measurements, or subjectively (with the support of panel and/or peer review) and whether the integrity of the designation is affected.

Duration and Reversibility

G.5.4.4 The duration and reversibility of landscape effects would be based on the period over which the MHPGC Project are likely to exist (during construction and O&M) and the extent to which these elements would be removed (during decommissioning) and the effects reversed at the end of that period. Long-term, medium-term and short-term landscape effects are defined as follows:

- long-term – more than 10 years (may be defined as permanent or reversible);
- medium-term – 6 to 10 years;
- short-term – 1 to 5 years.

Landscape Magnitude of Change Rating

G.5.4.5 The 'magnitude' or 'degree of change' resulting from the MHPGC Project is described as 'High', 'High-Medium', 'Medium', 'Medium-Low', 'Low' or 'Very Low' or 'Zero''. The basis for the assessment of magnitude for each receptor will be made clear using evidence and professional judgement.

G.5.4.6 The levels of magnitude of change that can occur are defined in Table G. 2.

Table G. 2: Landscape Magnitude of Change Ratings

Magnitude of Landscape Change	Examples of Landscape Magnitude
High	• size/scale: A large-scale change and major loss of key landscape elements/characteristics or the addition of large-scale or numerous new and uncharacteristic features or elements that would affect the landscape character and the special landscape qualities/integrity of a landscape designation. Directly affecting a host landscape receptor or indirectly affecting a nearby receptor. • geographical extent: The size or scale of change would typically, but not always affect a large geographical extent or area and may be close to the proposed development.

Magnitude of Landscape Change	Examples of Landscape Magnitude
High-Medium	Intermediate rating with combination of criteria from high or medium magnitude.
Medium	• size/scale: A medium scale change and moderate loss of some key landscape elements/characteristics or the addition of some new medium scale uncharacteristic features or elements that could partially affect the landscape character and the special landscape qualities/integrity of a landscape designation. Directly affecting a host landscape receptor or indirectly affecting a nearby receptor. • geographical extent: The size or scale of landscape change would typically, but not always affect a more localised geographical extent at an intermediate distance from the proposed development.
Medium-Low	Intermediate rating with combination of criteria from medium or low magnitude.
Low	• size/scale: A small-scale change and minor loss of a few landscape elements/non-key characteristics, or the addition of some new small-scale features or elements of limited characterising influence on landscape character/designations. • geographical extent: There may be a small partial change in landscape character, typically, but not always affecting a localised geographical extent at some distance from the proposed development.
Low-Very Low	Intermediate rating with combination of criteria from low or very low magnitude.
Very Low to Zero	• size/scale: A very small-scale change that may include the loss or addition of some landscape elements of limited characterising influence. The landscape characteristics and character would be unaffected. • geographical extent: Typically affecting a very small geographical extent at greater distance from the proposed development.

G.5.5 Evaluating Landscape Effects and Significance

G.5.5.1 The level of landscape effect is evaluated through the combination of landscape sensitivity and magnitude of change. Once the level of effect has been assessed, a judgement is then made as to whether the level of effect is 'significant' or 'not significant' as required by the relevant EIA Regulations. This process is assisted by the matrix in Table G. 5 which is used to guide the assessment.

G.5.5.2 Further information is also provided about the nature of the effects (whether these would be direct/indirect; temporary/permanent/reversible; beneficial/neutral/adverse or cumulative).

Significant Landscape Effects

G.5.5.3 A significant effect would occur where the combination of the variables results in the MHPGC Project having a defining effect on the landscape receptor, or where changes of a lower magnitude affect a landscape receptor that is of particularly high sensitivity. A major loss or irreversible effect over an extensive area or landscape character, affecting landscape elements, characteristics and/or perceptual aspects that are key to a nationally valued landscape are likely to be significant.

Non-significant Landscape Effects

G.5.5.4 A non-significant effect would occur where the effect of the MHPGC Project is not defining, and the landscape character of the receptor continues to be characterised principally by its baseline characteristics. Equally a small-scale change experienced by a receptor of high sensitivity may not significantly affect the special landscape quality or integrity of a designation. Reversible effects, on elements, characteristics and character that are of small-scale or affecting lower value receptors are unlikely to be significant.

G.6 Assessing Visual Effects

G.6.1.1 Visual Effects are concerned wholly with the effect of the development on views, and the general visual amenity and are defined by the Landscape Institute in GLVIA3 (The Landscape Institute and IEMA, 2013), Appendix G.6 as follows:

G.6.1.2 "An assessment of visual effects deals with the effects of change and development on views available to people and their visual amenity. The concern ... is with assessing how the surroundings of individuals or groups of people may be specifically affected by changes in the context and character of views."

G.6.1.3 Visual effects are identified for different receptors (people) who would experience the view at their place of residence, within their community, during recreational activities, at work, or when travelling through the area. The visual effects may include the following:

- visual effect: a change to an existing static view, sequential views, or wider visual amenity as a result of development or the loss of particular landscape elements or features already present in the view;
- cumulative visual effects: the cumulative or incremental visibility of similar types of development may combine to have a cumulative visual effect.

G.6.1.4 The level of visual effect (and whether this is significant) is determined through consideration of the sensitivity of each visual receptor (or range of sensitivities for receptor groups) and the magnitude of change that would be brought about by the construction, O&M and decommissioning of the MHPGC Project.

G.6.2 Zone of Theoretical Visibility

G.6.2.1 Plans mapping the ZTV are used to analyse the extent of theoretical visibility of development or part of a development, across the study area and to assist with viewpoint selection. The ZTV does not however, take account of the screening effects of buildings, localised landform and vegetation, unless specifically noted (see individual figures). As a result, there may be roads, tracks and footpaths within the study area which, although shown as falling within the ZTV, are screened or filtered by built form and vegetation, which would otherwise preclude visibility.

G.6.2.2 The ZTVs provide a starting point in the assessment process and accordingly tend towards giving a 'worst case' or greatest calculation of the theoretical visibility.

G.6.3 Viewpoint Analysis

G.6.3.1 Viewpoint analysis is used to assist the assessment and is conducted from selected viewpoints within the study area. The purpose of this is to assess both the level of visual effect for particular receptors and to help guide the design process and focus the assessment. A range of viewpoints are examined in detail and analysed to determine whether a significant visual effect would occur. By arranging the viewpoints in order of distance it is possible to define a threshold or outer geographical limit, beyond which significant effects would be unlikely.

G.6.3.2 The assessment involves visiting the viewpoint location and viewing wirelines and photomontages prepared for each viewpoint location. The fieldwork is conducted in periods of fine weather with good visibility and considers seasonal changes such as reduced leaf cover or hedgerow maintenance.

G.6.3.3 The LVIA therefore includes viewpoint analysis prepared for each viewpoint and presented as supporting evidence in an appendix to the LVIA. A summary table of the findings will also be provided in order of distance from the development site. This summary table will assist in defining the direction, elevation, geographical spread and nature of the potential visual effects and identify areas where significant effects are likely to occur. This approach seeks to provide clarity and confidence to consultees and decision makers by allowing the detailed judgements on the magnitude of visual change to be more readily scrutinised and understood.

G.6.3.4 The viewpoint analysis is used to assist the visual assessment of visual receptor locations reported in the baseline.

G.6.4 Evaluating Visual Sensitivity to Change

G.6.4.1 In accordance with section 6.31 to 6.37 of GLVIA3 (The Landscape Institute and IEMA, 2013), the sensitivity of visual receptors will be determined by a combination of the value of the view and the susceptibility of the visual receptors to the change likely to result from the MHPGC Project on the view and visual amenity.

Value of the View

G.6.4.2 The value of a view or series of views reflects the recognition and importance attached either formally through identification on mapping or being subject to planning designations, or informally through the value which society attaches to the view(s). The value of a view will be classified as high, high-medium, medium, medium-low or low and the basis for this assessment will be made clear using evidence and professional judgement, based on the following criteria.

- Formal recognition - The value of views can be formally recognised through their identification on OS or tourist maps as formal viewpoints, sign-posted and with facilities provided to add to the enjoyment of the viewpoint such as parking, seating and interpretation boards. Specific views may be afforded protection in local planning policy and recognised as valued views. Specific views can also be cited as being of importance in relation to landscape or heritage planning designations, for example the value of a view would be increased if it presents an important vista from a designed landscape or lies within or overlooks a designated area, which implies a greater value to the visible landscape.
- Informal recognition - Views that are well-known at a local level and/or have particular scenic qualities can have an increased value, even if there is no formal recognition or designation. Views or viewpoints are sometimes informally recognised through references in art or literature and this can also add to their value. A viewpoint that is visited and appreciated by a large number of people would generally have greater importance than one gained by very few people.

Susceptibility to Change

G.6.4.3 Susceptibility relates to the nature of the viewer experiencing the view and how susceptible they are to the potential effects of the MHPGC Project. A judgement to determine the level of susceptibility therefore relates to the nature of the viewer and their experience from that particular viewpoint or series of viewpoints, classified as high, high-medium, medium, medium-low or low and based on the following criteria:

- Nature of the viewer - The nature of the viewer is defined by the occupation or activity of the viewer at the viewpoint or series of viewpoints. The most common groups of viewers considered in the visual assessment include residents, motorists, and people taking part in recreational activity or working. Viewers, whose attention is focused on the landscape, or with static long-term views, are likely to have a higher sensitivity. Viewers travelling in cars or on trains would tend to have a lower sensitivity as their view is transient and moving. The least sensitive viewers are usually people at their place of work as they are generally less sensitive to changes in views;
- Experience of the viewer - The experience of the visual receptor relates to the extent to which the viewer's attention or interest may be focused on the view and the visual amenity they experience at a particular location. The susceptibility of the viewer to change arising from the MHPGC Project may be influenced by the viewer's attention or interest in the view, which may be focused in a particular direction, from a static or transitory position, over a long or short duration, and with high or low clarity. For example, if the principal outlook from a settlement is aligned directly towards the MHPGC Project, the experience of

the visual receptor would be altered more notably than if the experience relates to a glimpsed view seen at an oblique angle from a car travelling at high speed. The visual amenity experienced by the viewer varies depending on the presence and relationship of visible elements, features or patterns experienced in the view and the degree to which the landscape in the view may accommodate the influence of the MHPGC Project.

Visual Sensitivity Rating

G.6.4.4 An overall level of sensitivity will be applied for each visual receptor or view – High, High-medium, Medium, Medium-low, or Low – by combining individual assessments of the value of the view and the susceptibility of the visual receptor to change. Each visual receptor, meaning the particular person or group of people likely to be affected at a specific viewpoint, is assessed in terms of their sensitivity. The basis for the assessments will be made clear using evidence and professional judgement in the evaluation of each receptor. Criteria that tend towards higher or lower sensitivity are set out in Table G. 3.

Table G. 3: Visual Sensitivity to Change

Value/Susceptibility Criteria	Level of Value/Susceptibility Ranging from 'High' to 'Medium' to 'Low'	
	High ⟷ Medium ⟷ Low	
Value - Landscape Value is determined by a range of indicators/criteria with examples as follows:		
Map/tourist information	Specific viewpoint identified in OS maps and/or tourist information and signage.	Viewpoint not identified in OS maps or tourist information and signage.
Facilities	Facilities provided at viewpoint to aid the enjoyment of the view.	No facilities provided at viewpoint to aid enjoyment of the view.
Planning recognition	View afforded protection in planning policy.	View is not afforded protection in planning policy.
Landscape value	View is within or overlooks a designated landscape, which implies a higher value to the visible landscape.	View is not within, nor does it overlook, a designated landscape.
Recognition	View has informal recognition and well- known at a local level, as having particular scenic qualities.	View has no informal recognition and is not known as having particular scenic qualities.
Art/Literature	View or viewpoint is recognised through	View or viewpoint is not recognised in references in art or literature.

Value/Susceptibility Criteria	Level of Value/Susceptibility Ranging from 'High' to 'Medium' to 'Low'	
	High ⟷ Medium ⟷ Low	
	references in art or literature.	
Scenic Quality	View has high scenic qualities relating to the content and composition of the visible landscape.	View has low scenic qualities relating to the content and composition of the visible landscape.
Susceptibility to change – determined by a range of indicators/criteria with examples as follows:		
Activity of the viewer	Viewer who is likely or liable to be influenced by the MHPGC Project such as residents, walkers, or tourists, whose main attention and interest are on their surroundings.	Viewer who is un or less likely to be influenced by the MHPGC Project such as viewers whose attention is not focused on their surroundings (e.g. people at work, or team sports).
Nature of the View	Residents that gain static, long-term views of the MHPGC Project in their principal outlook.	Viewers who are transient and dynamic, such as those travelling in cars or on trains, where the view is of short duration.
Direction/Field of View	A view that is focused in a specific directional vista, with notable features of interest in a particular part of the view.	Open views with no specific point of interest.
Visual amenity	Viewers are focused on the experience of a high level of visual amenity at the location due to its overall pleasantness as an attractive visual setting or backdrop to activities.	The visual amenity experienced at the location by viewers is less pleasant or attractive than might otherwise be the case.
Sensitivity:	**Sensitivity drawn from consideration of the Value and Susceptibility criteria to level of Sensitivity ranging from 'High' to 'Medium' to 'Low'.**	

G.6.5 Visual Magnitude of Change

G.6.5.1 The visual magnitude of change is an expression of the scale of change that would result from the visibility of the MHPGC Project. In assessing the magnitude of change

the assessment has focused on the size or scale of change its geographical extent and its duration and reversibility which are all stated separately in relation to the assessed effects.

Size or Scale of Change

G.6.5.2 An assessment will be made of the size or scale of change in the view that is likely to be experienced as a result of the MHPGC Project, based on the following criteria:

- Distance - The distance between the visual receptor/viewpoint and the MHPGC Project. Generally, the greater the distance, the lower the magnitude of change, as the MHPGC Project would constitute a smaller scale component of the view;
- Size - The amount and size of the MHPGC Project that would be seen. Visibility may range from a small or partial visibility of the MHPGC Project to all of the MHPGC Project being visible. Generally, the larger and greater number of the MHPGC Project that appear in the view, the higher the magnitude of change;
- This is also related to the degree to which development may be wholly or partly screened by landform, vegetation (seasonal) and/or built form. Conversely open views are likely to reveal more of a development, particularly where this is a key characteristic of the landscape;
- Scale - The scale of the change in the view, with respect to the loss or addition of features in the view and changes in its composition. The scale of the MHPGC Project may appear larger or smaller relative to the scale of the receiving landscape;
- Field of View - The vertical/horizontal field of view (FoV) and the proportion of view that is affected by the MHPGC Project. Generally, the more of the proportion of a view that is affected, the higher the magnitude of change would be. If the MHPGC Project extend across the whole of the open outlook, the magnitude of change would generally be higher as the full view would be affected. Conversely, if the MHPGC Project extent over a narrow part of an open view, the magnitude of change is likely to be reduced as the MHPGC Project would not affect the whole view or outlook. This can in part be described objectively by reference to the horizontal/vertical FoV affected, relative to the extent and proportion of the available view;
- Contrast - The character and context within which the MHPGC Project would be seen and the degree of contrast or integration of any new features with existing landscape elements, in terms of scale, form, mass, line, height, colour, luminance and motion. Developments which contrast or appear incongruous in terms of colour, scale and form are likely to be more visible and have a higher magnitude of change;
- Consistency of image - The consistency of image of the MHPGC Project in relation to other developments. The magnitude of change for the MHPGC Project is likely to be lower if it appears broadly similar to other developments in the landscape in terms of its scale, form and general appearance. New development is more likely to appear as logical components of the landscape with a strong rationale for their location;

- Skyline/Background - Whether the MHPGC Project would be viewed against the skyline or a background landscape may affect the level of contrast and magnitude. For example, skyline developments may appear more noticeable, particularly where they affect open and uninterrupted or undeveloped horizons. Conversely, development may also appear more noticeable when viewed against a darker background landscape, such as forestry. In these cases, the magnitude of change would tend to be higher;
- If the MHPGC Project add to an already developed skyline the magnitude of change would tend to be lower;
- Number - Generally, the greater the number of separate development components seen simultaneously or sequentially, the higher the magnitude of change and this may lead to whole project effect. Further cumulative effects would occur in the case of separate developments and their spatial relationship to each other would affect the magnitude of change. For example, development that appears as an extension to an existing development would tend to result in a lower magnitude of change than a separate, new development;
- Nature of Visibility - The nature of visibility is a further factor for consideration. The MHPGC Project may be subject to various phases of development change and the manner in which the development may be viewed could be intermittent or continuous and/or seasonally, due to periodic management or leaf fall.

Geographical Extent

G.6.5.3 The geographic extent over which the visual effects would be experienced is also be assessed. This is distinct from the size or scale of effect and is described in terms of the physical area or location over which it would be experienced (described as a linear or area measurement). The extent of the effects would vary according to the specific nature of the MHPGC Project and is principally assessed through ZTV, field survey and viewpoint analysis of the extent of visibility likely to be experienced by visual receptors. The geographical extent of visual effects is described as per the following examples:

- The geographical extent can be described as an area measurement or proportion of the total receptor affected. For example, effects on people within a particular area such as a golf course or area of common land can be illustrated via a 'representative viewpoint' that represents a similar visual effect, likely to be experienced by larger numbers of people within that area. The geographical extent of that visual effect can be expressed as approximately '5 hectares' or '10%' of the common land or a golf course area;
- The geographical extent can be described as a linear measurement (m or km) according to the length of route affected. For example, effects on people travelling on a route through the landscape such as a road or footpath can be illustrated via a 'representative viewpoint' that represents a similar visual effect, likely to be experienced by larger numbers of people along that route. The geographical extent of that visual effect can be expressed as approximately '2km' or '10%' of the total length of the route;

- The geographical extent of a visual effect experienced from a specific viewpoint may be limited to that location alone. (An example of a 'specific viewpoint' is a public viewpoint recommended in tourist literature such as a well visited hill summit. An example of an 'illustrative viewpoint' is a particular location within a built-up or well vegetated area where an uncharacteristically open view exists).

Duration and Reversibility

G.6.5.4 The duration and reversibility of visual effects would be based on the period over which the MHPGC Project are likely to exist (during construction, O&M) and the extent to which these elements would be removed (during decommissioning) and the effects reversed at the end of that period. Long-term, medium-term and short-term visual effects are defined as follows:

- long-term – more than 10 years (may be defined as permanent of reversible);
- medium-term – 6 to 10 years;
- short-term – 1 to 5 years.

Visual Magnitude of Change Rating

G.6.5.5 The 'magnitude' or 'degree of change' resulting from the MHPGC Project is described as 'High', 'High-Medium', 'Medium', 'Medium-Low', 'Low', 'Low-Very Low' and 'Zero'. The basis for the assessment of magnitude for each receptor will be made clear using evidence and professional judgement and some examples of the levels of magnitude of change that can occur on views are defined in Table G. 4.

Table G. 4: Visual Magnitude of Change

Magnitude of Landscape Change	Examples of Visual Magnitude
High	• size and scale: A very large - large and dominant change to the view; • number: Involving the loss/addition of a large number of features/elements; • distance:Typically appearing closer to the viewer in the foreground. • FoV: Affecting a large vertical and wide horizontal FoV; • visibility: Multiple phase development with continuous/sequential visibility; • contrast: Strong contrast with surroundings with little or no screening. • skyline: Visible on the skyline as a new feature; • consistency of image: Contrasting with other developments, lacking in visual rationale. Typically experienced from representative viewpoints illustrating a visual effect likely to be experienced by larger numbers of people, relative to the activity, affecting a large area or length/proportion of route. May also be experienced from a specific viewpoint.

Magnitude of Landscape Change	Examples of Visual Magnitude
High-medium	Intermediate rating with combination of criteria from high or medium magnitude of change category.
Medium	• size and scale: A medium and prominent change to the view; • number: Involving the loss/addition of a number of features/elements; • distance: Typically appearing in the middle ground; • FoV: Affecting a medium vertical and a medium horizontal FoV; • visibility: Multiple phase development with intermitant/sequential visibility; • contrast: Contrast with surroundings and may benefit from some screening; • skyline: Visible on the skyline along with other features; • consistency of image: Different from other developments, some visual rationale. Typically experienced from representative viewpoints illustrating a visual effect likely to be experienced by a medium number of people, relative to the activity, affecting a medium area or length/proportion of route. May also be experienced from a specific viewpoint.
Medium-low	Intermediate rating with combination of criteria from medium or low magnitude of change category.
Low	• size and scale: A small/noticeable change, could be missed by casual observer; • number: Involving loss/addition of a small number of features/elements; • distance: Typically appearing in the background; • FoV:Affecting a small vertical and a narrow horizontal FoV; • visibility: Simple, single development, intermittently and infrequently visible; • contrast: Some parity, 'fits' with surroundings and benefits from screening; • skyline: Partly visible on a developed skyline or not visible on the skyline; • consistency of image: Similar from other developments with visual rationale, appearing reasonably well accommodated within its surroundings. Typically experienced from illustrative viewpoints likely to be experienced by low numbers of people, relative to the activity, affecting a smaller area or length/proportion of route. May also be experienced from a specific viewpoint.

Magnitude of Landscape Change	Examples of Visual Magnitude
Negligible - Zero	• size and scale: A small or negligible change, need to 'look for it'; • number: Involving the loss/addition of a small number of features/elements; • distance: Typically appearing in the far distance; • FoV: Affecting a small vertical and a very narrow horizontal FoV; • visibility: Simple, single development, intermittently and infrequently visible; • contrast: Blends with surroundings and/or is well screened; • skyline: Partly visible on a developed skyline or not visible on the skyline; • consistency of image: Similar from other developments with strong visual rationale, of appearing well accommodated within its surroundings. Typically experienced from illustrative viewpoints likely to be experienced by low numbers of people, relative to the activity, affecting a smaller area or length/proportion of route. May also be experienced from a specific viewpoint.

G.6.6 Evaluating Visual Effects and Significance

Introduction

G.6.6.1 The level of visual effect is evaluated through the combination of visual sensitivity and magnitude of change. Once the level of effect has been assessed, a judgement is then made as to whether the level of effect is 'significant' or 'not significant' as required by the relevant EIA Regulations. This process is assisted by the matrix in Table G. 5 which is used to guide the assessment. The factors considered in the evaluation of the sensitivity and the magnitude of the change resulting from the MHPGC Project and their conclusion, will be presented in a comprehensive, clear and transparent manner.

G.6.6.2 Further information is also provided about the nature of the effects (whether these would be direct/indirect; temporary/permanent/reversible; beneficial/neutral/adverse or cumulative).

Significant Visual Effects

G.6.6.3 A significant effect is more likely to occur where a combination of the variables results in the MHPGC Project having a defining effect on the view or visual amenity or where changes affect a visual receptor that is of high sensitivity.

Non-significant Visual Effects

G.6.6.4 A non-significant effect is more likely to occur where a combination of the variables results in the MHPGC Project having a non-defining effect on the view or visual amenity or where changes affect a visual receptor that is of low sensitivity.

Weather Conditions

G.6.6.5 The assessment of visual effects is undertaken in clear weather with good to excellent visibility. This means that the viewpoint assessment represents a maximum or fair assessment of the likely visual effects. The same viewpoint may be experienced under less optimal viewing conditions resulting in a significant effect appearing as non-significant, due to the change in the variable weather conditions. Due to the conditions of the assessment the reverse (a non-significant effect appearing as significant) is unlikely to occur.

G.7 Assessing Cumulative Landscape and Visual Effects

G.7.1.1 NatureScot's guidance, *Assessing the Cumulative Impact of Onshore Wind Energy Developments* (2021) is widely used across the UK to inform the specific assessment of the cumulative effects of both onshore and offshore windfarms and can be adapted to other forms of development such as grid infrastructure. The NatureScot (2021) guidance defines:

- cumulative effects as the additional changes caused by a Proposed Development in conjunction with other similar developments or as the combined effect of a set of developments taken together (NatureScot, 2021: p4);
- cumulative landscape effects are those effects that 'can impact on either the physical fabric or character of the landscape, or any special values attached to it' (NatureScot, 2021, p10);
- cumulative visual effects are those effects that can be caused by combined visibility, which occurs where the observer is able to see two or more developments from one viewpoint and/or sequential effects which occur when the observer has to move to another viewpoint to see different developments (NatureScot, 2021, p11).

G.7.1.2 The potential cumulative effects of the MHPGC Project with other relevant existing, consented or proposed development are described as follows.

- 'Whole project' effects resulting from the combined effects of the onshore and offshore elements of the Project. These effects are assessed as part of the main SLVIA/LVIA;
- the cumulative effects of the MHPGC Project in addition to and in-combination with other similar development (wind farms and other relevant development such as grid related projects) that are either consented/under construction; the subject of a valid planning application; or proposed as part of relevant plans and programmes.

G.7.1.3 The cumulative assessment methodology for SLVIA/LVIA will be described once the scope of any cumulative assessment is confirmed and agreed through the consultation process.

G.8 Evaluation of Significance

G.8.1.1 The matrix presented in Table G. 5 is used as a guide to illustrate the LVIA process. In line with the emphasis placed in GLVIA3 upon the application of professional judgement, an overly mechanistic reliance upon a matrix is avoided through the provision of clear and accessible narrative explanations of the rationale underlying the assessment made for each landscape and visual receptor. Such narrative assessments provide a level of detail over and above the outline assessment provided by use of the matrix alone.

G.8.1.2 The landscape and visual assessment unavoidably, involves a combination of quantitative and qualitative assessment and wherever possible cross references will be made to objective evidence, baseline figures and/or to photomontage visualisations to support the assessment conclusions. Often a consensus of professional opinion has been sought through consultation, internal peer review, and the adoption of a systematic, impartial, and professional approach. Importantly each effect results from its own unique set of circumstances and have been assessed on a case-by-case basis. The matrix as presented in Table G. 5 should therefore be considered as a guide and any deviation from this guide will be clearly explained in the assessment.

G.8.1.3 Significant landscape and visual effects are highlighted in bold and shaded dark grey in Table G. 5. They relate to all those effects that result in a 'Substantial', 'Major' or a 'Major to Moderate' level of effect. In some circumstances, 'Moderate' levels of effect (shaded light grey) also have the potential, subject to the Applicant's opinion, to be considered as significant and these exceptions are also highlighted in bold in the text and will be explained as part of the assessment, where they occur. White or un-shaded boxes in Table G. 5 indicate a non-significant effect.

G.8.1.4 In those instances where there would be no effect, the magnitude has been recorded as 'Zero' and the level of effect as 'None' or 'No View'. Intermediate levels of magnitude or effect are also used in the LVIA and are shown in Table G. 5 in italics, for example *High – Medium* magnitude or *Substantial to Major* level of effect.

Table G. 5: Evaluation of Landscape and Visual Effects

Magnitude of Change	Landscape and Visual Sensitivity		
	High	**Medium**	**Low**
High	Substantial	Major	Moderate
High - Medium	Substantial	Major to Moderate	Moderate to Minor
Medium	Major	Moderate	Minor
Medium - Low	Major to Moderate	Moderate to Minor	Minor
Low	Moderate	Minor	Negligible
Low – Very Low	Moderate to Minor	Negligible	Negligible
Very Low	Minor	Negligible	Negligible
Zero	None/No View		

G.9 Nature of Effects

G.9.1.1 The EIA Regulations 2017 state that the EIA Report/ES should define "the direct effects and any indirect, secondary, cumulative, transboundary, short-term, medium-term and long-term, permanent and temporary, positive and negative effects of the development".

G.9.1.2 Cumulative effects have been described in section Appendix G.7, and "short-term, medium-term and long-term, permanent and temporary" are described in Appendix Appendix G.5 and Appendix G.6 under the heading 'Duration of Effect'.

G.9.1.3 The definition of the remaining terms used in this assessment is defined here.

G.9.2 Direct and Indirect Effects

G.9.2.1 Direct landscape effects relate to the host landscape and concern both physical and perceptual effects on the receptor.

G.9.2.2 Indirect landscape effects relate to those landscapes and receptors which separated by distance or remote from the development and therefore are only affected in terms of perceptual effects. The Landscape Institute also defines indirect effects as those which are not a direct result of the development but are often produced away from it or as a result of a complex pathway.

G.9.2.3 Visual effects are generally all considered as direct effects. An indirect visual effect may however be used to define a visual effect on a view that is not in the direction of the main view of the viewer as described by the following examples.

- road users generally face the road directly ahead in the direction of travel and visual effects affecting those views may be described as direct effects. Where the visual effect is experienced in views oblique to the direction of travel they may be described as indirect;
- designed landscapes and vistas/viewpoints may be orientated in a particular direction and visual effects affecting those views may be described as direct

effects. Where the visual effect is experienced in views oblique to the direction of the designed or main/primary view they may be described as indirect.

G.9.2.4 Secondary effects (or effects subsequent to an initial effect) are covered in this assessment by indirect effects.

G.9.3 Positive and Negative Effects

G.9.3.1 Guidance provided by the in GLVIA3 on the nature of effect (i.e. beneficial or adverse) states that 'in the LVIA, thought must be given to whether the likely significant landscape and visual effects are judged to be positive (beneficial) or negative (adverse) in their consequences for landscape or for views and visual amenity', but it does not provide guidance as to how that may be established in practice. The nature of effect is therefore one that requires interpretation and, where applied, this involves reasoned professional opinion.

G.9.3.2 In this assessment the nature of effects refers to whether the landscape and/or visual effect of the MHPGC Project is positive or negative (herein referred to as 'beneficial'/'neutral' or 'adverse').

G.9.3.3 In relation to many forms of development, the LVIA will identify 'beneficial' and 'adverse' effects by assessing these under the term 'Nature of Effect'. The landscape and visual effects of large-scale infrastructure are difficult to categorise in either of these brackets as, unlike other disciplines, there are no definitive criteria by which the effects can be measured as being categorically 'beneficial' or 'adverse'. In some disciplines, such as noise or ecology, it is possible to quantify the effect in numeric terms, by objectively identifying or quantifying the proportion of a receptor that is affected and assessing the nature of that effect in justifiable terms. However, this is not the case in relation to landscape and visual effects where the approach combines quantitative and qualitative assessment.

G.9.3.4 Generally, in the development of 'new' energy infrastructure, a precautionary approach is adopted, which assumes that significant landscape and visual effects will be weighed on the adverse side of the planning balance. Unless it is stated otherwise, the effects considered in the assessment will be considered to be adverse. Beneficial or neutral effects may, however, arise in certain situations and are stated in the assessment where relevant, based on the following definitions.

- Beneficial effects contribute to the landscape and visual resource through the enhancement of desirable characteristics or the introduction of new, beneficial attributes. The development contributes to the landscape by virtue of good design or the introduction of new landscape planting. The removal of undesirable existing elements or characteristics can also be beneficial, as can their replacement with more appropriate components;
- Neutral effects occur where the development fits with the existing landscape character or visual amenity. The development neither contributes to or detracts from the landscape and visual resource and can be accommodated with neither beneficial or adverse effects, or where the effects are so limited that the change is hardly noticeable. A change to the landscape and visual resource is not considered to be adverse simply because it constitutes an alteration to the existing situation;

- Adverse effects are those that detract from the landscape character or quality of visual attributes experienced, through the introduction of elements that contrast, in a detrimental way, with the existing characteristics of the landscape and visual resource, or through the removal of elements that are key in its characterisation.

G.10 Visual Representations

G.10.1.1 ZTVs and visualisations (wirelines or wirelines and photomontages) are graphical images produced to assist and illustrate the LVIA and the cumulative assessment. The methodology use for viewpoint photography and photomontages will be produced in accordance with the SNH guidance on *Visual Representation of Wind Farms,* Version 2.2 (Scottish Natural Heritage, 2017), the *Guidelines for Landscape and Visual Impact Assessment*, Third Edition (GLVIA 3) (Landscape Institute and IEMA, 2013) and the Landscape Institute Technical Guidance Note on *Visual Representation of Development Proposals* (2019).

G.10.2 Methodology for Production of ZTVs

G.10.2.1 The ZTVs will be calculated using computer software to generate a ZTV of the MHPGC Project, to demonstrate the theoretical extent of visibility from any point in the study area.

G.10.2.2 A 3D computer model will be developed of the existing landscape and key reference using digital terrain data as follows.

- ordnance Survey Terrain 50: Used to produce the main or standard ZTV plot and wirelines, these tiles provide a digital record of the existing landform of Great Britain, or Digital Terrain Model (DTM) at 10m elevation intervals based on 50m grid squares and models representing the specified geometry and position of the onshore elements. The computer model will include the entire study area and takes account of the impacts caused by atmospheric refraction and the Earth's curvature;
- ordnance Survey light detection and ranging (LIDAR) Composite 2m: Used to produce a more detailed ZTV plots using 2m grid squares with surface features. It therefore takes into account the screening impacts of vegetation, buildings or other surface features that may prevent or reduce visibility (insofar as they are represented in the LIDAR data). The computer model will include the entire study area and takes account of atmospheric refraction and the Earth's curvature.

G.10.2.3 The resulting ZTV plots will be overlaid on Ordnance Survey mapping at an appropriate scale and presented as figures using desktop publishing or graphic design software.

G.10.2.4 Cumulative ZTV plots based on the intervisibility of the MHPGC Project and other relevant developments within the study area will also be produced.

G.10.2.5 There are limitations in this theoretical production, and these should be considered in the interpretation and use of the ZTV as follows.

- where the ZTV has been calculated using Ordnance Survey Terrain 50 this will not account for vegetation or built form unless added in the form of OS Vectormap data or digitally added and stated on the figure.;
- where the ZTV has been calculated using Ordnance Survey LIDAR Composite only those surface features picked up by LIDAR data will be represented;
- the ZTVs are based on theoretical visibility from 2m above ground level;
- the ZTV shows higher to lower visibility based on the amount of the MHPGC Project visible as represented by a grid of data points representing the 3D envelope, model or annotation of the MHPGC Project;
- the ZTV does not indicate the decrease in visibility that occurs with increased distance from the offshore elements of the MHPGC Project. The nature of what is visible from 2km away will differ markedly from what is visible from 500m away, although both could be indicated in the ZTV as having the same level of visibility.

G.10.2.6 These limitations mean that whilst the ZTV is used as a starting point in the assessment, providing an indication of where the MHPGC Project would theoretically be visible and tending to present a 'worst case' or over estimate of the theoretical visibility. The information drawn from the ZTV is checked by field survey observation.

G.10.3 Methodology for Baseline Photography

G.10.3.1 Once a view has been selected, the location is visited, confirmed, and assessed with the aid of a wireline or similar visualisation in the field. A photographic record is taken to record the view and the details of the viewpoint location and associated data are recorded to assist in the production of visualisations and to validate their accuracy.

G.10.3.2 The following photographic information is recorded:

- date, time, weather conditions and visual range;
- GPS recorded 12 figure grid reference accurate to ~5-10m;
- GPS recorded Above Ordnance Datum (AOD) height data;
- use of a fixed 50mm focal length lens is confirmed;
- horizontal field of view (in degrees);
- bearing to Target Site.

G.10.3.3 The photographs used to produce the photomontages will be taken with a digital SLR camera set to produce photographs equivalent to that of a manual 35mm SLR camera with a fixed 50mm focal length lens. The photographs will be taken on a tripod with a pano-head at a height of approximately 1.5m above ground.

G.10.3.4 All the resulting visualisations will be prepared to indicate other cumulative development in order that they may assist the cumulative assessment as well as the LVIA.

G.10.3.5 Whilst no two-dimensional image can fully represent the real viewing experience, the visualisation aims to provide a realistic representation of the onshore elements, based on current information and photomontage methodology.

Weather Conditions

G.10.3.6 GLVIA3 para 8.22 state – 'In preparing photomontages, weather conditions shown in the photographs should (with justification provided for the choice) be either:

- representative of those generally prevailing in the area; or
- taken in good visibility, seeking to represent a maximum visibility scenario when the development may be highly visible'.

G.10.3.7 In preparing photomontages for the LVIA, photographs will be taken in favourable weather conditions. Weather conditions shown in the photographs for all viewpoints have, where possible, will be taken during periods of 'very good' or 'excellent' visibility conditions, seeking to represent a maximum visibility scenario when the developments may be highly visible.

G.10.4 Methodology for Production of Visualisations

G.10.4.1 A photomontage is a visualisation which superimposes an image of a Project upon a photograph or series of photographs. Photomontage is a widespread and popular visualisation technique, which allows changes in views and visual amenity to be illustrated and assessed, within known views of the 'real' landscape.

G.10.4.2 To create the baseline panorama, the frames are individually cylindrically projected and then digitally joined to create a fully cylindrically projected panorama using Adobe Photoshop or PTGui software. This process avoids the wide-angle effect that would result should these frames be arranged in a perspective projection, whereby the image is not faceted to allow for the cylindrical nature of the full 360° view but appears essentially as a flat plane. Tonal alterations are made using Adobe software to create an even range of tones across the photographs once joined.

G.10.4.3 The photographs are also joined to create planar projection panoramas using PTGui software. These are used in the creation of the 53.5° FoV photomontages. In some views, more than one 53.5° FoV panorama may be shown to accommodate the full width of the MHPGC Project.

G.10.4.4 Visualisations that illustrate the MHPGC Project, set within a computer generated image of the landform will be used in the assessment to predict its theoretical appearance. This will be produced with a combination of Resoft WindFarm and 3D AutoCAD and will be based on a terrain model with a 2m data grid (2m LIDAR data). There are limitations in the accuracy of DTM data so that landform may not be represented precisely and may result in differences in visibility, however, the use of 2m LIDAR data minimises these limitations.

G.10.4.5 Rendering of the LSS in the photomontages is as photorealistic as possible to the conditions shown in each viewpoint photograph. There is some variation in the appearance and visibility between the viewpoints, as they are rendered to suit the conditions shown in each of the different viewpoint photographs, which have some unavoidable degree of variation in terms of lighting and weather conditions. The key requirement is that the LSS station will be rendered with sufficient contrast against

the skyline backdrop to illustrate its maximum visibility scenario in each image. Photomontages will be prepared to depict how the LSS would appear in excellent visibility conditions to illustrate the worst- case. The full suite of viewpoint photomontages should be viewed to gain an impression of the likely visual effects of the LSS.

G.10.4.6 Visualisations will be produced for the agreed viewpoints identified in the LVIA and photomontages will aim to provide a photorealistic image of the appearance of the MHPGC Project. 3D model representations are combined with the baseline view photographs to create a photorealistic rendered photomontage image of the development.

G.10.4.7 The baseline photographs and cumulative wireline visualisations shown for each viewpoint cover a 90° field of view (or in some cases, up to 360°), which accords with SNH guidance. These are cylindrically projected images and should be viewed flat at a comfortable arm's length.

G.10.4.8 The 53.5° field of view wirelines and photomontages are prepared using a planar projected image and should also be viewed flat at a comfortable arm's length. These images are each printed on paper 841 x 297mm (half A1) which provides for a relatively large-scale image.

G.10.4.9 Visualisations of the MHPGC Project will show, from each viewpoint, the existing baseline panorama and a wireframe or annotated panorama or photomontage.

G.10.4.10 The completed set of visualisations and accompanying data are then presented as figures using desktop publishing/graphic design software.

G.10.4.11 The photographs and other graphic material such as wirelines and photomontages used in this assessment are for illustrative purposes only and, whilst useful tools in the assessment, are not considered to be completely representative of what will be apparent to the human eye. The assessments are carried out from observations in the field and therefore may include elements that are not visible in the photographs.

G.10.5 Illustration of Landscape Planting Strategy

G.10.5.1 Visualisations will be prepared to illustrate the landscape design strategy which is proposed as an embedded environmental measure within the MHPGC Project. This is likely to include landscaping illustrated in Year one (implementation) and at a later date during the establishment (between Years five to 15).

G.10.6 Limitations of Visualisations

G.10.6.1 The photomontage visualisations used in the LVIA are for illustrative purposes only and, whilst useful tools in the assessment, are not considered to be completely representative of what will be apparent to the human eye. The assessments are carried out from observations in the field and therefore may include elements that are not visible in the photographs.

G.10.6.2 The photomontage visualisations of the LSS (and any development proposal) have a number of limitations when using them to form a judgement on visual effect. These include:

- a visualisation can never show exactly what a development will look like in reality due to factors such as: different lighting, weather and seasonal conditions which vary through time and the resolution of the image;
- the images provided give a reasonable impression of the scale and the distance to the MHPGC Project, but can never be 100% accurate to the as constructed effect;
- a static image cannot convey movement or reflection from the sun;
- the viewpoints illustrated are representative of views in the area but cannot represent visibility at all locations;
- to form the best impression of the effects, these images are best viewed at the viewpoint location shown;
- the images must be printed and viewed at the correct size (841mm x 297mm);
- images should be held flat at a comfortable arm's length. If viewing these images on a wall or board at an exhibition, stand at arm's length from the image presented to gain the best impression;
- it is preferable to view printed images rather than view images on screen. Images on screen should be viewed using a normal PC screen with the image enlarged to the full screen height to give a realistic impression;
- there are practical limitations to shooting viewpoint photographs only in very good or excellent visibility and at particular times of day.

G.11 References

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