



Morven Hawthorn Pit Grid Connection Project

Preliminary Environmental Information Report

Volume 2, Chapter 2: Offshore Water and Sediment
Quality

MVCNS-J4029-GOB-00003
October 2026
B01



GoBe

Document status

Version	Purpose of document	Authored by	Checker	Approved by	Date
B01	PEIR	GoBe	LL	LS	October 2026

Prepared by:	Prepared for:
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Annexes

Annex number	Annex title
2.1	Offshore Water Framework Directive Assessment

Glossary

Term	Meaning
Commitments	Measures (embedded mitigation and secondary) to be adopted during the construction, operation and maintenance (O&M), and decommissioning phases of the Morven Hawthorn Pit Grid Connection (MHPGC) Project.
Cumulative Effect	For each environmental topic, the baseline environment will be characterised, and the likely significant effect will be described within a topic-specific Study Area. Specific Study Areas are defined for each topic and are based on the maximum spatial extent.
Cumulative Effects Assessment	Assessment of the likely effects arising from the MHPFC Project alongside the likely effects arising from other proposed developments on the same receptor or resource.
Environmental Impact Assessment (EIA)	The process of identifying and assessing the significant effects likely to arise from a project. This requires consideration of the likely changes to the environment, where these arise as a consequence of a project, through comparison with the existing and projected future baseline conditions.
Inter-related effects	Effects that may arise from the interactions between different EIA topic effects considered within the project-alone assessment, potentially leading to more significant effects than if they were to be considered in isolation
Landfall	The area in which the offshore export cables make landfall (come onshore) and the transitional area between the offshore cabling and the onshore cabling. This term applies to the entire landfall area between the trenchless technique exit pits and the transition joint bay(TJB) inclusive of all construction works.
Magnitude	A combination of the spatial extent, duration, frequency and reversibility of an impact
Marine Directorate Licensing Operations Team (MD-LOT)	The part of the Scottish Government's Marine Directorate responsible for assessing and administering applications for marine licences and Section 36 consent (offshore) in Scotland.
Marine Management Organisation (MMO)	The MMO, as a UK government body, is responsible for licensing, regulating and overseeing activities in the marine environment for English waters. For a Development Consent Order (DCO) and deemed marine licence, the MMO acts as a statutory consultee, advising on marine planning, environmental impacts, habitats and compliance with marine licensing regulations.
Maximum Design Scenario (MDS)	The realistic worst case scenario, selected on a topic-specific and impact specific basis, from a range of potential parameters for the MHPGC Project.
Mean High Water Springs (MHWS)	The most inshore level location reached by the sea at high tide during mean high water spring tide. This is defined as the average tidal height throughout the year, of two successive high waters, during a 24-hour period in each month when the range of the tide is at its greatest.
Mean Low Water Springs (MLWS)	The average height of the low water levels of each pair of successive low waters during the periods of about 24 hours when the tidal range is at its greatest.

Term	Meaning
MHPGC Project Scoping Report	A Scoping Report for the MHPGC Project, scoping the likely significant effects of the project on the environment, was submitted and accepted by Planning Inspectorate (PINS) and submitted to the Scottish Ministers, via MD-LOT in February 2025.
MHPGC Project Scoping Opinions	Separate scoping opinions received from PINS (on behalf of the Secretary of State) and MD-LOT (on behalf of the Scottish Ministers) in response to the MHPGC Project Scoping Report. The MHPGC Project Scoping Opinions contain the range of issues that PINS, and MD-LOT in consultation with statutory stakeholders, have identified should be considered within the EIA process.
MHPGC Project	The MHPGC Project is comprised of the offshore export cables in Scottish and English waters from the Morven North or the Morven South offshore substation platform(s)(OSP), landfall, onshore export cables, the onshore land substation (LSS) and Alternative Current (AC) connection cables. Also referred to in this report as the MHPGC Project, for ease of reading.
Morven North Offshore Wind Array Project (hereafter 'Morven North')	The Morven North Offshore Wind Array Project which includes the wind turbines and foundations, Offshore Substation Platforms and foundations, inter-array and interconnector cables and associated infrastructure located within the Morven North Boundary.
Morven South Offshore Wind Array Project (hereafter 'Morven South')	The Morven South Offshore Wind Array Project, which includes the wind turbines and foundations, Offshore Substation Platforms and foundations, inter-array and interconnector cables and associated infrastructure located within the Morven South Boundary.
National Grid Hawthorn Pit Substation	The National Grid substation at Hawthorn Pit which the AC connection cables will connect into from the onshore land substation.
Offshore Substation Platforms (OSP(s))	OSP(s) comprise the support structure, topside and electrical components used for collecting the electricity generated by the wind turbine generators for the passage or transmission to landfall. These OSP(s) can be divided into two types: – HVAC (High Voltage Alternating Current) collector substations; – HVDC (High Voltage Direct Current) converter substations.
Operations and Maintenance phase (O&M)	The operational and maintenance phase of the MHPGC Project.
Planning Inspectorate (PINS)	The PINS is an executive agency of the UK Government responsible for administering and examining DCO applications for NSIPs in England. PINS manages the application process, oversees consultation and examination, and makes a recommendation to the relevant Secretary of State on whether consent should be granted.
MHPGC Project Preliminary Environmental Information Report (PEIR)	A report that provides preliminary environmental information in accordance with the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017. This is information that enables consultees to understand the likely significant environmental effects of a project and which helps to inform consultation responses.

Term	Meaning
Primary mitigation	Measures included as part of the location or design of the MHPGC Project made during the pre-application phase that are an inherent part of the MHPGC Project and do not require additional action to be taken. This includes modifications arising through the iterative design process. These measures will be secured through the consent itself through the description of the MHPGC Project, the parameters and associated commitments secured by the DCO and marine licence, or both.
Residual effects	Effects that continue to exist after mitigation has been applied.
Secondary mitigation	Actions that will require further activity to achieve the anticipated outcome and may be imposed as part of the planning consent, or through inclusion in the Environmental Statement (ES). These include measures required to reduce the significance of environmental effects and may be secured through an environmental management plan. For secondary mitigation measures both pre-mitigation and residual effects are presented.
Significance	Effect factor that is determined by the magnitude of impact along with the sensitivity of the receptor.
Tertiary mitigation	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.
The Study Area	For each environmental topic, the baseline environment will be characterised, and the potential environmental impacts will be described within a topic-specific Study Area. Specific Study Areas are defined for each topic and are based on the maximum spatial extent across which potential impacts of MHPGC Project may be experienced by the relevant receptors (i.e. Zone of Influence).
Transboundary impact	Potential impacts resulting from MHPGC Project and affecting another European Economic Area (EEA) state.
Transboundary effects	Assessment of likely significant effects resulting from MHPGC Project on the interests of another EEA state(s).

Acronyms

Acronym	Meaning
AC	Alternating Current
AL 1	Action Level 1
AL 2	Action Level 2
BGS	British Geological Survey
CCME	Canadian Council of Ministers of the Environment
CBRA	Cable Burial Risk Assessment
CEA	Cumulative Effect Assessment

Acronym	Meaning
Cefas	Centre for Environment, Fisheries and Aquaculture Science
CEQG	Canadian Environmental Quality Guidelines
CFE	Controlled Flow Excavator
CMS	Construction Method Statement
COWRIE	Collaborative Offshore Windfarm Research into the Environment
CSIP	Cable Specification and Installation Plan
DBT	Dibutyltin
DCO	Development Consent Order
DDT	Dichlorodiphenyltrichloroethane
DDV	Drop-Down Video
DECC	Department of Energy and Climate Change
Defra	Department for Environment, Food and Rural Affairs
EA	Environment Agency
ECC	Export Cable Corridor
EEA	European Economic Area
EIA	Environmental Impact Assessment
EMODnet	European Marine Observation and Data Network
EMP	Environmental Management Plan
EQS	Environmental Quality Standard
EQSD	Environmental Quality Standards Directive
ES	Environmental Statement
GES	Good Environmental Status
GPP	Guidance for Pollution Prevention
HDD	Horizontal Directional Drilling
HVAC	High Voltage Alternating Current
HVDC	High Voltage Direct Current
ICES	International Council for the Exploration of the Sea
IEMA	Institute of Environmental Management and Assessment
INNS	Invasive Non-Native Species
ISEP	Institute of Sustainability & Environmental Professionals
LAT	Lowest Astronomical Tide
LOD	Limit of Detection
LSE	Likely Significant Effects
MAC	Maximum Allowable Concentration
MAGIC	Multi-Agency Geographic Information for the Countryside
MBAGC	Morven Branxton Area Grid Connection

Acronym	Meaning
MBT	Monobutyltin
MCZ	Marine Conservation Zone
MD-LOT	Marine Directorate – Licensing Operations Team
MDS	Maximum Design Scenario
MFE	Mass Flow Excavator
MHPGC	Morven Hawthorn Pit Grid Connection
MHWS	Mean High Water Springs
MLWS	Mean Low Water Springs
MMO	Marine Management Organisation
MPA	Marine Protected Area
MPCP	Marine Pollution Contingency Plan
MPS	Marine Policy Statement
MSFD	Marine Strategy Framework Directive
NIEA	Northern Ireland Environment Agency
NMPi	National Marine Plan Interactive
NPPF	National Planning Policy Framework
NPS	National Policy Statement
NRW	Natural Resources Wales
NTS	Non-Technical Summary
NVZ	Nitrate Vulnerable Zone
O&M	Operations and Maintenance
OCP	Organochlorine Pesticide
OEMP	Offshore Environmental Management Plan
OSP	Offshore Substation Platform
OSPAR	Oslo and Paris Convention
OWF	Offshore Wind Farm
PAH	Polycyclic Aromatic Hydrocarbon
PBDE	Polybrominated Diphenyl Ether
PCB	Polychlorinated Biphenyl
PEIR	Preliminary Environmental Information Report
PEL	Probable Effect Level
PINS	Planning Inspectorate
PSA	Particle Size Analysis
RBD	River Basin District
RBMP	River Basin Management Plan
SAC	Special Area of Conservation

Acronym	Meaning
SEPA	Scottish Environment Protection Agency
SoS	Secretary of State
SPA	Special Protection Area
SPM	Suspended Particulate Matter
SSC	Suspended Sediment Concentration
TBT	Tributyltin
TEL	Threshold Effect Level
THC	Total Hydrocarbon Content
TOC	Total Organic Carbon
UK	United Kingdom
UKMS	UK Marine Strategy
UVFS	Ultra-Violet Fluorescence Spectroscopy
WFD	Water Framework Directive

Units

Unit	Meaning
µg/g	Micrograms per gram
ng/g	Nanograms per gram
mg/kg	Milligrams per kilogram
km	Kilometres
m	Metres
ml	Millilitres
%	Percent

2 Offshore Water and Sediment Quality

2.1 Introduction

- 2.1.1.1 This chapter of the Preliminary Environmental Information Report (PEIR) presents the preliminary findings of the Environmental Impact Assessment (EIA) work undertaken to date for the Morven Hawthorn Pit Grid Connection Project (hereafter 'MHPGC Project'), as described in **Volume 1, Chapter 2: Project Description, of the PEIR**.
- 2.1.1.2 The chapter considers the potential impacts and likely significant effects on Offshore Water and Sediment Quality that could result from the construction, operation and maintenance (O&M) and decommissioning phases of the MHPGC Project. Specifically, it relates to the offshore elements of the MHPGC Project from the offshore substation platform(s) (OSPs) within Morven North Offshore Wind Array Project or Morven South Offshore Wind Array Project (hereafter 'Morven North and Morven South') located within Scottish offshore waters, transiting through English offshore and inshore waters, to Mean High Water Springs (MHWS) at landfall.
- 2.1.1.3 This chapter describes the methodology, datasets that have informed the preliminary assessment, baseline conditions, including future baseline, mitigation measures and the preliminary residual significant effects on Offshore Water and Sediment Quality that could result from the MHPGC Project.
- 2.1.1.4 The assessment is informed by the following chapters:
- **Volume 1, Chapter 2: Project Description, of the PEIR;**
 - **Volume 1, Chapter 4: Approach to Environmental Impact Assessment, of the PEIR;**
 - **Volume 1, Chapter 5: Policy and Legislation, of the PEIR;**
 - **Volume 2, Chapter 1: Physical Processes, of the PEIR;**
 - **Volume 2, Chapter 3: Benthic Subtidal and Intertidal Ecology, of the PEIR;**
 - **Volume 2, Chapter 4: Fish and Shellfish Ecology, of the PEIR.**
- 2.1.1.5 The chapter also draws on information contained within the following annexes:
- **Volume 1, Annex 4.1: Draft Commitments Register, of the PEIR;**
 - **Volume 1, Annex 4.3: Transboundary Screening, of the PEIR;**
 - **Volume 1, Annex 4.4: Cumulative Screening and Location Plan, of the PEIR;**
 - **Volume 2, Annex 1.1: Physical Processes Technical Report, of the PEIR;**
 - **Volume 2, Annex 1.2: Model Design, Validation and Results, of the PEIR;**
 - **Volume 2, Annex 2.1: Offshore Water Framework Directive Assessment, of the PEIR;**
 - **Volume 2, Annex 3.1 Benthic Ecology Technical Report, of the PEIR.**
- 2.1.1.6 This PEIR offers a comprehensive overview of the MHPGC Project's potential environmental impacts and proposed mitigation measures, presenting essential data to stakeholders for review and feedback. The PEIR is also informed by the ongoing pre-application consultation process.
- 2.1.1.7 Following statutory consultation, feedback will be reviewed and considered, where appropriate, in preparation of the Environmental Statement (ES) that will accompany the application to the Secretary of State (via the Planning Inspectorate (PINS)) for development consent for the components of the MHPGC Project in English waters and marine licence application(s) to Marine Directorate – Licensing Operations Team (MD-LOT) for the components of the MHPGC Project in Scottish waters.

2.2 Legislative and policy context

2.2.1 Overview

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

2.2.2 Legislation

International Legislation

Marine Strategy Framework Directive (2008/56/EC)

- 2.2.2.1 The overarching aim of the Marine Strategy Framework Directive (MSFD) 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 MSFD 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 MSFD continues to operate through six-year implementation cycles following the 2020 target, with monitoring, assessment and management measures being reviewed and updated regularly. 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.
- 2.2.2.2 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 of the marine environment is at a level that is sustainable, thus safeguarding the potential for uses and activities by current and future generations"*.
- 2.2.2.3 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:
- Non-indigenous species;
 - Commercially exploited fish;
 - Food webs;
 - Eutrophication;
 - Sea floor integrity;
 - Hydrographical conditions;
 - Contaminants;
 - Contaminants in seafood;
 - Marine litter;
 - Introduction of energy, including underwater noise at levels that do not adversely affect the marine environment.

- 2.2.2.4 Of specific relevance to this chapter are the 'eutrophication', 'hydrographical conditions' and 'contaminants' aspects.

Water Framework Directive (2000/60/EC)

- 2.2.2.5 Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 established a comprehensive regulatory framework for the sustainable management and protection of surface waterbodies (including rivers, lakes, coasts and estuaries) and groundwater bodies. Waterbody classification is based on two categories: ecological and chemical status. For a waterbody to achieve an overall good status, both its ecological and chemical status must be at least good. Ecological status is determined by evaluating biological, hydromorphological, physico-chemical, and specific chemical parameters. The ecological status is classified as either high, good, moderate, poor, or bad.

- 2.2.2.6 A Water Framework Directive (WFD) assessment has been conducted within **Volume 2, Annex 2.1: Offshore Water Framework Directive Assessment and Volume 3, Annex 2.3: Onshore Water Framework Directive of the PEIR.**

EU Environmental Quality Standards Directive (2008/105/EC)

- 2.2.2.7 The Environmental Quality Standards Directive (EQSD) (2008/105/EC) sets out quality standards for waterbodies across the European Union to protect aquatic environments and human health. These standards are in line with the strategy and objectives of the EU's WFD (Directive 2000/60/EC). Within the EQSD, there are two key terms related to the assessment of pollutants in surface/ coastal waters:
- Annual Average - refers to the average concentration of a particular pollutant over the course of a year;
 - Maximum Allowable Concentration (MAC) - refers to the highest concentration of a particular pollutant that is allowed in surface water at any given time.

EU Bathing Water Directive (2006/7/EC)

- 2.2.2.8 The European Union's (EU) revised Bathing Water Directive (2006/7/EC) came into force in March 2006, replacing the previous Bathing Water Directive (76/160/EEC). The directive requires member states to identify and designate Bathing Waters, monitor them for specified microbiological parameters, and classify them based on water quality standards. The revised Bathing Water Directive establishes more stringent standards and places an emphasis on providing information to the public.

EU Nitrates Directive (91/676/EEC)

- 2.2.2.9 The Nitrates Directive (91/676/EEC) aims to protect water quality from agricultural pollution by regulating the use of nitrates. The directive requires member states to designate Nitrate Vulnerable Zones (NVZs) where agricultural practices contribute to nitrate pollution of waters. It mandates the development and implementation of action programs that include measures to reduce nitrogen pollution from agricultural sources. Member states must monitor and report on water quality in NVZs, ensuring compliance with set standards and promoting sustainable agricultural practices.

EU Urban Waste Water Treatment Directive (91/271/EEC)

- 2.2.2.10 The Urban Waste Water Treatment Directive (UWWTD) aims to safeguard the environment from the negative impacts associated with the collection, treatment, and discharge of urban wastewater. Under the UWWTD, 'sensitive areas' refer to waterbodies affected by elevated nitrate concentrations or eutrophication, signalling the need for targeted measures to prevent further nutrient-related pollution.

UK Wide National Legislation

Marine Strategy Regulations 2010

- 2.2.2.11 The Marine Strategy Regulations 2010 transpose the requirements of the EU's MSFD into domestic law, requiring the United Kingdom (UK) to put in place measures to achieve or maintain GES of marine waters within the UK marine strategy (UKMS) area by 31 December 2020.

Marine and Coastal Access Act 2009

- 2.2.2.12 The Marine and Coastal Access Act 2009 makes provisions for those functions and activities in the marine area, including provision about marine plans, licensing of marine activities, the protection of the marine area and its wildlife.

Scottish Specific Legislation

The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended)

- 2.2.2.13 The Controlled Activity Regulations (CAR) arose from the EU's WFD 2000/60/EC in 2011. The regulations provide a framework for controlling activities which could have an adverse effect on Scotland's water environment. The regulations, as amended, cover rivers, lochs, transitional waters (estuaries), coastal waters, groundwater and groundwater dependent wetlands.

The Environment (EU Exit) (Scotland) (Amendment etc.) Regulations 2019

- 2.2.2.14 The Environment (EU Exit) (Scotland) (Amendment etc.) Regulations 2019 amend domestic legislation to ensure the requirements of the directives such as the WFD continue to have effect within domestic law following the UK's exit from the EU.

English Specific LegislationThe Water Environment (Water Framework Directive) (England and Wales) Regulations 2017

- 2.2.2.15 The WFD (England and Wales) Regulations 2017 provide the principal legislative framework for implementing the WFD (2000/60/EC) in England and Wales. The regulations establish a River Basin District (RBD) approach with River Basin Management Plans (RBMPs) developed as the key policy documents to achieve objectives. They require waterbodies to achieve good status for surface and groundwater bodies, prevent deterioration and protect designated Protected Areas inclusive of Bathing Waters, Shellfish Waters, NVZs, waters sensitive to nutrient pollution, and drinking water protected areas.

Environment Act 2021

- 2.2.2.16 The Environment Act 2021 provides the overarching framework for environmental protection in England. The Act includes measures to improve water resource management, reduce pollution from wastewater discharges, and support the achievement of good ecological and chemical status in water bodies.

Shellfish Water Protected Areas (England and Wales) Directions 2016

- 2.2.2.17 The Shellfish Waters Directive (2006/113/EC) was repealed in December 2013 and subsumed within the WFD. The Shellfish Water Protected Areas (England and Wales) Directions 2016 require the Environment Agency (EA) (in England) to endeavour to observe a microbial standard in all 'Shellfish Water Protected Areas'. The microbial standard is 300 or fewer colony forming units of *Escherichia coli* per 100ml of shellfish flesh and intervalvular liquid. The Directions also require the EA, in England, to assess compliance against this standard to monitor microbial pollution. Compliance with the microbial standard involves 75% of samples taken within any period of 12 months must be below the microbial standard, and sampling/ analysis must be in accordance with the Direction.

The Bathing Water Regulations 2013 (as amended)

- 2.2.2.18 The Regulations implement the EU Bathing Water Directive (2006/7/EC) in England and Wales to improve water quality, protect public health at designated bathing waters and provide public information on bathing water quality and pollution risks.

The Nitrate Pollution Prevention Regulations 2015

- 2.2.2.19 The Regulations implement the EU Nitrates Directive (91/676/EEC) in England and aim to reduce water pollution from agricultural sources and to prevent such pollution occurring in the future. Under the Nitrates Directive, surface waters are identified where they are affected by, or are at risk of, nitrate pollution from agricultural sources, including waters that are eutrophic or may become eutrophic if action is not taken

The Urban Waste Water Treatment (England and Wales) Regulations 1994

- 2.2.2.20 The Regulations implement the EU Urban Waste Water Treatment Directive (91/271/EEC) in England and Wales. The Directive aims to protect the environment from the negative effects of the collection, treatment and discharge of urban waste water. The Directive sets treatment levels on the basis of sizes of sewage discharges and the sensitivity of waters receiving the discharges.

The Environmental Permitting (England and Wales) Regulations 2016

- 2.2.2.21 The Environmental Permitting (England and Wales) Regulations 2016 establish a unified framework for regulating activities that may cause pollution, requiring permits, controls and monitoring to protect water, land, air and human health. These Regulations help to deliver the environmental objectives of the WFD.

The Environment (Amendment etc.) (EU Exit) Regulations 2019

- 2.2.2.22 The Environment (Amendment etc.) (EU Exit) Regulations 2019 amend domestic legislation to ensure the requirements of the MSFD and the WFD and supporting legislation continue to have effect within domestic law following the UK's exit from the EU.

2.2.3 National policy context

National Policy Statements

- 2.2.3.1 National Policy Statements (NPSs) set out the primary policy framework for the assessment of projects requiring a Development Consent Order (DCO), under which the English component of the MHPGC Project will be considered. This framework includes guidelines, requirements and criteria that the MHPGC Project must meet to obtain consent and proceed with development. **Table 2.1** provides details of the NPSs relevant to Offshore Water and Sediment Quality and how and where they are covered in the PEIR:

- NPS for energy (EN-1) (Department of Energy and Climate Change (DECC), 2024a);
- NPS for renewable energy infrastructure (EN-3) (DECC, 2024b);
- NPS for electricity networks infrastructure (EN-5) (DECC, 2024c).

Table 2.1: Summary of the NPS provisions relevant to Offshore Water and Sediment Quality

Summary of relevant NPS provisions	How and where considered in the PEIR
NPS EN-1	
Section 5.16.3: <i>"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 ES or equivalent."</i>	A baseline characterisation of Offshore Water and Sediment Quality within the MHPGC Project Offshore Water and Sediment Quality Study Area is presented in Section 2.4 . The potential future baseline conditions in the absence of the MHPGC Project, including consideration of the impacts of climate change, are presented in Section 2.4.7 . Potential impacts to Offshore Water and Sediment Quality from the construction, O&M, and decommissioning stages of the MHPGC Project are included in the impact assessment in Section 2.8 .
Section 5.16.7: <i>"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, proposed new discharges and proposed changes to discharges; 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; and Any cumulative effects"</i>	A baseline characterisation of Offshore Water and Sediment Quality within the MHPGC Project Offshore Water and Sediment Quality Study Area is presented in Section 2.4 . The potential future baseline conditions in the absence of the MHPGC Project are presented in Section 2.4.7 . Potential impacts to Offshore Water and Sediment Quality from the construction, O&M, and decommissioning stages of the MHPGC Project are included in the impact assessment in Section 2.8 . A standalone WFD compliance assessment is provided as an annex to this chapter within Volume 2, Annex 2.1: Offshore Water Framework Directive Assessment, of the PEIR . An assessment of Onshore WFD compliance is undertaken within Volume 3, Annex 2.3 Water Framework Directive (Onshore) Cumulative effects are assessed in Section 2.9 .
Section 5.16.12 <i>"The Secretary of State will need to give impacts on the water environment more weight where a project would have an adverse effect on the achievement of the environmental</i>	Potential impacts to Offshore Water and Sediment Quality from the construction, O&M, and decommissioning stages of the MHPGC Project upon WFD waterbodies are included in the impact assessment in Section 2.8 .

Summary of relevant NPS provisions	How and where considered in the PEIR
<i>objectives established under the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017"</i>	A standalone WFD compliance assessment is provided as an annex to this chapter within Volume 2, Annex 2.1: Offshore Water Framework Directive Assessment, of the PEIR.
Section 5.16.14 <i>"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."</i>	Potential impacts to Offshore Water and Sediment Quality from the construction, O&M, and decommissioning stages of the MHPGC Project upon WFD waterbodies are included in the impact assessment in Section 2.8. A standalone WFD compliance assessment is provided as an annex to this chapter within Volume 2, Annex 2.1: Offshore Water Framework Directive Assessment, of the PEIR.
NPS EN-3	
Section 2.8.102: <i>"Applicants should have regard to duties in relation to GES of marine waters under the UKMS and Marine Protected Areas (MPA) target (including any interim target) in England, set under the Environment Act 2021, which the UK government is legally required to achieve."</i>	Impacts to Offshore Water and Sediment Quality from the construction, O&M, and decommissioning stages of the MHPGC Project are included in the impact assessment in Section 2.8. GES is assessed through a series of descriptors as detailed in Section 2.2.2 and consideration to the relevant Offshore Water and Sediment Quality descriptors eutrophication, hydrographical conditions and contaminants is included throughout Section 2.8.
Section 2.8.104: <i>"The construction, operation and decommissioning of offshore energy infrastructure, including the preparation and installation of the cable route and any electricity networks infrastructure can affect the following elements of the physical offshore environment, which can have knock-on impacts on other biodiversity receptors, including but not limited to:</i> <i>Water quality – disturbance of the seabed sediments or release of contaminants can result in direct or indirect effects on habitats and biodiversity, as well as on fish stocks thus affecting the fishing and aquaculture industries;</i> <i>...Sediment transport – the resultant movement of sediments, such as sand across the seabed or in the water column, can indirectly affect navigation channels for marine vessels, and could affect sediment supply to sensitive coastal sites and impact biodiversity and seabed habitats. Changes in sediment supply also have the potential to influence rates of coastal erosion;</i> <i>Suspended solids – the release of sediment during construction, operation and decommissioning can cause indirect effects on marine ecology and biodiversity;</i> <i>Sandwaves – the modification/clearance of sandwaves can cause direct physical (such as in affecting unknown archaeological remains) and ecological effects both at the seabed and within the water column due to disturbance and suspension of sediment, and potentially indirect effects (e.g., changes to seabed morphology in water depths where waves</i>	Potential impacts to Offshore Water and Sediment Quality from the construction, O&M, and decommissioning stages of the MHPGC Project are included in the impact assessment in Section 2.8. A standalone WFD compliance assessment is provided as an annex to this chapter within Volume 2, Annex 2.1: Offshore Water Framework Directive Assessment, of the PEIR. An assessment of Onshore WFD compliance is undertaken within Volume 3, Annex 2.3 Water Framework Directive (Onshore) A detailed assessment of the physical impacts of the MHPGC Project is provided in Volume 2, Chapter 1: Physical Processes, of the PEIR.

Summary of relevant NPS provisions	How and where considered in the PEIR
can influence the seabed, which can in turn affect wave climate and sediment transport); ...”.	
NPS EN-5	
Section 2.14.2: <i>“In the assessments of their designs, applicants should demonstrate:</i> <i>how environmental, community and other impacts have been considered and how adverse impacts have followed the mitigation hierarchy i.e. avoidance, reduction and mitigation of adverse impacts through good design;(…)</i> <i>(…) how the mitigation hierarchy has been followed, in particular to avoid the need for compensatory measures for coastal, inshore and offshore developments affecting Special Areas of Conservation (SACs), Special Protection Areas (SPAs) and Ramsar sites and Marine Conservation Zones (MCZs) (...).”</i>	Potential impacts to Offshore Water and Sediment Quality from the construction, O&M, and decommissioning stages of the MHPGC Project are included in the impact assessment in Section 2.8. This includes impacts from Suspended Sediment Concentration (SSC), and considers WFD designated waterbodies, bathing waters, and impacts to achieving GES under the MSFD. Mitigation measures relevant to Offshore Water and Sediment Quality are presented in Section 2.7.

National Planning Policy Framework

- 2.2.3.2 The National Planning Policy Framework (NPPF) has the potential to be considered important and relevant to the Secretary of State’s (SoS) consideration of the MHPGC Project (Department for Levelling Up, Housing and Communities, 2025). **Table 2.2** provides details of the elements of the NPPF that are relevant to Offshore Water and Sediment Quality and how and where they are covered in the PEIR or will be covered within the ES.

Table 2.2: Summary of NPPF requirements relevant to Offshore Water and Sediment Quality

NPPF section	How and where this is considered in the PEIR
Policy F3: Managing Coastal Change, Paragraph 2 <i>“Inappropriate development in vulnerable coastal areas should be avoided when identifying suitable locations for development, so that risks arising from coastal change are not exacerbated. In order to do this development plans should:</i> <i>a. Identify as a Coastal Change Management Area any area likely to be affected by physical changes to the coast, estuaries or tidal rivers, over the next century;</i> <i>b. Set out what types of development will be appropriate in the Coastal Change Management Area, and in what circumstances, taking into account the safeguards in policy F9 and local conditions;</i> <i>c. Safeguard land that is, or is likely to be, required for current or future coastal change risk management, including managed realignment; and</i> <i>d. Reduce risks by making provision for development and infrastructure which needs to be relocated away from Coastal Change Management Areas.”</i>	Potential impacts to Offshore Water and Sediment Quality within intertidal coastal environments from the construction, O&M, and decommissioning stages of the MHPGC Project are included in the impact assessment in Section 2.8. Mitigation measures relevant to Offshore Water and Sediment Quality are presented in Section 2.7. Further consideration to coastal change is given throughout Volume 2, Chapter 1 Physical Processes of the PEIR.

2.2.4 Marine planning policy context

- 2.2.4.1 The following marine plans are relevant to Offshore Water and Sediment Quality and have informed the assessment of preliminary effects in this chapter, their relevance to the MHPGC Project is outlined in **Table 2.3**:

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

Table 2.3: Marine planning policy relevant to Offshore Water and Sediment Quality

Marine plan description	How and where considered in the PEIR
UK Marine Policy Statement	
Section 2.6.4.1: <i>“Developments and other activities at the coast and at sea can have adverse effects on transitional waters, coastal waters and marine waters. During the construction, operation and decommissioning phases of developments, there can be increased demand for water, discharges to water and adverse ecological effects resulting from physical modifications to the water environment.”</i>	A baseline characterisation of Offshore Water and Sediment Quality inclusive of coastal and transitional waterbodies within the MHPGC Project Offshore Water and Sediment Quality Study Area is presented in Section 2.4. Potential impacts to Offshore Water and Sediment Quality from the construction, O&M, and decommissioning stages of the MHPGC Project are included in the impact assessment in Section 2.8. A standalone WFD compliance assessment is provided as an annex to this chapter within Volume 2, Annex 2.1: Offshore Water Framework Directive Assessment, of the PEIR. An assessment of Onshore WFD compliance is undertaken within Volume 3, Annex 2.3 Water Framework Directive (Onshore)
Section 2.6.4.3: <i>“The marine plan authority should satisfy itself 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, or prevent compliance with any WFD obligation and is consistent with the requirements of daughter directives of the WFD including those on priority substances and groundwater. Decision makers should also take into account impacts on the quality of designated bathing waters and shellfish waters from any proposed development.”</i>	Potential impacts to Offshore Water and Sediment Quality from the construction, O&M, and decommissioning stages of the MHPGC Project are included in the impact assessment in Section 2.8. A standalone WFD compliance assessment is provided as an annex to this chapter within Volume 2, Annex 2.1: Offshore Water Framework Directive Assessment, of the PEIR. An assessment of Onshore WFD compliance is undertaken within Volume 3, Annex 2.3 Water Framework Directive (Onshore)
Section 2.6.4.4: <i>“Marine plan authorities will also need to take into account, once developed, any relevant targets, indicators or measures aimed at achieving GES under the MSFD. One element of GES involves ensuring that concentrations and effects of contaminants are kept within acceptable limits, so as to ensure that there are no significant impacts on, or risks to, the wider marine environment.”</i>	A baseline characterisation of Offshore Water and Sediment Quality inclusive of contaminants within the MHPGC Project is presented in Section 2.4. Potential impacts to Offshore Water and Sediment Quality from the construction, O&M, and decommissioning stages of the MHPGC Project are included in the impact assessment in Section 2.8. GES is assessed through a series of descriptors as detailed in Section 2.2.2 and consideration to the relevant Offshore Water and Sediment Quality descriptors eutrophication, hydrographical conditions and contaminants is included throughout Section 2.8.
Section 3.6.6: <i>“When sediments are contaminated, dredging has the potential to cause significant environmental and health effects through exposure to contaminants in the dredging plume. These contaminants arise from diverse sources such as the legacy of industrial pollution, for example metals and poly chlorinated biphenyls, or historical and current use of antifoulants including tributyltin and heavy metals and new contaminants which are now finding their way into the marine environment, such as flame retardants including poly brominated diphenyl ethers.”</i>	A baseline characterisation of Offshore Water and Sediment Quality inclusive of contaminants within the MHPGC Project is presented in Section 2.4. Potential impacts to Offshore Water and Sediment Quality from the construction, O&M, and decommissioning stages of the MHPGC Project are included with specific impacts from the release of sediment-bound contaminants assessed across all project phases in the impact assessment in Section 2.8.
Scottish National Marine Plan	

Marine plan description	How and where considered in the PEIR
Section 3.5: <i>"The vision for the marine environment is underpinned by a series of strategic objectives (...) and apply to both inshore and offshore waters. These strategic objectives seek to integrate both the ecosystem approach and the guiding principles of sustainable development to deliver a robust approach to managing human impact on Scotland's seas."</i>	Potential impacts to Offshore Water and Sediment Quality from the construction, O&M, and decommissioning stages of the MHPGC Project are included in the impact assessment in Section 2.8. Within Scottish Waters his includes impacts upon offshore undesignated waters at the northern offshore extent of the MHPGC Project PEIR Red Line Boundary.
Section 3.6: <i>"The ecosystem approach is reflected in the adoption as strategic objectives of the 11 Descriptors of GES, set out in the Marine Strategy Framework Directive."</i>	Of specific relevance to this chapter are the 'eutrophication', 'hydrographical conditions' and 'contaminants' descriptors of GES set out in the Marine Strategy Framework Directive
GEN 12 Water Quality and resource: <i>"Developments and activities should not result in a deterioration of the quality of waters to which the Water Framework Directive, Marine Strategy Framework Directive or other related Directives apply."</i>	Potential impacts to Offshore Water and Sediment Quality from the construction, O&M, and decommissioning stages of the MHPGC Project are included in the impact assessment in Section 2.8. This includes WFD designated waterbodies, bathing waters, and impacts to achieving GES under the MSFD Directive.
Section 4.65: <i>"Marine planners and decision makers should be satisfied that impacts of development and use on water have been taken into account. With regards to the Water Framework Directive (WFD), reference should be made to the 'ecological status of the water environment' which includes water quality and quantity and changes to water level as well as biological aspects such as the impact of non-native species."</i>	Embedded commitments inherently considered within the assessment are presented in Table 2.31. In regards to preventing the deterioration of water quality particular focus should be given to CoT06, CoT37 and CoT39. Shellfish waters are not considered in the impact assessment in Section 2.8 due to their distance from the MHPGC Project PEIR Red Line Boundary. This is discussed in Paragraph 2.4.6.50.
Section 4.66: <i>"Marine planning and decision making authorities should ensure they have regard to any relevant River Basin Management Plans which implement the WFD and also take account of Shellfish Growing Waters and Bathing Water Directives. Supplementary plans and programmes of measures devised for the river basin district should also be taken into account. They 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 and should be consistent with the requirements of related Directives of the WFD including those on priority substances and groundwater. Decision makers should seek to mitigate impacts on the quality of shellfish waters, designated bathing waters and areas particularly important for immersion sports from any proposed development."</i>	Further consideration to the River Basin Management Plans is provided as an annex to this chapter within Volume 2, Annex 2.1: Offshore Water Framework Directive Assessment, of the PEIR. An assessment of Onshore WFD compliance is undertaken within Volume 3, Annex 2.3 Water Framework Directive (Onshore)
Section 4.67: <i>"The Marine Strategy Framework Directive also introduces requirements for targets on contamination and eutrophication for marine waters out to 200 nautical miles."</i>	Potential impacts to onshore water impacts are included in Volume 3, Chapter 2: Water Resources and Flood Risk
Northeast Inshore and Northeast Offshore Marine Plan	

Marine plan description	How and where considered in the PEIR
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.	Potential impacts to Offshore Water and Sediment Quality from the construction, O&M, and decommissioning stages of the MHPGC Project are included in the impact assessment in Section 2.8. Embedded commitments inherently considered within the assessment are presented in Table 2.31. In regards to preventing the deterioration of water quality particular focus should be given to CoT06, CoT37 and CoT39.

2.2.5 Local policy context

2.2.5.1 The onshore and intertidal components of the MHPGC Project lie within the jurisdiction of Durham County Council. The following local policy that is relevant to Offshore Water and Sediment Quality so far as it relates to the intertidal environment, and has informed the preliminary assessment of effects in this chapter. The relevance of the policy to the MHPGC Project is outlined in **Table 2.4**.

- Durham Local Plan (Durham County Council, 2020).

Table 2.4: Local policy relevant to Offshore Water and Sediment Quality

Policy description	How and where considered in the PEIR
Durham Local Plan	
Policy 37: Durham Heritage Coast and Wider Coastal Zone - This policy aims to protect and enhance the Durham Heritage Coast and Wider Coastal Zone, including ensuring consistency with the purposes of the Heritage Coast and objectives of the Heritage Coast Management Plan. Objective 3 of the Heritage Coast Management Plan is: to maintain, and improve the environmental health of inshore waters affecting the Heritage Coast and its beaches through appropriate works and management.	Potential impacts to Offshore Water and Sediment Quality from the construction, O&M, and decommissioning stages of the MHPGC Project are included in the impact assessment in Section 2.8. This includes an assessment of effects from trenchless techniques to install cables under the intertidal zone to the TJB landward of MHWS that may impact the Durham Heritage coast. Potential impacts to onshore water quality impacts are included in Volume 3, Chapter 2: Water Resources and Flood Risk and Volume 3, Annex 2.3 Water Framework Directive (Onshore), of the PEIR.

2.3 Consultation and engagement

2.3.1 Scoping

- 2.3.1.1 A Scoping Report for the MHPGC Project was issued to the Planning Inspectorate (PINS) and MD-LOT in February 2025 (RPS, 2025). Following consultation with the appropriate statutory bodies, PINS (on behalf of the SoS) and MD-LOT both provided Scoping Opinions in March 2025 (PINS, 2025; MD-LOT, 2025, respectively).
- 2.3.1.2 **Table 2.5** sets out the key comments raised during the scoping process specific to Offshore Water and Sediment Quality, with details of how these comments have been addressed within the PEIR.

Table 2.5: Summary of scoping responses relevant to Offshore Water and Sediment Quality

Comment	How and where considered in the PEIR
PINS	
All matters, Paragraph 7.3.6.2 <i>"The MHPGC Project Scoping Report states that all matters in relation to water quality are proposed to be scoped out of assessment, stating that the proposed matters relating to water quality will be assessed in other relevant environmental aspect chapters, including: physical processes, benthic subtidal and intertidal ecology, and fish and shellfish ecology. The Inspectorate does not consider that the evidence presented in the MHPGC Project Scoping Report is sufficient to allow this matter to be scoped out of further assessment."</i>	An assessment of potential Offshore Water and Sediment Quality impacts is presented in Section 2.8 including those impacts PINS considered to have insufficient evidence to allow to be scoped out.
Impacts to sediment transport and sediment transport pathways due to the presence of infrastructure, Table 7.12. <i>"This matter is proposed to be scoped out on the basis that there is no proposed infrastructure that could impact sediment transport and pathways. The Inspectorate is aware that cable protection can impact water flow, particularly at low water depths. In the absence of information such as evidence demonstrating clear agreement with relevant consultation bodies, the Inspectorate is not able to agree to scope these matters from assessment. The ES should include an assessment of this matter, of the information referred to demonstrating agreement with the relevant consultation bodies and the absence of Likely Significant Effects (LSE)."</i>	The preliminary assessment of potential impacts to sediment transport pathways due to the presence of infrastructure is provided within Volume 2, Chapter 1: Physical Processes, of the PEIR for all phases of the MHPGC Project, and the associated effect on Offshore Water and Sediment Quality provided in Section 2.8 for O&M.
Increased SSC and associated deposition, Table 7.12 <i>"The physical processes and benthic subtidal and intertidal ecology chapters have scoped in this matter for assessment but do not consider the impacts on water quality. There is limited adequate justification provided in the MHPGC Project Scoping Report regarding why this matter should be scoped out of assessment. In the absence of information such as evidence demonstrating clear agreement with relevant consultation bodies, the Inspectorate is not able to agree to scope these matters from the assessment. The ES should include an assessment of this matter, or the information referred to demonstrating agreement with the relevant consultation bodies and the absence of LSE."</i>	The Applicant has included a preliminary assessment of the potential impacts to offshore water quality from increased SSC and associated deposition in Section 2.8
Increased risk of introduction Invasive Non-Native Species (INNS), Table 7.12	This matter has been scoped out from this chapter. Increased risk of introduction and spread of INNS through vessel movement is considered in the assessments

Comment	How and where considered in the PEIR
<i>"The MHPGC Project Scoping Report states that the risk relating to this matter through vessel movement will be assessed within the benthic subtidal and intertidal ecology chapter, as well as through the EMP and relevant guidelines. On this basis the Inspectorate is content to scope this matter out from further assessment in this chapter."</i>	in Volume 2, Chapter 3: Benthic and Intertidal Ecology, of the PEIR.
Accidental pollution during construction, operation and maintenance (O&M), and decommissioning, Table 7.12. <i>"The MHPGC Project Scoping Report states that embedded mitigation will include vessel compliance with the International Convention for the Prevention of Pollution from Ships (MARPOL), as well as the provision of a Marine Pollution Contingency Plan (MPCP) to include emergency plans for pollution incidents and securing best practice measures through an EMP. Based on the information provided on the proposed mitigation and control measures, the Inspectorate agrees that significant effects from accidental release of pollution during all phases are unlikely. The Inspectorate agrees that this matter can be scoped out; the ES should identify and ensure that mitigation for all potential pollution incidents are accounted for in the MPCP. The ES should explain where appropriate management and control measures to reduce/ avoid potential pollution events are secured through the DCO or other legal mechanism, for all phases of the proposed development."</i>	The Outline Environmental Management Plan (EMP), including an Outline MPCP will be produced at the ES stage and submitted with the DCO and Marine Licence applications within commitment CoT06. Based on the control measures to be detailed within the outline EMP and outline MPCP, no further action is required. This matter has been scoped out of assessment within the PEIR and subsequent ES.
Impacts from the release of sediment bound contaminants, Table 7.12. <i>"This matter is proposed to be scoped out due to the low levels of sediment contamination in the area. However, the historic industrial use at landfall has not been taken into consideration, therefore the Inspectorate cannot agree to scope this matter out. This matter should be scoped into the assessment. "</i>	The Applicant has included a preliminary assessment of the potential impacts from the release of sediment bound contaminants within Section 2.8.
Impacts to bathing water quality, Table 7.12. <i>"The MHPGC Project Scoping Report states that there are two bathing waters within the study area, however limited justification is provided to detail why they would not be impacted. The Inspectorate considers that an assessment is required regarding this matter and therefore cannot agree to scope this matter out."</i>	The Applicant has included a preliminary assessment of the potential impacts on bathing water quality within Section 2.8.
Impacts to shellfish water protected areas, Table 7.12 <i>"This matter is proposed to be scoped out due a 45km distance to the nearest shellfish water protected area. On this basis the Inspectorate is content to scope this matter out of further assessment."</i>	No further action is required. This matter has been scoped out on the basis of distance between the MHPGC Project PEIR Red Line Boundary and shellfish water protected areas.
Impacts to the achievement of GES, Table 7.12 <i>"Limited information regarding the achievement of GES is given within the MHPGC Project Scoping Report. The Inspectorate cannot agree to scope this matter out with the limited information provided. This matter should be scoped into the assessment, or agreement with the relevant statutory consultation bodies regarding the agreement to omit this matter from the scope should be provided."</i>	The Applicant has included a preliminary assessment of the potential impacts to the achievement of GES in Section 2.8.
Environment Agency	
The MHPGC Project must not compromise areas protected by WFD (i.e. bathing waters). Failure to consider bathing waters as part of the site selection process may	The potential impacts to bathing waters and coastal and transitional waterbodies identified following the site selection process is included in the impact assessment in

Comment	How and where considered in the PEIR
mean that inappropriate sites are pursued and mean that the Applicant does not comply with WFD. Two designated bathing waters are located immediately to the north of Seaham.	Section 2.8. Further information on the site selection process is provided in Volume 1, Chapter 3: Site Selection & Consideration of Alternatives, of the PEIR. Further consideration to compliance with the WFD is provided as an annex to this chapter within Volume 2, Annex 2.1: Offshore Water Framework Directive Assessment, of the PEIR.
MD-LOT	
The Applicant has proposed to scope out all potential water quality impacts from the EIA Report and Table 7.12 details the justification for this approach. The Scottish Ministers are content with the Applicant's proposal to scope water quality out of the EIA Report on the basis that any proposed impacts will be considered further under specific receptor topics. The Scottish Ministers, draw the Applicant's attention to the SEPA standing advice with particular regard to the Water Framework Directive, invasive non-native species and pollution prevention, and advise that these be given consideration in the EIA Report.	On the basis of the MHPGC Project Scoping Opinion from PINS, the potential impacts of the MHPGC Project on Offshore Water and Sediment Quality are provided in Section 2.8. An assessment regarding INNS is presented within Volume 2, Chapter 3 Benthic Subtidal and Intertidal Ecology, of the PEIR.
The offshore water quality study area is defined in Section 7.3.3 of the MHPGC Project Scoping Report as incorporating the MHPGC Project Scoping Boundary plus a tidal ZoI buffer defined from desktop sources. This included the ZoI for the maximum extent of indirect impacts to benthic subtidal receptors, fish and shellfish ecology and MPA receptors from increases in SSCs and deposition. A summary of key desktop datasets and reports is provided by the Applicant in Table 7.11 of the MHPGC Project Scoping Report.	Noted. The Offshore Water and Sediment Quality Study Area is presented in Section 2.4.2. An updated summary of key desktop datasets is presented in Section 2.4.4
MMO	
The MMO defers to the Environment Agency on the suitability of the scope of the assessment with regards to water quality.	Noted. Advice from the EA has been responded to in this PEIR chapter.
Natural England	
Sediment transport and sediment transport pathways due to the presence of infrastructure: Natural England advise that this impact is scoped in as cable protection can change water flow, impacting ocean and coastal processes. This would be of particular concern within the depth of closure at the landfall and any part of the cable in less than 10m depth of water at lowest astronomical tide (LAT).	The preliminary assessment of potential impacts to sediment transport pathways due to the presence of infrastructure is provided within Volume 2, Chapter 1: Physical Processes, of the PEIR for all phases of the MHPGC Project, and the associated effect on Offshore Water and Sediment Quality provided in Section 2.8 for O&M.

2.3.2 Further consultation and engagement

2.3.2.1 There has been no additional consultation associated with Offshore Water and Sediment Quality.

2.4 Baseline Characterisation

2.4.1 Overview

- 2.4.1.1 **Volume 1, Chapter 2: Project Description, of the PEIR**, sets out the description of the MHPGC Project and **Volume 1, Chapter 4: Approach to Environmental Impact Assessment, of the PEIR** sets out the overarching approach that has been used in developing the PEIR
- 2.4.1.2 This section describes the methods and data sources used to characterise the baseline within the Offshore Water and Sediment Quality Study Area and describes the existing baseline characteristics.

2.4.2 Offshore Water and Sediment Quality Study Area

- 2.4.2.1 The Offshore Water and Sediment Quality Study Area is defined as the MHPGC Project PEIR Red Line Boundary seaward of MHWS plus a buffer extending up to 9km, extending to MHWS at the top of the intertidal zone in English waters.
- 2.4.2.2 The 9km buffer equates to the greatest tidal excursion distance around the offshore extent of the MHPGC Project PEIR Red Line Boundary, as described in **Volume 2, Annex 1.2: Model Design Validation and Results, of the PEIR**. This buffer is designed to conservatively incorporate the extent of likely impacts of the MHPGC Project, providing a precautionary geographic context and encompassing the relevant functional habitats and potential maximum dispersion of suspended particles in one tidal cycle. Beyond this extent, it is considered that any effects resulting from the MHPGC Project on Offshore Water and Sediment Quality receptors would be minimal.
- 2.4.2.3 The Offshore Water and Sediment Quality Study Area is shown on **Figure 2.1**.

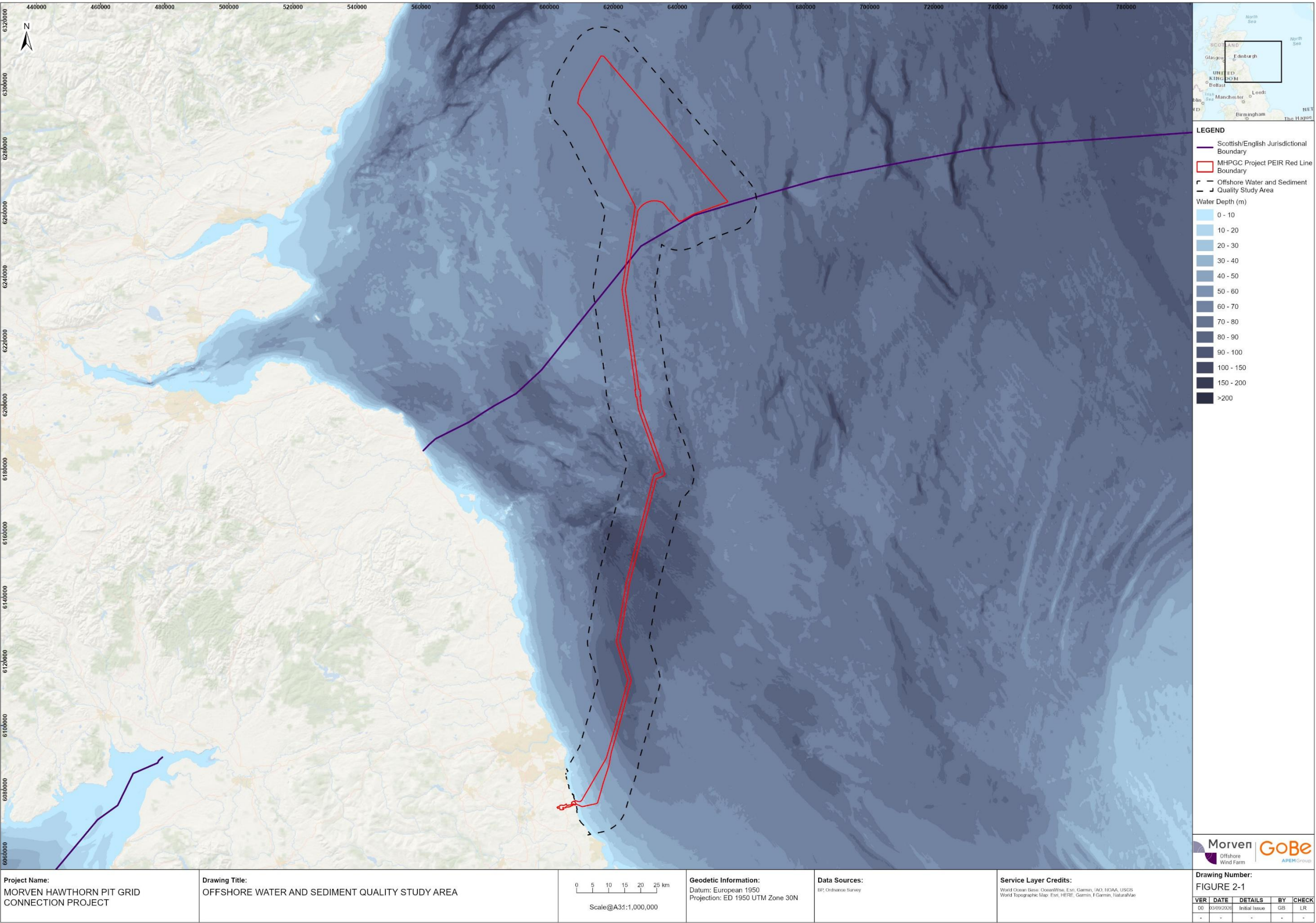


Figure 2.1: MHPGC Offshore Water and Sediment Quality Study Area

2.4.3 Relevant guidance

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

- Marine Licensing: sediment analysis and sample plans (MMO, 2025);
- Clearing the Waters for All Guidance. Water Framework assessment: estuarine and coastal waters (EA, 2023);
- Scottish Environment Protection Agency (SEPA), Northern Ireland Environment Agency (NIEA), and Natural Resources Wales (NRW): Guidance for Pollution Prevention (GPP);
 - Works and maintenance in or near water: GPP 5 (SEPA, NIEA and NRW, 2018a);
 - Pollution incident response planning: GPP 21 (SEPA, NIEA and NRW, 2021);
 - Dealing with spills: GPP 22 (SEPA, NIEA and NRW, 2018b);
- EIA for offshore renewable energy projects (British Standards Institution, 2015);
- Offshore wind cabling: ten years' experience and recommendations (Natural England, 2018)
- Further review of sediment monitoring data (Collaborative Offshore Windfarm Research into the Environment (COWRIE) ScourSed-09) (ABPmer *et al.*, 2010).

2.4.4 Baseline Data Sources

Desk study

2.4.4.1 For the purpose of this Offshore Water and Sediment Quality Chapter, a desk-based review was undertaken using relevant spatial and scientific data sources. These existing data sets and literature are presented below:

- Suspended Sediment Climatologies around the UK (Centre for Environment, Fisheries and Aquaculture Science (Centre for Environment, Fisheries and Aquaculture Science(Cefas)), 2015)
- Atlantic – European North West Shelf – Ocean Biogeochemistry Analysis and Forecast (Copernicus Marine Service, 2026)
- Catchment Data Explorer (EA, 2025);
- Bathing Waters: list of designated waters in England (Defra, 2025a);
- Multi-Agency Geographic Information for the Countryside Map (MAGIC, 2025);
- Bathing Water Quality (Defra, 2025b);
- Water Quality Explorer (Defra, 2025c);
- Scotland's Bathing Waters (SEPA, 2025);
- Shellfish water protected areas (SEPA, 2024);
- Pressures from Human Activities (Cefas, 2024);
- Intermediate Assessment 2017 – Contaminants (Oslo and Paris Convention (OSPAR), 2017);
- National Marine Plan Interactive (NMPi) (Marine Scotland, 2026);
- Shellfish Classification (Food Standards Agency, 2026);
- List of shellfish water protected areas in England (Defra, 2022);
- Urban waste water treatment: updated sensitive areas maps (Defra and EA 2023);
- Shellfish classification and microbiological monitoring (Cefas, 2026);
- River Basin Management Plan: maps (EA, 2026).

Site specific surveys

2.4.4.2 At the time of writing, two site specific surveys relevant to Offshore Water and Sediment Quality have been undertaken, within the offshore extent of the MHPGC Project PEIR Red Line Boundary. The initial subtidal survey (Gardline, 2024, provided as Appendix C to **Volume 1, Annex 3.1: Benthic Ecology Technical Report, of the PEIR**) was conducted between June and November 2023 with an additional subtidal survey undertaken between August and September 2024 (Gardline, 2025, as Appendix E to **Volume 1, Annex 3.1: Benthic Ecology Technical Report, of the PEIR**). The sampling strategy was designed to determine seabed characteristics and sediment quality in order to inform the baseline characterisation of the offshore extent of the MHPGC Project PEIR Red Line Boundary.

The surveys comprised the collection of drop-down video (DDV) data and grab sampling for the analysis of particle size, macrofaunal community and sediment chemistry with comprehensive details of the survey design, methodologies and output provided in Gardline (2024; 2025).

2023 Survey (Gardline, 2024)

- 2.4.4.3 The initial subtidal survey was conducted in 2023 within the MHPGC Project Scoping Boundary, focussing on a range of offshore export cable route and landfall options. This area has since been refined to focus on the preferred offshore cable corridor and associated landfall options (the MHPGC Project PEIR Red Line Boundary). Consequently only 35 of the 133 stations sampled were located within the offshore extent of the MHPGC Project PEIR Red Line Boundary with a successful suite of sampling occurring at 33 of these relevant locations. These comprised replicate samples for benthic macrofaunal analysis (one processed and one retained as spare) and a sample for Particle Size Analysis (PSA) with additional samples for sediment chemistry were acquired at 16 of the 35 stations using a 0.1m² Day Grab. eDNA sub-sampling was also undertaken at selected stations.

2024 Survey (Gardline, 2025)

- 2.4.4.4 The 2024 survey comprised 59 stations, of which 43 were located within the offshore extent of the MHPGC Project PEIR Red Line Boundary. The remaining 16 stations were located outside the offshore extent of the MHPGC Project PEIR Red Line Boundary as they were positioned within nearshore areas associated with earlier landfall options. Further details regarding site selection are provided within **Volume 1, Chapter 3: Site Selection and Consideration of Alternatives, of the PEIR**. Sampling density varied along the route, with stations spaced at approximately 4 km intervals in Scottish waters (seven stations) and approximately 2 km intervals in English waters (36 stations). At each station, a minimum of three grab samples were collected for PSA and macrofaunal analysis, with additional samples for sediment chemistry collected at 23 of the 43 stations within the offshore extent of the MHPGC Project PEIR Red Line Boundary.
- 2.4.4.5 Geophysical surveys were undertaken in 2022 for the Morven North and Morven South projects, with information presented in Table 3.8.
- 2.4.4.6 Subtidal benthic surveys were undertaken in 2022 for the Morven North and Morven South projects, with information presented in Table 3.8.
- 2.4.4.7 Morven North and Morven South Offshore Wind Array Project EIA Report: Volume 3, Annex 8.1 Benthic Subtidal Ecology Shared Technical Report (Tetra Tech RPS Energy, 2026a)
- 2.4.4.8 A technical report for Morven North and Morven South that presents a baseline characterisation of the seabed habitats and benthic communities within these respective site boundaries. The report includes the analysis of benthic site-specific survey data from a survey undertaken from April to August 2022 by Gardline Ltd. within the Morven North and Morven South study areas (extending to 5-14km around the respective boundaries). The sampling strategy was designed to characterise the benthic communities associated with all the broadscale habitats and identify any potentially sensitive features. There were 100 sampling stations across the two study areas at which grab sampling and Drop Down Video (DDV) surveys were undertaken, with DDV surveys also completed at an additional two stations. Three sediment samples were collected at each of the 100 grab sampling stations, with samples used for macrofaunal and eDNA analyses. Physicochemical analyses were undertaken at 52 stations, while eDNA analyses were completed for 50 of the 100 samples.
- 2.4.4.9 Morven North and Morven South Offshore Wind Array Project EIA Report: Volume 3, Annex 7.1 Physical Processes Shared Technical Report (Tetra Tech RPS Energy, 2026b)
- 2.4.4.10 A technical report for Morven North and Morven South presents a baseline characterisation of physical processes within these respective site boundaries. The report includes an analysis of a geophysical site-specific data from a survey undertaken from April to August 2022 by Gardine and XOcean to establish bathymetry, seabed geology, morphology and sediments. The surveys comprised geophysical methods (including Multibeam Echosounder (MBES), Side-Scan Sonar (SSS), Sub-Bottom Profiling (SBP) and an Ultra High Resolution Seismic (UHRS) system).

Sediment Contamination Guidelines

- 2.4.4.11 In the absence of quantified standards, common practice for characterising baseline sediment quality conditions is to compare contamination levels against the Cefas Guideline Action Levels and the Canadian Environmental Quality Guidelines (CEQGs), provided by Canadian Council of Ministers of the Environment (CCME). The Marine Directorate (formerly Marine Scotland) applies a similar approach to the Cefas guidelines with minor variations to the included contaminants and the threshold values (**Table 2.6**). Critically the Marine Scotland Guidance includes individual Polycyclic Aromatic Hydrocarbon (PAH) compounds in comparison to the grouped approach of Cefas.

Cefas Guideline and Marine Scotland Action Levels

- 2.4.4.12 In the absence of Environmental Quality Standards (EQSs), sediment contaminant data from both Gardline surveys (Gardline, 2024; 2025) has been analysed relative to the Cefas and Marine Scotland Guideline Action Levels for the disposal of dredged material. Presented in **Table 2.7**, Action Levels are used in this assessment to determine whether further assessment is required.
- 2.4.4.13 These Action Levels are used as part of a 'weight of evidence' approach to assessment of material suitable for disposal at sea. Generally, contaminant levels falling below Action Level 1 (AL1) are not considered to cause adverse environmental effects. If contaminant levels fall above Action Level 2 (AL2), they are generally considered unsuitable for disposal at sea. Those sediments which record concentrations between AL1 and AL2 may be disposed of at sea but may require some consideration prior to doing so. Certain contaminants such as the identified metals have specific Action Levels for each individual contaminant whilst some are grouped and the threshold is applicable to the total contamination. The AL1 threshold for Polychlorinated Biphenyls (PCBs), for example, applies to the sum of the International Council for the Exploration of the Sea (ICES) 7 congeners rather than the individual PCB.

Table 2.6: Cefas Action Levels for the Disposal of Dredged Material (MMO, 2014)

Contaminant/Compound	Cefas Action Levels (mg/kg Dry weight)	
	AL 1	AL2
Arsenic	20	100
Cadmium	0.4	5
Chromium	40	400
Copper	40	400
Mercury	0.3	3
Nickel	20	200
Lead	50	500
Zinc	130	800
Organotins (Tributyltin (TBT), Dibutyltin (DBT) Monobutyltin, (MBT)	0.1	1
PCBs – sum of ICES 7	0.01	N/A
PCBs – sum of 25 congeners	0.02	0.2
PAHs	0.1	N/A
Dichlorodiphenyltrichloroethane (DDT)	*0.001	N/A
Dieldrin	*0.005	N/A

Table 2.7: Marine Scotland Pre-disposal Sampling Guidance (Marine Scotland, 2017)

Contaminant/Compound	Marine Scotland Action Levels (mg/kg Dry weight)	
	AL 1	AL 2
Arsenic	20	70
Cadmium	0.4	4
Chromium	50	370
Copper	30	300
Mercury	0.25	1.5
Nickel	30	150
Lead	50	400
Zinc	130	600
Tributyltin	0.1	0.5
PCBs	0.02	0.18
Polyaromatic Hydrocarbons		
Acenaphthene	0.1	N/A
Acenaphthylene	0.1	N/A
Anthracene	0.1	N/A
Fluorene	0.1	N/A
Naphthalene	0.1	N/A
Phenanthrene	0.1	N/A
Benzo[a]anthracene	0.1	N/A

Contaminant/Compound	Marine Scotland Action Levels (mg/kg Dry weight)	
	AL 1	AL 2
Benzo[b]fluoranthene	0.1	N/A
Benzo[k]fluoranthene	0.1	N/A
Benzo[a]pyrene	0.1	N/A
Benzo[g,h,i]perylene	0.1	N/A
Dibenzo[a,h]anthracene	0.01	N/A
Chrysene	0.1	N/A
Fluoranthene	0.1	N/A
Pyrene	0.1	N/A
Indeno(1,2,3cd)pyrene	100	N/A

Canadian Environmental Quality Guidelines

2.4.4.14 Where Action Levels do not provide comprehensive guidance for individual PAHs, the CEQGs are used in place to ensure a thorough understanding of the seabed contaminants (**Table 2.8**). These guidelines serve as scientific reference points applicable to the UK. The guidance values consist of Threshold Effect Levels (TELs) and Probable Effect Levels (PELs) in comparison to the AL 1 and AL 2 indicators of the Cefas and Marine Scotland guidelines to identify risk to the environment. The TELs and PELs are used to identify the following three ranges of chemical concentrations with regard to biological effects:

- Below the TEL - The minimal effect range within which adverse effects rarely occur;
- Between the TEL and PEL - The possible effect range within which adverse effects occasionally occur; and
- Above the PEL - The probable effect range within which adverse effects frequently occur.

Table 2.8: Canadian Environmental Quality Guidelines (CCME, 1999)

Polyaromatic Hydrocarbon	TEL (µg/kg dry weight)	PEL (µg/kg dry weight)
Acenaphthene	6.71	88.9
Acenaphthylene	5.87	128
Anthracene	46.9	245
Benz[a]anthracene	74.8	693
Benzo[a]pyrene	88.8	763
Chrysene	108	846
Dibenzo[a,h]anthracene	6.22	135
Fluoranthene	113	1,494
Fluorene	21.2	144
2-Methylnaphthalene	20.2	201
Naphthalene	34.6	391
Phenanthrene	86.7	544
Pyrene	153	1,398

Data limitations and assumptions

- 2.4.4.15 Whilst many of the baseline characteristics are well understood, as described throughout **Section 2.4.6**, some data sources or assumptions are studied and/or quantified in less detail for the Offshore Water and Sediment Quality Study Area. This section seeks to identify areas of uncertainty and potential data gaps.
- 2.4.4.16 The site-specific sediment grab sampling (Gardline, 2024; 2025), while providing detailed information on the sediment composition (and fauna) present, cannot cover wide swaths of the seabed and consequently represents point samples that must be interpreted in combination with the other appropriate datasets. The grab samples conducted indicated good validation against publicly available regional data (British Geological Survey (BGS), 2026). The available data is therefore considered to be sufficiently robust to underpin the assessment presented herein and an overall high confidence is placed in the description of the baseline environment in relation to sediment quality.
- 2.4.4.17 The most recent WFD waterbody classifications reported by the EA are assessed throughout 2026, with the latest available classifications provided for 2022. Whilst at the time of writing these represent the most recent results, this presents a limitation due to the potential for overall classification of relevant coastal and transitional waterbodies or protected areas to change. The history of these waterbodies is publicly available, providing a record of designated waterbody status, alongside performance in specific biological, chemical and physical parameters, so an informed assumption can be made on the likelihood of the classification maintaining, increasing, or decreasing from that shown in publicly available data (Defra 2025b, EA, 2025)
- 2.4.4.18 The availability of data relevant for the characterisation and assessment of Offshore Water and Sediment Quality is such that, despite some data limitations, it is considered that a thorough, meaningful and proportionate characterisation for the purposes of the PEIR has been undertaken. As such, the available evidence base is sufficiently robust to underpin the assessment presented here and an overall high confidence is placed on the assessment.

2.4.6 Overview of baseline environment

Water Quality

- 2.4.6.1 Berx and Hughes (2009) presents monthly mean temperature and salinity data across the north-west Atlantic shelf from 1971-2000 at approximately 10km resolution. This data can be analysed within selected grid cells across the Offshore Water and Sediment Quality Study Area to characterise the baseline environment. A selection of near-bed and surface temperature and salinity data across various points of the cable route are presented in **Table 2.9**, **Table 2.10** and **Figure 2.2**:
- 2.4.6.2 The physical attributes of the water column within the North Sea are characterised by extensive annual and inter annual variation both spatially and temporarily due to seasonal patterns, tidal currents, and bathymetry (van Leeuwen et al., 2015). Generally, inshore to offshore SSC gradients exist particularly in the vicinity of the mouths of large estuaries such as the Thames, Humber and Severn (Cefas, 2016; **Figure 2.3**).

Table 2.9: Monthly Mean Near-bed Temperature and Salinity across the MHPGC Project based on Climatology Data between 1971 and 2000 (Berx and Hughes, 2009)

Month	Near-bed Temperature (°C)			Near-bed Salinity (‰)		
	Scottish Waters	Cable Midpoint	Landfall	Scottish Waters	Cable Midpoint	Landfall
January	7.14	7.36	7.37	34.79	34.56	34.51
February	6.28	6.37	6.43	34.79	34.75	34.63
March	6.25	6.33	6.54	34.77	34.74	34.71
April	6.40	6.49	6.46	34.67	34.61	34.63
May	6.43	6.61	6.96	34.68	34.56	34.44
June	7.55	7.46	8.09	34.67	34.51	34.43
July	8.25	7.92	8.05	34.72	34.71	34.61
August	9.33	8.87	9.76	34.72	34.64	34.49
September	10.69	9.95	9.81	34.80	34.74	34.68
October	10.75	10.05	10.53	34.90	34.79	34.63
November	9.86	9.69	9.69	34.78	34.74	34.57
December	9.21	8.90	8.51	34.83	34.74	34.65
Annual Average	8.18	8.00	8.18	34.76	34.67	34.58

Table 2.10 Monthly Mean Surface Temperature and Salinity across the MHPGC Project based on Climatology Data between 1971 and 2000 (Berx and Hughes, 2009)

Month	Surface Temperature (°C)			Surface Salinity (‰)		
	Scottish Waters	Cable Midpoint	Landfall	Scottish Waters	Cable Midpoint	Landfall
January	7.14	7.40	7.36	34.72	34.46	34.35
February	6.29	6.46	6.44	34.74	34.75	34.65
March	6.22	6.25	6.38	34.72	34.75	34.72
April	6.70	7.00	6.70	34.66	34.77	34.64
May	7.48	8.23	8.55	34.53	34.47	34.43
June	10.54	10.79	10.87	34.59	34.49	34.31

Month	Surface Temperature (°C)			Surface Salinity (‰)		
	Scottish Waters	Cable Midpoint	Landfall	Scottish Waters	Cable Midpoint	Landfall
July	12.75	13.89	13.99	34.59	34.58	34.47
August	14.34	15.04	14.81	34.59	34.52	34.40
September	12.58	13.04	13.22	34.74	34.65	34.54
October	11.61	11.46	11.61	34.82	34.75	34.60
November	9.89	9.87	9.87	34.73	34.70	34.55
December	9.17	8.82	8.40	34.82	34.76	34.65
Annual Average	9.56	9.85	9.85	34.69	34.64	34.52

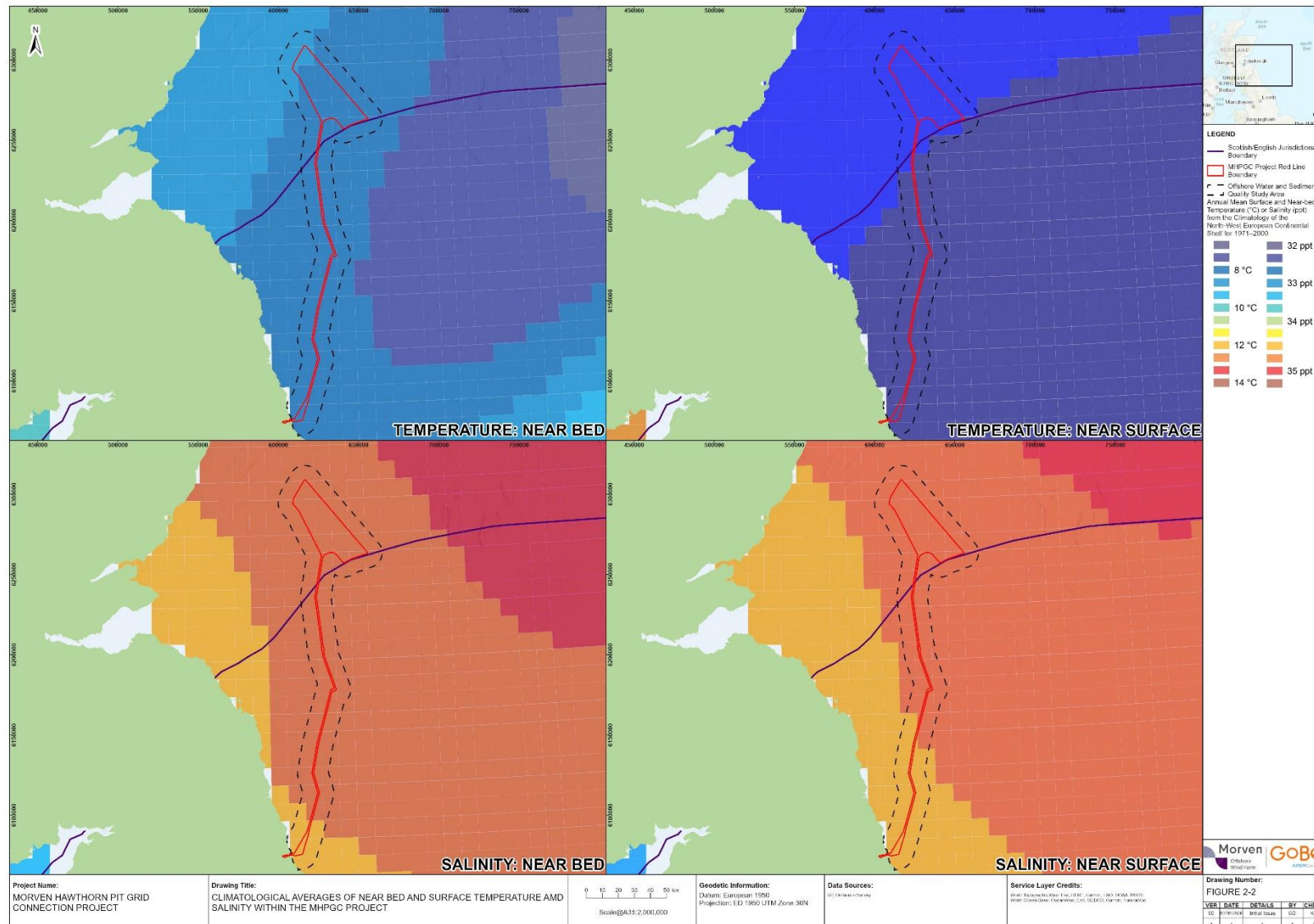


Figure 2.2: Climatological Averages of Near-bed and Surface Temperature and Salinity within the Offshore Water and Sediment Quality Study Area and Wider Marine Area

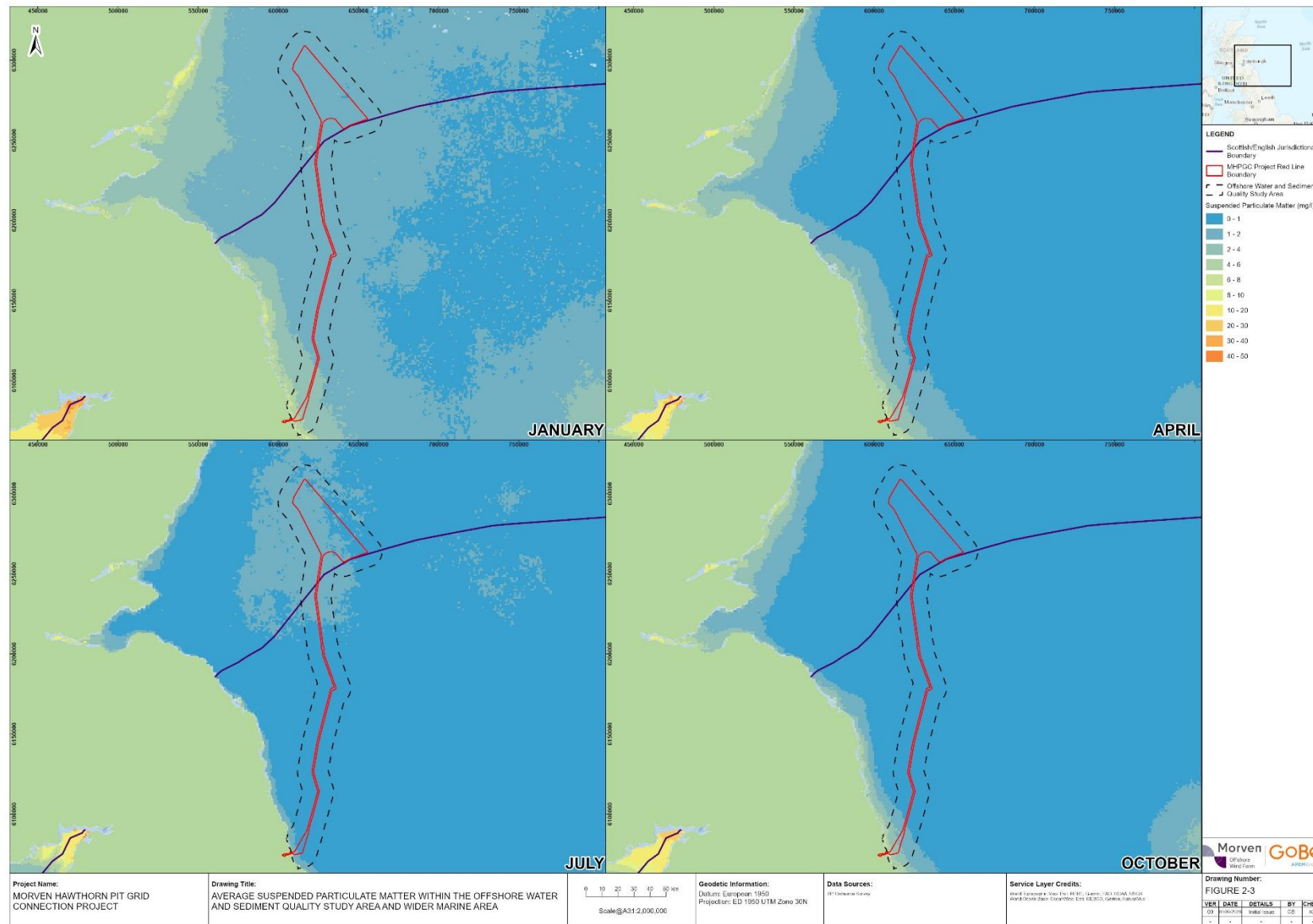


Figure 2.3: Average Suspended Particulate Matter within the Offshore Water and Sediment Quality Study Area and Wider Marine Area

Scottish Waters

- 2.4.6.3 Surface Suspended Particulate Matter (SPM) levels within Scottish Waters of the Offshore Water and Sediment Quality Study Area were recorded at less than 3mg/l during the period 1998 to 2015 (Cefas, 2016). Levels of SPM are directly relatable to SSC levels. Higher SSC values will occur during spring tides and storm conditions, with the greatest concentrations encountered close to the bed.
- 2.4.6.4 The annual mean near-bed temperature within the Scottish Waters of the Offshore Water and Sediment Quality Study Area averages 8.18°C annually and displays a seasonal pattern, with peak temperatures of 10.75°C in October and lows of 6.25°C in March at the reflecting the delay expected from surface warming as presented in **Table 2.9**.
- 2.4.6.5 The annual mean near bed salinity within the Scottish Waters of the Offshore Water and Sediment Quality Study Area is reported to remain marine with influence from freshwater sources having limited influence upon the average salinity. Across the Scottish waters of the MHPGC Project Study Area, an average concentration of 34.76 parts per thousand (‰) is reported with minimal fluctuations throughout the year (ranging from 34.67‰ in April to 34.90‰ in October) as presented in **Table 2.9**.
- 2.4.6.6 The annual mean surface temperature within the Scottish Waters of the Offshore Water and Sediment Quality Study Area averages 9.56°C annually and displays a seasonal pattern, with peak temperatures of 14.34°C in August and lows of 6.22°C in March reflecting the delay expected from surface warming as presented in **Table 2.10**.
- 2.4.6.7 The annual mean surface salinity within the Scottish Waters of the Offshore Water and Sediment Quality Study Area is reported to remain marine with influence from freshwater sources having limited influence upon the average salinity. Across the Scottish waters of the MHPGC Project Study Area, an average concentration of 34.69 parts per thousand (‰) is reported with minimal fluctuations throughout the year (ranging from 34.53‰ in May to 34.82‰ in October) as presented in **Table 2.10**.

English Waters

- 2.4.6.8 Within the nearshore extent of the MHPGC Project PEIR Red Line Boundary in English Waters, surface SPM concentrations reach 30mg/l (Cefas, 2016) due to their proximity to the Tyne and Wear Estuaries. Surface SPM concentrations further offshore in the northern North Sea remain below 5mg/l and can be related to the increasing distance from the aforementioned terrestrial sources (Cefas, 2016).
- 2.4.6.9 The annual mean near-bed temperature varies slightly between the midpoint of the offshore extent of the MHPGC Project PEIR Red Line Boundary and the landfall area by 0.18°C annually with both areas displaying a distinct seasonal pattern with the warmest readings in October with peak temperatures of 10.05°C and 10.53°C respectively for the midpoint of the offshore extent of the MHPGC Project PEIR Red Line Boundary and landfall. The coldest month was on average March for the cable midpoint and February at the landfall location with a variation of 0.1°C between the two.
- 2.4.6.10 The annual mean near-bed salinity within the English waters is reported to remain marine with influence from freshwater sources having limited influence upon the average salinity. The annual average concentration of the midpoint of the offshore extent of the MHPGC Project PEIR Red Line Boundary was 34.67 ‰ compared to 34.58 ‰ at the landfall. The landfall area was found to be slightly less saline every month except March with minimal fluctuations throughout the year as presented in **Table 2.9**.
- 2.4.6.11 The annual mean surface temperature remains consistent between the midpoint of the offshore extent of the MHPGC Project PEIR Red Line Boundary and the landfall area annually with both areas displaying a seasonal pattern with the warmest readings in August with peak temperatures of 15.04°C and 14.81°C respectively for the midpoint of the offshore extent of the MHPGC Project PEIR Red Line Boundary and landfall. The coldest month on average was March for both locations with a variation of 0.13°C between the two as presented in **Table 2.10**.
- 2.4.6.12 The annual mean surface salinity within the English waters is reported to remain marine with influence from freshwater sources having limited influence upon the average salinity. The annual average concentration of the midpoint of the offshore extent of the MHPGC Project PEIR Red Line Boundary was 34.64 ‰ compared to 34.52 ‰ at the landfall. The landfall area was found to be

slightly less saline every month with minimal fluctuations throughout the year as presented in **Table 2.10**.

Sediment Classification

- 2.4.6.13 Data available from European Marine Observation and Data Network (EMODnet) within the offshore extent of the MHPGC Project PEIR Red Line Boundary indicate that surficial sediments predominantly consist of sand in the northern extent of the MHPGC Project PEIR Red Line Boundary traversing small segments of gravelly sand and slightly gravelly sand. Past the midpoint of the offshore extent of the MHPGC Project PEIR Red Line Boundary the surficial sediments transition from sand into a vast area of finer grain size characterised as muddy sand. Within 10km of the coastline at the landfall location, a plethora of surficial sediments are present, and this region is not dominated by one particular grain size (Folk, 1954; EMODnet, 2024). Gardline (2024; 2025) characterise the surficial sediments within the MHPGC Project Study Area using PSA data as presented spatially on **Figure 2.4**.

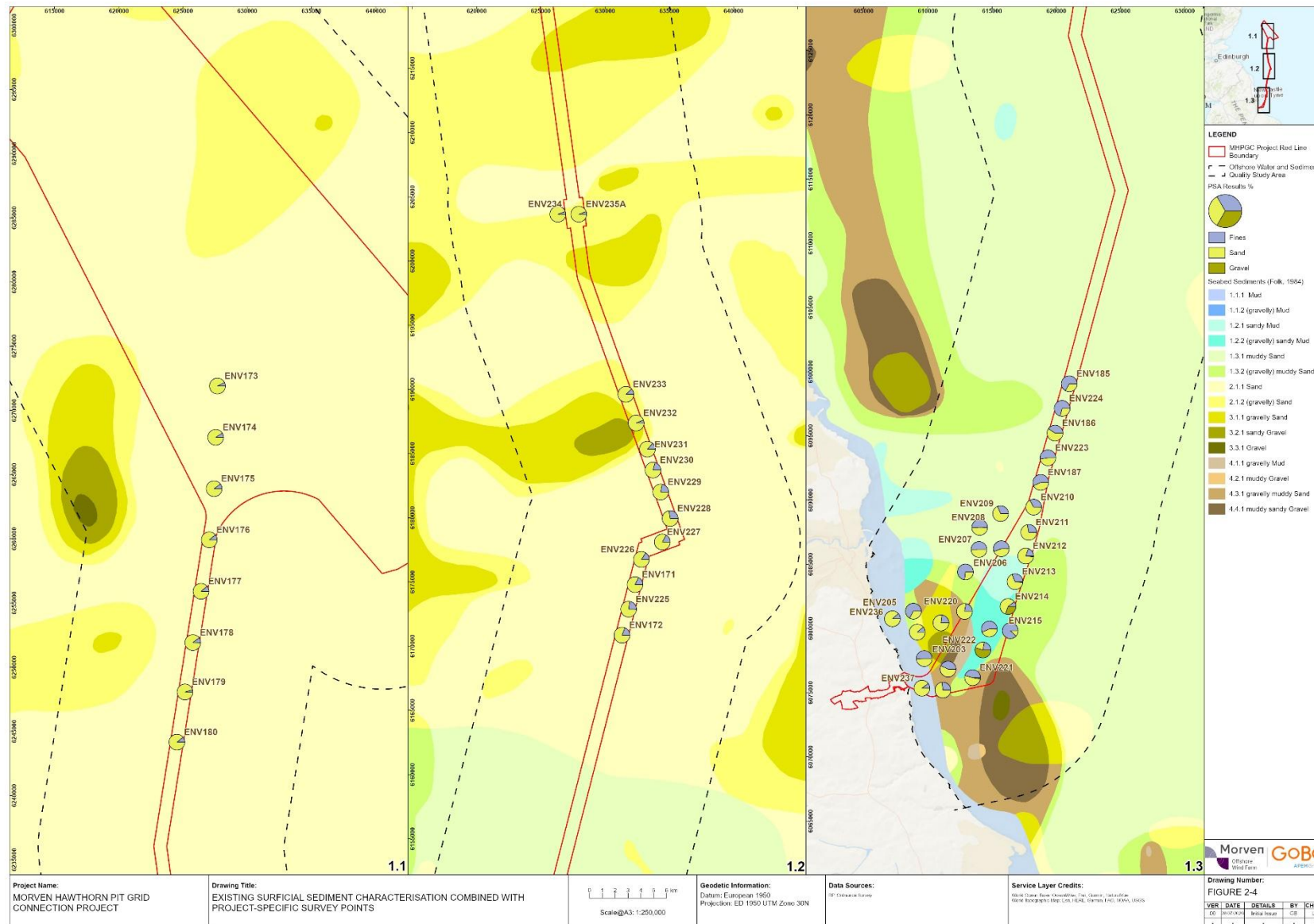


Figure 2.4: Existing Surficial Sediment Characterisation Combined with Project Specific Survey Points

Scottish Waters

- 2.4.6.14 Site specific sediment sampling occurred within Scottish Waters at seven of the 49 stations across the offshore extent of the MHPGC Project PEIR Red Line Boundary (Gardline, 2025) with the results of PSA determined by wet and dry sieving and laser diffraction techniques. Mean particle diameter size ranged from 180µm at ENV176 to 341µm at ENV179 with an average grain size across all Scottish stations of 223µm. The most southern station ENV179 was characterised by moderate sorting (Folk and Ward, 1957) with the remaining six defined as poorly sorted. All seven stations were defined as either Sand or Muddy Sand according to the modified Folk classification.
- 2.4.6.15 The minimum, maximum and mean sediment composition are detailed for the seven stations situated within Scottish Waters (ENV173-ENV179) in **Table 2.11** below.

Table 2.11: Sediment Characteristics within Scottish Waters (Gardline, 2025)

Sediment Type	Minimum Fraction	Mean Fraction	Maximum Fraction
Fines (<63µm)	4.60	9.1	11.1
Sand (63µm – 2mm)	88.70	90.8	95.1
Gravel (>2mm)	0.03	0.16	0.35

English Waters

- 2.4.6.16 Site specific sediment sampling occurred within English Waters at 42 of the 49 stations across the offshore extent of the MHPGC Project PEIR Red Line Boundary (Gardline, 2025) with the results of PSA determined by wet and dry sieving and laser diffraction techniques. Mean particle diameter size ranged from 12µm at ENV215 to 927µm at ENV214 with an average grain size across all English stations of 139µm. Of the 42 stations 38 were categorised as poor or very poorly sorted with the remaining four station deemed to be moderate (Folk and Ward, 1957). The Modified Folk Classification of the stations were muddy sand (n=22), Sandy mud (n=12), Sand (n=3), Slightly gravelly muddy sand (n=3) and Muddy sandy gravel (n=2).
- 2.4.6.17 The proportion of fine sediments identified in the central and southern portions of the offshore extent of the MHPGC Project PEIR Red Line Boundary are reflective of the wider regional context and is of particular importance to sediment contaminant due to their larger surface area to volume ratios and higher organic carbon content.
- 2.4.6.18 The minimum, maximum and mean sediment composition are detailed for the 42 stations situated within English Waters in **Table 2.12** below.

Table 2.12: Sediment Characteristics within English Waters (Gardline, 2025)

Sediment Type	Minimum Fraction	Mean Fraction	Maximum Fraction
Fines (<63µm)	5.3	32.5	88.2
Sand (63µm – 2mm)	11.8	65.2	94.5
Gravel (>2mm)	0	2.27	54.62

Sediment Contamination

- 2.4.6.19 There are no formal quantitative EQS for sediment, unlike water quality. The standards presented in the EQS directive (2008/105/EC) are in line with the EU's WFD (2000/60/EC) and mainly relate to the concentration of contaminants dissolved within the water column. The embedded commitments identified within **Table 2.31** ensure the MHPGC Project construction, O&M and decommissioning activities will not result in the direct release of contaminants into the water column. Consequently, the description of the baseline environment and subsequent assessment focusses on the potential to disturb sediment bound contaminants.

2.4.6.20 The sediment quality thresholds presented in **Section 2.4.4** represent industry standards for assessing sediment bound contaminants. The methods used in Gardline. (2024) and Gardline (2025) are comparable with the guideline values with analysis of sediment hydrocarbons, metals, Total Organic Content (TOC), PCB, Organochlorine Pesticides (OCPs) and organotin analyses were carried out by SOCOTEC, an MMO validated laboratory.

2.4.6.21 To meet the objectives of the scope of works, a total of 54 stations were pre-selected along the route. This included eight stations spaced at approximately 4km intervals along the route within the northern area, including seven in Scottish Waters, 13 stations in the central area in English waters and 33 stations in the southern area in English waters, which were spaced at approximately 2km intervals along the route. A minimum of three grab samples were proposed every 2km to 4km using a 0.1m² Day grab for analysis of particle size, environmental DNA (eDNA) and macrofaunal community. An additional sample was acquired at 30 stations for chemical analysis and fish eDNA¹.

Scottish Stations

2.4.6.22 Of the seven Gardline (2025) sampling stations within the Scottish Waters of the MHPGC Project PEIR Red Line Boundary four were selected to take an additional sample for sediment chemistry analysis. with the spatial location presented on **Figure 2.4** and the results presented in **Table 2.13**.

Metal Contamination

2.4.6.23 As detailed in **Table 2.7**, Marine Scotland (2017) provides guidance thresholds to determine the suitability of material to be disposed of at sea. Marine Scotland provides thresholds for eight metals as detailed in **Table 2.7**. The sediment quality thresholds selected represent concentrations at which there is considered to be a low probability of effects to marine life. Exceedance of a threshold does not necessarily indicate unacceptable risk, just a potentially higher probability of measurable effects.

2.4.6.24 Metal concentrations within the Scottish Waters of the MHPGC Project PEIR Red Line Boundary were not reported by Gardline (2025) to exceed Marine Scotland's AL1 for any metal analyte, indicating that effects to marine life from metal contamination would be unlikely if these sediments were to be disturbed.

Table 2.13: Metal Concentrations (µg/g) within Scottish Waters of the MHPGC Project PEIR Red Line Boundary (Gardline, 2025)

Analyte	Marine Scotland AL1	Marine Scotland AL2	ENV173	ENV175	ENV177	ENV179
Arsenic	20	70	3.1	2.4	3.1	4.6
Cadmium	0.4	4	<0.04	<0.04	<0.04	<0.04
Chromium	50	370	9.1	8.8	9.5	7.5
Copper	30	300	1.3	1.3	1.6	1.2
Mercury	0.25	1.5	<0.01	0.03	<0.01	<0.01
Nickel	30	150	2.8	2.9	3	2.8
Lead	50	400	3.6	3.4	3.9	4.2
Zinc	130	600	13	13	13	12

¹ Following several unsuccessful grab sampling attempts likely attributed to coarse sediments three stations (Station ENV183, ENV197 and ENV198) were abandoned. Similarly, sampling was not attempted at four stations (Stations ENV182, ENV188, ENV199 and ENV219) after review of the seabed imagery due to the presence of cobbles and boulders

Polycyclic Aromatic Hydrocarbon Contamination

- 2.4.6.25 PAHs are classed as priority hazardous substances and ubiquitous persistent, bio-accumulative and toxic compounds under the WFD in the related EQS Directive (2008/105/EC amended by 2013/39/EU). The CEQGs (TELs and PELs values) provide the most reliable standardised estimates of the potential toxicity of individual PAHs in marine sediments, as outlined in **Table 2.14**.
- 2.4.6.26 Concentrations of PAHs within the Scottish Waters of the MHPGC Project PEIR Red Line Boundary were not reported to exceed Marine Scotland's AL1 (**Table 2.7**) or the CEQGs (**Table 2.8**) for any PAH analyte indicating that effects to marine life from PAH contamination would be unlikely if these sediments were to be disturbed.

Table 2.14: PAH Concentrations in Scottish Waters of the MHPGC Project PEIR Red Line Boundary (ng/g) Gardline 2025)

Analyte	Marine Scotland AL1	ENV173	ENV175	ENV177	ENV179
Acenaphthene	100	<1	<1	<1	<1
Acenaphthylene	100	<1	<1	<1	<1
Anthracene	100	<1	<1	<1	<1
Benzo[a]anthracene	100	<1	<1	<1	<1
Benzo[a]pyrene	100	<1	<1	<1	<1
Benzo[b]fluoranthene	100	<1	<1	<1	<1
Benzo[e]pyrene ²	N/A	2	2	2	2
Benzo[ghi]perylene	100	<1	<1	<1	<1
Benzo[k]fluoranthene	100	<1	<1	<1	<1
C1-naphthalenes	100	<1	<1	<1	<1
C1-phenanthrene	100	<1	<1	<1	<1
C2-naphthalenes	100	2	2	2	<1
C3-naphthalenes	100	<1	<1	<1	<1
Chrysene	100	<1	<1	<1	<1
Dibenzo[ah]anthracene	10	<1	<1	<1	<1
Fluoranthene	100	<1	<1	<1	<1
Fluorene	100	<1	<1	<1	<1
Indeno[1,2,3-cd]pyrene	100000	2	2	2	2
Naphthalene	100	<1	<1	<1	<1
Perylene	100	<1	<1	<1	<1
Phenanthrene	100	<1	<1	<1	<1
Pyrene	100	<1	<1	<1	<1

²Benzo[e]pyrene is not considered one of the priority PAHs used to assess sediment risk and as such does not have an assigned AL.

Total Organic Carbon

- 2.4.6.27 In general, for continental shelf sediments, there is a close relationship between organic carbon content and the surface area of the mineral matrix (Mayer, 1994). Increased TOC is expected with the presence of fine sediment, as it adsorbs to the increased surface area provided by the fine grain particles. The Gardline (2025) report measured TOC across four sites within the Scottish Waters of the MHPGC Project PEIR Red Line Boundary. TOC values ranged from 0.13% at Stations ENV179 and ENV173 to 0.17% at Station ENV175 with an average of 0.15%.

Total Hydrocarbon Content

- 2.4.6.28 It has previously been shown that benthic macrofauna may suffer adverse effects when Total Hydrocarbon Content (THC) concentrations are in excess of $50\mu\text{g g}^{-1}$ (Kjeilen-Eilertsen *et al*, 2004) and as such, this value represents the threshold above which hydrocarbons are expected to have significant environmental impact. Concentrations of THC were analysed using Ultra-Violet Fluorescence Spectroscopy (UVFS) at the five stations located within the Scottish Waters of the MHPGC Project PEIR Red Line Boundary (Gardline, 2024; 2025). All five sites reported concentrations of THC below the $1\mu\text{g/g}$ Limit of Detection (LOD) indicating THC is positively correlated with the reported TOC concentrations.

Polychlorinated Biphenyl Contamination

- 2.4.6.29 PCBs are a group of toxic, synthetic, lipid-soluble chlorinated hydrocarbons formerly used in various industrial applications. They are persistent environmental contaminants with the potential to bioaccumulate and bio-magnify in food chains (Madgett *et al.*, 2022). PCB concentrations in the four sediment samples collected from the Scottish Waters of the MHPGC Project PEIR Red Line Boundary were below the LOD (0.08ng/g), suggesting a low risk of toxic effects from sediment disturbance.

Organotin Contamination

- 2.4.6.30 Organotin compounds are man-made metallic tin complexes with hydrocarbon substituents. These compounds are found globally following extensive use in antifoulant paint for watercraft among various other applications. Concentrations of tributyltin, monobutyltin, tetrabutyltin and triphenyltin were all below the LOD at both stations (ENV173 and ENV175) within Scottish Waters of the MHPGC Project PEIR Red Line Boundary. Dibutyltin concentrations, whilst persisting at detectable concentrations, remained below the AL1 threshold ($0.1\mu\text{g/g}$) at both ENV173 and ENV175 which were reported at 0.004 and $0.002\mu\text{g/g}$ respectively suggesting a low risk of toxic effects from sediment disturbance.

Organochlorine Pesticide Contamination

- 2.4.6.31 OCPs are a globally used group of chlorinated hydrocarbon derivatives with a variety of applications in the chemical industry primarily as synthetic pesticides. These compounds are known for their high toxicity, slow degradation, and bioaccumulation (Jayaraj *et al.*, 2016). No detectable concentrations ($<0.1\text{ng/g}$) of OCPs were found to be present inside the sediments within Scottish Waters of the MHPGC Project PEIR Red Line Boundary.

English Stations

- 2.4.6.32 Of the Gardline (2024; 2025) sampling stations within the English Waters of the MHPGC Project PEIR Red Line Boundary, 26 have been analysed for contaminants with the spatial location presented on **Figure 2.4** and the results presented in the following section.

Metal Contamination

- 2.4.6.33 As detailed in **Table 2.6**, Cefas provide guidance thresholds to determine the suitability of material to be disposed of at sea. The MMO provide thresholds for eight metals as detailed in Table 2.6. The sediment quality thresholds selected represent concentrations at which there is considered to be a low probability of effects to marine life. Exceedance of a threshold does not indicate unacceptable risk, just a potentially higher probability of measurable effects.
- 2.4.6.34 Metal concentrations within the English Waters of the MHPGC Project PEIR Red Line Boundary were not reported to exceed Cefas's AL2 for any metal analyte (Gardline, 2025). Within the central stations of the offshore extent of the MHPGC Project PEIR Red Line Boundary no exceedances of Cefas AL1 were reported. Of the metals that were analysed, four (Arsenic, Nickel, Lead and Zinc) reported concentration above Cefas AL 1 at one or more stations all within the southern area of the offshore

extent of the MHPGC Project PEIR Red Line Boundary, with Stations ENV200 and ENV203 recording concentrations above Cefas AL1 for all four of these metals.

Table 2.15: Metal Concentrations (µg/g) within the English Waters of the MHPGC Project PEIR Red Line Boundary (Gardline, 2025).

MHPGC Area	Station	Arsenic	Cadmium	Chromium	Copper	Mercury	Nickel	Lead	Zinc
Central	ENV233	4.5	<0.04	11.3	1.8	<0.01	4.4	5.7	19
	ENV231	4.6	<0.04	12.6	1.9	<0.01	4.6	6.4	17
	ENV229	4.5	<0.04	12	2.4	<0.01	5.3	8	18
	ENV227	3.6	<0.04	10.5	2.3	<0.01	5.4	7.4	19
	ENV171	4.8	<0.04	12.8	3	<0.01	6.6	7.8	23
	ENV172	5.2	<0.04	15.3	3.6	<0.01	7.8	9.4	25
Southern	ENV185	9.2	0.1	31.3	10.5	0.08	20.8	31	65
	ENV186	6.1	0.09	20.4	6.6	0.04	13.3	20.8	44
	ENV187	7.2	0.09	21.9	8.3	0.06	14.9	26.1	54
	ENV208	12.2	0.19	27	17.2	0.18	19.3	53.3	96
	ENV206	18.1	0.21	30.8	25.8	0.19	24.1	81.6	132
	ENV205	15.4	0.18	19.7	14.3	0.1	14.5	55	98
	ENV236	12.8	0.22	14.2	11.3	0.05	11.8	46	96
	ENV211	6.2	0.06	15.2	6.2	0.06	9.8	19.2	42
	ENV217	15.8	0.16	30.2	18.8	0.21	22.1	59.5	97
	ENV213	12.1	0.08	19.7	9.2	0.06	13.4	34.2	72
	ENV215	22.4	0.19	36.8	27.6	0.25	28.5	90.8	123
	ENV220	19.4	0.16	16.3	20.8	0.12	15.6	52.6	97
	ENV222	25.3	0.18	29.3	24.5	0.21	24	71.1	111
	ENV221	20.8	0.14	17.7	21.1	0.16	16.2	51.3	88
	ENV200	30.1	0.24	28.4	34.9	0.27	26.5	94.7	132
	ENV201	17.6	0.16	14.7	17.8	0.14	14.2	50.1	92

	ENV237	20.6	0.2	11.7	22.1	0.09	13.8	49.6	106
	ENV218	12.3	0.11	12.8	9.9	0.06	11.1	44	89
	ENV204	12	0.13	12.7	9.6	0.08	10.3	41.8	86
	ENV203	20.7	0.21	30.1	27.6	0.18	23.8	96.5	138
Cefas AL1³		20	0.4	40	40	0.3	20	50	130
Cefas AL2		100	5	400	400	3	200	500	800

Polycyclic Aromatic Hydrocarbon Contamination

- 2.4.6.35 PAHs are classed as priority hazardous substances and ubiquitous persistent, bio-accumulative and toxic compounds under the WFD in the related EQS Directive (2008/105/EC amended by 2013/39/EU). The CEQGs (TELs and PELs values) provide the most reliable standardised estimates of the potential toxicity of individual PAHs in marine sediments, as outlined in **Table 2.16**.
- 2.4.6.36 Concentrations of PAHs within the English Waters of the MHPGC Project PEIR Red Line Boundary were not reported to exceed Cefas AL1 or the CEQGs TEL for any PAH analyte within the central area of the offshore extent of the MHPGC Project PEIR Red Line Boundary indicating that effects to marine life from PAH contamination would be unlikely if these sediments were to be disturbed. In the southern area of the offshore extent of the MHPGC Project PEIR Red Line Boundary only three of the ten PAHs with the CEQG thresholds remained below the higher PEL threshold and all ten exceeded the TEL and Cefas AL1 on one or more occasions. Gardline (2024; 2025) found total PAH concentrations showed a significant positive correlation with sediment fines and TOC. Spatially the highest concentrations of PAHs are situated within the southern stations.
- 2.4.6.37 Within Table 2.16 values in bold indicate an exceedance of Cefas AL 1 (MMO, 2023) values with blue and purple shading indicate an exceedance of the TEL and the PEL respectively (CCME, 1999).

³ Exceedances of Cefas AL1 are indicated by bold text and light blue highlight. No exceedance of Cefas AL2 were identified with the threshold value provided for additional context.

Table 2.16: PAH Concentrations in English Waters of the MHPGC Project PEIR Red Line Boundary (ng/g) Gardline 2024 and 2025)

MHPGC Area	Analyte	Acenaphthene	Acenaphthylene	Anthracene	Benzo[a]anthracene	Benzo[a]pyrene	Benzo[b]fluoranthene	Benzo[e]pyrene	Benzo[ghi]perylene	Benzo[k]fluoranthene	C1-naphthalenes	C1-phenanthrene	C2-naphthalenes	C3-naphthalenes	Chrysene	Dibenzo[a,h]anthracene	Fluoranthene	Fluorene	Indeno[1,2,3-cd]pyrene	Naphthalene	Perylene	Phenanthrene	Pyrene
Central	ENV233	<1	<1	<1	<1	<1	4	5	2	3	<1	<1	3	1	<1	<1	2	<1	5	<1	<1	<1	<1
	ENV231	<1	<1	<1	<1	<1	4	5	2	3	2	2	3	2	<1	<1	2	<1	5	<1	<1	<1	1
	ENV229	<1	<1	<1	3	4	10	15	7	8	6	9	11	4	5	2	7	<1	15	3	<1	6	6
	ENV227	<1	<1	<1	2	3	9	11	5	7	4	5	5	4	3	<1	5	<1	11	2	<1	3	3
	ENV171	<1	<1	<1	2	3	9	10	5	7	5	5	6	5	3	1	5	<1	11	2	<1	3	3
	ENV172	<1	<1	<1	<1	1	4	4	2	2	2	2	3	2	<1	<1	2	<1	4	<1	<1	2	<1
Southern	ENV185	12	7	20	60	70	102	101	72	89	177	140	170	181	72	18	111	20	91	59	17	102	101
	ENV186	9	5	15	44	50	67	66	51	55	140	112	139	148	54	12	79	15	55	43	11	86	75
	ENV187	24	10	39	96	103	114	106	90	98	253	229	255	293	108	21	171	34	87	78	23	182	159
	ENV208	49	17	78	165	165	164	159	140	139	573	472	556	633	181	32	302	72	104	200	34	358	291
	ENV206	83	33	139	247	228	229	206	199	196	1520	785	1310	1300	286	40	477	131	133	484	52	625	466
	ENV205	20	9	34	60	55	57	45	51	39	452	227	367	312	73	14	127	32	28	144	11	180	123
	ENV236	14	5	19	36	35	34	30	29	29	264	113	201	170	43	6	67	20	20	81	7	93	68

	ENV211	9	4	12	31	32	41	41	33	29	130	97	133	140	37	7	56	14	27	42	5	71	54
	ENV217	78	38	133	269	258	245	216	209	220	857	664	806	881	306	42	547	106	160	278	56	587	503
	ENV213	35	21	84	182	172	163	134	126	143	365	322	347	402	191	30	242	49	101	127	36	269	209
	ENV215	120	40	179	391	391	392	362	327	304	2140	1220	1830	1740	452	75	704	194	272	700	76	937	684
	ENV220	55	22	72	119	101	83	89	101	81	1550	573	1210	1000	150	17	224	99	48	472	18	473	242
	ENV222	123	44	182	366	339	308	268	283	271	2340	1140	1890	1740	413	57	685	187	176	746	60	949	638
	ENV221	188	104	323	646	574	464	394	435	441	4990	2090	3950	3530	701	84	1210	331	273	1660	112	1810	1110
	ENV200	260	109	340	779	717	608	511	543	559	5160	2300	4130	3510	855	110	1520	410	359	1670	140	2130	1360
	ENV201	123	41	139	221	194	173	172	190	143	2830	1480	2620	2650	294	33	391	275	87	790	38	1170	414
	ENV237	46	18	50	119	89	76	64	86	71	1330	497	1110	874	144	15	219	89	38	377	18	419	225
	ENV218	13	6	20	36	31	29	23	30	27	329	124	250	194	46	7	81	22	17	98	10	117	81
	ENV204	15	9	22	48	41	39	31	38	33	417	167	322	258	61	14	104	28	20	124	11	151	101
	ENV203	76	48	118	272	283	267	249	231	227	1740	742	1440	1180	308	52	453	142	187	535	58	612	441
Cefas AL1		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
TEL		6.71	5.87	46.9	74.8	88.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	108	6.22	113	21.2	N/A	34.6	N/A	86.7	153
PEL		88.9	128	245	693	763	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	846	135	1494	144	N/A	391	N/A	544	1398

Total Organic Carbon and Total Hydrocarbon Content

- 2.4.6.38 In general, for continental shelf sediment, there is a close relationship between organic carbon content and the surface area of the mineral matrix (Mayer, 1994). Increased TOC is expected with the presence of fine sediment, as it adsorbs to the increased surface area provided by the fine grain particles. The Gardline (2024; 2025) reports measured TOC across five sites within the English Waters of the MHPGC Project PEIR Red Line Boundary; TOC values ranged from 0.15% at Stations ENV233 to 12.4% at Station ENV200 with an average of 2.58% (**Table 2.17**).
- 2.4.6.39 It has previously been shown that benthic macrofauna may suffer adverse effects when THC concentrations are in excess of 50µg/g (Kjeilen-Eilertsen, 2024) and as such, this value represents the threshold above which hydrocarbons are expected to have significant environmental impact. Concentrations of THC were analysed using UVFS at the stations located within the English Waters of the MHPGC Project PEIR Red Line Boundary (Gardline, 2024; 2025). All six central sites reported concentrations of THC below 2.7µg/g indicating THC is positively correlated with the reported TOC concentrations. Significant variation between the 20 stations along the southern area of the offshore extent of the MHPGC Project PEIR Red Line Boundary was observed, with THC significantly positively correlated with TOC content. The THC by UVFS concentrations exceeded 50µg/g at thirteen stations along the southern area of the route, therefore the faunal communities may be adversely affected by THC at these stations.

Table 2.17: Total Organic Carbon (%) and Total Hydrocarbon Content (µg/g) within English Waters of the MHPGC Project PEIR Red Line Boundary

MHPGC Area	Station	TOC%	THC (µg/g)
Central	ENV233	0.15	<1.0
	ENV231	0.19	<1.0
	ENV229	0.28	1.4
	ENV227	0.23	2.7
	ENV171	0.23	2.1
	ENV172	0.23	1.8
Southern	ENV185	1.69	20.8
	ENV186	0.79	15.5
	ENV187	1.19	31.8
	ENV208	2.6	178
	ENV206	4.26	92.5
	ENV205	1.59	91.1
	ENV236	0.52	37.9
	ENV211	0.61	23.6
	ENV217	4.14	147
	ENV213	1.25	130
	ENV215	5.13	93.9
	ENV220	2.94	158
	ENV222	4.65	447
	ENV221	9.23	572
	ENV200	12.4	471
	ENV201	4.69	339
	ENV237	3.12	97

MHPGC Area	Station	TOC%	THC (µg/g)
	ENV218	0.69	27.4
	ENV204	0.69	45.2
	ENV203	3.59	183

2.4.6.40 Polychlorinated Biphenyl Contamination

2.4.6.41 PCBs are a group of toxic, synthetic, lipid-soluble chlorinated hydrocarbons formerly used in various industrial applications. They are persistent environmental contaminants with the potential to bioaccumulate and bio-magnify in food chains (Madgett *et al.*, 2022). PCB concentrations in sediment samples collected from the English Waters of the MHPGC Project PEIR Red Line Boundary were below the LOD (0.08ng/g), at all six of the central stations and three of the southern stations suggesting a low risk of toxic effects from sediment disturbance. Of the 17 stations with concentrations above LOD, none exceeded the Cefas AL 1 concentration of 0.1mg/kg (**Table 2.18**).

Table 2.18: PCB Concentrations (ng/g) within the southern MHPGC Project PEIR Red Line Boundary

Station	PCB52	PCB101	PCB118	PCB138	PCB153	PCB180	Total 25 PCB Congener s	Total ICES-7 PCBs
ENV185	<0.08	0.15	0.23	0.23	0.22	0.10	1.58	0.23
ENV186	<0.08	<0.08	<0.08	0.09	0.12	<0.08	0.21	0.09
ENV187	0.08	0.13	0.22	0.13	0.15	0.11	1.36	0.13
ENV208	0.20	0.32	0.46	0.39	0.40	0.21	3.98	0.99
ENV206	0.27	0.46	0.53	0.35	0.57	0.25	5.71	1.14
ENV205	<0.08	0.14	0.18	0.16	0.23	<0.08	1.21	0.16
ENV236	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	N/A	N/A
ENV211	<0.08	<0.08	0.10	0.09	0.07	<0.08	0.26	0.09
ENV217	0.43	0.43	0.62	0.40	0.52	0.28	6.02	1.31
ENV213	0.10	0.17	0.14	0.16	0.18	<0.08	1.40	0.16
ENV215	0.38	0.53	0.63	0.75	0.77	0.38	7.72	1.84
ENV220	0.22	0.31	0.33	0.33	0.29	0.21	3.33	0.67
ENV222	0.29	0.43	0.53	0.45	0.47	0.26	5.47	1.29
ENV221	0.23	0.27	0.36	0.28	0.33	0.21	3.88	0.83
ENV200	0.49	0.60	0.67	0.66	0.77	0.41	8.44	1.99
ENV201	0.14	0.20	0.22	0.28	0.23	0.13	2.43	0.49
ENV237	0.15	0.22	0.23	0.25	0.26	0.14	2.23	0.34
ENV218	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	N/A	N/A
ENV204	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	N/A	N/A
ENV203	0.48	0.91	1.23	0.99	1.11	0.80	15.37	3.46
Cefas AL 1	N/A	N/A	N/A	N/A	N/A	N/A	20	10
Cefas AL 2	N/A	N/A	N/A	N/A	N/A	N/A	200	N/A

Organotin Contamination

- 2.4.6.42 Organotin compounds are man-made metallic tin complexes with hydrocarbon substituents. These compounds are found globally following extensive use in antifoulant paint for watercraft among various other applications. Concentrations of dibutyltin, tributyltin, monobutyltin, tetrabutyltin and triphenyltin were all significantly below the Cefas AL 1 within English Waters of the MHPGC Project PEIR Red Line Boundary (**Table 2.19**).

Table 2.19: Organotin concentrations (ng/g) within the English Waters of the MHPGC Project PEIR Red Line Boundary

Station	Dibutyltin (DBT)	Tributyltin (TBT)	Monobutyltin (MBT)	Tetrabutyltin (TTBT)	Triphenyltin (TPT)
ENV173	0.004	<0.001	<0.01	<0.001	<0.001
ENV175	0.002	<0.001	<0.01	<0.001	<0.001
ENV227	0.007	<0.001	<0.01	<0.001	<0.001
ENV171	0.003	<0.001	<0.01	<0.001	<0.001
ENV185	<0.005	<0.005	0.025	0.015	<0.005
ENV186	<0.005	<0.005	<0.01	<0.005	0.008
ENV187	<0.005	<0.005	<0.01	0.009	<0.005
ENV208	<0.005	<0.005	0.047	<0.005	<0.005
ENV206	<0.005	<0.005	0.036	<0.005	<0.005
ENV211	<0.005	<0.005	0.042	<0.005	<0.005
ENV213	<0.005	<0.005	0.018	<0.005	<0.005
ENV215	<0.005	<0.005	0.023	<0.005	<0.005
ENV221	<0.005	0.008	<0.01	<0.005	<0.005
ENV203	<0.005	<0.005	0.012	<0.005	<0.005
Cefas AL1	0.1	0.1	0.1	N/A	N/A

Organochlorine Pesticide Contamination

- 2.4.6.43 OCPs are a globally used group of chlorinated hydrocarbon derivatives with a variety of applications in the chemical industry primarily as synthetic pesticides. These compounds are known for their high toxicity, slow degradation, and bioaccumulation (Jayaraj *et al.*, 2016). No detectable concentrations of OCPs were found to be present inside the sediments above the Cefas AL1 within English Waters of the central MHPGC Project PEIR Redline Boundary. The highest concentration of OCPs was recorded at Station ENV221 for DDT (5.7ng/g) with Station ENV205 also exceeding the Cefas AL 1 (**Table 2.20**).

Table 2.20: Detectable OCPs with the MHPGC Project PEIR Red Line Boundary (ng/g)

Station	alpha-Hexachlorocyclohexane (α -HCH)	beta-Hexachlorocyclohexane (β -HCH)	gamma-Hexachlorocyclohexane (γ -HCH)	Dieldrin	Hexachlorobenzene	p,p'-Dichlorodiphenyldichloroethane (TDE)	p,p'-Dichlorodiphenyldichloroethylene (DDE)	p,p'-Dichlorodiphenyldichloroethane (DDT)
ENV185	<0.1	<0.1	<0.1	<0.1	0.3	0.6	0.3	<0.1
ENV186	<0.1	<0.1	<0.1	<0.1	0.1	0.3	0.2	0.2
ENV187	<0.1	<0.1	<0.1	<0.1	0.3	0.5	0.3	0.1
ENV208	<0.1	<0.1	<0.1	<0.1	0.4	1.3	0.4	0.1
ENV206	0.1	<0.1	<0.1	0.3	0.6	1.7	0.6	0.1
ENV205	<0.1	<0.1	<0.1	<0.1	0.2	1.3	0.2	2.1
ENV236	<0.1	<0.1	<0.1	<0.1	<0.1	0.3	<0.1	<0.1
ENV211	<0.1	<0.1	<0.1	<0.1	<0.1	0.3	<0.1	<0.1
ENV217	<0.1	<0.1	<0.1	<0.1	0.5	1.4	0.6	0.2
ENV213	<0.1	<0.1	<0.1	<0.1	0.3	0.3	0.2	<0.1
ENV215	0.1	<0.1	0.1	0.6	0.8	2.2	0.9	0.5
ENV220	<0.1	<0.1	0.1	<0.1	0.3	1.1	0.3	<0.1
ENV222	0.1	<0.1	0.1	0.5	<0.1	1.5	0.5	0.2
ENV221	<0.1	<0.1	0.1	<0.1	0.4	4.2	0.4	5.7
ENV200	0.2	<0.1	0.2	<0.1	<0.1	2.4	0.9	<0.1
ENV201	<0.1	<0.1	<0.1	<0.1	0.2	0.8	0.2	<0.1
ENV237	<0.1	<0.1	<0.1	<0.1	0.1	0.6	<0.1	<0.1
ENV218	<0.1	<0.1	<0.1	0.1	<0.1	0.4	<0.1	<0.1
ENV204	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	<0.1	<0.1
ENV203	0.2	0.4	0.3	0.5	0.5	2.0	0.9	0.8

Station	alpha- Hexachlorocycl ohexane (α - HCH)	beta- Hexachlorocycl ohexane (β - HCH)	gamma- Hexachlorocycl ohexane (γ - HCH)	Dieldrin	Hexachloroben zene	p,p'- Dichlorodiphen ylchloroethan e (TDE)	p,p'- Dichlorodiphen ylchloroethyl ene (DDE)	p,p'- Dichlorodiphen yltrichloroetha ne (DDT)
Cefas AL1⁴	N/A	N/A	N/A	5	N/A	N/A	N/A	1

⁴ Exceedances of Cefas AL1 are indicated by bold text and light blue highlight.

Environment Agency Survey Data

- 2.4.6.44 The EA samples the water and sediment quality around the coast of the UK and presents the data via the Water Quality Explorer (Defra, 2026). A sampling point (NE-45500210) approximately 2.2km off the coast, southeast of Seaham is situated within the Offshore Water and Sediment Quality Study Area and provides information on contamination within the marine sediments.
- 2.4.6.45 Five results from this nearshore location at ~20m depth from August 2025 show the concentrations of compounds to be in comparable ranges to the Gardline (2024; 2025) baseline data. Organic carbon percentage was found to be 10.52% which is similar to the highest TOC value identified in the Gardline (2025) data.
- 2.4.6.46 PCBs were shown to have a maximum value of 0.5µg/kg and 0.2µg/kg on average for the ICES 7 PCBs. The averages of the five sample results are provided in Table 2.21 for metals and PAHs. No exceedances of AL 1 were identified for metals from this sampling point. PAH concentrations are similar to those found within the Gardline (2025) surveys with multiple exceedances of AL 1 and the TEL alongside exceedances of the PEL, which is indicative of the historical contamination in the north east.

Table 2.21: Environment Agency Contamination Results from Sampling Point (NE045500210)

Determinand	Average result	Unit	AL1	AL2	TEL	PEL
Arsenic	14.6	mg/kg	20	100	N/A	N/A
Cadmium	0.122	mg/kg	0.4	5	N/A	N/A
Chromium	32	mg/kg	40	400	N/A	N/A
Copper	15.8	mg/kg	40	400	N/A	N/A
Lead	47.8	mg/kg	0.3	3	N/A	N/A
Mercury	0.121	mg/kg	20	200	N/A	N/A
Nickel	15.6	mg/kg	50	500	N/A	N/A
Zinc	83.2	mg/kg	130	800	N/A	N/A
Anthracene	370	µg/kg	100	N/A	46.9	245
Benzo(a)Anthracene	680	µg/kg	100	N/A	74.8	693
Benzo(a)Pyrene	528	µg/kg	100	N/A	88.8	763
Benzo(g,h,i)Perylene	424	µg/kg	100	N/A	N/A	N/A
Fluoranthene	1350	µg/kg	100	N/A	113	1,494
Indeno(1,2,3-cd)pyrene	320	µg/kg	100	N/A	N/A	N/A
Naphthalene	3100	µg/kg	100	N/A	34.6	391
Phenanthrene	2400	µg/kg	100	N/A	86.7	544
Pyrene	1120	µg/kg	100	N/A	153	1,398

Water Framework Directive Designated Sites

- 2.4.6.47 As specified in the Water Environment (Water Framework Directive) Regulations 2017 and Water Environment and Water Services (Scotland) Act 2003 for England and Scotland respectively, there is a requirement to characterise coastal waters, as part of River Basin Districts, within the area extending seaward from the limit of the highest tide or, where appropriate, the seaward limits of any bodies of transitional water.

Scottish Waters

2.4.6.48 The closest point of the offshore extent of the MHPGC Project PEIR Red Line Boundary to a designated site within Scottish waters is approximately 50km away. Consequently, as no pathway of effects is present, Scottish designated sites will not be considered further in this Offshore Water and Sediment Quality Chapter.

English Waters

2.4.6.49 All sites designated in accordance with the Water Environment (Water Framework Directive) Regulations 2017 that fall within the Offshore Water and Sediment Quality Study Area (**Figure 2.1**) are assessed as receptors within the PEIR and include:

- One WFD coastal Waterbody
 - Tyne and Wear Coastal Waterbody (ID: GB650301500002)
- Three Bathing Waters
 - Seaham Hall Beach;
 - Seaham Beach;
 - Crimdon;
- Three Nutrient Sensitive Areas
 - Hawthorn Burn from Source to North Sea NVZ;
 - Seaham Hall Beach Bathing Water Sensitive Area;
 - Seaham Beach Bathing Water Sensitive Area.

2.4.6.50 There are no Shellfish Waters within the Offshore Water and Sediment Quality Study Area therefore no pathway of effects exists on this receptor group. As such Shellfish Waters are not considered further within this Offshore Water and Sediment Quality Chapter.

2.4.6.51 The designated sites within the MHPGC Offshore Water and Sediment Quality Study Area are presented on **Figure 2.5**: and discussed in the subsequent section.

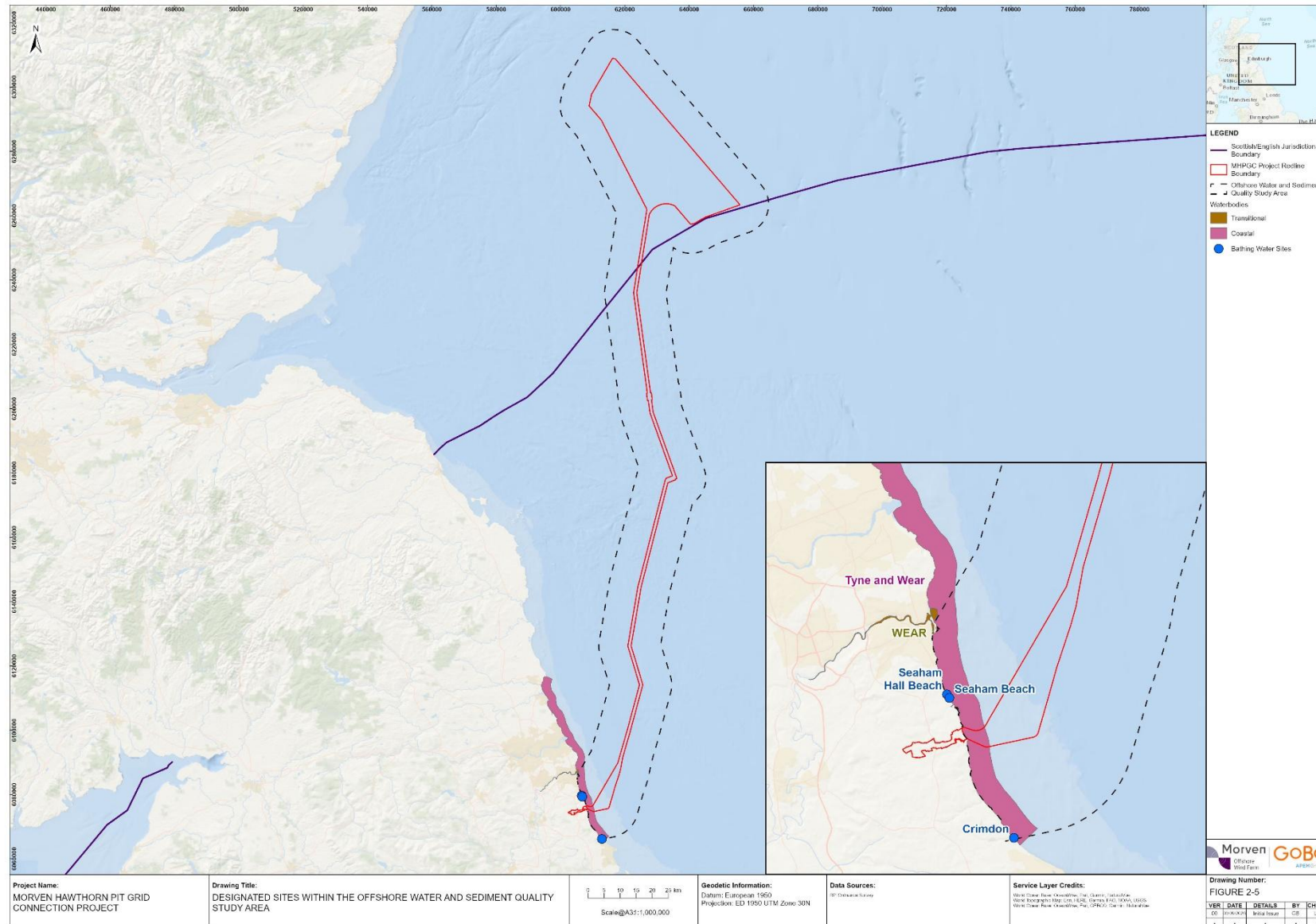


Figure 2.5: WFD Designated Sites within the MHPGC Project Offshore Water and Sediment Quality Study Area

Coastal and Transitional Waterbodies

- 2.4.6.52 Throughout England there are currently 61 designated coastal waterbodies and 105 designated transitional waterbodies, managed and monitored under the WFD legislation. The MHPGC Project PEIR Red Line Boundary overlaps with the Northumbria Transitional and Coastal (TraC) Management Catchment with the landfall situated within the Tyne and Wear coastal waterbody. The latest classification status (2022) is presented for this waterbody in **Table 2.22**. The Offshore Water and Sediment Quality Study does not extend past MHWS and therefore The Wear Transitional Waterbody is outside the 9km buffer and not discussed further in the section.

Table 2.22: Summary of classification status of the Tyne and Wear Coastal Waterbody

Parameter	Coastal Waterbody
Waterbody Name	Tyne and Wear
Waterbody ID	GB650301500002
Surface Area (km ²)	126.569
Hydromorphological Designation	Undesignated
Ecological Status	Good
Biological Quality Elements	Good
Physico-chemical quality elements	High
Supporting elements (Surface Water)	N/A
Hydromorphological supporting elements	Not high
Specific Pollutants	High
Chemical Status	Not required

Bathing Waters

- 2.4.6.53 There are currently 27 designated Bathing Waters across the Northumberland, Durham and Tyne and Wear coastlines, three of which are situated within the MHPGC Offshore Water and Sediment Quality Study Area (**Table 2.23**). Water quality is tested for two types of bacteria, E. coli and intestinal enterococci and Bathing Waters are categorised as 'excellent', 'good', 'sufficient' or 'poor' on the basis of these bacteria levels. As assessed for the 2025 Bathing Water season, Crimdon is currently designated as excellent whereas Seaham Beach and Seaham Hall Beach are currently designated as good.
- 2.4.6.54 Crimdon Bathing Water has a hydrological catchment of approximately 30km² comprised primarily of a mixture of arable and grassland land use with numerous villages throughout. Inputs into the bathing water occur from the Crimdon Beck but are not considered to impact the water quality under normal conditions. Sewage discharges from coastal villages to the north are treated and discharged via a long sea outfall at Horden with storm overflows on this system designed to protect the bathing water quality at Crimdon. Research conducted by the EA over the four-year assessment period (2022-2025) suggests Crimdon does not have a history of macroalgae or phytoplankton blooms.
- 2.4.6.55 Seaham Beach Bathing Water has a hydrological catchment of approximately 6.3km² with land use consisting of arable and grasslands in the upper extent of the catchment and predominately urban in the lower catchment. Riverine inputs into the Bathing Water from Dalton Beck are occasionally responsible for high bacterial counts due to intermittent discharges from the local sewerage system. There are no direct outfalls onto Seaham Beach however discharges to local streams can temporarily impact bathing water quality following periods of high rainfall. Additional storage tanks were constructed in 2015 to reduce the occurrence of spills reaching the bathing water. Research conducted by the EA over the four-year assessment period (2022-2025) suggests Seaham Beach Bathing Water does not have a history of macroalgae or phytoplankton blooms.
- 2.4.6.56 Seaham Hall Beach Bathing Water has a hydrological catchment of approximately 6.7km² with the land use matching that at Seaham Beach due to their proximity. Similarly pollution pressures, macroalgae and phytoplankton concerns are reportedly the same as identified for Seaham Beach.

Table 2.23: Designated Bathing Water Classifications from 2022-2025 Bathing Water Seasons

Designated Bathing Water	Classification (Bathing Water Season)			
	2025	2024	2023	2022
Crimdon	Excellent	Excellent	Good	Excellent
Seaham Beach	Good	Good	Good	Good
Seaham Hall Beach	Good	Good	Sufficient	Good

Nutrient Sensitive Areas and Nitrate Vulnerable Zones

- 2.4.6.57 There are currently 22 NVZs within Northumbria designated as being at risk from agricultural nitrate pollution for the 2025-2028 period. The MHPGC Offshore Water and Sediment Quality Study Area overlaps with the Hawthorn Burn from Source to North Sea NVZ; however, the MHPGC Project is not anticipated to affect or be affected by this designation as releases of nitrates are not associated with the Project.
- 2.4.6.58 The UWWTD (91/271/EEC) aims to protect the environment from the adverse effects of urban wastewater that impact sensitive waters by requiring tertiary treatment at sewage treatment plants. The type of sensitive area determines the form of tertiary treatment required. For example, sensitive bathing waters will be protected by Ultraviolet (UV) treatment, while waters adversely effected by nutrients in discharge will require phosphorous and/or nitrogen reductions. There are two UWWTD sensitive areas within the Offshore Water and Sediment Quality Study Area as defined by Defra (2023) Seaham Hall Beach and Seaham Beach are both considered to be Bathing Water Sensitive Areas. The MHPGC Project is not anticipated to affect or be affected by this designation as releases of wastewater are not associated with the Project

2.4.7 Future baseline conditions

- 2.4.7.1 During the 35-year operational lifetime of the MHPGC Project, the Offshore Water and Sediment Quality baseline can be expected to evolve both on a natural basis and in response to global trends such as climate change and other anthropogenic activities. The Infrastructure Planning (EIA) Regulations 2017, the Marine Works (Environmental Impact Assessment) Regulations 2007 and the Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017 require that "an outline of the likely evolution thereof without implementation of the development as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge" is included. Therefore, an assessment of future baseline conditions, in the absence of the MHPGC Project, has been undertaken and is described within this section.
- 2.4.7.2 The baseline conditions relating to Offshore Water and Sediment Quality are not stationary and will change regardless of the MHPGC Project being constructed. Despite being subject to ongoing research many predictions expect future increases in SPM levels causing reduced water clarity (Thewes *et al.*, 2022; Wilson and Heath, 2019). This is attributed to various marine factors including changing tidal ellipses from sea level rise and bed shear stress increases alongside terrestrial adaptations including increased land-based precipitation and subsequent run-off (Opdal *et al.*, 2019).
- 2.4.7.3 Seawater chemistry is expected to undergo various shifts. Reductions in salinity are projected in Scottish waters by the end of the century due to changes in Atlantic Ocean circulation (Dye *et al.*, 2020). Concurrently, continued uptake of atmospheric CO₂ will lead to lower pH levels and increased ocean acidification. In stratified areas like the northern North Sea, this may result in aragonite and calcite undersaturation (Humphreys *et al.*, 2020). Anticipated rising temperatures will likely extend stratification periods, leading to lower dissolved oxygen levels (Mahaffey *et al.*, 2020).
- 2.4.7.4 Contaminant levels within the sediments and biota of the North Sea have generally been shown to be reducing (OSPAR Commission, 2022). Contaminant release into the North Sea from both land-based sources and the Oil and Gas Industry has been observed to reduce since 2010; this is expected to continue due to improved regulation and diffuse pollution control initiatives (OSPAR Commission, 2017).

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- 2.4.7.5 Sediment-bound contaminants can partition into the dissolved phase at rates influenced by water temperature. Increased temperature correlates with an increased rate of dissolution due to the increased kinetic energy available.. A temperature increase of 1°C between 2000 and 2040, and 1.6°C by 2060, is projected under Representative Concentration Pathway 8.5 (RCP8.5) conditions (NOAA, 2024) however, significant changes in contaminant concentrations in the water column are not anticipated.
- 2.4.7.6 Shifts in bacterial load are also expected. While improved wastewater treatment should reduce point-source inputs, diffuse sources such as agricultural runoff remain uncertain. Changes in precipitation patterns may further influence nutrient loading in coastal areas, potentially reducing local water quality.
- 2.4.7.7 Warming ocean temperatures will likely result in ecological shifts, including increased frequency and intensity of harmful algal blooms and altered phytoplankton dynamics (ClimateXChange, 2017).

2.5 Impact assessment methodology

2.5.1 Overview

- 2.5.1.1 **Volume 1, Chapter 4: Approach to Environmental Impact Assessment, of the PEIR**, sets out the overarching approach that has been used in developing the PEIR. This section describes the technical methods used to determine the sensitivity of the receptors and magnitude of effects and sets out the significance criteria that have been used for the preliminary Offshore Water and Sediment Quality assessment. The methodologies for assessing sensitivity, magnitude and significance for Offshore Water and Sediment Quality assessment are described in more detail below.

2.5.2 Receptor sensitivity

- 2.5.2.1 When defining sensitivity, reference has been made to the criteria levels set out in **Volume 1, Chapter 4: Approach to Environmental Impact Assessment, of the PEIR**. To determine sensitivity of the receptor, the vulnerability of the receptor to the specific impact and its ability to recover and adapt were also considered (see **Table 2.24**).

Table 2.24: Definition of terms relating to the sensitivity of the receptor

Sensitivity	Definition
Very high	The water quality of the receptor supports or contributes towards the designation of an internationally or nationally important feature and/ or has a very low capacity to adapt to any change to the current water quality status. The effect on the receptor is anticipated to be permanent and will not recover.
High	The water quality of the receptor supports or contributes towards the designation of an internationally or nationally important feature and has a moderate to low capacity to adapt to the proposed form of change to current water quality status. The effect on the receptor is anticipated to recover over the long term.
Medium	The water quality of the receptor supports or contributes towards the designation of an internationally or nationally important feature and has a high capacity to adapt to the proposed form of change to current water quality status. The effect on the receptor is anticipated to recover within the medium term.
Low	Specific water quality conditions of the receptor are likely to be able to adapt to change with very little or no impact upon the baseline conditions detectable. The effect on the receptor is anticipated to recover within the short term.
Negligible	The specific water quality conditions of the receptor are not sensitive to the change in question and there will be no change to its baseline condition.

2.5.3 Magnitude of impact

- 2.5.3.1 The magnitude of an impact that could affect Offshore Water and Sediment Quality is influenced by several key factors, including the scale of the change, the spatial extent over which the impact is likely to occur, and the duration and frequency of the impact. When defining the magnitude of the impact, criteria detailed in **Volume 1, Chapter 4: Approach to Environmental Impact Assessment, of the PEIR**, has been followed (see **Table 2.25**).

Table 2.25: Definition of terms relating to the magnitude of an impact

Magnitude	Definition
High	Permanent adverse change to key characteristics of the water quality of the receiving water feature. Water quality status degraded to the extent that a permanent or long-term change (i.e., a WFD reporting cycle) occurs. Inability to meet EQS as a result of the proposed activities.
	Permanent beneficial change to key characteristics of the water quality of the receiving water feature. Water quality status enhanced to the extent that a permanent or long-term change (i.e., a WFD reporting cycle) occurs.

Magnitude	Definition
Medium	Adverse change/deterioration to key characteristics of the water quality of the receiving water feature. Water quality status is likely to take considerable time to recover to baseline conditions. Ability to meet EQS becomes compromised.
	Beneficial change/enhancement to key characteristics of the water quality of the receiving water feature. Water quality status is likely to take considerable time to recover to baseline conditions.
Low	Noticeable temporary, but not considered to be substantial, adverse changes to the water quality of the receiving water feature. Activity is not likely to alter local status to the extent that water quality characteristics change considerably and/ or EQS become compromised.
	Noticeable, temporary but not considered to be, substantial beneficial changes to the water quality of the receiving water feature. Activity is not likely to alter local status to the extent that water quality characteristics change considerably and/ or EQS improve.
Negligible	Adverse changes which are barely discernible from background conditions. Impact will be reversible.
	Beneficial changes which are barely discernible from background conditions.
No change	No discernible change to water quality, sediment quality, or identified receptors over any length of time.

2.5.4 Significance of effect

- 2.5.4.1 The significance of the effect upon Offshore Water and Sediment Quality is determined by correlating the magnitude of the impact and the sensitivity of the receptor. The method employed for this assessment is presented in **Table 2.26**.
- 2.5.4.2 Following the classification of an effect using this methodology, a clear statement will then be made as to whether that effect is significant or not significant. Major and moderate effects are considered to be significant in EIA terms, whilst minor and negligible effects are considered to be not significant in EIA terms. However, professional judgement will also be applied in reaching conclusions as to the significance of effects. Typical definitions for the classification of effects are shown in **Table 2.27**.

Table 2.26: Matrix used for the assessment of the significance of the effect

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

Table 2.27: Significance definitions

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

2.5.5 Assumptions and limitations of the assessment

- 2.5.5.1 In addition to the data limitations and assumptions stated in **Section 2.4.4.15 to 2.4.4.18** the assessments have included the development and use of numerical hydrodynamic and sediment models. These models are robust tools but are subject to a number of assumptions. These include the input parameters (e.g., using a representative sediment grain size for sediment transport, for example), scenario assumptions (e.g., the volume and location of pre-ley trenching released under different release scenarios) as well as uncertainty in the underpinning datasets (e.g., hydrodynamic data and bathymetry data). Such uncertainty is managed through conservatism in the design of the modelling study and the interpretation of the model results in the context of the baseline and using expert judgement. Discussion relating to the performance of the models developed to support the assessment is also set out in **Volume 2, Annex 1.2: Model Design, Validation and Results, of the PEIR**.
- 2.5.5.2 There is additional uncertainty associated with the sediment plume assessment due to activities of the MHPGC Project and/or activities of potential other projects. This arises due to the uncertainty regarding how the seabed geology will respond to the proposed works. There are several factors which determine the exact volume of material that is entrained into the water column; including the exact type of cable installation equipment used, the variability of the forcing conditions at the installation time (i.e., the waves and tidal conditions) and the mechanical properties of the geological units. To address this limitation, a series of potential release scenarios have been considered in **Volume 2 Chapter 1: Physical Processes** and **Volume 2, Annex 1.2: Model Design Validation and Results of the PEIR** based upon the Maximum Design Scenario (MDS).
- 2.5.5.3 There is also uncertainty associated with the specific construction methodology and timing of construction works. Various construction methodologies may be utilised depending upon the site characteristics and whilst broad timeframes are set the precise dates of construction activities

cannot be confirmed at this stage. The assessment methodology accounts for this by assessing a realistic MDS as presented within **Table 2.30**.

2.6 Key parameters for assessment

2.6.1 Scope of the assessment

- 2.6.1.1 The approach to assessment was presented in the MHPGC Project Scoping Report and has been refined in consultation with relevant statutory and non-statutory consultees as detailed in **Section 2.3** and through the MHPGC Project Scoping Opinions received from PINS (on behalf of the SoS) and MD-LOT.
- 2.6.1.2 Impacts for which it is considered there is no pathway to result in likely significant effects have been scoped out of the assessment and these impacts will not be considered further. **Table 2.28** summarises the impacts considered within the scope of the assessment, while a summary of the impacts scoped out of the assessment is presented in **Table 2.29**.

Table 2.28: Impacts scoped into the assessment

Impact	Potential effects scoped into the assessment
Construction phase	
Increased SSC and associated deposition	There is potential for increased SSCs and associated deposition to occur during construction where activities are occurring on the seabed which could affect water quality. Such activities include seabed preparation and cable installation.
Impacts from the release of sediment-bound contaminants	There is potential for increased concentrations of previously sediment-bound contaminants to occur within the water column during construction where activities are disturbing the seabed which could affect water quality. Such activities include seabed preparation and cable installation.
Impacts to bathing water quality	The potential for construction activities to impact bathing water quality may occur where Project activities disturb the nearby seabed. Increases to SSC and mobilisation of previously sediment bound contaminants from seabed preparation and cable installation (including trenchless techniques) could theoretically impact bathing water quality within English Waters.
Impacts to the achievement of GES	The potential for construction activities to impact WFD waterbodies within English Waters may occur where project activities disturb the nearby seabed. Increases to SSC and mobilisation of previously sediment bound contaminants from seabed preparation and cable installation (including trenchless techniques) could potentially impact the potential to achieve GES.
O&M phase	
Impacts to sediment transport and sediment transport pathways due to the presence of infrastructure	There is a potential pathway of impact for installed project infrastructure such a cable protection which can influence sediment transport pathways through changes to the hydrodynamic regime such as water flows.
Increased SSC and associated deposition	There is potential for increased SSCs and associated deposition to occur within the water column and on the seafloor during O&M where activities are occurring on the seabed which could affect water quality. Such activities include cable repair and reburial.
Impacts from the release of sediment-bound contaminants	There is potential for increased concentrations of previously sediment-bound contaminants to occur within the water column during O&M where activities are disturbing the seabed which could affect water quality. Such activities include cable repair and reburial.
Impacts to bathing water quality	The potential for O&M activities to impact bathing water quality may occur where project activities disturb the seabed. Increases to SSC and mobilisation of previously sediment bound contaminants from cable repairs could theoretically impact bathing water quality within English Waters.

Impact	Potential effects scoped into the assessment
Impacts to the achievement of GES	The potential for O&M activities to impact WFD waterbodies within English Waters may occur where project activities disturb the nearby seabed. Increases to SSC and mobilisation of previously sediment bound contaminants from any nearby cable repairs could potentially impact the potential to achieve GES.
Decommissioning phase	
Increased SSC and associated deposition	There is potential for increased SSCs and associated deposition to occur during decommissioning where activities, such as cable removal occur on the seabed which could affect water quality.
Impacts from the release of sediment-bound contaminants	There is potential for increased concentrations of previously sediment-bound contaminants to occur within the water column during decommissioning where activities, such as cable removal disturb the seabed which could affect water quality.
Impacts to bathing water quality	The potential for decommissioning activities to impact bathing water quality may occur where project activities disturb the seabed. Increases to SSC and mobilisation of previously sediment bound contaminants caused by the removal of cables could theoretically impact bathing water quality within English Waters.
Impacts to the achievement of GES	The potential for decommissioning activities to impact WFD waterbodies within English Waters may occur where project activities disturb the seabed. Increases to SSC and mobilisation of previously sediment bound contaminants caused by the removal of cables could potentially impact the potential to achieve GES.

Table 2.29: Impacts scoped out of the assessment

Impact	Justification for scoping out of the assessment
Construction phase	
Increased risk of introduction and spread of INNS	The risk relating to INNS will be assessed within Volume 2, Chapter 3: Benthic Subtidal and Intertidal Ecology, of the PEIR and managed through the EMP and compliance with relevant guidance.
Accidental pollution	Embedded mitigation will include vessel compliance with MARPOL, as well as the provision of a MPCP to include emergency plans for pollution incidents and securing best practice measures through an EMP. Section 2.7 outlines the commitments relevant to Offshore Water and Sediment Quality adopted as a part of the MHPGC Project.
Impacts to shellfish water protected areas	Impacts to Shellfish water protected areas are scoped out (following approval through the Scoping Opinion) due to not being identified within or in proximity to the MHPGC Offshore Water and Sediment Quality Study Area.
Impacts to Scottish bathing water quality	Impacts to Scottish bathing water quality are scoped out (following approval through the Scoping Opinion) due to not being identified within or in proximity to the MHPGC Offshore Water and Sediment Quality Study Area.
O&M phase	
Increased risk of introduction and spread of INNS	The risk relating to INNS will be assessed within Volume 2, Chapter 3: Benthic Subtidal and Intertidal Ecology, of the PEIR and managed through the EMP and compliance with relevant guidance.
Accidental pollution	Embedded mitigation will include vessel compliance with MARPOL, as well as the provision of a MPCP to include emergency plans for pollution incidents and securing best practice measures through an EMP. Section 2.7 outlines the commitments relevant to Offshore Water and Sediment Quality adopted as a part of the MHPGC Project.
Impacts to shellfish water protected areas	Impacts to Shellfish water protected areas are scoped out (following approval through the Scoping Opinion) due to not being identified within or in proximity to the MHPGC Offshore Water and Sediment Quality Study Area.

Impact	Justification for scoping out of the assessment
Impacts to Scottish bathing water quality	Impacts to Scottish bathing water quality are scoped out (following approval through the Scoping Opinion) due to not being identified within or in proximity to the MHPGC Offshore Water and Sediment Quality Study Area.
Decommissioning phase	
Increased risk of introduction and spread of INNS	The risk relating to INNS will be assessed within Volume 2, Chapter 3: Benthic Subtidal and Intertidal Ecology, of the PEIR and managed through the EMP and compliance with relevant guidance
Accidental pollution	Embedded mitigation will include vessel compliance with MARPOL, as well as the provision of a MPCP to include emergency plans for pollution incidents and securing best practice measures through an EMP. Section 2.7 outlines the commitments relevant to Offshore Water and Sediment Quality adopted as a part of the MHPGC Project.
Impacts to shellfish water protected areas	Impacts to Shellfish water protected areas are scoped out (following approval through the Scoping Opinion) due to not being identified within or in proximity to the MHPGC Offshore Water and Sediment Quality Study Area.
Impacts to Scottish bathing water quality	Impacts to Scottish bathing water quality are scoped out (following approval through the Scoping Opinion) due to not being identified within or in proximity to the MHPGC Offshore Water and Sediment Quality Study Area.

2.6.2 Maximum design scenario

- 2.6.2.1 The MDS for each impact identified in **Section 2.6.1** has been selected as the design scenario having the potential to result in the greatest effect on an identified receptor or receptor group. The MDS presented in **Table 2.30** have been selected from the parameters provided in **Volume 1, Chapter 2: Project Description, of the PEIR**, and methodology outlined in **Volume 1, Chapter 4: Approach to Environmental Impact Assessment, of the PEIR**.

Table 2.30: MDS relevant for the assessment of potential impacts on Offshore Water and Sediment Quality

Impact	MDS	Explanation
Note: The cable length measurements are for the maximum distance between the OSP and trenchless drill exit pit unless otherwise stated. For clarity one trench length is as follows: - OSP to exit pit – up to 324.67km; - OSP to MHWS – up to 326.00km - Scottish waters (OSP to Scottish-English Offshore Waters Boundary) – up to 98km; - English waters (English offshore waters boundary to exit pit) – up to 226.67km; - English waters (English offshore waters boundary to MHWS) – up to 228.00km.		
Construction		
Increased SSC and associated deposition - impacts on sediment and water quality.	Construction duration: up to four years. Sandwave clearance: - Sandwave clearance activities undertaken using Mass flow excavator (MFE) over an approximate four month duration; - Sediment disturbance rate is 1000kg/s - Surface width of up to 28m per trench and base width of up to 20m per trench; <u>Per trench = 1,484,000m²</u> - Scottish waters: 31km length × 28m width = 868,000m² - English waters: 22km length × 28m width = 616,000m² <u>Total (up to two trenches) = 2,968,000m²</u> - Scottish waters: 1,736,000m² - English waters: 1,232,000m² Cable installation (trenching): - Installation via trenching of up to 324.67km of cable, with a trench width of up to 2.1m and a depth of up to 3m; - Trenching rate is 400m/hr. <u>Per trench = 2,045,421m³</u> - Scottish waters: 98km length × 2.1m width x 3m depth = 617,400m²	The MDS is defined by the maximum spatial extent of seabed disturbance from cable installation, route preparation, sandwave clearance and landfall works. Landfall works and vessel interactions are defined by the maximum footprint of exit pits, floatation pits, anchor spreads and jack-up activities. The MDS is inherently precautionary, assuming all maximum parameters occur concurrently with no reduction for overlapping disturbance footprints. Site preparation: - Sandwave clearance activities may be undertaken using a range of techniques (plough and MFE), over an approximate four-month duration in both Scottish and English waters. Releases via both are modelled; - A conservative MFE near-bed sediment release rate of 1000 kg/s conservatively estimated based on the MDS trench cross section dimensions, the speed of progress of the tool and the bulk density of the local sediment type;

	- English waters: 226.67km length × 2.1m width × 3m depth = 1,428,021m³ <u>Total (up to two trenches) = 4,090,842m³</u> - Scottish waters: 1,234,800m³ - English waters: 2,856,042m³ Trenchless techniques (landfall) (English waters): - Up to four boreholes. Trenchless installation via techniques such as Horizontal Directional Drilling (HDD), (conduit diameter of 1.6m, conduit length of 2,000m). Drilling fluid discharge up to 180m³ each and up to 1,083m³ total. - Trenchless drill punchout will be up to approximately 1690m offshore of MHWS in water depths up to 20m Lowest Astronomical Tide (LAT). - Up to four exit pits (140m long × 50m wide × 5m deep). Area up to 7,000m² each; 28,000m² total. Volume up to 18,667m³ each; 74,668m³ total. - Up to two floatation pits (240m long × 55m wide × 5m deep). Area up to 13,200m² each; 26,400m² total. Volume up to 39,167m³ each; 78,334m³ total.	- Dredge spoil release is simulated as an instantaneous release at the water surface. 10% of 11,000m³ is assumed to form the passive phase of the plume; - Other seabed preparation such as sandwave clearance plough, boulder clearance and pre-lay grapnel run (PLGR) may be used but do not represent the MDS in terms of potential increases in SSC and associated deposition. Cable installation: - Trenching may be carried out by mechanical cutting, jet trenching, ploughing or Controlled Flow Excavator (CFE). Jet trenching is anticipated to generate the highest SSC and has therefore been assumed as the MDS; - Suspension of 100% of material from the trench cross section will give the MDS for sediment disturbance; - Conservatively assumes 100% fluidisation of material expelled from a U-shaped trench. In reality trenching will move a proportion of material rather than bringing it fully into suspension; - Offshore export cable corridor trenching modelling assumes sediment release along the whole offshore export cable corridor; - Cable routes cross a variety of seabed materials, and burial depth may be up to 3m in some areas. The assessment therefore considers this upper bound to define the MDS in terms of sediment disturbance; - Trenching rate will be up to 400m/hr. Trenchless techniques (landfall): - Trenchless installation methods include HDD and Direct Pipe; - HDD represents the maximum MDS for sediment disturbance due to the potential for drilling fluid release (frac-out); - The MDS for sediment disturbance by trenchless installation is given by applying a conservative Bentonite concentration of 100 kg/m³ in drilling mud, the volume of spoil released is equal to the maximum volume of the bore; - Other stages of drilling (pilot hole drilling and stages of reaming) may result in smaller release events separated in
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		time. But the MDS is considered as a release of drilling mud from a single conduit; - Two drills could be operational at one time; however, the timing of drilling will be staggered meaning there will not be an occasion where punch-out occurs simultaneously (or within 6 hours of each other). - Trenchless drill punchout will be up to approximately 1,690m offshore of MHWS in water depths up to -20m LAT.
Impacts from the release of sediment-bound contaminants	The MDS, as described above, for changes to SSC and associated deposition during the construction phase.	The justification, as described above, for changes to SSC and associated deposition during the construction phase provides the MDS because of maximum mobilisation of sediment bound contaminants which can impact bathing water quality and achievement of GES.
Impacts to bathing water quality		
Impacts to the achievement of GES		
Operation and Maintenance		
Changes to sediment transport and sediment transport pathways due to the presence of infrastructure. (including secondary scour assessment)	Cable protection (English and Scottish waters): - Offshore export cable: Total of up to 8.3% (equivalent to 27km) of the total route length within Scottish and English waters may require external protection using rock berm installation. Rock berms may be up to 14m wide and 2m high and side slope of 1:3. <u>Area per trench = 378,980m²</u> <u>Total area (up to two trenches) = 757,960m²</u> <u>Volume per trench = 433,120m³</u> <u>Total volume (up to two trenches) = 866,240m³</u> - Offshore export cable: Total of up to 8km of the total route length within Scottish and English waters may require external protection using a Cable Protection System (CPS). CPS may be up to 0.8m wide and 0.8m high. <u>Area per trench = 6,400m²</u> <u>Total area (up to two trenches) = 12,800m²</u> - Export cable crossing: Up to 16 crossings using either rock installation or concrete mattresses within Scottish and English waters. Each crossing will be up to 200m (length) x 18m (wide) x 2m (height). <u>Per crossing = 3,600m²</u> <u>Total (up to 16 crossings) = 57,640m²</u>	Cable protection (English and Scottish waters): - Cable protection has the potential to change sediment transport pathways through alteration of the tidal and wave regimes. - Rock berms present the potentially larger local obstacle above the seabed. - CPS is typically an articulated circular cladding installed around the cables to provide additional protection against movement, impact or abrasion. The CPS might be buried in the seabed or surface laid.

Increased SSC and associated deposition - impacts on sediment and water quality.	O&M duration: up to 35 years - Up to 41 export cable repairs, each with a length of up to 2km and a 20m width. Up to 40,000m2 of temporary disturbance each; 1,640,000m2 total; - Up to 4% of the cable route length, up to 13km, may require remediation per year. Remediation may occur in different locations and for varying lengths, but it is anticipated that up to 13km of export cable length per year per trench will require remediation with a maximum width of 20m. Up to 522,240m2 of temporary disturbance per year; total 18,278,400m2.	Cable repairs (English and Scottish waters): - The greatest foreseeable number of cable reburial and repair events is considered to be the MDS for sediment dispersion; - The majority of cable repairs are anticipated to be c.500-1000m. The MDS utilises the area of disturbance by repair which provides a highly conservative area; - The repair of cables may be undertaken using similar techniques to those employed during installation, therefore the potential increases in SSC and deposition would be in-line with the construction phase.
Impacts from the release of sediment-bound contaminants	The MDS, as described above, for changes to SSC and associated deposition during the O&M phase.	The justification, as described above, for changes to SSC and associated deposition during the O&M phase provides the MDS because of maximum mobilisation of sediment bound contaminants which can impact bathing water quality and achievement of GES.
Impacts to bathing water quality		
Impacts to the achievement of GES		
Decommissioning		
Increased SSC and associated deposition - impacts on sediment and water quality.	The MDS, as described above, for changes to SSC and associated deposition during the construction phase.	The justification, as described above, for changes to SSC and associated deposition during the construction phase, provides the MDS for decommissioning because of maximum mobilisation of sediment bound contaminants which can impact bathing water quality and achievement of GES.
Impacts from the release of sediment-bound contaminants		
Impacts to bathing water quality		
Impacts to the achievement of GES		

2.7 Commitments adopted as part of the MHPGC Project

- 2.7.1.1 As set out in **Volume 1, Chapter 4: Approach to Environmental Impact Assessment, of the PEIR**, and **Volume 1, Annex 4.1: Draft Commitments Register, of the PEIR**, several measures have been adopted as part of the MHPGC Project to reduce the potential for impacts on Offshore Water and Sediment Quality.
- 2.7.1.2 Embedded mitigation includes the following measures as identified in the Institute of Sustainability & Environmental Professionals (ISEP) (formerly the Institute of Environmental Management and Assessment (IEMA)) Guide to Shaping Quality Development (IEMA, 2015):
- Primary mitigation - measures included as part of the project design. ISEP (formerly IEMA) describes these as “modifications to the location or design of the development made during the pre-application phase that are an inherent part of the project and do not require additional action to be taken”. This includes modifications arising through the iterative design process. These measures will be secured through the consent itself through the description of the project and the parameters secured in the DCO and marine licence, or both;
 - Tertiary mitigation – ISEP describes these as “actions that would occur with or without input from the EIA feeding into the design process. These include actions that will be undertaken to meet other existing legislative requirements, or actions that are considered to be standard practices used to manage commonly occurring environmental effects”.
- 2.7.1.3 During the site selection processes avoidance of the Noses Point dredge and disposal site was taken in account in the design of the approach to landfall. Further information regarding site selection can be found within **Volume 1, Chapter 3: Site Selection & Consideration of Alternatives, of the PEIR**. Embedded mitigation measures that will form part of the final design (and are established legislative requirements/good practice, or both) have been taken into account as part of the initial assessment of likely significant effects presented in **Section 2.8** (i.e., the initial determination of impact magnitude and significance of effects assumes implementation of these measures). This ensures measures that the Applicant is committed to are considered in the assessment of likely significant effects.
- 2.7.1.4 Where an assessment identifies likely significant adverse effects, secondary mitigation measures may be applied. These are measures that could further prevent, reduce or, where possible, offset these effects. They are defined by ISEP as “actions that will require further activity to achieve the anticipated outcome” and may be imposed as part of the planning consent, or through inclusion in the ES. These include measures required to reduce the significance of environmental effects and may be secured through an environmental management plan. For effects where secondary mitigation measures are proposed, both pre-mitigation and residual effects are presented.
- 2.7.1.5 The measures relevant to Offshore Water and Sediment Quality are outlined in **Table 2.31**. As there is a secured commitment to implementing these measures, they are considered inherently part of the design of the MHPGC Project and have therefore been considered in the assessment of likely significant effects presented in **Section 2.8**.

Table 2.31: Embedded commitments relevant to Offshore Water and Sediment Quality implemented as part of the MHPGC Project

Commitment number	Measure adopted	How the measure will be secured
CoT06/MM-006	An Outline Offshore Environmental Management Plan (OEMP) will be prepared and submitted with the application for development consent and Marine Licence(s) to the Scottish Ministers. A Detailed OEMP will be developed in accordance with the Outline OEMP. The Outline OEMP will include: • An Outline Marine Biosecurity Plan; • An Outline Marine Pollution Contingency Plan; • An Outline Marine Mammal Mitigation Protocol; • An Outline Vessel Traffic Management Plan; • An Outline Navigational Safety Plan; • A chemical risk assessment that includes information such as how chemicals will be used, stored, and transported, in line with recognised best-practice guidance; • A dropped-object protocol will be established to cover the reporting and recovery of any items lost overboard that could endanger other sea users; • A Marine Emergency Action Card outlining the steps to be followed in the case of a marine emergency; • Provisions for the handling and disposal of waste.	Will be secured via dML condition and/or condition of Scottish Marine Licence(s)
CoT07/MM-007	An Outline Offshore Operations and Maintenance Plan will be prepared and submitted as part of the application for development consent and Marine Licence(s) to the Scottish Ministers. A Detailed Offshore Operations and Maintenance Plan will be produced prior to entering the operation and maintenance phase.	Will be secured via dML condition and/or condition of Scottish Marine Licence(s)
CoT08/MM-010	An Outline Offshore Cable Specification and Installation Plan (CSIP) will be prepared and submitted with the application for development consent and Marine Licence(s) to the Scottish Ministers. It will include cable burial to be the preferred option for cable protection, where practicable. A Detailed CSIP will be developed prior to construction in accordance with the Outline CSIP. The Outline CSIP will include (but is not limited to): • A Cable Burial Risk Assessment (CBRA), which will define burial depths and safeguards, based on seabed conditions and external aggression and climate change hazards, to keep the offshore export cables protected and compliant through all project phases while upholding navigational and environmental safety; • The implementation, management and monitoring of cable protection.	Will be secured via dML condition and/or condition of Scottish Marine Licence(s)
CoT14/MM-002	An Offshore Construction Method Statement (CMS) will be produced and implemented prior to construction.	Will be secured via dML condition and/or condition of Scottish Marine Licence(s)

Commitment number	Measure adopted	How the measure will be secured
CoT37	An Outline Marine Pollution Contingency Plan (MPCP) will form part of the OEMP, which will be prepared and submitted with the application for development consent and Marine Licence(s) to the Scottish Ministers. The Outline MPCP will describe the hazards, response strategies, and step-by-step actions for handling spills, contaminant releases (including details of non-toxic, biodegradable drilling fluids), and vessel collisions during construction or operations below MHWS, and will include all essential emergency contacts and information. A Detailed MPCP will be developed in accordance with the Outline MPCP.	Will be secured via dML condition.
CoT39	Dredge and disposal activity within English Waters will be undertaken in accordance with the Dredge and Disposal Site Characterisation Report that will be prepared and submitted with the application for development consent.	Will be secured via dML condition.
CoT44	An Offshore Decommissioning Programme will be developed prior to decommissioning and will be adhered to. It will be in line with the latest relevant legislation and available guidance at the time of production, as far as reasonably practicable.	Will be secured via dML condition and/or condition of Scottish Marine Licence(s)

2.8 Assessment of impacts

2.8.1 Overview

- 2.8.1.1 This section includes the assessment of the impacts to Offshore Water and Sediment Quality arising from the construction, O&M and decommissioning phases of the MHPGC Project. A summary of the effects is presented in **Table 2.39**.

2.8.2 Construction phase

Increased SSC and associated deposition - impacts on sediment and water quality

- 2.8.2.1 During the construction phase of the MHPGC Project, activities such as seabed preparation and cable installation will inevitably disturb sediments. Such disturbance will result in the resuspension of sediments into the water column, producing sediment plumes in both Scottish and English waters (depending on the location of activity). Following a period of settlement this disturbance will give rise to localised deposition.
- 2.8.2.2 The presence of elevated SSCs can adversely affect water quality primarily through a reduction in water clarity which subsequently can reduce the penetration depth of natural light within the water column. The increased turbidity may reduce primary productivity and consequently increase bacterial survival rates. Sediment resuspension may release nutrients previously bound within the seabed such as nitrogen and phosphorous into the water column. Elevated nutrient concentrations may increase the risk of localised eutrophication occurring through rapid increases to phytoplankton populations and subsequent decreases to dissolved oxygen through the decomposition process following depletion of the nutrients. Dissolved oxygen is a critical indicator of water quality and reduced oxygen levels have the ability to negatively impact marine organisms that rely on oxygen rich environments.
- 2.8.2.3 The aforementioned pathways have the potential to be induced by the construction activities associated with the MHPGC Project. As described within the MDS (**Table 2.30**), sediment plumes will be generated in the marine environment from seabed disturbance originating from the following construction activities:
- Site preparation via MFE;
 - Cable installation via jet trenching;
 - Drilling fluid releases from HDD at the landfall location.
- 2.8.2.4 In order to make landfall within English waters of the MHPGC Project PEIR Red Line Boundary, trenchless techniques will be utilised (CoT13). This will include the use of drilling fluids such as bentonite which may increase SSC within the water column when the drill punchout occurs. As per **Table 2.30** this will be located approximately 1,690m offshore at >20m water depth. Bentonite is a non-toxic, inert, natural clay mineral (<63µm particle diameter), and is a key component of drilling muds used in marine construction. It is included in the 'List of Notified Chemicals' approved for use and discharge into the marine environment and is classified as a Group E substance under the Offshore Chemical Notification Scheme. Substances in Group E are defined as the group least likely to cause environmental harm and are "readily biodegradable and non-bioaccumulative". This is further supported by bentonite being included on the OSPAR List of Substances Used and Discharged Offshore which are considered to Pose Little or No Risk to the Environment.
- 2.8.2.5 Aside from the potential for increased turbidity from the release of bentonite, no other potential deterioration in water or sediment quality, such as the introduction of contaminants or nutrients, is anticipated due to bentonite or other drilling fluids properties.
- Receptor sensitivity – Scottish Waters
- 2.8.2.6 Undesignated waters within the MHPGC Offshore Water and Sediment Quality Study Area, are considered to be resistant to temporary reductions in water clarity and subsequent potential bacterial count increases arising from construction activities. Therefore, it is considered that the receptor sensitivity for undesignated waters is considered to be **low**.

Receptor sensitivity – English Waters

- 2.8.2.7 Offshore Water and Sediment Quality receptors have been split into three distinct categories (bathing waters, WFD coastal and undesignated waters) in order to accurately classify their sensitivity. Each category of receptors has been assessed on an individual basis due to the varying classifications of each receptor in relation to their EQS.
- 2.8.2.8 All three Bathing waters are designated as Good or Excellent and contribute towards the designation of a nationally important feature. As coastal waters are inherently dynamic systems and results from the previous four bathing seasons are combined to determine the classification the Bathing Waters are therefore considered to possess a high capacity to accommodate short term changes within natural variation. Therefore, it is considered that the receptor sensitivity for bathing waters is considered to be **medium**.
- 2.8.2.9 The Tyne and Wear WFD coastal waterbody is currently designated as GES in the most recent EA classification. This indicates a waterbody with stable, healthy and resilient baseline conditions that possess a high capacity to adapt to change. Therefore, it is considered that the receptor sensitivity for WFD coastal and transitional waterbodies is considered to be **medium**.
- 2.8.2.10 Undesignated waters within the MHPGC Offshore Water and Sediment Quality Study Area, are considered to be resistant to temporary reductions in water clarity and subsequent potential bacterial count increases arising from construction activities. Therefore, it is considered that the receptor sensitivity for undesignated waters is considered to be **low**.

Magnitude of impact

- 2.8.2.11 An assessment of the potential SSC increases is presented within **Volume 2, Chapter 1: Physical Processes of the PEIR**. The conclusions of this Offshore Water and Sediment Quality chapter are primarily based upon this sediment plume assessment. Further details relating to the methodology are presented in full within **Volume 2, Annex 1.2: Model Design, Validation and Results, of the PEIR**.
- 2.8.2.12 A summary of the results relevant to Offshore Water and Sediment Quality in regard to increased SSC and associated deposition are presented below.
- 2.8.2.13 Four main zones of effect are predicted for each of the seabed disturbance activities based on the distance along the tidal axis from the activity. Within each of these, the SSC elevations are primarily controlled by the sediment volume, the resuspension height/release above the seabed, and the ambient current speed and direction at the time.
- 0 to 50m - Zone of highest SSC increase and greatest likely thickness of deposition. All gravel sized sediment likely deposited in this zone, also a large proportion of sands that are not resuspended high into the water column, alongside most or all dredge spoil in the active phase.
 - At the time of active disturbance: very high SSC increase (tens to hundreds of thousands of mg/l) lasting for the duration of active disturbance plus up to 30 minutes following end of disturbance; sands and gravels may deposit in local thicknesses of tens of centimetres to several metres; fine sediment is unlikely to deposit in measurable thickness.
 - More than one hour after the end of active disturbance: SSC is <50mg/l; no measurable ongoing deposition.
 - 50 – 500m - Zone of measurable SSC increase and measurable, but lesser thickness of deposition. Mainly sands that are released or resuspended higher in the water column and resettling to the seabed whilst being advected by ambient tidal currents.
 - At the time of active disturbance: high SSC increase (hundreds to thousands of mg/l) lasting for the duration of active disturbance plus up to 30 minutes following end of disturbance; sands and gravels may deposit in local thicknesses of up to tens of centimetres; fine sediment is unlikely to deposit in measurable thickness.
 - More than one hour after end of active disturbance: SSC is <10mg/l; fine sediment is unlikely to deposit in measurable thickness.
 - Deposition thicknesses of 5 cm or more may occur (will be limited to) up to approximately 100m from activities causing sediment disturbance.
 - Deposition thicknesses of 1 cm or more may occur (will be limited to) up to approximately 200m from activities causing sediment disturbance.

- Measurably higher SSC of hundreds mg/l or more may occur (will be limited to) up to approximately 200m from activities causing sediment disturbance (the distance within which most sand and gravel will have resettled and only finer sediment remains in suspension).
- 500m up to the 9km tidal excursion buffer - Zone of lesser but measurable SSC increase and no measurable thickness of deposition. Mainly fines that are maintained in suspension for more than one tidal cycle and are advected by ambient tidal currents.
 - At the time of active disturbance: low to intermediate SSC increase (tens to low hundreds of mg/l) as a result of any remaining fines in suspension, only within a narrow plume (tens to a few hundreds of metres wide, SSC decreasing rapidly by dispersion to ambient values within one day after the end of active disturbance; fine sediment is unlikely to deposit in measurable thickness.
 - One to six hours after end of active disturbance: decreasing to low SSC increase (tens of mg/l); fine sediment is unlikely to deposit in measurable thickness.
 - Six to 24 hours after end of active disturbance: decreasing gradually through dispersion to background SSC (no measurable local increase); fine sediment is unlikely to deposit in measurable thickness. No measurable change from baseline SSC after 24 hours to 48 hours following cessation of activities.
- Beyond the 9km tidal excursion buffer (or anywhere not tidally aligned to the active sediment disturbance activity)
 - There is no expected effect or change to SSC nor a measurable sediment deposition.

2.8.2.14 The MHPGC construction activities are not anticipated to affect either phytoplankton or dissolved oxygen levels beyond natural variation as nutrient releases are not expected to exceed levels observed during storm events. All effects are anticipated to be temporary in nature due to the short-term discrete nature of the MHPGC Project construction activities. In addition to the absence of significant nutrient releases, there are no outfalls or discharges associated with the project which may be toxic or persistent within the marine environment. Therefore, the proposed activities are not expected to cause a reduction in the dissolved oxygen in the water column. Consequently, no source-receptor pathways are identified for a deterioration of dissolved oxygen, phytoplankton blooms or eutrophication as a result of the proposed construction activities.

2.8.2.15 Bentonite is a non-toxic, inert, natural clay material with a particle size less than 63µm. It is included in the List of Notified Chemicals approved for use and discharge into the marine environment and is classified as a Group E substance under the Offshore Chemical Notification Scheme. Substances in Group E are defined as the group least likely to cause environmental harm and are “*readily biodegradable and non-bioaccumulative*”. This is further supported by bentonite being included on the OSPAR List of Substances Used and Discharged Offshore which are considered to pose little or no risk to the environment. As such bentonite may persist in suspension for hours or days (depending on the wave and tidal conditions) following its release, becoming diluted to very low concentrations (indistinguishable from natural background levels and variability) within a few tidal cycles. The majority of the plume will be advected in the direction of the ambient tidal currents, which are aligned as a primarily north-south pattern as presented in **Volume 2, Chapter 1: Physical Processes, of the PEIR**. The transport direction will depend upon the tidal state (flood/ebb) during release, and it is expected that the plume would be widely dispersed before settling. As a result, it is not expected to accumulate anywhere within the Offshore Water and Sediment Quality Study Area at a measurable thickness.

2.8.2.16 Deterioration in water quality due to increased SSC and deposition will remain highly localised within the Offshore Water and Sediment Quality Study Area with nearly all measurable deposition occurring within 50m of the disturbance and SSC decreasing to ambient concentrations within one day following cessation of activities across the Offshore Water and Sediment Quality Study Area. Following dispersion of construction activity sediment plumes, UV light penetration will increase, and bacterial counts will return to baseline conditions. The timescales associated with this return to baseline conditions are dependent on localised factors including light radiation and oxidative stress (Rozen and Belkin, 2001). The presence of fine material within the central and southern sections of the offshore extent of the MHPGC Project PEIR Red Line Boundary may extend the duration of fine

sediment plumes in comparison to sand and gravel dominated areas such as those in Scottish Waters.

- 2.8.2.17 Therefore, it is considered that the magnitude of increased SSC and associated deposition which could result in impacts on sediment and water quality, during the construction phase, is **low adverse**.

Significance of effect

- 2.8.2.18 Overall, it is considered that the receptor sensitivity is **medium or low** and the magnitude of impact is **low adverse**. Therefore, the effect of increased SSC and associated deposition, during the construction phase, is considered to be **minor adverse**, which is not significant in EIA terms.

Additional mitigation and residual effect

- 2.8.2.19 No additional Offshore Water and Sediment Quality mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the embedded commitments outlined in **Table 2.31**) was not deemed to be significant.
- 2.8.2.20 Therefore, the residual effect of increased SSC and associated deposition in terms of impacts on sediment and water quality, during the construction phase, is considered to be **minor adverse**, which is not significant in EIA terms.

Impacts from the release of sediment-bound contaminants

- 2.8.2.21 As described in **Paragraph 2.8.2.1** construction activities that disturb the seabed have the potential to increase SSC and subsequently generate sediment plumes within the marine environment of both the English and Scottish waters of the Offshore Water and Sediment Quality Study Area. Whilst resuspended into the water column, sediment-bound contaminants (PAHs, PCBs, PBDEs, OCPs, organotins and metals) have the potential to be released into the water column and adversely affect water quality.
- 2.8.2.22 The outcome of this impact is highly dependent upon the existing concentrations and nature of the contamination present within the sediment. The magnitude of impact will be subject to the baseline level of sediment contamination, with increased magnitude of impact correlating with higher contamination levels and vice versa.

Receptor sensitivity – Scottish Waters

- 2.8.2.23 Undesignated waters within the MHPGC Offshore Water and Sediment Quality Study Area such as those within the northern sections of the offshore extent of the MHPGC Project PEIR Red Line Boundary, do not contribute towards the designation of internationally or nationally important features and are able to tolerate temporary change with very little impact upon the baseline conditions. Therefore, it is considered that the receptor sensitivity for undesignated waters is **low**.

Receptor sensitivity – English Waters

- 2.8.2.24 Due to the fact that the qualifying features of the designated Bathing Waters are not influenced by sediment contamination, alongside Seaham Hall Beach, Seaham Beach and Crimdon Beach maintaining Good or Excellent classifications they are considered to possess a high capacity to accommodate the changes within natural variation. Therefore, it is considered that the receptor sensitivity for designated bathing waters is **medium**.
- 2.8.2.25 The Tyne and Wear WFD coastal waterbody is currently designated as GES in the most recent EA classification. This indicates a waterbody with stable, healthy and resilient baseline conditions that possess a high capacity to adapt to change. Furthermore, chemical status including that of priority hazardous substances and other pollutants such as the indicator PAH Benzo(a)pyrene does not require assessment for the most recent classification in all English waterbodies. This is attributed to a change of methods alongside an increased evidence base for the 2019 assessment that caused all waterbodies to fail on chemical status. Without the introduction of ubiquitous, persistent, bioaccumulative, and toxic substances (uPBTs) chemical status is deemed comparable to previous years assessments (Defra, 2025). The most recent of which in 2016 deemed the Tyne and Wear to have Good chemical Status. Therefore, it is considered that the receptor sensitivity for WFD coastal and transitional waterbodies is **medium** in respect of releases of sediment bound contamination.
- 2.8.2.26 Undesignated waters within the MHPGC Offshore Water and Sediment Quality Study Area such as those within the central and northern sections of the offshore extent of the MHPGC Project PEIR Red

Line Boundary, do not contribute towards the designation of internationally or nationally important features and are able to tolerate temporary change with very little impact upon the baseline conditions. Therefore, it is considered that the receptor sensitivity for undesignated waters is **low**.

Magnitude of impact

- 2.8.2.27 Site-specific sediment sampling (Gardline, 2024; 2025) across the offshore extent of the MHPGC Project PEIR Red Line Boundary present the details relating to sediment contamination levels. A summary of results relevant to the Offshore Water and Sediment Quality chapter are presented within **Section 2.4.5**. These surveys indicate that sediment contamination levels within Scottish Waters and northern and central areas of the offshore extent of the MHPGC Project PEIR Red Line Boundary within English waters are low. No samples exceeded the relevant guidance thresholds (Marine Scotland/CEQG) at any location with Scottish Waters. Similarly, within the central areas of the offshore extent of the MHPGC Project PEIR Red Line Boundary concentrations of all contaminants were reported to be low with no exceedances of recognised guidance thresholds (Cefas/CEQG) identified.
- 2.8.2.28 Within the southern section of the MHPGC Project PEIR Red Line Boundary, contamination concentrations are substantially higher than the central and Scottish equivalents with fractions of fine sediments similarly elevated. Concentrations of PCBs, organotins and OCPs were widely reported to be below the thresholds across the entire MHPGC Project with only two exceedances of AL 1 identified at Stations ENV221 and ENV205 for DDT concentrations.
- 2.8.2.29 Numerous exceedances of the Cefas and CEQG threshold values occur across the various metal and PAHs analyte groups. Of the eight metals concentrations of arsenic, nickel, lead and zinc were all reported above Cefas AL 1 at multiple stations, however no sample reported an exceedance of Cefas AL 2. Concentrations of every PAH with an assigned threshold value were reported in exceedance of Cefas AL 1 and the TEL, with eight also exceeding the PEL and five of these observed at numerous stations indicating elevated levels of these contaminants.
- 2.8.2.30 Under normal circumstances, very small concentrations of contaminants are expected to enter the dissolved phase, with the vast majority adhering to the sediment particles when temporarily entering suspension in the water column. Partition coefficients may be applied to estimate the concentration of the contaminants entering the dissolved phase which typically result in a reduction of several orders of magnitude from the concentrations associated with suspended sediments. Given the short-term nature of the works and presence of the sediment plumes, within the Offshore Water and Sediment Quality Study Area any increase in contaminants within the water column would be immeasurable in practice against background levels.
- 2.8.2.31 The tidal regime has been shown to be relatively weak (peak current speeds on a mean spring tide are ~0.6 m/s (**Volume 2, Chapter 1: Physical Processes, of the PEIR**) further indicating wide scale dispersion is unlikely as shown in the modelling results with SSC reducing to background concentration across the Offshore Water and Sediment Quality Study Area within 24 hours (1 tidal cycle).
- 2.8.2.32 Therefore, it is considered that the magnitude of impacts from the release of sediment-bound contaminants, during the construction phase is **low adverse**.

Significance of effect

- 2.8.2.33 Overall, it is considered that the receptor sensitivity is **medium to low** and the magnitude of impacts from the release of sediment-bound contaminants is **low**. Therefore, the effect of impacts from the release of sediment-bound contaminants, during the construction phase, is considered to be **minor adverse** at worse, which is not significant in EIA terms.

Additional mitigation and residual effect

- 2.8.2.34 No additional Offshore Water and Sediment Quality mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the embedded commitments outlined in **Table 2.31**) was not deemed to be significant.
- 2.8.2.35 Therefore, the residual effect of impacts from the release of sediment-bound contaminants, during the construction phase, is considered to be **minor adverse**, which is not significant in EIA terms.

Impacts to bathing water quality

- 2.8.2.36 Impacts to bathing water quality could occur within the English Waters of the Offshore Water and Sediment Quality Study Area following the creation of sediment plumes from construction activities specifically within the nearshore environment. This may include site preparation via MFE, cable installation via jet trenching and drilling fluid releases from HDD at the landfall location. As described within the impact assessments for increases to SSC and deposition and impacts from the release of sediment-bound contaminants.

Receptor sensitivity – English Waters

The qualifying features of the designated Bathing Waters are not influenced by sediment contamination, but rather bacterial concentrations of E. coli and IE. All three Bathing waters are designated as Good or Excellent and contribute towards the designation of a nationally important feature. As coastal waters are inherently dynamic systems and results from the previous four bathing seasons are combined to determine the classification, the Bathing Waters are therefore considered to possess a high capacity to adapt to short term changes within natural variation. Therefore, it is considered that the receptor sensitivity for bathing waters is considered to be **medium**.

Magnitude of impact

- 2.8.2.37 As described within the impact assessments for increases to SSC and deposition and impacts from the release of sediment-bound contaminants impacts to bathing water quality can occur from those construction activities that disturb the sediments. For impacts to bathing waters the construction activity occurring closest to shore will be the installation of offshore export cables via trenchless techniques in order to make landfall. As per **Table 2.30** this will occur up to approximately 1,690m offshore at water depths >20m LAT. The modelling undertaken as part of **Volume 2, Chapter 1: Physical Processes, of the PEIR** presents the maximum instantaneous SSC on a mean spring tide from sandwave clearance, spoil disposal and trenchless techniques in nearshore English waters. Figure 1.2 of **Volume 2, Chapter 1: Physical Processes, of the PEIR** shows the resultant sediment plume remains spatially separate from the coastline at concentrations above baseline conditions. Despite Seaham Beach being of closest proximity to the MHPGC Project PEIR Red Line Boundary (3.04km) elevated SSC from any construction activities are not shown to impact these bathing waters.
- 2.8.2.38 Sediment-bound contamination within the nearshore environment was found to be significantly higher than the central and northern areas of the offshore extent of the MHPGC Project PEIR Red Line Boundary. Stations ENV237 and ENV201 are the two closest sample locations to the bathing waters that may be disturbed by cable installation activities. Concentrations of PCBs and OCPs at these two stations were not found to exceed Cefas AL1. One minor exceedance of arsenic was identified at ENV237 (20.6µg/g) and likewise one marginal exceedance of Cefas AL1 for lead at ENV201 (50.1µg/g). The historic contamination in the nearshore environment is evident in the reported PAH concentrations. Both stations reported concentrations above the TEL (where applicable) for all PAHs however no exceedances of the PEL were identified at ENV237. In comparison four exceedances of the PEL were reported at ENV201 indicating a potentially more contaminated environment. As previously identified within the assessment for impacts from sediment-bound contaminants very small concentrations of contaminants are expected to enter the dissolved phase, with the vast majority adhering to the sediment particles when temporarily entering suspension in the water column.
- 2.8.2.39 The short timeframes associated with the dispersion of any generated sediment plumes allow the water quality to rapidly return to the baseline conditions making a deterioration in quality of the designated Bathing Waters unlikely. Based on the available evidence as presented throughout **Section 2.4** it is therefore concluded that existing contaminants will not be mobilised in sufficient concentrations for periods of time that would significantly affect the surrounding environment.
- 2.8.2.40 Therefore, it is considered that the magnitude of impacts to bathing water quality, during the construction phase is **low adverse**.

Significance of effect

- 2.8.2.41 Overall, it is considered that the receptor sensitivity is **medium** and the magnitude of impacts to bathing water quality is **low adverse**. Therefore, the effect of impacts to bathing water quality during the construction phase, is considered to be **minor adverse**, which is not significant in EIA terms.

Additional mitigation and residual effect

- 2.8.2.42 No additional Offshore Water and Sediment Quality mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the embedded commitments outlined in **Table 2.31**) was not deemed to be significant.
- 2.8.2.43 Therefore, the residual effect of impacts to bathing water quality, during the construction phase, is considered to be **minor adverse**, which is not significant in EIA terms.

Impacts to the achievement of GES

- 2.8.2.44 The requirement to achieve GES is a WFD objective of surface waterbodies. For the purpose of this impact assessment this relates to nearshore English waters designated under the WFD. **Figure 2.5:** shows WFD waterbodies within the Offshore Water and Sediment Quality Study Area and **Table 2.22** presents the data associated with the Tyne and Wear Coastal Waterbody. The Tyne and Wear Coastal Waterbody is classified based on a variety of criteria including biological, chemical and hydromorphological elements. The potential for deterioration in status of WFD coastal/transitional waterbodies can be caused through the same pathways of effect as assessed for increased SSC and deposition and impacts from the release of sediment bound contamination. Installation of the offshore export cables and trenchless techniques such as HDD at landfall will generate sediment plumes and may disturb sediment bound contaminants.

Receptor sensitivity – English Waters

- 2.8.2.45 The sensitivity of the Tyne and Wear coastal waterbody regarding impacts related to the achievement of GES is inherently tied to the potential source-receptor pathways resulting from disturbance of sediments. Potential effects have been identified as temporary and the current and historical classifications of the waterbody indicate stable, healthy, and resilient baseline conditions with a high capacity to adapt to change.
- 2.8.2.46 Therefore, it is considered that the receptor sensitivity is **medium**.

Magnitude of impact

- 2.8.2.47 The deterioration of the Tyne and Wear Coastal waterbody could occur due to the resuspension of sediments. This effect is temporary given the nature of construction activities and is expected to remain within the (up to) 9km extent of the tidal ellipses with the majority of increased SSC identified within the 50 – 500m range. It is anticipated that, following dispersion of the sediment plumes and subsequent increase in UV light penetration, any elevated bacterial counts will return to baseline levels. Available evidence would suggest that activities causing increases in SSC are temporary, highly localised with elevated concentrations rapidly reducing following cessation of activities.
- 2.8.2.48 Sediment-bound contamination within the nearshore environment was found to be significantly higher than the central and northern areas of the offshore extent of the MHPGC Project PEIR Red Line Boundary. Stations ENV237 and ENV201 are the two closest sample locations to the coast that may be disturbed by cable installation activities. Concentrations of PCBs and OCPs at these two stations were not found to exceed Cefas AL1. One minor exceedance of arsenic was identified at ENV237 (20.6µg/g) and likewise one marginal exceedance of Cefas AL1 for lead at ENV201 (50.1µg/g). The historic contamination in the nearshore environment is however evident in the reported PAH concentrations. Both stations reported concentrations above the TEL (where applicable) for all PAHs however no exceedances of the PEL were identified at ENV237. In comparison four exceedances of the PEL were reported at ENV201 indicating a more contaminated environment. As previously identified within the assessment for impacts from sediment bound contaminants very small concentrations of contaminants are expected to enter the dissolved phase, with the vast majority adhering to the sediment particles when temporarily entering suspension in the water column.
- 2.8.2.49 The short timeframes associated with the generation, and subsequent dispersion of sediment plumes will allow the water quality to rapidly return to the baseline conditions making a deterioration

in quality of the Tyne and Wear costal waterbody unlikely. Based on the available evidence, it is therefore concluded that existing contaminants will not be mobilised in sufficient concentrations that would significantly affect the waterbody.

- 2.8.2.50 Therefore, it is considered that the magnitude of impacts to the achievement of GES, during the construction phase is **low adverse**.

Significance of effect

- 2.8.2.51 Overall, it is considered that the receptor sensitivity is **medium** and the magnitude of impacts to the achievement of GES is **low adverse**. Therefore, the effect of impacts to the achievement of GES, during the construction phase, is considered to be **minor adverse**, which is not significant in EIA terms.

Additional mitigation and residual effect

- 2.8.2.52 No additional Offshore Water and Sediment Quality mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the embedded commitments outlined in **Table 2.31**) was not deemed to be significant.
- 2.8.2.53 Therefore, the residual effect of impacts to the achievement of GES, during the construction phase, is considered to be **minor adverse**, which is not significant in EIA terms

2.8.3 O&M phase

Increased SSC and associated deposition - impacts on sediment and water quality

- 2.8.3.1 The potential process regarding increased SSC and associated deposition has been outlined in full for the construction phase in **Section 2.8.2**. In summary disturbed seabed sediments can generate sediment plumes and lead to a reduction in UV light penetration within the water column and subsequently reduce bacterial mortality rates. This same process can be result from O&M activities causing seabed disturbance such as cable repair and replacement during the MHPGC Project's operational lifespan (35 years). Such disturbance will result in the resuspension of sediments into the water column, producing sediment plumes in both Scottish and English waters (depending on the location of activity) and following a period of settlement this disturbance may give rise to localised deposition.

Receptor sensitivity – Scottish Waters

- 2.8.3.2 Undesignated waters within the MHPGC Project Offshore Water and Sediment Quality Study Area, are considered to be resistant to temporary reductions in water clarity, subsequent potential bacterial count increases and localised deposition arising from O&M activities. Therefore, it is considered that the receptor sensitivity for undesignated waters is **low**.

Receptor sensitivity – English Waters

- 2.8.3.3 All three Bathing waters are designated as Good or Excellent and contribute towards the designation of a nationally important feature. As coastal waters are inherently dynamic systems and results from the previous four bathing seasons are combined to determine the classification these Bathing waters are therefore considered to possess a high capacity to accommodate short term changes within natural variation. Therefore, it is considered that the receptor sensitivity for bathing waters is considered to be **medium**
- 2.8.3.4 The Tyne and Wear WFD coastal waterbody is currently designated at GES in the most recent EA classification (2022). This indicates a waterbody with stable, healthy and resilient baseline conditions that possess a high capacity to adapt to change. Therefore, it is considered that the receptor sensitivity for WFD coastal and transitional waterbodies is **medium**.
- 2.8.3.5 Undesignated waters within the MHPGC Project Offshore Water and Sediment Quality Study Area, are considered to be resistant to temporary reductions in water clarity, subsequent potential bacterial count increases and localised deposition arising from O&M activities. Therefore, it is considered that the receptor sensitivity for undesignated waters is **low**.

Magnitude of impact

- 2.8.3.6 **Table 2.30** identifies the scenarios with the greatest potential for seabed disturbance across all Project phases. For O&M the MHPGC Project activities resulting in the most re-suspension of sediments is defined as cable repairs.
- 2.8.3.7 Cable repair and replacement may be undertaken as and when sections of cable become exposed and/or damaged. Up to 41 export cable repairs are anticipated over the operation lifespan of the project with the maximum dimensions deemed to be 2km in length and 20m in width. The techniques utilised during repairs will be similar to those employed during installation therefore, the potential increases in SSC and deposition would be in-line with the construction phase at the point of cable repair. Due to the irregular nature of the work in regards to location of the repairs as well as when such repairs may occur potential impacts would likely be more localised and occur over a shorter duration than those considered during the construction phase. Compounding impacts are not anticipated as cable repair events are likely to be isolated both spatially and temporally with any increased SSC returning to baseline prior to another cable repair event.
- 2.8.3.8 Therefore, it is considered that the magnitude of increased SSC and associated deposition, during the O&M phase is **low adverse**.

Significance of effect

- 2.8.3.9 Overall, it is considered that the receptor sensitivity is **medium or low** and the magnitude of increased SSC and associated deposition - impacts on sediment and water quality is **low adverse**. Therefore, the effect of increased SSC and associated deposition, during the O&M phase, is considered to be **minor adverse**, which is not significant in EIA terms.

Additional mitigation and residual effect

- 2.8.3.10 No additional Offshore Water and Sediment Quality mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the embedded commitments outlined in **Table 2.31**) was not deemed to be significant.
- 2.8.3.11 Therefore, the residual effect of increased SSC and associated deposition, during the O&M phase, is considered to be **minor adverse**, which is not significant in EIA terms.

Impacts from the release of sediment-bound contaminants

- 2.8.3.12 The potential process regarding impacts from the release of sediment bound contaminants has been outlined in full for the construction phase. In summary O&M activities that disturb the seabed have the potential to increase SSC within the marine environment and subsequently generate sediment plumes. Whilst resuspended into the water column, sediment-bound contaminants (THC, PAHs, PCBs, PBDEs, OCPs, organotins and metals) can be released into the water column and adversely affect water quality.

Receptor sensitivity – Scottish Waters

- 2.8.3.13 Undesignated waters within the MHPGC Project Offshore Water and Sediment Quality Study Area such as those within the northern sections of the offshore extent of the MHPGC Project PEIR Red Line Boundary, do not contribute towards the designation of internationally or nationally important features and are able to tolerate change with very little impact upon the baseline conditions. Therefore, it is considered that the receptor sensitivity for undesignated waters is **low**.

Receptor sensitivity – English Waters

- 2.8.3.14 The qualifying features of the designated Bathing Waters are not influenced by sediment contamination but rather bacterial indicators. Seaham Hall Beach, Seaham Beach and Crimdon Beach currently maintain Good or Excellent classifications and as such they are considered to possess a high capacity to accommodate the changes within natural variation. Therefore, it is considered that the receptor sensitivity for designated bathing waters is **medium**.
- 2.8.3.15 The Tyne and Wear WFD coastal waterbody is currently designated as GES in the most recent EA classification. This indicates a waterbody with stable, healthy and resilient baseline conditions that possess a high capacity to adapt to change. As described in **Paragraph 2.8.2.25** chemical status is currently not required to be assessed at all surface waterbodies with the most recent comparable chemical status deemed to be good in 2016. Therefore, it is considered that the receptor sensitivity

for WFD coastal and transitional waterbodies is **medium** in regards to releases of sediment bound contamination.

- 2.8.3.16 Undesignated waters within the MHPGC Project Offshore Water and Sediment Quality Study Area such as those within the central and northern sections of the offshore extent of the MHPGC Project PEIR Red Line Boundary, do not contribute towards the designation of internationally or nationally important features and are able to tolerate temporary change with very little impact upon the baseline conditions. Therefore, it is considered that the receptor sensitivity for undesignated waters is **low**.

Magnitude of impact

- 2.8.3.17 The MHPGC O&M activities deemed to have the most potential for resuspension of sediment is detailed in **Table 2.30**. The MDS identifies cable repair activities to have the most potential for impact.
- 2.8.3.18 Cable repair and replacement may be undertaken as and when sections of cable become exposed and/or damaged. Up to 41 export cable repairs are anticipated over the operation lifespan of the project with the maximum dimensions deemed to be 2km in length and 20m in width. The techniques utilised during repairs will be similar to those employed during installation therefore, the potential increases in SSC would be in-line with the construction phase at the point of cable repair as detailed in **Paragraph 2.8.2.27** onwards. Due to the irregular nature of the work in regards to location of the repairs as well as when such repairs may occur, potential impacts would likely be more localised and occur over a shorter duration than those considered during the construction phase. Compounding impacts are not anticipated as cable repair events are likely to be isolated both spatially and temporally with any increased SSC returning to baseline prior to another cable repair event
- 2.8.3.19 Therefore, it is considered that the magnitude of impacts from the release of sediment bound contaminants, during the O&M phase is, at worst no greater than those assessed during construction and consequently is deemed to be **low adverse**.

Significance of effect

- 2.8.3.20 Overall, it is considered that the receptor sensitivity is **medium to low** and the magnitude of impacts from the release of sediment-bound contaminants is **low**. Therefore, the effect of impacts from the release of sediment-bound contaminants, during the construction phase, is considered to be **minor adverse** at worse, which is not significant in EIA terms.

Additional mitigation and residual effect

- 2.8.3.21 No additional Offshore Water and Sediment Quality mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the embedded commitments outlined in Table 2.31) was not deemed to be significant.
- 2.8.3.22 Therefore, the residual effect of impacts from the release of sediment-bound contaminants, during the O&M phase, is considered to be **minor adverse**, which is not significant in EIA terms

Impacts to bathing water quality

- 2.8.3.23 Impacts to bathing water quality could occur following the creation of sediment plumes from O&M activities specifically within the nearshore environment. This may include cable repair within the southern sections of the offshore extent of the MHPGC Project PEIR Red Line Boundary within English waters. The full process for impacts to bathing water quality are detailed within the impact assessment for construction and relates to increases in SSC and deposition and impacts from the release of sediment-bound contaminants.

Receptor sensitivity – English Waters

- 2.8.3.24 The qualifying features of the designated Bathing Waters are not influenced by sediment contamination, but rather bacterial concentrations of E. coli and IE. All three Bathing waters are designated as Good or Excellent and contribute towards the designation of a nationally important feature. As coastal waters are inherently dynamic systems and results from the previous four bathing seasons are combined to determine the classification, the Bathing Waters are therefore considered to possess a high capacity to adapt to short term changes within natural variation.

Therefore, it is considered that the receptor sensitivity for bathing waters is considered to be **medium**.

Magnitude of impact

- 2.8.3.25 As described within the construction phase assessment for impacts to bathing water quality deterioration in water quality can occur from those activities that disturb the sediments. Cable maintenance (include repair, re-burial and replacement may result in the disturbance of seabed sediments. These events will be, smaller scale due to the irregular nature of the work in regards to location of the repairs as well as when such repairs may occur, potential impacts would likely be more localised and occur over a shorter duration than those considered during the construction phase. Compounding impacts are not anticipated as cable repair events are likely to be isolated both spatially and temporally with any increased SSC returning to baseline prior to another cable repair event
- 2.8.3.26 It is considered that the magnitude of impacts to bathing water quality will be at worse no greater than those assessed during the construction phase and therefore it is considered that the magnitude of impacts to bathing water quality during the O&M is **low adverse**.

Significance of effect

- 2.8.3.27 Overall, it is considered that the receptor sensitivity is **medium** and the magnitude of impacts to bathing water quality is **low adverse**. Therefore, the effect of impacts to bathing water quality during the O&M phase, is considered to be **minor adverse**, which is not significant in EIA terms.

Additional mitigation and residual effect

- 2.8.3.28 No additional Offshore Water and Sediment Quality mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the embedded commitments outlined in **Table 2.31**) was not deemed to be significant.
- 2.8.3.29 Therefore, the residual effect of impacts to bathing water quality, during the O&M phase, is considered to be **minor adverse**, which is not significant in EIA terms.

Impacts to the achievement of GES

- 2.8.3.30 The same pathway of effects for impacts to the achievement of GES exists during the O&M phase as compared to the construction phase. Cable repair activities can result in sediment disturbance which in turn may generate sediment plumes increasing SSC and enabling sediment bound contaminants to enter the water column.

Receptor sensitivity – English Waters

- 2.8.3.31 The sensitivity of the Tyne and Wear coastal waterbody regarding impacts related to the achievement of GES is inherently tied to the potential source-receptor pathways resulting from disturbance of sediments. Potential effects have been identified as temporary and the current and historical classifications of the waterbody indicate stable, healthy, and resilient baseline conditions with a high capacity to adapt to change.
- 2.8.3.32 Therefore, it is considered that the receptor sensitivity is **medium**.

Magnitude of impact

- 2.8.3.33 Impacts to the achievement of GES is a WFD objective of surface waterbodies. For the purpose of this impact assessment this relates to nearshore English waters designated under the WFD. As assessed for the construction phase increased SSC and elevated contamination levels will remain within the 9km extent of the tidal ellipses with the majority of increased SSC identified within the 50 – 500m range and is temporary and small scale given the nature of O&M activities.
- 2.8.3.34 It is anticipated that, under normal circumstances, very small concentrations of contaminants are expected to enter the dissolved phase, with the vast majority adhering to the sediment particles when temporarily entering suspension in the water column. Following dispersion of the sediment plumes and subsequent increase in UV light penetration, any elevated bacterial counts will also return to baseline levels. Available evidence would suggest that O&M activities causing increases in SSC are temporary, highly localised and small scale with elevated concentrations rapidly reducing following cessation of O&M activities. This is due to the irregular nature of the O&M activities in regards to location of the repairs as well as when such repairs may occur. Potential impacts would therefore

likely be more localised and occur over a shorter duration than those considered during the construction phase. Compounding impacts are not anticipated as cable repair events are likely to be isolated both spatially and temporally with any increased SSC returning to baseline prior to another cable repair event

- 2.8.3.35 Therefore, it is considered that the magnitude of impacts to the achievement of GES, during the construction phase is **low**.

Significance of effect

- 2.8.3.36 Overall, it is considered that the receptor sensitivity is **medium** and the magnitude of impacts to the achievement of GES is **low adverse**. Therefore, the effect of impacts to the achievement of GES, during the O&M phase, is considered to be **minor adverse**, which is not significant in EIA terms.

Additional mitigation and residual effect

- 2.8.3.37 No additional Offshore Water and Sediment Quality mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the embedded commitments outlined in **Table 2.31**) was not deemed to be significant.
- 2.8.3.38 Therefore, the residual effect of impacts to the achievement of GES, during the O&M phase, is considered to be **minor adverse**, which is not significant in EIA terms.

Changes to sediment transport and sediment transport pathways due to the presence of infrastructure (including secondary scour assessment)

- 2.8.3.39 During the O&M phase of the MHPGC Project, modification of existing sediment transport pathways could occur in response to changes in the wave and tidal regimes resulting from the presence of cable protection as well as direct blockages to sediment transport.
- 2.8.3.40 The above changes could potentially occur over a range of timescales, depending on location and the specific infrastructure that is interacting with the sediment transport regime.
- 2.8.3.41 The MDS with respect to the potential for changes to the sediment transport regime is set out in **Table 2.30**.

Receptor sensitivity – Scottish Waters

- 2.8.3.42 Undesignated waters within the MHPGC Project Offshore Water and Sediment Quality Study Area such as those within the northern sections of the offshore extent of the MHPGC Project PEIR Red Line Boundary, do not contribute towards the designation of internationally or nationally important features and are able to tolerate minor changes to depth and flows from cable protection with immeasurable changes upon the baseline conditions due to the existing depths. Therefore, it is considered that the receptor sensitivity for undesignated waters is negligible.

Receptor sensitivity – English Waters

- 2.8.3.43 The Tyne and Wear coastal waterbody is currently classified at GES. Hydromorphology is a “supporting element”, which means that for water bodies where ecological status is less than High, hydromorphological state is not taken into account as a component of overall ecological status assessment. Therefore, it is considered that the receptor sensitivity is considered to be **negligible**.
- 2.8.3.44 Undesignated waters within the MHPGC Project Offshore Water and Sediment Quality Study Area such as those within the central and northern sections of the offshore extent of the MHPGC Project PEIR Red Line Boundary, do not contribute towards the designation of internationally or nationally important features and are able to tolerate minor changes to depth and flows from cable protection with immeasurable changes upon the baseline conditions due to the existing depths. Therefore, it is considered that the receptor sensitivity for undesignated waters is negligible.

Magnitude of impact

- 2.8.3.45 For both Scottish and English waters, the presence of cable protection has the potential to result in a localised blockage of waves, tides and sediment transport.
- 2.8.3.46 Cable protection (using a combination of concrete mattresses/rock bags/rock installation) may be installed along parts of the export cable, covering a maximum of up to 8.3% (equivalent to 27,070m) of the cable length within Scottish and English waters collectively. Rock installation for protection may be up to 2m high and 14m wide, with a side slope of 1:3. There will be up to 16 cable crossings

which may also require protection (in the form of rock installation or concrete mattresses). Each crossing will be up to 200m (length) x 19m (width) x 2m (height). 8,000m may be protected using CPS resulting in a total maximum protection length of 35,070m.

- 2.8.3.47 Water depths are between approximately 80m LAT and 107m LAT along the offshore extent of the MHPGC Project PEIR Red Line Boundary, seaward of the 12nm. On the few occasions, during large storm events, when waves are sufficiently large to interact at all with the cable protection, it is very unlikely that the cable protection will present a sufficient obstacle to cause changes to their size or direction. The cable protection height (< 2m) is a very small proportion of the total water depth and so, together with the sloped sides of the berm, will present a minimal obstruction to tidal currents and subsequently the dispersion of sediment plumes will not be impacted.
- 2.8.3.48 Cable installation in the nearshore will be undertaken using trenchless methods, which will cause no direct disturbance to the existing coastline because it will not interact directly with, or leave any infrastructure exposed in, the active parts of the beach (between the entry and exit points of the drill) and so will not impact upon littoral processes in these areas. Provided that the cable remains buried beyond the exit point, there is no possibility for it to interact with, or have any effect on, nearshore sediment transport processes.
- 2.8.3.49 The purpose of cable protection is to provide protection to the offshore export cables and remove risk to local sea users. It is also designed to prevent sediment scour. Where protection is applied, no scour will be caused by the protected cable itself. However, where surficial sediment is present, a small amount of localised secondary scour may form at the edges of the protection, in proportion to the overall protection dimensions and the clast size used.
- 2.8.3.50 The patterns and dimensions of sediment accumulation or scour may vary over the operational lifetime of the berm, due to natural fluctuations in sediment supply and transport rates and directions. Changes may be seasonal or episodic in nature (e.g., during or following larger storms, then gradually returning to another state associated with purely tidal conditions). However, the nature of the seabed (sediment type and texture) around the berm, including within any areas of local accretion or scour, is not expected to be measurably very different to the surrounding seabed.
- 2.8.3.51 Therefore, it is considered that the magnitude of changes to sediment transport pathways due to the presence of infrastructure, during the O&M phase is **negligible**.

Significance of effect

- 2.8.3.52 Overall, it is considered that the receptor sensitivity is **negligible** and the magnitude of impacts to the sediment transport pathway from the presence of infrastructure is **negligible**. Therefore, the effect of impacts to the sediment transport pathway from the presence of infrastructure, during the O&M phase, is considered to be **negligible**, which is not significant in EIA terms.

Additional mitigation and residual effect

- 2.8.3.53 No additional Offshore Water and Sediment Quality mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the embedded commitments outlined in **Table 2.31**) was not deemed to be significant.
- 2.8.3.54 Therefore, the residual effect of impacts to the achievement of GES, during the O&M phase, is considered to be **negligible**, which is not significant in EIA terms.

2.8.4 Decommissioning phase

Increased SSC and associated deposition - impacts on sediment and water quality

- 2.8.4.1 The infrastructure associated with the MHPGC Project will be decommissioned as per the methodology set out in the decommissioning programme (CoT44). The removal of cables may be undertaken using similar techniques to those employed during installation, therefore the potential increases in SSC and deposition would be in-line with the construction phase. Whilst the MDS is for all export cable materials to be removed for decommissioning, in many cases it may be less environmentally impactful to leave assets in place. The decommissioning approach will be reviewed at the time of decommissioning following the most up to date and best available guidance.

- 2.8.4.2 Removal of offshore infrastructure is considered as the MDS as this may result in deterioration of water quality through disturbance of sediments. Any generated sediment plumes and associated deposition are anticipated to act comparably to those described within construction.

Receptor sensitivity – Scottish Waters

- 2.8.4.3 Undesignated waters within the MHPGC Project Offshore Water and Sediment Quality Study Area, are considered to be resistant to temporary reductions in water clarity and subsequent potential bacterial count increases arising from decommissioning activities. Therefore, it is considered that the receptor sensitivity for undesignated waters is **low**.

Receptor sensitivity – English Waters

- 2.8.4.4 All three Bathing waters are designated as Good or Excellent and contribute towards the designation of a nationally important feature. As coastal waters are inherently dynamic systems and results from the previous four bathing seasons are combined to determine the classification the Bathing Waters are therefore considered to possess a high capacity to accommodate short term changes within natural variation. Therefore, it is considered that the receptor sensitivity for bathing waters is considered to be **medium**

- 2.8.4.5 The Tyne and Wear WFD coastal waterbody is currently designated as GES in the most recent EA classification. This indicates a waterbody with stable, healthy and resilient baseline conditions that possess a high capacity to adapt to change. Therefore, it is considered that the receptor sensitivity for WFD coastal and transitional waterbodies is **medium**.

- 2.8.4.6 Undesignated waters within the MHPGC Project Offshore Water and Sediment Quality Study Area, are considered to be resistant to temporary reductions in water clarity and subsequent potential bacterial count increases arising from decommissioning activities. Therefore, it is considered that the receptor sensitivity for undesignated waters is **low**.

Magnitude of impact

- 2.8.4.7 Impacts developing from decommissioning activities are assumed for the purpose of this assessment to be equal to, or less than those assessed during the construction phase of the MHPGC Project.

- 2.8.4.8 Therefore, it is considered that the magnitude of increased SSC and associated deposition impacts on sediment and water quality, during the construction phase is **low adverse**.

Significance of effect

- 2.8.4.9 Overall, it is considered that the receptor sensitivity is **medium to low** and the magnitude of impact is **low adverse**. Therefore, the effect of increased SSC and associated deposition which results in impacts on sediment and water quality, during the decommissioning phase, is considered to be **minor adverse**, which is not significant in EIA terms.

Additional mitigation and residual effect

- 2.8.4.10 No additional Offshore Water and Sediment Quality mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the embedded commitments outlined in **Table 2.31**) was not deemed to be significant.

- 2.8.4.11 Therefore, the residual effect of increased SSC and associated deposition, during the decommissioning phase, is considered to be minor, which is not significant in EIA terms.

Impacts from the release of sediment-bound contaminants

- 2.8.4.12 The infrastructure associated with the MHPGC Project will be decommissioned as per the methodology set out in the decommissioning programme (CoT44). Removal of such infrastructure may result in deterioration of water quality through disturbance of sediments. Any generated sediment plumes and associated contaminant releases are anticipated to act comparably to those described within construction.

Receptor Sensitivity – Scottish Waters

- 2.8.4.13 Undesignated waters within the MHPGC Project Offshore Water and Sediment Quality Study Area such as those within the northern sections of the offshore extent of the MHPGC Project PEIR Red Line Boundary, do not contribute towards the designation of internationally or nationally important

features and are able to tolerate change with very little impact upon the baseline conditions. Therefore, it is considered that the receptor sensitivity for undesignated waters is **low**.

Receptor sensitivity – English Waters

- 2.8.4.14 The qualifying features of the designated Bathing Waters are not influenced by sediment contamination but rather bacterial indicators. Seaham Hall Beach, Seaham Beach and Crimdon Beach currently maintain Good or Excellent classifications and as such they are considered to possess a high capacity to accommodate the changes within natural variation. Therefore, it is considered that the receptor sensitivity for designated bathing waters is **medium**.
- 2.8.4.15 The Tyne and Wear WFD coastal waterbody is currently designated as GES in the most recent EA classification. This indicates a waterbody with stable, healthy and resilient baseline conditions that possess a high capacity to adapt to change. Furthermore, chemical status including that of priority hazardous substances and other pollutants such as the PAH indicator Benzo(a)pyrene does not require assessment for the most recent classification at all English surface waterbodies. This is attributed to a change of methods alongside an increased evidence base for the 2019 assessment that caused all waterbodies to fail on chemical status. Without the introduction of ubiquitous, persistent, bioaccumulative, and toxic substances (uPBTs) chemical status is deemed comparable to previous years assessments (EA, 2025). The most recent of which in 2016 deemed the Tyne and Wear to have Good chemical Status. Therefore, the receptor sensitivity for WFD coastal and transitional waterbodies is considered to be **medium** in regard to releases of sediment bound contamination.
- 2.8.4.16 Undesignated waters within the MHPGC Project Offshore Water and Sediment Quality Study Area such as those within the central and northern sections of the offshore extent of the MHPGC Project PEIR Red Line Boundary, do not contribute towards the designation of internationally or nationally important features and are able to tolerate temporary change with very little impact upon the baseline conditions. Therefore, it is considered that the receptor sensitivity for undesignated waters is **low**.

Magnitude of impact

- 2.8.4.17 Impacts developing from decommissioning activities are assumed for the purpose of this assessment to be equal to, or less than those assessed during the construction phase of the MHPGC Project. Therefore, it is considered that the magnitude of impacts from the release of sediment-bound contaminants, during the construction phase is **low adverse**.

Significance of effect

- 2.8.4.18 Overall, it is considered that the receptor sensitivity is **medium to low** and the magnitude of impacts from the release of sediment-bound contaminants is **low adverse**. Therefore, the effect of impacts from the release of sediment-bound contaminants, during the decommissioning phase, is considered to be **minor adverse**, which is not significant in EIA terms.

Additional mitigation and residual effect

- 2.8.4.19 No additional Offshore Water and Sediment Quality mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the embedded commitments outlined in **Table 2.31**) was not deemed to be significant.
- 2.8.4.20 Therefore, the residual effect of impacts from the release of sediment bound contaminants, during the decommissioning phase, is considered to be **minor**, which is not significant in EIA terms.

Impacts to bathing water quality

- 2.8.4.21 The infrastructure associated with the MHPGC Project will be decommissioned as per the methodology set out in the decommissioning programme (CoT44). Removal of such infrastructure may result in impacts to bathing water quality through disturbance of sediments. Any generated sediment plumes, resulting influence upon bacterial mortality and disturbed contaminants are anticipated to act comparably to those described within construction.

Receptor sensitivity – English Waters

- 2.8.4.22 .

2.8.4.23 The qualifying features of the designated Bathing Waters are not influenced by sediment contamination, but rather bacterial concentrations of E. coli and IE. All three Bathing waters are designated as Good or Excellent and contribute towards the designation of a nationally important feature. As coastal waters are inherently dynamic systems and results from the previous four bathing seasons are combined to determine the classification, the Bathing Waters are therefore considered to possess a high capacity to adapt to short term changes within natural variation. Therefore, it is considered that the receptor sensitivity for bathing waters is considered to be **medium**

Magnitude of impact

2.8.4.24 Impacts developing from decommissioning activities are assumed, for the purpose of this assessment to be equal to, or less than those assessed during the construction phase of the MHPGC Project. Therefore, the magnitude of impact is assessed to be **low adverse** for potential impacts to bathing water quality.

Significance of effect

2.8.4.25 Overall, it is considered that the receptor sensitivity is **medium** and the magnitude of impacts to bathing water quality is **low adverse**. Therefore, the effect of impacts to bathing water quality during the decommissioning phase, is considered to be **minor**, which is not significant in EIA terms.

Additional mitigation and residual effect

2.8.4.26 No additional Offshore Water and Sediment Quality mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the embedded commitments outlined in **Table 2.31**) was not deemed to be significant.

2.8.4.27 Therefore, the residual effect of impacts to bathing water quality, during the decommissioning phase, is considered to be **minor**, which is not significant in EIA terms.

Impacts to the achievement of GES

2.8.4.28 The infrastructure associated with the MHPGC Project will be decommissioned as per the methodology set out in the decommissioning programme (CoT44). Removal of such infrastructure may result in deterioration of water quality within WFD waterbodies through the disturbance of sediments. The pathways of effect identified within the assessment for construction are anticipated to act comparably in response to decommissioning activities.

Receptor sensitivity – English Waters

2.8.4.29 The sensitivity of the Tyne and Wear coastal waterbody regarding impacts related to the achievement of GES is inherently tied to the potential source-receptor pathways resulting from disturbance of sediments. Potential effects have been identified as temporary and the current and historical classifications of the waterbody indicate stable, healthy, and resilient baseline conditions with a high capacity to adapt to change.

2.8.4.30 Therefore, it is considered that the receptor sensitivity is **medium**.

Magnitude of impact

2.8.4.31 Impacts developing from decommissioning activities are assumed, for the purpose of this assessment to be equal to, or less than those assessed during the construction phase of the MHPGC Project. Therefore, the magnitude of impact is assessed to be **low adverse** for potential impacts to the achievement of GES.

Significance of effect

2.8.4.32 Overall, it is considered that the receptor sensitivity is **medium** and the magnitude of impacts to the achievement of GES is **low adverse**. Therefore, the effect of impacts to the achievement of GES, during the decommissioning phase, is considered to be **minor adverse**, which is not significant in EIA terms.

Additional mitigation and residual effect

2.8.4.33 No additional Offshore Water and Sediment Quality mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the embedded commitments outlined in **Table 2.31**) was not deemed to be significant.

2.8.4.34 Therefore, the residual effect of impacts to the achievement of GES, during the decommissioning phase, is considered to be **minor**, which is not significant in EIA terms.

2.9 Whole project assessment and Cumulative Effects Assessment methodology

Methodology

- 2.9.1.1 The Morven Programme comprises four distinct projects: Morven North, Morven South, MHPGC Project, and Morven Branxton Area Grid Connection Project (MBAGC Project).
- 2.9.1.2 The following assessment scenarios have been considered to identify the Likely Significant Effects (LSE) of the MHPGC Project in combination with other projects on the same receptor, as follows (and summarised in **Table 2.32**):
- Whole project assessment: to identify the LSE associated with MHPGC Project together with Morven North and Morven South in turn, (Scenario 1: MHPGC Project + Morven North and Scenario 2: MHPGC Project + Morven South), each of which would comprise a “Whole Project”;
 - Morven Programme assessment: to identify the LSE associated with all four components of the Morven Programme (Morven North, Morven South, MHPGC Project, and MBAGC Project) (Scenario 3);
 - Cumulative Effects Assessment (CEA): to identify the LSE associated with MHPGC Project together with relevant projects, plans and activities, including other components of the Morven Programme, using a tiered approach (Scenario 4).
- 2.9.1.3 The whole project assessment and CEA have been undertaken in accordance with the methodology described in **Volume 1, Chapter 4: Approach to Environmental Impact Assessment**.

Table 2.32: Scenarios to be considered in the MHPGC Project whole project assessment and Cumulative Effects Assessment for Offshore Water and Sediment Quality

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

- 2.9.1.4 For the purposes of this Offshore Water and Sediment Quality, Scenarios 1, 2, and 4 have been taken forward for assessment; Scenario 3 has not been included as it is not applicable to this chapter. As discussed in **Volume 1, Chapter 4: Approach to Environmental Impact Assessment, of the PEIR**, the Morven Programme assessment (Scenario 3) is only required for specific chapters to provide further context to, and to support, the conclusions of the CEA scenario (Scenario 4), in agreement with the relevant stakeholders for these topics. As Scenario 3 does not form the basis of the CEA conclusions, it is considered a supplementary assessment to the CEA scenario (Scenario 4) for these specific topics. The approach to the CEA presented in this Offshore Water and Sediment Quality chapter complies with the requirements under the EIA Regulations to assess the LSE on the environment arising from a project cumulatively with other relevant plans, projects and activities, and no supplementary assessment of the Morven Programme (Scenario 3) is required or has been requested by relevant stakeholders with regard to Offshore Water and Sediment Quality.
- 2.9.1.5 The projects and plans selected as relevant to the CEA presented within this chapter are based upon the results of a screening exercise (see **Volume 1, Annex 4.3: Cumulative Screening and Location Plan, of the PEIR**). Each project or plan has been considered on a case-by-case basis for screening in or out of this chapter's assessment based upon data confidence, impact-receptor pathways and the spatial/temporal scales involved.

- 2.9.1.6 In undertaking the CEA for the MHPGC Project, it should be noted that other projects and plans under consideration will have differing potential for proceeding to an operational stage and hence a differing potential to ultimately contribute to a cumulative impact alongside the MHPGC Project. Therefore, a tiered approach has been adopted, whereby all third-party projects and plans considered have been allocated into 'tiers' reflecting their current stage within the planning and development process. This provides a framework for placing relative weight upon the potential for each project/plan included in the CEA to ultimately be realised, based upon the project/plan's current stage of maturity and certainty in the project/plan's parameters. The tiered approach utilised within the MHPGC Project CEA employs the following tiers:
- Tier 1 assessment – Existing developments either built (operational) or under construction⁵; approved developments awaiting implementation; and permitted/submitted application(s), but not yet determined, plus Morven North and Morven South;
 - Tier 2 assessment – All plans/projects assessed under Tier 1, plus plans/projects where a scoping report has been submitted and is in the public domain;
 - Tier 3 assessment – All plans/projects assessed under Tier 1 and 2, plus the MBAGC Project, and plans/projects that are reasonably foreseeable (e.g. projects identified in development plans, projects in other plans and programmes, offshore renewable energy projects that have a Crown Estate Scotland Lease Option Agreement).
- 2.9.1.7 The specific projects and plans screened into the CEA for Offshore Water and Sediment Quality are outlined in **Table 2.33**.
- 2.9.1.8 The potential impacts that have been considered in the CEA (listed in **Table 2.34**) represent a subset of those assessed for MHPGC Project alone. While all impacts scoped into the project-level assessment were considered for inclusion in the CEA, a number were screened out at the CEA stage on the basis that they are localised, temporary, and/or event-based in nature, or have been assessed as negligible or low magnitude. These impacts are not considered capable of interacting cumulatively with similar changes arising from other plans or projects in a manner that could give rise to a cumulative impact and have therefore been scoped out of the whole project and CEA. These impacts are:
- Impacts to bathing water quality;
 - Impacts to the achievement of GES.
- 2.9.1.9 Impacts to bathing water quality may arise from the identified pathways of effects, namely increased SSCs and disturbance of sediment bound contaminants. Seaham Beach, Seaham Hall Beach and Crimdon Bathing waters are all assessed comprehensively as receptor to both included cumulative impacts.
- 2.9.1.10 Impacts to the achievement of GES may arise from the identified pathways of effects, namely increased SSCs and disturbance of sediment bound contaminants. The Tyne and Wear WFD Coastal Waterbody is assessed comprehensively as a receptor to both included cumulative impacts.
- 2.9.1.11 Similarly, some of the potential impacts considered within the MHPGC Project alone assessment are specific to a particular phase of development (e.g. construction, O&M or decommissioning). Where cumulative effects with other plans or projects only have potential to occur where there is spatial or temporal overlap with the MHPGC Project during certain phases of development, impacts

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

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

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

associated with a certain phase may be omitted from further consideration where no plans or projects have been identified that have the potential for cumulative effects during this period.

- 2.9.1.12 Due to the uncertainty associated with the exact timings of other projects and activities, there is insufficient data on which to undertake a quantitative or semi-quantitative assessment. As such, the discussion presented here is qualitative. Whilst each of the identified projects may undertake maintenance works such as asset reburial or repairs, these are likely to be infrequent occurrences during the lifetime of the respective projects.
- 2.9.1.13 Sediment plumes from O&M activities are generally short-lived, with major maintenance works infrequent. Any impacts from operational offshore windfarm export cables, pipelines, and O&G activities are therefore likely to be short-lived and of localised extent, with limited opportunity to overlap with the MHPGC Project activities. The likely cumulative impacts of the developments identified in **Table 2.33**, with respect to SSC and contamination, are considered below. Sediment plume modelling, presented in **Volume 2, Annex 1.2: Model Design, Validation and Results, of the PEIR** provide evidence that sediment plumes may be advected from the MHPGC Project infrastructure up to a maximum of 9km (the largest spring tidal excursion ellipse). This means that, should construction related activities connected to the MHPGC Project be occurring at the same time as other plans and projects within 9km, there may be potential for cumulative changes in SSC.
- 2.9.1.14 To assess the potential for cumulative changes to SSC and deposition as well as contamination, other projects and activities located within the Offshore Water and Sediment Quality Study Area as defined by the maximum spring tidal excursion ellipse identified within the offshore extent of the MHPGC Project PEIR Red Line Boundary were scoped into the assessment. Such projects are shown spatially on **Figure 2.6**

Table 2.33: List of other projects and plans considered within the Cumulative Effects Assessment for Offshore Water and Sediment Quality

Project/plan	Status	Distance from MHPGC Project (km)	Description of project/plan	Estimated dates of construction (If applicable)	Estimated dates of operation (If applicable)	Overlap with MHPGC Project
Tier 1						
Offshore wind projects and associated cables						
Morven North	Application submitted, awaiting decision	0.00	Proposed for up to 96 turbines.	2033-2042	2038 to 2073-2077	Yes. Overlap of construction phase and operational phase with the construction or operational phases of MHPGC Project.
Morven South	Application submitted, awaiting decision	0.00	Proposed for up to 95 turbines.	2033-2042	2038 to 2073-2077	Yes. Overlap of construction phase and operational phase with the construction or operational phases of MHPGC Project.
Berwick Bank ECC (Cambois Connection - Northumberland)	Consented	0.25	Proposed OWF cable generating up to 4.1 GW	2028-2031	2032 onwards	Yes. Overlap of operational phase with the construction or operational phases of MHPGC Project.

Project/plan	Status	Distance from MHPGC Project (km)	Description of project/plan	Estimated dates of construction (If applicable)	Estimated dates of operation (If applicable)	Overlap with MHPGC Project
Ossian	Application submitted, awaiting decision	5.50	OWF with potential generating capacity of 3.6 GW	2031-2034	2025 - Onwards	Yes. Overlap of construction phase and/or operational phase with the construction and/or operational phases of MHPGC Project.
Other cables and pipelines						
Eastern Green Link 2 (EGL2)	Under Construction	0.00	2 GW HVDC link between Peterhead in Aberdeenshire and Drax in North Yorkshire	2026-2028	2029 - Onwards	Yes. Overlap of operational phase with the construction and/or operational phases of MHPGC Project.
Eastern Green Link 1 (EGL1)	Under Construction	0.50	2 GW HVDC link between Torness in East Lothian, Scotland and Hawthorn Pit in County Durham	2026-2029	2030 onwards	Yes. Overlap of operational phase with the construction and/or operational phases of MHPGC Project.
Aggregate and Disposal Sites						

Project/plan	Status	Distance from MHPGC Project (km)	Description of project/plan	Estimated dates of construction (If applicable)	Estimated dates of operation (If applicable)	Overlap with MHPGC Project
Noses Point	Operational	0.16	Open disposal site (TY130)	Ongoing		Yes. Overlap of operational phase with the construction and operational phases of MHPGC Project.
Souter Point (Outer)	Operational	4.50	Open disposal site (TY081)	Ongoing		Yes. Overlap of operational phase with the construction and operational phases of MHPGC Project.
Sunderland	Operational	5.43	Open disposal site (TY090)	Ongoing		Yes. Overlap of operational phase with the construction and operational phases of MHPGC Project.
Tier 2						
Other cables and pipelines						

Project/plan	Status	Distance from MHPGC Project (km)	Description of project/plan	Estimated dates of construction (If applicable)	Estimated dates of operation (If applicable)	Overlap with MHPGC Project
Eastern Green Link 3 (EGL3) subsea cable	Scoping report published	2.33	2 GW HVDC link between Fife and King's Lynn	2027-2033	2034 onwards	Yes. Potential for construction phase and/or operational phase to interact with the construction or operational phases of MHPGC Project.
Eastern Green Link 4 (EGL4) Scoping Route	Scoping report published	0.00	HVDC electrical link to connect Fife in Scotland with Norfolk in England	2028-2032	2033 onwards	Yes. Potential for operational phase to interact with the construction and operational phases of MHPGC Project.
Tier 3						
Offshore wind projects and associated cables						
MBAGC Project	Pre-application	0.00	Potential transmission for Morven North or Morven South	Unknown	Unknown	Unknown. Construction, O&M and decommissioning phases may overlap with MHPGC Project construction, O&M and decommissioning phases.

Project/plan	Status	Distance from MHPGC Project (km)	Description of project/plan	Estimated dates of construction (If applicable)	Estimated dates of operation (If applicable)	Overlap with MHPGC Project
Eastern Green Link 5 (EGL5) (indicative location)	Scoping report published	3.10	HVDC electrical link to connect Anderby Creek and north-east Bilsby	Unknown	Unknown	Unknown. Construction, O&M and decommissioning phases may overlap with MHPGC Project construction, O&M and decommissioning phases.



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

- 2.9.2.1 The MDSs identified in **Table 2.34** have been selected as those having the potential to result in the greatest potential impact on an identified receptor or receptor group in relation to the whole project assessment and CEA. The MDSs have been based on the MHPGC Project alone assessment MDS (**Table 2.30**), as well as publicly available information on other third-party projects and plans that have been screened into the CEA (**Table 2.33**). Where applicable, the Morven North and Morven South alone assessment MDSs, and project information available for MBAGC Project have also informed the MDSs outlined in **Table 2.34**.

Table 2.34: Maximum Design Scenario considered for the assessment of potential whole project and cumulative effects on Offshore Water and Sediment Quality

Potential Impact	Phase ⁶⁷			Maximum Design Scenario	Justification
	C	O	D		
Increased SSC and associated deposition - impacts on sediment and water quality	✓	✓	✓	Scenario 1 MDS as described for MHPGC Project (Table 2.30), assessed cumulatively with Morven North. Scenario 2 MDS as described for MHPGC Project (Table 2.30), assessed cumulatively with Morven South Scenario 4 MDS as described for MHPGC Project (Table 2.30), assessed cumulatively with the following other projects and plans: Tier 1 - Offshore Wind Farm projects and associated cables: – Morven North; – Morven South; – Berwick Bank ECC (Cambois Connection). – Ossian - Other Cables and Pipelines – Eastern Green Link 2 (EGL2); – Eastern Green Link 1 (EGL1); - Aggregates and Disposal Sites – Noses Point; – Souter Point (Outer); – Sunderland. Tier 2 - Other Cables and Pipelines – Eastern Green Link 3 subsea cable; – Eastern Green Link 4 (EGL4);	Projects and plans included within these scenarios involve activities that may result in increases to SSC within the Offshore Water and Sediment Quality Study Area. Where spatial and/or temporal overlap occurs with the MHPGC Project, these activities may act cumulatively and are therefore considered to represent a precautionary MDS.

⁶ C= Construction, O= Operations and maintenance, D= Decommissioning phases⁷ “✓” is used to denote the phase the potential impact can occur, “X” outlines there is no impact within this project phase

Potential Impact	Phase ⁶⁷			Maximum Design Scenario	Justification
	C	O	D		
				Tier 3 - Offshore Wind Farm projects and associated cables - MBAGC Project - Other Cables and Pipelines - Eastern Green Link 5 subsea cable	
Impacts from the release of sediment-bound contaminants	✓	✓	✓	Scenario 1 MDS as described for MHPGC Project (Table 2.30), assessed cumulatively with Morven North. Scenario 2 MDS as described for MHPGC Project (Table 2.30), assessed cumulatively with Morven South. Scenario 4 MDS as described for MHPGC Project (Table 2.30), assessed cumulatively with the following other projects and plans: Tier 1 - Offshore Wind Farm projects and associated cables: - Morven North; - Morven South; - Berwick Bank ECC (Cambois Connection); - Ossian - Other Cables and Pipelines - Eastern Green Link 2 (EGL2); - Eastern Green Link 1 (EGL1); - Aggregates and Disposal Sites - Noses Point; - Souter Point (Outer); - Sunderland. Tier 2 - Other Cables and Pipelines - Eastern Green Link 3 subsea cable - Eastern Green Link 4 (EGL4); Tier 3	Projects and plans included within these scenarios involve activities that may result in disturbance of the seabed and subsequent releases of sediment bound contaminants within the Offshore Water and Sediment Quality Study Area. Where spatial and/or temporal overlap occurs with the MHPGC Project, these activities may act cumulatively and are therefore considered to represent a precautionary MDS.

Potential Impact	Phase ⁶⁷			Maximum Design Scenario	Justification
	C	O	D		
				• Offshore Wind Farm projects and associated cables – MBAGC Project. • Other Cables and Pipelines – Eastern Green Link 5 subsea cable	

2.10 Whole project assessment and Cumulative Effects Assessment

2.10.1 Overview

- 2.10.1.1 A description of the significance of whole project and cumulative effects upon Offshore Water and Sediment Quality receptors arising from each identified impact is given below. The whole project assessment and CEA for the MHPGC Project is presented in **Table 2.35** to **Table 2.38**.

Cumulative increases to SSC and associated deposition - impacts on sediment and water quality

- 2.10.1.2 There is potential for cumulative increases to SSC and associated deposition as a result of activities associated with the MHPGC Project and other projects that are under construction, in operation or with planned decommissioning.
- 2.10.1.3 The summary of the whole project assessment for 'cumulative increases to SSC and associated deposition' is presented in **Table 2.35** and the summary of the CEA is presented in **Table 2.36**.
- 2.10.1.4 Increases in SSC have the potential to cause a reduction in water quality through decreases to UV light penetration and subsequent bacterial mortality. This impact is associated primarily with the construction and decommissioning phases of other plans and projects due to the increased likelihood of sediment plume generation in comparison with O&M impacts. Following a period of settlement this disturbance will give rise to localised deposition.
- 2.10.1.5 There is potential for increased SSC and associated deposition resulting from the MHPGC Project construction, O&M and decommissioning activities occurring alongside other offshore wind farms and cable construction, O&M and decommissioning activities within the Offshore Water and Sediment Quality Study Area. Sediment-disturbing activities associated with these projects include drilling of wind turbine and offshore substation platform foundations, MFE sandwave clearance, trenching and dredging during construction, and cable reburial and repair during O&M. There is also potential for cumulative interaction with dredge disposal activities as sediment plumes are generated within these locations during active disposal events.

Table 2.35: MHPGC Project whole project assessment for cumulative increases to SSC and associated deposition.

Whole project assessment	
Scenario 1: MHPGC Project and Morven North	Scenario 2: MHPGC Project and Morven South
Construction phase	
Magnitude of impact	The whole project assessment for Scenario 1 considers the MHPGC Project together with Morven North meaning impacts could occur in both English and Scottish Waters. The whole project assessment for Scenario 2 considers the MHPGC Project together with Morven South meaning impacts could occur in both English and Scottish Waters. The construction period of Morven North and Morven South may overlap with the construction period of the MHPGC Project. Morven North and Morven South overlap with parts of the spring tidal excursion buffer of the MHPGC Project. Consequently, sediment-disturbing activities such as drilling wind turbine/OSP foundations, MFE sandwave clearance, and dredging could occur simultaneously within a spring tidal excursion distance of each other. This overlap may potentially result in cumulative changes in SSC and associated deposition if sediment disturbing activities are taking place both within Morven North or Morven South and where the MHPGC Project PEIR Red Line Boundary overlaps with these areas. Temporary increases in SSC from such activities could potentially result in a reduction in water clarity, primary production, bacterial mortality and dissolved oxygen concentrations and increased nutrients within the water column. Although there is a possibility of temporal and spatial overlap of the construction of Morven North or Morven South with the construction of the MHPGC Project, the exact dates remain uncertain. It should be noted that two concurrent sediment plumes would not travel towards each other as they are advected by the tide (predominantly north-south orientated). Given the low levels of sediment dispersion, as demonstrated by project-specific sediment modelling Volume 2, Annex 1.2: Model Design, Validation and Results, of the PEIR increased SSC is restricted to the near-field only due to low current speeds and near seabed release point. There is not expected to be a notable spatial overlap with concentrated sediment plumes created during the construction of Morven North or Morven South and the construction of the MHPGC Project. The impact of scenario 1 or scenario 2 is not considered likely to cumulatively raise the impact magnitude rating concluded in the MHPGC Project alone assessment, given the short-lived nature of sediment plumes and their highly localised behaviour. Therefore, the potential increases in SSC, when considered cumulatively, are still anticipated to be within the natural variation of the Offshore Water and Sediment Quality Study Area, where no additive effect is expected to water clarity or bacterial mortality. Hence, even with the additional potential sediment disturbances introduced by Morven North and Morven South, the magnitude of the impact is considered to remain as low adverse.
Sensitivity of receptor	In Scottish Waters the sensitivity of the undesignated waters is the same as that assessed for the MHPGC Project alone assessment and summarised as low for increases to SSC and associated deposition in both Scenario 1 and Scenario 2.

Whole project assessment	
Scenario 1: MHPGC Project and Morven North	Scenario 2: MHPGC Project and Morven South
	In English Waters the sensitivity of the undesignated waters is the same as that assessed for the MHPGC Project alone assessment and summarised as low for increases to SSC and associated deposition in both Scenario 1 and Scenario 2.
Significance of effect	The receptor sensitivity is considered to be low for undesignated waters in both Scottish and English Waters and the magnitude of impacts is low adverse . Therefore, the effect of increased SSC and associated deposition, during the construction phase, is considered to be at worst minor adverse , which is not significant in EIA terms.
Further mitigation and residual significance	No additional Offshore Water and Sediment Quality mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the embedded commitments outlined in Table 2.31) was not deemed to be significant
Operation and maintenance phase	
Magnitude of impact	The whole project assessment for Scenario 1 considers the MHPGC Project together with Morven North meaning impacts could occur in both English and Scottish Waters. The whole project assessment for Scenario 2 considers the MHPGC Project together with Morven South meaning impacts could occur in both English and Scottish Waters. Sediment plumes generated by Morven North or Morven South considered here are anticipated to behave in a similar pattern as the sediments being disturbed for the MHPGC Project due to expected similarities in operational design combined with a similar environmental setting and sedimentary characteristics. O&M activities associated with the MHPGC Project can cause increased SSC albeit less frequently and at a smaller scale than activities associated with construction or decommissioning. Temporary increases in SSC could potentially result in a reduction in water clarity, primary production, bacterial mortality and dissolved oxygen concentrations and increased nutrients within the water column. The same is true for Morven North or Morven South with O&M activities occurring irregularly when required at smaller more localised scales. Due to the irregular nature of the work in regards to location of the repairs as well as when such repairs may occur, potential impacts would likely be more localised and occur over a shorter duration than those considered during the construction phase. Additional compounding impacts are not anticipated as cable repair events from both MHPGC Project or Morven North or Morven South are likely to be isolated both spatially and temporally with any increased SSC returning to baseline prior to another cable repair event. Therefore, cumulatively with Morven North or Morven South, the magnitude of the impact is considered to be low adverse for potential increased SSC and associated deposition.
Sensitivity of receptor	The sensitivity of Offshore Water and Sediment Quality receptors to cumulative increases to SSC and associated deposition will remain the same as outlined for the construction phase. In summary the receptor sensitivity is considered to be low for undesignated waters.
Significance of effect	The receptor sensitivity is low and the magnitude of increased SSC and associated is low adverse . Therefore, the effect of increased SSC and associated deposition, during the O&M phase, is considered to be minor adverse , which is not significant in EIA terms.

Whole project assessment	
Scenario 1: MHPGC Project and Morven North	Scenario 2: MHPGC Project and Morven South
Further mitigation and residual significance	No additional Offshore Water and Sediment Quality mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the embedded commitments outlined in Table 2.31) was not deemed to be significant.
Decommissioning phase	
Magnitude of impact	The whole project assessment for Scenario 1 considers the MHPGC Project together with Morven North meaning impacts could occur in both English and Scottish Waters. The whole project assessment for Scenario 2 considers the MHPGC Project together with Morven South meaning impacts could occur in both English and Scottish Waters. Impacts arising from decommissioning activities are considered to be similar, or less, than those which occur during construction. Temporary increases in SSC could potentially result in a reduction in water clarity, primary production, bacterial mortality and dissolved oxygen concentrations and increased nutrients within the water column. Therefore, cumulatively with Morven North or Morven South, the magnitude of the impact is considered to be low for potential increased SSC and associated deposition.
Sensitivity of receptor	The sensitivity of Offshore Water and Sediment Quality receptors to cumulative increases to SSC and associated deposition will remain the same as outlined for the construction phase. In summary the receptor sensitivity is considered to be for undesignated waters.
Significance of effect	The receptor sensitivity is considered to be and low for undesignated waters and the magnitude of increased SSC and associated deposition - impacts on sediment and water quality is low adverse . Therefore, the effect of increased SSC and associated deposition, during the decommissioning phase, is considered to be minor adverse , which is not significant in EIA terms.
Further mitigation and residual significance	No additional Offshore Water and Sediment Quality mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the embedded commitments outlined in Table 2.31) was not deemed to be significant.

Table 2.36: MHPGC Project CEA for increased SSC and associated deposition - impacts on sediment and water quality

Cumulative Effects Assessment	
Scenario 4: MHPGC Project, Tier 1 (including Morven North and Morven South), Tier 2, and Tier 3 (including MBAGC Project) Projects	
Construction phase	
Magnitude of impact	Dredging and disposal, seabed preparation works, foundation and cable installation and maintenance works from other projects can all cause temporary increases in SSC and deposition. Increases in SSC have the potential to cause a reduction of water quality through decreases to UV light penetration and subsequently bacterial mortality in both Scottish and English Waters. Due to uncertainties associated with the exact (day/month) timings of other plans and projects, there is insufficient data on either project scale or timings on which to undertake a quantitative or semi-quantitative assessment. As such, the discussion presented here is qualitative. It is considered highly unlikely that each of the identified operational projects (Table 2.33) would be undertaking routine maintenance work, in particular asset reburial or repairs, at the same time, as these are infrequent occurrences during the lifetime of developments. Although there is a possibility of temporal overlap with the construction of Morven North, Morven South, Ossian OWF and EGL 3, the exact dates remain uncertain. It should be noted that two concurrent sediment plumes would not travel towards each other as they are advected by the tide (predominantly north-south orientated). Given the low levels of sediment dispersion, as demonstrated by project-specific sediment modelling (Volume 2, Annex 1.2: Model Design, Validation and Results, of the PEIR) increased SSC is restricted to the near-field only due to low current speeds and near seabed release point. There is not expected to be a notable spatial overlap with concentrated sediment plumes created during the construction of the other projects. <u>Tier 1</u> This impact is associated with the construction phase of the MHPGC Project and cumulative impacts from the identified Tier 1 Projects. Due to the increased likelihood of sediment plume generation when compared to their O&M phases cumulative impacts are primarily associated with construction and decommissioning phases of the OWFs and cable projects (Morven North, Morven South, Berwick Bank ECC, GL1 and EGL2). The operational phase of the identified disposal sites (Noses Point, Souter Point and Sunderland) however can result in sediment plumes of varying magnitude depending on the type of sediment deposited (e.g. coarse versus fine sediments) Of the Tier 1 projects there is a potential for cumulative effects to occur through interactions between sediment plumes of individual projects within the Offshore Water and Sediment Quality Study Area due to the spatial and temporal overlap. A variety of project types have been identified within the Study Area and overlap of impact pathways known to disturb sediments can vary between the type of project/plan being considered. All of the identified Tier 1 Projects are currently in the operational phases or will be prior to the construction phase of the MHPGC Project except Morven North and Morven South and the Ossian OWF. The operational aspects of such projects (excluding sea disposal sites) are considered highly unlikely to undertake routine maintenance work, in particular asset reburial or repairs, at the same time, within the Offshore Water and Sediment Quality Study Area as these are infrequent occurrences during the lifetime of developments. Once constructed, despite the spatial overlap, these projects are therefore not anticipated to cause ongoing SSC increases throughout the construction period of the MHPGC Project.

Cumulative Effects Assessment

Table 2.35 details the cumulative impacts from increases to SSC and associated deposition for both Morven North and Morven South. The construction phase of Ossian OWF will overlap temporally with the construction phase of the MHPGC Project (2033-2037). Impacts from this project are expected to resemble the impacts caused by the MHPGC Project alone due to the similarities in both design, timeframes and location. The construction dates for the Ossian OWF are expected to be 2031 to 2034 in comparison to the MHPGC Project's 2033 to 2037. Similarities in surficial sediments shown in publicly available datasets further support the assumption that effects from re-suspended sediments will behave in a similar way as assessed for the MHPGC Project alone. Increased SSC quickly dissipates following the cessation of activities with no increases in background concentrations within 48 hours of the installation end. As such, it is not expected for there to be any additive process to increase SSC within the water column when considered cumulatively with the Ossian project.

Marine disposal sites can have various impacts on SSC in surrounding waters. For example, the depositing of material (i.e., dredged sediments or spoil) can result in sediment plumes of increased SSC of varying magnitude depending on the type of sediment deposited (e.g., coarse versus fine sediments). Generally, during spoil disposal, sediments will be discharged as a highly turbid dynamic plume, with the coarser sediment fraction falling quickly to the seabed with limited opportunity to be advected away by tidal currents. However, finer sediments found in the spoil will remain in suspension for longer, forming a plume that will likely be advected by tidal currents. Any resultant plume may have potential to impact water quality (e.g., reduction in light penetration and reduced bacterial mortality). Three open sea disposal sites were identified within the Offshore Sediment and Water Quality Study Area in English waters (Noses Point, Souter Point (Outer) and Sunderland). Sediment plumes from these sea disposal sites are considered to act in a similar manner to sediment plumes generated solely from the MHPGC Project due to the similar location and type of activity. Spatial overlaps of sediment plumes from dredging or sea disposal activities are not expected to occur frequently. As shown by modelling (**Volume 2, Annex 1.2: Model Design, Validation and Results, of the PEIR**) sediment plumes are rapidly indistinguishable from background levels within 24 to 48 hours following cessation of activities across the whole tidal excursion buffer. Therefore, no additive effect towards increased SSC and deposition is expected from sea disposal sites within the Offshore Water and Sediment Quality study area.

Tier 2

Of the Tier 2 Projects identified the construction phase of the EGL 3 cable will overlap temporally with the construction phase of the MHPGC Project (2033-2037) whilst EGL 4 will already be in operation. Impacts arising from the construction and O&M of these projects are anticipated to be analogous with those of the MHPGC Project due to the similar proposed location and type of activities. Similarities in surficial sediments shown in publicly available datasets (BGS, 2026) further support the assumption that effects from re-suspended sediments will behave in the same way as from the MHPGC Project. Increased SSC quickly dissipates following the cessation of activities with no increases in background concentrations within 48 hours of the installation end. As such, it is not expected for there to be any additive process to increase SSC within the water column when considered cumulatively with Tier 2 projects. Therefore, increases to SSC and associated deposition, when considered cumulatively, is still anticipated to be within the natural variation of the Offshore Water and Sediment Quality Study area.

Tier 3

Cumulative Effects Assessment	
	For Tier 3 projects, the development phases of the MBAGC Project or the EGL 5 cable may overlap with the MHPGC Project construction activities however due to these projects being in the pre-planning stage precise timing on construction and operation are currently unknown. If they were to occur simultaneously, sediment-disturbing activities could act concurrently. The magnitude of impact from the MHPGC Project construction activities when considered cumulatively with all projects in Scenario 4, is therefore considered to be low for increased SSC and associated deposition during the construction phase.
Sensitivity of receptor	As outlined in the MHPGC project alone assessment for increased SSC and associated deposition temporary increases in SSC could potentially result in a reduction in water clarity, primary production, bacterial mortality and dissolved oxygen concentrations and increased nutrients within the water column. The sensitivity of Offshore Water and Sediment Quality receptors (Seaham Hall Beach, Seaham Beach and Crimdon Bathing Waters, Tyne and Wear coastal waterbody and undesignated waters) is considered to be the same as outlined for the MHPGC Project alone. In summary bathing waters and the Tyne and Wear coastal Waterbody are considered to be medium whilst undesignated waters are considered to be low.
Significance of effect	Overall, it is considered that the receptor sensitivity is medium or low and the magnitude of impact is low adverse. Therefore, the effect of increased SSC and associated deposition, during the construction phase, is considered to be minor adverse, which is not significant in EIA terms.
Further mitigation and residual significance	No additional Offshore Water and Sediment Quality mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the embedded commitments outlined in Table 2.31) was not deemed to be significant. Therefore, the residual effect of increased SSC and associated deposition which could result in impacts on sediment and water quality, during the construction phase, is considered to be minor adverse, which is not significant in EIA terms
Operations and maintenance phase	
Magnitude of impact	Activities associated with the O&M of the MHPGC Project, such as cable repairs can cause sediment resuspension albeit less frequently than activities associated with construction or decommissioning. It is considered highly unlikely that each of the identified operational projects (Table 2.33) would be undertaking routine maintenance work, in particular asset reburial or repairs, at the same time, as these are infrequent occurrences during the lifetime of developments particularly within one tidal ellipse of each other. In the unlikely event this does occur sediment disturbance will likely be of a lesser extent than assessed for the construction phase with any impacts localised and temporary. <u>Tier 1</u> Morven North and Morven South and Ossian OWF are proposed to be operational during the operational phase of the MHPGC Project. The remaining Tier 1 Projects (Berwick Bank ECC (Cambois Connection), EGL1, EGL2, Noses Point, Souter Point (Outer), and Sunderland) are expected to remain operational. As discussed for construction, operational Tier 1 projects are anticipated to cause sediment disturbances less frequently and to a lesser extent than during construction with sediment plume generation

Cumulative Effects Assessment	
	likely to be highly localised and temporary. Any impacts arising from the three sea disposal sites are anticipated to act analogously to the construction phase assessment. <u>Tier 2</u> EGL 3 is scheduled to be operational prior to the MHPGC Project and similarly will have a reduced magnitude of impacts upon SSC from that assessed during construction. O&M impacts are anticipated to be less frequent and highly localised in comparison to the assessment of cumulative effects during construction. <u>Tier 3</u> The development phases of the MBAGC Project and EGL 5 may overlap with the MHPGC Project O&M activities however due to MBAGC Project and EGL 5 being in the pre-planning stage precise timing on construction and operation are currently unknown. If they were to occur simultaneously, sediment-disturbing activities could act concurrently. Impacts arising from O&M activities are considered to be similar, or less, than those which occur during construction. Therefore, cumulatively with other plans and projects, the magnitude of the impact is considered to be low for increased SSC and associated deposition during the O&M phase.
Sensitivity of receptor	As outlined during the MHPGC project alone assessment for increased SSC and associated deposition, temporary increases in SSC could potentially result in a reduction in water clarity, primary production, bacterial mortality and DO concentrations and increased nutrients within the water column. The sensitivity of Offshore Water and Sediment Quality receptors (Seaham Hall Beach, Seaham Beach and Crimdon Bathing Waters, Tyne and Wear coastal waterbody and undesignated waters) is considered to be the same as outlined for the MHPGC Project alone. In summary bathing waters and the Tyne and Wear coastal Waterbody are considered to be medium whilst undesignated waters are considered to be low.
Significance of effect	Overall, it is considered that the receptor sensitivity is medium or low and the magnitude of impact is low adverse. Therefore, the effect of increased SSC and associated deposition, during the O&M phase, is considered to be minor adverse, which is not significant in EIA terms
Further mitigation and residual significance	No additional Offshore Water and Sediment Quality mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the embedded commitments outlined in Table 2.31) was not deemed to be significant. Therefore, the residual effect of increased SSC and associated deposition which could result in impacts on sediment and water quality, during the O&M phase, is considered to be minor adverse, which is not significant in EIA terms.
Decommissioning phase	
Magnitude of impact	The infrastructure associated with the MHPGC Project will be decommissioned as per the methodology to be set out in the decommissioning programme. Removal of such infrastructure may result in deterioration of water quality through disturbance of sediments. Any generated sediment plumes and associated deposition are anticipated to act comparably to those described within construction.

Cumulative Effects Assessment

	<u>Tier 1</u> Decommissioning of the MHPGC Project is anticipated to begin in 2073 after a 35-year operational period. The Berwick Bank ECC (Cambois Connection) will begin construction six years prior to the MHPGC Project whilst the timeframes associated with the Ossian OWF indicate that construction may be completed three years earlier than the MHPGC Project. Due to the similarities in project the operational timeframes are expected to be similar. Decommissioning of these projects will therefore likely already be complete prior to the MHPGC Project commencing the decommissioning phase. The same stipulations can be made about the EGL 1 and EGL 2 projects whilst the decommissioning of Morven North and Morven South will likely overlap with the MHPGC Project. Noses Point, Souter Point (Outer) and Sunderland marine disposal sites may still be operational during the decommissioning phase of the MHPGC project however the impacts arising from decommissioning works are expected to be lower than that of construction and therefore additive effects when considering the projects cumulatively are not anticipated to be significant. <u>Tier 2</u> EGL 3 and 4 are both proposed to finish construction prior to the MHPGC Project construction phase and are also likely to be decommissioned prior to the MHPGC Project. Decommissioning impacts will be similar if not less than that of construction and therefore additive effects when considering the projects cumulatively are not anticipated to be significant. <u>Tier 3</u> The development phases of the MBAGC Project and EGL 5 may overlap with the MHPGC Project O&M activities however due to the MBAGC Project and EGL 5 being in the pre-planning stage precise timing on construction and operation are currently unknown. If they were to occur simultaneously, sediment-disturbing activities could act concurrently. Impacts arising from decommissioning activities are considered to be similar, or less, than those which occur during construction. Therefore, cumulatively with other plans and projects, the magnitude of the impact is considered to be low for increased SSC and associated deposition during the decommissioning phase.
Sensitivity of receptor	As outlined during the MHPGC project alone assessment for increased SSC and associated deposition, temporary increases in SSC could potentially result in a reduction in water clarity, primary production, bacterial mortality and DO concentrations and increased nutrients within the water column. The sensitivity of Offshore Water and Sediment Quality receptors (Seaham Hall Beach, Seaham Beach and Crimdon Bathing Waters, Tyne and Wear coastal waterbody and undesignated waters) is considered to be the same as outline for the MHPGC Project alone. In summary bathing waters and the Tyne and Wear coastal Waterbody are considered to be medium whilst undesignated waters are considered to be low.
Significance of effect	Overall, it is considered that the receptor sensitivity is medium or low and the magnitude of impact is low adverse. Therefore, the effect of increased SSC and associated deposition, during the decommissioning phase, is considered to be minor adverse, which is not significant in EIA terms.

Cumulative Effects Assessment	
Further mitigation and residual significance	No additional Offshore Water and Sediment Quality mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the embedded commitments outlined in Table 2.31) was not deemed to be significant. Therefore, the residual effect of increased SSC and associated deposition which could result in impacts on sediment and water quality, during the O&M phase, is considered to be minor adverse, which is not significant in EIA terms.

Impacts from the release of sediment-bound contaminants

- 2.10.1.6 There is potential for cumulative increases in contaminant concentrations following seabed disturbance as a result of activities associated with MHPGC Project and other projects that are under construction, in operation or with planned decommissioning.
- 2.10.1.7 The summary of the whole project assessment for impacts from the release of sediment-bound contaminants is presented in **Table 2.37** and the summary of the CEA is presented in **Table 2.38**.
- 2.10.1.8 The construction, O&M and decommissioning of the MHPGC Project has the potential to increase contaminant levels in the marine environment through the generation of sediment plumes. Other plans and projects within the Offshore Sediment and Water Quality Study area that cause sediment disturbance may introduce previously sediment bound contaminants into the water column through the same pathway of effects as assessed for MHPGC Project alone. Activities such as seabed preparation, foundation drilling and cable installation from other OWFs or cable projects could cause cumulative effects upon Offshore Water and Sediment Quality receptors.
- 2.10.1.9 Whilst in suspension, there is the potential for sediment-bound contaminants, such as metals, hydrocarbons and organic pollutants, to be released into the water column and lead to an adverse effect on water quality receptors. The outcome of such impact depends primarily upon the existing volume and nature of contaminants present within the sediment with increased magnitude of impact likely in correlation with higher contamination levels.

Table 2.37: MHPGC Project whole project assessment for cumulative impacts from the release of sediment-bound contaminants.

Whole project assessment	
Scenario 1: MHPGC Project and Morven North	Scenario 2: MHPGC Project and Morven South
Construction phase	
Magnitude of impact	The whole project assessment for Scenario 1 considers the MHPGC Project together with Morven North meaning impacts could occur in both Scottish and English Waters. The whole project assessment for Scenario 2 considers the MHPGC Project together with Morven South meaning impacts could occur in both Scottish and English Waters. The construction period of Morven North or Morven South may overlap with the construction period of the MHPGC Project. Morven North and Morven South coincide with parts of the spring tidal excursion buffer of the MHPGC Project. Consequently, sediment-disturbing activities such as drilling wind turbine/OSP foundations, MFE sandwave clearance, and dredging could occur simultaneously within a spring tidal excursion distance of each other. This overlap may potentially result in cumulative changes to the impacts from the release of sediment-bound contaminants if sediment disturbing activities are taking place within Morven North or Morven South and the part of the MHPGC Project PEIR Red Line Boundary that overlaps with these areas concurrently. Although there is a possibility of temporal and spatial overlap of Morven North or Morven South with the construction of the MHPGC Project, the exact dates remain uncertain. It should be noted that two concurrent sediment plumes would not travel towards each other as they are advected by the same tidal orientation (predominantly north-south orientated). Given the low levels of sediment dispersion, as demonstrated by project-specific sediment modelling Volume 2, Annex 1.2: Model Design, Validation and Results, of the PEIR increased concentrations of contamination is restricted to the near-field only due to the low current speeds and near seabed release point. There is not expected to be a notable spatial overlap with concentrated sediment plumes created during the construction of Morven North or Morven South and the construction of the MHPGC Project. Typically, low concentrations of sediment bound contaminants enter the dissolved phase within the water column, whilst the vast majority remain adhered to the sediment particles when temporarily entering suspension in the water column. Morven North and Morven South are situated within the MHPGC Project PEIR Red Line Boundary in a vast region of large grain sediment (Figure 2.4:). The release of sediment bound contaminants was scoped out of the benthic ecology chapters of the Morven North and Morven South EIARs (RPS, 2026a and RPS 2026b). One exceedance of Marine Scotland's AL 1 was identified within Morven North for Arsenic with no other exceedances of Marine Scotland AL 1 for PCBs and metals or the TEL for PAH concentrations being identified across either project. Given the short-lived nature of sediment plumes and their highly localised behaviour alongside the low concentrations of contaminants identified in the vicinity of Morven North or Morven South the impact of MHPGC Project plus Morven North or Morven South is not considered likely to cumulatively raise the impact magnitude rating concluded in the MHPGC Project alone assessment. Therefore, the potential increases in contaminant concentration, when considered cumulatively, are still anticipated to be within the natural variation of the Offshore Water and Sediment Quality Study Area, where no additive effect is expected to

Whole project assessment	
Scenario 1: MHPGC Project and Morven North	Scenario 2: MHPGC Project and Morven South
	concentrations of contaminants. Hence, even with the additional potential sediment disturbances introduced by Morven North and Morven South, the magnitude of the impact is considered to remain as low adverse .
Sensitivity of receptor	In Scottish Waters the sensitivity of the undesignated waters is the same as that assessed for the MHPGC Project alone assessment and summarised as low for impacts from the release of sediment-bound contaminants in both Scenario 1 and Scenario 2. In English Waters the sensitivity of the undesignated waters is the same as that assessed for the MHPGC Project alone assessment and summarised as low for impacts from the release of sediment-bound contaminants in both Scenario 1 and Scenario 2
Significance of effect	The receptor sensitivity is considered to be low for undesignated waters and the magnitude of impact is considered to be at worst minor adverse . Therefore, the effect of impacts from the release of sediment-bound contaminants , during the construction phase, is considered to be minor adverse , which is not significant in EIA terms.
Further mitigation and residual significance	No additional Offshore Water and Sediment Quality mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the embedded commitments outlined in Table 2.31) was not deemed to be significant.
Operation and Maintenance phase	
Magnitude of impact	The whole project assessment for Scenario 1 considers the MHPGC Project together with Morven North meaning impacts could occur in both Scottish and English Waters. The whole project assessment for Scenario 2 considers the MHPGC Project together with Morven South meaning impacts could occur in both Scottish and English Waters. Sediment plumes generated by Morven North or Morven South considered here are anticipated to behave in a similar pattern as the sediments being disturbed for the MHPGC Project due to expected similarities in operational design combined with a similar environmental setting and sedimentary characteristics. O&M activities associated with the MHPGC Project may disturb the seabed albeit less frequently and at a smaller scale than activities associated with construction or decommissioning. The same is true for Morven North and Morven South with O&M activities occurring irregularly when required at smaller more localised scales. Due to the irregular nature of O&M work in regards to location of the repairs as well as when such repairs may occur, potential impacts would likely be more localised and occur over a shorter duration than those considered during the construction phase. Additional compounding impacts are not anticipated as cable repair events from both MHPGC Project or Morven North or Morven South are likely to be isolated both spatially and temporally with any increased SSC returning to baseline prior to another cable repair event. Similarly to the northern sediment samples analysed for the MHPGC Project, Morven North and Morven South both identified low concentrations of sediment bound contamination. Typically, low concentrations of sediment bound contaminants enter the

Whole project assessment	
Scenario 1: MHPGC Project and Morven North	Scenario 2: MHPGC Project and Morven South
	dissolved phase within the water column, whilst the vast majority remain adhered to the sediment particles when temporarily entering suspension in the water column further reducing the likelihood of adverse effects. Therefore, cumulatively with Morven North or Morven South, the magnitude of the impact is considered to be low for potential impacts from the release of sediment-bound contaminants.
Sensitivity of receptor	The sensitivity of Offshore Water and Sediment Quality receptors to cumulative impacts from the release of sediment-bound contaminants will remain the same as outlined for the construction. In summary the receptor sensitivity is considered to be low for undesignated waters.
Significance of effect	The receptor sensitivity is low and the magnitude of impacts is low adverse . Therefore, the effect of impacts from the release of sediment-bound contaminants during the O&M phase, is considered to be minor adverse , which is not significant in EIA terms.
Further mitigation and residual significance	No additional Offshore Water and Sediment Quality mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the embedded commitments outlined in Table 2.31) was not deemed to be significant.
Decommissioning phase	
Magnitude of impact	The whole project assessment for Scenario 1 considers the MHPGC Project together with Morven North meaning impacts could occur in both Scottish and English Waters. The whole project assessment for Scenario 2 considers the MHPGC Project together with Morven South meaning impacts could occur in both Scottish and English Waters. Impacts arising from decommissioning activities are considered to be similar, or less, than those which occur during construction. Decommissioning activities that disturb the seabed may resuspend previously sediment bound contaminants. Temporary increases in SSC could potentially result in a reduction in water clarity, primary production, bacterial mortality and dissolved oxygen concentrations and increased nutrients within the water column. Therefore, cumulatively with Morven North or Morven South, the magnitude of the impact is considered to be low for potential increased SSC and associated deposition.
Sensitivity of receptor	The sensitivity of Offshore Water and Sediment Quality receptors to cumulative impacts from the release of sediment-bound contaminants will remain the same as outlined for the construction. In summary the receptor sensitivity is considered to be low for undesignated waters.
Significance of effect	The receptor sensitivity is considered to be low for undesignated waters and the magnitude of impacts from the release of sediment-bound contaminants is low adverse . Therefore, the effect from the release of sediment-bound contaminants, during the construction phase, is considered to be minor adverse , which is not significant in EIA terms.

Whole project assessment	
Scenario 1: MHPGC Project and Morven North	Scenario 2: MHPGC Project and Morven South
Further mitigation and residual significance	No additional Offshore Water and Sediment Quality mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the embedded commitments outlined in Table 2.31) was not deemed to be significant.

Table 2.38: MHPGC Project CEA for Impacts from the Release of Sediment Bound Contaminants

Cumulative Effects Assessment	
Scenario 4: MHPGC Project, Tier 1 (including Morven North and Morven South), Tier 2, and Tier 3 (including MBAGC Project) Projects	
Construction phase	
Magnitude of impact	The construction of the MHPGC Project has the potential to increase contaminant levels in the marine environment through the generation of sediment plumes. Sediment disturbance will occur as a result of seabed preparation, foundation drilling and cable installation. Whilst in suspension, there is the potential for sediment bound contaminants, such as metals, hydrocarbons and organic pollutants, to be released into the water column and lead to an adverse effect on Offshore Water and Sediment Quality. The outcome of such impact depends upon the existing volume and nature of contaminants present within the sediment with increased magnitude of impact likely in correlation with higher contamination levels. As described in Section 2.4.6, the sediment bound contaminants across the MHPGC Project were determined to be in low concentration within northern and central sections of the offshore extent of the MHPGC Project PEIR Red Line Boundary, whilst the Southern section of the offshore extent of the MHPGC Project PEIR Red Line Boundary, in English waters identified large fractions of fine sediments and higher contamination, especially PAHs as described in Table 2.16. <u>Tier 1</u> This impact is associated with the construction phase of the MHPGC Project and cumulative impacts from the identified Tier 1 Projects. Due to the increased likelihood of sediment plume generation and subsequent releases of previously sediment-bound contamination when compared to their O&M phases, cumulative impacts are primarily associated with construction and decommissioning phases of the OWFs and cable projects (Morven North, Morven South, Berwick Bank ECC, GL1 and EGL2). The operational phase of the identified disposal sites (Noses Point, Souter Point (Outer) and Sunderland) however can result in sediment plumes of varying magnitude depending on the type of sediment deposited (e.g. coarse versus fine sediments). Of the Tier 1 projects there is a potential for cumulative effects to occur if multiple sediment plumes were to occur cumulatively there is potential for previously low contaminant concentrations to become bioavailable at high enough concentrations in the water column to cause deterioration to Offshore Water and Sediment Quality receptors. As identified in Table 2.33 the Tier 1 projects of concern are a combination of OWFs, cable projects and sea disposal sites. All of the identified Tier 1 Projects are currently in the operational phases or will be prior to the construction phase of the MHPGC Project except Morven North, Morven South and Ossian. Scenario 1 and 2 discusses the impacts of Morven North and Morven South and assessed the cumulative impacts of the whole project assessment to be low adverse for impacts from the release of sediment bound contaminants. Impacts arising from the construction and O&M of Ossian OWF are anticipated to be comparable with those of the MHPGC Project due to the similar proposed location and type of activities. Similarities in surficial sediments shown in publicly available datasets (BGS, 2026) further support the assumption that effects from re-suspended sediments will behave in the same way as from the

Cumulative Effects Assessment

	MHPGC Project. Any increased contaminant concentrations will likely be dispersed following the cessation of activities with no increases in background SSC within 48 hours of the installation end. The operational aspects of identified projects (excluding marine disposal sites) are considered highly unlikely to undertake routine maintenance work, in particular asset reburial or repairs, at the same time, within the Offshore Water and Sediment Quality Study Area as these are infrequent occurrences during the lifetime of developments. Once constructed, despite the spatial overlap, these projects are therefore not anticipated to cause ongoing seabed disturbances throughout the construction period of the MHPGC Project. In the event that O&M activities occur within 9km of the MHPGC Project sediment disturbance and subsequent sediment bound contaminant releases are likely to be of lesser extent than that assessed for construction. Noses Point, Souter Point (Outer) and Sunderland marine disposal sites are required to assess dredged material for contaminants prior to disposal in order to reduce environmental impacts. Due to this embedded mitigation, sediment plumes from such sites are not anticipated to cause significant releases of sediment bound contaminants alone or when considered cumulatively due to the advection of tidal ellipses and dispersion rates in the region. <u>Tier 2</u> Of the Tier 2 Projects identified the construction phase of the EGL 3 cable will overlap temporally with the construction phase of the MHPGC Project (2033-2037) whilst EGL 4 will already be in operation. Impacts arising from the construction and O&M of these projects are anticipated to be analogous with those of the MHPGC Project due to the similar proposed location and type of activities. Similarities in surficial sediments shown in publicly available datasets (BGS, 2026) further support the assumption that effects from re-suspended sediments will behave in the same way as from the MHPGC Project. Any increased contaminant concentrations will be dispersed following the cessation of activities with no increases in background concentrations within 48 hours of the installation end. As such, it is not expected for there to be any additive process to increase contamination concentrations within the water column when considered cumulatively with Tier 2 projects. Therefore, impacts from the release of sediment bound contaminants, when considered cumulatively, is still anticipated to be within the natural variation of the Offshore Water and Sediment Quality Study Area. <u>Tier 3</u> For Tier 3 projects, the construction periods of the MBAGC Project and EGL 5 may overlap with the MHPGC Project construction activities however due to these projects being in the pre-planning stage precise timings of construction and operation are currently unknown. If they were to occur simultaneously, sediment-disturbing activities could act concurrently. Therefore, when considered cumulatively with other plans and projects, the magnitude of the impact is considered to be low for impacts from the release of sediment-bound contaminants during the construction phase.
Sensitivity of receptor	As outlined during the MHPGC project alone assessment, impacts from the release of sediment-bound contaminants could occur from activities that disturb the seabed. Such activities have the potential to increase SSC and subsequently generate sediment plumes within the marine environment of both Scottish and English Waters of the MHPGC Project. Whilst resuspended into the water column, sediment-bound contaminants have the potential to be released into the water column and adversely affect water quality.

Cumulative Effects Assessment	
	The sensitivity of Offshore Water and Sediment Quality receptors (Seaham Hall Beach, Seaham Beach and Crimdon Bathing Waters, Tyne and Wear coastal waterbody and undesignated waters) is considered to be the same as outlined for the MHPGC Project alone. In summary bathing waters and the Tyne and Wear coastal Waterbody are considered to be medium whilst undesignated waters are considered to be low .
Significance of effect	Overall, it is considered that the receptor sensitivity is medium or low and the magnitude of impact is low adverse. Therefore, the effect of impacts from the release of sediment-bound contamination, during the construction phase, is considered to be minor adverse , which is not significant in EIA terms.
Further mitigation and residual significance	No additional Offshore Water and Sediment Quality mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the embedded commitments outlined in Table 2.31) was not deemed to be significant. Therefore, the residual effect of impacts from the release of sediment-bound contaminants, during the O&M phase, is considered to be minor adverse , which is not significant in EIA terms.
Operations and maintenance phase	
Magnitude of impact	Activities associated with the O&M of the MHPGC Project, such as cable repairs can cause sediment resuspension albeit less frequently than activities associated with construction or decommissioning. Whilst in suspension, there is the potential for sediment bound contaminants, such as metals, hydrocarbons and organic pollutants, to be released into the water column and lead to an adverse effect on Offshore Water and Sediment Quality. The outcome of such impact depends upon the existing volume and nature of contaminants present within the sediment with increased magnitude of impact likely in correlation with higher contamination levels. It is considered highly unlikely that each of the identified operational projects (Table 2.33) would be undertaking routine maintenance work, in particular asset reburial or repairs, at the same time, as these are infrequent occurrences during the lifetime of developments particularly within one tidal ellipse of each other. In the unlikely event this does occur disturbed sediment and subsequent releases of sediment bound contaminants will likely be of a lesser extent than assessed for the construction phase with any impacts localised and temporary. <u>Tier 1</u> Morven North, Morven South and Ossian OWF are proposed to be operational during the operational phase of the MHPGC Project. As discussed for construction, operational Tier 1 projects are anticipated to cause sediment disturbances less frequently than during construction with sediment plume generation likely to be highly localised and temporary resulting in less potential for contaminants to enter the dissolved phase. Any impacts arising from the three sea disposal sites are anticipated to act analogously to the construction phase assessment. <u>Tier 2</u> EGL 3 is scheduled to be operational prior to the MHPGC Project and similarly will have a reduced magnitude of impacts upon SSC from that assessed during construction. O&M impacts are anticipated to be less frequent and highly localised resulting in less potential for contaminants to enter the dissolved phase in comparison to the assessment of cumulative effects during construction.

Cumulative Effects Assessment	
	<u>Tier 3</u> The development phases of the MBAGC Project and EGL 5 may overlap with the MHPGC Project O&M activities however due to these projects being in the pre-planning stage precise timing on construction and operation are currently unknown. If they were to occur simultaneously, sediment-disturbing activities could act concurrently. Impacts arising from O&M activities are considered to be similar, or less, than those which occur during construction. Therefore, cumulatively with other plans and projects, the magnitude of the impact is considered to be low for impacts from the release of sediment-bound contaminants during the O&M phase.
Sensitivity of receptor	As outlined during the MHPGC project alone assessment activities that disturb the seabed have the potential to increase SSC and subsequently generate sediment plumes within the marine environment of both the Scottish and English Waters of the MHPGC Project. Whilst resuspended into the water column, sediment-bound contaminants have the potential to be released into the water column and adversely affect water quality. The sensitivity of Offshore Water and Sediment Quality receptors (Seaham Hall Beach, Seaham Beach and Crimdon Bathing Waters, Tyne and Wear coastal waterbody and undesignated waters) is considered to be the same as outlined for the MHPGC Project alone. In summary bathing waters and the Tyne and Wear coastal Waterbody are considered to be medium whilst undesignated waters are considered to be low.
Significance of effect	Overall, it is considered that the receptor sensitivity is medium or low and the magnitude of impact is low adverse. Therefore, the effect of impacts from the release of sediment-bound contaminants, during the O&M phase, is considered to be minor adverse, which is not significant in EIA terms.
Further mitigation and residual significance	No additional Offshore Water and Sediment Quality mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the embedded commitments outlined in Table 2.31) was not deemed to be significant. Therefore, the residual effect of impacts from the release of sediment-bound contaminants, during the O&M phase, is considered to be minor adverse, which is not significant in EIA terms.
Decommissioning phase	
Magnitude of impact	The infrastructure associated with the MHPGC Project will be decommissioned as per the methodology to be set out in the decommissioning programme (CoT44). Removal of such infrastructure may result in deterioration of water quality through disturbance of sediments. Any generated sediment plumes and associated deposition are anticipated to act comparably to those described within construction. <u>Tier 1</u> Decommissioning of the MHPGC Project is anticipated to begin in 2073 after a 35-year operational period. The Berwick Bank ECC (Cambois Connection) will begin construction six years prior to the MHPGC Project whilst the timeframes associated with the Ossian OWF indicate that construction may be completed three years earlier than the MHPGC Project. Due to the similarities in project the operational timeframes are expected to be similar. Decommissioning of these projects will therefore likely already be

Cumulative Effects Assessment	
	complete prior to the MHPGC Project commencing the decommissioning phase. The same stipulations can be made about the EGL 1 and EGL 2 projects whilst the decommissioning of Morven North and Morven South will likely overlap with the MHPGC Project. Noses Point, Souter Point (Outer) and Sunderland marine disposal sites may still be operational during the decommissioning phase of the MHPGC project however the impacts arising from decommissioning works are expected to be lower than that of construction and therefore additive effects when considering the projects cumulatively are not anticipated to be significant. <u>Tier 2</u> EGL 3 and 4 are both proposed to finish construction by the start of the MHPGC Project and are also likely to be decommissioned prior to the MHPGC Project. Decommissioning impacts will be similar if not less than that of construction and therefore additive effects when considering the projects cumulatively are not anticipated to be significant. <u>Tier 3</u> The development phases of the MBAGC Project and EGL 5 may overlap with the MHPGC Project O&M activities; however, due to these projects being in the pre-planning stage precise timing on construction and operation are currently unknown. If they were to occur simultaneously, sediment-disturbing activities could act concurrently. Impacts arising from decommissioning activities are considered to be similar, or less, than those which occur during construction. Therefore, cumulatively with other plans and projects, the magnitude of the impact is considered to be low for increased SSC and associated deposition during the decommissioning phase.
Sensitivity of receptor	As outlined during the MHPGC project alone assessment activities that disturb the seabed have the potential to increase SSC and subsequently generate sediment plumes within the marine environment of both Scottish and English Waters of the MHPGC Project. Whilst resuspended into the water column, sediment-bound contaminants have the potential to be released into the water column and adversely affect water quality. The sensitivity of Offshore Water and Sediment Quality receptors (Seaham Hall Beach, Seaham Beach and Crimdon Bathing Waters, Tyne and Wear coastal waterbody and undesignated waters) is considered to be the same as outlined for the MHPGC Project alone. In summary bathing waters and the Tyne and Wear coastal Waterbody are considered to be medium whilst undesignated waters are considered to be low.
Significance of effect	Overall, it is considered that the receptor sensitivity is medium or low and the magnitude of impact is low adverse. Therefore, the effect of impacts from the release of sediment-bound contaminants, during the O&M phase, is considered to be minor adverse, which is not significant in EIA terms
Further mitigation and residual significance	No additional Offshore Water and Sediment Quality mitigation is considered necessary because the likely effect in the absence of further mitigation (beyond the embedded commitments outlined in Table 2.31) was not deemed to be significant. Therefore, the residual effect of impacts from the release of sediment-bound contaminants, during the O&M phase, is considered to be minor adverse, which is not significant in EIA terms.

2.10.2 Proposed monitoring

- 2.10.2.1 Site specific monitoring is not proposed as the assessment has concluded that the MHPGC Project would not give rise to likely significant effects for Offshore Water and Sediment Quality, either alone or when considered cumulatively with other plans, projects or activities.

2.11 Transboundary effects

- 2.11.1.1 A screening of transboundary impacts has been carried out and any potential for significant transboundary effects with regard to Offshore Water and Sediment Quality from the construction, O&M and decommissioning phases of the MHPGC Project upon interests of other states has been assessed as part of the PEIR.
- 2.11.1.2 The offshore components of the MHPGC Project and the Offshore Water and Sediment Quality Study Area are located within UK territorial waters, which were considered as part of the baseline assessment in **Section 2.8**. Any impacts on Offshore Water and Sediment Quality receptors due to construction, O&M and decommissioning activities are likely to be confined within the 9km tidal excursion buffer from the offshore extent of the MHPGC Project PEIR Red Line Boundary. Therefore, no transboundary impacts with regards to Offshore Water and Sediment Quality are anticipated and therefore there is no potential for significant effects would arise.

2.12 Inter-related effects

- 2.12.1.1 Inter-related effects are the combined impact of multiple aspects of the MHPGC Project on a single receptor. These are as follows:
- **Project lifetime effects:** Assessment of the scope for effects that occur throughout more than one phase of the MHPGC Project (construction, O&M and decommissioning), to interact to potentially create a more significant effect on a receptor than if just assessed in isolation in each of these three phases.
 - **Receptor led effects:** Assessment of the scope for all effects (including inter-relationships between environmental topics) to interact, spatially and temporally, to create inter-related effects on a receptor.
- 2.12.1.2 Inter-related effects are assessed within **Volume 4, Chapter 5: Inter-related Effects, of the PEIR**, and are summarised below.
- Project lifetime effects
 - The activities resulting in the highest sediment disturbance will occur during the construction phase, with any effects caused deemed to be temporary. An assessment of the potential SSC increases is presented within **Volume 2, Chapter 1: Physical Processes, of the PEIR** and reported no measurable changes from baseline SSC after 24 hours to 48 hours following cessation of activities. Given the short-term nature of the works and presence of the sediment plumes, within the Offshore Water and Sediment Quality Study Area any increase in contaminants within the water column would be immeasurable in practice following dispersion of the sediment plume.
 - The interaction of these impacts between the construction, operation and decommissioning of the MHPGC Project is not predicted to result in any greater significance than those assessed in the individual project phases due to the short timeframes associated with the presence of sediment plumes.
 - Receptor led effects
 - Sediment disturbance caused by the MHPGC Project has the potential to reduce water quality. Higher SSC decreases the depth to which UV light can penetrate the water column and may result in a reduction of primary production, dissolved oxygen and bacterial mortality. This has the potential to cause secondary effects of minor significance on benthic ecology and fish and shellfish ecology during construction, O&M and decommissioning.
 - The release of sediment bound contaminants from activities disturbing the sediment could lead to an increased contaminant bioavailability with the potential for ecotoxicological effects. However, due to the lack of contaminants found in the Gardline (2025) in the Scottish, northern and central sections of the offshore extent of the MHPGC Project PEIR Red Line Boundary and the <48 hour presence of sediment plumes that may carry the contamination found within the Southern elements of the MHPGC Project, it is considered unlikely that there would be any pathways for secondary effects on benthic or fish and

shellfish communities. Therefore, the significance of effect is considered to be minor and no greater in-combination effect is expected.

2.13 Summary

2.13.1 Summary of effects

2.13.1.1 This chapter has assessed the potential impacts on Offshore Water and Sediment Quality from the construction, O&M and decommissioning phases of the MHPGC Project alone and cumulatively with other plans and projects. **Table 2.39** presents a summary of impacts and confirms the residual effects.

2.13.2 Summary of secondary mitigation and monitoring

2.13.2.1 No secondary mitigation or monitoring is required for Offshore Water and Sediment Quality because the likely effects in the absence of further mitigation (beyond the embedded commitments outlined in **Table 2.31** were not deemed to be significant in EIA terms.

Table 2.39: Summary of potential impacts and residual effects

Impact	Sensitivity of receptor	Magnitude of impact	Significance of effect	Secondary mitigation and monitoring	Residual effect
Construction phase					
Increased SSC and associated deposition	Medium to Low	Low Adverse	Minor Adverse	N/A	Minor Adverse
Impacts from the release of sediment-bound contaminants	Medium to Low	Low Adverse	Minor Adverse	N/A	Minor Adverse
Impacts to bathing water quality	Medium	Low Adverse	Minor Adverse	N/A	Minor Adverse
Impacts to the achievement of GES	Medium	Low Adverse	Minor Adverse	N/A	Minor Adverse
O&M phase					
Increased SSC and associated deposition	Medium to Low	Low Adverse	Minor Adverse	N/A	Minor Adverse
Impacts from the release of sediment-bound contaminants	Medium to Low	Low Adverse	Minor Adverse	N/A	Minor Adverse
Impacts to bathing water quality	Medium	Low Adverse	Minor Adverse	N/A	Minor Adverse
Impacts to the achievement of GES	Medium	Low Adverse	Minor Adverse	N/A	Minor Adverse
Changes to sediment transport and sediment transport pathways due to the presence of infrastructure.	Negligible	Negligible	Negligible	N/A	Negligible
Decommissioning phase					
Increased SSC and associated deposition	Medium to Low	Low Adverse	Minor Adverse	N/A	Minor Adverse

Impact	Sensitivity of receptor	Magnitude of impact	Significance of effect	Secondary mitigation and monitoring	Residual effect
Impacts from the release of sediment-bound contaminants	Medium to Low	Low Adverse	Minor Adverse	N/A	Minor Adverse
Impacts to bathing water quality	Medium	Low Adverse	Minor Adverse	N/A	Minor Adverse
Impacts to the achievement of GES	Medium	Low Adverse	Minor Adverse	N/A	Minor Adverse

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