



Morven Hawthorn Pit Grid Connection Project

Preliminary Environmental Information Report

Volume 1, Chapter 2: Project Description

MVCNS-J4029-JVW-00008
October 2026
B01

Document status					
Version	Purpose of document	Authored by	Checker	Approved by	Date
B01	PEIR	MvOWL	LS	LS	October 2026

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Table of contents

2	Project Description	1
2.1	Introduction.....	1
2.2	Background.....	1
2.3	Project Location	2
2.4	Project design envelope approach.....	4
2.5	Consultation undertaken to date	4
2.6	Key Infrastructure and Parameters	15
2.7	Measures adopted as a part of the MHPGC Project (Commitments).....	19
2.8	Programme	23
2.9	Offshore components of the MHPGC Project.....	23
2.10	Landfall (including intertidal area)	33
2.11	Onshore components of the MHPGC Project	39
2.12	Connection to National Grid Hawthorn Pit Substation	57
2.13	Landfall and onshore construction environmental management	57
2.14	Landfall and onshore construction working hours	58
2.15	Onshore biodiversity net gain, enhancement and/or mitigation areas	58
2.16	Operation and maintenance (O&M) activities	59
2.17	Decommissioning.....	61
2.18	Security.....	62
2.19	Quality, health, safety and environment.....	62
2.20	Major accidents and disasters	63
2.21	Waste management	64
2.22	Next steps	64
2.23	References	65

List of tables

Table 2-1: Summary of responses to Scoping Opinions	5
Table 2-2: Summary of key parameters for the MHPGC Project.....	16
Table 2-3: MHPGC Project CoTs directly relevant to the Project Description	19
Table 2-4: MHPGC Project indicative construction programme summary	23
Table 2-5: Indicative activities and parameters in relation to pre-construction site investigation surveys.....	26
Table 2-6: Design Envelope – UXO clearance	27
Table 2-7: Design Envelope – boulder clearance and out of service cable removal.....	28
Table 2-8: Design Envelope - sandwave clearance	29
Table 2-9: Design Envelope – construction of offshore export cables	30
Table 2-10: Design Envelope - offshore export cable installation, cable protection and cable crossings	31
Table 2-11: Anticipated pre-construction surveys for landfall (including intertidal area)	35
Table 2-12: Design Envelope – temporary landfall onshore compound(s) and access	36

Table 2-13: Design Envelope – trenchless technique installation of offshore export cables at landfall.....	37
Table 2-14: Design Envelope – Flotation pits	38
Table 2-15: Design Envelope – TJB(s).....	38
Table 2-16: Design Envelope (Blue onshore LSS Option) – Onshore export cables.....	43
Table 2-17: Design Envelope (Blue onshore LSS Option) – joint bays and monitoring boxes.....	44
Table 2-18: Design Envelope - onshore LSS	46
Table 2-19: Design Envelope (Blue onshore LSS Option) –AC connection cables	48
Table 2-20: Design Envelope (Blue onshore LSS Option) – joint bays and link boxes for AC connection cables	48
Table 2-21: Design Envelope – temporary construction compounds along the onshore export cable corridor and AC connection cable corridor	50
Table 2-22: Design Envelope – construction of onshore LSS	50
Table 2-23: Design Envelope – onshore cable installation	52
Table 2-24: Design Envelope – onshore trenchless drill	56
Table 2-25: Design Envelope - offshore operations and maintenance activities.....	59
Table 2-26: Design Envelope – offshore operations and maintenance vessel numbers and movements	60

List of figures

Figure 2-1: MHPGC Project PEIR Red Line Boundary	3
Figure 2-2: Indicative Extent of DCO and Scottish Marine Licence(s).....	18
Figure 2-3: Offshore Export Cable Corridor and MHPGC PEIR Red Line Boundary: Onshore	25
Figure 2-4: Landfall Location and Arrangements.....	34
Figure 2-5: Indicative Siting of the Landfall and Onshore Components of the MHPGC Project	40
Figure 2-6: Onshore LSS Option Areas.....	41
Figure 2-7: Indicative Biodiversity Net Gain, Enhancement and/or Mitigation Land Area	42

List of diagrams

Diagram 2-1: Components of the Morven Offshore Wind Farm.....	16
Diagram 2-2: Indicative construction programme of the MHPGC Project	23
Diagram 2-3: An illustration of a typical offshore export cable bundle.....	30
Diagram 2-4: Indicative temporary cable corridor cross section	54
Diagram 2-5: Indicative temporary cable corridor cross section	55

Annexes

Annex number	Annex title
2.1	Onshore EMF Compliance Statement

Glossary

Term	Meaning
Alternating Current (AC) connection cable corridor	The corridor within which the AC connection cables will be located, from the onshore land substation to the National Grid Hawthorn Pit Substation.
AC connection cables	Alternating Current (AC) cables that will connect the proposed onshore land substation to the National Grid Hawthorn Pit Substation.
the Applicant	The legal entity making the applications for consent; Morven Offshore Wind Limited (MvOWL).
Biodiversity Net Gain (BNG)	Biodiversity Net Gain (BNG) is a process whereby development leaves biodiversity in a measurably better state and is a planning policy requirement in England under the National Planning Policy Framework (2025). BNG is a statutory requirement under the Environment Act (2021) for certain Town and Country Planning Act (TCPA) developments setting out a mandatory 10 percent (%) net gain in biodiversity. At time of writing, the 10% statutory requirement is not in force for Nationally Significant Infrastructure Projects (NSIPs), although is expected in November 2026. Guidance has been provided by the Department for Environment, Food and Rural Affairs (Defra).
Blue Onshore Land Substation (LSS) Option Area	Proposed location option for the onshore land substation, located west of the A19 and south of the access road to the Jade Business Park.
Cable protection	Measures used to protect subsea cables where burial is not possible, due to seabed conditions or at cable crossings, to ensure cable stability and reduce risks from anchors, fishing gear and environmental forces.
Commitments	Measures (embedded mitigation and secondary) to be adopted during the construction, operation and maintenance and decommissioning phases of the MHPGC Project.
Construction Traffic Management Plan (CTMP)	A required document for development which details how vehicles and pedestrians are to be managed to minimise disruption during building work (including routes, scheduling, and safety).
Core working hours	Working hours of 7am-7pm, Monday - Friday and 7am - 1pm on Saturday, no activity on Sundays or bank holidays.
Decommissioning	The period during which a development and its associated processes are removed from active operation.
Deflagration	Deflagration in the context of Unexploded Ordnance (UXO) refers to a method of clearance that involves igniting and

	burning the explosive contents of UXOs without causing a detonation.
Development Consent Order (DCO)	An order made under the Planning Act 2008, as amended, granting development consent.
Earthworks	Includes the processes of soil-stripping, ground-levelling, excavation and landscaping.
Environment Agency (EA)	The EA is the public body responsible for protecting and improving the environment in England, including regulating activities that affect land, water, and biodiversity. For a DCO, the EA acts as a statutory consultee, advising on flood risk, water quality and ecological impacts.
Environmental 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.
Green Onshore Land Substation (LSS) Option Area	Proposed location option for the onshore land substation, located between Jade Business Park (Spring Rd, Murton, Seaham SR7 9DR) and the National Grid Hawthorn Pit Substation.
High-order unexploded Ordnance (UXO) clearance	The clearance of unexploded ordnance using high-order detonation.
High Voltage Alternating Current (HVAC)	A HVAC electric power transmission system uses alternating current for electric power transmission that periodically reverses direction at regular intervals.
High Voltage Direct Current (HVDC)	A HVDC electric power transmission system uses direct current for electric power transmission, in contrast to the more common alternating current systems. Most HVDC links use voltages between 100 kilovolts (kV) and 800kV.
Intertidal area	The area between Mean High Water Springs (MHWS) and the Mean Low Water Springs (MLWS).
Joint Bay	An excavated area where adjacent sections of underground cable are connected by a cable joint. Typically, a concrete lined pit below ground, that provides a suitable environment for undertaking associated jointing and testing activities.
Landfall	The area in which the offshore export cables make landfall (come onshore) and the transitional area between the offshore cabling and the onshore cabling. This term applies to the entire landfall area between the trenchless technique exit pits and the transition joint bay inclusive of all construction works.
Link Box	An underground or above ground structure containing equipment used for cable sheath bonding, earthing and testing associated with the AC connection cables. Typically comprising an accessible chamber or enclosure designed to provide access during the operation and maintenance phase.
Local Authority	The Local Authority is a body empowered by law to exercise various statutory functions for a particular geographic area of the United Kingdom. This includes District Councils and County Borough Councils. For a DCO, the Local Authority acts as a statutory consultee, advising on local planning matters,

	environmental impacts and compliance with relevant policies and community considerations.
Low order UXO clearance	Applying techniques like deflagration to neutralize UXOs without causing a high order explosion, thereby reducing sound levels.
Lowest Astronomical Tide (LAT)	The lowest tide level that can be expected to occur under average meteorological conditions and under any combination of astronomical conditions.
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.
Marine Directorate Licensing Operations Team (MD-LOT)	The part of the Scottish Government's Marine Directorate responsible for assessing and administering applications for marine licences and Section 36 consent (offshore) in Scotland.
Marine Licence	A marine licence permits the undertaking of different activities in the marine environment, including construction, the deposition or removal of substances or objects from the seabed and dredging. The Marine and Coastal Access Act 2009 requires a marine licence to be obtained for licensable marine activities within the Scottish offshore region (12nm – 200nm) and in English offshore and inshore regions (noting that deemed marine licences will be included within the Development Consent Order application).
Mean High Water Springs (MHWS)	The most inshore level location reached by the sea at high tide during mean high water spring tide. This is defined as the average throughout the year, of two successive high waters, during a 24-hour period in each month when the range of the tide is at its greatest.
Mean Low Water Springs (MLWS)	The average height of the low water levels of each pair of successive low waters during the periods of about 24 hours when the tidal range is at its greatest.
MHPGC Project Environmental Statement (ES)	The document presenting the results of the Environmental Impact Assessment process.
MHPGC Project PEIR Red Line Boundary	The area within which all components of the MHPGC Project will be located, including areas required on a temporary basis during construction and/or decommissioning (such as construction compounds).
MHPGC PEIR Red Line Boundary: Onshore	Spatial extent used to define the environmental assessment within the PEIR. The area within which all onshore components of the MHPGC Project will be located landward of MHWS, including areas required on a temporary basis during construction and/or decommissioning (e.g. construction compounds).
MHPGC Project Preliminary Environmental Information Report (PEIR)	A report that provides preliminary environmental information in accordance with the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017. This is information that enables consultees to understand the likely significant environmental effects of a project and which helps to inform consultation responses.
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 Scoping Report	A Scoping Report for the MHPGC Project, scoping the likely significant effects of the project on the environment, was submitted and accepted by Planning Inspectorate (PINS) and submitted to the Scottish Ministers, via the Marine Directorate – Licencing Operations Team (MD-LOT) in February 2025.
Monitoring Box	An underground or above ground structure containing equipment used for monitoring and testing associated with the onshore export cables. Typically comprising an accessible chamber or enclosure designed to provide access during the operation and maintenance phase.
Morven Branxton Area Grid Connection Project (hereafter 'MBAGC Project')	The Morven Branxton Area Grid Connection Project will be comprised of the offshore export cable in Scottish waters from the Morven North or the Morven South Offshore Substation Platforms, the onshore export cable and the onshore land substation in the vicinity of Branxton in East Lothian, Scotland.
Morven Hawthorn Pit Grid Connection Project	The MHPGC Project is comprised of the offshore export cables in Scottish and English waters from the Morven North or the Morven South offshore substation platform(s) (OSP), landfall, onshore export cables, the onshore land substation (LSS) and AC connection cables. Also referred to in this report as the MHPGC Project, for ease of reading.
Morven North Offshore Wind Array Project and Morven South Offshore Wind Array Project	Morven North and Morven South comprise the Morven North Offshore Wind Array Project and Morven South Offshore Wind Array Project, collectively.
National Grid Hawthorn Pit Substation	The National Grid substation at Hawthorn Pit, County Durham, which the AC connection cables will connect into from the Onshore Land Substation.
Offshore export cable corridor	The proposed corridor in which the offshore export cables will be located, from either the Morven North or Morven South offshore substation platform to the transition joint bay (TJB) at landfall.
Offshore export cables	HVDC cables which bring electricity from either the Morven North or Morven South offshore substation platform to the TJB at landfall.
Onshore components	Infrastructure landward of the transition joint bay at landfall, comprising onshore export cable, onshore export cable corridor, onshore land substation (LSS) AC connection cable and AC connection cable corridor and associated temporary and permanent infrastructure including temporary and permanent compound areas and accesses.
Onshore export cable corridor	The proposed corridor within which onshore export cables and associated infrastructure will be laid and located, from the TJB to the onshore land substation.

Onshore export cables	HVDC cables which bring electricity from the TJB to the onshore land substation.
Onshore Land Substation (LSS)	A purpose-built site comprising a compound containing the electrical components for converting the HVDC to HVAC power. The LSS site associated with the MHPGC Project adjusts the power quality and power factor to meet the requirements of power supply being fed to the National Grid Hawthorn Pit Substation.
Operations and maintenance phase (O&M)	The operational and maintenance phase of the MHPGC Project.
Outline Offshore Operation & Maintenance Plan	Outline plan to describe how offshore assets will be inspected, maintained and repaired throughout their operational life, ensuring safety, reliability and minimising environmental impact.
Planning Inspectorate (PINS)	The PINS is an executive agency of the UK Government responsible for administering and examining DCO applications for NSIPs in England. PINS manages the application process, oversees consultation and examination, and makes a recommendation to the relevant Secretary of State on whether consent should be granted.
Sandwave	A lower regime sedimentary structure that forms across from tidal currents.
Scottish Offshore Waters	The sea area beyond Scotland's territorial waters (12 nautical miles from the coast) out to the limits of the UK Exclusive Economic Zone adjacent to Scotland.
Transition Joint Bay (TJB)	An underground bay housing a joint which connects the offshore export cables to the onshore export cables. The TJB will be located in the vicinity of the onshore side of the landfall.
Trenchless techniques	Construction methods used to install underground or sub-surface infrastructure without the need for continuous open trench excavation, thereby avoiding or minimising disturbance to surface features, habitats and existing land users.
Unexploded Ordnance (UXO)	Unexploded ordnance are explosive weapons (e.g. bombs, shells, grenades, land mines and naval mines etc.) that did not explode when they were employed and still pose a risk of detonation, potentially many decades after they were used or discarded.
United Kingdom Hydrographic Office (UKHO)	The UKHO is a government agency responsible for providing hydrographic and marine geospatial data, charts and publications to support safe navigation and marine operations.

Acronyms

Unit	Meaning
AC	Alternating Current
BESS	Battery Energy Storage System
BNG	Biodiversity Net Gain

CBRA	Cable Burial Risk Assessment
CL:AIRE	Contaminated Land: Applications in Real Environments
CMS	Construction Method Statement
CoCP	Code of Construction Practice
CoT	Commitment
CPT	Cone Penetration Test
CSIP	Cable Specification and Installation Plan
CSV	Construction Support Vessel
CTV	Crew Transport Vessel
DCO	Development Consent Order
Defra	Department for Environment, Food and Rural Affairs
EA	Environment Agency
ECow	Ecological Clerk of Works
EIA	Environmental Impact Assessment
ES	Environmental Statement
HDD	Horizontal Directional Drilling
HVAC	High Voltage Alternating Current
HVDC	High Voltage Direct Current
IEMA	Institute of Environmental Management and Assessment
ISEP	Institute of Sustainability and Environmental Professionals
LAT	Lowest Astronomical Tide
LEMP	Landscape and Ecological Management Plan
LSS	Land Substation
LWS	Local Wildlife Site
MBAGC	Morven Branxton Area Grid Connection
MCA	Maritime and Coastguard Agency
MDS	Maximum Design Scenario
MHPGC	Morven Hawthorn Pit Grid Connection
MHWS	Mean High Water Springs
MLWS	Mean Low Water Springs
MMO	Marine Management Organisation
MvOWL	Morven Offshore Wind Limited
NPS	National Policy Statement
ODMP	Operational Drainage Management Plan
OEMP	Offshore Environmental Management Plan
OFTO	Offshore Transmission Owner
O&M	Operations and Maintenance

OSP	Offshore Substation Platform
PEIR	Preliminary Environmental Information Report
PDE	Project Design Envelope
PINS	Planning Inspectorate
PLGR	Pre-Lay Grapnel Run
SAC	Special Area of Conservation
SAR	Search and Rescue
SoS	Secretary of State
SOV	Service Operation Vessel
SPZ	Source Protection Zone
SSSI	Site of Special Scientific Interest
SWMP	Site Waste Management Plan
TJB	Transition Joint Bay
USV	Uncrewed Surface Vessel
UXO	Unexploded Ordnance

Units

Unit	Meaning
kv	Kilovolt
kHz	Kilohertz
Hz	Hertz
km	Kilometre
km ²	Square kilometre
m	Metre
m ²	Square metre
m ³	Cubic metre
ha	Hectare
%	Percent

2 Project Description

2.1 Introduction

- 2.1.1.1 This 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'). This chapter describes the offshore and onshore components necessary for the construction, operation and maintenance (O&M) and decommissioning phases of the MHPGC Project.
- 2.1.1.2 The Planning and Infrastructure Act 2025 has removed the statutory duty to undertake pre-application consultation with local communities. Nevertheless, MvOWL has elected to undertake a further round of consultation and produce a PEIR and associated documentation, irrespective of statutory requirements, as engagement with local communities remains a key part of the MHPGC Project's consultation approach and ambitions.

2.2 Background

- 2.2.1.1 Morven Offshore Wind Limited (MvOWL), a joint venture between JERA Nex bp Limited (JNBP) and EnBW Energie Baden-Württemberg (EnBW) (hereafter 'the Applicant'), was awarded a seabed option under the 2021/22 ScotWind Leasing Round for the Morven Option Lease Agreement Site (hereafter Morven Site), located wholly within Plan Option Area E1, identified in the Scottish Government's Sectoral Marine Plan for Offshore Wind Energy (the SMP) (Scottish Government, 2020). Since then, the Applicant has continued to develop and evolve the Morven Site and made the decision in 2024 to split the site into two distinct projects, the Morven North Offshore Wind Array Project (hereafter, 'Morven North') and the Morven South Offshore Wind Array Project (hereafter, 'Morven South'), which would be located off the coast of Aberdeenshire in the North Sea, within Scottish waters.
- 2.2.1.2 The UK and Scottish Government's ambitions for offshore wind deployment are supported by the Offshore Transmission Network Review (OTNR), which was established to identify more coordinated and efficient approaches to connecting offshore generation to the onshore transmission grid network. As part of the OTNR, the Holistic Network Design (HND) and subsequent HND Follow-Up Exercise (HND FUE) assessed connection options for offshore wind projects. The assessment considered updated project data, stakeholder feedback, and evolving policy objectives. For the Morven projects, the HND and HND FUE assessments concluded that connection should be achieved through radial transmission links, with separate grid connections identified to support the export of power from Morven North and Morven South. A radial connection is a direct connection from offshore to onshore with no other connections being linked to any other generating assets.
- 2.2.1.3 As a result of the HND and HND FUE (see **Section 3.7** for further detail) and in order to progress the MHPGC Project, the Applicant seeks to consent Morven North, Morven South and the two grid connection assets, i.e. the MHPGC Project and the Morven Branxton Area Grid Connection Project (hereafter, the MBAGC Project), separately. The section 36 applications for Morven North and Morven South were submitted to the Scottish Ministers in May 2026 and are undergoing a separate consultation process. The MHPGC Project will seek development consent and Marine Licence(s) as part of this application, and a further application will be required for the MBAGC Project, which will act as the second grid connection to the Branxton Area in East Lothian, Scotland.
- 2.2.1.4 The outcomes of the HND and HND FUE confirmed that the MHPGC Project will connect either the HVDC OSP within Morven North or Morven South, located within Scottish offshore waters, to the National Grid substation at Hawthorn Pit.
- 2.2.1.5 The MHPGC Project will comprise the offshore export cables traversing through Scottish offshore waters, English offshore waters and English inshore waters, to landfall in County Durham where the offshore cables will connect to the onshore export cables in the transition joint bay (TJB), and onshore export cables connecting to the onshore LSS with AC connection cables connecting to the National Grid substation.

- 2.2.1.6 For assets located in England, the Applicant sought a direction from the Secretary of State (SoS) for Energy Security and Net Zero under section 35 of the Planning Act 2008 to confirm that the onshore and offshore assets in England (including English waters) should be treated as development for which development consent is required under the Planning Act 2008.
- 2.2.1.7 A direction from the SoS for Energy Security and Net Zero was duly made on 05 March 2024 confirming that the MHPGC Project should be treated as a development for which development consent is required. The Applicant is now pursuing a single Development Consent Order (DCO) for the onshore and offshore components of the MHPGC Project in England.
- 2.2.1.8 In respect of the MHPGC Project assets located within Scottish waters (specifically, Scottish Offshore Waters), Marine Licence(s) will be applied for from the Marine Directorate - Licensing Operations Team (MD-LOT), in accordance with the provisions of the Marine and Coastal Access Act 2009 (MCAA 2009).
- 2.2.1.9 Full detail on the background of the MHPGC Project is provided in **Volume 1, Chapter 1: Introduction, of the PEIR**. Further details of the relevant planning policy context are provided in **Volume 1, Chapter 5: Policy and Legislation, of the PEIR**.

2.3 Project Location

- 2.3.1.1 The MHPGC Project is anticipated to be located entirely within the MHPGC Project PEIR Red Line Boundary, shown in **Figure 2-1**. The MHPGC Project PEIR Red Line Boundary encloses the permanent MHPGC Project components, and any temporary areas required during the project lifecycle, such as compounds and accesses. In total, the MHPGC Project PEIR Red Line Boundary is approximately 1,220.07 km² (geodesic area).
- 2.3.1.2 The offshore components of the MHPGC Project are located in both Scottish waters and English waters in the North Sea.
- 2.3.1.3 The onshore components of the MHPGC Project are located wholly within the local authority area of Durham County Council in North-East England, sitting between the landfall North of Hawthorn Quarry and South of the A182, and the National Grid Substation at Hawthorn Pit.

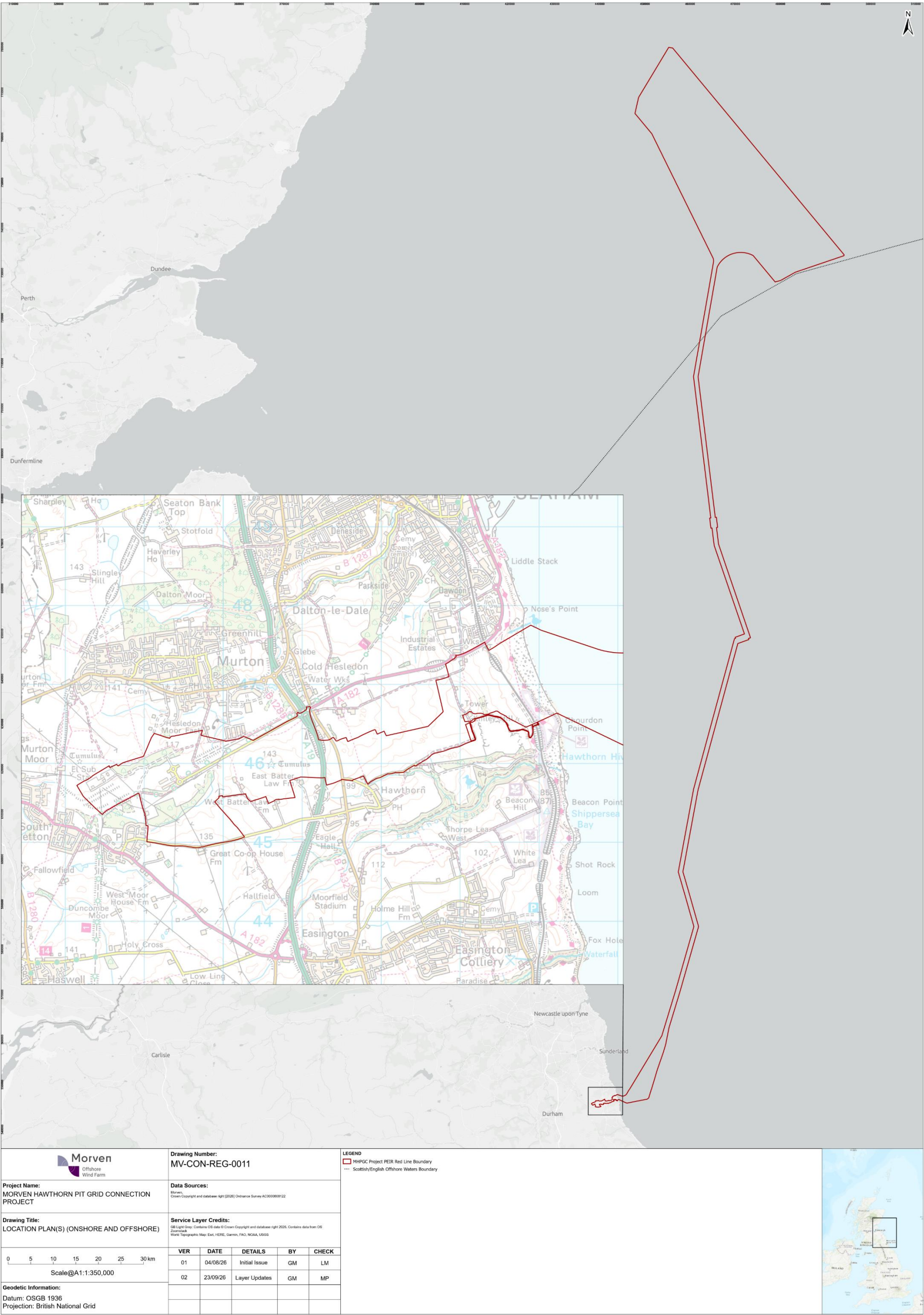


Figure 2-1: MHPGC Project PEIR Red Line Boundary

2.4 Project design envelope approach

- 2.4.1.1 At this stage of the EIA and consenting process, the detailed design for the MHPGC Project is not known. It is often the case that at the time consent is applied for and obtained, there may be design elements that are unknown to an applicant until construction is commenced. In such cases, a Project Design Envelope (PDE) approach, also known as the Rochdale Envelope approach, may be used.
- 2.4.1.2 The PDE approach defines a design envelope and parameters within which the final design will sit. It allows flexibility for elements that are likely to require more detailed design subsequent to publication of a PEIR or submission of an Environmental Statement (ES), such as siting of infrastructure, foundation types and construction methods. It also allows the findings of the consultation process and feedback from statutory and non-statutory stakeholders to be considered during the design process, where appropriate.
- 2.4.1.3 The adoption of the PDE approach allows meaningful EIA to take place by defining a 'maximum design scenario' (MDS), which is the basis of the identification of likely environmental effects. The MDS is the realistic worst-case scenario that would give rise to the greatest impact (and subsequent effect). For example, where several substation design options are under consideration, the assessment is based on the option predicted to have the largest magnitude of impact. This may be the option with the largest footprint, the greatest height or the largest area of disturbance during construction, depending on the topic under consideration. By identifying the MDS for any given impact, it can be concluded that the impact (and therefore the resulting effect) would be no greater for any other design scenario.
- 2.4.1.4 The approach is expressly supported by:
- the Overarching National Policy Statement (NPS) for Energy (NPS EN-1) (DESNZ, 2025a);
 - the NPS for Renewable Energy Infrastructure (NPS EN-3) (DESNZ, 2025b); and
 - the NPS for Electricity Networks Infrastructure (NPS EN-5) (DESNZ, 2025c).
- 2.4.1.5 This chapter therefore sets out the PDE for the MHPGC Project in line with the above policy documents and with the Planning Inspectorate's (PINS) Advice Note Nine: Rochdale Envelope (PINS, 2025a). The PDE described within this chapter has been designed to:
- take into account site selection and design refinement work undertaken to date (see **Volume 1, Chapter 3: Site Selection & Consideration of Alternatives, of the PEIR**); and
 - include sufficient flexibility to accommodate future stages of design refinement, including consideration of relevant best practice guidance and legislation, applicable at the time.
- 2.4.1.6 The design described within this chapter will continue to be refined, taking into account the findings of the ongoing EIA process and engagement with stakeholders. A refined PDE will be presented in the Environmental Statement (ES) and reflected in the draft DCO and marine licence applications that will accompany the relevant applications for consent in England and Scotland. Following the grant of the relevant consents, the final design for the MHPGC Project will be chosen within the parameters set out in the MHPGC Project ES and secured through the DCO and Marine Licence(s), as applicable.
- 2.4.1.7 Each technical topic chapter of the PEIR explains the PDE assumptions relevant to that chapter and identifies the MDS for each impact. The overall assessment methodology for the MHPGC Project is set out in more detail in **Volume 1, Chapter 4: Approach to Environmental Impact Assessment, of the PEIR**.

2.5 Consultation undertaken to date

2.5.1 Scoping

- 2.5.1.1 A Scoping Report for the MHPGC Project was issued to the Planning Inspectorate (PINS) and the Marine Directorate Licensing Operations Team (MD-LOT) in February 2025 (RPS, 2025). Following consultation with the appropriate statutory bodies, PINS (on behalf of the Secretary of State (SoS))

and MD-LOT both provided Scoping Opinions in March 2025 (PINS, 2025; MD-LOT, 2025, respectively).

- 2.5.1.2 **Table 2-1** sets out key comments raised during the scoping process that are relevant to the Project Description chapter, together with details of how these comments have been addressed within the PEIR.

Table 2-1: Summary of responses to Scoping Opinions

Comment	Response to comment raised and/or where considered in this chapter
Planning Inspectorate (PINS)	
The site area stated in the Scoping Report is included as one area and it is not clear whether this covers just the English part of the proposed development or also includes the Scottish part of the proposed development. The ES should clearly include the site area subject to the Development Consent Order (DCO) and this should be clearly written in the ES and reflect as such in the DCO.	Section 2.6 sets out the key components of the MHPGC Project and outlines that the DCO application will only relate to infrastructure within the English jurisdiction. Separate Marine Licence(s) will be sought from MD-LOT for the offshore components of the MHPGC Project within the Scottish waters. Figure 2-2 presents the extent of the MHPGC PEIR Red Line Boundary that will be the subject of the DCO application and the Scottish Marine Licence(s) application respectively. Full details on the background of the MHPGC Project and approach to the required consents application are provided in Volume 1, Chapter 1: Introduction, of the PEIR .
The Scoping Report states that seabed preparation may be required prior to cable installation. The ES should describe the expected seabed preparation activity that would be required, including confirmation of the volume of sand and disposal location arising from any pre-sweeping of sand waves. The ES should also identify the worst-case footprint of seabed disturbance that would arise from offshore construction activities.	Section 2.9.3 provides details of the proposed seabed preparation activities to facilitate the installation of the offshore export cables. These include the volume of sand requiring clearance, its disposal location, and the maximum footprint of seabed disturbance, which is set out in Table 2-7, Table 2-8 and paragraph 2.9.3.20 . The potential impacts of seabed preparation activities are in the relevant topic chapters in Volume 2 of the PEIR .
The Scoping Report states that external cable protection may be required for the offshore components, for example where cables cross existing third party assets or where full burial is not achieved. The ES should explain the worst-case scenario for cable protection and include the assumptions used which the worst-case scenario is based on. It should detail the maximum volume of material required for cable protection and explain how this has been quantified.	Section 2.9.4 and Table 2-10 provide details of the external cable protection required to facilitate the installation of the offshore export cables. These include the MDS for cable protection extent and the volume of material required for cable protection. The assumptions and assessment of these maximum design parameters are provided in the relevant topic chapters in Volume 2 of the PEIR .
The ES should describe the expected number, type and frequency of vessel movements required to construct, operate and decommission the proposed development. If these are unknown, then the ES should explain the assumptions that have been made about vessel movements to inform assessment using a worst-case scenario.	Section 2.9.4 and Table 2-26 provides details of the maximum expected number, type and frequency of vessel movements required to facilitate the construction, O&M and decommissioning of the MHPGC Project. The assumptions and assessment of these maximum design parameters are provided in the relevant topic chapters in Volume 2 of the PEIR .
The Scoping Report identifies the proposed development's connection with other proposed and/or planned infrastructure projects. The ES should describe the relationship between the proposed development and any connected projects, including the use of figures. This should include the extent to which the proposed development is dependent on their delivery and the development timelines of other projects (including the predicted lifespans once operational), with an explanation of how these will be coordinated to reduce environmental effects. Any assumptions made about connected projects should be explained, together	The assessment of cumulative effects between the MHPGC Project and other proposed or planned projects are provided within each of the chapters within Volume 2, Volume 3 and Volume 4, of the PEIR . Details of the consenting approach of the MHPGC Project and connected projects including Morven North, Morven South and the MBAGC Project is provided in Volume 1, Chapter 1: Introduction, of the PEIR .

Comment	Response to comment raised and/or where considered in this chapter
with any uncertainty remaining and how this is addressed in the assessment.	
This section in the Scoping Report includes a description for both the onshore export cables and grid connection cables, however the text does not always differentiate between the different sets of cables. There are also some apparent discrepancies regarding the width of the onshore export cable, whereby the text states that it could be a maximum of 100m, but table 3.4 refers to an indicative width of 50m. The ES should always make it clear which cables are being referred to and ensure that a maximum design scenario is being assessed in the ES at all times to ensure consistency.	Section 2.11 provides details of the onshore components of the MHPGC Project and their construction/installation, with clear distinction between the onshore export cables and the AC connection cables. Discrepancies regarding the width of the onshore export cable reported in the Scoping Report have also been clarified in Table 2-16 and Table 2-23. The assessment of these maximum design parameters is provided in the relevant topic chapters in Volumes 3 and 4 of the PEIR.
The Scoping Report states that the export cables are likely to be installed through the intertidal zone using trenchless methods (such as Horizontal Directional Drilling (HDD)). It also states that there may be a need for construction vehicles to access the beach and there may be a requirement to have an offshore marine spread. The Inspectorate notes the mitigation measure MM-14, which states that cable installation in the nearshore would be undertaken using trenchless methods. The precise technique at this stage is not clear. The ES should describe and assess any options in this regard, including effects during construction, operation and decommissioning. Impacts associated with the anticipated changes at the landfall site throughout the lifetime of the proposed development should be assessed where significant effects are likely. Where reliance is placed on the use of a specific method to mitigate significant effects, the applicant should ensure that such commitments are appropriately defined and secured. The ES should describe how cable burial and siting of associated infrastructure would be managed throughout the lifespan of the proposed development. The alternatives chapter of the ES should describe the main reasons for the option chosen, including a comparison of the environmental effects.	Section 2.10.4 provides details of the trenchless techniques anticipated to install the offshore export cables between the TJB(s) and the subtidal area. To avoid direct impact to existing infrastructure and sensitive designations at landfall, the Applicant has made a commitment (CoT13 of Volume 1, Annex 4.1: Commitments Register, of the PEIR) that the installation of the offshore export cables under Durham Coast Site of Special Scientific Interest (SSSI) and Special Area of Conservation (SAC) will be undertaken by trenchless technologies. The assessment of effects associated with the use of trenchless techniques at landfall throughout the lifetime of the MHPGC Project are provided within each of the chapters within Volume 2, Volume 3 and Volume 4 of the PEIR, including details of any mitigation measures required to mitigate any significant effects. Section 2.16 also provides details of the anticipated O&M activities to manage all components of the MHPGC Project throughout their lifespan. The alternatives to the MHPGC Project are provided within Volume 1, Chapter 3: Site Selection & Consideration of Alternatives, of the PEIR and its supporting Annexes.
The Scoping Report states that temporary access roads will be required. Temporary watercourse crossings (including culverts and bridges) may also be needed to facilitate the route. The ES should describe the location and parameters of temporary access routes, including any changes proposed to the existing highway, and confirm the predicted number/type of traffic movements required. Where details are unknown, a worst-case scenario should be presented. Where crossing of watercourses and culverts are required, these should be discussed and agreed with the Environmental Agency.	Section 2.11.5 provides details of the temporary access roads and potential watercourse crossings required to facilitate the construction of the onshore components of the MHPGC Project. Preliminary projections of traffic movements attributable to the MHPGC Project and assessment of the associated maximum design parameters are included within Volume 3, Chapter 5: Traffic and Transport, of the PEIR.
The ES should describe the proposed number, location and parameters of temporary construction compounds and laydown areas required during construction and decommissioning of the proposed development. The ES should assess any likely significant effects arising from these works.	Section 2.11.5 and Section 2.11.6 provide details of the maximum number of temporary construction compounds and the maximum size of any temporary works areas required to facilitate the construction of the onshore components of the MHPGC Project. At this stage, decommissioning activities are only anticipated to the onshore LSS and are assumed to be similar to construction in reverse sequence. This means that the temporary

Comment	Response to comment raised and/or where considered in this chapter
	infrastructure requirement for construction and decommissioning should be similar. The assessment of effects arising from construction and decommissioning are provided in the relevant topic chapters in Volumes 3 and 4 of the PEIR.
The Scoping Report states that onshore and offshore cables are likely to be left in-situ, but there is a possibility that they may be removed, in the event that the proposed development is decommissioned. The Inspectorate notes that a decommissioning plan will be prepared post-consent and updated across the lifetime of the development. However, in order to ensure that all likely significant effects associated with the proposed development are included in the ES, the ES should include an assessment of decommissioning effects based on a reasonable worst-case scenario.	As explained in section 2.17, the removal of onshore and offshore cables and associated cable protection measures has been assessed as a realistic worst-case scenario, although this is not a preferred decommissioning approach. The assessment of the decommissioning effects based on this realistic worst-case scenario is provided in the relevant topic chapters in Volumes 2, 3 and 4 of the PEIR.
The Scoping Report describes three options for landfall, two options for routing of the offshore cable, and three options for the onshore cable route. The location of the proposed substation is also to be determined, with an area of search shown on paragraph 6.2. The applicant should make every attempt to narrow the range of options and explain clearly in the ES which elements of the proposed development have yet to be finalised. The description of the proposed development in the ES must not be so wide that it is insufficiently certain to comply with the requirements of Regulation 14 of the EIA Regulations. The need and justification to support the level of flexibility sought must be explained in the ES, including how it has been taken into account in the assessments through relevant parameters (temporal and spatial) and a defined worst-case for resulting environmental effects. It will be essential to ensure consistency throughout the ES and any other relevant assessments supporting the application from which the ES draws. It should be noted that if the proposed development materially changes prior to submission of the DCO application, the applicant may wish to consider requesting a new scoping opinion.	Section 2.4 sets out that the PDE approach has been employed to the design of the MHPGC Project to allow flexibility for elements that are likely to require more detailed design subsequent to publication of a PEIR or submission of an ES. The assessment of effects of the MHPGC Project are provided within the relevant topic chapters in Volumes 2, 3 and 4 of the PEIR. These assessments utilise a MDS to define the realistic worst-case scenario for assessment based on the receptors being considered. The Applicant considers that the PDE approach set out in Section 2.4 has been developed in accordance with the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the 'EIA Regulations') and PINS Advice Note Nine: Rochdale Envelope. The approach allows flexibility for the detailed design for the MHPGC Project while ensuring realistic worst-case development scenarios are identified and properly assessed, thereby giving sufficient certainty of compliance. The Applicant will continue narrowing the design options of the MHPGC Project as the EIA process progresses. Details of the site selection process and consideration of alternatives at this stage are provided within Volume 1, Chapter 3: Site Selection and Consideration of Alternatives, of the PEIR.
It is difficult to distinguish the benthic habitat types presented on figure 7.9 in the nearshore area. It is also not possible to distinguish the proximity of designated sites to the cable route and landfall site in figures such as figure 7.28 at the scale currently provided. The ES must include clear and appropriate figures to support the impact assessment. Figures should be of an appropriate scale and shading to allow each element on the figure to be clearly distinguishable and include clear keys/legends and labels.	Clear and appropriate figures are provided throughout the PEIR to ensure that each element is distinguishable and at an appropriate scale, including clear legends and labels as needed. Figures presenting the benthic habitat types and designated sites are provided within Volume 2, Chapter 3: Benthic Subtidal and Intertidal Ecology, of the PEIR.
The ES should include a description of the nature and quantity of materials and natural resources used in the proposed development, including expected quantities and types of any waste that would be generated during construction, operation and decommissioning. The ES should describe the assumptions made in the assessment with regards to likely exportation of waste. The Inspectorate notes that no separate waste aspect chapter is to be produced and there is no commitment	Section 2.21 sets out the approach to management of waste generated from the MHPGC Project, including the expected quantities and types of waste. It also provides that procedures for handling waste materials will be set out in the Outline Offshore Environmental Management Plan and the Outline Site Waste Management Plan (which will form part of the Code of Construction Practice). The Applicant has made commitments (CoT06 and CoT45 of Volume 1, Annex 4.1: Commitments Register, of the PEIR) to prepare and submit

Comment	Response to comment raised and/or where considered in this chapter
at this stage to produce a Site Waste Management Plan (SWMP). An assessment of effects relating to waste should be provided where significant effects are likely to occur, including in relation to transport effects arising from the movement of waste.	both plans with the development consent application and/or as part of the Marine Licence application(s) to the Scottish Ministers. Detailed versions of both plans will be developed substantially in accordance with the corresponding outline plan, and as approved by the discharging authority. The assessment of effects associated with waste is provided in the relevant topic chapters in Volumes 2, 3 and 4 of the PEIR.
The numbering of the tables and figures does not accord with the chapter structure and sometimes these are misreferred to in the supporting text. The ES should include a clear and logical number system for tables and figures, with the correct references in the supporting text.	The PEIR has provided a clear and logical number system for both the tables and figures with the correct cross references in supporting text.
The Inspectorate notes the applicant intends to prepare an ES that covers both the proposed development and a separate marine licence application in Scotland. The Inspectorate is content with this approach provided that the ES project description is structured such that it is clear which elements are to be consented within the DCO. However, the assessments within the ES must clearly identify the effects associated with the works that would be permitted by the DCO separately. This is to ensure that the Examining Authority/ Secretary of State can understand the effects associated with the proposed developments and the requirements for any mitigation secured within the DCO. Where it is not possible to make a distinction between effects associated with the DCO in England and the marine licence in Scotland, such as in the case of mobile species that may occur in both Scottish and English waters, this should also be clearly stated in the ES and the approach to the assessment supported by appropriate reasoning. The ES should also describe any interactive or cumulative effects between the different project elements where these would lead to significant effects.	Section 2.6 and the overview section of section 2.9, section 2.10 and section 2.11 of this chapter set out components of the MHPGC Project that are to be consented within the DCO and Marine Licence application, respectively. The assessment of effects associated with the extent of the DCO application and Marine Licence application(s), including circumstances where this distinction is not possible to be made, is set out in the topic chapters in Volumes 2, and 4 of the PEIR where necessary.
A standalone ES chapter for major accidents and disasters is not proposed on the basis that potential accidents and disasters will be assessed in other aspect chapters, where relevant, including significant effects arising from the vulnerability of the proposed development to major accidents and disasters. The Scoping Report also states that a description of how major accidents and disasters have been considered in the design of the proposed development will be outlined in the project description chapter of the ES. The Inspectorate has considered this approach and agrees that a standalone chapter is not necessary on the basis that the information relating to major accidents and disasters will be provided elsewhere in the ES. Each ES chapter should clearly state where it has considered major accidents and disasters within the relevant technical assessments. The Inspectorate would expect an overarching section in the ES which explains how potential impacts have been identified and where in the ES the assessment of their effects is	Section 2.20 provides an overview of how major accidents and disasters have been considered in the design of the MHPGC Project and outlines the list of effects related to major accidents and disasters identified in the relevant topic chapters in Volumes 2, 3 and 4 of the PEIR.

Comment	Response to comment raised and/or where considered in this chapter
presented. The applicant's attention is also directed to the comments of the Inspectorate in ID 5.5 above in respect of climate and extreme weather events.	
MD-LOT	
The Scoping Report identifies that seabed preparation will be necessary prior to cable installation. Should seabed preparation involve dredging, the EIA Report must identify the quantities of dredged material and identify the likely location for deposit. The Applicant may also be required to submit pre-dredge sample analysis, this should include supporting characterisation of the new or existing deposit sites. Any seabed levelling or removal of substances from on or under the seabed (including dredging and 'grapnel runs') will require consideration in the EIA Report and may require a marine licence. The Scoping Report also identifies that boulders may be removed from the site of the Proposed Works. The EIA Report must provide the anticipated estimate of boulders to be cleared (including how much uncertainty may be associated with the figures presented). Clear narrative must be provided within the EIA Report to show how this has been estimated prior to further geophysical and geotechnical surveys being undertaken.	Section 2.9.3 provides details of the proposed seabed preparation activities to facilitate the installation of the offshore export cables. These include the MDS for boulder clearance and sandwave clearance as well as the maximum cable corridor length and seabed footprint that are anticipated to be affected by the seabed preparation activities. The assumptions and assessment of these maximum design parameters are provided in the relevant topic chapters in Volume 2 of the PEIR. The Applicant has made a commitment (CoT39 of Volume 1, Annex 4.1: Commitments Register, of the PEIR) to prepare and submit a Dredge and Disposal Site Characterisation Report with the application for development consent as per the MMO's requirement. There is no comparable report required for Scottish waters although as noted above the assumptions and assessment of these maximum design parameters are provided in the relevant topic chapters in Volume 2 of the PEIR.
In terms of cable installation, the Scottish Ministers consider that the EIA Report must clearly detail the number and size of export cables to be installed and whether they are to be bundled into a single trench or laid separately. The EIA Report must provide an estimate of the anticipated likelihood of suitable burial along that route and must also be clear on the range of burial depths that have been considered as part of the assessment. Clear narrative must be provided within the EIA Report to show how this has been estimated prior to the further geophysical and geotechnical surveys being undertaken. Where reliance is placed on a subsequent cable plan or cable burial risk assessment as mitigation, the EIA Report must explain how this measure will mitigate the effects, what measures are proposed for inclusion and the effectiveness and degree of confidence that can be placed on such measure. It is recommended that such plans are included alongside the EIA Report.	Section 2.9.4 and Table 2-9 provide the design details of the offshore export cables and the cable bundle arrangement. The MDS set out in Table 2-9 notes that the MHPGC Project will require two offshore HVDC power cables (conductors) and two fibre optic cables forming a single cable circuit. The offshore export cables will be installed in up to two trenches, with a trench width of up to 2.1 m and a depth of up to 3 m, with a maximum external cable diameter of 320mm (if bundled into a single trench) or 160mm (if laid in 2 separate trenches). Section 2.9.4 and Table 2-9 also provide the estimate of the anticipated likelihood of suitable burial along the offshore export cable corridor. The assumptions and assessment of these maximum design parameters are provided in the relevant topic chapters in Volumes 2 and 4 of the PEIR, including details of any mitigation measures required. The Applicant has also made a commitment (CoT08 of Volume 1, Annex 4.1: Commitments Register, of the PEIR) that an Outline Offshore Cable Specification and Installation Plan (CSIP) will be prepared and submitted with the application for development consent and as part of the Marine Licence application(s) to the Scottish Ministers. The Outline CSIP will include a Cable Burial Risk Assessment (CBRA) which will define burial depths and safeguards to keep the offshore export cables protected and compliant through all project phases.
Section 3.4.3.16 of the Scoping Report states that if burial is not possible then additional cable protection methods will be adopted. Table 3.2 of the Scoping Report lists cable protection materials including concrete mattresses, rock placement, rock bags, grout bags, cement bags, sandbags, articulated pipes, cast iron shells, bend restrictors/stiffeners, frond mats. Where there is any potential for cable protection to be used to protect the cables, this must be assessed in the EIA Report including details on materials, quantities and	Section 2.9.4 and Table 2-10 provide details of the external cable protection required to facilitate the installation of the offshore export cables. These include the MDS for cable protection material and extent, as well as the volume of material required for cable protection. The assumptions and assessment of these maximum design parameters are provided in the relevant topic chapters in Volume 2 and 4 of the PEIR.

Comment	Response to comment raised and/or where considered in this chapter
location (including how much uncertainty may be associated with the figures presented). The EIA Report should describe the main reasons for selecting the chosen cable protection over the alternatives considered, providing a clear robust justification for the options taken. The Scottish Ministers direct the Applicant to the representations from NatureScot and the SFF with regard to the predicted amounts and potential locations of cable protection and the impact of cable protection methods to be utilised.	The finalised cable installation approach and any necessary cable protection measures for the offshore export cables will be confirmed during detailed design, after consents have been granted. The Applicant has also made a commitment (CoT08 of Volume 1, Annex 4.1: Commitments Register, of the PEIR) that an Outline Offshore CSIP will be prepared and submitted with the application for development consent and as part of the Marine Licence application(s) to the Scottish Ministers. The Outline CSIP will include a CBRA which will define burial depths and safeguards to keep the offshore export cables protected and compliant through all project phases.
Section 3.4.3 of the Scoping Report includes reference to geophysical, geotechnical and unexploded ordnance surveys. The Scottish Ministers advise that the EIA Report must describe and assess the environmental effects, including in-combination effects, of the range of surveys required. The EIA Report must also include consideration of the options which will be assessed in relation to UXO clearance, the differences amongst them and an assessment of the environmental effects of these options. In this regard, the Scottish Ministers advise that the EIA Report must include a worst-case scenario of high order detonation in terms of impact and mitigation, unless there is robust supporting evidence that can be presented to show consistent performance of the preferred low order or deflagration method. The Scottish Ministers refer the Applicant further to the Joint Statement – Marine environment: unexploded ordnance clearance in this regard. As per the NatureScot representation, impacts will require consideration in the EIA Report in terms of assessment under European Protected Species licensing.	Section 2.9.2 provides details of the pre-construction geophysical and geotechnical surveys required, and section 2.9.3 provides details of UXO clearance required to facilitate the installation of the offshore export cables. Table 2-6 sets out the MDS for UXO clearance, which includes maximum detonation weight. It should be noted the MHPGC Project is not seeking consent for high order clearance, although this has been modelled for information. The assumptions and assessment of these maximum design parameters are provided in the relevant topic chapters in Volume 2 of the PEIR, including details of any measures required to mitigate any significant effects.
Section 3.8 of the Scoping Report details that operation and maintenance activities will be considered within the EIA Report. The Scottish Ministers advise that the EIA Report must provide a full description and consideration of the nature and scope of these activities, including the types of activity, their frequency, and how activities will be carried out for the Proposed Works. This should include consideration for the potential overlapping of activities with those required for the Morven Offshore Wind Farm array. Such proposed activities may require to be permitted by a marine licence issued for the Proposed Works, unless an exemption applies.	Section 2.16.1 and Table 2-25 provide detailed descriptions of the reasonably foreseeable planned and unplanned O&M activities associated with the offshore export cables and the MDS for these activities, including their frequency and extent throughout the lifetime of the MHPGC Project. The assessment of cumulative effects between the MHPGC Project and other connected projects including Morven North and/or Morven South are provided within each of the topic chapters within Volume 2, Volume 3 and Volume 4 of the PEIR.
Environment Agency	
E2 – Design of onshore cables Document Reference(s): MHPGC Project EIA Scoping Report, Chapter, Section 3.5.3 Issue: No information is provided regarding the design of onshore cables. Impact: Potential for underground cables to pose an unacceptable risk to groundwater quality. Solution: Confirmation of whether fluid filled cables are proposed as part of the design of the Proposed Developer is required.	Section 2.11.2 and section 2.11.4 provide the design details of the onshore export cables and AC connection cables, including the associated maximum parameters. Both the onshore export cables and AC connection cables are not anticipated to be fluid filled that could transport pollutants, through SPZ1 or SPZ2 or below the water table in principal or secondary aquifers. Should this be required, the MHPGC Project will follow the EA's guidance and undertake relevant risk assessment relating to potential presence of hazardous substances and potential risks to controlled waters receptors.

Comment	Response to comment raised and/or where considered in this chapter
Additional narrative/ explanation In accordance with Statement C5 of the EA's Approach to Groundwater Protection, the EA will normally object to pipelines or fluid-filled cables that transport pollutants, particularly hazardous substances that: • Pass through SPZ1 or SPZ2 where this is avoidable. • Are below the water table in principal or secondary aquifers. Where there is an unavoidable need for pipelines or fluid-filled cables to pass through SPZ1 or SPZ2, operators are expected to adopt Best Available Techniques (BAT) and operate in accordance with the Energy Networks Association guidance. The EA expects operators to carry out a site-specific risk assessment prior to the decommissioning of fluid-filled cables in SPZ1 and SPZ2 and will work with operators to agree the best available environmental option.	
E3 – Proposed water drainage for the land Substation (LSS) site Document Reference(s): MHPGC Project EIA Scoping Report, Chapter 3.5, Section 3.6.1.3 Issue: No detail of the proposed drainage solution for the LSS is provided at this stage, including how this will manage potentially contaminated water, in particular firefighting water in the event of a substation fire. It is also presumed that the LSS would require a local water supply for emergency firefighting purposes, and that this may require the construction of a borehole-fed emergency water supply. Impact: Insufficiently mitigated rainwater runoff and emergency fire water runoff from this facility could result in impacts to controlled waters. Potential for firefighting water supply constraints to be encountered. Solution: Confirmation of how surface water runoff from the LSS will be managed to avoid impacting surface and groundwater bodies is required. Should a borehole-fed emergency water supply be required, a groundwater investigation consent may be required. Additional narrative/ explanation A Surface Water Drainage Strategy and/or Surface Water Management Plan should be developed which includes measures for the isolation and removal of potentially contaminated runoff from the LSS. This information should include, but not be limited to: • A detailed drainage plan which demonstrates, in the event of an emergency, that contaminated firewater can be adequately contained within the site to ensure that there is no discharge of polluted water to ground or surface water bodies. • The scheme should include an impermeable base or layer beneath the substation infrastructure, to ensure infiltration beneath the site can be controlled. • Any system for the storage of contaminated firewater should have sufficient capacity/headroom for the volumes expected in the event of a fire, even during periods of intense rainfall.	Section 2.11.3 provides the design details of the onshore LSS including an overview of the arrangement for surface water drainage. It is anticipated that permanent surface drainage will be required on the impermeable areas of the onshore LSS (see maximum extent in Table 2-18) and additional sustainable drainage systems will be incorporated as necessary. The Applicant has made a commitment (CoT22 of Volume 1, Annex 4.1: Commitments Register, of the PEIR) that an Outline Operational Drainage Management Plan (ODMP) for the onshore LSS will be prepared and submitted with the application for development consent. The Outline ODMP will detail measures to ensure that existing land drainage is reinstated and/or maintained, and ensure surface water runoff generated at the chosen onshore LSS option by new impermeable areas is attenuated with an allowance for climate change and discharged from the site to an appropriate location at a restricted discharge rate. A detailed ODMP will be developed substantially in accordance with the Outline ODMP and in line with the latest relevant drainage guidance notes in consultation with the EA and the Lead Local Flood Authority.

Comment	Response to comment raised and/or where considered in this chapter
The system for containing firefighting effluent should be automatic with a backup system in place in case of power failure.	
E4 – Cable installation method Document Reference(s): MHPGC Project EIA Scoping Report, Chapter 3, Section 3.5.3.6 Issue: Horizontal Directional Drilling (HDD) might be employed. Impact: HDD or other trenchless installation methods could impact groundwater or surface water quality if not suitably managed. Solution: HDD crossings should be supported by the development and implementation of a Drilling Fluid Breakout Plan. Additional narrative/ explanation If HDD is proposed to be used to cross watercourses the Applicant would need to assess whether this would affect local licensed or unlicensed abstractions by carrying out a water feature survey. A Hydrogeological Risk Assessment should also be carried out where HDD or other trenchless installation methods are proposed which may interact with Principal or Secondary A aquifers or pass beneath surface watercourses or sensitive ecological habitats.	Section 2.11.6 provides details of the installation of onshore export cables and AC connection cables including potential need for crossings where trenchless technique may be employed. Bentonite slurry could be used as drilling mud to stabilise the bores. The Applicant has made a commitment (CoT47 of Volume 1, Annex 4.1: Commitments Register, of the PEIR) that an Outline Bentonite Breakout Plan will be submitted as part of the application for the development consent. A Detailed Bentonite Breakout Plan will be developed substantially in accordance with the outline plan, and as approved by the discharging authority. Further assessment detail of the impact of trenchless installation methods on groundwater or surface water quality is provided in Volume 3, Chapter 2: Water Resources and Flood Risk, of the PEIR.
E5 – Operation and maintenance phase activities Document Reference(s): MHPGC Project EIA Scoping Report, Chapter 3, Section 3.8 Issue: Anticipated activities during the operation and maintenance phase of the Project are not listed. Impact: Uncertainty about the risks posed by the Project to the environment during the operation and maintenance phase Solution: Confirmation of anticipated operation and maintenance activities for the onshore portion of the Project is required.	Section 2.16.2 provides details of the reasonably foreseeable planned and unplanned O&M activities associated with the onshore components of the MHPGC Project.
E6 – Retention of buried infrastructure during decommissioning Document Reference(s): MHPGC Project EIA Scoping Report, Chapter 3, Section 3.9 Issue: The retention of buried structures is likely during the decommissioning phase. Impact: Retained infrastructure could cause contaminative impact to controlled waters following decommissioning phase if risks are not properly assessed. Solution: The risks posed by the retention of below ground infrastructure following decommissioning needs to be considered and assessed.	Section 2.17.4 sets out the arrangement for decommissioning the onshore components of the MHPGC Project, including the preferred retention of onshore export cables and AC connection cables buried underground. The Applicant has made a commitment (CoT16 of Volume 1, Annex 4.1: Commitments Register, of the PEIR) that an Onshore Decommissioning Plan will be developed prior to decommissioning and will include details relevant to flood risk, pollution prevention, protection of soils and avoidance of ground disturbance. Further detail of the assessment on effects related to decommissioning the onshore components of the MHPGC Project is provided in the relevant topic chapters of Volumes 3 and 4 of the PEIR.
Natural England	
Paragraph 3.4.2.18 Topic: Offshore infrastructure	Section 2.9.3 provides details of the proposed seabed preparation activities to facilitate the installation of the offshore export cables. These include the MDS for boulder clearance and sandwave clearance as well as the maximum cable corridor length and seabed footprint that are

Comment	Response to comment raised and/or where considered in this chapter
Comments: No information has been provided regarding the anticipated locations or total area of impact (both direct and indirect) for seabed preparation Recommendations: We advise that the total area of impact (both direct and indirect) should be provided for cable route clearance activities. For boulder clearance in protected sites, this should also include where the boulders are placed and where they have been removed from. Specific locations should also be provided for these activities and any sensitive habitats identified. Sensitive habitats include, but are not restricted to, Annex 1 habitats outside protected sites and Section 41 priority habitats. We also advise that the avoid, reduce, mitigate hierarchy should be used to reduce environmental impacts. These potential impacts should be considered scoped in and assessed.	anticipated to be affected by the seabed preparation activities. The potential impacts of seabed preparation activities are assessed in the relevant topic chapters in Volume 2 of the PEIR.
Paragraph 3.5.2.1 Topic: Cable landfall Comments: Horizontal Directional Drilling (HDD) Recommendations: HDD is a strongly preferred method for installation of the cable through the intertidal zone, as it eliminates physical disturbance of the intertidal area. Natural England welcomes the proposed use of this approach for this project, and we support the undertaking of feasibility studies and ground investigations to inform the methodology and environmental assessments. However, Natural England is aware that the use of HDD relies heavily on local site and environmental conditions and so cannot be guaranteed. We recommended that an alternative methodology is identified in advance and is suitably assessed for environmental impacts, to minimise disruption and environmental risks should HDD become unfeasible at short notice. Additionally, the risk of potential contamination of notified habitats, from the use of chemicals for lubrication of the HDD, will need to be considered in the ES and HRA	Section 2.10.4 provides details of the trenchless techniques anticipated to install the offshore export cables between the TJB(s) and the subtidal area. To avoid direct impact to existing infrastructure and sensitive designations at landfall, the Applicant has made a commitment (CoT13 of Volume 1, Annex 4.1: Commitments Register, of the PEIR) that the installation of the offshore export cables under Durham Coast Site of Special Scientific Interest (SSSI) and Special Area of Conservation (SAC) will be undertaken by trenchless technologies. The potential impacts associated with trenchless technique installation are assessed in the relevant topic chapters in Volumes 3 and 4 of the PEIR.
Paragraph 3.5.2.1 Topic: Onshore infrastructure Comments: The high-level methods note that it is likely that the pipeline will pass beneath the Durham Cliffs SSSI via HDD. Recommendation: The ES should assess this method, alongside any others proposed if HDD may be infeasible, with a view to assessing a worst-case scenario to identify if damage could occur to the site's vegetated sea cliffs and geological features due to vibration or direct damage from machinery.	Section 2.10.4 provides details of the trenchless techniques anticipated to install the offshore export cables between the TJB(s) and the subtidal area. The potential impacts associated with trenchless technique installation are assessed in the relevant topic chapters in Volumes 3 and 4 of the PEIR.
Paragraph 3.4.2.2 Topic: Design envelope for offshore export cables Comments: Flexibility is required in the location, depth of burial and protection measures for the offshore export cables to ensure physical and technical constraints, changes in available technology and project economics can be accommodated within the final design.	Section 2.9.4 and Table 2-9 provide the design details of the offshore export cables, including the MDS for the number and size of the offshore export cables and the likely area of seabed disturbance. The red line boundary has been significantly reduced between EIA Scoping and PEIR, which is further detailed in Volume 1, Annex 3.2: Selection and Refinement of the Offshore Infrastructure, of the PEIR. Table 2-10 also provides details of the external cable protection required and includes the MDS for the total area of

Comment	Response to comment raised and/or where considered in this chapter
Recommendations: We would advise that to reduce environmental impacts, the area of seabed disturbance should be minimised. The total area of impact (both direct and indirect) should also be provided and assessed in the ES for each type of habitat impacted.	seabed impacted by offshore export cable protection. The potential impacts associated with seabed disturbance during the installation of offshore export cables and cable protection materials are assessed in the relevant topic chapters in Volume 2 of the PEIR.
Paragraph 3.8.1.2 Topic: Maintenance of the offshore cable Comments: Non-routine major maintenance activities may include cable reburial and cable repair activities. Recommendations: The full range of cable repair/replacement/remedial burial works, and external cable protection addition and maintenance should be scoped in, considered and their impacts assessed.	Section 2.16.1 and Table 2-25 provide detailed descriptions of the reasonably foreseeable planned and unplanned O&M activities associated with the offshore export cables, including the MDS for these activities including their frequency and extent throughout the lifetime of the MHPGC Project The potential impacts associated with the offshore O&M activities are assessed in the relevant topic chapters in Volume 2 of the PEIR.
Paragraph 3.9.1.2 Topic: Decommissioning Comments: During decommissioning, it is anticipated offshore cables and any offshore cable protection may be left in-situ, to minimise environmental impacts associated with their removal. The possibility of removing the subsea cables and leaving structures above the seabed in-situ with appropriate navigation markers will also be assessed. Recommendations: We advise that a full assessment of potential impacts to the marine environment of the decommissioning of the proposed project should be provided. Natural England advice is that all offshore infrastructure should be removed in line with UNCLOS and OSPAR and the 2019 guidance (Decommissioning offshore renewable energy installations - GOV.UK). Natural England further advises that returning the seabed to its pre-development status will contribute to achieving Good Environmental Status of the wider marine environment as required by the UK's Marine Strategy and OSPAR requirements. We advise that the Applicants should commit to the removal of all structures above the seabed and consider the potential decommissioning of any proposed external cable protection (including evidence on the likelihood of its success and impacts). Secondly, we advise that the Applicants should consider and assess the long-term impacts to the marine physical environment of any assets left in situ. The OWEK Designing for Decommissioning of Offshore Wind OGUK_Guidelines has useful information for designing projects with decommissioning in mind, including consideration for costs of decommissioning. The Waste Hierarchy should be considered early in the design stages of the development to facilitate the decommissioning processes, for example determining the level of cable protection required and exploring the use of removable external cable protection. The baseline conditions at the end of design life may differ significantly from those at pre-construction and the value of receptors may change over the lifetime of the project. The magnitude of decommissioning effects	Section 2.17.2 and section 2.17.3 provide details of the approach to decommissioning the offshore export cables along the offshore export cable corridor. The current preferred approach to the decommissioning of offshore export cables is that they would be left <i>in situ</i>. This is because the removal of offshore export cables and cable protection measures may not always represent the least disruptive or most environmentally beneficial option. However, in the relevant topic chapters in Volume 2 of the PEIR the removal of cables and cable protection measures has been assessed as the realistic worst-case scenario for that topic. If the offshore export cables and cable protection are to be removed during decommissioning, these will be carried out to return the seabed to its pre-development status as far as reasonably practicable. The decommissioning works will be undertaken in line with the requirements set out in the United Nations Convention on the Law of the Sea (UNCLOS), the OSPAR Convention, the Government's guidance on decommissioning of offshore renewable energy installations (2019) and any other guidance at the time when the decommissioning works are carried out. The Applicant has made a commitment (CoT44 of Volume 1, Annex 4.1: Commitments Register, of the PEIR) that an Offshore Decommissioning Programme will be developed and submitted to the Marine Management Organisation (MMO) and MD-LOT prior to commencement of any offshore construction. It will be in line with the latest relevant legislation and available guidance at the time of production, as far as reasonably practicable. The Applicant has also made a commitment (CoT06 of Volume 1, Annex 4.1: Commitments Register, of the PEIR) that an Outline Offshore Environmental Management Plan (OEMP) will be prepared and submitted with the application for development consent and as part of the Marine Licence application(s) to the Scottish Ministers. The Outline OEMP will include provisions for the handling and disposal of waste associated with the construction, operations and maintenance, and decommissioning of the offshore export cables following the waste hierarchy. A Detailed OEMP will be developed substantially in accordance with the Outline OEMP and submitted to and approved by the MMO and MD-LOT.

Comment	Response to comment raised and/or where considered in this chapter
on the marine physical environment may not be comparable to those during the construction phase. Post-decommissioning monitoring may be required to ensure that abandoned assets do not pose a risk to the marine physical environment and processes in the future. As alternative end-of-life options emerge and details become available, a new EIA for the decommissioning process will be required. Decommissioning should also consider permanent habitat loss from any infrastructure that remains at the time of decommissioning (an extension of habitat loss from the operational phase).	
NatureScot	
It is noted in Table 3.2 that frond mats may be used for cable protection. We do not wish to see frond mats used due to the likelihood of introducing polypropylene (plastic) particles into the marine environment.	Table 2-10 provides details of the external cable protection required and sets out that cable protection material types that are currently considered only include concrete mattresses, rock bags, rock installation and cable protection systems.
It is stated in Table 3.7 that the minimum target depth for cable burial is 0.5 – 2.5m. We generally advise that the minimal target burial depth should be at least 1m to help reduce potential EMF impacts and reduce risk of re-exposure and damage.	Table 2-9 provides the design details of the offshore export cables and sets out that the minimum target burial depth is 0.5m. Potential EMF impacts have been assessed for relevant receptors and further detail is provided in the relevant topic chapters in Volume 2 of the PEIR.

2.6 Key Infrastructure and Parameters

2.6.1.1 The MHPGC Project is to connect Morven North or Morven South to the National Grid Hawthorn Pit Substation. The MHPGC Project is subject to a DCO application under the Planning Act 2008 and Marine Licence application(s) under the MCAA 2009. Separate consent applications for Morven North and Morven South have been made.

2.6.1.2 **Diagram 2-1** illustrates the components of the wider Morven Offshore Wind Farm development. The key components of the MHPGC Project include the following:

- Offshore components:
 - Offshore export cables: High voltage direct current (HVDC) cables which bring electricity from either the Morven North OSP or the Morven South OSP to the transition joint bay (TJB) at landfall;
- 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; and
 - TJB: An underground bay housing a joint which connects the offshore export cables to the onshore export cables. The TJB(s) will be located on the onshore side of the landfall;
- Onshore components:
 - Onshore export cables: HVDC cables which bring electricity from the TJB(s) to the onshore LSS;
 - Onshore LSS: A purpose-built site comprising a compound containing the electrical components for converting the HVDC to High Voltage Alternating Current (HVAC) power. The LSS site associated with the MHPGC Project adjusts the power quality and power factor to meet the requirements of power supply being fed to the National Grid Hawthorn Pit Substation. Two location options for the onshore LSS, Green onshore LSS Option Area and Blue onshore LSS Option Area, are being considered for the PEIR;

- Alternating current (AC) connection cables: AC cables that will connect the proposed onshore LSS to the National Grid Hawthorn Pit Substation;
- Environmental mitigation and biodiversity net gain area: Temporary and/or permanent areas to provide environmental mitigation or biodiversity net gain.

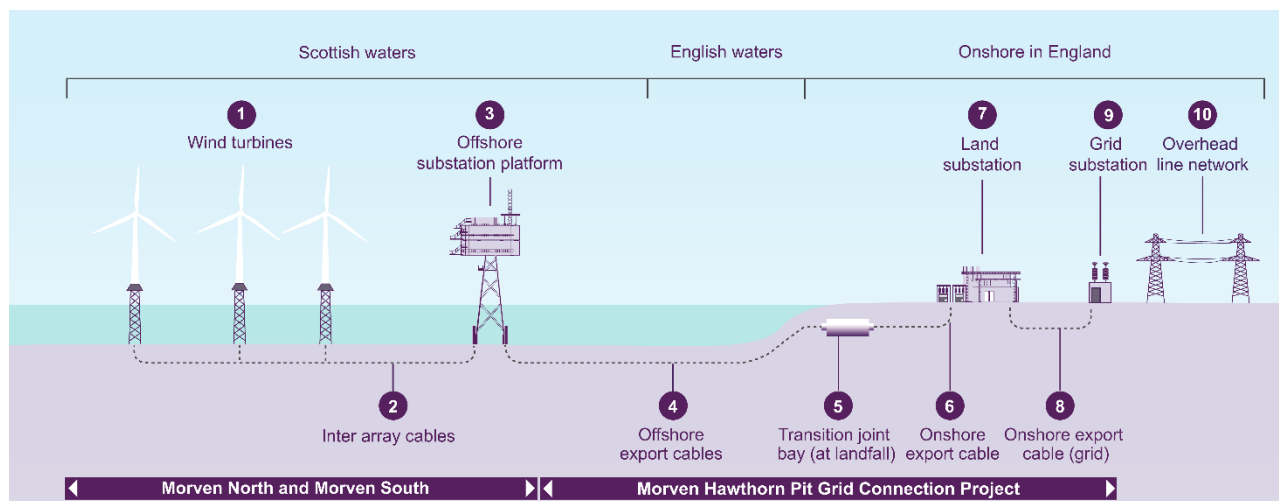


Diagram 2-1: Components of the Morven Offshore Wind Farm

- 2.6.1.3 The onshore export cables and the AC connection cables will be completely buried underground for their entire length. No overhead lines or associated pylons will be installed as part of the MHPGC Project.
- 2.6.1.4 In addition to the components outlined in **paragraph 2.6.1.2**, temporary onshore infrastructure will be required for the construction phase, including construction compounds, haul roads and accesses.
- 2.6.1.5 The above key components will be located within the MHPGC Project PEIR Red Line Boundary (RLB) as shown in **Figure 2-1**. The refinement of the RLB, as well as the selection of landfall sites, are detailed within **Volume 1, Chapter 3: Site Selection & Consideration of Alternatives, of the PEIR**.
- 2.6.1.6 It should be noted that the offshore export cables located within Scottish offshore waters will be the subject of separate Marine Licence application(s). All other components of the MHPGC Project, including the section of the offshore export cables located within English waters, and all landfall and onshore components, will be the subject of the DCO application. **Figure 2-2** presents the extent of the MHPGC PEIR Red Line Boundary that will be the subject of the DCO application and the Scottish Marine Licence(s) application respectively.
- 2.6.1.7 It should also be emphasised that the MHPGC Project does **not** include the following elements:
- Morven North and Morven South, including the OSPs for the two array sites;
 - the MBAGC Project; and
 - the National Grid Hawthorn Pit Substation.
- 2.6.1.8 **Table 2-2** presents the key summary parameters for the MHPGC Project. It should be noted that the routing and length of the onshore export cables and AC connection cables vary depending on the onshore LSS option. However, where specified in this chapter, the Blue onshore LSS Option constitutes the realistic worst-scale for onshore parameters for the MHPGC Project, as explained further in **sections 2.11.2 and 2.11.4**.

Table 2-2: Summary of key parameters for the MHPGC Project

Parameter	Design Envelope – Up to MDS
MHPGC Project Red Line boundary area (km ²)	1220.07
Offshore	

Parameter	Design Envelope – Up to MDS
Maximum number of offshore export cables	2 power cores (1 cable circuit), with up to 2 fibre optic cables
Maximum length of offshore export cables (km) (OSP to MHWS)	326.40
Onshore	
Maximum total length of onshore cable corridor (km)	9.59
Maximum number of onshore export cables	2 power cores(1 cable circuit), with up to 2 fibre optic cables
Maximum length of onshore export cables (km), blue onshore LSS option	4.83 (blue onshore LSS option) 8.31 (green onshore LSS option)
Maximum number of onshore LSS	1
Maximum area of onshore LSS (m2), including landscaping area and sustainable drainage systems (SuDS)	67,300
Maximum number of AC connection cables	12 power cores(4 cable circuits), with up to 4 earth continuity conductors and 8 fibre optic cables
Maximum length of AC connection cables (km), blue onshore LSS option	4.26

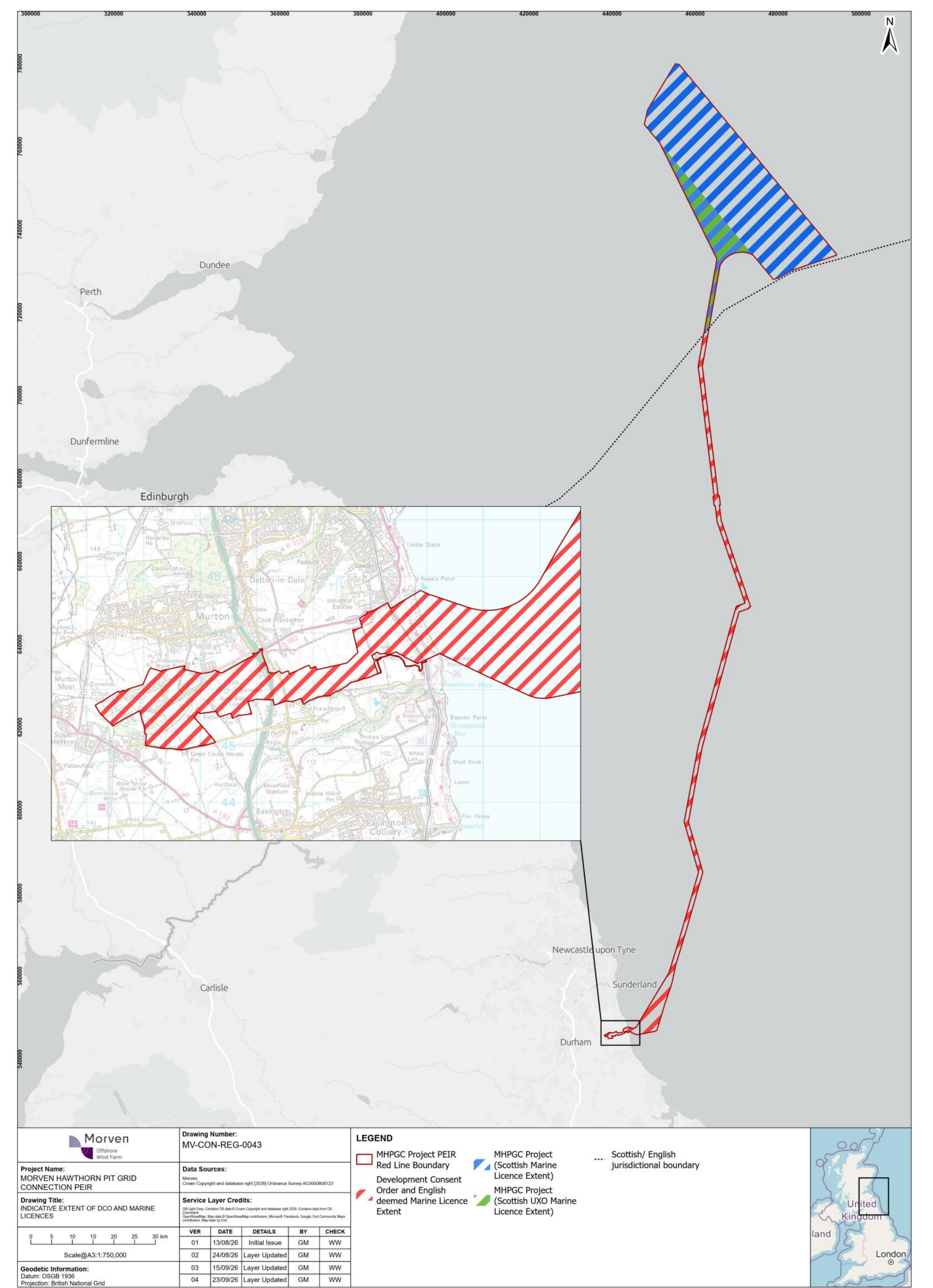


Figure 2-2: Indicative Extent of DCO and Scottish Marine Licence(s)

2.7 Measures adopted as a part of the MHPGC Project (Commitments)

- 2.7.1.1 Through the EIA process to date, a range of mitigation and monitoring measures have been identified in order to avoid or reduce potential effects. All measures to be adopted by the MHPGC Project are called 'Commitments' (CoTs). The CoTs will be used to guide the final design and details for construction, operation and maintenance (O&M), and decommissioning phases.
- 2.7.1.2 The Applicant has identified a range of CoTs including both embedded (i.e. primary/inherent and tertiary/inexorable) and secondary/foreseeable mitigation measures. At this stage, details of all proposed CoTs for the MHPGC Project are provided in **Volume 1, Annex 4.1: Draft Commitments Register, of the PEIR**. The draft CoTs register will inform forthcoming pre-application consultation and will be further updated in conjunction with the preparation of the ES for the DCO application and Scottish Marine Licence(s) application(s).
- 2.7.1.3 **Table 2-3** highlights the MHPGC Project CoTs that are identified as directly relevant to this chapter.

Table 2-3: MHPGC Project CoTs directly relevant to the Project Description

Commitment (CoT) number	Measure adopted
CoT03	Core working hours for the construction of the landfall and onshore components of the MHPGC Project will be as follows: Monday to Friday: 07:00–19:00 hours; Saturday: 07:00–13:00 hours; Up to one hour before and after core working hours for mobilisation ("mobilisation period"), i.e. 06:00–20:00 weekdays and 06:00–14:00 Saturdays; In circumstances outside of core working practices, specific works may need to be undertaken outside the core working hours. Advance notice of such works will be provided to the relevant planning authority. This will be set out in the Outline Code of Construction Practice (CoCP), which will be prepared and submitted as part of the application for development consent. A Detailed CoCP will be developed substantially in accordance with the Outline CoCP.
CoT04	Advance warning will be provided via Notice to Mariners to ensure that the appropriate authorities are informed of offshore construction, operation and maintenance, and decommissioning activities. Copies of all notices must be provided to the MMO, MCA and UKHO as well as other interested parties, as appropriate. Early notification will allow appropriate marking of all installed infrastructure on UKHO Admiralty/nautical charts.
CoT06	An Outline Offshore Environmental Management Plan (OEMP) will be prepared and submitted with the application for development consent, and as part of the Marine Licence application(s) to the Scottish Ministers. A Detailed OEMP will be developed substantially in accordance with the Outline OEMP and submitted and approved by the MMO and MD-LOT. The Outline OEMP will include: - an Outline Marine Biosecurity Plan; - an Outline Marine Pollution Contingency Plan; - an Outline Marine Mammal Mitigation 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; and - provisions for the handling and disposal of waste.
CoT07	An Outline Offshore Operations and Maintenance Plan will be prepared and submitted as part of the application for development consent and as part of the Marine Licence application(s) to the Scottish

Commitment (CoT) number	Measure adopted
	Ministers. A Detailed Offshore Operations and Maintenance Plan will be produced substantially in accordance with the outline plan, prior to entering the operation and maintenance phase.
CoT08	An Outline Offshore Cable Specification and Installation Plan (CSIP) will be prepared and submitted with the application for development consent and as part of the Marine Licence application(s) to the Scottish Ministers. It will include cable burial to be the preferred option for cable protection, where practicable. A Detailed CSIP will be developed prior to construction that will be substantially in accordance with the Outline CSIP. The Outline CSIP will include (but is not limited to): - a Cable Burial Risk Assessment (CBRA), which will define burial depths and safeguards, based on seabed conditions and external aggression and climate change hazards, to keep the offshore export cables protected and compliant through all project phases while upholding navigational and environmental safety; - the implementation, management and monitoring of cable protection; and - details on the development of the cable installation and protection design within the Farn Deep's Nephrops ground, which will seek to maximise cable burial and minimise the requirement for external cable protection, where technically feasible, taking account of cable stability, integrity and other engineering requirements.
CoT09	An Offshore Crossing Schedule will be prepared and submitted as part of the application for development consent and as part of the Marine Licence application(s) to the Scottish Ministers. Crossing and proximity agreements will be put in place with known existing cable and pipeline infrastructure owners prior to installation of the offshore export cables and associated cable protection.
CoT10	The Outline Highways Access Management Plan will be prepared and submitted with the application for development consent. It will include details regarding temporary access points from the public highway will be installed to facilitate vehicular access to the onshore export cable corridor, AC connection cable corridor and the Onshore Land Substation, during construction. A Detailed Highways Access Management Plan will be developed substantially in accordance with the outline plan.
CoT13	The Project Description (Volume 1, Chapter 2 of the PEIR) sets out that the installation of the offshore export cables under Durham Coast SSSI and SAC will be undertaken by trenchless technologies. The exit pits associated with the trenchless technologies installation will be at least 100 m seaward of the eastern boundary of the Durham Coast SSSI and SAC.
CoT14	An Offshore Construction Method Statement (CMS) will be prepared and approved by the MMO prior to the commencement of construction.
CoT16	An Onshore Decommissioning Plan will be developed prior to decommissioning. It will include provisions for the removal of all onshore above ground infrastructure and the decommissioning of below ground infrastructure (if and where relevant and practicable), and details relevant to flood risk, pollution prevention, protection of soils and avoidance of ground disturbance. The Onshore Decommissioning Plan will be in line with the latest relevant legislation and available guidance at the time of production, as far as reasonably practicable.
CoT18	An Outline Code of Construction Practice (CoCP) will be prepared and submitted with the application for development consent. A Detailed CoCP will be developed substantially in accordance with the Outline CoCP. The Outline CoCP will include (but is not limited to) measures to maintain and address: - flood protection and control measures; - water environment and drainage; - noise and vibration management measures; - air quality and dust management; - pollution prevention and management; - geology and ground conditions; - soil and materials management; - land use, tourism and recreational assets; and - waste management.

Commitment (CoT) number	Measure adopted
CoT19	Ongoing liaison with the fishing industry through the appointment of a Company Fisheries Liaison Officer(s) (CFLO)(s) and adherence to good practice guidance with regards to fisheries liaison (e.g. Fishing Liaison with Offshore Wind and Wet Renewables Group FLOWW (2025) guidance for English Waters).
CoT22	An Outline Operational Drainage Management Plan (ODMP) for the onshore Land Substation (LSS) will be prepared and submitted with the application for development consent. The Outline ODMP will detail measures to ensure that existing land drainage is reinstated and/or maintained, and ensure surface water runoff generated at the chosen onshore LSS option by new impermeable areas is attenuated with an allowance for climate change and discharged from the site to an appropriate location at a restricted discharge rate. A Detailed ODMP will be developed substantially in accordance with the Outline ODMP and in line with the latest relevant drainage guidance notes in consultation with the Environment Agency and the Lead Local Flood Authority.
CoT23	An Outline Surface Water and Groundwater Management Plan (SWGMP) will form part of the Outline Code of Construction Practice (CoCP) and will be submitted with the application for development consent. The Outline SWGMP will set out measures to protect surface water and groundwater during construction, covering surface water and drainage management measures, flood risk control measures, and management of foul water from construction compounds. A Detailed SWGMP will be developed substantially in accordance with the Outline SWGMP.
CoT24	All aspects of the construction work will be in accordance with the Health and Safety at Work Act (1974) and regulations made under the Act, and the Construction (Design and Management) Regulations 2015, together with any other applicable statutory health and safety requirements.
CoT25	Construction site lighting will only operate when required and will be positioned and directed to avoid unnecessary illumination to residential properties, sensitive ecological receptors and footpath users, and minimise glare to users of adjoining public highways. Construction site lighting will be designed in accordance with latest relevant available guidance and legislation and the details of the location, height, design and luminance of lighting to be used will be covered within the Outline Construction Artificial Light Emissions Management Plan, will form part of the Outline (CoCP), which will be prepared and submitted as part of the application for the development consent.
CoT27	The onshore export cables and the AC connection cables will be completely buried underground for the entire length. No overhead pylons will be installed as part of the MHPGC Project.
CoT28	An Outline Navigational Safety Plan will form part of the Outline Offshore Environmental Management Plan (OEMP), which will be prepared and submitted with the application for development consent and as part of the Marine Licence application(s) to the Scottish Ministers. It will detail measures to ensure compliance with international marine regulations, in addition to outlining safe passing distances requested by MHPGC Project vessels, and the use of guard vessels. A Detailed Navigational Safety Plan will be developed substantially in accordance with the outline plan.
CoT29	Post-construction, the temporary working areas will be reinstated to pre-existing condition as far as reasonably practical, in line with best practice guidance.
CoT32	An Advisory Safety Statement to define advisory safe passing distance and use of guard vessels, will be submitted as part of the application for development consent and as part of the Marine Licence application(s) to the Scottish Ministers.
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.
CoT41	An Outline Construction Traffic Management Plan (CTMP) will be prepared and submitted with the application for development consent. A Detailed CTMP will be developed substantially in accordance with the Outline CTMP prior to construction. The Detailed CTMP will set out measures to include (but not limited to): - managing the numbers, timing and routeing of HGVs during the construction phase; - managing the movement of construction worker traffic during the construction phase; - details of any traffic management measures necessary to ensure the safe passage of construction traffic via the local highway network; and

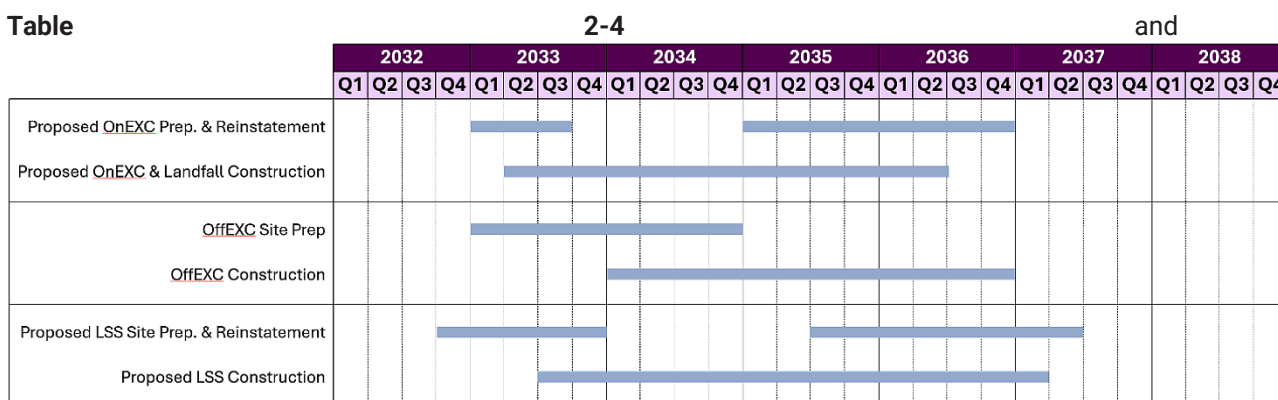
Commitment (CoT) number	Measure adopted
	- details of localised road improvements if and where these may be necessary to facilitate safe use of the existing road network.
CoT43	An Outline Landscape and Ecological Management Plan (LEMP) will be prepared and submitted with the development consent application and will establish the mitigation and management measures relevant to terrestrial and intertidal ecology and conservation. It will include: - mitigation measures relating to protected or notable species and/or sensitive habitats; - appointment of an Ecological Clerk of Works (ECoW) where required; and - details of mitigation planting at the onshore substation site including the number, location, species and details of management and maintenance of planting. A Detailed LEMP will be developed substantially in accordance with the Outline LEMP.
CoT44	An Offshore Decommissioning Programme will be developed and submitted to the MMO and MD-LOT prior to the commencement of any offshore construction. It will be in line with the latest relevant legislation and available guidance at the time of production, as far as reasonably practicable.
CoT45	An Outline Site Waste Management Plan (SWMP) will form part of the Outline Code of Construction Practice (CoCP), which will be prepared and submitted with the development consent application. A Detailed SWMP will be developed substantially in accordance with the Outline SWMP, in consideration of the latest relevant available guidance.
CoT46	An Outline Construction Fencing Plan, will form part of the Outline Code of Construction Practice (CoCP), which will be prepared and submitted with the development consent application. All temporary working areas, including in relation to the Transition joint bays, onshore export cables, the preferred onshore LSS option, and the AC connection cables will be made clear through the use of signage and secured with appropriate fencing. A Detailed Construction Fencing Plan will be developed substantially in accordance with the Outline Construction Fencing Plan.
CoT47	An Outline Bentonite Breakout Plan will form part of the Outline Code of Construction Practice (CoCP), which will be submitted as part of the application for the development consent. A Detailed Bentonite Breakout Plan will be developed substantially in accordance with the outline plan.
CoT49	An Outline Onshore Construction Method Statement (CMS) will form part of the Outline Code of Construction Practice (CoCP), which will be prepared and submitted as part of the application for development consent. A Detailed Onshore CMS will be produced substantially in accordance with the Outline Onshore CMS and will include details of cable installation and methodology.
CoT51	An Onshore Crossing Schedule will be submitted with the application for development consent based on the refined design for the application. The following features will be crossed using trenchless techniques: - A, B and Classified unnumbered roads (known as C roads) (including the A19 and B1432); - all railway lines (including the section of railway line which runs between Seaham and Horden); - the Durham Coast SSSI and SAC; and - Hesledon Moor East SSSI.
CoT56	An Offshore In-Principal Monitoring Plan (OIPMP) will be prepared and submitted as part of the application for development consent and as part of the Marine Licence application(s) to the Scottish Ministers. The OIPMP will include for monitoring as part of the operational asset integrity surveys. A Detailed Offshore Monitoring Plan will be produced prior to operation and maintenance phases substantially in accordance with the OIPMP, and will be approved in consultation with statutory advisors and regulators.
CoT57	An Outline Biodiversity Gain Plan will be prepared and submitted with the application for development consent. It will include details of the MHPGC Project's assessment and the measures proposed to secure and deliver the project's statutory Biodiversity Gain objective. A Detailed Biodiversity Gain Plan will be developed substantially in accordance with the outline plan.
CoT58	UXO hazards will be avoided where practicable and appropriate. Where avoidance is not possible, removal techniques will be considered prior to detonation. Low-order techniques, such as deflagration, will be the preferred method where practicable and appropriate. Should low order not be practicable, relocation will be considered and if no alternatives exist, high order clearance may be required. If high order is required for UXO clearance works, licensing will be subject to a standalone

Commitment (CoT) number	Measure adopted
	Marine Licence application(s). The application(s) will provide details of measures to seek to minimise impacts on marine mammals where appropriate.
CoT59	An Outline Landfall Construction Method Statement (CMS) will form part of the Outline Code of Construction Practice (CoCP), which will be prepared and submitted as part of the application for development consent. A Detailed Landfall CMS will be produced substantially in accordance with the Outline Landfall CMS and will include details of cable installation and methodology.
CoT62	Design Principles will be produced and submitted as part of the application for development consent. It will focus on design elements associated with the onshore Local Substation (LSS) fulfilling the requirement for 'good design', as prescribed in the National Policy Statements EN-1, EN-3 and EN-5.

2.8 Programme

2.8.1.1 At this stage, the timing of construction activities set out within the PEIR is indicative. For the purposes of assessment, it is anticipated that the earliest construction date for the MHPGC Project is Q4 2032. The Applicant also anticipates that the MHPGC Project will be fully operational by 2038, meaning that it is likely all components of the MHPGC Project need to be completed by this time.

2.8.1.2 Table



2.8.1.3 Diagram 2-2 present the indicative construction programme.

Table 2-4: MHPGC Project indicative construction programme summary

Construction programme	Onshore cable route and landfall	Offshore cable route	Onshore LSS
Construction duration	42 months	48 months	54 months
Operation date	2038	2038	2038
Operational design life	35 years	35 years	35 years
Maximum duration of reinstatement	24 months	N/A	24 months

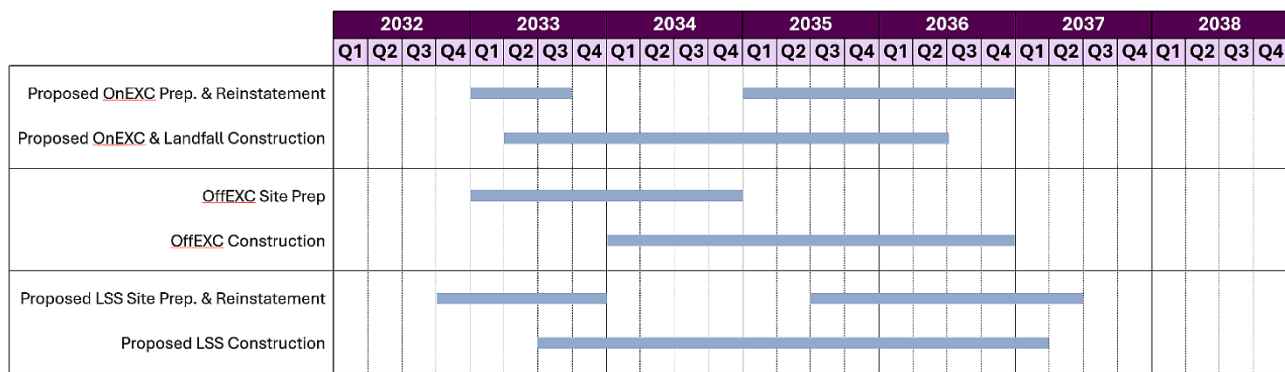


Diagram 2-2: Indicative construction programme of the MHPGC Project

2.9 Offshore components of the MHPGC Project

2.9.1 Introduction

- 2.9.1.1 As set out in paragraph 2.6.1.2, the permanent offshore infrastructure for the MHPGC Project includes the offshore export cables from the Morven North or Morven South OSP to the TJB(s) at landfall. The permanent offshore infrastructure and all installation activity is anticipated to be located within the offshore export cable corridor as shown in **Figure 2-3**, which extends to Mean High Water Spring (MHWS).
- 2.9.1.2 This section sets out the design parameters and the proposed installation and construction methods assessed within the PEIR for the offshore components.
- 2.9.1.3 The location and siting of the offshore components described in this section have been informed by a site selection and export cable route refinement process, which is set out in **Volume 1, Chapter 3: Site Selection & Consideration of Alternatives, of the PEIR**. This process has balanced environmental constraints with technical and commercial considerations and is ongoing. The process of site selection and refinement will be further progressed towards the submission of the DCO and Scottish Marine Licence applications.
- 2.9.1.4 It should be noted that the DCO application will only relate to offshore components located within the English waters and onshore components in England. Offshore components located within the Scottish offshore waters will be subject to the separate Marine Licence application(s). For clarity, where applicable the description of offshore construction activities and associated parameters have been divided into sections: parameters located within the Scottish offshore waters, and parameters located within the English waters.

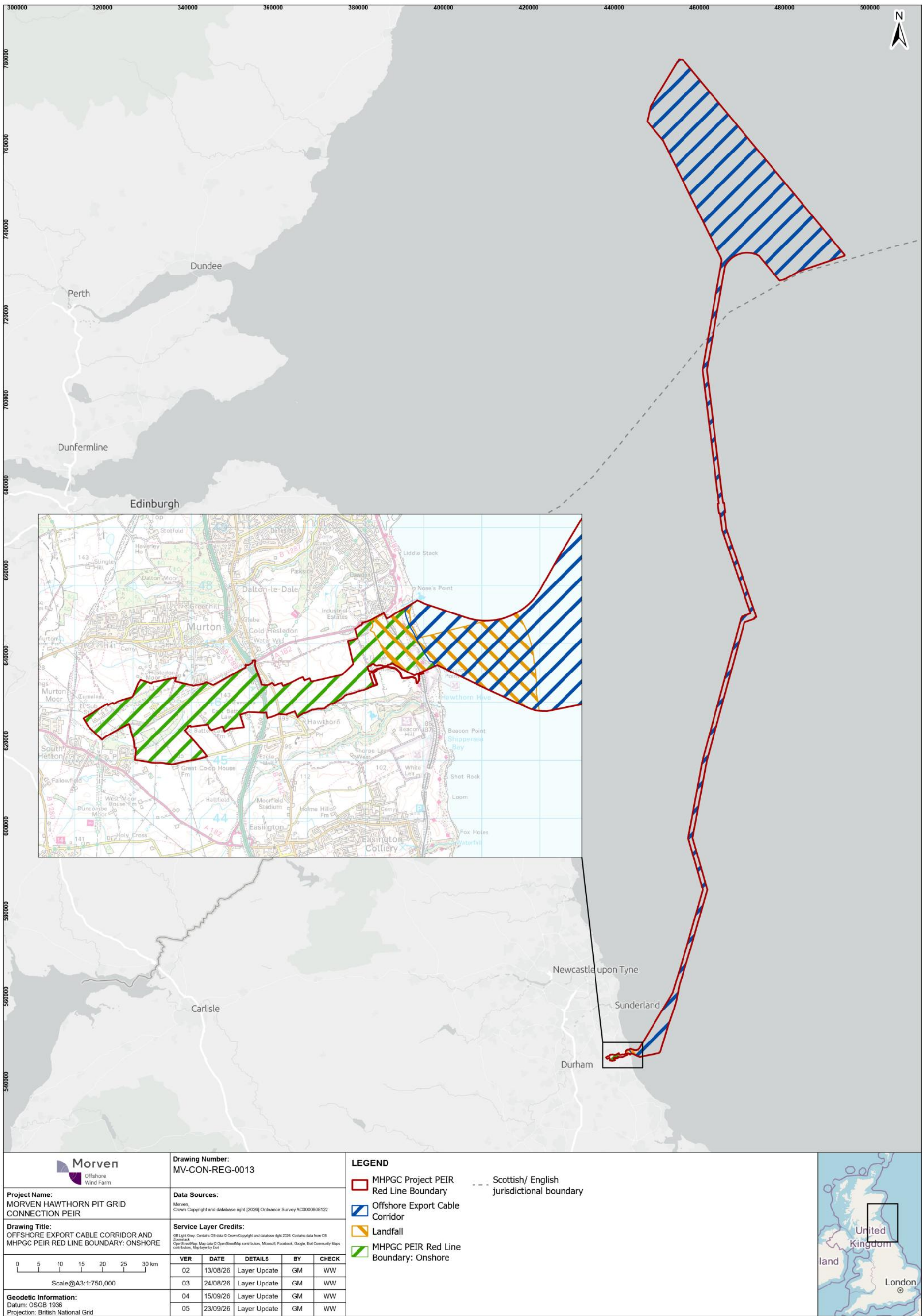


Figure 2-3: Offshore Export Cable Corridor and MHPGC PEIR Red Line Boundary: Onshore

2.9.2 Pre-construction geophysical and geotechnical surveys

- 2.9.2.1 Before construction starts, detailed site investigation surveys will be carried out to characterise the seabed conditions and morphology, verify its geological layering, identify the presence/absence of any obstructions or hazards and inform the definition of the offshore export cable route within the offshore export cable corridor. The surveys are likely to include geophysical and geotechnical surveys conducted within the footprint of the offshore export cable corridor. Geophysical survey works will be carried out to provide detail on UXO, bedform and boulder mapping, bathymetry, a topographical overview of the seabed and an indication of sub-layers.
- 2.9.2.2 **Table 2-5** lists the standard best practice activities to be undertaken and includes the typical sonar frequencies and associated sound-pressure levels.

Table 2-5: Indicative activities and parameters in relation to pre-construction site investigation surveys

Equipment/ Activity	Sonar frequency and sound-pressure level
Geophysical	
High Resolution Multi-Beam echosounder	200-400 kHz 180 to 240 dB re 1 μ Pa
Side scan Sonar	300-600 kHz 216 to 228 dB re 1 μ Pa
Single beam echosounder	20-40 kHz 160 - 220 dB re 1 μ Pa
Sub-bottom profilers	0.2-14 kHz (chirp), 85-115 kHz (high frequency) 180-240 dB re 1 μ Pa
Ultra-high resolution seismic (such as sparker)	0.05-4 kHz 170-200 dB re 1 μ Pa
Ultra-short baseline acoustic positioning transponder	21-31kHz
Geotechnical	
Seismic cone penetration tests (CPTs)	Receiver frequency of approximately 28Hz
Vibrocoring	Operating frequency of approximately 20 to 35 kHz (this may vary depending on the type of vibrator motor unit used in the equipment).

2.9.3 Site preparation activities

- 2.9.3.1 Before commencing the installation of offshore export cables, the following site preparation activities set out in this section may be required.

Unexploded ordnance (UXO) clearance

- 2.9.3.2 It is possible that UXO may be encountered during the installation of the offshore export cables. This poses a health and safety risk where it coincides with the planned location of infrastructure and associated vessel activity and therefore it is necessary to survey for, and manage, potential UXO. In order to identify UXO, detailed surveys of the location where infrastructure will be located are required. These surveys would be informed by the results of earlier pre-construction surveys set out in **section 2.9.2**.
- 2.9.3.3 Potential UXO identified during the pre-construction UXO detection surveys will be investigated to determine whether they are confirmed as UXO. Confirmed UXO will either be cleared via low order or avoided. UXO may be avoided through micro-routing of the offshore export cables or cleared through in-situ low order clearance, or recovery of the UXO for disposal at an alternate location. The preferred option for clearance is low order, and the Applicant is not seeking consent for high order clearance. Should high order clearance be required, due to the condition of the UXO a separate Marine Licence

application will be submitted. Where micro-routing or relocation cannot be implemented, low order clearance of UXO will be undertaken.

- 2.9.3.4 There are a number of methodologies that may be used to clear UXO, including detonation of the UXO using an explosive counter-charge placed next to the UXO on the seabed (referred to as a 'high order' technique) or methods that neutralise the UXO to be safe without detonation (referred to as 'low order' techniques). These low order techniques include 'deflagration' which involves the use of a small charge to 'burn out' the explosive material without full detonation and are the MHPGC Project's preferred method of clearance.
- 2.9.3.5 The Applicant has made a commitment (CoT58 of **Volume 1, Annex 4.1: Commitments Register, of the PEIR**) that low order techniques, such as deflagration, will be the preferred method for UXO clearance where practicable and appropriate. Should low order not be practicable, relocation will be considered and if no alternatives exist high order clearance may be required. As the Applicant does not intend to include high order UXO clearance within the draft DCO and the Scottish Marine Licence(s) application(s), the Applicant will apply for separate Marine Licence(s) post-consent should high order technique be required for UXO clearance works.
- 2.9.3.6 UXO detection surveys must be undertaken within approximately one year before the commencement of the offshore export cable construction, as seabed dynamics can expose or bury objects over time.
- 2.9.3.7 At this stage for assessment purposes in the PEIR, based on the desk-top study assessment of potential UXO presence (RPS, 2023), the MHPGC Project assumes a realistic worst-case scenario of requiring low order clearance of up to 22 UXO, including 8 in Scottish waters and 14 in English waters.
- 2.9.3.8 Prior to any UXO clearance works, method statement(s) for UXO low order clearance will be submitted for approval by the MMO or MD-LOT. This will provide confirmation of the UXO identified for low order clearance and confirmation that clearance does not coincide with archaeological sites or sensitive seabed features. This will be secured via a condition within the draft Marine Licence(s) submitted as part of the DCO application and the Scottish Marine Licence(s) application(s).
- 2.9.3.9 **Table 2-6** lists the maximum parameters for UXO clearance.

Table 2-6: Design Envelope – UXO clearance

Parameter	Design Envelope – up to MDS
Anticipated realistic maximum number of UXOs identified	Up to 96 confirmed UXO, up to 22 requiring low order clearance
Total duration of UXO clearance activities	Up to 24 days
UXO clearance corridor (m)	100

Boulder clearance and out of service cable removal

- 2.9.3.10 Boulder clearance is commonly required during site preparation for installation of offshore infrastructure. Micro-routing of cables around all boulders would be onerous and impractical. Boulders pose a risk of damage and exposure to cables, as well as an obstruction risk to the cable installation equipment. Therefore, any boulders identified as likely to impact installation will need to be moved to the side, away from the immediate location of the cable infrastructure.
- 2.9.3.11 Pre-application surveys will show where boulder clearance may be required along the offshore export cable corridor. Boulder clearance will occur within the footprint of other installation activities, and a combination of techniques including ploughing and boulder grabs will be used. Where a high density of boulders is seen, the expectation is that a plough will be required for boulder clearance within the construction footprint of the offshore export cable corridor. Where medium and low density of boulders are present, a subsea grab is expected to be employed. As this activity occurs within the same workspace as other installation tasks including sandwave clearance for cables (see **paragraphs 2.9.3.15 – 2.9.3.17**), its area of seabed disturbance is not listed separately to avoid double counting.

- 2.9.3.12 If the final location of the offshore infrastructure crosses any existing out of service cables the necessary section of cable will be removed. Any cable removal will be undertaken in consultation with the asset owner and in accordance with the International Cable Protection Committee guidelines (2011). It is anticipated that the cables will be retrieved to a vessel deck, where a section of the out of service cable will be cut to clear the crossing point, the cut section then retrieved to the vessel deck and removed from site.
- 2.9.3.13 **Table 2-7** lists the maximum parameters for boulder clearance and out of service cable removal.
- 2.9.3.14 The boulder clearance plough is expected to advance at a rate of around 100 m to 400 m per hour, equating to a total operation lasting roughly one to six months, respectively.

Table 2-7: Design Envelope – boulder clearance and out of service cable removal

Parameter	Design Envelope – up to MDS
Boulder displacement/clearance width (m)	20m per trench (using boulder clearance plough)
Length and percentage of route requiring boulder clearance (m, %)	Total: 69km (21% of total length) Scottish waters: 31km (32% of length in Scottish waters) English waters: 38km (17% of length in English waters)
Duration (months)	6

Sandwave clearance for cables

- 2.9.3.15 In some areas within the offshore export cable corridor, existing sandwaves and similar bedforms may require clearance or levelling before the offshore export cables are installed. Many of the cable installation tools require a stable, flat seabed surface. In addition, cables must be buried to a depth where they can be expected to stay buried for the operational lifetime of the MHPGC Project. Sandwaves are generally mobile in nature and therefore offshore export cables must be buried sufficiently beneath the level at which natural sandwave movement could uncover them. This means that mobile sediments in relation to sandwaves need to be removed before installation takes place.
- 2.9.3.16 **Table 2-8** presents the maximum design parameters for sandwave clearance in both Scottish and English waters for the installation of the offshore export cables in up to two cable trenches. These parameters have been informed by the results of initial surveys (high resolution multi-beam echo sounder, side scan sonar, sub-bottom profiler, geotechnical and environmental surveys), which have been used to provide an initial analysis of the bathymetry, soils and seabed features. It should be noted that both boulder clearance (see **paragraphs 2.9.3.10 - 2.9.3.14**) and sandwave clearance will occur within the offshore export cable corridor, albeit they may or may not occur along the same sections of the corridor. The corridor width for boulder clearance is less than that required for sandwave clearance and therefore boulder clearance represents repeat disturbance to the seabed for any sections of the corridor that require both boulder clearance and sandwave clearance.
- 2.9.3.17 It is expected that material, subject to seabed preparation activities, will be released in the vicinity of where it was removed, and if not within the immediate vicinity with the MHPGC Project PEIR Red Line Boundary. The Applicant has made a commitment (CoT39 of **Volume 1, Annex 4.1: Commitments Register, of the PEIR**) that dredge and disposal activity within English waters will be undertaken in accordance with a Dredge and Disposal Site Characterisation Report that will be prepared and submitted with the application for development consent.

Table 2-8: Design Envelope - sandwave clearance

Parameter	Design Envelope – up to MDS		
	Scottish waters	English waters	Offshore section of MHPGC Project (total)
Area of material requiring levelling/clearance (m ²)	1,736,000	1,232,000	2,968,000
Volume of material requiring levelling/clearance (m ³)	1,488,000	1,056,000	2,544,000
Sandwave levelling/clearance surface width (m)	28	28	28
Sandwave levelling/clearance length and percentage of corridor (m, %)	31,000 (31%)	22,000 (10%)	53,000 (16.24%)
Duration of sandwave levelling/clearance along the offshore export cable corridor (months)	N/A	N/A	4

Pre-lay Grapnel Runs (PLGRs)

- 2.9.3.18 PLGRs will be conducted along the cable corridor to clear any seabed debris, obstructions and any remaining obstacles, such as discarded fishing nets, equipment, ropes, or wires, from the area that will be used for the offshore export cable installation.
- 2.9.3.19 PLGRs are expected to run through parallel tracks to clear a width of 10m per cable trench. Grapnel runs will typically be towed at 2-5 knots. Tension will be continuously monitored, and the line will be hauled in at intervals to remove any debris that has been caught.
- 2.9.3.20 It is currently anticipated that PLGRs will cover an area of up to 6,493,400 m². Taking account of the total cable length, towing speed and experience from similar projects, the entire PLGR campaign is expected to last up to nine months.

2.9.4 Offshore export cables***Location and design overview***

- 2.9.4.1 Offshore export cables will be used for the transfer of electricity from either the Morven North or Morven South OSP to the TJB(s) at the landfall.
- 2.9.4.2 The Applicant requires flexibility in type, location, depth of burial and protection measures for the offshore export cables to ensure that anticipated physical and technical constraints and changes in available technology can be accommodated.
- 2.9.4.3 The MHPGC Project will require up to two HVDC power cores (conductors) and two fibre optic cables forming a single cable circuit. The offshore export cables will be installed in up to two trenches. **Diagram 2-3** shows a typical offshore export cable bundle for the MHPGC Project including power cores (brown) and fibre optic cables (blue). It should be noted that having separated power cores is also possible, especially at landfall where separate power core pull-in is planned (see **paragraphs 2.10.4.5 - 2.10.4.7**).

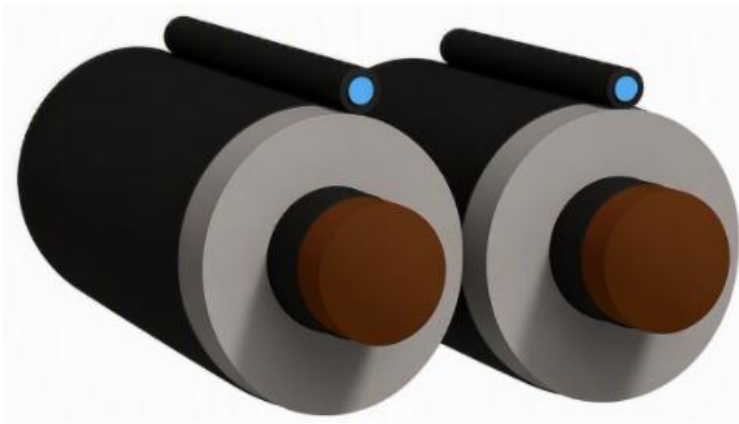


Diagram 2-3: An illustration of a typical offshore export cable bundle

2.9.4.4 Further detail regarding the design envelope for the offshore export cables is described in **Table 2-9**.

Table 2-9: Design Envelope – construction of offshore export cables

Parameter	Design Envelope – up to MDS		
	Scottish waters	English waters	MHPGC Project
Number of offshore export cables	up to 2 export cables and up to 2 fibre optic cables		
Number of Trenches	2		
Number of cable circuits	1		
Voltage (kV)	320		
HVAC/HVDC	HVDC		
Maximum external cable diameter (mm)	160		
Maximum length per cable (km) (OSP to MHWS)	98.00	228.00	326.00
Maximum total length of offshore export cables (km)	196.00	456.00	652.00
Width of cable corridor (m)	1000		
Trench depth (m)	3		
Minimum target burial depth (m)	0.5		
Trench width (m)	Up to a maximum width: 8.9 (ploughing)		
Width of seabed disturbance (m)	Up to a maximum width: 20 (ploughing) , 15 (jetting)		
Footprint of seabed disturbance per trench (m ²)	N/A	N/A	Up to a maximum area: 4,870,050 (jetting) 6,493,400 (ploughing)

Offshore export cable installation and protection

2.9.4.5 Offshore export cables would be installed/buried using a range of techniques including mechanical cutting, jet trenching, controlled flow excavation and ploughing (during or post lay trenching). These techniques allow the seabed to be opened with a trench for laying the cables. The installation tools for implementing these techniques may be powered or pulled from an offshore installation vessel. The installation tools would be pulled over a positioned export cable to simultaneously open the trench, place the cable in the trench, bury the cable and backfill the trench. Alternatively, the installation tools may open the trench as a separate activity, before the cable is lowered into the trench and buried.

- 2.9.4.6 It is anticipated that up to 16 cable crossings will be required for the offshore export cable as it may intersect existing assets in the North Sea including subsea fibre-optic telecommunications cables, HVDC electricity interconnectors, and high voltage export cables. Final crossing designs will be agreed with the relevant asset owners, but some form of cable protection is likely to be required.
- 2.9.4.7 **Table 2-10** sets out the design envelope for offshore export cable installation, cable protection and potential cable crossing, based on the MDS for offshore export cable trenches. The finalised installation approach and any necessary cable protection measures for the offshore export cables will be confirmed during detailed design, after consents have been granted. Final choices will be informed by the results of environmental and pre-construction site investigation surveys. The Applicant has made a commitment (CoT08 of **Volume 1, Annex 4.1: Commitments Register, of the PEIR**) that an Outline Offshore CSIP will be prepared and submitted with the application for development consent and as part of the Marine Licence application(s) to the Scottish Ministers. It will include details such as the implementation, management and monitoring of cable protection, as well as a CBRA which defines burial depths and safeguards. A Detailed CSIP will be developed prior to construction that will be substantially in accordance with the Outline CSIP.

Table 2-10: Design Envelope - offshore export cable installation, cable protection and cable crossings

Parameter	Design Envelope – up to MDS
Offshore export cable installation	
Cable installation burial technique	Mechanical Cutting Jet Trenching Controlled Flow Excavation Ploughing (during or post lay trenching)
Offshore export cable protection	
Cable protection material type	Concrete Mattresses Rock Bags Rock Installation Cable Protection Systems
Method for installation for all cable protection proposed	Concrete Mattresses/Rock Bags (utilising a Standard Offshore Construction or Cable Lay Vessel) Rock Installation (utilising a Rock Dump Vessel)
Height of cable protection, per trench (m)	Up to maximum height: 2.0 (Rock Berm)
Width of cable protection, per trench (m)	Up to maximum width: 14 (Rock Berm)
Total area of seabed impacted by offshore export cable protection (m ²), up to two trenches (MDS based on rock berm)	770,760
Total volume of seabed impacted by offshore export cable protection (m ³), up to two trenches (MDS based on rock berm)	874,282
Percentage length with cable protection coverage(%), up to two trenches (MDS based on rock berm)	10.69
Offshore export cable crossing	
Maximum number of offshore export cable crossings, up to two trenches	16
Cable crossing protection type	Rock Placement Concrete Mattresses

Parameter	Design Envelope – up to MDS
Length per crossing (m)	200
Width per crossing (m)	18.0
Height per crossing (m)	2.0
Total area of all crossings (m ²), up to two trenches	57,600
Total volume of crossing protection material (m ³), up to two trenches	64,000

Vessel requirements for offshore export cable installation

- 2.9.4.8 Some of the offshore components of the MHPGC Project are likely to be manufactured offsite at manufacturing sites in the UK and/or abroad. The offshore construction phase will therefore be supported by various installation vessels including cable lay vessels, trenching support vessel, guard vessels, survey vessels, PLGR vessel, installation support vessel, out of service cable removal vessel, boulder clearance vessel, dredging vessel, crew transport vessel (CTV), rock dumping vessel, construction support vessel, tug/anchor handler and cable barge
- 2.9.4.9 During the construction phase, it is anticipated that up to 550 return trips will be made by the installation vessels. A maximum of 33 vessels may be operational at any one time during the construction phase.

2.9.5 Aids to navigation, colour, marking and lighting

- 2.9.5.1 The MHPGC Project will be designed and constructed in accordance with the following latest guidance in relation to navigation safety and emergency response:
- Association of Marine Aids to Navigation and Lighthouse Authorities (2021) Recommendation G1162 on the Marking of Man-Made Offshore Structures; and
 - Maritime and Coastguard Agency (MCA) (2021) Offshore Renewable Energy Installations: Guidance on UK navigational practice, safety and emergency response (MGN 654 and annexes).
- 2.9.5.2 Appropriate marking, lighting and aids to navigation will be employed during the construction, operation and maintenance, and decommissioning phases, as appropriate to ensure the safety of all parties. Appropriate lighting, specified in line with MCA (2021), will ensure clear visibility for search and rescue (SAR) and emergency response.
- 2.9.5.3 The location of the offshore export cable will be communicated to the UK Hydrographic Office for incorporation into Admiralty Charts and the Notices to Mariners procedures. These locations will also be provided to the Defence Geographic Centre.
- 2.9.5.4 The Applicant has made a commitment (CoT28 of **Volume 1, Annex 4.1: Commitments Register of the PEIR**) that an Outline Navigational Safety Plan will form part of the Outline Offshore Environmental Management Plan, which will be prepared and submitted with the application for development consent and as part of the Marine Licence application(s) to the Scottish Minister. The Outline Navigational Safety Plan will detail measures to ensure compliance with international marine regulations. A Detailed Navigational Safety Plan will be developed substantially in accordance with the outline plan, and will be submitted to and approved by the discharging authority in consultation with the MCA and Trinity House before construction begins.

2.9.6 Advisory safe passing distances

- 2.9.6.1 During construction, operation and maintenance, and decommissioning, vessel movements within the offshore extent of the MHPGC Project PEIR Red Line Boundary may be influenced by activities undertaken to protect the health and safety of all users of the sea. This may include the implementation of advisory safe passing distances around vessels associated with installation of

and maintenance works for the offshore export cables, which could result in localised deviations to vessel routes.

- 2.9.6.2 Guard vessels will be deployed, as required, acting as dedicated sentinels, monitoring and warning passing traffic, requesting advisory safe passing distances, coordinating communications, and standing ready for emergency or environmental response.
- 2.9.6.3 The Applicant has made a commitment (CoT32 of **Volume 1, Annex 4.1: Commitments Register of the PEIR**) that an Advisory Safety Statement will be submitted as part of the application for development consent and as part of the Marine Licence application(s) to the Scottish Ministers. The Advisory Safety Statement will define advisory safe passing distance and the use of guard vessels during the construction, operation and maintenance, and decommissioning phases of the MHPGC Project.
- 2.9.6.4 The implementation of advisory safe passing distances may also result in restricted access to fishing grounds and interference with fishing activity. To manage interactions between the MHPGC Project and the fishing industry, the Applicant has made a commitment (CoT19 of **Volume 1, Annex 4.1: Commitments Register of the PEIR**) for ongoing liaison with the fishing industry through the appointment of a Company Fisheries Liaison Officer(s) and adherence to good practice guidance with regards to fisheries liaison (e.g. Fishing Liaison with Offshore Wind and Wet Renewables Group guidance (2025) for English Waters).

2.9.7 Offshore construction environmental management

- 2.9.7.1 The offshore components of the MHPGC Project, including offshore works associated with the landfall, will be constructed in an environmentally sensitive manner. All works will comply with the applicable legislation, standards and codes of practice identified in the topic chapters of the PEIR and the mitigation hierarchy will be applied to seek to minimise impacts on the marine environment.
- 2.9.7.2 At this stage, details of all proposed CoTs for the MHPGC Project are provided in **Volume 1, Annex 4.1: Draft Commitments Register, of the PEIR**, and those directly relevant to this chapter are provided in **section 2.7**. These will be refined subject to further consultation and engagement and will be provided in the Outline OEMP to be submitted in support of the DCO application and Marine Licence application(s) to the Scottish Ministers.

2.10 Landfall (including intertidal area)

2.10.1 Overview

- 2.10.1.1 The landfall is the area where the offshore export cables make landfall (comes on shore). This is the transitional area between the offshore export cables and the onshore export cables. This term applies to the entire area between the trenchless technique exit pits and the TJB(s), inclusive of all construction works, including the offshore and onshore export cable corridors and landfall compound(s). The landfall will be located along the northeastern coast of England south of Seaham in County Durham.
- 2.10.1.2 The offshore export cables will be installed under the intertidal area using trenchless techniques, and will be jointed to the onshore export cables at the TJB(s). A TJB is an underground concrete structure and will be located on the onshore side of the landfall, which is landward of MHWS. **Figure 2-4** shows that the indicative area where the TJB(s) will likely be located within. This area is located North of Hawthorn Quarry and South of the A182 and abuts the Durham Coast Railway Line to the east.
- 2.10.1.3 The TJB(s) will house the jointed cable connection, at this location there may be monitoring boxes, of which will be accessible via an inspection cover at ground level.
- 2.10.1.4 The maximum duration of the landfall construction works is 3.5 years (42 months). Further details on duration and the construction programme are set out in **section 2.8**.
- 2.10.1.5 All landfall components of the MHPGC Project are to be consented through the DCO application.
- 2.10.1.6 This section sets out the design parameters and the proposed installation and construction methods assessed within the PEIR for the landfall components.

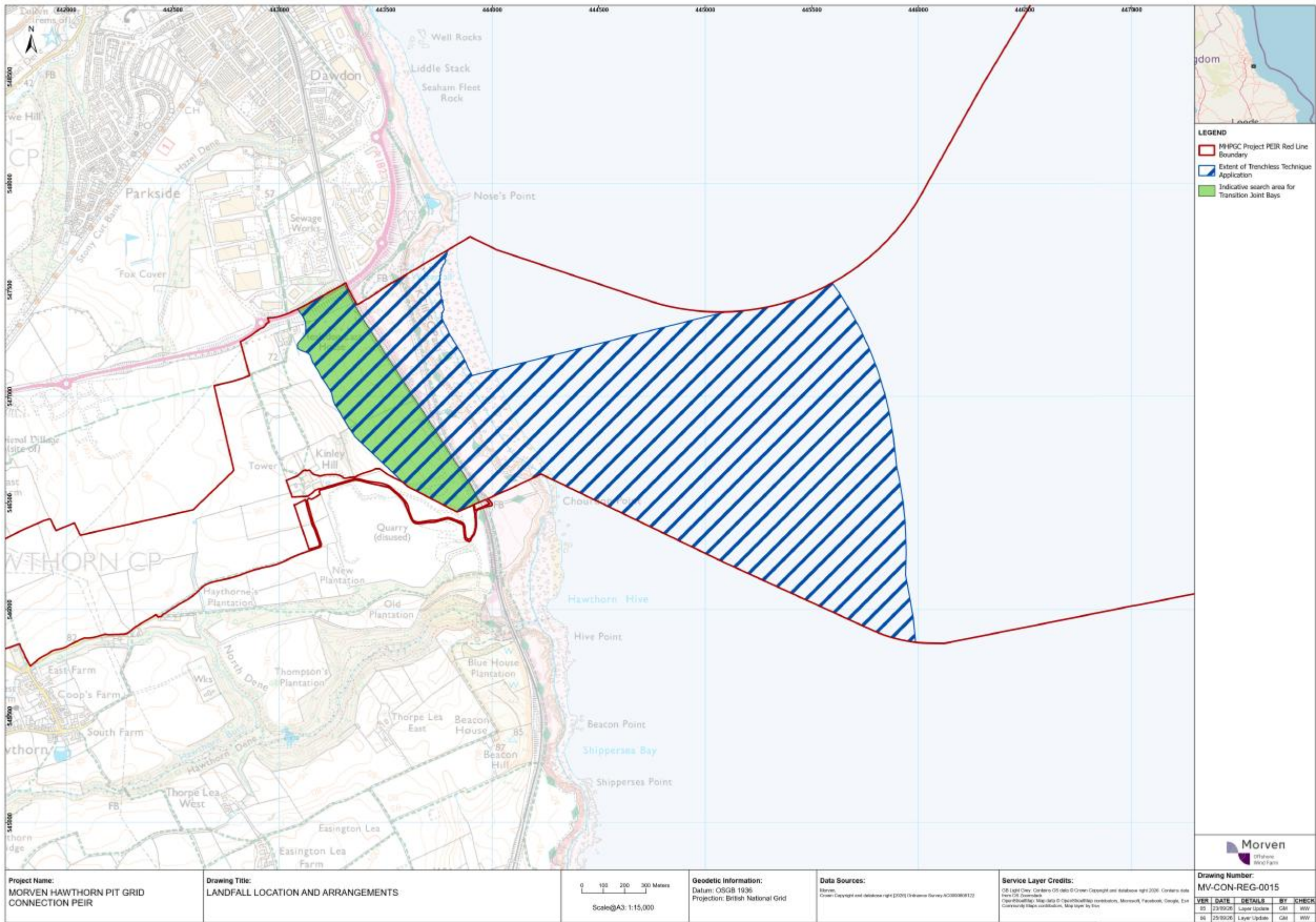


Figure 2-4: Landfall Location and Arrangements

2.10.2 Pre-construction geophysical and geotechnical surveys

2.10.2.1 **Table 2-11** sets out the anticipated pre-construction surveys for landfall. These surveys/investigations will be undertaken to allow for plotting the path to bring the offshore export cables to landfall, taking into account the seabed and soil condition and the presence of any existing structures.

Table 2-11: Anticipated pre-construction surveys for landfall (including intertidal area)

Pre-construction survey type	Details
Geophysical Survey	- Seismic Refraction and Multi-channel Analysis of Surface Waves (MASW) survey. - Electrical Resistivity Tomography (ERT). - Pre-investigation Geophysical Survey, including multi-beam echo sounder, side-scan sonar, sub-bottom profiling, magnetic survey and/or intrusive magnetometer survey, may be necessary, subject to the findings from detailed UXO risk assessment to reduce UXO risk to as low as reasonably practicable.
Geotechnical Investigation	- Boreholes. - CPTs (CPT, CPTu, S-CPT, T-CPT). - Machine excavated Trial Pits. - Downhole geophysical logging (including caliper measurement, natural gamma, P and S wave logging and high-resolution acoustic televiewer). - Magnetic resonance. - Soil and groundwater sampling for contamination environmental testing. - Groundwater and ground gas monitoring.

2.10.3 Site preparation activities

2.10.3.1 The general sequence of site preparation activities at landfall includes the establishment of temporary onshore compounds at the indicative search area for the TJB(s). It should be noted that no construction activities and site preparation activities will be required in the intertidal area.

- establishment of temporary access tracks and any gates which may be required to access the compound;
- installation of secure fencing or hoarding of the temporary compound area;
- surfacing works for the temporary compound;
- installation of welfare and site security arrangements; and
- delivery of equipment required for the works.

2.10.3.2 All compounds will require suitable security fencing or hoarding. Lighting may be used within the compound boundaries for security, during periods of low light levels/darkness (e.g. during the autumn/winter months) (for safety), or where nighttime activities may be required (e.g. offshore cable pull-in, see **paragraphs 2.10.4.5 - 2.10.4.7** for further details).

2.10.3.3 All construction compounds will be removed, and sites reinstated, once construction has been completed.

2.10.3.4 It is currently anticipated that a maximum of one main compound and one secondary compound are needed for the landfall construction works. The main compound will operate as a central base for the landfall construction works and will house the site office, welfare facilities, car parking spaces, as well as acting as a staging post and secure storage spaces for equipment and component deliveries. Meanwhile, the secondary compound is smaller satellite compound that provides additional welfare facilities and localised material storage spaces.

- 2.10.3.5 It has been assumed that use of a cofferdam will not be required, due to requirement to deliver landfall using trenchless techniques. Access to the temporary landfall compound(s) will be from the A182 or via the main onshore cable haul road through an existing access at Hawthorn Quarry (see **paragraphs 2.11.5.3 - 2.11.5.6**). **Table 2-12** outlines the maximum parameters for the temporary landfall compound(s) and access.

Table 2-12: Design Envelope – temporary landfall onshore compound(s) and access

Parameter	Design Envelope – up to MDS
Number of main compound(s)	1
Maximum total area of main compound(s) (m ²)	48,000
Number of secondary compound(s)	1
Maximum total area of secondary compound(s) (m ²)	900
Duration of compounds (months)	42

2.10.4 Trenchless technique installation of offshore export cables at landfall

Overview of technique and location

- 2.10.4.1 Horizontal Directional Drilling (HDD) or other trenchless technique(s) will be used to prepare the trenchless path at landfall to enable the subsequent pull-in and installation of the offshore export cables from the subtidal trenchless technique exit pits to the TJB(s) location. The offshore export cables will be brought onshore at the TJB(s), where they will be jointed to the onshore export cables.
- 2.10.4.2 From the launch area located within the temporary onshore landfall compound, a trenchless bore will be constructed, up to a maximum of one bore for each offshore export cable.
- The trenchless bores will extend beneath the intertidal area and emerge at a suitable offshore location, referred to as the exit pit.
 - The construction of the landfall will be installed using an appropriate trenchless construction technique, such as HDD or a similar trenchless method. The installation process will be continuously monitored and controlled to ensure the landfall is constructed in accordance with the design requirements.
 - The trenchless installation will create a conduit suitable for the installation and protection of the offshore export cable. Depending on the construction technique adopted, the conduit may be installed either concurrently with the excavation process or following completion of the bore.
 - A vessel, jack-up or barge positioned offshore may support the trenchless installation activities, including management of the offshore exit location and any required tool retrieval activities. Following completion of the landfall construction trenchless activities, the offshore export cable will be installed through the conduit. This will involve an offshore cable lay vessel or cable lay barge laying out the offshore export cable from the vessel/barge whilst the onshore winch, which has the winch wire also connected to the end of the offshore export cable, concurrently pulls in the cable from sea to land.
- 2.10.4.3 The trenchless technique installation will emerge on the seabed of a subtidal location (more than 390m from MHWS) ranging from approximately 4 – 20m below the Lowest Astronomical Tide (LAT), with the final punchout locations subject to further post-consent survey and detailed design. The exact alignment of the trenchless installation will also be finalised during detailed design, but the Applicant has made a commitment (CoT13 of **Volume 1, Annex 4.1: Commitments Register, of the PEIR**) that the installation of the offshore export cables under Durham Coast SSSI and SAC will be undertaken by trenchless technologies. The exit pits associated with the trenchless technique installation will also be at least 100m seaward of the eastern boundary of the Durham Coast SSSI and SAC, avoiding direct impacts to these sensitive designations.
- 2.10.4.4 The maximum design parameters for the trenchless installation are detailed in **Table 2-13**.

Table 2-13: Design Envelope – trenchless technique installation of offshore export cables at landfall

Parameter	Design Envelope – up to MDS
Length of trenchless drill bore from entry to exit pit (m), per offshore export cable	2,000
Number of trenchless drill bores	4
Trenchless drill bore external diameter (mm)	1,600
Duration of trenchless drilling activity (days)	300
Entry Pits within temporary onshore landfall compound	
Number of entry pits	4
Trenchless drill entry pit area (m ²), per pit	262.5
Trenchless drill entry pit excavated volume (m ³), per pit	2,762
Indicative maximum burial depth of trenchless drill(s) (m below ground level)	80
Exit Pits at the subtidal location	
Number of exit pits	4
Trenchless drill exit pit area (m ²), per pit	7,000
Trenchless drill exit pit excavated volume (m ³), per pit	18,667
Trenchless drill exit pit water depth (offshore below LAT) (m)	20
Burial depth of trenchless drill(s) (m below seabed)	40

Pull-in of the offshore export cables

- 2.10.4.5 The offshore export cables to be pulled into landfall will be transported via an installation drum located on a cable lay vessel or cable lay barge and the vessel/barge will position in the vicinity of the trenchless technique exit pits. Using either divers or a remotely operated vehicle (ROV), the vessel/barge shall retrieve the winch wire of the onshore pull-in winch and connect it to the end of the cable being pulled. The onshore winch, located at the TJB working area, shall pull the cable concurrently as the cable vessel/barge releases cable from the onboard drum. The cable is pulled through the landfall via the pre-installed casing/ducts/pipes, and the cable end then being locked-off/held at the TJB location. This process is completed separately for each cable.
- 2.10.4.6 Up to two main vessels may be required to support the offshore export cable pull-in activities due to the possibility of having a single cable lay vessel or a supporting barge. Other smaller vessels may also support the operation such as a dive vessel, tugs for barge control or a general construction vessel to assist with the winch wire retrieval operation. Overall, it is anticipated that up to 250 return trips will be made by the installation and support vessels during the construction phase, with a maximum of 14 vessels that may be operational at any one time.
- 2.10.4.7 Flotation pits may also be required during offshore export cable installation where the cable lay vessel cannot safely approach close enough to the trenchless technique exit pits to undertake the cable pull-in operation. In these circumstances, the cable would be 'floated in' from the offshore vessel to the subtidal exit pits.
- 2.10.4.8 Due to the distance between the offshore vessel and the exit pit, combined with the weight of the cable, the cable would otherwise sink to the seabed and would be dragged across the sea floor until it reached the exit pit. This makes the cable pull-in operation more difficult, increasing the potential for seabed interaction and risks damage to the cable. To prevent this, buoyancy aids are attached to the cable, allowing it to remain suspended within the water column during installation. These

buoyancy aids are subsequently removed, either by divers or a remotely operated vehicle (ROV), before the cable enters the exit pit and is pulled through the landfall bore trajectory.

- 2.10.4.9 As the 'float-in' operation typically takes place in shallow nearshore waters, sufficient water depth is required to maintain the cable in suspension. The flotation pit provides a locally deepened area of the seabed in which the cable can remain suspended in the water column during the cable pull-in operation. The flotation pit facilitates the cable catenary, the removal of buoyancy aids and controlled alignment of the cable as it approaches the landfall exit pit. The flotation pit would be reinstated following completion of installation works.

- 2.10.4.10 **Table 2-14** sets out the maximum parameters for the flotation pits.

Table 2-14: Design Envelope – Flotation pits

Parameter	Design Envelope – up to MDS
Number of flotation pits	2
Surface area per flotation pit (m ²)	13,200
Depth per flotation pit (m)	5
Volume to be dredged per flotation pit (m ³)	39,167

2.10.5 Transition Joint Bay(s) Construction

- 2.10.5.1 Once the landfall bores have been constructed with pre-installed casing/ducts/pipes between the TJB(s) and the trenchless technique exit pits, the permanent TJB(s) will then be constructed within the TJB working area at the indicative TJB(s) area on the onshore side of the landfall (see **Figure 2-4**). It is currently anticipated that permanent access will be created from the A182 to the location of the TJB(s).
- 2.10.5.2 A TJB consists of an excavation with a concrete reinforced floor, into which the offshore and onshore export cables are pulled before the cables are jointed together. After jointing, each TJB will be backfilled or has a concrete roof installed that creates a chamber for access by the hatch, with the surface reinstated to its original condition. Manhole covers may be fitted to provide future maintenance access at surface level.
- 2.10.5.3 Each TJB may contain an underground Monitoring Box, contained within an underground chamber that would be accessible via the manhole cover at ground level.
- 2.10.5.4 The design envelope for the TJB(s) is presented in **Table 2-15**. It is anticipated that up to two TJBs are required, should the two power cores elements of the offshore export cable circuit be brought onshore with a greater separation that allows for a common TJB.

Table 2-15: Design Envelope – TJB(s)

Parameter	Design Envelope – up to MDS
Number of TJB(s)	2
Location of TJB(s)	Within 150m (inland) of landfall trenchless drill entry pits
Ground level surface Area of TJB(s) (permanent) (m ²)	150
Permanent area of surface level TJB manhole covers (m ²)	25
Depth of TJB(s) (m)	2.5

2.11 Onshore components of the MHPGC Project

2.11.1 Introduction

- 2.11.1.1 As set out in **paragraph 2.6.1.2**, the permanent onshore infrastructure for the MHPGC Project includes the onshore export cables, onshore LSS and AC connection cables. Temporary infrastructure, such as construction compounds and access roads, will also be required. This section sets out the design parameters and the proposed installation and construction methods assessed within the PEIR for each of these components.
- 2.11.1.2 The permanent onshore infrastructure, together with the temporary infrastructure, is anticipated to located within the MHPGC PEIR Red Line Boundary: Onshore shown in **Figure 2-5**. It should be noted that the presented siting of the onshore infrastructure is indicative and have not informed the assessment within the PEIR.
- 2.11.1.3 It should be noted there are currently two location options for the onshore LSS – Green onshore LSS Option Area and Blue onshore LSS Option Area, as illustrated in **Figure 2-6**. It should be noted that the onshore LSS option will determine the routing of the onshore export cable corridor and AC connection cable corridor, as demonstrated in **Figure 2-5**.
- 2.11.1.4 It should also be noted that the area to the south of Jade Business Park is under consideration for use for potential net gain and environmental enhancement and/or mitigation, as illustrated in **Figure 2-7**.
- 2.11.1.5 The indicative locations and siting of the onshore components described in this section have been informed by a site selection and route refinement process, which is set out in **Volume 1, Chapter 3: Site Selection & Consideration of Alternatives, of the PEIR**.
- 2.11.1.6 All onshore components of the MHPGC Project are to be consented through the DCO application.

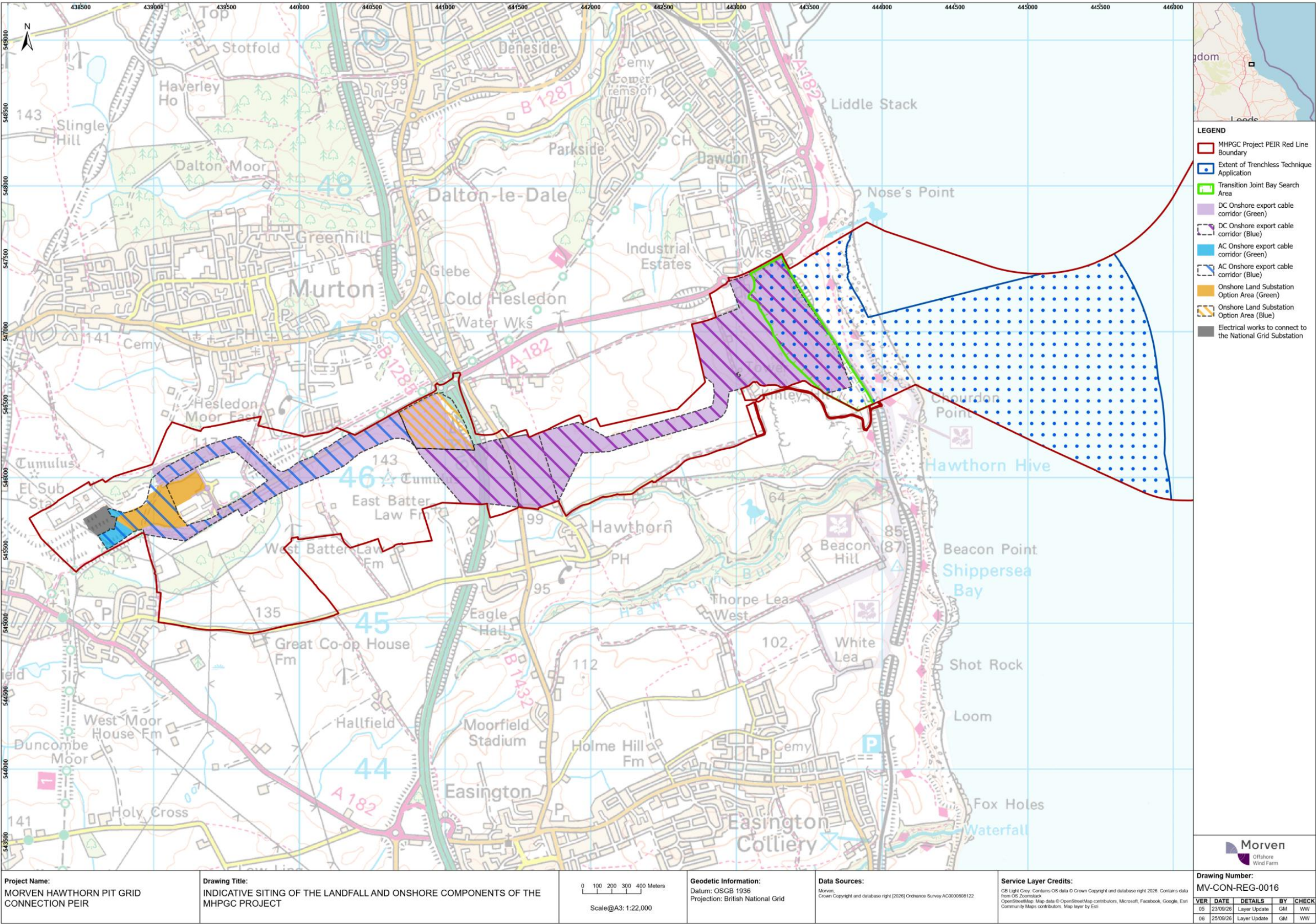


Figure 2-5: Indicative Siting of the Landfall and Onshore Components of the MHPGC Project



Figure 2-6: Onshore LSS Option Areas



Figure 2-7: Indicative Biodiversity Net Gain, Enhancement and/or Mitigation Land Area

2.11.2 Onshore export cable corridor

Location and design overview

- 2.11.2.1 The onshore export cables will provide a cable connection between the TJB(s) at landfall and the proposed onshore LSS. As shown in **Figure 2-5**, an indicative onshore export cable corridor has been identified, within which the onshore export cables will be located.
- 2.11.2.2 From the TJB(s) at landfall, the onshore export cable corridor is anticipated to route westwards from the coast, crossing the B1432 and then the A19. After that, the onshore LSS option will determine the final routing and length of the onshore export cable corridor.
- 2.11.2.3 It is currently anticipated that one HVDC cable circuit containing two power cores and two fibre optic cables is required. The onshore export cable corridor will have a maximum length of up to approximately 8.31km long. Onshore export cables will be installed in up to two cable trenches and the Applicant has made a commitment (CoT27 of **Volume 1, Annex 4.1: Commitments Register, of the PEIR**) that the onshore export cables will be completely buried underground for the entire length. To allow for adequate protection and avoid landowner disturbance, the onshore export cables will be buried at least 1 m from ground level.
- 2.11.2.4 The operating voltage of the cables will be selected prior to construction but is likely to be 320 kV. The onshore export cables themselves will consist of copper or aluminium power cores wrapped with various materials for insulation, protection, and sealing. Fibre-optic cables are also likely required for communications and temperature sensing.
- 2.11.2.5 Once installed, the permanent easement of the onshore export cable corridor will be up to 8.65 m wide, with exceptions occurring where cables need to be separated for special circumstances – for example on the approach to trenchless crossing locations (see **paragraphs 2.11.6.12 - 2.11.6.16**).
- 2.11.2.6 The design envelope for the onshore export cables is presented in **Table 2-16**. It should be noted that while the design envelope for the Green onshore LLS Option has a longer onshore export cable corridor due to the greater distance from the TJB(s) at landfall, the design envelope for the Blue onshore LSS Option constitutes the realistic worst-case due to the larger cable corridor width and thus area of temporary land-take required associated with AC connection cables, when compared to the Green onshore LSS Option.

Table 2-16: Design Envelope (Blue onshore LSS Option) – Onshore export cables

Parameter	Design Envelope – up to MDS
Length of onshore export cable corridor (km)	4.83
Number of onshore export cables	Up to 2 power cores and up to 2 fibre optic cables
Number of onshore export cable circuits	1
Number of cable trenches	2
Area of onshore export cable corridor (permanent) (m ²)	41,780
Typical permanent cable corridor width (m)	8.65
Typical cable trench depth (m)	1.8
Voltage (kV)	320
Diameter of duct (mm) (excluding trenchless crossing locations)	400

Joint bays and monitoring boxes

- 2.11.2.7 Joint bays and monitoring boxes will be required along the onshore export cable corridor. Joint bays are typically concrete floor lined pits below ground that provide a clean and dry environment for jointing sections of cable together and provide support for the cable joint itself. The distance between joint bays will be maximised where possible to provide a less intrusive and cost-effective

cable installation. Land above the joint bays will be reinstated; joint bays will only require intrusive access during the operation and maintenance phase in the event of a cable failure requiring replacement. At these cable joints, it is anticipated there will be fibre optic cable boxes, known as monitoring boxes, allowing monitoring and testing of the cables.

2.11.2.8 Monitoring boxes are smaller pits compared to joint bays, which house equipment used for monitoring and testing of the onshore export cables. Monitoring boxes are typically located adjacent to the joint bay locations. They are typically located underground but can also locate as an above ground structure, comprising an accessible chamber or enclosure designed to provide access during the operation and maintenance phase. Access is anticipated to be on an annual basis for routine inspection, for example to check on condition and water egress. Further information onshore operation and maintenance activities can be found in **section 2.16.2**.

2.11.2.9 The design envelope for the joint bays and monitoring boxes is set out in **Table 2-17**.

Table 2-17: Design Envelope (Blue onshore LSS Option) – joint bays and monitoring boxes

Parameter		Design Envelope – up to MDS
Joint bays		
Number of joint bays		12
Minimum distance between joint bays for onshore export cables (m)		400
Size of joint bay for onshore export cables (surface area) (m ²), per joint bay		6.25
Monitoring boxes		
Number of monitoring boxes		12
Minimum distance between monitoring boxes for onshore export cables (m)		400
Size of monitoring box for onshore export cables (surface area) (m ²), per monitoring box		6.25

2.11.3 Onshore land substation (LSS)

Overview and Location

2.11.3.1 The proposed onshore LSS will be a HVDC convertor station that converts the power supplied through the HVDC onshore export cables to HVAC at 400kV, allowing a connection to the National Grid Hawthorn Pit Substation

2.11.3.2 As shown in **Figure 2-6**, the following onshore LSS site options have been identified and will be considered within the PEIR:

- Green onshore LSS Option Area; and
- Blue onshore LSS Option Area.

2.11.3.3 The onshore LSS Option Areas have been adequately sized to enable all construction activities associated with the onshore LSS to occur within the footprint of the Option Areas. The siting of the onshore LSS will continue to evolve through the EIA process and will consider environmental and engineering constraints as well as stakeholder and commercial factors. It is therefore possible that the final footprint of the selected onshore LSS option will be further refined upon the submission of the DCO application. An overview of the site selection process is provided in **Volume 1, Chapter 3: Site Selection and Alternatives, of the PEIR**.

Green onshore LSS Option Area

2.11.3.4 The Green onshore LSS Option Area is located on vacant land in the North West sector of Jade Business Park and to the east of the National Grid Hawthorn Pit Substation. The site directly abuts woodland to the south which is part of an application to re-use spoil from the business park to raise

land and create a visual screen. The site is an irregular shape due to the surrounding uses and is broadly flat.

- 2.11.3.5 Land within and adjacent to the site is not subject to any designation, however, there are designated sites to the east and north including Hesledon Moor East SSSI approximately 150m east of the site and associated Local Wildlife Site (LWS). The site is also a brownfield site (former Hawthorn Mine) and is within 500m of the settlement of Murton to the north.
- 2.11.3.6 Access to the site is via the Jade Business Park access road and an unnamed road which runs along the eastern and northern boundary of the site. This road is gated part way along and appears to provide permanent access to the National Grid Hawthorn Pit Substation.
- 2.11.3.7 As this option is closer to the National Grid Hawthorn Pit Substation, the onshore export cable corridor will be longer, but the AC connection cable corridor will be shorter.

Blue onshore LSS Option Area

- 2.11.3.8 The Blue onshore LSS Option Area is located just West of the A19 and South of the access road to Jade Business Park. It lies on agricultural land which forms the north and northeastern slopes of Batter Law Hill. Land generally is gently sloping rising from around 100mAOD at the north of the site to 130mAOD to the south of the site.
- 2.11.3.9 Land within a radius of 500m from the site is not subject to any designation, however, there are designated sites in the wider area including Heseldon Moor SSSI and a number of associated LWSs. There are individual properties to the south and west of the site comprising farmhouses while a housing estate on the outskirts of South Hetton is located to the northwest.
- 2.11.3.10 The site is immediately south of the Jade Business Park access road. This provides opportunities to establish short and direct access into the LSS site.
- 2.11.3.11 This option is further from the National Grid Hawthorn Pit Substation, so the onshore export cable corridor will be shorter, but the AC connection cable corridor will be longer, compared to the Green onshore LSS Option Area.

Design

- 2.11.3.12 The onshore LSS will contain the electrical components to convert the power supplied from the Morven North or Morven South to 400 kV and to adjust the power quality and power factor, as required to meet the UK Grid Code for supply to National Grid.
- 2.11.3.13 The onshore LSS will also house the auxiliary equipment and facilities for operating, maintaining and controlling the LSS. It will contain associated infrastructure including (but not limited to) switchgear and electrical equipment such as high voltage reactors, high voltage power electronic converters, smoothing-reactors, power transformers, harmonic filters, cooling equipment, control and welfare buildings, lightning protection, internal access roads, security fencing, security gates and other associated equipment, structures and buildings including noise attenuation works if required, together with, AC and DC switchgear, DC cable sealing-end compounds, cooling systems (including pumps, radiators and heat-exchange units), auxiliary power systems (Uninterruptible Power Supply and standby generation), supervisory control and data acquisition control and telecommunications systems, and earthing and surge-protection equipment.
- 2.11.3.14 The onshore LSS will have an optimised layout so that equipment is enclosed within secondary buildings where appropriate and land is set aside for landscape planting and drainage mitigation.
- 2.11.3.15 Two broad substation design options are currently considered; Air Insulated Switchgear (AIS) and Gas Insulated Switchgear (GIS) designs. For an AIS option, the equipment will be sited in an 'open yard' style. For a GIS option, some or all of the equipment will be housed within single or multiple buildings.
- 2.11.3.16 Onshore LSS substructures are expected to use steel frames with external profiled metal cladding. The structural steelwork will be fabricated and prepared off site and delivered to site for assembly.
- 2.11.3.17 The Applicant has made a commitment (CoT62 of **Volume 1, Annex 4.1: Commitments Register, of the PEIR**) that Design Principles will be produced and submitted as part of the application for

development consent. It will focus on design elements associated with the onshore LSS fulfilling the requirement for 'good design', as prescribed in NPS EN-1, NPS EN-3 and NPS EN-5.

2.11.3.18 The design envelope for the onshore LSS is presented in **Table 2-18**. It should be noted that AIS and GIS substations are different in form and size, however indicative maximum design parameters are presented in **Table 2-18**.

Table 2-18: Design Envelope - onshore LSS

Parameter	Design Envelope – up to MDS
Transmission type (HVAC or HVDC)	HVDC Converter Substation
Permanent footprint of the onshore LSS, including landscaping area (m ²)	67,300
Temporary construction footprint of the onshore LSS (m ²)	70,000
Number of buildings	14, including main converter building, auxiliaries building, control and protection building, transformer building, spares building, admin centre, security building, generation building, Battery Energy Storage System (BESS) building and control buildings for switchgear bays.
Height of tallest building/structure on the onshore LSS (m)	30
Width of main building/structure (m)	100
Length of main buildings (m)	200
Height of lightning protection (m)	35
Number of lightning protection rods	28
Width of permanent access road (m)	15
Width of temporary access road(s) including passing bays (m)	15

Access

2.11.3.19 Access points for the onshore LSS may be provided from the existing highway network, which is present on both onshore LSS Option Areas. At this stage, a number of potential access points from the highway for each onshore LSS Option Area are under consideration. The access points will depend on the selected onshore LSS Option Area and will be further progressed towards the submission of the DCO application.

Fencing

2.11.3.20 The permanent footprint of the onshore LSS will be clearly marked and secured with appropriate fencing.

Landscape and ecological planting

2.11.3.21 The Applicant has made a commitment (CoT43 of **Volume 1, Annex 4.1: Commitments Register, of the PEIR**) that an Outline Landscape and Ecological Management Plan (LEMP) will be prepared and submitted with the development consent application. Detailed LEMP(s) will be developed post-consent substantially in accordance with the Outline LEMP. The LEMP will include details of mitigation planting at the onshore LSS, including the number, location, species and details of management and maintenance of planting. Where practical, landscape mitigation planting will be established as early as reasonably practicable in the construction phase.

2.11.3.22 The Applicant has made a commitment (CoT62 of **Volume 1, Annex 4.1: Commitments Register, of the PEIR**) that Design Principles will be produced and submitted as part of the application for development consent. It will focus on design elements associated with the onshore LSS including the landscaping area.

Surface water drainage

- 2.11.3.23 Impermeable areas on the onshore LSS, for instance for any buildings or structures, will require permanent surface drainage.
- 2.11.3.24 The Applicant has made a commitment (CoT22 of **Volume 1, Annex 4.1: Commitments Register, of the PEIR**) that an Outline ODMP for the onshore LSS will be prepared and submitted with the application for development consent. The Outline ODMP will include measures to ensure that existing land drainage is reinstated and/or maintained, and ensure surface water runoff generated at the chosen onshore LSS option by new impermeable area is attenuated with an allowance for climate change and discharged from the site to an appropriate location at a restricted discharge rate. Additional sustainable drainage systems (SuDS) will also be incorporated as necessary (source control) and confirmed at the detailed design stage.
- 2.11.3.25 A Detailed ODMP will be developed substantially in accordance with the Outline ODMP and in line with the latest relevant drainage guidance notes in consultation with the Environment Agency and the Lead Local Flood Authority.

Foul drainage

- 2.11.3.26 Foul drainage will be collected in one of the following ways:
- mains connection discharge to a local authority sewer system, if available; or
 - septic tank located within the onshore LSS boundary.
- 2.11.3.27 The preferred method for controlling foul waste will be determined during detailed design and will depend on the availability and cost of a mains connection and the number of visiting hours staff that will attend the site.

Lighting

- 2.11.3.28 Construction site lighting will only operate when required and will be positioned and directed to avoid unnecessary illumination to residential properties, sensitive ecological receptors and footpath users, and minimise glare to users of adjoining public highways. The Applicant has made a commitment (CoT25 of **Volume 1, Annex 4.1: Commitments Register, of the PEIR**) that an Outline Construction Artificial Light Emissions Management Plan, forming part of the Outline CoCP, will be prepared and submitted as part of the application for the development consent. It will cover details of the location, height, design and luminance of construction site lighting, which will be designed in accordance with the latest relevant available guidance and legislation.
- 2.11.3.29 The use of lighting for operation and security would be minimised. Operational lighting requirements at the onshore LSS may include:
- low level lighting to illuminate warning signs associated with electrified fences and gates;
 - security lighting around perimeter fence of the onshore LSS platform, to allow CCTV coverage;
 - car park lighting – standard car park lighting, which may be motion sensitive; and
 - repair/maintenance – task related flood lighting may be necessary on a very infrequent basis.

2.11.4 Alternating Current (AC) connection cable corridor

- 2.11.4.1 The connection between the proposed onshore LSS and the existing National Grid Hawthorn Pit Substation will be achieved by the AC connection cables. It is currently anticipated that up to four HVDC cable circuits containing a total of twelve power cores, four earth continuity conductors and eight fibre optic / control cables are required. AC connection cables will be installed in up to four separate trenches (one circuit per trench) and the Applicant has made a commitment (CoT27 of **Volume 1, Annex 4.1: Commitments Register, of the PEIR**) that the AC connection cables will be

completely buried underground for the entire length. To allow for adequate protection and avoid landowner disturbance, the AC connection cables will be buried at least 1 m from ground level.

- 2.11.4.2 As shown in **Figure 2-5**, the AC connection cables will be located along the AC connection cables corridor within the MHPGC PEIR Red Line Boundary: Onshore. Additional above ground infrastructure, such as circuit breaker compounds, may be required within the AC connection cable corridor in proximity to the existing National Grid Hawthorn Pit Substation.
- 2.11.4.3 The design envelope for the AC connection cables is set out in **Table 2-19**. It presents the design envelope for the Blue onshore LSS Option, which constitutes the realistic worst-case due to longer cable corridor, larger cable corridor width and thus area of temporary land-take required, when compared to the Green onshore LSS Option.

Table 2-19: Design Envelope (Blue onshore LSS Option) –AC connection cables

Parameter	Design Envelope – up to MDS
Length of AC connection cable route (km)	4.26
Number of AC connection cables	Up to 12 power cores, up to 4 earth continuity conductors and up to 8 fibre optic / control cables
Number of AC connection cable circuits	4
Number of cable trenches	4
Area of AC connection cable corridor (permanent) (m ²)	106,500
Permanent cable corridor width (m)	25
Typical cable trench depth (m)	1.8
Diameter of duct (mm) (excluding trenchless crossing locations)	315
Voltage (kV)	400

- 2.11.4.4 Joint bays and link boxes will be located along the AC connection cables route where sections of the cable will be joined together. Link boxes are smaller pits compared to joint bays, which house equipment used for cable sheath bonding, earthing and testing associated with the AC connection cables. Link are typically located underground but can also locate as an above ground structure, comprising an accessible chamber or enclosure designed to provide access during the operation and maintenance phase.

- 2.11.4.5 The associated design envelope is shown in **Table 2-20**.

Table 2-20: Design Envelope (Blue onshore LSS Option) – joint bays and link boxes for AC connection cables

Parameter	Design Envelope – up to MDS
Joint bays	
Number of joint bays	32
Minimum distance between joint bays for AC connection cables (m)	500
Size of joint bay for AC connection cables (surface area) (m ²), per joint bay	25
Link boxes	
Number of link boxes	32
Minimum distance between link boxes for AC connection cables (m)	500

Parameter	Design Envelope – up to MDS
Size of link box for AC connection cables (m2), per link box	6.25

2.11.5 Construction of the onshore components of the MHPGC Project

Pre-construction surveys

2.11.5.1 Pre-construction site investigation surveys will likely be required , potentially covering:

- topographic surveys;
- ecological surveys to update the EIA baseline and support any necessary protected species mitigation licence(s) that may be required;
- ground investigations (e.g. geotechnical and ground stability surveys);
- soil surveys;
- land drainage surveys; and
- targeted archaeological excavations to verify findings of the EIA process.

2.11.5.2 All surveys will be carried out in line with current industry best practice and relevant guidance.

Site preparation activities along the onshore export cable and AC connection cable corridors

Temporary access

- 2.11.5.3 Temporary construction access points will be required from the public highway to the onshore export cable and AC connection cable corridors as well as to construction compounds. New temporary highway access points will be established to facilitate construction machinery and delivery vehicles to access the work areas from the highway.
- 2.11.5.4 The access points will be constructed in line with Durham County Council's requirements as the relevant highway authority
- 2.11.5.5 To reduce the number of Heavy Good Vehicles (HGVs) travelling on the public highway, the onshore export cable corridor and AC connection cable corridor will require one temporary haul road. The haul road will be constructed early in the construction programme and will be used where needed throughout the installation of the onshore export cable corridor and AC connection cable corridor.
- 2.11.5.6 The haul road will be a maximum of 8m wide (excluding passing places) made up of permeable gravel aggregate (at an average 0.5m in depth) with a geotextile or protective matting on the surface. The temporary haul road may also require temporary watercourse crossings. In this case, temporary culverts or bridges of up to 10m long x 6m wide x 5m high may be provided.

Temporary construction compounds

- 2.11.5.7 Temporary construction compounds will be established early in the programme. Main and secondary construction compounds are planned to serve the installation of onshore export cables and AC connection cables.
- 2.11.5.8 The main compounds will operate as a central base for the onshore construction works and will house the central site offices, welfare facilities, car parking spaces, as well as acting as a staging post and secure storage for equipment and component deliveries. Meanwhile, secondary compounds are smaller satellite compounds providing additional welfare facilities and localised material storage spaces. Temporary construction compounds will be prepared by removing and storing topsoil and subsoil and then constructing hardstanding areas using crushed stone. Perimeter fencing will be erected around each compound where required. All construction compounds will be removed, and sites reinstated to their original condition once construction has been completed.
- 2.11.5.9 The maximum design parameters for the temporary compounds along the onshore export cable and AC connection cable corridors are shown in Table 2-21.

Table 2-21: Design Envelope – temporary construction compounds along the onshore export cable corridor and AC connection cable corridor

Parameter	Design Envelope – up to MDS
Number of main compound(s)	2 (one each to the east and west of the A19)
Main compound size (m ²)	70,000
Number of secondary compound(s)	6
Secondary compound size (m ²)	10,000
Duration (all compounds) (months)	42

2.11.5.10 Temporary construction compounds will also be required where HDD or other trenchless techniques is used for crossing existing assets (see **paragraphs 2.11.6.12 – 2.11.6.16**). Major trenchless technique operations will require a compound to contain the drilling rig, equipment and the drill entry pit. However, most compounds for these trenchless crossings will be located at either side of the crossing and within the temporary working corridor.

Temporary drainage

2.11.5.11 Temporary drainage will be installed beneath the hardstanding of temporary construction compounds and haul roads, which will channel surface water away from compacted ground, reducing the likelihood of flooding and soil erosion and in turn keeping the temporary construction compounds and haul roads stable.

Site preparation activities and construction of the onshore LSS

2.11.5.12 An overview of the key construction activities is provided below and the maximum design parameters for the onshore LSS construction are presented in **Table 2-22**.

Table 2-22: Design Envelope – construction of onshore LSS

Parameter	Design Envelope – up to MDS
Temporary construction footprint of the onshore LSS (m)	70,000
Temporary works (laydown and storage) area for the onshore LSS (m)	35,000
Number of construction equipment	15-20, including but not limited to piling rigs, cranes, concrete mixers, telehandlers, roller compactors, rebar benders, dozers, excavators, graders, forklifts, self-propelled modular transporters, tractor and trailers, mobile elevating work platforms, dumpers, tipper trucks.
Indicative construction duration (months)	54

Temporary access

2.11.5.13 It is anticipated that the proposed permanent access route(s) to the onshore LSS will be used for access to the onshore LSS works area during the construction phase, albeit a temporary surface may be used.

2.11.5.14 Additional temporary access may be required for the construction of the onshore LSS. Where access is needed to be created from existing highway network, these access routes will have to be put in place at an early stage of the construction programme.

Temporary construction compounds

2.11.5.15 Temporary construction compounds will be established to support the construction of the onshore LSS. The construction compounds will provide offices, welfare facilities, soil and material storage, storage of plant and equipment and parking for construction staff.

2.11.5.16 In order to establish the temporary construction compounds, the topsoil will be stripped and stored, and any areas of hardstanding will be formed. Areas of hardstanding may be created for car parking and access points. Water, sewerage and electricity services will be supplied either via mains connection or mobile services such as bowzers, septic tanks and generators. Security fencing and lighting will be required at the compounds; task lighting may also be required during working hours in the winter months. Construction activities will be undertaken in accordance with the measures provided in the detailed Code of Construction Practice(s) (CoCP(s)), an outline for which will be submitted with the application for development consent.

Grading and earthworks

2.11.5.17 To install the working platform for the onshore LSS, a cut and fill operation may be required (i.e. excavated material may be used to create a level site for substation construction after foundation installation). The extent of cut and fill required will be confirmed as the design progresses.

2.11.5.18 The construction footprint will first be stripped of all organic matter and loose rock. Any waste or unsuitable material encountered will be removed as required by the environmental and geotechnical investigations. Once the surface has been cleared, the grading operation will begin. Stripped soils will be stockpiled and managed in accordance with the Construction Code of Practice for the Sustainable Use of Soils on Construction Sites (PB13298) or the latest equivalent guidance. Any suspected or confirmed contaminated soils will be appropriately separated, contained and tested before removal, if required.

2.11.5.19 If a balance between the earthwork quantities for cut and fill is proven impossible or impractical to achieve, it would be necessary to either export excess soil or import new fill soil. Any soil exported will be disposed of at a licensed disposal site. Excavations of foundations and service trenches will commence following the completion of grading.

Electrical connection

2.11.5.20 The electrical equipment will be installed and tested before being connected to the array assets and the National Grid Hawthorn Pit Substation (i.e. the hot commissioning phase). Once the construction of the onshore LSS is completed, the site will be secured, and the supporting infrastructure finalised in readiness for hot commissioning phase and under strict rules of entry. The temporary works (laydown and storage) area will be demobilised and the area reinstated.

2.11.6 Installation of onshore export cable and AC connection cable corridors

2.11.6.1 Installation of the onshore export cables and AC connection cables is anticipated to be undertaken in the following broad sequence. However, some sequencing may differ once the principal contractor(s) is appointed and at detailed design.

- Completion of any pre-construction surveys and any site preparation activities (see **section 2.11.5**), including the following:
 - ecological mitigation (for instance, hedgerow removal or creation of mitigation badger setts);
 - establishment of construction compounds and new access points from the highway where required;
 - installation of fencing around the construction areas; and
 - site preparation works, installation of pre-construction drainage, topsoil removal and storage, establishment of temporary compounds, installation of temporary haul roads;
- trenchless technique installation works at identified locations;
- Trench excavation works, installation of backfill materials and protective tape;
- Backfilling of trench to subsoil level;
- Excavation and construction of joint bays along the route;

- Installation of power and fibre optic cables between joint bays and installation of link boxes and inspection covers;
- Jointing together of cables at joint bay locations;
- Installation of post-construction drainage, removal of haul roads, removal of temporary compounds and fencing;
- Replacement of topsoil along the onshore export cable corridor and reinstatement to previous land use;
- Removal of temporary access points and planting of any sections of replacement hedgerow; and
- Removal/ reinstatement of construction compounds.

2.11.6.2 Further details of onshore environmental management measures provided in **section 2.13**.

Cable route installation

- 2.11.6.3 Cable circuits will be installed using open trenching methods primarily. Where open trenching is used, topsoil and subsoil will be removed from the trench and stored next to the trench (topsoil and subsoil stored separately) within the temporary working corridor.
- 2.11.6.4 The trenches will be excavated using a mechanical excavator or trencher. Each trench would have a typical depth of approximately 1.8m to the bottom of the trench. This burial depth may be exceeded where the route crosses features, such as pipelines and land drains, and it may vary according to ground conditions.
- 2.11.6.5 The onshore export cables and AC connection cables may be installed into the open trench through laying the cables within the open trench directly or installing cable ducts into the open trench with specialised backfill material that ensures a consistent structural and thermal environment for the cables.
- 2.11.6.6 Protective tiles and warning tape will be installed in the trenches above the cables to ensure the cables are not damaged by any third party.
- 2.11.6.7 Once the cables are installed, the trenches will be backfilled with the excavated material; first with the subsoil, followed by the topsoil and the land reinstated back to its previous use.
- 2.11.6.8 If cable ducts are used to install the onshore export cables and AC connection cables, following installation of the ducts and backfilling of the trenches, the cables will be pulled through the ducts from the joint bays. This may require the use of a temporary cable pulling pad adjacent to the joint bays (for example, in the event of bad weather).
- 2.11.6.9 The temporary onshore export cable corridor and AC connection cable corridor during construction are anticipated to have a maximum width of 40m and 100m respectively. The design envelope for the onshore cable installation is provided in **Table 2-23**.

Table 2-23: Design Envelope – onshore cable installation

Parameter	Design Envelope – up to MDS	
	Onshore export cable corridor	Onshore AC connection cable corridor
Number of cable trenches	2	4
Trench width at base per circuit (m)	1.8	2.8
Trench width at top per circuit (m)	3.8	4.8
Typical cable trench depth (m)	1.8	1.8
Depth of stabilised backfill (mm)	450	450

Parameter	Design Envelope – up to MDS	
	Onshore export cable corridor	Onshore AC connection cable corridor
Area of construction cable corridor (temporary including permanent) (m ²), blue Onshore LSS Option	426,000	193,200
Width of construction cable corridor (temporary including permanent) (m)	40	100

2.11.6.10 Dewatering of trenches may be required. This will require a pump. In the event that trenches need dewatering, water from such activities will be discharged in agreement with Durham County Council (as the Lead Local Flood Authority (LLFA)) and/or the Environment Agency to a local drainage ditch or watercourse and/or spread over ground in controlled manner.

2.11.6.11 **Diagram 2-4** and **Diagram 2-5** show the indicative cross section for the temporary construction corridor of the onshore export cables and AC connection cables respectively.

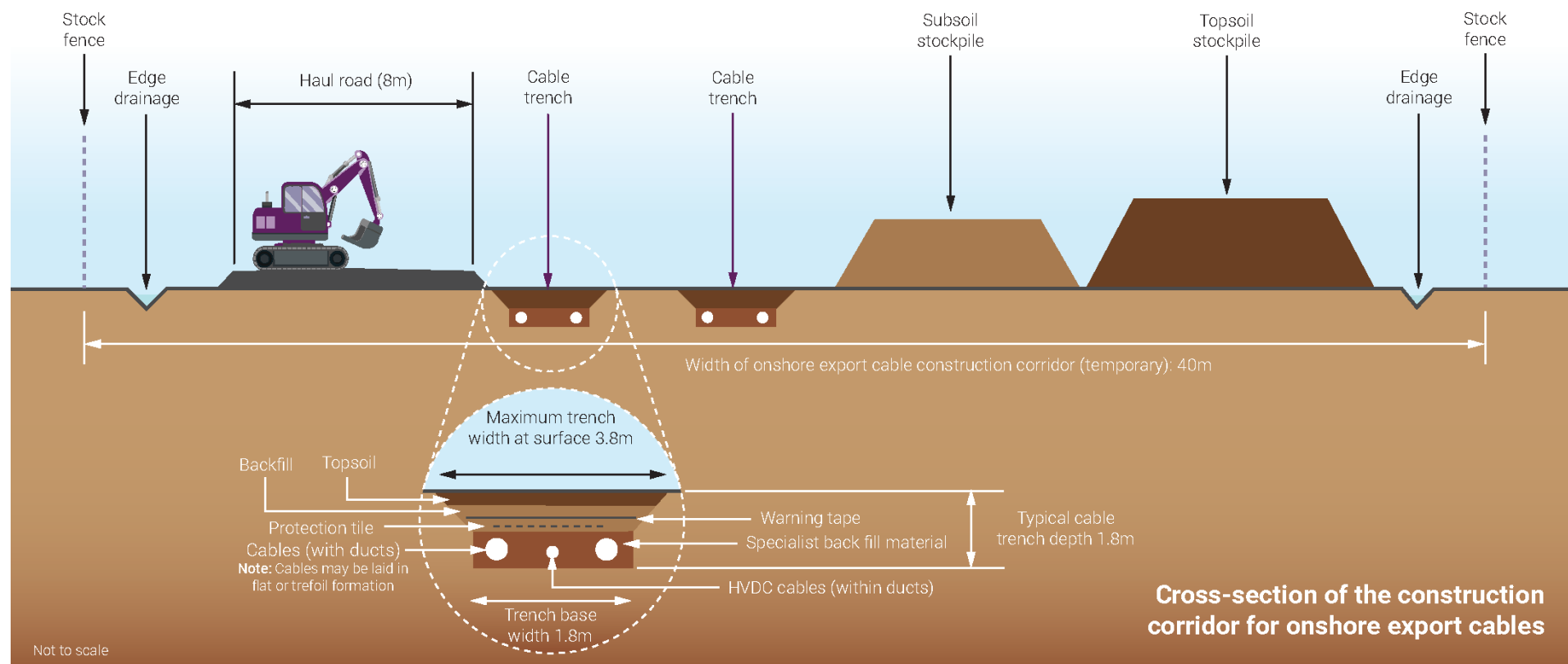


Diagram 2-4: Indicative temporary cable corridor cross section

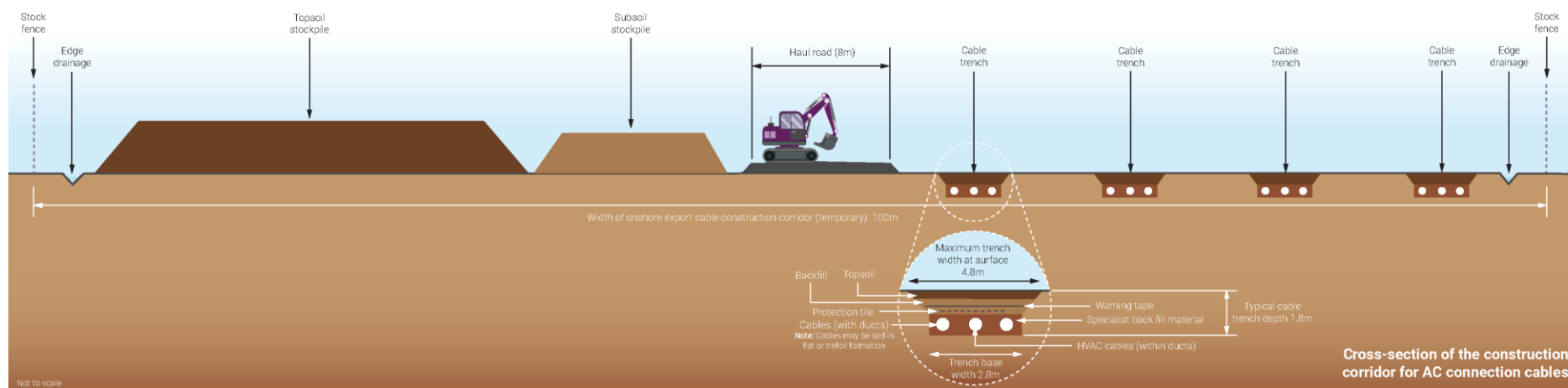


Diagram 2-5: Indicative temporary cable corridor cross section

Crossings and trenchless techniques

- 2.11.6.12 The onshore export cable and AC connection cable corridors will cross existing infrastructure and obstacles, such as roads, built areas and watercourses. Wherever practical, these key crossings will be undertaken using HDD or other trenchless techniques such as auger boring, direct pipe or micro-tunnelling.
- 2.11.6.13 Trenchless crossing techniques involve drilling underneath the obstacle. Every trenchless drilling depth will be dependent on the feature being crossed, the asset owner requirements and the localised geology, which will be assessed and determined during detailed design. The drilling is commenced from an entry pit, extending beneath the obstacles until it punches out at the desired exit location. This will create a conduit suitable for the installation of the onshore export cables or AC connection cables. The conduit may be installed either concurrently with the drilling process or following completion of the trenchless bore, depending on the trenchless technique adopted. The onshore export cable or AC connection cables will then be pulled through the conduit using pulling equipment for installation.
- 2.11.6.14 During the drill process, bentonite and/or polymer fluids is pumped to the drilling head to stabilise the bore and ensure that it does not collapse. The Applicant has made a commitment (CoT47 of **Volume 1, Annex 4.1: Commitments Register, of the PEIR**) that an Outline Bentonite Breakout Plan will be submitted as part of the application for development consent. A Detailed Bentonite Breakout Plan will be developed substantially in accordance with the outline plan.
- 2.11.6.15 The Applicant has made a commitment (CoT51 of **Volume 1, Annex 4.1: Commitments Register, of the PEIR**) that an Onshore Crossing Schedule will be submitted with the application for development consent based on the refined design for the application. At the current stage, it is understood that the following features will be crossed using trenchless techniques:
- A, B and Classified unnumbered roads (known as C roads) (including the A19 and B1432);
 - all railway lines (including the section of railway line which runs between Seaham and Horden);
 - the Durham Coast SSSI and SAC; and
 - Hesledon Moor East SSSI.
- 2.11.6.16 **Table 2-24** provides the maximum design parameters for the onshore trenchless crossings.

Table 2-24: Design Envelope – onshore trenchless drill

Parameter	Design Envelope – up to MDS
Number of trenchless drill compounds	6 (3 entry and 3 exit trenchless drill compounds)
Temporary Trenchless drill compound size (m ²)	6,000
Trenchless drill entry pit indicative dimensions (m)	Length: 8 Width: 5 Depth: 3.5
Trenchless drill exit pit indicative dimensions (m)	Length: 8 Width: 5 Depth: 3.5

2.11.7 Reinstatement

- 2.11.7.1 Once the installation of the cable routes is completed, the temporary haul roads will be removed and the ground reinstated using stored subsoil and topsoil. All temporary construction compounds and temporary fencing will be removed, field drainage and/or irrigation will be reinstated. Where practicable consideration will be given to early restoration of the cable route section by section when installation is completed.

- 2.11.7.2 Hedgerows will be replanted using locally sourced native species, where practicable. Suitably qualified and experienced contractors will be used to undertake the reinstatement, which will be based on restoring the hedge to match the remaining hedgerow at each location. Where appropriate, enhancement (such as planting of additional suitable species) may be undertaken.
- 2.11.7.3 Joint bays will be completely buried, with the land above reinstated. Manhole covers will be provided on the surface for access to link boxes (for AC connection cables) and monitoring boxes (for onshore export cables) during the operation and maintenance phase.

2.12 Connection to National Grid Hawthorn Pit Substation

- 2.12.1.1 The AC connection cables will be connected to the National Grid Hawthorn Pit Substation. As shown in **Figure 2-6**, the grid connection area required to undertake the electric works to connect to the National Grid Hawthorn Pit Substation is located within the MHPGC PEIR Red Line Boundary: Onshore.
- 2.12.1.2 Installation of the AC connection cables within the grid connection area will take place in the same manner as the onshore export cable corridor and AC connection cable corridor (see **section 2.11.6**). The AC connection cables will be installed and connected to the National Grid Hawthorn Pit Substation, approaching the final connection point either by open cut or trenchless installation techniques.
- 2.12.1.3 Connection to National Grid Hawthorn Pit Substation could include the installation of electrical infrastructure such as busbar circuit breakers, disconnectors, earth switches, current and voltage transformers, surge arresters, post insulators, cable sealing ends, steel structures, AC connection cable connection protection systems, marshalling building/room, marshalling cabinets/units and electrical earthing. The electrical infrastructure is proposed to be in an open yard style, in combination with a marshalling building which will house marshalling and electrical equipment.
- 2.12.1.4 The diversion of and connection to existing services and electrical cables and equipment may also be required to facilitate the connections. This includes provision of auxiliary electrical suppliers from existing supplies.
- 2.12.1.5 Temporary construction compound(s) may also be required at the grid connection area to undertake the electrical works to connect to the National Grid Hawthorn Pit Substation.

2.13 Landfall and onshore construction environmental management

2.13.1 Introduction

- 2.13.1.1 The landfall and onshore components of the MHPGC Project will be constructed in an environmentally sensitive manner. All works will comply with the applicable legislation, standards and codes of practice identified in the topic chapters of the PEIR and every reasonable effort will be made to minimise impacts on the local community and environment.
- 2.13.1.2 At this stage, details of all proposed commitments proposed for the MHPGC Project are provided in **Volume 1, Annex 4.1: Draft Commitments Register, of the PEIR**, and those directly relevant to this chapter are provided in **section 2.7**.

2.13.2 Code of Construction Practice

- 2.13.2.1 Any construction activities associated with the landfall and onshore components of the MHPGC Project and located landward of MHWS will be undertaken in accordance with the measures provided in the CoCP. The Applicant has made a commitment (CoT18 of **Volume 1, Annex 4.1: Commitments Register, of the PEIR**) that an Outline CoCP will be prepared and submitted with the application for development consent. Detailed CoCP will be developed substantially in accordance with the Outline CoCP. The Outline CoCP will include (but is not limited to) measures to maintain and address:
- flood protection and control measures;
 - water environment and drainage;
 - noise and vibration management measures;

- air quality and dust management;
- pollution prevention and management;
- geology and ground conditions;
- soil and materials management;
- land use, tourism and recreational assets; and
- waste management.

2.13.3 Traffic movements

2.13.3.1 The Applicant has made a commitment (CoT41 of **Volume 1, Annex 4.1: Commitments Register, of the PEIR**) that an Outline Construction Traffic Management Plan (CTMP) will be prepared and submitted with the application for development consent. A detailed CTMPs will be developed substantially in accordance with the Outline CTMP prior to construction. The Detailed CTMP will set out measures to include (but not limited to):

- managing the numbers, timing and routeing of Heavy Goods Vehicles (HGVs) during the construction phase;
- managing the movement of construction worker traffic during the construction phase;
- details of any traffic management measures necessary to ensure the safe passage of construction traffic via the local highway network; and
- details of localised road improvements if and where these may be necessary to facilitate safe use of the existing road network.

2.14 Landfall and onshore construction working hours

2.14.1.1 The Applicant has made a commitment (CoT03 of **Volume 1, Annex 4.1: Commitments Register, of the PEIR**) that core working hours for the construction of the landfall and onshore components of the MHPGC Project will be as follows:

- Monday to Friday: 07:00–19:00 hours;
- Saturday: 07:00–13:00 hours; and
- up to one hour before and after core working hours for mobilisation ('mobilisation period'), i.e. 06:00–20:00 weekdays and 06:00–14:00 Saturdays.

2.14.1.2 In circumstances outside of core working practices, specific activities may need to be undertaken outside the core working hours. For example, during cable pull-in activities at the landfall, it is likely there will be a need to undertake these activities outside of core working hours to make use of the available tidal windows and to ensure the cable is protected at all times prior to burial and re-instatement. This could also apply to other specific activities, such as for the maintenance of dewatering pumps; activities related to the completion of concrete works at the onshore LSS; or at landfall and specific onshore cable crossing locations where drilling activity will be undertaken to apply the trenchless techniques. Advance notice of undertaking works outside of the core working hours will therefore be given to the relevant planning authority.

2.14.1.3 The instances where 24-hour working may be required would relate to specific activities (e.g. trenchless drilling, duct/tunnel installation and cable pull-ins) at specific locations of the onshore and landfall route (e.g. where there may be more constraints, such as challenging ground conditions or working conditions). 24-hour working would not be employed for routine construction activities.

2.15 Onshore biodiversity net gain, enhancement and/or mitigation areas

2.15.1.1 The Applicant aims to mitigate for effects on habitats arising as a result of the MHPGC Project and to deliver biodiversity net gain, where practicable. Area identified through the iterative EIA process to date as potentially suitable for net gain, enhancement and/or mitigation is shown in **Figure 2-7**.

- 2.15.1.2 The Applicant has made a commitment (CoT57 of **Volume 1, Annex 4.1: Commitments Register, of the PEIR**) that an Outline Biodiversity Gain Plan will be prepared and submitted with the application for development consent. It will include details of the MHPGC Project's assessment and the measures proposed to secure and deliver the project's statutory Biodiversity Gain objective. A Detailed Biodiversity Gain Plan will be developed substantially in accordance with the outline plan.

2.16 Operation and maintenance (O&M) activities

2.16.1 Offshore O&M activities

- 2.16.1.1 The Applicant has made a commitment (CoT07 of **Volume 1, Annex 4.1: Commitments Register, of the PEIR**) that an Outline Offshore Operations and Maintenance Plan will be prepared and submitted as part of the application for development consent and as part of the Marine Licence application(s) to the Scottish Ministers. A Detailed Offshore Operations and Maintenance Plan will be produced substantially in accordance with the outline plan, prior to entering the O&M phase.
- 2.16.1.2 **Table 2-25** provides a description of the reasonably foreseeable planned and unplanned O&M activities associated with the offshore export cables, as well as the maximum design parameters of these activities.

Table 2-25: Design Envelope - offshore operations and maintenance activities

Offshore O&M activities	Description	Design Envelope – up to MDS
Routine inspections	Routine inspections of the offshore export cables will be undertaken to ensure the cables are buried to a safe depth and are not exposed. These inspections will also assess the integrity of the cables and cable protection systems.	Up to 140 routine inspections (4 per year across the offshore export cable corridor) over the lifetime of the MHPGC Project.
Routine geophysical surveys	Routine geophysical surveys will be undertaken to examine the condition of the seabed and record the final position of the offshore export cables so it can be shared with any relevant stakeholders. It is assumed that for each survey the duration would be up to 6 weeks focused on specific areas of concern.	Up to 140 post-installation surveys (4 per year across the offshore export cable corridor) over the lifetime of the MHPGC Project.
Offshore export cable remediation (subtidal and intertidal)	Remediation of offshore export cables may be required where cables have become exposed via natural sediment transport processes. Routine geophysical survey data will first be examined to identify areas that may require remedial burial. A multibeam sonar (or comparable survey method) will then verify the precise location of the cable, present burial depth and/or areas of exposure. Where any areas of exposed or insufficiently buried cables are identified, they will be remediated by re-burying the cables to the desired burial depth using suitable re-burial tooling such as but not limited to, ploughing tools, trenching equipment or jetting tools, as appropriate. Remediation may also involve rock placement, specifically at locations of previous rock placement where the cable protection is no longer in place to the required specification. After the intervention, a follow-up seabed survey will be conducted to assess whether the target depth has been achieved. If necessary, another pass may be required to achieve the specified depth. All burial results will be documented and only once all remedial works have been agreed will the vessel and associated equipment depart the site for demobilisation.	Up to 35 remedial burial events over the lifetime of the MHPGC Project. Up to 26 km of offshore export cables (or up to 4% of the total cable route length) may be subject to remediation re-burial, per remedial burial event.

Offshore O&M activities	Description	Design Envelope – up to MDS
Offshore export cable repairs	The MHPGC Project cable monitoring system will flag any cable failures. Once a fault is detected, the affected export cable may have to be exposed prior to recovery where testing will be conducted to determine the extent and type of repair required. For the purposes of the MDS, it is assumed that every repair will necessitate full cable re-burial.	Up to 41 cable repair events (up to 2 km per repair event) totalling up to 82 km of repair over the lifetime of the MHPGC Project.

2.16.1.3 **Table 2-26** set out the maximum number of O&M vessels required and the total number of round trips anticipated for each O&M activities throughout the O&M phase of the MHPGC Project.

Table 2-26: Design Envelope – offshore operations and maintenance vessel numbers and movements

Offshore O&M activities	Maximum vessel requirements	Maximum number of return trips (total across the O&M phase)
Routine inspections	Up to 2 inspection/survey vessels on site at any one time	420
Routine geophysical surveys	Up to 4 uncrewed surface vessels (USV) and 1 GV on site at any one time	1,100
Offshore export cable remediation	Up to four O&M vessels on site at any one time, comprising a combination of construction support vessel (CSV) and/or Service Operation Vessels (SOV) and/or guard vessel and/or rock dump vessels and/or CTVs/workboats.	2,170
Offshore export cable repairs	Up to four operation and maintenance vessels on site at any one time, comprising a combination of CLV and/or barge and/or Barge Handlers/Tugs and/or Jack-Up and/or CSV and/or CTV and/or Rockdump.	245

2.16.2 Landfall and onshore operation and maintenance activities

2.16.2.1 This section summarises the reasonably foreseeable planned and unplanned O&M activities for the landfall and onshore components of the MHPGC Project. The final landfall and onshore O&M strategy will be confirmed once the technical specifications of the MHPGC Project are known.

TJB(s) and related monitoring boxes at landfall

2.16.2.2 It is not expected that the TJB(s) at the landfall will need to be assessed during the O&M phase. However, any related monitoring boxes will be fitted with manhole covers to allow for access for inspection. Access to these monitoring boxes is expected on an annual basis although this is typically determined by the Offshore Transmission Owner (OFTO). The export cables will also be monitored remotely to determine if and where corrective activities may be required. The TJB(s) are only expected to require access in the event of a cable failure or fault resulting in replacement or repair.

Routine inspections/monitoring of onshore export cables and AC connection cables

2.16.2.3 The condition of the onshore export cables and the AC connection cables will be monitored remotely, with occasional site visits for inspections and reactive maintenance. Potential corrective works may include re-terminating joints, performing partial-discharge or other diagnostic tests and, if a cable fails, pulling in a replacement length or applying an alternative repair method.

2.16.2.4 Monitoring boxes (for the onshore export cables) and link boxes (for the AC connection cables) will be inspected and cleaned on a scheduled basis to:

- verify structural integrity and effective drainage (i.e. no water ingress);
- check for evidence of animal or vegetation intrusion; and
- visually examine the cable joints, supplemented as required by thermography, insulation-resistance measurements and sheath testing.

2.16.2.5 Access to monitoring boxes and link boxes is expected on an annual basis although this is typically determined by the OFTO. Meanwhile, joint bays are only expected to require intrusive access in the event of a cable failure or fault resulting in replacement or repair.

Onshore LSS

2.16.2.6 During the O&M phase, monthly day visit inspections, quarterly detailed inspections/non-intrusive work and annual turnaround/shutdown will be scheduled for the onshore LSS. Activities associated with planned operation and maintenance of the onshore LSS will include, but are not limited to, convertor valve inspections, cooling system maintenance, control and protection system function testing and maintenance, convertor transformer inspection and maintenance, AC and DC high voltage electrical equipment maintenance, SF6 handling, inspection and maintenance, building and ancillary service maintenance, earthing and lightning protection inspections, drainage system checks and emptying, structural inspections, emergency drills/technician training..

2.16.2.7 Vehicle movements associated with planned operation and maintenance of the onshore LSS are expected to operate only during the daytime and evening periods (i.e. 07:00 – 19:00). Vehicle movements may be subject to unscheduled events outside these hours but will occur only in response to unscheduled events or emergencies.

2.17 Decommissioning

2.17.1.1 At the end of the operational lifetime (assumed to be 35 years), the MHPGC Project may be decommissioned. Closer to the decommissioning date, detailed decommissioning plans will be developed in line with the regulations, requirements, guidance and best practice relevant at that time.

2.17.2 Offshore

2.17.2.1 The Applicant has made a commitment (CoT44 of **Volume 1, Annex 4.1: Commitments Register, of the PEIR**) that an Offshore Decommissioning Programme will be developed and submitted to the MMO and MD-LOT prior to the commencement of any offshore construction. It will be in line with the latest relevant legislation and available guidance at the time of production, as far as reasonably practicable. The decommissioning sequence will generally be the reverse of the construction sequence and involve similar types and numbers of vessels and equipment.

2.17.2.2 The current preferred approach to the decommissioning of offshore export cables is that they would be left *in situ*; however, a future scenario could exist where they may be retrieved and, if retrieved, would be disposed of, or recycled, in line with latest relevant legislation and guidance at the time. This is because although the offshore export cables could technically be extracted by reversing their installation, this may not always represent the least disruptive or most environmentally beneficial option. The same principle applies to cable protection measures (e.g. rock placement, concrete mattress). These items can also be removed in theory, yet leaving them *in situ* could, in many cases, have a lower environmental impact. The removal of cables and cable protection measures has been assessed in relevant chapters in **Volume 2 of the PEIR** where this represents the realistic worst-case scenario for that topic.

2.17.2.3 At this time, it is difficult to foresee what techniques would be used to remove the offshore export cables and cable protection during decommissioning. However, it is likely that equipment similar to that which is used to install the cables and cable protection could be used to reverse the burial process. Therefore, if the offshore export cables and cable protection are to be removed during decommissioning, the area of seabed impacted is likely to be the same as the area impacted during their installation.

2.17.3 Landfall and intertidal

- 2.17.3.1 At this time, it is difficult to determine whether it may be best to remove the offshore export cables from the intertidal environment. To minimise environmental and other disturbance, it may be preferable to leave the offshore export cables *in situ* with the cable ends cut, sealed and securely buried. Alternatively, full or partial removal of the cables may be undertaken.
- 2.17.3.2 Partial removal may be undertaken by pulling the cables back out of the ducts/pipes, to recover the copper and/or aluminium and steel within them. Where recycling or disposal may be necessary, this would be undertaken in accordance with the latest guidance, legislation and policy at the time.

2.17.4 Onshore

- 2.17.4.1 The Applicant has made a commitment (CoT16 of **Volume 1, Annex 4.1: Commitments Register, of the PEIR**) that an Onshore Decommissioning Plan will be developed prior to decommissioning. It will include provisions for the removal of all onshore above ground infrastructure and the decommissioning of below ground infrastructure (if and where relevant and practicable), and details relevant to flood risk, pollution prevention, protection of soils and avoidance of ground disturbance. The Onshore Decommissioning Plan will be in line with the latest relevant legislation and available guidance at the time of production, as far as reasonably practicable.

Onshore export cables and AC connection cables

- 2.17.4.2 The current preferred approach to the decommissioning of onshore export cables and AC connection cables is that they would be left *in situ*. This is because leaving the cables in place has negligible environmental impact whilst excavation and removal would disturb the local environment.
- 2.17.4.3 Joint bays, monitoring boxes (for onshore export cables) and link boxes (for AC connection cables) will be removed only if it is feasible with minimal environmental disturbance or if their removal is required to return the land to its current agricultural use.

Onshore LSS

- 2.17.4.4 De-construction of the onshore LSS will follow the reverse order of construction, once it has been taken out of service. All electric equipment will be removed, and any waste arising disposed of in accordance with relevant regulations and where applicable any legislative requirements at the time. Foundations will be broken up and the site re-instated, or alternately re-purposed for another use. Where alternate uses may be explored, these may be subject to additional relevant consents and licenses at the time. For the purposes of EIA, decommissioning of the onshore LSS is assumed to be similar to the construction and in reverse sequence.

2.18 Security

- 2.18.1.1 The MHPGC Project will be appropriately secure throughout all phases of the development to ensure the safety and security of all personnel working on the MHPGC Project and the integrity of the electricity supply to National Grid. All above ground onshore infrastructure, such as the onshore LSS and any active construction areas, will be enclosed within secure compounds. The onshore export cables and AC connection cables will be buried and will not be readily accessible from the surface.

2.19 Quality, health, safety and environment

- 2.19.1.1 Every part of the MHPGC Project will be risk assessed in line with relevant Government guidance and the Applicant's internal best-practice standards. Findings of the risk assessments will then form the basis of the methods and safety mitigations applied throughout the MHPGC Project lifecycle.
- 2.19.1.2 The Applicant has a focus on employee safety culture in order to avoid incidents and accidents. There will be constant controls to ensure that safety measures are followed and that the Applicant has built a safe workplace for its employees and contractors. The focus on quality, health, safety and the environment is intended to give everyone a highly controlled and safety-driven environment to work.

2.20 Major accidents and disasters

2.20.1.1 The EIA Regulations stipulate that, where relevant, the potential for significant effects to arise from the vulnerability of a project to major accidents and disasters and the risk of major accidents and/or disasters needs to be considered.

2.20.1.2 'Major accidents' and 'disasters' are defined in accordance with 2020 ISEP (formerly IEMA) guidance as:

- 'major accidents': uncontrolled events that threaten serious environmental effects and require resources beyond the control of the Applicant; and
- 'disasters': natural or man-made hazards with the potential to cause an event that threatens serious environmental effects.

2.20.1.3 Significant effects that could realistically arise as a result of the MHPGC Project in relation to major accidents and disasters broadly include:

- the potential significant effects of the MHPGC Project on the environment, deriving from its vulnerability to risk of relevant major accidents and/or disasters;
- the potential significant effects of the MHPGC Project interacting with any sources of external hazards; and
- the potential significant effects of an external major accident and/or disaster and risk of the MHPGC Project's existence on an environmental receptor or resource.

2.20.1.4 However, as a topic, major accidents and disasters was scoped out within the MHPGC Project Scoping Report, and further justification/details can be found in that report (RPS, 2025). The Scoping Opinion from PINS confirmed that a dedicated chapter on major accidents and disasters is not required as any related risks will be evaluated within the pertinent technical chapters (PINS, 2025b, see Section 6, Table 6.1, ID 6.1.3).

2.20.1.5 Therefore, the PEIR applies PINS's advice and the requirements of the EIA Regulations by evaluating accident and/or disaster related risks during construction, O&M and decommissioning as part of relevant individual topic chapters. In particular the following effects have been identified within specific chapters of the PEIR:

- risks of anchor or fishing gear snagging (**Volume 2, Chapter 8: Shipping and Navigation, of the PEIR**);
- increased likelihood of vessel collisions (**Volume 2, Chapter 8: Shipping and Navigation, of the PEIR**);
- reduction in under-keel clearance (**Volume 2, Chapter 8: Shipping and Navigation, of the PEIR**);
- diminished emergency response capability and restricted SAR access (**Volume 2, Chapter 8: Shipping and Navigation, of the PEIR**);
- accidental pollution affecting groundwater quality or quantity (**Volume 3, Chapter 1: Geology, Hydrogeology and Ground Conditions, of the PEIR**);
- accidental pollution affecting surface waters and watercourses (**Volume 3, Chapter 2: Water Resources and Flood Risk, of the PEIR**);
- increased flood risk (**Volume 3, Chapter 2: Water Resources and Flood Risk, of the PEIR**);
- accidental pollution affecting terrestrial ecology & ornithology, intertidal ornithology and nature conservation (**Volume 3, Chapter 3: Terrestrial Ecology and Ornithology, of the PEIR**);
- vulnerability of the MHPGC Project to climate change (**Volume 4, Chapter 4: Climate Change, of the PEIR**);
- safety implications of transporting Abnormal Indivisible Loads (**Volume 3, Chapter 5: Traffic and Transport, of the PEIR**); and

- construction traffic related accident and safety risks (**Volume 3, Chapter 5: Traffic and Transport, of the PEIR**).

2.20.1.6 Risk in relation to construction workers and employees are excluded from the considered major accident and/or disaster related risks given other legislative provisions in place to manage and reduce risk in relation to health and safety which the MHPGC Project would be managed in accordance with ISEP guidance (ISEP, 2020).

2.21 Waste management

2.21.1.1 Waste will be generated by the MHPGC Project, with the bulk of arisings expected during construction and decommissioning phases. In line with Government policy set out in NPS EN-1 (DESNZ, 2025a), consideration will be given to the types and quantities of waste that will be generated.

2.21.1.2 During construction of the onshore export cables and AC connection cables, surplus or waste is expected from every element of the trenches including ducts, cables, excavated soil and thermal backfill. Meanwhile, the MDS for the onshore LSS assumes all excavated soil or rock that cannot be reused as engineering fill will be deemed waste and exported off site, and up to 50,000 m³ of unsuitable material could be generated.

2.21.1.3 Procedures for handling waste materials will be set out in the following plans:

- Outline Offshore Environmental Management Plan (OEMP), which will include provisions for the handling and disposal of waste. The Applicant has made a commitment (CoT06 of **Volume 1, Annex 4.1: Commitments Register, of the PEIR**) that an Outline OEMP will be prepared and submitted with the application for development consent and as part of the Marine Licence application(s) to the Scottish Ministers. A Detailed OEMP will be developed substantially in accordance with the Outline OEMP and submitted and approved by the MMO and MD-LOT.
- Outline Site Waste Management Plan (SWMP), which forms part of the Outline CoCP. It will describe quantities of likely waste type arising from the MHPGC Project and how they will be managed (i.e. reuse, recycling, recovery or disposal). The Outline SWMP will also describe the duty of care requirements and identify potential waste management facilities in the vicinity of the MHPGC Project. The Applicant has made a commitment (CoT45 of **Volume 1, Annex 4.1: Commitments Register, of the PEIR**) that the Outline SWMP will be prepared and submitted with the development consent application. A Detailed SWMP will be developed substantially in accordance with the Outline SWMP, in consideration of the latest relevant available guidance.

2.21.1.4 The OEMP and SWMP will be developed in line with the Contaminated Land: Applications in Real Environments (CL:AIRE) and any latest relevant available guidance.

2.22 Next steps

2.22.1.1 This chapter sets out the design parameters and the proposed installation and construction, operation and maintenance and decommissioning methods assessed within this PEIR.

2.22.1.2 The location and siting of the MHPGC Project has been informed by a site selection and route refinement process, which is set out in **Volume 1, Chapter 3: Site selection and consideration of alternatives of this PEIR**. This process has considered a wide range of environmental constraints as well as technical and commercial factors. The process of site selection and refinement remains ongoing.

2.22.1.3 The design described within this chapter will continue to be refined, taking into account the findings of the ongoing EIA process and engagement with stakeholders. Refined design parameters will be Environmental Statement (ES) and reflected in the draft DCO and Marine Licence applications that will accompany the relevant applications for consent in England and Scotland.

2.23 References

- Contaminated Land: Applications in Real Environments (CL:AIRE) (2025). Definition of Waste: Code of Practice. Available at: <https://claire.co.uk/projects-and-initiatives/dow-cop.html> (Accessed: July 2026).
- Department for Environment, Food & Rural Affairs (Defra). (2009). Construction Code of Practice for the Sustainable Use of Soils on Construction Sites. Available at: <https://assets.publishing.service.gov.uk/media/5b2264ff40f0b634cfb50650/pb13298-code-of-practice-090910.pdf> (Accessed: July 2026).
- Department for Energy Security & Net Zero (DESNZ). (2025a). Overarching National Policy Statement for Energy (EN-1). Available at: <https://assets.publishing.service.gov.uk/media/695d1015f41883f4e50ed9ab/overarching-national-policy-statement-for-energy-en-1-web-accessible.pdf> (Accessed: July 2026).
- Department for Energy Security & Net Zero (DESNZ). (2025b). National Policy Statement for Renewable Energy Infrastructure (EN-3). Available at: <https://assets.publishing.service.gov.uk/media/695d1368b5c46330350ed9a2/national-policy-statement-for-renewable-energy-infrastructure-en-3-web-accessible.pdf> (Accessed: July 2026).
- Department for Energy Security & Net Zero (DESNZ). (2025c). National Policy Statement for Electricity Networks Infrastructure (EN-5). Available at: <https://assets.publishing.service.gov.uk/media/695d12e1b5c46330350ed9a1/national-policy-statement-for-electricity-networks-infrastructure-en-5-web-accessible.pdf> (Accessed: July 2026).
- Institute of Environmental Management and Assessment (IEMA) (2020). Major Accidents and Disasters in EIA: A Primer. Available at: https://www.iema.net/media/brbdeibt/j27374_iema_major_accidents_disasters_final-1.pdf (Accessed: July 2026).
- International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA). (2021). G1162 The Marking Offshore Renewable Energy Installations. Available at: <https://www.iala.int/product/g1162/> (Accessed: July 2026).
- International Cable Protection Committee (ICPC). (2011). Recommendation #1, Management of Redundant and Out-of-Service Cables, Issue 12B. Available at: https://www.sargassoseacommission.org/storage/documents/Recommendation_01_Iss_12B.pdf (Accessed: July 2026).
- Marine Directorate – Licencing Operations Team. (2025). Scoping Opinion - Morven Offshore Wind Farm, Hawthorn Pit Grid Connection. Available at: https://marine.gov.scot/sites/default/files/morven_offshore_wind_farm_-_scop-0058_-_hawthorn_pit_grid_connection_-_scoping_opinion.pdf (Accessed: July 2026).
- Marine Management Organisation. (2025). Scoping request under the Infrastructure Planning (Environmental Impact Assessment) Regulations 2009 for the proposed Morven Offshore Windfarm Transmission Assets Project by Morven Offshore Wind Limited. MMO Reference: DCO/2025/00005.
- Maritime and Coastguard Agency (MCA). (2021). Offshore Renewable Energy Installations – Guidance on UK navigational practice, safety and emergency response (MGN 654). Available at:

<https://www.gov.uk/government/publications/mgn-654-mf-offshore-renewable-energy-installations-orei-safety-response> (Accessed: July 2026).

- RPS. (2023). Desk study for potential UXO contamination Morven export cable routes: Risk Assessment and Mitigation Strategy. Report Ref: EES1423, Report Number: R-02-01.
- RPS. (2025). Morven Hawthorn Pit Grid Connection Project Environmental Impact Assessment Scoping Report. Available at: <https://nsip-documents.planninginspectorate.gov.uk/published-documents/EN0210005-000004-Morven%20Hawthorn%20Pit%20Grid%20Connection%20Project%20Scoping%20Report.pdf> (Accessed: July 2026).
- Scottish Government. (2020). Sectoral Marine Plan for Offshore Wind. Available at: <https://www.gov.scot/publications/sectoral-marine-plan-offshore-wind-energy/documents/> (Accessed: July 2026).
- The Planning Inspectorate (PINS). (2025a). Nationally Significant Infrastructure Projects - Advice Note Nine: Rochdale Envelope. Available at: <https://www.gov.uk/government/publications/nationally-significant-infrastructure-projects-advice-note-nine-rochdale-envelope/nationally-significant-infrastructure-projects-advice-note-nine-rochdale-envelope> (Accessed: July 2026).
- The Planning Inspectorate (PINS). (2025b). Scoping Opinion: Proposed Morven Hawthorn Pit Grid Connection Project - EN0210005. Available at: <https://nsip-documents.planninginspectorate.gov.uk/published-documents/EN0210005-000005-Scoping%20Opinion%20-%20Morven%20Hawthorn%20Pit%20Grid%20Connection%20Project.pdf> (Accessed: July 2026).