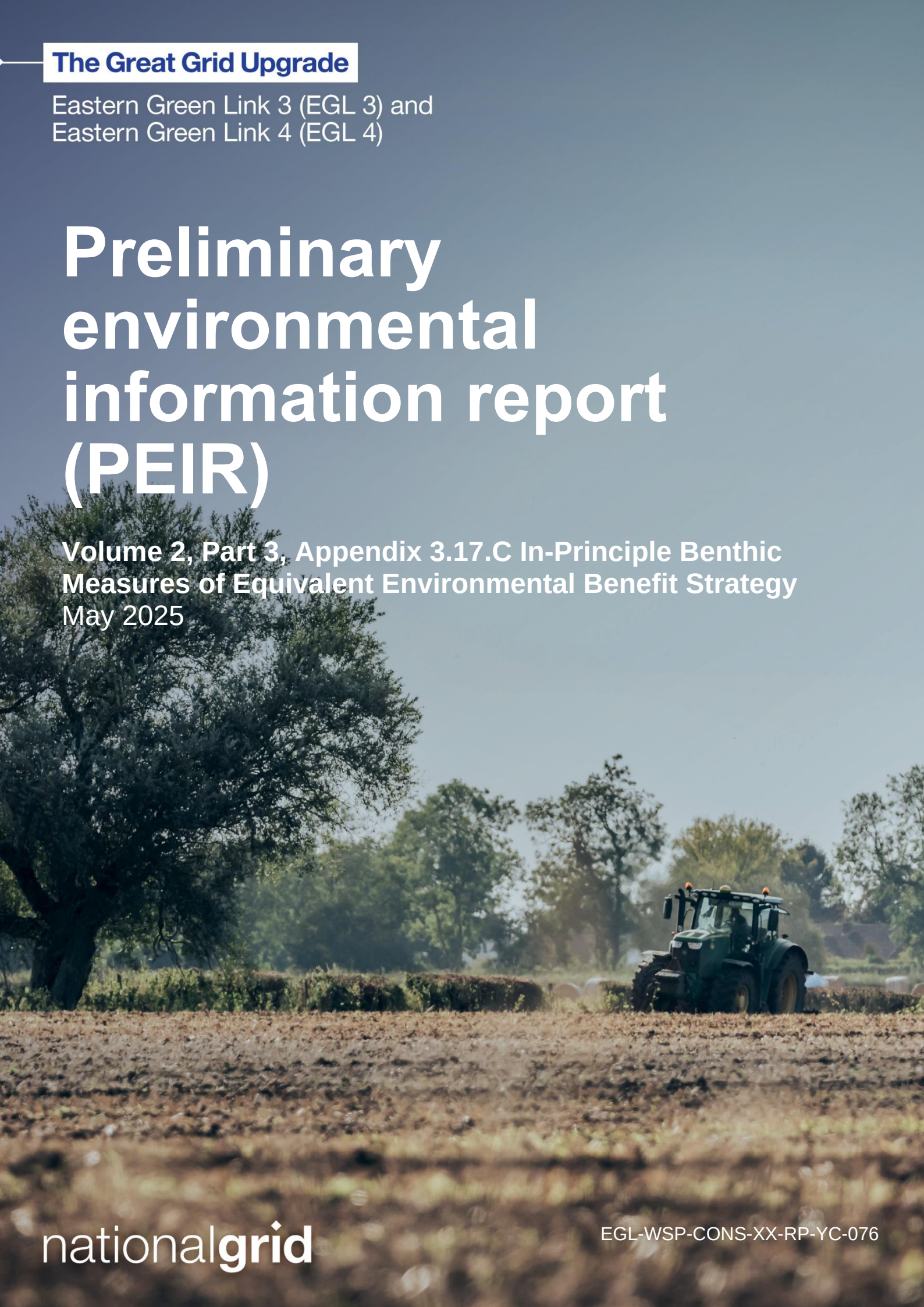
The Great Grid Upgrade

Eastern Green Link 3 (EGL 3) and
Eastern Green Link 4 (EGL 4)

Preliminary environmental information report (PEIR)

Volume 2, Part 3, Appendix 3.17.C In-Principle Benthic Measures of Equivalent Environmental Benefit Strategy

May 2025



nationalgrid

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Glossary of terms

Term	Definition
CA	Competent Authority
CSCB	Cromer Shoal Chalk Beds
DCO	Development Consent Order
DEFRA	Department for Environment, Food and Rural Affairs
DESNZ	Department of Energy Security and Net Zero
EGL	Eastern Green Link
EIA	Environmental Impact Assessment
ES	Environmental Statement
FOCI	Features of Conservation Interest
GMA	General Management Approach
GW	Gigawatt
HO	Holderness Offshore
HVDC	High Voltage Direct Current
IFCA	Inshore Fisheries and Conservation Authorities
IMP	Implementation and Monitoring Plan
km	Kilometre
LoSCM	Library of Strategic Compensation Measures
MCAA	Marine and Coastal Access Act
MCZ	Marine Conservation Zone
MCZA	Marine Conservation Zone Assessment
MEEB	Measures of Equivalent Environmental Benefit
MEEB	Measure of Equivalent Environmental Benefit
MHWS	Mean High Water Springs
MMO	Marine Management Organisation
MPA	Marine Protected Area
MRF	Marine Recovery Fund
NGET	National Grid Electricity Transmission
NSN	National Site Network

Term	Definition
OPRED	Offshore Petroleum Regulator for Environment and Decommissioning
OWEIP	Offshore Wind Environmental Improvement Package
PINS	Planning Inspectorate
RSMP	Regional Seabed Monitoring Programme
SAC	Special Areas of Conservation
SEP & DEP	Sheringham and Dudgeon Extension Projects
SHE-Transmission	Scottish Hydro Electric Transmission
SNCB	Statutory Nature Conservation Body
SoS	Secretary of State
SPT	Scottish Power Transmission
SSEN-Transmission	Scottish and Southern Electricity Networks Transmission
WCS	Worst-case scenario
WMS	Written Ministerial Statement

3.17.CIn Principle Benthic Measures of Equivalent Environmental Benefit Strategy

3.17.C.1 Background

3.17.C.1.1 Eastern Green Link 3 (EGL 3) and Eastern Green Link 4 (EGL 4) (the English Offshore Scheme) are two proposed new electrical connections being developed to reinforce the electricity transmission system between Scotland and England. The English Offshore scheme comprises of the proposed Eastern Green Link 3 and Eastern Green Link 4 electrical connections.

3.17.C.1.2 EGL 3 is being jointly developed by National Grid Electricity Transmission plc (NGET) (a division of National Grid plc) and Scottish Hydro Electric Transmission Ltd (SHE-T) , who are operating and known as Scottish and Southern Electricity Networks Transmission (SSEN Transmission.The proposals comprise a 2-Gigawatt (GW) High Voltage Direct Current (HVDC) link between Peterhead, Aberdeenshire in Scotland, and King's Lynn and West Norfolk, Norfolk in England.

3.17.C.1.3 EGL 4 is being developed in parallel with EGL 3. EGL 4 is being jointly developed by NGET and Scottish Power Transmission (who are operating and known as Scottish Power Energy Networks (SPEN)) and comprises a 2 GW HVDC link between Westfield, Fife in Scotland and King's Lynn and West Norfolk, Norfolk in England.

3.17.C.1.4 A Development Consent Order (DCO) is being sought for the English components of the Projects for which NGET is the sole Applicant, as the Transmission Operator in England and Wales. Separate deemed Marine Licences are being sought for EGL 3 and EGL 4, and in accordance with the United Nations Convention on the Laws of the Sea (UNCLOS) and Section 81 of the Marine and Coastal Access Act 2009 (MCAA) cable installation beyond 12 NM is exempt from requiring a Marine Licence. Therefore, the Applicant intends to structure the DMLs to reflect the licensable activities within and outside 12 NM. Whilst assessment of effects has been provided for the Projects, only the installation of cable protection is licensable beyond 12 NM. This is equally applicable to the MCZ Stage 1 Assessment which focusses on impact associated with cable protection within the MCZ.

3.17.C.1.5 EGL 3 and EGL 4 are separate projects, independent of one another; however, they have a common Landfall at Anderby Creek on the Lincolnshire coastline, a common connection point to the existing transmission network in Norfolk and they also follow the same onshore cable route for the majority of their length. Therefore, EGL 3 and EGL 4 are being consented by a single DCO, as two co-ordinated and predominantly co-located projects in England.

3.17.C.1.6 The English Offshore Scheme is sited within the English marine environment, through inshore and offshore waters, and up to Mean High Water Springs (MHWS) in England. The most northerly elements of the English Offshore Scheme would

be located at the boundary of English Waters and Scottish Waters, and the most southerly elements would be located at MHWS at Anderby Creek. EGL 3 is approximately 436 km of subsea HVDC cable from Landfall to the marine boundary with Scotland, and EGL 4 is approximately 425 km.

3.17.C.1.7 The DCO would be supported by a range of plans and documents, including an Environmental Statement (ES), which would set out the results of the Environmental Impact Assessment (EIA). A **Stage 1 Marine Conservation Zone Assessment (MCZA) (Volume 2, Part 3 Appendix 3.17.C)**, which sets out the information necessary for the competent authority (CA), in this case the Department of Energy Security and Net Zero (DESNZ) Secretary of State (SoS), to undertake a MCZA to determine if the English Offshore Scheme could potentially hinder the conservation objectives for any MCZs would accompany the ES.

3.17.C.1.8 If the CA cannot satisfy itself that there is no significant risk of the activity hindering conservation objectives, and if no alternative approach presents a substantially lower risk, then Measures of Equivalent Environmental Benefit (MEEB) may be required under Section 126 of the Marine and Coastal Access Act 2009. Subsection 7(c) of this Act states that if an activity poses a significant risk to the conservation objectives of a Marine Conservation Zone (MCZ), the authority may only permit it if the applicant undertakes or arranges for measures that provide environmental benefits equivalent to the potential damage. Additionally, the CA must be satisfied that the public benefit of proceeding with the act clearly outweighs the risk of environmental harm and that arrangements for implementing MEEB are in place before the activity commences.

3.17.C.1.9 This MEEB Roadmap has been prepared to support the ES and MCZA and presents a pathway for progressing 'without prejudice' measures to support a MEEB case for the English Offshore Scheme. Full details of the MCZA are presented in **Stage 1 Marine Conservation Zone Assessment (Volume 2, Part 3 Appendix 3.17.B).**

3.17.C.2 In-Principle MEEB Approach

3.17.C.2.1 The Applicant has undertaken a MCZ Screening Assessment, which is presented in **Volume 2, Part 3, Appendix 3.17.A: Marine Conservation Zone Assessment Screening.** The screening process identified a single site within the English Offshore Scheme area – Holderness Offshore MCZ - that in the absence of mitigation measures, the identified impact pathways for the EGL 4 Project are capable of affecting (other than insignificantly) either the protected features of the MCZ or the ecological or geomorphological processes on which the protected features are dependent. The EGL 4 Project crosses the Holderness Offshore MCZ for approximately 8.7 km. No sites were screened in for the EGL 3 Project.

3.17.C.2.2 The draft Order Limits have been developed through extensive route selection and evaluation work, considering environmental, engineering, and socio-economic constraints. Where possible, mitigation has been applied as per the mitigation hierarchy (Regulation 14(2) Infrastructure Planning (EIA) Regulations 2017, Ref 3.17.C.1) of avoid, mitigate, restore, or rehabilitate, then compensate.

3.17.C.2.3 Initially several options were considered with respect to routing in proximity to the Holderness Offshore MCZ. A decision was taken in January 2025 to avoid or take the shortest distance through the Holderness Offshore MCZ. EGL 3 routes around

the MCZ completely avoiding interaction with the Holderness Offshore MCZ and EGL 4 follows a similar parallel route but interacts with the MCZ in the southeastern corner for a short distance. The English Offshore Scheme has sought, wherever possible, to avoid or minimise infrastructure within the MCZ, however some infrastructure within the MCZ is unavoidable. Further details on specific impacts are provided in the **Stage 1 Marine Conservation Zone Assessment (MCZA) (Volume 2, Part 3 Appendix 3.17.B).**

3.17.C.2.4 The impacts potentially arising from the English Offshore Scheme under the worst-case scenario (WCS) were assessed against the conservation objectives for the Holderness Offshore MCZ. The **Stage 1 Marine Conservation Zone Assessment (MCZA) (Volume 2, Part 3 Appendix 3.17B)** concludes that there is no significant risk of these impacts, in-isolation or in-combination with other planned projects within/surrounding the MCZ, of hindering the achievement of the conservation objectives stated and a Stage 2 MCZA would not be required.

3.17.C.2.5 Nonetheless, in the interest of precaution, and without seeking to pre-judge the final decision by DESNZ SoS, the Applicant considers it prudent to prepare an 'in-principle' MEEB plan to support the MCZA. This approach is in keeping with precedent from recently consented offshore energy projects such as the Sheringham and Dudgeon Extension Projects (SEP & DEP – see (Equinor, 2023), Ref 3.17.C.2). This roadmap would be submitted to demonstrate the feasibility of potential measures and to set out information that is required to assess the validity of such measures.

3.17.C.2.6 As part of the process of developing the 'without prejudice' MEEB case, the Applicant has identified a 'shortlist' of possible compensation options based on the existing Project design, recent DCO decisions which have been consented based on protected sites derogation and compensation/MEEB, and stakeholder feedback received to date.

3.17.C.3 Purpose of this Document

3.17.C.3.1 This document introduces the MEEB options that the Applicant considers to be potentially appropriate to offset the Projects' benthic impacts on the Holderness Offshore MCZ should derogation under the Marine and Coastal Access Act (2009) (MCAA) (Ref 3.17.C.3) be required. The 'in principle' MEEB case relates specifically to permanent habitat loss associated with external cable protection within the Holderness Offshore MCZ.

3.17.C.3.2 Measures that are being considered by the Project are:

- designation of a new Marine Protected Area(s) (MPA) and/or extension of existing MPA(s).
- removal of redundant infrastructure within, and outside of the MCZ.
- habitat restoration.

3.17.C.3.3 These options have been shortlisted following an appraisal of a long list of MEEB options collated by the Applicant. The Applicant has undertaken a detailed literature review and consequently has undertaken a Black, Red, Amber Green (BRAG) constraints assessment to determine which options are most appropriate to consider in more detail. While the BRAG assessment has helped the Applicant assess the potential suitability of options, the options considered most favourable

have been selected based on available evidence due to the limited number of viable MEEB available.

3.17.C.3.4 This document supports the Project's Preliminary Environmental Impact Report (PEIR). Its purpose is to present progress on proposed MEEB, gather stakeholder feedback on processes, data, and assumptions used to determine these measures, and identify any additional factors to consider ahead of a formal submission to the Planning Inspectorate. This document also presents a roadmap for delivering benthic compensation as the Project progresses including a timeframe for delivery and consideration of adaptive measures.

3.17.C.4 Consultation

3.17.C.4.1 Stakeholder engagement has been established during the pre-application process and has continued as the Project has made progress with mitigation and its compensation measures.

3.17.C.4.2 To date the Project has engaged the following stakeholders on the dates listed in **Table 3.17.C-1**:

Table 3.17.C-1 - Record of Consultation

Date	Meeting Forum & Focus	Attendees
23/10/2024	Project update meeting at which the MCZ routeing was discussed. Routeing around the outside would require more sandwave pre-sweeping. JNCC cited their preference for routeing around the outside	JNCC
05/02/2025	Project update meeting to present the routeing decision which was to route around the Holderness Offshore MCZ for EGL 3 and minimise interaction with the MCZ for EGL 4. The Applicant also provided an update on the planned technical working group to discuss the MCZ assessments and in-principle MEEB strategy	JNCC
09/04/2025	Initial technical working group to discuss the content and conclusions of the preliminary MCZ Assessment Screening and Stage 1. The preliminary in-principle MEEB strategy was also presents and discussed with initial feedback provided by attendees.	MMO, JNCC and Natural England

3.17.C.5 Holderness Offshore Marine Conservation Zone

Overview

3.17.C.5.1 The Holderness Offshore MCZ is located approximately 11 km offshore at its closest, from the Holderness coast in the Southern North Sea region. The MCZ boundary is partly delineated to the west by the 6 NM Territorial Seas limit and overlaps with part of the western area of the Southern North Sea SAC ((JNCC, 2024) Ref 3.17.C.4). The site ranges from depths of just over 5m to 50m and covers an area of 1,176 km^2.

3.17.C.5.2 The Holderness Offshore MCZ lies across the 12 nm territorial sea limit, and therefore site management is delivered by Natural England and Joint Nature Conservation Committee (JNCC).

3.17.C.5.3 The site is designated under Section 116 of the MCAA with the following broadscale sediment habitats, species of conservation importance and feature of geological interest listed as Protected Features:

- Subtidal coarse sediment (A5.1)
- Subtidal sand (A5.2)
- Subtidal mixed sediments (A5.4)
- Ocean quahog (*Artica islandica*)
- North Sea glacial tunnel valleys (hereafter referred to as “Inner Silver Pit”)

3.17.C.5.4 The MCZ is dominated by subtidal coarse sediments (A5.1), covering an area of approximately 1,070 km^2. There are patches of subtidal mixed sediments (A5.4) located throughout the site with the largest patch located in the centre of the MCZ. Small patches of subtidal sand (A5.2), covering a total area of less than 25 km^2 are located within the site and are predominately situated near the periphery of the site. The southeast corner of the MCZ encompasses Inner Silver Pit, this area has a high biodiversity and is an ecologically important area providing habitats for numerous species.

3.17.C.5.5 The seabed of the Holderness Offshore MCZ is predominantly composed of sediment habitats including subtidal sand, mixed and coarse sediment and contains the northern tip of the Silver Pit North Sea glacial tunnel valleys. The heterogeneous seabed supports a wide range of species, both on and in the sediment, including multiple species of polychaete worms, mussel beds, sponges, starfish and crustaceans (such as crabs and shrimp). The site is also a spawning and nursery ground for a number of fish species, including lemon sole (*Microstomus kitt*), plaice (*Pleuronectes platessa*) and European sprat (*Sprattus sprattus*). The slow growing and threatened/declining bivalve, the ocean quahog (*A. islandica*) has also been recorded within the site, highlighting the importance of the MCZ for slow growing species.

3.17.C.5.6 The Holderness Offshore MCZ has been subjected to numerous anthropogenic activities ((Tiilin & Tyler-Walters, 2014), Ref 3.17.C.5). Natural England and JNCC ((2021), Ref 3.17.C.6) have predicted that these ongoing impacts could limit the ability to maintain and restore the conditions of the designated features with the MCZ.

3.17.C.5.7 Particularly, the sedimentary habitat designated features of the Holderness Offshore MCZ has been notably subjected to stresses associated with oil and gas (O&G) infrastructure and low-level benthic trawling and dredging. Data collected in 2017 indicates that these fishing activities occur throughout the MCZ including each sediment features, and that calculated trawling effort is low to moderate. Trawling related impacts have a more substantial impact on the biological communities associated with the broadscale habitats of the MCZ than physical hydrodynamic changes. These communities are particularly sensitive to the abrasion of the seabed and the removal of non-target species. Surface abrasion from trawling gear can damage, displace, or result in mortality for benthic and epibenthic flora and fauna. The interaction between the fishing gear and seabed can also alter habitat structure and attract short-term scavengers. Some broadscale habitat features associated with the site have already been lost due to the ongoing presence of widespread O&G infrastructure.

3.17.C.5.8 As a burrowing bivalve, Ocean quahog distribution, is highly influenced by sedimentary habitats and therefore has been subjected to stresses associated with fishing activities ((Tyler-Walters & Sabatini, 2017), Ref 3.17.C.7). Such activities are known to intersect with records of Ocean quahog within the site. This species is known to be exposed to high levels of impacts associated with trawling and is known to be sensitive to deep penetration/disturbance of the substrate below the surface of the seabed, shallow abrasion/penetration, and removal of non-target species. These impacts have the potential to damage, displace or can lead to mortality for the Ocean quahog. O&G infrastructure is not known to intersect with the distribution of Ocean quahog within the MCZ, though there are multiple pipelines near to where this species has been previously recorded which may have resulted in localised physical damage, smothering, and mortality due to the introduction of rock protection, concrete mattresses and drill cutting piles.

3.17.C.5.9 Surveys have identified a limited extent of Ocean quahog within the MCZ, with a patchy distribution principally located in the north of the site along with one survey record located in the southwest of the site ((Garcia, et al., 2019; DEFRA, 2017), Ref 3.17.C.8 and Ref.3.17.C.9). It is unclear whether the presence of O&G structures within the MCZ is currently influencing hydrodynamic processes to the extent that the dispersal of larvae is being disrupted.

3.17.C.6 Conservation Objectives

3.17.C.6.1 The conservation objectives for the Holderness Offshore MCZ are that the protected features:

- if already in favourable condition, maintain in such condition and
- if not already in favourable condition, be brought into such condition, and remain in such condition.

3.17.C.6.2 The conservation objectives for the individual protected features within the Holderness Offshore MCZ are outlined in **Table 3.17.C-2.**

Table 3.17.C-2 - Conservation Objectives for Holderness Offshore MCZ

Protected Features	Conservation Objectives
Subtidal coarse sediment Subtidal mixed sediments Subtidal sand	Supplementary advice (JNCC, 2021) sets the following objectives for the sedimentary broadscale habitats: • Extent and distribution: Recover • Structure and function: Recover • Supporting processes: Maintain With respect to subtidal coarse sediment, subtidal sand and subtidal mixed sediments within the site, this means that: • Its extent is stable or increasing; and • Its structures and functions, its quality, and the composition of its characteristic biological communities (which includes a reference to the diversity and abundance of species forming part of or inhabiting that habitat) are such as to ensure that it remains in a condition which is healthy and not deteriorating. Any temporary deterioration in condition is to be disregarded if the habitat is sufficiently healthy and resilient to enable its recovery. Any alteration to that feature brought about entirely by natural processes is to be disregarded.
Ocean quahog (*Arctica islandica*) Species of Conservation Importance	Supplementary advice (JNCC, 2021) sets the following objectives for ocean quahog: • Extent and distribution: Recover • Structure and function: Recover • Supporting processes: Recover With respect to the ocean quahog within the MCZ, this means that: • The quality and quantity of its habitat and the composition of its population in terms of number, age and sex ratio are such as to ensure that the population is maintained in numbers which enable it to thrive. Any temporary reduction of numbers is to be disregarded if the population is sufficiently thriving and resilient to enable its recovery. Any alteration to that feature brought about entirely by natural processes is to be disregarded.
North Sea glacial tunnel valleys (Silver Pit)	With respect to the North Sea glacial tunnel valleys within the MCZ, this means that:

Protected Features	Conservation Objectives
	1. Its extent, component elements and integrity are maintained. 2. Its structure and functioning are unimpaired; and 3. Its surface remains sufficiently unobscured for the purposes of determining whether the conditions in paragraphs (1) and (2) are satisfied. Any obscurement of that feature brought about entirely by natural processes is to be disregarded. Any alteration to that feature brought about entirely by natural processes is to be disregarded.

3.17.C.6.3 Cefas undertook a dedicated site verification survey (CEND0812) in 2012. Acoustic data were acquired opportunistically on the transits between ground truth stations which were collected from the northern portion of the site over 43 stations using benthic grabs, videos and still images.

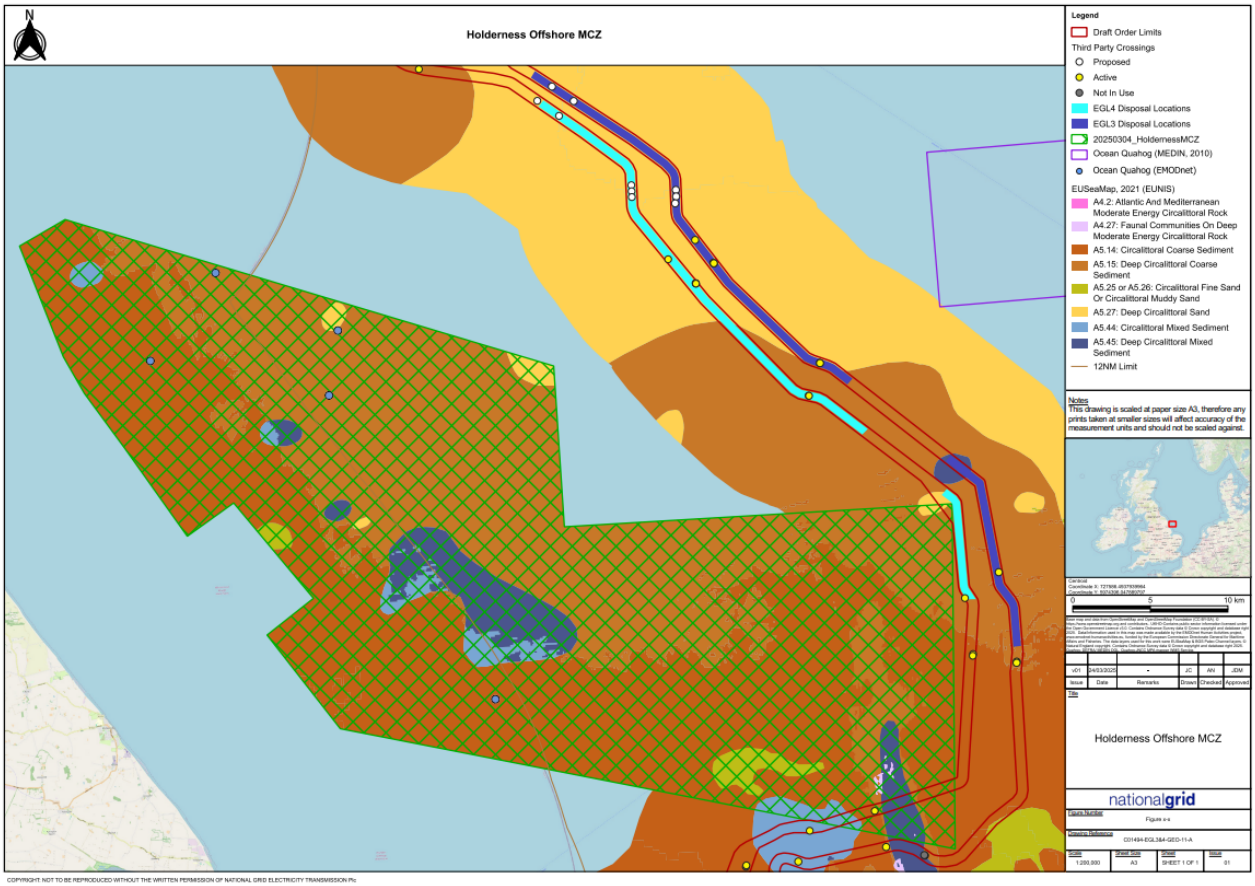
3.17.C.6.4 In 2017, a post-survey site report was produced, which provides an interpretation of the acoustic and ground truthing survey data collected by Cefas at the Holderness Offshore MCZ during May 2012. The data was used to validate the predicted distribution of broadscale habitat features and Features of Conservation Interest (FOCI).

3.17.C.6.5 Natural England and JNCC (2021), Ref 3.17.C.6 have stated that the General Management Approach (GMA) for all sedimentary habitat features and Ocean quahog is to recover to favourable condition as all are currently in unfavourable condition. Inner Silver Pit is in favourable condition; therefore, the GMA is to maintain the feature at favourable condition.

3.17.C.7 Summary of Potential Impact

3.17.C.7.1 The EGL 4 Project crosses the Holderness Offshore MCZ for approximately 8.7 km in the southeastern edge of the MCZ, including the Inner Silver Pit (**Plate 3.17.C-1)**. The EGL 3 draft Order Limits avoid the MCZ by routeing around the eastern boundary though does intersect with the Silver Pit feature outside of the MCZ.

Plate 3.17.C-1 - Holderness Offshore MCZ and the Projects



3.17.C.7.2 The initial MCZ screening assessment identified a pathway between the Protected Features of the Holderness Offshore MCZ, and the following four impacts related to the EGL 4 Project:

- temporary habitat loss/seabed disturbance
- permanent habitat loss
- water flow (tidal current) changes, including sediment transport considerations
- temporary increase and deposition of suspended sediments.

3.17.C.7.3 These impacts would potentially arise because of activities associated with pre-construction and construction activities, operation, and decommissioning. In keeping with precedent set by other energy projects concerning impacts hindering conservation objectives for MCZs, specifically those with subtidal sedimentary features, this ‘in principle’ MEEB roadmap is provided on the basis of WCS permanent habitat loss. The other impacts assessed in the Stage 1 MCZA are not considered to require MCAA derogation on an ‘in principle’ basis due to the more widely acknowledged temporary nature and scale of such impacts as well as the activities being exempt from Marine Licensing. While the Applicant maintains that conservation objectives would not be hindered as a result of the use of cable protection, it understands the requirement to proceed with caution.

3.17.C.7.4 The worst-case footprint for permanent habitat loss is presented in **Table 3.17.C-3**. The Applicant would endeavour to minimise the requirement for rock protection (or other forms of protection) within the MCZ, however, acknowledges that there may be a requirement for derogation under the MCAA should rock protection be required.

3.17.C.7.5 The WCS impact area is calculated on the basis of maximum potential need for cable protection (rock placement or other forms of protection) at infrastructure crossings, and the need for protection in areas where insufficient cable coverage has been assessed as higher risk.

Table 3.17.C-3 - Summary of Footprint for WCS Permanent Habitat Loss

Phase	Impact	Construction	Operation	Decommissioning
EGL 4 Project	Permanent habitat loss	0.057 km^2	To be confirmed	Would be the same as the construction plus operation footprint

3.17.C.7.6 The EGL 4 Project does not route through known areas of Ocean quahog presence within the MCZ. No external cable protection would be needed in the areas known to support Ocean quahog and therefore permanent habitat loss would not occur in areas associated with Ocean quahog. As such, the MEEB options considered by the Project do not include the need to offset any Ocean quahog impacts. Additionally, the scale and resilience of the Silver Pit glacial tunnel valley geological feature is such that the Applicant is confident that impacts would not be subject to derogation under MCAA. Preliminary investigations have not identified that external cable protection is needed within subtidal sand feature within the MCZ, thus there would be no permanent habitat loss for this protected feature and as such a reduced requirement for 'in principle' MEEB.

3.17.C.7.7 While the Applicant maintains that the WCS impacts to the Holderness Offshore MCZ would not hinder achievement of conservation objectives for any of the protected features, it recognises that SNCBs and regulators may identify additional sensitivity for subtidal coarse and subtidal mixed sediments. Therefore, MEEB would be delivered with the objective of offsetting impacts for sedimentary features impacted by EGL 4 as outlined in **Table 3.17.C-4**.

Table 3.17.C-4 - Scale of Impacts on Subtidal Sediments

Protected Feature	WCS Impact Footprint
Subtidal coarse sediments	A maximum of 0.039 km^2 of cable protection is required within the MCZ; equivalent to 0.0046 % of the subtidal coarse sediment.
Subtidal mixed sediments	A maximum of 0.022 km^2 of cable protection is required within the MCZ; equivalent to 0.027 % of the subtidal mixed sediment.

3.17.C.8 MEEB Approach

Guidance

3.17.C.8.1 Department for Environment, Food and Rural Affairs (DEFRA) and Natural England provide specific guidance on the delivery of compensation and MEEB. This guidance has been followed in developing the MEEB options for the Project.

3.17.C.8.2 DEFRA's compensation hierarchy, outlined in their draft best practice guidance ((DEFRA, 2021) , Ref 3.17.C.10) states that the following steps should be taken, with priority given to Step 1 with preference reducing towards Step 4:

- **step 1**: address same impact at same location
- **step 2**: same ecological function different location
- **step 3**: comparable ecological function same location
- **step 4**: comparable ecological function different location.

3.17.C.8.3 The Applicant was cognisant of this hierarchy when devising the long list and down-selecting to create the refined shortlist of the potential MEEB options. Updated DEFRA guidance ((DEFRA, 2024), Ref 3.17.C.11) states that the hierarchy should be applied in consultation with relevant statutory nature conservation bodies (SNCBs) and that the following factors should be considered in order of priority when selecting measures:

- **Ecological effectiveness** - ecological effectiveness of measures takes account of the ecological outcomes to be achieved and the confidence that the measures would be effective. This should be the priority consideration when working through the hierarchy.
- **Local circumstances** - as far as possible, measures should take account of local circumstances where the risk is predicted to occur (see local circumstances header for further information).
- **Proximity** - measures should be delivered as close as possible to the area affected by the plan or project.

3.17.C.8.4 Note that DEFRA guidance (DEFRA, 2024), Ref 3.17.C.11) also states that for MCZs, measures that benefit a different qualifying feature (or features) should consider equivalent environmental benefit. Measures should replicate the ecological structure or function of the feature or features at risk and the location of MEEB should not take priority over the ecological outcomes that might be secured. This approach allows for a degree of flexibility and rationality when considering potential options.

3.17.C.8.5 Each of the factors outlined in DEFRA guidance ((DEFRA, 2021; 2024) Ref 3.17.C.10, Ref 3.17.C.11) were accounted for when developing the scoring system for the Applicants initial long list of MEEB options (see **Section 3.17.C.11**).

3.17.C.8.6 In addition to DEFRA guidance, the Applicant has also consulted Natural England guidance on the appraisal of ‘in principle’ compensation (and MEEB) measures ((Natural England, 2021), Ref 3.17.C.12). The compensation requirements set out in Natural England guidance have been considered when assessing the suitability of MEEB options to better understand where measures are well defined, and

where the SoS might require more detail to ensure confidence that MEEB can be secured.

3.17.C.8.7 The long list options proposed as potential MEEB within this roadmap were also developed with reference to the following guidance:

- Managing Natura 2000 sites. The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC ((European Commission, 2018), Ref 3.17.C.13
- Benthic mitigation measures for the proposed Measure of Equivalent Environmental Benefit Assessment - informal advice ((Natural England, 2024) Ref 3.17.C.21).

3.17.C.8.8 A Written Ministerial Statement (WMS) was published by DEFRA in January 2025 ((DEFRA, 2025), Ref 3.17.C.14) alongside interim guidance on strategic compensation measures for offshore wind activities delivered via the Marine Recovery Fund (MRF) from DESNZ ((DESNZ, 2025), Ref 3.17.C.15). The WMS set out the UK Government's plans to de-risk and accelerate planning decisions for offshore wind and associated transmission infrastructure projects. To do this, DEFRA plans to implement an offshore wind environmental improvement package (OWEIP) which amongst other things, looks to launch a MRF in late 2025 to provide an optional mechanism for developers to fund strategic compensatory measures (and MEEB).

3.17.C.8.9 The WMS acknowledges that multiple projects are at risk because there are currently no ecologically effective options that can compensate for unavoidable impacts on seabed habitats within Special Areas of Conservation (SAC) and MCZs. As such, DEFRA is committing to "*designating new MPAs and/or extending existing MPAs in Secretary of State waters to deliver sufficient strategic compensation to compensate for likely environmental effects of offshore wind* [and transmission projects] *(*Ref 3.17.C.16)*."*

3.17.C.8.10 The interim guidance from DESNZ is intended to assist eligible offshore wind and transmission projects in understanding how they can refer to the strategic compensation measures in the OWEIP Library of Strategic Compensation Measures (LoSCM) prior to the MRF being operational. Crucially, this guidance confirms the eligibility of projects requiring MEEB to offset impacts within MCZs:

3.17.C.8.11 "*Applicants must continue to apply the mitigation hierarchy for their projects. Where it is determined that the hierarchy has been exhausted, applicants may present a derogation case under* the *appropriate legislation. If the derogation case is agreed, compensatory measures and/or measures of equivalent environmental benefit are likely to be* required *under Regulation 68 of the Conservation of Habitats and Species Regulations 2017, Regulation 36 of the Conservation of Offshore Marine Habitats and Species Regulations 2017 (the Habitats Regulations), or S.126 of the Marine and Coastal Access Act 2009. Where this guidance refers to the term "compensation" or "compensation measures", this should be understood to mean both compensation under the Habitats Regulations and measures of equivalent environmental benefit under the Marine and Coastal Access Act 2009*."

3.17.C.9 Delivery Mechanisms

3.17.C.9.1 The Project has considered three delivery options for MEEB; project led, collaborative and/or strategic measures to ensure that MEEB is delivered in the most effective way that maximises the ecological benefit of the measure.

- **Project led measures:** These are Project alone options tailored to address the ecological impacts of EGL 4. They focus on mitigating the precise effects of the Project, such as habitat restoration or creation, aimed at offsetting local environmental damage.
- **Collaborative measures:** Such options would involve working with one or more developers either multilaterally or facilitated through an industry body, to implement compensation strategies that benefit a broader ecological area or species. They aim to address cumulative impacts across multiple projects or regions, often through shared funding or joint efforts and theoretically have a wider delivery scope than project alone delivery.
- **Strategic measures:** These are long-term, large-scale initiatives aimed at improving overall ecological resilience at a regional or national level. They are led by other stakeholders, such as government and industry bodies. They focus on achieving broader conservation goals that wouldn't be deliverable by a single project and are often planned and implemented over extended periods, potentially beyond the life of a single offshore wind farm project.

3.17.C.10 Strategic MEEB Delivery

3.17.C.10.1 A key challenge in delivering MEEB is ensuring that measures are secure and robust in the eyes of SNCBs. To address this, DEFRA has developed a library of ecologically robust strategic compensation measures in partnership with industry and SNCBs (LoSCM) as outlined in **Section 3.17.C.1**.

3.17.C.10.2 DEFRA's (DEFRA, 2021, Ref 3.17.C.10) definition of 'strategic compensation' (or MEEB) is an option: *"that works across a wide area, joining up across projects and organisations to deliver* an *ecological benefit greater than the sum of its parts and/or measures that* can *only be delivered by Government (e.g., enhanced protection of MPAs)*". The Project understands that Natural England regards strategic delivery of compensation and MEEB as having ecological merit with the ability to provide a solution to offset impacts on faunal communities and habitats impacted by multiple developments including offshore wind farms and transmission assets in the North Sea.

3.17.C.10.3 At the outset of the Applicant's process for identifying potentially suitable MEEB options, and when the original scoring system was devised for assessing options, details regarding strategic compensation/MEEB and the MRF were limited. However, following the publication of DEFRA's WMS (DEFRA, 2025, Ref.3.17.C.14), and DESNZ's interim guidance on strategic compensation and the MRF (DESNZ, 2025, Ref 3.17.C.15), it has become evident that strategic compensation is likely to be available to the Project for MEEB.

3.17.C.11 Developing and Refining Compensation Measures

Method

3.17.C.11.1 To illustrate the progress in the development of potential MEEB options to stakeholders at PEIR stage, this roadmap outlines the current status of long list and shortlisted options that are being appraised by the Project.

3.17.C.11.2 It is understood that MEEB should seek to successfully re-establish the contribution, or contributions made by adversely affected features of the Holderness Offshore MCZ to achieve the MPA network objectives. With this in mind, a literature review has been undertaken to determine a long list of MEEB options for Holderness Offshore MCZ. This has included a detailed assessment of publicly available information for other projects that have developed MEEB delivery plans for benthic habitats, and the appraisal of guidance documents.

3.17.C.11.3 Further details on the longlist process and refinement to shortlist are provided below.

Longlist

3.17.C.11.4 The preliminary stages of identifying suitable MEEB options to offset potential impacts on the subtidal mixed and coarse sediment features of the Holderness Offshore MCZ involved the creation of a long list. The aim of the long list was to identify all possible options to deliver MEEB for impacts potentially resulting from the Project. The Project acknowledges that not all options in the long list are ecologically or technically feasible, but believes it is important to cast a wide net and gather stakeholder opinions on numerous options to identify the most suitable avenues for successful delivery. Note that the longlist of measures was developed prior to the completion of the Stage 1 MCZA, and as such, considered a range of options that may no longer be suitable based upon final conclusions.

3.17.C.11.5 The literature review focussed on identifying measures that could either remove existing impacts within the MCZ or improve the features already present within the site. This is important given that the conservation objectives for benthic features of the MCZ are ‘recover’ for extent and distribution, and structure and function, and ‘maintain’ for supporting processes. The compilation of the long list also involved reviewing DCO documentation for other energy projects potentially requiring MEEB (such as the Norfolk Projects, and SEP and DEP) in the North Sea region. Following the development of the long list, each option was appraised in line with DEFRA ((2021; 2024), Ref 3.17.C.10 and Ref 3.17.C.11) guidance and compensation hierarchy.

3.17.C.11.6 The long list options were comparatively assessed, scored and ranked to provide clarity on their suitability to offset potential Project-related impacts within the Holderness Offshore MCZ (see **Annex A**). However, following the publication of guidance on compensation by DEFRA and DESNZ (DEFRA, 2025, Ref 3.17.C.14); DESNZ, 2025, Ref 3.17.C.15) and completion of the Stage 1 MCZA, options were reassessed due to an evolving landscape for MEEB. While the Applicant acknowledges the value in the work undertaken through scoring and ranking MEEB options, it has become apparent that due to limited viable options, MEEB should be assessed on an individual basis using available evidence and stakeholder feedback.

3.17.C.11.7 Presented in **Table 3.17.C-5** is the long list of MEEB options and rationale for the advancement of measure to the shortlist or elimination from further consideration.

Shortlist

3.17.C.11.8 Viable MEEB options have been developed taking into account the latest advice and guidance on MCAA derogation, available supporting evidence from other energy projects and publicly available information, timescale of implementation, and experiences of other projects in the North Sea who have developed 'without prejudice' MCAA Derogation cases.

3.17.C.11.9 From the long list of options considered by the Project, three possible MEEB options are under consideration for further development based upon the evidence provided in **Table 3.17.C-5.** These are:

- designation of new MPA(s) and/or extension of existing MPA(s).
- removal of redundant infrastructure within, and outside of the MCZ (e.g. cables, rock protection, scour protection).
- habitat restoration - planting of Native oyster (*Ostrea edulis*) or Horse mussel (*Modiolus modiolus*) beds outside of the MCZ.

3.17.C.11.10 The shortlisted options for MEEB are discussed in further detail in **Section 3.17.C.12.**

Table 3.17.C-5 - Long list of Measures to deliver Measures of Equivalent Environmental Benefit for Holderness Offshore MCZ

Measure	Delivery Mechanism	Summary	Rationale for exclusion/development
1. Removal of marine debris (including fishing equipment) within the MCZ.	Project-led	Removal of marine debris including fishing equipment from the MCZ would likely reduce the impacts on the designated features.	**Excluded** Recent advice from SNCBs (JNCC et al., 2023, Ref 3.17.C.17) states that they do not consider the removal of anthropogenic marine debris to offer adequate compensation for loss of benthic habitats within MPAs as MEEB. Furthermore, the Applicant cannot be confident that the quantity of marine debris within the MCZ would meet the MEEB quantum requirements for the Project. Furthermore, this measure does not relate to the conservation objectives for the MCZ, and marine debris is not listed as a pressure concern (JNCC & Natural England, 2021, Ref.17.C.12). Therefore, this option would not be considered further.
2. Removal of redundant infrastructure within the MCZ (e.g. cables, rock protection, O&G infrastructure, redundant pipelines, scour protection, pipeline protection).	Project-led	Removal of redundant infrastructure, including O&G infrastructure, pipelines, cables and rock protection within the MCZ would likely reduce the impacts on the designated features.	**Shortlisted** Offshore Petroleum Regulator for Environment and Decommissioning's (OPRED) position as outlined in OPRED ((2023), Ref 3.17.C.18) is that this measure is not suitable for the removal of O&G infrastructure due to numerous challenges associated with liability, health and safety and legal concerns. As such, this measure can only be investigated further in relation to telecoms and electricity cable infrastructure. The removal of pipeline protection without the removal of the associated pipelines is not considered suitable due to the increased vulnerability of O&G pipelines that remain in situ following the removal of protection.

Measure	Delivery Mechanism	Summary	Rationale for exclusion/development
			The Applicant cannot be confident that the quantity of redundant infrastructure within the MCZ would meet the MEEB quantum requirements for the Project at this point and plans to engage with telecoms and asset owners regarding the potential for removal of redundant infrastructure.
3. Habitat recreation within the MCZ - use of dredged material to restore sublittoral sediment /Ocean quahog habitat damaged by fishing activity/lost to infrastructure.	Project-led	Ocean quahog habitat primarily consists of sand and mud. Within the Holderness Offshore MCZ, there is degraded ocean quahog habitat as areas of sublittoral sand/coarse sediment/sublittoral mixed sediment have been impacted by bottom trawling. Habitat recreation within the Holderness Offshore MCZ, may be possible by depositing appropriate sediment types from other marine regions. This would need to be verified as suitable ocean quahog habitat using Particle Size Analysis (PSA). Ensuring optimal regions of habitat, through surveys, would likely increase fecundity and decrease mortality. As ocean quahog are extremely long-lived species, their monitoring of their recovery is challenging as species recovery at a population level may take decades or centuries.	**Excluded** There is low confidence in the technical feasibility of this measure which is related to concerns surrounding restoring relatively fine sediment habitats in medium to high energy coastal regimes. This is not a proven measure in coastal locations, and as such confidence in this measure's success is low. Due to the potential mobility of substrate sediments used for restoration, this option may also be associated with a smothering risk for sessile benthic communities within the direct and indirect deposition footprint. Therefore, this option would not be considered further.

Measure	Delivery Mechanism	Summary	Rationale for exclusion/development
4. Designation of new MPA and/or extension of existing MPAs.	Strategic	The Applicant understands that this measure would be delivered by DEFRA with support from JNCC and Natural England. SNCBs would also be responsible for undertaking site selection and consultation with other sea users and public stakeholders. This measure would be secured through contributions to the MRF and the Project's DCO wording. Designating new MPAs and/or extending existing MPAs would protect designated features and would enhance the structure and function of the national site network (NSN).	**Shortlisted** Following the publication of DEFRA's WMS (DEFRA, 2025, Ref 3.17.C.14) and interim guidance on strategic compensation with reference to the MRF (DESNZ, 2025, Ref 3.17.C.15), the Applicant has confidence in the efficacy and delivery mechanism for this measure. Though site selection work and public consultation have not been completed, and the designation process is likely to take several years, the inclusion of this measure within the LoSCM signifies central UK Government approval of this MEEB option. Following the DESNZ 'Call for Information' request, the Applicant submitted a response to the 'Benthic Strategic Compensation Questionnaire' In October 2024. The questionnaire included details on whether the Project intends to propose MPA designation as a benthic compensation/MEEB, as well as identifying the likely MPAs that may be impacted by the Project.
5. Fisheries management measures (spatial reduction or development of management mechanism) inside of the MCZ.	Collaborative	Implementing spatial reduction of bottom trawling would increase the protection of the designated features within the Holderness Offshore MCZ.	**Excluded** The Applicant has concerns over additionality in relation to this measure given the regulatory work already undertaken the by the Marine Management Organisation (MMO) who manage fishing and non-licensable activities within the MCZ. It is understood that the MMO are in the process of considering the impacts of bottom towed fisheries within designated sites and as such, fisheries management is not regarded to be suitable ((MMO, 2023), Ref 3.17.C.19). Therefore, this option would not be considered further.
6. Removal of marine debris (including	Project-led	Collecting marine debris within the wider North Sea area and beyond	**Excluded**

Measure	Delivery Mechanism	Summary	Rationale for exclusion/development
fishing equipment) outside of the MCZ.		may help reduce the impacts of marine debris on the wider marine environment.	Recent advice from SNCBs (JNCC et al., 2023, Ref 3.17.C.17) states that they do not consider the removal of anthropogenic marine debris to offer adequate compensation for loss of benthic habitats within MPAs as MEEB. It is possible that the Applicant could source a sufficient quantity of marine debris outside of the MCZ to meet the MEEB quantum requirements for the Project, though this remains unlikely. Furthermore, this measure does not relate to the conservation objectives for the MCZ, and marine debris is not listed as a pressure concern (JNCC & Natural England, 2021, Ref 3.17.C.6 and Ref 3.17.C.12). Therefore, this option would not be considered further.
7. Marine debris awareness & engagement campaign (stakeholder engagement), amnesty gear collection	Project-led	Contributing to or creating a marine debris awareness and engagement campaign in collaboration with the Inshore Fisheries and Conservation Authorities (IFCAs), MMO and the fishing industry.	**Excluded** There is uncertainty around delivering this measure at the required extent for MEEB. This option would only be suitable as a supporting measure. The metric of success would be measured but by engagement, and long-term adjustment of behaviour, as well as volume of debris recycled/disposed of. It is the Applicant's understanding that this approach is not supported by Natural England and as such would not be considered further as MEEB.
8. Removal of redundant infrastructure outside of the Holderness Offshore MCZ (e.g. cables, O&G	Project-led	Removal of redundant infrastructure, including O&G infrastructure, pipelines, cables and rock protection outside of the Holderness Offshore MCZ but within an MCZ designated for similar features would likely reduce	**Shortlisted** Offshore Petroleum Regulator for Environment and Decommissioning's (OPRED) position as outlined in OPRED ((2023), Ref 3.17.A.18) is that this measure is not suitable for the removal of O&G infrastructure due to

	Measure	Delivery Mechanism	Summary	Rationale for exclusion/development
	infrastructure, redundant pipelines, scour protection, pipeline protection) but with an MCZ designated for similar features		the impacts on the marine environment.	numerous challenges associated with liability, health and safety and legal concerns. As such, this measure can only be investigated further in relation to telecoms and electricity cable infrastructure. The removal of pipeline protection without the removal of the associated pipelines is not considered suitable due to the increased vulnerability of O&G pipelines that remain in situ following the removal of protection. The Applicant cannot be confident that the quantity of redundant infrastructure within the MCZ would meet the MEEB quantum requirements for the Project, though there is likely to be a higher volume of infrastructure outside of the MCZ. The Applicant would engage with telecoms and cable asset owners regarding the potential for removal of redundant infrastructure.
9.	Removal of aggregate extraction pressure outside of the Holderness Offshore MCZ	Project-specific	The removal of aggregate extraction pressure outside of the MCZ would likely increase the biodiversity of the wider marine environment and NSN.	**Excluded** As a licenced activity, it is beyond the Applicants ability to exert control over aggregate licence holders' extraction within approved areas. Management of extraction activities is managed by the MMO and should aggregate extraction result in unacceptable impacts, these would be addressed via the imposition of licence conditions. Additionally, extraction sites are monitored under the Regional Seabed Monitoring Programme (RSMP) to ensure that level of impact on the marine environment does not exceed the accepted environmental assessment and HRA outcomes, including on protected features. The Crown Estate also have seabed rights over aggregate resources and as such, aggregate licence holders are not considered to be owners of the areas in which they

Measure	Delivery Mechanism	Summary	Rationale for exclusion/development
			operate. As such, this measure is not suitable for the Project to consider further.
10. Habitat restoration - Planting oyster (*Ostrea edulis*) beds within the MCZ (biogenic reef creation).	Project-led or Collaborative	Native oyster bed restoration has the potential to provide important ecosystem service such as supporting fish populations, increasing biodiversity, and other beneficial impacts to the MCZ. This measure would provide enhanced value and function to the sedimentary features of the MCZ in the form of increased biodiversity.	**Excluded** Native oyster has a historical presence in North Sea, though not within Holderness Offshore MCZ. Environmental conditions within the MCZ such as depth range and current velocity are suboptimal for the establishment of oyster beds. This is supported by modelled data illustrating areas of oyster restoration potential within the European Native Oyster Restoration Handbook ((Native Oyster Network & Environment Agency, 2020), Ref 3.17.C.20) which shows potential areas to the west of the MCZ within the Holderness Inshore MCZ boundary. As such, this measure is not suitable for the Project to consider further.
11. Habitat restoration - Planting blue mussel (*Mytilus edulis*) beds within the MCZ (biogenic reef creation).	Project-led, Collaborative	Blue mussel bed restoration has the potential to provide important ecosystem service such as supporting sediment stabilisation, nutrient cycling and water filtration, and other beneficial impacts to the MCZ. This measure would provide enhanced value and function to the sedimentary features of the MCZ in the form of increased biodiversity.	**Excluded** The techniques for blue mussel bed restoration exist but are deemed challenging. There is a lack of evidence surrounding the successful deployment of this method in the southern North Sea. There are no records of historical mussel beds within the MCZ resulting in lower ranking according to DEFRA guidance (DEFRA, 2021, Ref 3.17.C.10). Though *M. edulis* can be abundant in subtidal environments, it is not common. Additionally, habitat preference is for rocky substrate, though it can colonise mixed sediment. There is little to no evidence on the effectiveness of this measure within the MCZ. This is a less proven method

Measure	Delivery Mechanism	Summary	Rationale for exclusion/development
			than oyster bed restoration. *M. edulis* is considered very tolerant of a range of physical and chemical conditions. It is typically found on shallow rocky shores. Due to a lack of confidence in the successful delivery of this measure, it has not been assessed as suitable for the Project to progress further.
12. Habitat restoration - Planting horse mussel (*Modiolus modiolus*) beds within the MCZ (biogenic reef creation).	Project-led, Collaborative	Horse mussel bed restoration has the potential to provide important ecosystem service such habitat provision, increasing biodiversity, water filtration, carbon storage and other beneficial impacts to the MCZ. This measure would provide enhanced value and function to the sedimentary features of the MCZ in the form of increased biodiversity.	**Shortlisted** There is little to no evidence on the effectiveness of this measure within the MCZ. However, Horse mussel (*M. modiolus*) has historically been widespread in the North Sea (including in offshore areas) and can inhabit soft sediments as well as hard substrates. Reefs may form in soft substrates though formation process is long (several years). The Project would most likely have to utilise novel hatchery methods for mussels and develop a method for deployment. While there may be challenges associated with the delivery of this method, similar programmes are being utilised in offshore locations such as Dogger Bank which supports the ecological efficacy of this measure. As such, the Applicant would continue to consider the viability of this measure through engagement with experienced and specialist habitat restoration delivery partners, and desk-based site selection work.
13. Control of marine invasive non-native species (MINNS) (e.g. *Crepidula fornicata*) within MCZ to remove competitor effects	Project-led	A benthic survey would be undertaken followed by an implementation of controls or active removal of target species to minimise the spread of MINNS within the MCZ. Control measures most likely to include hand collection.	**Excluded** There are no publicly available records of non-native species within the site, though *C. fornicata* is commonly associated with habitats present within MCZ (mixed muddy sediments). There is uncertainty around delivering this measure at the required extent for MEEB. It is uncertain whether the necessary quantum would be available within the MCZ site boundary. Due to a lack of

Measure	Delivery Mechanism	Summary	Rationale for exclusion/development
on vulnerable species.			confidence in the successful delivery of this measure, it has not been assessed as suitable for the Project to progress further.
14. Habitat restoration - Planting of Native oyster (*Ostrea edulis*) beds outside of the MCZ.	Project-led, Collaborative	Native oyster bed restoration has the potential to provide important ecosystem service such as supporting fish populations, increasing biodiversity, and other beneficial impacts to the wider marine environment. This measure would provide enhanced value and function to the sedimentary features of the MCZ in the form of increased biodiversity.	**Shortlisted** Native oyster has a historical presence in North Sea, as such it is considered that habitat creation at the right site could deliver MEEB. A proven track record of successful oyster bed habitat creation programmes in the UK aligns with DEFRA guidance (DEFRA, 2021, Ref 3.17.C.10) which states that there should be "*confidence in the measure being entirely effective*". Deliverability is subject to identifying a suitable area that could support *O. edulis* and being able to protect such an area from commercial fishing pressure. Delivering oyster restoration within another MCZ may increase likelihood of success for this option. The Applicant would continue to consider the viability of this measure through engagement with experienced and specialist habitat restoration delivery partners, and desk-based site selection work.
15. Habitat restoration - Planting of blue mussel beds outside of the MCZ.	Project-led, Collaborative	Blue mussel bed restoration has the potential to provide important ecosystem service such as supporting sediment stabilisation, nutrient cycling and water filtration, and other beneficial impacts to the wider marine environment. This measure would provide enhanced value and function to the	**Excluded** The techniques for blue mussel bed restoration exist but are deemed challenging. There is a lack of evidence surrounding the successful deployment of this method in the southern North Sea. There is evidence of the effectiveness of this option though not for the potentially impacted sedimentary features within the MCZ i.e. coarse and mixed sediment environments. Due to a lack of confidence in the successful delivery of this measure, it

Measure	Delivery Mechanism	Summary	Rationale for exclusion/development
		sedimentary features of the MCZ in the form of increased biodiversity.	has not been assessed as suitable for the Project to progress further.
16. Habitat restoration - Planting of Horse mussel beds outside of the MCZ.	Project-led, Collaborative	Horse mussel bed restoration has the potential to provide important ecosystem service such habitat provision, increasing biodiversity, water filtration, carbon storage and other beneficial impacts to the wider marine environment. This measure would provide enhanced value and function to the sedimentary features of the MCZ in the form of increased biodiversity.	**Shortlisted** There is little to no evidence on the effectiveness of this measure within the MCZ though Horse mussel (*M. modiolus*) has historically been widespread in the North Sea (including in offshore areas) and can inhabit soft sediments as well as hard substrates. Reefs may form in soft substrates though formation process is long (several years). The Project would most likely have to utilise novel hatchery methods for mussels and develop a method for deployment. While there may be challenges associated with the delivery of this method, similar programmes are being utilised in offshore locations such as Dogger Bank which supports the ecological efficacy of this measure. As such, the Applicant would continue to consider the viability of this measure through engagement with experienced and specialist habitat restoration delivery partners, and desk-based site selection work.
17. Fisheries management measures (spatial reduction or development of management mechanism) outside of the MCZ.	Project-led	Implementing spatial reduction of bottom trawling would likely increase biodiversity of the wider marine environment.	**Excluded** The Applicant has concerns over additionality in relation to this measure given the regulatory work already undertaken the by the Marine Management Organisation (MMO) and IFCAs who manage fishing and non-licensable activities in the North Sea. It is understood that the MMO are in the process of considering the impacts of bottom towed fisheries within designated sites and as such, fisheries management is not regarded to be suitable (MMO, 2023), Ref 3.17.C.19).Therefore, this option would not be considered further.

Measure	Delivery Mechanism	Summary	Rationale for exclusion/development
18. Seagrass restoration or establishment to act as a carbon sink outside of the MCZ.	Project-led, Collaborative	The restoration of seagrass outside of the MCZ, would likely increase the amount of stored carbon within the marine environment. This measure would provide enhanced value and function to the sedimentary features of the MCZ in the form of increased biodiversity.	**Excluded** To deliver this measure, the Applicant would need to collaborate with habitat restoration specialists. Certainty in this measure is increased following its inclusion in the Round 4 Dogger Bank SAC Strategic Compensation Plan (The Crown Estate, 2024)(The Crown Estate, 2024). However, this option is not considered suitable due to its inability to deliver equivalent ecosystem functions i.e. seagrass restoration cannot provide analogous structure and function to subtidal coarse and mixed sediments. This option could not be progressed for the Holderness Offshore MCZ and does not provide comparable ecological function.

3.17.C.12 Shortlisted Measures

Introduction

3.17.C.12.1 An overview of the three shortlisted measures identified to be potentially suitable as MEEB for the Project is provided in **Section 3.17.C.13 - 3.17.C.14**. Each of these measures would be subject to further appraisal by the Applicant and would be discussed with key stakeholders including JNCC and Natural England as the 'in principle' MEEB strategy develops.

3.17.C.13 Designation of New MPA and/or Extension of Existing MPAs

Overview

3.17.C.13.1 This measure, which was included by DEFRA in the LoSCM and as such is centrally approved. It would involve the designation of new, or extension of existing MPAs with the objective of maintaining the NSN for benthic habitats. This measure would be delivered by the MRF which is due to be operational in late 2025 to provide an optional mechanism for developers to fund delivery of strategic compensation measures.

3.17.C.13.2 DEFRA has committed (DEFRA, 2025, Ref 3.17.C.14) to designating new MPAs and/or extending existing MPAs in SoS waters to deliver sufficient strategic compensation to compensate for likely environmental effects of offshore wind (and associated transmission asset) development. Potential areas would be identified based upon ecological principles. DEFRA would follow the established legislative processes for the designation of MPAs and would also be responsible for liaising with stakeholders including sea users, the public, The Crown Estate and MMO ahead of the final designation process.

Measure of Success

3.17.C.13.3 This measure would be delivered by DEFRA with support from Natural England and JNCC. As such, the Applicant is confident of its success. However, it would not be for the Applicant to determine the success of the measure. As with existing MPAs within the NSN, it would be Natural England's responsibility to monitor the new and/or extended MPAs to monitor success, or the need for adaptive management.

3.17.C.13.4 Interim guidance on strategic compensation and the MRF from DESNZ (DESNZ, 2025, Ref 3.17.C.15) states that Applicants should provide a full Implementation and Monitoring Plan (IMP) when available from DEFRA to provide clarity on compensation implementation, site management and monitoring before impacts occur. Once operational, the MRF operator would provide information on monitoring and measuring success to the Applicant who would be required to submit their own IMP to the DESNZ SoS.

Scale

3.17.C.13.5 It is expected that the total area of new and/or extended MPAs required to compensate for the predicted impacts of offshore wind projects (and transmission projects) would be small in comparison to the tranches of MPAs previously designated in SoS waters. However, it is understood that any new designations/extensions would be sufficient to account for predicted impacts for offshore wind projects up to and including Leasing Round 5, as well as transmission infrastructure projects.

3.17.C.13.6 The Project responded to the DESNZ 'Call for Information', and completed the 'Benthic Strategic Compensation Questionnaire' with details regarding potential requirement for strategic compensation for benthic impacts which would help inform the site selection and designation process being undertaken by Defra with support from JNCC and Natural England. This would help ensure that any site progressed to the designation stage would provide sufficient compensation/MEEB quantum for the projects requiring this option.

3.17.C.13.7 To date, there have been no details published regarding the process for relying on this MEEB ahead of time, including what ratios and/or multipliers may be apply should impacts arising from projects occur ahead of designation or should like-for-like compensation not be available.

Site Selection

3.17.C.13.8 In all cases, MPA designations would be delivered by DEFRA and as such, site selection is beyond control of the Applicant. New MPA designations and associated management would be funded by the offshore wind (and transmission) developers that successfully apply to use this measure through the MRF, though these contributors would not be participants in the site selection process. It is understood that DEFRA is expecting advice from Natural England and JNCC on site selection in Spring 2025.

Delivery Mechanism

3.17.C.13.9 This MEEB can only be delivered strategically, and not on a project-led basis. Applicants would be required to pay into the MRF to access MPA designations/extensions as a compensation measure.

3.17.C.13.10 The DESNZ interim guidance on strategic compensation via the MRF states that: "*The DCO should also include a requirement to provide post-consent evidence that the agreed contribution has been paid, and a requirement to provide a high-level IMP, prior to commencing any works which would give rise to the adverse effect for which compensation is required*".

Monitoring and Adaptive Management

3.17.C.13.11 As per the DESNZ interim guidance on strategic compensation via the Marine Recovery Fund (DESNZ, 2025, Ref 3.17.C.15):

3.17.C.13.12 "*DESNZ Secretary of State would usually expect to see greater clarity and certainty regarding* the *compensation and the ongoing management and monitoring before works which give rise to the adverse effect for which compensation is required can commence. When the MRF is operational, this information would normally be provided by the MRF Operator to the applicant for*

submission to the DESNZ Secretary of State as a full Implementation and Monitoring Plan."

3.17.C.13.13 "*It is recognised that the detailed information usually expected by DESNZ Secretary of State may not be fully available until the Government's MPA designation/extension programme is* complete*. The WMS therefore commits to the production of high-level Implementation and Monitoring Plans, which should be obtained from Defra by the applicant and provided to the DESNZ Secretary of State before works* which *give rise to the adverse effect for which compensation is required can commence. These plans would contain the following information:*

- *High level explanation as to how designation of an MPA would compensate for effects on each relevant habitat and, where possible, ratios used.*
- *Implementation timetable and an explanation of the MPA designation process.*
- *Information on current monitoring, long term management and reporting of MPAs, and any differences for MPAs designated for compensation purposes.*
- *Information on how the effectiveness of the MPA designation would be maintained in terms of enforcement and adaptive management.*
- *Commitment to providing an updated IMP as the designation process continues and detail is resolved*."

3.17.C.13.14 The Project's DCO should indicate a requirement to provide a full implementation and monitoring plan (or analogous document suitable for MCAA derogation cases) as soon as this is available from DEFRA on completion of the MPA designation/extension programme.

3.17.C.13.15 Monitoring and adaptive management are beyond the Applicant's control, and it remains to be seen how projects would be required to contribute to the MRF regarding these issues. The Project would continue to monitor updates from DEFRA and DESNZ.

Next Steps

3.17.C.13.16 The Project would continue to engage with DEFRA and Natural England and other key stakeholders regarding strategic compensation. The Applicant would keep up to date with progress and would contribute to any delivery groups and calls for information as required. Any updates on Project design refinements would be communicated to DESNZ to ensure that the Projects MEEB requirements are met by the designation of new MPAs and/ or extension of existing MPAs.

3.17.C.14 Removal of Redundant Infrastructure Within, and Outside of the MCZ

Overview

3.17.C.14.1 The presence of O&G infrastructure is widespread within the MCZ and there is some evidence surrounding the recovery of seabed features following the removal of structures. However, OPRED's position as outlined in OPRED (2023) (Ref 3.17.C.18) is that the removal of O&G infrastructure is not suitable for MEEB or compensation due to insurmountable challenges associated with liability, health and safety and legal concerns. Therefore, this measure is only suitable for the

removal of infrastructure not related to O&G, such as disused telecoms and interconnector cables, obsolete cable protection and scour protection. The Applicant does not believe there to be sufficient quantum of assets within the Holderness Offshore MCZ to meet the Projects potential requirements, so this measure would look to address habitat loss both within and outside of the MCZ boundary.

3.17.C.14.2 To deliver this measure, the Project plans to undertake a desk-study to identify potential assets within the North Sea that interact with the same (or similar) sedimentary features as those impacted within the Holderness Offshore MCZ. In accordance with the compensation hierarchy (DEFRA, 2021, (3.17.C.10); 2024, (Ref 3.17.C.11)) priority would be given to assets closest to the Holderness Offshore MCZ, and to those overlying subtidal mixed and coarse sediments. Following the identification of any potentially suitable assets, the Project would engage the owners to determine the feasibility of removal. The removal of such infrastructure, though potentially outside of the MPA network would deliver either the same ecological function at same location, or same ecological function at different location.

3.17.C.14.3 Geophysical site investigation surveys may be required to assess the extent and condition of any assets identified for removal should no recent data be available. This would help identify the best removal means and the status of surrounding habitats. Following the removal of any assets, sediment features would be left to recover and monitored to identify the need for any remedial action or to demonstrate success.

3.17.C.14.4 The Applicant considers this MEEB to be technically feasible but recognises that there may be regulatory, procedural and liability issues associated with removal of infrastructure, especially where asset owners may be obliged to decommission their own assets.

Measure of Success

3.17.C.14.5 The success of this measure depends on the identification of suitable disused assets that can be removed from the seabed to allow recovery of sedimentary features, and on reaching agreement with the disused asset owners. This measure would target infrastructure that overlies subtidal coarse and mixed sediment, or alternative habitats that can provide similar ecological function. The removal of infrastructure would allow the reinstatement of baseline conditions by eliminating a physical barrier which at present has reduced the quantity of sedimentary habitat within its footprint.

3.17.C.14.6 Success would be determined by accurately measuring the quantity of seabed which is able to revert to a sedimentary condition following removal of structures. A monitoring programme would be undertaken to assess the rate and extent of recovery. This would feed into a regular review which would determine the success of this MEEB.

3.17.C.14.7 Details surrounding specific success criteria, monitoring programme and adaptive management would be outlined by the Applicant in a MEEB IMP which would be developed with oversight from a targeted Steering Group post-consent.

Scale

3.17.C.14.8 This measure can be delivered on a scale with possible headroom to deliver more than the required amount of MEEB. It is proposed that the area of assets removed should at least be equivalent to the area impacted by permanent habitat loss resulting from the Project. The application of any ratio or multipliers would be considered once the location of any assets to be removed is known, and the surrounding habitats are well understood.

Site Selection

3.17.C.14.9 Where this measure is delivered would depend on the location of any assets considered to be viable for removal. Assets closest to the Holderness Offshore MCZ would be prioritized to support sedimentary features within the local habitat network.

Delivery Mechanism

3.17.C.14.10 This MEEB would be delivered on a project led basis. Deliverability of this measure is subject to agreement with disused infrastructure owners. Consultation would be required with asset owner(s) to understand the parameters of the infrastructure to ensure that it can be removed.

Monitoring and Adaptive Management

3.17.C.14.11 Following the removal of seabed infrastructure, it is proposed that regular geophysical and benthic surveys would be undertaken to assess the scale and rate of sedimentary feature recovery. After a suitable period, should recovery not be progressing as hoped, the need for adaptive management would be assessed.

3.17.C.14.12 Adaptive management may take several forms which could include additional removal of seabed infrastructure, contribution to the MRF, habitat enhancement measures, removal of marine INNS, or any other measures identified through engagement with SNCBs and the Steering Group.

3.17.C.14.13 Details surrounding specific success criteria, monitoring programme and adaptive management measures would be outlined by the Applicant in a MEEB IMP which would be developed with oversight from a targeted Steering Group post-consent.

Next Steps

3.17.C.14.14 The Applicant would engage with SNCBs on this measure to better understand any knowledge or data that they may hold which can assist in the identification of redundant infrastructure in the southern North Sea. Desk based work would also be undertaken using publicly available datasets to identify potentially suitable assets ahead of engaging asset owners.

3.17.C.14.15 Should a suitable asset be located for removal, and the asset owners provide assent, the Applicant would proceed with a geophysical survey to establish the condition of seabed infrastructure and to inform the removal strategy. Prior to any removal, the Applicant would obtain a Marine Licence from the MMO.

3.17.C.15 Habitat Restoration - Planting of Native Oyster (*Ostrea edulis*) or Horse mussel (*Modiolus modiolus*) Beds

Overview

3.17.C.15.1 The Native oyster has a historical presence in the North Sea, with vast oyster reefs being present at one time along European coastlines ((Native Oyster Network & Environment Agency, 2020) Ref 3.17.C.20). The extent of Horse mussel beds was also once vast in the UK ((Marine Climate Change Impacts Partnership, 2018), Ref 3.17.C.22) though has been typically more rusticated to northern latitudes than the Native oyster. Both species are known for forming dense aggregations in the form of 'beds' which over time act to stabilize the substrate and create reefs. The structural heterogeneity of these reefs provides numerous ecosystem services including increased biodiversity and food supply, a blue carbon sink and habitat for numerous faunal groups including commercial fish species. Reef aggregations can also result in increased water quality, increased fish production, increased bivalve populations in the region and denitrification.

3.17.C.15.2 While extremely valuable from an ecological perspective, both species have declined dramatically in the North Sea in recent years, largely due to increased mobile bottom fishing impacts and climate change (Marine Climate Change Impacts Partnership, 2018, Ref 3.17.C.22).

3.17.C.15.3 Due to a reduction in extent for both Native oyster and Horse mussel, there is scope to provide numerous ecosystem services, and increased biodiversity to offset potential impacts of the Project by delivering restoration as MEEB. Though this option would not be delivered on a like-for-like basis, it would deliver comparable ecological functions at either the same or a different location. The Project notes the recent precedent set by SEP & DEP which prepared an In-Principle MEEB Plan ((Equinor, 2022) Ref 3.17.C.2) to account for potential impacts from external cable protection in an area of designated subtidal mixed sediment in the Cromer Shoal Chalk Beds (CSCB) MCZ. One of the options proposed by SEP & DEP is the planting of Native oyster beds within CSCB MCZ. While the SoS acknowledged that this option is not like-for-like, it was recognised that restoring a historic feature would provide considerable ecological value by increasing biodiversity, providing nursery grounds for fish, and providing numerous ecosystem goods and services (Equinor, 2022, Ref 3.17.C.2).

3.17.C.15.4 To date, there have been more successful examples of oyster restoration in the North Sea than Horse mussel restoration and as such, there is higher confidence in the former option. Additionally, Horse mussels are more susceptible than Native oysters to the impacts of climate change, with the North Sea representing its most southerly extent. This is likely to mean that there is less potentially suitable habitat available for restoration opportunities. However, Horse mussel restoration remains under consideration, with the Applicant aware of a project currently working to restore Horse mussel beds on the Dogger Bank.

3.17.C.15.5 Oyster or mussel bed recovery can be achieved by firstly identifying a suitable location for restoration. This would initially involve a desk-based process which would examine environmental and habitat data alongside constraint data (e.g., location of existing infrastructure, high intensity fishing areas, pollution) to determine the locations of potentially suitable sites. A partnership with a specialist in this field would be highly valuable at this stage and would provide insight into what conditions (temperature, salinity, substrate, site size etc.) are likely to result

in a successful restoration project. Restoration is recommended in areas known to have supported Native oyster or Horse mussel populations historically, this would guide the site selection process.

3.17.C.15.6 Should this measure be delivered on a Project led basis, following the identification of a suitable site, a survey campaign would be undertaken to ground-truth site conditions and to identify any potential threats to the measure e.g., the presence of INNS. Baseline surveys would help determine site suitability and whether the required substrate is present. If the suitable substrate is lacking, restoration efforts would need to improve availability of suitable substrates, but if the site is recruitment limited (i.e., not connected to a regional network population), then restoration methods to increase the breeding population would need to be applied.

Measure of Success

3.17.C.15.7 Following the deployment of suitable substrate (cultch) and/or oysters or mussels, a monitoring programme would be implemented to assess the success of this measure. The key metrics used to determine success would follow those outlined in the European Native Oyster Habitat Restoration Monitoring Handbook ((Native Oyster Network & Environment Agency, 2020) Ref 3.17.C.20). These metrics are also considered to be suitable for Horse mussels, though confirmation of this would be sought from restoration specialists. Success criteria that are likely to be considered are:

- Survival
- density
- shell cover
- temperature
- salinity
- bed area
- size frequency.

Scale

3.17.C.15.8 The Applicant understands there to be sufficient opportunities for delivering this measure at a sufficient scale to offset benthic impacts arising because of the Project. There is legal precedent for a 1:1 ratio based on the Hornsea Three benthic compensation and therefore the Applicant suggests this would be a matter for the SoS to determine. However, the Applicant notes that if required, this MEEB could deliver on a greater than 1:1 ratio.

Site Selection

3.17.C.15.9 It is likely that a larger oyster or mussel restoration scheme would have a higher success rate if the habitat is able to become established at scale. To maximise the likelihood that any oyster or mussel bed that is created is self-sustaining with long term viability, it is proposed that this measure is delivered in partnership with other oyster bed habitat creation plans under development. The identification of a site with sufficient scale, and the correct ecological conditions would be developed

alongside a specialist partner either on a project alone, or collaborative basis with another developer.

3.17.C.15.10 Whether delivered by the Applicant alone or in collaboration, the site selection is expected to include robust consideration of the key biotic and abiotic factors that influence Native oyster settlement and functioning.

Delivery Mechanism

3.17.C.15.11 Habitat restoration could be delivered on a Project led basis with input from a specialist restoration partner with a proven record of delivering such projects, or collaboratively with another project delivering MEEB.

3.17.C.15.12 If MEEB progresses on a collaborative basis, a commercial agreement would be sought which would define the scale of the measure, apportionment of benefits, monitoring and maintenance responsibilities, funding etc. There are numerous benefits of collaborating to deliver MEEB which include an ability to deliver a restoration scheme at a larger scale, and enhanced delivery timescales associated with working alongside another developer in a more advanced planning stage than the Applicant.

Monitoring and Adaptive Management

3.17.C.15.13 Monitoring of the restoration scheme would be in line with those outlined in the European Native Oyster Habitat Restoration Monitoring Handbook (Native Oyster Network & Environment Agency, 2020) Ref 3.17.C.20). Success criteria would align with those outlined in paragraph 3.17.C.15.7.

3.17.C.15.14 Details surrounding success criteria, monitoring programme and adaptive management measures would be outlined by the Applicant in a MEEB IMP which would be developed with oversight from a targeted Steering Group post-consent.

Next Steps

3.17.C.15.15 Alongside seeking to progress collaborative options with other developers, the Project would engage with restoration specialists with a proven track record of delivering functioning Native oyster beds.

3.17.C.15.16 In addition to the engagement with potential collaborative and delivery partners, the Applicant would undertake an initial desk-top site selection exercise and continue to interrogate the viability of Horse mussel restoration where confidence in delivery is presently reduced compared to that of Native oyster.

3.17.C.16 Conclusion/Summary

3.17.C.16.1 A Stage 1 MCZA has been completed for the Projects which could not rule out benthic impacts for Holderness Inshore MCZ due to the potential requirement for cable protection within this site. Though there is potential for permanent habitat loss under the Project design's WCS, this was not concluded to hinder the conservation objectives for the MCZ due to the limited scale of predicted impact.

3.17.C.16.2 Nonetheless, based on precedent for other energy projects in the North Sea that have been required to present a MEEB case as part of a DCO application, the Applicant has prepared an 'in principle' MEEB roadmap. This document outlines

which measures identified by the Applicant are considered suitable for delivering MEEB for sedimentary features of the Holderness Offshore MCZ.

3.17.C.16.3 The Applicant has undertaken an extensive literature review to compile a long list of potentially suitable options that could be progressed as MEEB on an 'in principle' basis.

3.17.C.16.4 Each of these options has been assessed in accordance with industry guidance and using publicly available information from other projects' DCO documentation. From a long list of options, three have been identified as having higher merit to successfully offset Project impacts. The three options considered to represent the most suitable MEEB for the Project are:

- designation of a new MPA and/or extension of an existing MPA
- removal of redundant infrastructure
- habitat restoration – planting of Native oyster or Horse mussel beds.

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Annex A

Comparative Assessment and Scoring Methodology

Following the identification of the long list MEEB options, each long list measure was interrogated using a comparative assessment approach to determine its suitability to offset project-related impacts within the Holderness Offshore MCZ. The comparative assessment followed a logical process assessing each of the 19 design options against six criteria. For each assessment criteria, 'matters to be considered' were developed with reference to the European Commission ((2018), Ref 3.17.C.13) guidance and the conservation objectives for the MCZ. Each criterion and individual matter to be considered was then scored on a one to three scale, three being the highest best outcome with the highest confidence. The single exception to this was the 'Hierarchy of measure (location/specificity)' criteria which was scored from one to four to reflect the DEFRA hierarchy scores (DEFRA, 2021) Ref 3.17.C.10). **Annex Table 3.17.C--1** Comparative assessment criteria presents the 'matters to be considered' that were used in the assessment.

Annex Table 3.17.C--1 Comparative assessment criteria

Matter to be Considered	Description
Hierarchy of measure (location/specificity)	Does the measure target the impacted feature(s) at the same location, or is the focus of the measure a different feature and/or different location?
Confidence in effectiveness	Is there confidence that the measure would be effective at delivering the required compensation at the proposed location?
Technical feasibility	Does the technology/policy/legislative framework for delivery of this option exist, is the methodology matured? Is the measure designed according to the best scientific knowledge, and is it targeted to the impacted feature? Is there confidence in the delivery if this option?
Scale/extent	Can the measure be feasibly delivered at the extent (e.g. at the necessary size/area/duration) needed to deliver the required compensation?
Timescale to implementation	Are the timescales for implementation suitable and proportionate to the anticipated ecological impacts? Do timescales ensure the continuity of the NSN?
Cost considerations	Does the measure include any aspects likely to result in particularly high costs or that would be prohibitively expensive?

Annex Table 3.17.C--2 Comparative assessment scoring systemprovides the definitions used to determine the score/rank for each assessment category for the long list MEEB options. For each design option the matter to be considered has been scored using the ranking, with green corresponding to 'high' score, amber corresponding to a 'medium' score, and 'red' to a low score. The use of a red, amber, green ('RAG') scoring system allowed for a visual assessment as well as a quantitative one to aid in clarity of the individual outcomes.

Annex Table 3.17.C--2 Comparative assessment scoring system

Ranking/score	Definition
3	• High confidence in effectiveness, approach proven by other projects. • The measure can be delivered at large scale to deliver full compensation, ecological function will be re-instated rapidly so a ratio of 1:1 is appropriate. • The measure can deliver compensation before ecological impacts occur. • Costs associated with the measure are relatively low. • Easy option to implement and technically feasible. The technology, policy and/or legislative framework exists and is of high scientific quality and targeted to the impacted feature.
2	• Some confidence in effectiveness, similar approaches proven by other projects in different environments. • The measure can be delivered at the required extent, but no excess gains expected. Ratios of >1:1 will be required. • The measure will be operational by the time impacts occur, but compensation will not be fully delivered. • Costs associated with this measure are substantial. • There are challenges associated with implementation. The technology, policy and/or legislative framework exists but substantial revisions are needed.
1	• Low confidence in effectiveness, unproven by other projects. • The measure cannot be realised at the required extent. • There is little confidence in the measure being in place before impacts occur. • Costs associated with this measure are extreme. • Technical delivery is not feasible.
Hierarchy of measure (location/specificity)	
4	Addresses the same impact at the same location
3	Addresses same ecological function at different location
2	Addresses comparable ecological function at the same location
1	Addresses comparable ecological function at different location

Following the scoring of each category for all of the long list options, the options were ranked to investigate which measures scored most highly. Using the scores that had not been subject to any transformation resulted in six ranks. To introduce more sensitivity to the scoring process, alternative scoring methods were employed to determine if they changed the overall ranking of the MEEB options being assessed. These included square and cubic scoring which introduced a higher degree of sensitivity in the scoring process. **Annex Table 3.17.C--3 Conversion of ranking to criteria score**shows the conversion of ranking used.

For the evaluation of the MEEB long list measures, square scoring was used as it showed more sensitivity than linear scoring. Cubic scoring and square scoring were identical in sensitivity and resulted in the same ranking of options i.e. 13 rank positions each under respective treatments.

Annex Table 3.17.C--3 Conversion of ranking to criteria score

Ranking	Linear	Square	Cubic
1	1	1	1
2	2	4	8
3	3	9	27
4	4	16	64
5	5	25	125

Square and cubic scoring allowed for a degree of nuance to be determined between the options and therefore square scoring was used to determine the highest scoring option. The suitability of alternative scoring treatments was tested by examining how options ranked when scored using linear, square, or cubic ranking with the objective of increasing score granularity. When no weighting was applied to the scores (linear), the results were sorted into six ranks i.e. three options came first, two options came second, two options came third and four options came fourth fifth, and sixth respectively. When square weighting was applied, the granularity of the results increased, with 13 score ranks emerging. Cubic weighting resulted in 12 ranks and offered no additional clarity between MEEB options. The scores under each scoring treatment are shown in **Annex Table 3.17.C--4** Comparative Assessment scores under scoring treatments**.**

Under all scoring mechanisms, Option 4 (MCZ site extension) scored the highest followed by Option 9 (new MPA site designation) and Option 2 (Removal of redundant infrastructure within the MCZ). Conversely, Options 11 (planting of oyster beds within the MCZ), 12 (planting of mussel beds within the MCZ), 14 (control of MINNS) and 17 (planting of horse mussel beds at an alternative location) were ranked as the lowest and least preferable options. The low ranking of these options is largely attributable to the low level of confidence in effectiveness and a lack of technical feasibility for the methodologies in the proposed locations.

Annex Table 3.17.C--4 Comparative Assessment scores under scoring treatments

Option	Linear Score	Linear Ranking	Square Score	Square Ranking	Cubic Score	Cubic Ranking
Removal of marine debris (including fishing equipment) within the MCZ.	13	4	35	7	109	5
Removal of redundant infrastructure within the MCZ (e.g. cables, rock protection, O&G infrastructure, redundant pipelines, scour protection, pipeline protection).	15	2	43	3	135	2
Habitat recreation within the MCZ - use of dredged material to restore sublittoral sediment /Ocean quahog habitat damaged by fishing activity/lost to infrastructure.	12	5	30	9	90	8
MCZ site extension	16	1	46	1	142	1
Fisheries management measures (spatial reduction or development of management mechanism) inside of the MCZ.	14	3	38	5	116	4
Removal of marine debris (including fishing equipment) outside of the MCZ.	12	5	28	10	72	10
Marine debris awareness & engagement campaign (stakeholder engagement), amnesty gear collection	14	3	36	6	98	7
Removal of redundant infrastructure outside of the Holderness Offshore MCZ (e.g. cables, O&G infrastructure, redundant pipelines, scour protection, pipeline protection) but with an MCZ designated for similar features	15	2	39	4	105	6
New MPA site designation	16	1	44	2	124	3
Removal of aggregate extraction pressure outside of the Holderness Offshore MCZ	14	3	36	6	98	7

Option	Linear Score	Linear Ranking	Square Score	Square Ranking	Cubic Score	Cubic Ranking
Planting oyster (Ostrea edulis) beds within the MCZ (biogenic reef creation).	11	6	23	12	53	12
Planting blue mussel (Mytilus edulis) beds within the MCZ (biogenic reef creation).	11	6	23	12	53	12
Planting Horse mussel (Modiolus modiolus) beds within the MCZ (biogenic reef creation).	13	4	31	8	79	9
Control of marine invasive non-native species (MINNS) (e.g. C. fornicata) within MCZ to remove competitor effects on vulnerable species.	11	6	23	12	53	12
Planting of native oyster (Ostrea edulis) beds outside of the MCZ.	13	4	31	8	79	9
Planting of blue mussel beds outside of the MCZ.	12	5	26	11	60	11
Planting of Horse mussel beds outside of the MCZ.	11	6	23	13	53	12
Fisheries management measures (spatial reduction or development of management mechanism) outside of the MCZ.	13	4	31	8	79	9
Seagrass restoration or establishment to act as a carbon sink outside of the MCZ.	12	5	28	10	72	10

The scores for each option under different weighting scenarios are presented in **Annex Table 3.17.C-** 5 Outcomes for weighting scenarios. It is apparent that Option 9 (new MPA site designation) still presented as the preferred measure across all scenarios, though the performance of this option was variable depending on the weighting applied. Some options that were consistently high-ranked options in absence of any weighting demonstrated relatively high variability across different scenarios e.g. Option 4 (MCZ site extension).

Annex Table 3.17.C- 5 Outcomes for weighting scenarios

MEEB	Weighted scenarios									
	Effectiveness twice as important	Rank	Technical feasibility twice as important	Rank	Location twice as important	Rank	Scale/extent twice as important	Rank	Timescale twice as important	Rank
Removal of marine debris (including fishing equipment) within the Holderness Offshore MCZ.	286	9	286	9	272	6	329	7	400	6
Removal of redundant infrastructure within the Holderness Offshore MCZ	514	3	443	5	386	3	514	3	443	4
Habitat recreation - use of dredged material to restore sublittoral sediment/Ocean quahog habitat damaged by fishing activity/lost to infrastructure.	214	10	214	10	200	7	257	9	257	9
MCZ site extension	557	2	486	4	429	2	557	2	486	3
Fisheries management measures (spatial reduction or development of management mechanism) inside of MCZ.	372	8	329	8	314	5	443	5	372	7
Removal of marine debris (including fishing equipment) outside of the Holderness Offshore MCZ.	286	9	286	9	272	6	329	7	400	6

MEEB	Weighted scenarios									
	Effectiveness twice as important	Rank	Technical feasibility twice as important	Rank	Location twice as important	Rank	Scale/extent twice as important	Rank	Timescale twice as important	Rank
Marine debris awareness & engagement campaign (stakeholder engagement), amnesty gear collection	443	5	443	5	386	3	400	6	514	2
Removal of redundant infrastructure outside of the Holderness Offshore MCZ but within an MCZ designated for similar features	557	2	486	4	429	2	557	2	486	3
New MPA site designation	629	1	629	1	500	1	629	1	557	1
Removal of aggregate extraction pressure outside of the Holderness Offshore MCZ	443	5	400	7	386	3	514	3	514	2
Planting oyster (*O. edulis*) beds within the Holderness Offshore MCZ (biogenic reef creation).	286	9	286	9	272	6	400	6	329	8
Planting blue mussel (*M. edulis*) beds within the Holderness Offshore MCZ (biogenic reef creation).	286	9	286	9	272	6	400	6	329	8
Planting Horse mussel (*M. modiolus*) beds within the Holderness Offshore MCZ (biogenic reef creation).	400	7	514	3	386	3	514	3	443	4

MEEB	Weighted scenarios									
	Effectiveness twice as important	Rank	Technical feasibility twice as important	Rank	Location twice as important	Rank	Scale/extent twice as important	Rank	Timescale twice as important	Rank
Control of MINNS (e.g. *C. fornicata*) inside of MCZ to remove competitor effects on vulnerable species.	286	9	400	7	272	6	286	8	329	8
Planting of Native oyster (*O. edulis*) beds at an alternative location.	486	4	557	2	429	2	557	2	486	3
Planting of blue mussel beds at an alternative location.	414	6	414	6	357	4	486	4	414	5
Planting of Horse mussel beds at an alternative location.	372	8	329	8	314	5	443	5	372	7
Fisheries management measures (spatial reduction or development of management mechanism) outside of the MCZ.	557	2	486	4	429	2	557	2	486	3
Seagrass restoration or establishment to act as a carbon sink.	400	7	514	3	386	3	514	3	443	4

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