



Sheringham Shoal and Dudgeon Offshore Wind Farm Extension Projects

Appendix 1: In-Principle Cromer Shoal Chalk Beds (CSCB) Marine Conservation Zone (MCZ) Measures of Equivalent Environmental Benefit (MEEB) Plan (Revision C) (Clean Version)

Revision C

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Glossary of Acronyms

CSIMP	Cable Specification and Installation Monitoring Plan
CSCB	Cromer Shoal Chalk Beds
DCO	Development Consent Order
DEP	Dudgeon Extension Project
DEEP	Dornoch Environmental Enhancement Project
DOW	Dudgeon Offshore Wind Farm
EIFCA	Eastern Inshore Fisheries and Conservation Authority
ES	Environmental Statement
HDD	Horizontal Directional Drilling
HOW03	Hornsea Three Offshore Wind Farm
HRA	Habitats Regulations Assessment
INNS	Invasive Non-Native Species
IROPI	Imperative Reasons of Overriding Public Interest
JNCC	Joint Nature Conservation Committee
MCZA	Marine Conservation Zone Assessment
MCZ	Marine Conservation Zone
MEEB	Measures of Equivalent Environmental Benefit
MPA	Marine Protected Area
NORI	Native Oyster Restoration Initiative
OSP	Offshore Substation Platform
PEIR	Preliminary Environmental Information Report
SAC	Special Area of Conservation
SEP	Sheringham Shoal Extension Project
SNCB	Statutory Nature Conservation Body
SOW	Sheringham Shoal Offshore Wind Farm

Glossary of Terms

<p>The Applicant</p>	<p>Equinor New Energy Limited. As the owners of SEP and DEP, Scira Extension Limited (SEL) and Dudgeon Extension Limited (DEL) are the named undertakers that have the benefit of the Development Consent Order. References in this document to obligations on, or commitments by, 'the Applicant' are given on behalf of SEL and DEL as the undertakers of SEP and DEP.</p>
<p>Dudgeon Offshore Wind Farm Extension Project (DEP)</p>	<p>The Dudgeon Offshore Wind Farm Extension onshore and offshore sites including all onshore and offshore infrastructure.</p>
<p>DEP offshore site</p>	<p>The Dudgeon Offshore Wind Farm Extension consisting of the DEP wind farm site, interlink cable corridors and offshore export cable corridor (up to mean high water springs).</p>
<p>DEP North array area</p>	<p>The wind farm site area of the DEP offshore site located to the north of the existing Dudgeon Offshore Wind Farm</p>
<p>DEP South array area</p>	<p>The wind farm site area of the DEP offshore site located to the south of the existing Dudgeon Offshore Wind Farm</p>
<p>DEP wind farm site</p>	<p>The offshore area of DEP within which wind turbines, infield cables and offshore substation platform/s will be located and the adjacent Offshore Temporary Works Area. This is also the collective term for the DEP North and South array areas.</p>
<p>Marine Protected Areas</p>	<p>A suite of protected sites within the marine environment consisting of Marine Conservation Zones (MCZs) under the Marine and Coastal Access Act 2009 (the MCAA), Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) pursuant to the Conservation of Habitats and Species Regulations 2017 and the Conservation of Offshore Marine Habitats and Species Regulations 2017 (together, the Habitats Regulations); together with relevant parts of Ramsar sites and marine elements of Sites of Special Scientific Interest (SSSIs), which together form an ecologically coherent and well-managed network of marine protected areas.</p>
<p>Offshore export cable corridor</p>	<p>This is the area which will contain the offshore export cables between offshore substation platform/s and landfall, including the adjacent Offshore Temporary Works Area.</p>

Offshore export cables	The cables which would bring electricity from the offshore substation platform(s) to the landfall.
Sheringham Shoal Offshore Wind Farm Extension Project (SEP)	The Sheringham Shoal Offshore Wind Farm Extension onshore and offshore sites including all onshore and offshore infrastructure.
SEP offshore site	Sheringham Shoal Offshore Wind Farm Extension consisting of the SEP wind farm site and offshore export cable corridor (up to mean high water springs).
SEP wind farm site	The offshore area of SEP within which wind turbines, infield cables and offshore substation platform/s will be located and the adjacent Offshore Temporary Works Area.

1. Introduction

1.1 Revision C Deadline 2 Updates

1. This document has been updated at Deadline 2. As noted in **Section 1.2** below, the Applicant updated **Figure 8.1** to address comments from Natural England however an error during PDF'ing meant the updated figure was not incorporated into Revision B and therefore this has now been included in this Revision C.

1.2 Revision B Deadline 1 Updates

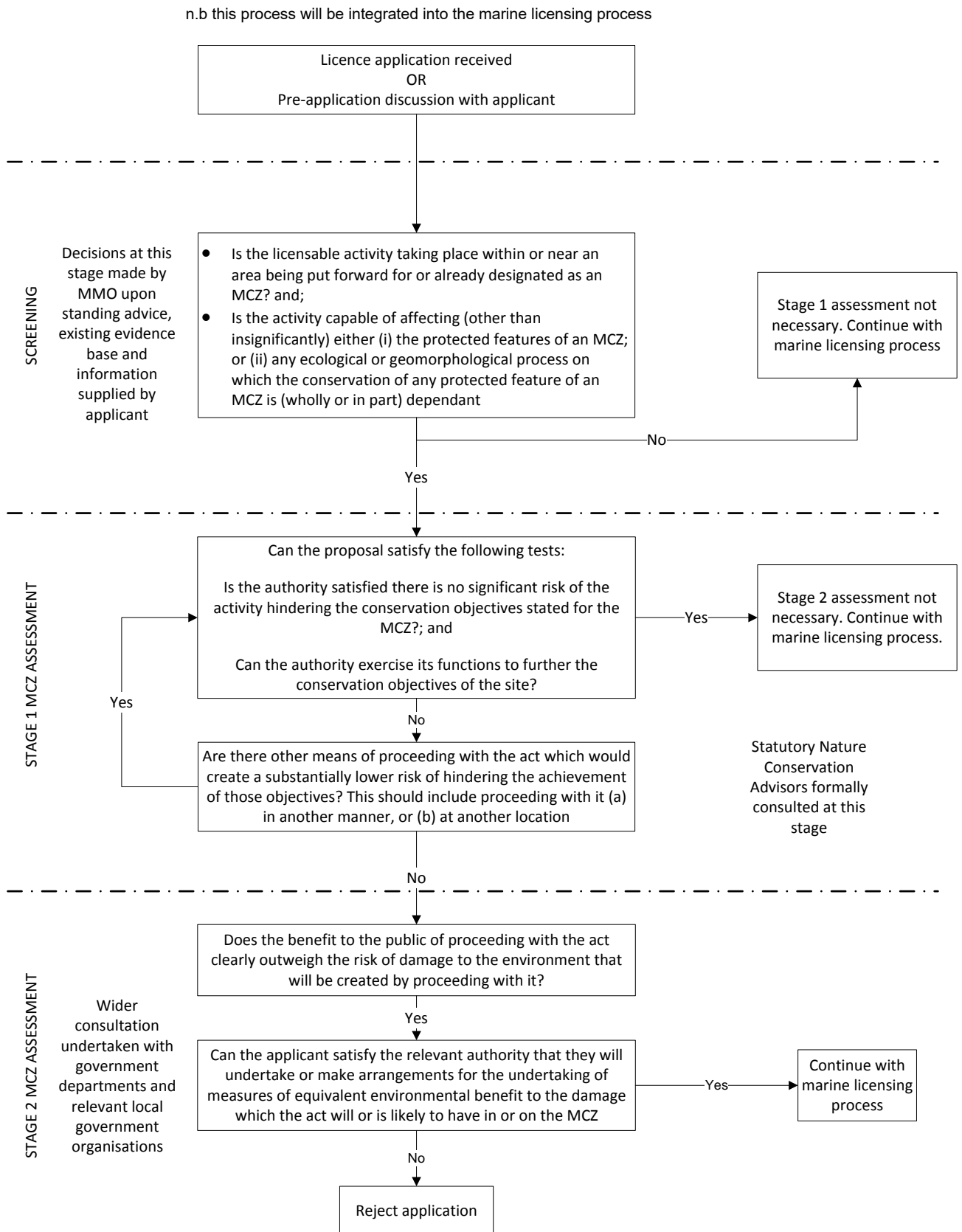
2. This document has been updated to Revision B at Deadline 1 to address comments from Natural England within Appendix G of their Relevant Representation (RR-063). Other minor updates to provide clarification or increase the robustness of the proposals have also been provided. Updates include:
 - Update to **Section 8.1** to remove text stating “*This would restore the status of native oyster in the CSCB MCZ to that of a healthy native oyster population*”. The Applicant's proposals are to restore an oyster bed of 10,000m² and ‘partially’ restore a historic feature of the region;
 - **Figure 8.1** updated to address comment from Natural England ‘*Natural England therefore advises against the placement of cultch and restoration of an Oyster bed in the middle of a mixed sediment area. For this to be considered as additionality we advise that it would be better to extend/enhance the area of the mixed sediment on the boundary with impoverished coarse sediment e.g. in the centre of the ‘c’ shaped mixed sediment area or north/south of the blue rectangle*’;
 - More information on biosecurity has been added to **Section 8.4.3.3**.
 - Provision for larval dispersal studies (**Table 8.2**).
 - Removal of MEEB DCO condition wording from Annex D which is now contained within the **Proposed Without Prejudice DCO Drafting (Revision B)** [document reference 3.1.3].

1.3 Background

3. The Sheringham Shoal Offshore Wind Farm Extension Project (hereafter SEP) and Dudgeon Offshore Wind Farm Extension Project (hereafter DEP) are proposed extensions to the existing Sheringham Shoal and Dudgeon offshore wind farms. When operational, SEP and DEP combined would have the potential to generate renewable power for around 785,000 United Kingdom (UK) homes per year from up to 23 wind turbines at SEP and up to 30 wind turbines at DEP.
4. As the owners of SEP and DEP, Scira Extension Limited (SEL) and Dudgeon Extension Limited (DEL) are the named undertakers that have the benefit of the Development Consent Order. References in this document to obligations on, or commitments by, ‘the Applicant’ are given on behalf of SEL and DEL as the undertakers of SEP and DEP.

5. SEP and DEP will be connected to shore by offshore export cables installed to the landfall at Weybourne, on the north Norfolk coast. There will be up to two export cables, installed in two separate trenches. Horizontal directional drilling will be used for installation of the export cables at the landfall, from an onshore joint transition bay, under the intertidal zone to approximately 1,000m from the coastline.
6. As described in the **Scenarios Statement** [APP-314], SEP or DEP may be developed in isolation or both Projects may be developed. There are differing requirements for external cable protection depending on whether SEP or DEP are built in isolation or if SEP and DEP are both built (see **Section 6**).
7. The offshore export cable corridor passes through the Cromer Shoal Chalk Beds (CSCB) Marine Conservation Zone (MCZ). It is therefore possible that project activities could be capable of significantly affecting the protected features of the MCZ and therefore this site has been screened into a MCZ assessment (MCZA) for further consideration. The **Stage 1 CSCB MCZA** [APP-077] concludes that the conservation objective of maintaining the protected features of the CSCB MCZ in a favourable condition will not be hindered by the construction, operation and decommissioning phases of SEP or DEP in isolation, SEP and DEP combined or cumulatively with any other plan, project or activity. However, in light of consultation from stakeholders (see the **Consultation Report** [APP-029], the Applicant is providing a Stage 2 assessment, on a precautionary and without prejudice basis to enable consultation on Stage 2 to be undertaken pre-application and during examination, should it be required in the consent determination process. The stages of the MCZA are shown in **Plate 1.1**.

Plate 1-1 Flow chart summary of the MCZ Assessment process used by the MMO during marine licence determination (MMO, 2013)



1.4 Purpose of this Document

8. This document provides the In-Principle Measures of Equivalent Environmental Benefit (MEEB) Plan to support the Stage 2 MCZA. The planting of a native oyster bed within the CSCB MCZ will be progressed as the primary MEEB, if the Secretary of State is unable to reach a conclusion of no significant risk of SEP and/or DEP hindering the conservation objectives of the MCZ (either alone or in-combination). The proposed approach to delivery of oyster bed planting within the CSCB MCZ is described in **Section 8**.
9. Draft versions of the In-Principle MEEB Plan were consulted upon with the members of the Seabed Expert Topic Group, as a part of the Evidence Plan Process (**Section 4**). This document provides the updated In-Principle MEEB Plan, taking account of stakeholder feedback (see **Annex B**).
10. As noted in **Section 1.3**, the provision of evidence supporting the case for derogation, including this In-Principle MEEB Plan, is entirely without prejudice to the Applicant's position provided in the **Stage 1 CSCB MCZA [APP-077]**, that there will be no significant risk of hindering the conservation objectives of the CSCB MCZ.
11. The In-Principle MEEB Plan has been submitted with the DCO application to demonstrate the feasibility of potential measures and to set out the information that will be required in the MEEB Implementation and Monitoring Plan (if required). The Applicant expects that, in the event the Secretary of State is unable to reach a conclusion of no significant risk of SEP and DEP hindering the conservation objectives of the MCZ (either alone or in-combination), a requirement will be included in the DCO for the submission and approval of a MEEB Implementation and Monitoring Plan for the CSCB MCZ, prior to the commencement of works.

1.5 Implications of the Project Development Scenarios

12. As indicated above, SEP and DEP may be delivered under a range of project development scenarios. Details of the scenarios and how these are reflected in the DCO application is set out in the **Scenarios Statement [APP-314]**. The pre-application engagement relating to the In-Principle MEEB Plan has assumed that both projects are developed, and the proposed MEEB measure is considered by the Applicant to deliver the level of MEEB required in comparable proportion (factoring in the risks and uncertainties associated with delivering successful MEEB) to address the worst-case impacts of both SEP and DEP, as required by draft Defra guidance (Defra, 2021).
13. The scenario under which SEP and/or DEP will be delivered will be confirmed prior to the commencement of the authorised development, and the **Draft DCO (Revision D)** [document reference 3.1] secures the requirement to notify the relevant planning authority and the MMO as appropriate of which scenario is being undertaken. This will need to be confirmed before further requirements of the DCO and conditions of the Deemed Marine Licences (DMLs) can be discharged.
14. The Applicant has considered the requirements for MEEB under each project development scenario and has determined that the delivery of the proposed measures under each scenario is dependent on how scalable the given measure is.

15. The project development scenarios for SEP and DEP can be broadly categorised as:
 - In isolation – where only SEP or DEP is constructed;
 - Sequential – where SEP and DEP are both constructed in a phased approach with either SEP or DEP being constructed first; or
 - Concurrent – where SEP and DEP are both constructed at the same time.
16. The **Scenarios Statement** [APP-314] describes the ambition to deliver SEP and DEP with an integrated transmission system, however the predicted impacts on the CSCB MCZ are no different if the transmission system for the two projects are delivered integrated or separately.
17. Where both projects are delivered in the sequential scenario, the overall final MEEB to be delivered will be the same as in the concurrent scenario. The Applicant therefore considers it practical to deliver all of the MEEB at the same time under either the sequential or concurrent scenario. In the sequential scenario this may mean that one project delivers MEEB earlier than may have otherwise been required if it were a standalone project, which could be at risk e.g. prior to Final Investment Decision (FID). The Applicant considers however that the second project would have the benefit of the MEEB being in place slightly longer than the first project thereby reducing pressure on the onward project programme.
18. Should SEP or DEP be delivered in isolation, it would be necessary to deliver only the scale of measures required to achieve adequate MEEB in proportion to the impacts predicted from the given project (SEP or DEP). Where this is not practical because the measure is not ecologically scalable, the Applicant is proposing to deliver the MEEB measure to its full extent. Where MEEB is scalable, or partially scalable, the measure would be delivered on a scale appropriate to the nature and extent of the predicted impact from SEP, or from DEP. With respect to oyster bed planting within the CSCB MCZ, this measure is not considered scalable owing to the overall aim of establishing a self-sustaining oyster bed (which requires a minimum size to be implemented in order for the oyster bed to successfully self-seed). As such, this MEEB (should it be required) would be delivered to its full extent outlined in **Section 8**, irrespective of whether SEP or DEP are built in isolation or if SEP and DEP are both built.
19. As owners of SEP and DEP, Scira Extension Limited (SEL) and Dudgeon Extension Limited (DEL) are the named undertakers that have the benefit of the DCO. References throughout this document and any supporting annexes to obligations on, or commitments by, 'the Applicant' are given on behalf of SEL and DEL as the undertakers of SEP and DEP.

2. Legislation and Guidance

2.1 Marine and Coastal Access Act 2009

20. Information on the Marine and Coastal Access Act (MCAA) 2009 and MCZA is provided in the **Stage 1 CSCB MCZA** [APP-077] and **MCAA Derogation: Provision of Evidence** [APP-082].
21. With regard to MEEB, Section 126(7) of the MCAA 2009 states:

“...although the person seeking the authorisation is not able to satisfy the authority that there is no significant risk of the act hindering the achievement of the conservation objectives stated for the MCZ, that person satisfies the authority that—
(a) there is no other means of proceeding with the act which would create a substantially lower risk of hindering the achievement of those objectives,
(b) the benefit to the public of proceeding with the act clearly outweighs the risk of damage to the environment that will be created by proceeding with it, and
(c) the person seeking the authorisation will undertake, or make arrangements for the undertaking of, measures of equivalent environmental benefit to the damage which the act will or is likely to have in or on the MCZ.”

22. Parts (a) and (b) are addressed separately in the SEP and DEP **MCZA Derogation: Provision of Evidence** [APP-082]. Therefore, this document focuses only on MEEB that may be required under Section 126(7)(c) of the MCAA 2009.

2.2 Guidance on MEEB

23. The current and draft Overarching National Policy Statement for Energy (EN-1) highlights the purpose of MCZs of conserving marine flora or fauna, marine habitats or types of marine habitat or features of geological or geomorphological interest and notes that the Secretary of State’s decision making is bound by the duties in relation to MCZs imposed by sections 125 and 126 of the MCAA 2009. The draft National Policy Statement for Renewable Energy Infrastructure (EN-3) states that applicants should refer to the latest Defra compensation guidance. Defra (2021a) draft best practice guidance for developing compensatory measures in relation to Marine Protected Areas (MPA) includes MCZs and sets out the following principles that compensation/MEEB should satisfy:
- *“Link to the conservation objectives for the site or feature and address the specific damage caused by the permitted activity;*
 - *Focus on providing the same ecological function for the species or habitat that the activity is damaging OR, where this is not technically possible, provide functions and properties that are comparable to those that originally justified designation;*
 - *Not negatively impact on any other sites or features;*
 - *Ensure the overall coherence of designated sites and the integrity of the MPA network; and*
 - *Be able to be monitored to demonstrate that they have delivered effective and sustainable compensation for the impact of the project. The monitoring and management strategy must require further action to be taken if the compensation is not successful.”*
24. In relation to the second bullet point above, the guidance provides a hierarchy approach (shown in **Table 2.1**).

Table 2.1: MEEB Hierarchy (Source: Defra, 2021a)

Hierarchy of Measures	Description
1. Address same impact at same location	Address the specific impact caused by the permitted activity in the same location (within the site boundary)
2. Same ecological function different location	Provide the same ecological function as the impacted feature; if necessary, in a different location (outside of the site boundary)
3. Comparable ecological function same location	Provide ecological functions and properties that are comparable to those that originally justified the designation in the same location as the impact
4. Comparable ecological function different location	Provide ecological functions and properties that are comparable to those that originally justified designation; if necessary, in a different location (outside of the site boundary)

25. The guidance states that the MEEB should be secured before the impact takes place, recognising that ideally the MEEB would be functioning prior to construction but that this is not always possible: *“Where this is not possible, it is important that necessary licences are in place, finances are secured, and realistic implementation plans have been agreed with the appropriate bodies to demonstrate that the compensatory measure is secured.”*
26. **Table 2.2** provides an overview of minimum requirements for MEEB provided in Defra (2021a), along with cross-references to where this information is provided within the In-Principle MEEB Plan (this document).

Table 2.2: MEEB Requirements (Source: Defra, 2021a)

MEEB Requirement	SEP & DEP MEEB
The extent of the impact – the number and status of the features affected	Provided in Section 5
The environmental value and function of the affected feature	Provided in Section 5.2.1
The environmental value and function of the proposed compensatory measure	Provided in Section 8.2
The location of the proposed compensatory measure	Provided in Section 8.3 and Annex C
How quickly compensatory measures are expected to be functioning and contributing to the network	Provided in Section 8.7 and Annex C.
The confidence in the measure being entirely effective	Provided for each potential measure in Section 8.8
Ability for its success to be monitored and managed accordingly	Provided for each potential measure in Section 8.5

3. Development of Potential MEEB – Methodology

3.1 General Approach

27. Annex A outlines the approach that was taken to review the feasibility of a range of potential MEEB options. Through consultation on this document throughout the pre-application stage (**Section 4**) the planting of an oyster bed in the CSCB MCZ was identified as the preferred measure.
28. A detailed literature review and engagement with relevant parties was then undertaken to inform the development of this In-Principle MEEB Plan in terms of:
- The environmental benefit it would provide to the value and function of the MCZ;
 - The location and spatial scale;
 - Post-consent development and licensing;
 - Potential sources of cultch and oyster;
 - Deployment method;
 - Approach to monitoring and adaptive management;
 - Commitment to funding;
 - Programme for delivery of the MEEB;
 - Confidence in the likely success of the MEEB; and
 - Planned ongoing consultation.

4. Consultation

29. Section 127(1) of the MCAA 2009 states that *“The appropriate statutory conservation body may give advice and guidance as to... (e) which activities are, or are not, of equivalent environmental benefit (for the purposes of section 126(7)(c)) to any particular damage to the environment (within the meaning of that provision)”*. This In-Principle MEEB Plan therefore aims to inform without prejudice discussions with relevant stakeholders.
30. Consultation on the draft outline In-Principle MEEB Plan was undertaken in Q2/3 2021 with the members of the Seabed Expert Topic Group (ETG), as a part of the Evidence Plan Process. A revised draft In-Principle MEEB Plan version 1 was then submitted to the ETG, followed by a meeting in Q4 2021. Another ETG meeting was held in Q1 2022. A summary of the consultation timeline for the various iterations of the MEEB Plan is provided in **Table 4.1**. **Annex B** provides the Applicant’s response to key comments received from stakeholders on the draft versions of the In-Principle MEEB plan and ETG meeting comments.

Table 4.1: Completed and Planned Consultation on the MEEB Documents

Document Name/Version	Date of Consultation	Description
Draft Outline In-Principle MEEB Plan	March 2021 (complete)	Outline document which set out the legislative and policy context for MEEB and provided an initial review of potential MEEB.

Document Name/Version	Date of Consultation	Description
Draft In-Principle MEEB Plan version 1	September 2021 (complete)	Based on stakeholder feedback on the above, further refinement of the MEEB measures proposed was undertaken with additional detail included for measures deemed by stakeholders to be most suitable.
Draft In-Principle MEEB Plan version 2	December 2021 (complete)	Based on stakeholder feedback on the above, further refinement of the MEEB measures proposed was undertaken with additional detail included for measures deemed by stakeholders to be most suitable.
Final In-Principle MEEB Plan	August 2022 (DCO submission document)	The final in-principle version submitted with the DCO application
MEEB Implementation and Monitoring Plan	Post-consent	If required, this document would be the MEEB Implementation and Monitoring Plan to be delivered under the DCO requirement.

5. Cromer Shoal Chalk Beds MCZ

31. The CSCB MCZ (**Figure 8.1**) extends from Weybourne to Happisburgh, approximately 200m seaward from low water mark to a distance of between 5 and 10km offshore, enclosing an area of 315.64km² (Net Gain, 2011).

5.1 Conservation Objectives

32. The conservation objective of the MCZ is that the protected habitats (Natural England, undated):

- *“are maintained in favourable condition if they are already in favourable condition*
- *be brought into favourable condition if they are not already in favourable condition*

For each protected feature, favourable condition means that, within a zone:

- *its extent is stable or increasing*
- *its structure and functions, its quality, and the composition of its characteristic biological communities (including diversity and abundance of species forming part or inhabiting the habitat) are sufficient to ensure that its condition remains healthy and does not deteriorate*

For the feature of geological interest, favourable condition means that, within a zone:

- *its extent, component elements and integrity are maintained*
- *its structure and functioning are unimpaired*
- *its surface remains sufficiently unobscured for the purposes of determining whether the conditions in paragraphs (1) and (2) are satisfied.*

Any temporary deterioration in condition is to be disregarded if the habitat is sufficiently healthy and resilient to enable its recovery.

Any alteration to a feature brought about entirely by natural processes is to be disregarded when determining whether a protected feature is in favourable condition.”

33. At the time of writing, no condition assessment is available for the CSCB MCZ however it is understood that Natural England is in the process of updating the condition assessment.

5.2 Designated Features

34. The site is designated for the features listed in **Table 5-1**. **Table 5-1** also outlines the features of the CSCB MCZ which the SEP and DEP offshore export cables have potential to interact with (further information on the impacts of SEP and DEP on the features of the CSCB MCZ is provided in the **Stage 1 CSCB MCZA** [APP-077].

Table 5-1: CSCB MCZ Protected Features with Overlap of the Offshore Export Cable Corridor (✓)

Protected feature	Type of feature	Potential interaction with SEP/DEP export cables
High energy circalittoral rock	Broadscale marine habitat	✗ Horizontal Directional Drill (HDD) beyond nearshore rock/chalk
High energy infralittoral rock	Broadscale marine habitat	✗ HDD beyond nearshore rock/chalk
Moderate energy circalittoral rock	Broadscale marine habitat	✗ HDD beyond nearshore rock/chalk
Moderate energy infralittoral rock	Broadscale marine habitat	✗ HDD beyond nearshore rock/chalk
Subtidal coarse sediment	Broadscale marine habitat	✓
Subtidal mixed sediments	Broadscale marine habitat	✓
Subtidal sand	Broadscale marine habitat	✓
Peat and clay exposures	Marine habitat	✗ Not recorded in export cable corridor
Subtidal chalk	Marine habitat	✗ HDD beyond nearshore rock/chalk
North Norfolk Coast assemblage of subtidal sediment features and habitats	Feature of geological interest	✓ Natural England (2018) states “given the characteristics of the geomorphological feature we advise that the other features of the Cromer Shoal MCZ can be used as a proxy when considering operational/activities impacts in the interim.”

5.2.1 Value and Function of the Relevant Protected Features

35. There is currently little guidance or information on the value or function of subtidal coarse sediment; subtidal mixed sediments; and subtidal sand features that SEP and/or DEP have the potential to interact with. The CSCB MCZ Factsheet (Defra, 2016) discusses the importance of the MCZ, focussing on the infralittoral rock and chalk bed features. No Supplementary Advice on Conservation Objectives is currently available for the MCZ.
36. The primary value of subtidal sediment (coarse, mixed and sand) is assumed to be associated with the biological communities supported by these features and the role of this community in the wider ecosystem.
37. The following habitat classifications were identified during the site-specific survey (see Environmental Statement (ES) **Appendices 8.1 DEP Benthic Characterisation Report** [APP-184] and **8.2 SEP Benthic Characterisation Report** [APP-185]):
 - A5.1 Sublittoral coarse sediment
 - A5.431 *Crepidula fornicata* with ascidians and anemones on infralittoral coarse mixed sediment
 - A5.611 *Sabellaria spinulosa* on stable circalittoral mixed sediment
 - A5.44 Circalittoral mixed sediments
 - A5.13 Infralittoral coarse sediment
 - A5.233 *Nephtys cirrosa* and *Bathyporeia* spp. in infralittoral sand
38. Areas of these sandy, mixed and coarse substrates will support prey species for fish and seabirds, for example.
39. The function of the habitat is associated with the prevailing physical processes, allowing the natural development of the ecological community. **Chapter 6 Marine Geology, Oceanography and Physical Processes** [APP-092] of the ES describes the physical processes in the offshore export cable corridor. Sediment transport within the area of the offshore export cable corridor where it overlaps the CSCB MCZ is predominantly a non-mobile bed. Mobile bedforms were identified at two locations; these are the Holocene sand areas 3.2km to 4.2km offshore along the corridor, which includes the seaward extent of the MCZ (**Figure 8.1**).
40. The tidal range varies from about 3.0m towards the eastern end of the MCZ to about 4.5m towards its western end.
41. Along most of the offshore export cable corridor, the spring tide peak current flows are predicted to be 0.8-1.2m/s on both flood and ebb tides. Currents are directed west-northwest on a flood tide and east-southeast on an ebb tide. Neap tide peak current flows are predicted to be 0.4-0.8m/s on both flood and ebb tides. Within 1km of the coast the predicted spring tidal current flows reduce to less than 0.6m/s and re-orient to westerly on a flood tide and easterly on an ebb tide (coast-parallel).
42. Nearshore wave conditions are limited by protection afforded by sand banks such as Sheringham Shoal and Pollard Bank.

6. Summary of Potential Impacts on the Cromer Shoal Chalk Beds MCZ

43. The **Stage 1 CSCB MCZA** [APP-077] concludes there will be no risk of hindering the conservation objectives of the CSCB MCZ and therefore this In-Principle MEEB Plan is provided without prejudice to that position. For the purposes of developing the In-Principle MEEB Plan, proposals are based on experience from other offshore wind farm projects (e.g. Hornsea Three (HOW03), Norfolk Vanguard and Norfolk Boreas), whereby if there is any potential risk to the conservation objectives, it is most likely to be associated with long term (project lifetime) habitat loss from external cable protection.
44. The Applicant is committed to minimising external cable protection in the CSCB MCZ and has sought to refine the quantities required through the measures outlined in the **Stage 1 CSCB MCZA** [APP-077] and **Outline CSCB MCZ CSIMP** [APP-291]. As such, external cable protection will only be used where deemed to be essential, in the instance that adequate burial is not possible for any section of the route through the MCZ. It is noted that the existing SOW did not require any external cable protection to be installed in what is now the CSCB MCZ whilst DOW only required external cable protection at the HDD exit point. Additionally, these cables have not had to undergo any reburial or repair operations to date.
45. As secured through the **Outline CSCB MCZ CSIMP** [APP-291], all external cable protection used within the CSCB MCZ will be designed to be removable on decommissioning (i.e. no loose rock type systems will be used), although the requirement for removal will be agreed with stakeholders and regulators at the time. Detail describing the feasibility of, and commitment to, removing external cable protection is provided within **Appendix 3 Decommissioning Feasibility Study** [APP-294] of the **Outline CSCB MCZ CSIMP** [APP-291].
46. The worst case scenario for external cable protection in the MCZ is for an overall total of 1,800m², defined as:
- 600m² of external cable protection for unburied cables per Project. This is based on 100m length of protection per cable and a width of 6m (i.e. 600m² per cable). There would be one offshore export cable per Project, resulting in 1,200m² total for SEP and DEP combined. This could be installed anywhere along the length of the offshore export cable corridor inside the MCZ up to the approach to the HDD exit point (see below).
 - At the HDD exit point in the subtidal, in the transition zone between where the ducts exit the sea bed and the point at which it is possible for the burial tool to start the process of burying the cables. External cable protection may be required along up to 100m of each of the cables i.e. a total length of 200m for both cables. The cable protection would likely be in the form of removable 8 tonne rock bags up to 3m wide. The sea bed footprint of the installed rock bags would therefore be up to 600m² for both cables in total.

47. The area of removable external cable protection that is required to be installed within the CSCB MCZ for SEP or DEP in isolation is up to 900m² and for SEP and DEP is up to 1,800m². As noted in **Section 8.1**, for the purposes of the SEP and DEP In-Principle MEEB Plan, the preferred measure would be to deploy and maintain a native oyster bed of 10,000m² with an average density of 5 live oysters per m². As outlined in **Section 1.5**, this scale of oyster bed restoration would be delivered irrespective of whether SEP or DEP are built in isolation or if SEP and DEP are both built as it is considered to be the minimum size that could be implemented to achieve the overall aim of this MEEB which is to create a self-sustaining oyster bed. This would provide a greater than 1:5 ratio of MEEB if both Projects are built, or greater than 1:10 ratio if only one Project is built. Either way, the proposed MEEB offers long term enhanced ecological function to the habitat being lost and would restore a historic feature of the region. These ratios apply to the preferred measure of planting a native oyster bed. In the unlikely event that an alternative MEEB is required (see **Section 8.5.2**) the appropriate scale and therefore ratio would take account of the project development scenario (and therefore predicted impact), the scalability of the measure and the environmental benefit provided (factoring in the risks and uncertainties associated with delivering this measure) and would be agreed with the MEEB steering group (see **Section 8.1**).
48. As summarised in **Table 5-1**, the SEP and DEP offshore export cables have potential to impact on the subtidal coarse sediment, subtidal mixed sediments and subtidal sand features of the MCZ.
49. The Applicant has committed to using HDD at the landfall, with an exit point which avoids the area of outcropping chalk/rock in the nearshore.
50. The **Stage 1 CSCB MCZA** [APP-077] identifies the following biological attributes of the protected features, of relevance to long term habitat loss:
- Distribution: presence and spatial distribution of biological communities
 - Structure and function: presence and abundance of key structural and influential species
 - Structure: species composition of component communities
51. The installation of external export cable protection on sediment habitats will potentially result in localised mortality of associated biological communities and their replacement, over time, by a community with a different species composition and different key structural and influential species.
52. All sediment biotopes, including those recorded in the SEP and DEP offshore export cable corridor, and those identified in Natural England (2018) as being represented within CSCB MCZ sediment habitat features, have high sensitivity to physical change to another sea bed type, with no resistance and very low resilience. However, given the very small area of long-term sediment habitat loss, the presence, spatial distribution and characteristics of biological communities will largely be maintained across the CSCB MCZ. This scale of impact (0.0006% of the MCZ and a worst-case loss of 0.01% of the subtidal sand feature if all habitat loss were to this feature alone) is unlikely to alter the wider value of the feature, such as providing a nursery for fish and feeding ground for seabirds.

53. In addition, the **Stage 1 CSCB MCZA** [APP-077] assesses the following impacts on the form and function of the physical attributes of protected features, of relevance to long term habitat loss:
- Extent and distribution
 - Structure: sediment composition and distribution
 - Supporting processes: energy / exposure
54. The extent, distribution and structure of sediment features will largely be maintained across the CSCB MCZ. Subtidal coarse sediment, sand, and mixed sediment sea bed would be replaced by, or buried beneath, external export cable protection in localised and discrete areas (approximately 0.0007% of the estimated spatial extent of broadscale marine sediment and habitat features in the MCZ and a worst-case loss of 0.01% of the subtidal sand feature if all habitat loss were to this feature alone).
55. External cable protection would sit up to 0.5m proud of the original sea bed level and will locally change the exposure of adjacent areas to tidal currents and wave action, and potentially cause localised scour effects. Associated habitat loss through changes to sediment composition would be restricted to areas of mobile sediments (subtidal sand), although exposure changes may have more subtle effects on the biological communities associated with affected adjacent sediment habitats. However, any such impacts would be highly localised and within the estimated worst-case footprint of habitat loss. Following removal of external cable protection, the local energy environment would return to ambient conditions within natural variability.

7. MEEB Review

56. A review of potential MEEB, described in **Annex A**, was undertaken in consultation with the Seabed ETG (see **Annex B**). The options considered for the CSCB MCZ are summarised **Table 7.1**.

Table 7.1: Summary of Potential SEP and DEP Measures of Equivalent Environmental Benefit (Red – unlikely to be feasible; Amber – uncertain; and Green – likely to be feasible)

Hierarchy level (Defra, 2021b)	Possible measure and method	Proposed delivery mechanism/s	RAG and rationale				Next steps
			Deliverability	Spatial scale	Timescale	= Overall Potential Feasibility	
Same function, same location	Removal of anthropogenic features - marine debris within the CSCB MCZ	Survey to locate debris Agree removal method and license with MMO in consultation with NE. Commission removal of debris	This measure has been demonstrated to be legally securable by the HOW03 DCO.	A 1:1 ratio has been secured for HOW03. On this basis a survey area of 1,800m ² and debris removal would be required.	Could be implemented between consent and construction	Likely legal feasibility due to precedent set by HOW03, Norfolk Boreas and Norfolk Vanguard, however noted that this measure is not currently supported by stakeholders	This measure would be reviewed if required as a back up to the preferred measure (see Section 8).
Same function, same location	Removal of anthropogenic features - disused infrastructure within the CSCB MCZ	Agree removal of a disused cable with the owner, license and undertake the removal.	Deliverability is subject to agreement with the owner and identification of surface infrastructure that is causing an impact on the MCZ.	A 1:1 ratio may be appropriate in this case. This would require 1,800m ² of disused cable to be recovered. Consultation would be required with the owner to understand the parameters of the cable to ensure that this area can be removed.	Could be implemented between consent and construction	Uncertain Feasibility is subject to reaching agreement with the cable owner and identifying suitable infrastructure	This measure would be reviewed if required as a back up to the preferred measure (see Section 8).
Same function, same location	Planting of native oyster beds within CSCB MCZ	In order to deliver the planting of biogenic reef/beds, the developer would commission an appropriate organisation with experience and expertise in this field. Need to ensure beds are not damaged by commercial fisheries.	Suitable habitat is likely to be present, oyster beds are known to have been present in the area historically and the oyster beds would be protected by the management measures of the MCZ.	Deploy and maintain a native oyster bed of 10,000m ² with an average density of 5 live oysters per m ² . This would provide a greater than 1:5 ratio of MEEB if both Projects are built, or greater than 1:10 ratio if only one Project is built	Could be implemented between consent and installation of external cable protection within the CSCB MCZ noting that a self-sustaining reef could take longer to establish and would require ongoing monitoring.	Likely Evidence suggests suitable habitat is present in the region and that oyster beds have been successfully planted in other North Sea coastal locations. This measure is also supported by stakeholders (see Annex B)	If MEEB is required, progress this as the preferred measure (see Section 8).
Same function, different location	Removal of anthropogenic features outside the CSCB MCZ	As per removal of anthropogenic features within the MCZ, with an additional consultation phase to identify an appropriate location to target.	Comparable in deliverability to that being undertaken by HOW03, however this would be subject to an alternative location being identified	A 1:1 ratio has been secured for HOW03. On this basis a survey area of 1,800m ² and debris removal would be required.	Could be implemented between consent and construction or post-construction in the SEP or DEP wind farm sites	Uncertain, subject to information from stakeholders/third parties to assist in identifying an area to target. If an area can be identified the feasibility is expected to be high due to precedent set by HOW03	This measure would be reviewed if required as a back up to the preferred measure (see Section 8).
Same function, different location	Designation of feature in different location Identify alternative area of suitable feature for protection	Technical input and/or financial support to SNCB to progress site designation of alternative location or extension to existing MCZ.	Deliverability would be subject to identification of appropriate area and agreement with Regulator/SNCB	An area proportionate to the impact, whilst sufficient to achieve meaningful protection should be identified. The precise size of the designation/extension would be agreed with the Regulator in consultation with relevant stakeholders.	It is estimated that the designation process would take approximately 4 years, subject to the identification of suitable area(s).	Uncertain Feasibility is subject to confirming that suitable areas are available to be taken forward. This would then be subject to the statutory designation process.	This measure would be reviewed if required as a back up to the preferred measure (see Section 8).
Comparable function, same location	Fisheries management measures (i.e.	Financial contribution to developing fisheries management measures.	Would require strategic support from Government.	The extent would be agreed with the SNCB. The number of potting fishermen required to be	Uncertain timescale to establish fisheries management.	Uncertain	Not progressed further

Hierarchy level (Defra, 2021b)	Possible measure and method	Proposed delivery mechanism/s	RAG and rationale				Next steps
			Deliverability	Spatial scale	Timescale	= Overall Potential Feasibility	
	displacement of potting outside the MCZ; and innovative potting methods)			displaced to achieve this area would also need to be agreed.		Feasibility is subject to Government Authorities supporting fisheries management measures. Natural England have indicated that they would not support this measure (Annex B).	
Comparable function, different location	Planting of native oyster beds at an alternative location (e.g. within SEP and DEP wind farm sites)	In order to deliver the planting of biogenic reef/beds, the developer would commission an appropriate organisation with experience and expertise in this field. Need to ensure beds are not damaged by commercial fisheries.	Deliverability is subject to identifying a suitable area which could support native oyster and protect the area from commercial fishing pressure	Deploy and maintain a native oyster bed of 10,000m ² with an average density of 5 live oysters per m ² . This would provide a greater than 1:5 ratio of MEEB if both Projects are built, or greater than 1:10 ratio if only one Project is built	Could be implemented <5 years, however if required to be planted around the turbine foundations, the measure would have to be developed post construction but could be legally secured prior to construction in accordance with Defra (2021a). A self-sustaining reef could take longer to establish and would require ongoing monitoring.	Likely Evidence suggests suitable habitat would be present in the region and that oyster beds have been successfully planted in other locations. Noted that Eastern Inshore Conservation Authority (EIFCA) and Natural England prefer restoration within the CSCB MCZ.	This measure would be reviewed if required as a back up to the preferred measure (see Section 8).

8. Proposed Approach to Delivery of MEEB (if required)

8.1 Overview

57. If MEEB is deemed to be required by the Secretary of State, the planting of an oyster bed within the CSCB MCZ would be progressed as the preferred MEEB. This would be secured, by the MEEB DCO Condition Wording provided in the **Proposed Without Prejudice DCO Drafting (Revision B)** [document reference 3.1.3]. .
58. A MEEB steering group would be established who would be consulted on the production of the MEEB Implementation and Monitoring Plan (**Section 8.9.1**). The MEEB Implementation and Monitoring Plan would be based on the principles set out in this document.
59. For the purposes of the In-Principle MEEB Plan, the aim would be to deploy and maintain an oyster bed of 10,000m² with an average density of 5 live oysters per m². This would provide a greater than 1:5 ratio of MEEB, offering long term enhanced ecological function to the habitat being lost and would partially restore a historic feature of the region. This scale of restoration effort has also been selected because once fully functioning, it is expected that the native oyster bed would become self-sustaining.
60. Given that little to no native oyster beds are extant in CSCB MCZ, the process described in **Plate 8.1** below would be followed to achieve this overarching aim.
61. The **Strategic and Collaborative Approaches to Compensation and Measures of Equivalent Environmental Benefit** [APP-084] describes the Applicant's proposed approach to potential collaboration with third parties on this MEEB measure. A provision for the Applicant to deliver its MEEB in collaboration with other developers (subject to approval by the Secretary of State) is also set out within the MEEB DCO Condition Wording (**Proposed Without Prejudice DCO Drafting (Revision B)**) [document reference 3.1.3] document).
62. Whilst oyster restoration within the CSCB MCZ is the preferred project-led measure, there is potential that a viable strategic compensation funding mechanism may become available within the necessary timescales for SEP and DEP and could be relied upon by the Applicant to discharge its MEEB requirements if required. To ensure this option is available to SEP and DEP, the Applicant has included a provision within the MEEB DCO Condition Wording (**Proposed Without Prejudice DCO Drafting (Revision B)**) [document reference 3.1.3] document) for a contribution to be made to a Strategic Compensation Fund¹ or (subject to approval by the Secretary of State) another scheme wholly or partly in place of oyster restoration within the CSCB MCZ or as an adaptive management measure. The exact sum would subject to agreement with Defra in consultation with the MEEB steering group. For further information regarding this option see the **Strategic and Collaborative Approaches to Compensation and Measures of Equivalent Environmental Benefit** [APP-084].

¹ Such as the Marine Recovery Fund as committed to within the Offshore Wind Environment Improvement Package

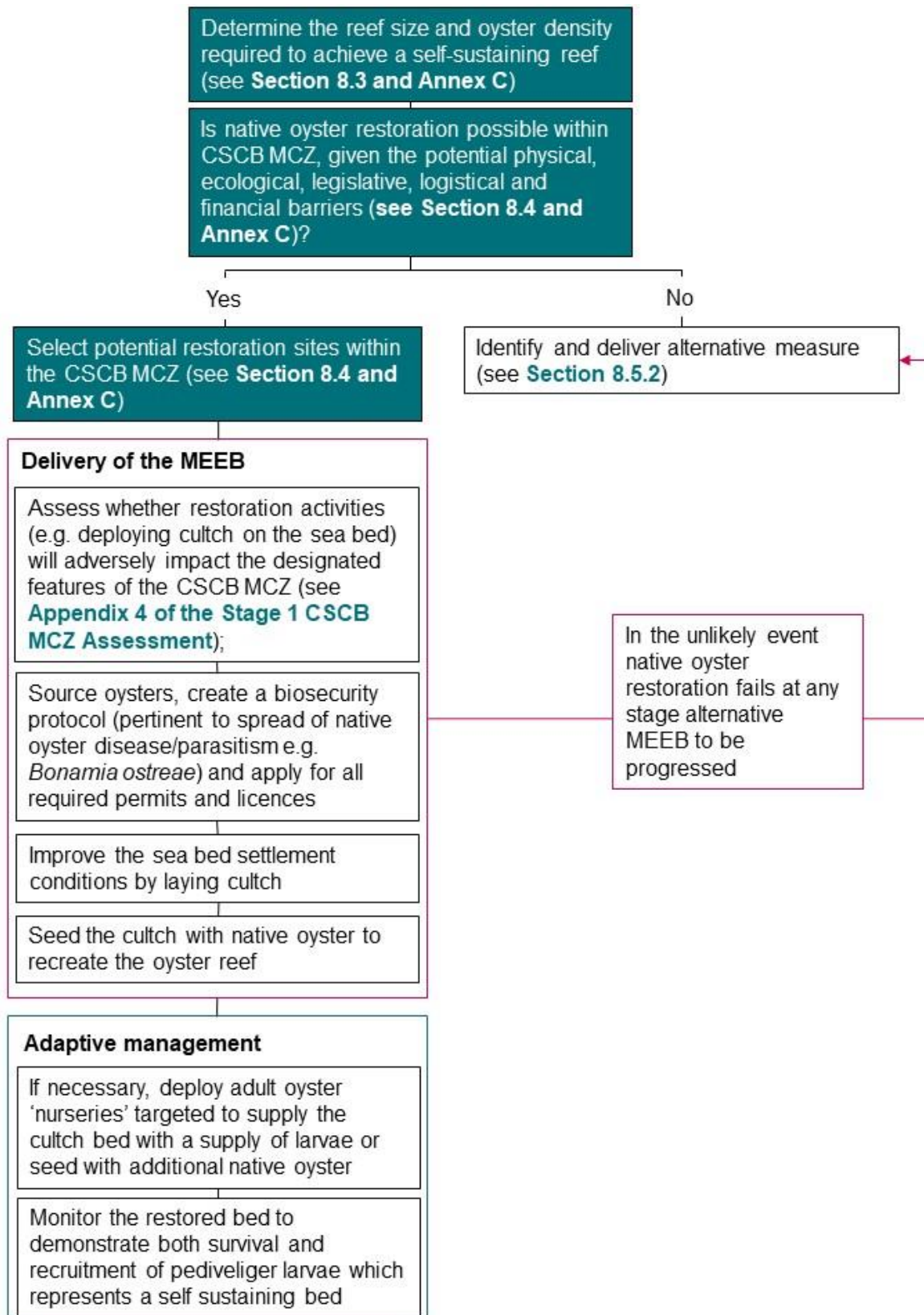


Plate 8.1 Process that will be undertaken to restore a native oyster bed of 10,000m² for the purposes of MEEB

8.2 Value and Function

63. Native oyster beds support increased biodiversity and provide nursery grounds for juvenile fish and other species (Coen *et al.*, 2007, cited in Robertson *et al.* 2021). They are also filter feeders, supporting water quality by removing impurities. Particles that are not eaten are deposited as pseudofaeces which enriches surrounding sediment and contributes to organic nitrate and organic carbon fixation and removal from the water column (Coen *et al.*, 2007; Fodrie *et al.*, 2017; Lee *et al.*, 2020). In addition, studies (e.g. Fodrie *et al.* 2017) suggest that oyster beds have the capacity to deliver carbon sequestration, due to their use of carbon in producing the calcium carbonate shell.
64. These critical ecosystem functions and services, combined with the potential for flood/erosion defence if coastally located, give oyster beds an estimated economic value (excluding harvesting for consumption) of \$5,500–\$99,000 (£4,500–£82,000 at the time of writing) per 10,000m² per year (Grabowski *et al.*, 2012).

8.3 Site Selection and Size of Oyster Bed

65. **Annex C** describes the initial site selection process undertaken to identify the preferred location, size and density of oyster bed planting within the CSCB MCZ.
66. The restoration of native oyster bed is required to deliver equivalent environmental benefit to 1,800m² habitat loss on subtidal coarse sediment, subtidal mixed sediments and subtidal sand features of the MCZ (**Section 6**). As noted above, it is estimated that in order to maintain a sufficient effective population size over the long term a larger reef will be deployed than the 1,800m² of habitat loss.
67. OSPAR define a native oyster bed as (OSPAR, 2009):
“Ostrea edulis occurring at densities of 5 or more per m² on shallow mostly sheltered sediments (typically 0–10 m depth, but occasionally down to 30 m). There may be considerable quantities of dead oyster shell making up a substantial portion of the substratum.”
68. A density of at least 5 oyster per m² will therefore be the target for the MEEB. **Annex C** estimates that at least 50,000 oysters would be needed to maintain a sufficient effective population size over the long term, to have enough genetic diversity to adapt to changing stressors e.g. climate change-induced temperature rises (Low *et al.*, 2007).
69. At a density of 5 oysters/m², this results in a target oyster bed area of 10,000m². **Annex C** also estimates a precautionary survival rate of 48% and therefore an initial stock of 105,000 oysters over the 10,000m² area (an initial density of 10.5 oysters/m²) may be required.
70. It is recommended that due to the reproductive strategy of native oysters, reef density is the primary focus (to avoid Allee effects)², rather than reef size and therefore a phased deployment could be undertaken to enable the production of seed oyster for deployment of a 10,000m² reef in appropriate increments.

² where individual oysters in a bed that is below a critical size and density are likely to experience reduced fitness (through inability to fertilise gametes)

71. The 10,000m² reef would provide a greater than 1:5 ratio of MEEB, offering long term enhanced ecological function to the habitat being lost and restoring a historic feature of the region.
72. **Annex C** identifies a 1km² initial oyster restoration site search area (see **Figure 8.1**). Available data suggests this location provides suitable environmental conditions (see **Section 5.5.2 of Annex C**) for the successful restoration of native oyster. A targeted survey of this area would be undertaken post consent to confirm the suitability of this location and to select the 10,000m² area for oyster deployment within this search area.

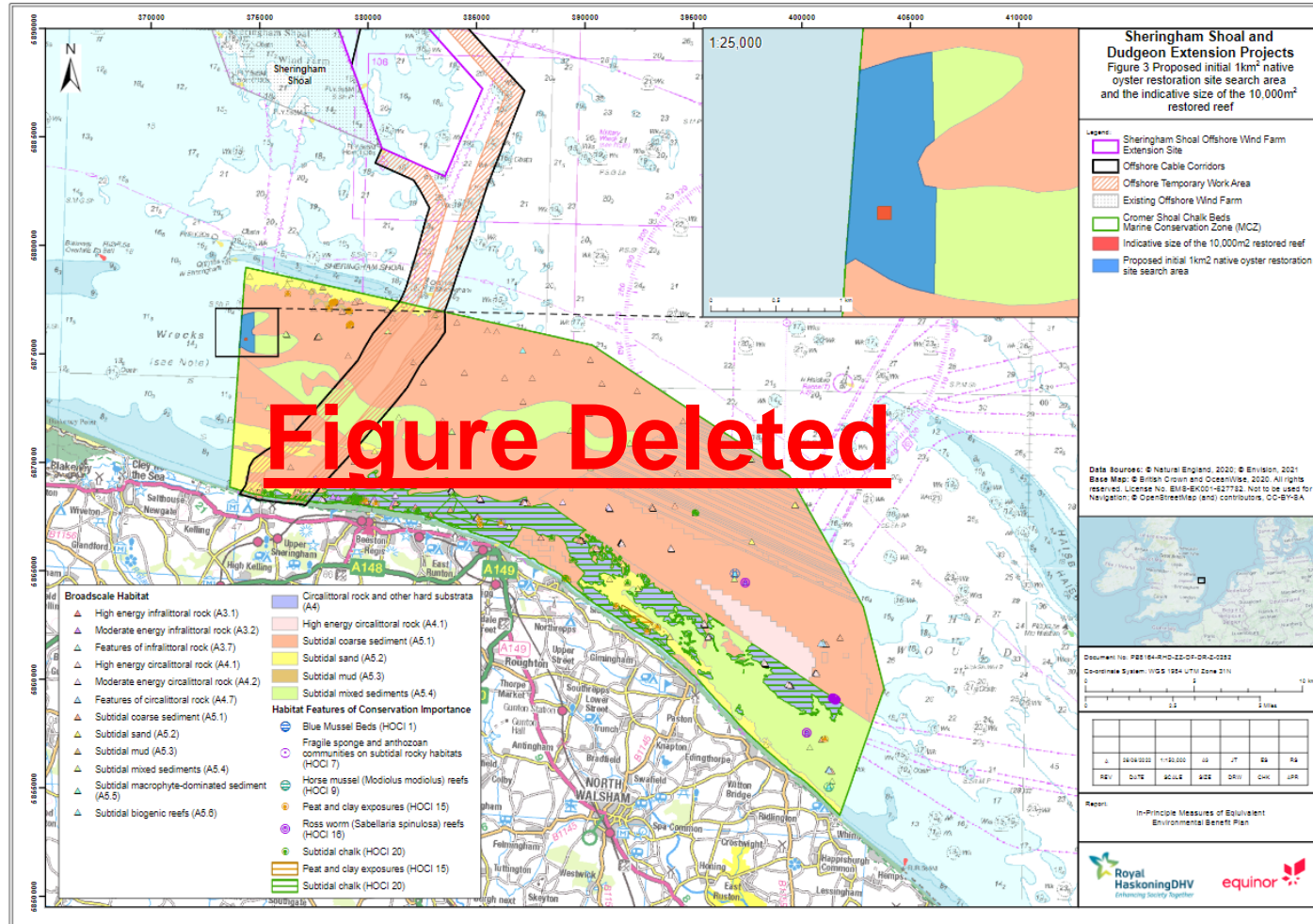
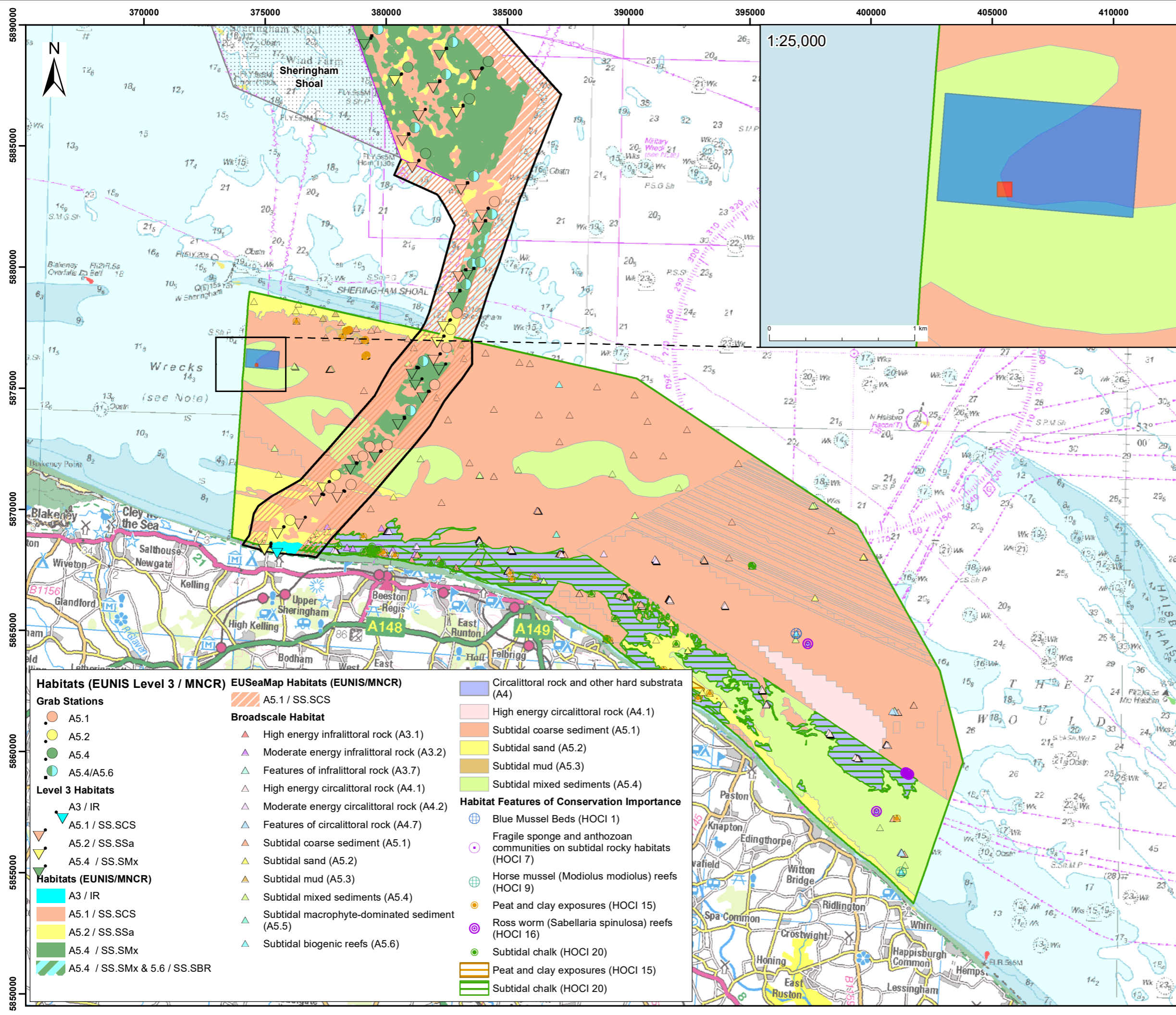


Figure 8.1 The proposed initial 1km² (light blue polygon) native oyster restoration site search area and the indicative size of the 10,000m² restored reef (red square within blue polygon) in the north-western section of the CSCB MCZ



Sheringham Shoal and Dudgeon Extension Projects
 Figure 8.1 Proposed initial 1km² native oyster restoration site search area and the indicative size of the 10,000m² restored reef

- Legend:**
- Sheringham Shoal Offshore Wind Farm
 - Extension Site
 - Offshore Cable Corridors
 - Offshore Temporary Work Area
 - Existing Offshore Wind Farm
 - Cromer Shoal Chalk Beds
 - Marine Conservation Zone (MCZ)
 - Indicative size of the 10,000m² restored reef
 - Proposed initial 1km² native oyster restoration site search area

Data Sources: © Natural England, 2020; © Envision, 2021
Base Map: © British Crown and OceanWise, 2020. All rights reserved. License No. EMS-EK001-627782. Not to be used for Navigation: © OpenStreetMap (and) contributors, CC-BY-SA



- Habitats (EUNIS Level 3 / MNCR)**
- A5.1
 - A5.2
 - A5.4
 - A5.4/A5.6
- Level 3 Habitats**
- A3 / IR
 - A5.1 / SS.SCS
 - A5.2 / SS.SSa
 - A5.4 / SS.SMx
- Habitats (EUNIS/MNCR)**
- A3 / IR
 - A5.1 / SS.SCS
 - A5.2 / SS.SSa
 - A5.4 / SS.SMx
 - A5.4 / SS.SMx & 5.6 / SS.SBR
- EUSeaMap Habitats (EUNIS/MNCR)**
- A5.1 / SS.SCS
- Broadscale Habitat**
- High energy infralittoral rock (A3.1)
 - Moderate energy infralittoral rock (A3.2)
 - Features of infralittoral rock (A3.7)
 - High energy circalittoral rock (A4.1)
 - Moderate energy circalittoral rock (A4.2)
 - Features of circalittoral rock (A4.7)
 - Subtidal coarse sediment (A5.1)
 - Subtidal sand (A5.2)
 - Subtidal mud (A5.3)
 - Subtidal mixed sediments (A5.4)
 - Subtidal macrophyte-dominated sediment (A5.5)
 - Subtidal biogenic reefs (A5.6)
- Habitat Features of Conservation Importance**
- Blue Mussel Beds (HOCI 1)
 - Fragile sponge and anthozoan communities on subtidal rocky habitats (HOCI 7)
 - Horse mussel (*Modiolus modiolus*) reefs (HOCI 9)
 - Peat and clay exposures (HOCI 15)
 - Ross worm (*Sabellaria spinulosa*) reefs (HOCI 16)
 - Subtidal chalk (HOCI 20)
 - Peat and clay exposures (HOCI 15)
 - Subtidal chalk (HOCI 20)
- Circularittoral rock and other hard substrata (A4)**
- High energy circularittoral rock (A4.1)
 - Subtidal coarse sediment (A5.1)
 - Subtidal sand (A5.2)
 - Subtidal mud (A5.3)
 - Subtidal mixed sediments (A5.4)

Document No: PB8164-RHD-ZZ-OF-DR-Z-0252
 Co-ordinate System: WGS 1984 UTM Zone 31N
 Scale: 1:25,000
 Scale bar: 0 to 10 km / 0 to 5 Miles

REV	DATE	SCALE	SIZE	DRW	CHK	APR
B	07/03/2023	1:150,000	A3	GC	ES	RS
A	28/06/2022	1:150,000	A3	JT	ES	RS

Report: In-Principle Measures of Equivalent Environmental Benefit Plan



8.4 Planting of Native Oyster Beds within the CSCB MCZ

8.4.1 Post-Consent Development of the MEEB Implementation and Monitoring Plan

73. This In-Principle MEEB Plan provides details of the approach which would be undertaken to restore a 10,000m² native oyster bed in the CSCB MCZ, however this would continue to be reviewed and developed post consent based on new data and available evidence, and in consultation with stakeholders and the MEEB steering group.
74. As discussed in **Section 8.3**, a targeted survey would be undertaken of the area of search identified in **Figure 8.1** to confirm the suitability of this location to deploy native oyster. In addition, as discussed in **Annex C Section 4**, planting of native oyster is being developed successfully at a range of locations throughout the UK, including in the southern North Sea at Blackwater Estuary, and therefore the development of the MEEB Implementation and Monitoring Plan would draw on information from these projects. The following sections are informed by the European Native Oyster Habitat Restoration Handbook (Preston *et al.*, 2020).
75. In order to develop and implement the MEEB Implementation and Monitoring Plan, specialists in oyster restoration would be commissioned by the Applicant.

8.4.2 Marine Licence and Crown Estate Lease

76. **Appendix 4 Assessment of Potential Impacts on Cromer Shoal Chalk Beds Marine Conservation Zone Features from Planting of Native Oyster Beds** [APP-081] of the **Stage 1 CSCB MCZA** provides an assessment of the potential risk of the MEEB Implementation and Monitoring Plan hindering the conservation objectives of the existing features of the CSCB MCZ.
77. It is not anticipated that a sea bed lease from The Crown Estate will be required for restoring a designated site feature. A Marine Licence application to the MMO for the deployment of cultch would be made post consent (if required). The MMO aims to progress Marine Licence Applications within 13 weeks of submission.

8.4.3 Source Cultch and Oysters

8.4.3.1 Cultch

78. As discussed in **Annex C**, cultch may be required to enhance the substrate suitability for planting of oyster. For example, the Essex Native Oyster Restoration Initiative (NORI) project used a mixture of aggregate pebbles from an onshore source and waste oyster shell from local markets;³ and the Dornoch Environmental Enhancement Project (DEEP)⁴ has used waste shell from the scallop and mussel industry.
79. Following final site selection, including a survey of the existing habitat, the requirement for cultch would be determined and suitable sources identified.

³

⁴

8.4.3.2 Oyster

80. As discussed in **Annex C**, an initial stocking of 105,000 oyster is estimated to be required to take account of predicted survival rate, with the aim of establishing a bed of 5 live oysters/m² (50,000 oysters in 10,000m²) to maintain a sufficient effective population size over the long term.
81. There are a number of oyster farms (including at Blakeney Harbour on the North Norfolk coast) and hatcheries throughout the UK which could be used to source seed oyster and it is likely that multiple sources will be used to establish the numbers required. The Applicant would, as far as possible, seek to use suppliers and partners from within the Norfolk region, providing benefits to local communities.

8.4.3.3 Biosecurity

82. Biosecurity of the cultch and oyster sources will be a key consideration in the selection process to ensure no pathogens or INNS are spread with the cultch material or oysters. For example, bonamiosis is an oyster disease that is generally caused by parasites of the genus *Bonamia*. *Bonamia*, most commonly the *B. ostreae* parasite, infects the immune system cells (haemocytes) of *O. edulis* in European waters.
83. The MEEB Implementation and Monitoring Plan will incorporate mitigation protocols to secure biosecurity measures once the source of cultch and oyster are confirmed. These protocols would include but are not limited to:
- Identification and use of reliable sources of stock.
 - Application of good management practices.
 - Effective disease recognition and diagnosis.
 - Identification of effective measures to take in the event of a disease outbreak or other unknown mortality.

8.4.4 Deployment

84. If MEEB is deemed to be required by the Secretary of State for SEP and DEP, the Applicant proposes, in line with other similar restoration projects, a phased and adaptive approach to oyster bed restoration, starting with a pilot project. This would involve introducing 300 – 1,000 adult oysters to several potential suitable locations within the initial oyster restoration site search area. These oysters would be deployed in cages or bags. If acceptable survival is achieved after one year at at least one of the locations, then the project can enter the reef restoration phase:
- **Phase 1** (first year) would involve the deployment of 1,000m³ of cultch being spread over a 5,000m² area, followed by the reintroduction of 52,500 oysters on the cultch. Survival would be monitored prior to Phase 2.

- **Phase 2** (second year) would involve a further deployment of 1,000m³ cultch within the remaining 5,000m² of the restoration area, followed by reintroduction of 52,500 oysters over the remaining 5,000m² area. This would give a combined total area for Phase 1 and Phase 2 of 10,000m², with 105,000 oysters reintroduced. With ongoing monitoring, lessons learnt during Phase 1 deployment can be captured during Phase 2, with deployment adapted accordingly.
85. The appropriate season for deployment of the reef restoration (Phases 1 to 2) will be determined through the MEEB Implementation and Monitoring Plan in consultation with oyster restoration specialists, taking into account the age and condition of the seed oysters; optimal temperature, lunar cycle and food availability; and periods of minimal predator abundance to maximise the survival rates of deployed oyster. However, late spring to early summer (April/May) is expected to be the optimal native oyster reintroduction period (**Annex C**).
86. The method for deployment will be established post consent as the MEEB Implementation and Monitoring Plan develops, following commissioning of contractor(s), vessel(s) and equipment for deployment. The approach is likely to utilise a boat-based chute to direct the oysters to the selected sea bed location. This may require a diver or ROV survey following placement of the oysters on the sea bed to ensure the appropriate density of oysters deployed from the vessel.
87. See **Section 8.7** for an indicative programme for the proposed restoration works.

8.5 Monitoring and Adaptive Management

8.5.1 Monitoring

88. Following the deployment of cultch and oysters, a monitoring programme would be implemented to assess the key metrics as informed by the European Native Oyster Habitat Restoration Monitoring Handbook (zu Ermgassen et al., 2021) (**Table 8.1**).
89. The monitoring is likely to be undertaken by geophysical survey, with ground truthing by diver, drop down, and/or towed video surveys.
90. In order to determine whether successful native oyster reef restoration has been achieved, particularly in the context of the MEEB requirements, criteria for success during each phase have been developed and are presented in **Table 8.1**.
91. As noted in **Section 8.1**, the aim of the MEEB is to deploy and maintain an oyster bed of 10,000m² with an average density of 5 live oysters per m². During Phase 1 and the early stage of Phase 2 restoration, the bed will be becoming established and therefore specifically defined metrics and criteria for success relating to oyster survival and oyster density are proposed in **Table 8.1** for these phases.
92. Surveys would be undertaken throughout the lifetime of the oyster bed restoration project. Survey frequency is anticipated to be higher during the early phases of restoration with a tapering off as the bed becomes established and self-sustaining. The Applicant would consult the MEEB steering group to agree an optimal survey frequency based on the status of the establishing bed and this would form part of the MEEB Implementation and Monitoring Plan.

93. This information is intended to provide an initial monitoring framework. Should the Secretary of State conclude that MEEB is required, further details related to the nature and frequency of monitoring as well as success metrics would be developed post-consent as part of the MEEB Implementation and Monitoring Plan and in consultation with the MEEB steering group (see [Section 8.9.1](#)).

Table 8.1: Native oyster bed restoration monitoring aims and criteria for success in the context of MEEB with consideration of key metrics informed by zu Ermgassen et al. (2021)

Metric	Monitoring Aims and Criteria for Success
Pilot Phase	
Oyster survival	<p>Measure survival of the oysters introduced in cages or bags to determine feasibility of the location for oyster reef restoration.</p> <p>The results of the pilot phase would be discussed with the MEEB steering group and agreement reached on whether this has been a success. Results of the pilot phase would be used to inform the detailed deployment strategy during the reef restoration phase.</p>
Reef restoration: Deployment phase (Phase 1 and 2): key metrics and criteria to determine success for the purposes of MEEB	
Oyster survival	<p>Based on the results of the pilot phase, appropriate oyster survival rates will be defined to indicate success, partial success or failure.</p> <p>If only partial success is achieved, the Applicant would, in consultation with the MEEB steering group, determine whether there are any options for remediation to improve survival and if these are identified, re-deployment of adult oyster within the restoration area would be undertaken.</p>
Oyster density	<p>Determine the average density of live oysters within the 10,000m² area as a measure of the reproductive success of the restored reef.</p> <ul style="list-style-type: none"> • Success = greater than or equal to 5 live oysters/m² • Partial success = 2-4 live oyster/m² • Failure = 1 or fewer live oyster/m²
Shell cover	<p>If substrate is a limiting factor in development of the oyster bed, monitoring will assess the shell cover to determine if additional cultch should be deployed to support the bed.</p>
Temperature	<p>The growth, feeding, spawning and survival of native oyster is temperature dependent. Temperature will therefore be monitored to be analysed as a factor of the findings of the other metrics.</p>
Salinity	<p>The native oyster prefers marine areas with a higher salinity (> 30psu). At water temperatures < 20°C they tolerate temporarily lower salinity levels of 16-19psu. As the prospective restoration sites are in non-estuarine North Sea environments, salinity is not expected to fall below 33psu (Santos <i>et al.</i>, 2019) and no monitoring is recommended for this metric.</p>
Reef restoration: Adaptive management phase	
Oyster bed area	<p>Throughout the adaptive management phase, frequent monitoring of the MEEB area (10,000m²) together with the oyster bed habitat area (i.e. the full area of the bed if it has grown beyond 10,000m²) will be undertaken to assess any changes in areal extent.</p>



Metric	Monitoring Aims and Criteria for Success
Oyster density	Determine the average density of live oysters within the 10,000m ² area as a measure of the reproductive success of the restored reef. <ul style="list-style-type: none"> • Success = greater than or equal to 5 live oysters/m² • Partial success = 2-4 live oyster/m² • Failure = 1 or fewer live oyster/m²
Shell cover	As above for Phase 1 and 2.
Oyster size frequency	Assess the distribution of differently sized oysters within the population as a measure of the composition of different ages in the population. This in turn allows survival, recruitment and growth rates to be determined which is key to establishing the 'health' of the reintroduced bed.
Temperature	As above for Phase 1 and 2.
Salinity	As above for Phase 1 and 2.
Increases in biodiversity	Pre- and post-restoration monitoring for changes in species abundance and diversity on and in proximity to the establishing oyster bed would be undertaken to identify any change in biological community structure and composition.

8.5.2 Adaptive Management

94. In the unlikely event that a 10,000m² oyster bed is not retained, consideration would be given to whether remedial measures (i.e. reintroduction of further oysters) could be effective to maintain the oyster bed or whether an alternative MEEB should be progressed (see [Section 8.1](#) and [Plate 8.1](#)). This would be determined in consultation with the MEEB steering group.
95. In the unlikely event that development of an oyster bed within the CSCB MCZ is deemed to be unsuccessful as defined by the proposed metrics and criteria for success described in [Section 8.5.1](#), an alternative MEEB would become necessary. If alternative MEEB was to be progressed, it would be approved by the Secretary of State.
96. It is recognised that this could be required after deployment of external cable protection in the CSCB MCZ, however the requirement to deliver MEEB is secured through the MEEB DCO Condition Wording ([Proposed Without Prejudice DCO Drafting \(Revision B\)](#) [document reference 3.1.3] document). This is in accordance with the draft compensation guidance (Defra, 2021a) which states:
- “Defra recognises that in some cases and for certain habitats and species [compensation] could take several years and therefore it may not be feasible for the compensatory measures to be complete before the impact takes place. Where this is not possible, it is important that necessary licences are in place, finances are secured, and realistic implementation plans have been agreed with the appropriate bodies to demonstrate that the compensatory measure is secured.”*
97. Should planting of an oyster bed within the MCZ be unsuccessful, the following alternatives would be considered:
- Planting of an oyster bed elsewhere (e.g. within the SEP and DEP wind farm sites);
 - Designation of a comparable feature;

- Removal of anthropogenic features (marine debris or disused infrastructure);
 - Strategic measures, if available; or
 - Other MEEB options not yet considered.
98. Other options might include payment into a Strategic Compensation Fund or another scheme as an adaptive measure. A provision securing this option is outlined within the MEEB DCO Condition Wording (**Proposed Without Prejudice DCO Drafting (Revision B)**) [document reference 3.1.3] document). For further information on this option see the **Strategic and Collaborative Approaches to Compensation and Measures of Equivalent Environmental Benefit** [APP-084].
99. The onus would be on the Applicant to find an alternative MEEB, in consultation with the MEEB steering group and where necessary, following approval by the Secretary of State.

8.5.3 Management Measures

100. As discussed in **Annex C Section 5.5.2.4**, areas of shrimp trawling within the MCZ have been avoided through the site selection of the MEEB location. Static potting is currently undertaken but, based on evidence described in **Annex C**, this is not deemed to be a key constraint for oyster restoration, provided the intensity of potting on the reef remains sufficiently low. Should monitoring of the oyster bed indicate that potting activity is hindering the oyster restoration efforts, the Applicant would seek to work with the MEEB steering group, EIFCA and relevant fishers to identify a suitable and acceptable course of remediation.
101. An existing byelaw under the MCAA 2009 is in place in the CSCB MCZ which prohibits fishing vessels larger than 15.24m using towed nets and EIFCA has proposed a further byelaw prohibiting bottom-towed fishing in the MCZ (EIFCA, 2019). Planting of native oyster within the MCZ would therefore be compatible with these management measures. Byelaws are required to be regularly reviewed to ensure they remain effective and necessary and therefore this could apply to the oyster bed. Through this review, should the beds become sustainable, with evidence that they would remain sustainable with harvesting of the oyster, consideration would be given to trialling the establishment of a commercial fishery.
102. As an example, the Blackwater, Crouch, Roach and Colne Estuary MCZ oyster restoration programme (Kent and Essex IFCA, undated) will be subject to a byelaw which closes the restoration area to dredging and harvesting for 10 years, after which, the management measure will be reviewed by an expert group and potentially opened to fishing if:
- There has been a significant stock increase across the MCZ to the specified tonnage; or
 - There has been a significant increase in stock levels in one of the nine areas; and
 - The stock has been stable or increasing for 3 years.

103. Once the proposed CSCB MEEB oyster bed is considered to have met the necessary success criteria (as outlined in the MEEB Implementation and Monitoring Plan and agreed with the MEEB steering group) and proven to be resilient to environmental change, it may be possible for it to support a small commercial fishery. If at such a time, the Applicant and the MEEB steering group agree that this is possible, the Applicant would seek to engage with the relevant authorities to agree suitable management measures in line with the MCZs conservation objectives and fishery sustainability goals to permit sustainable co-use of this resource whilst also ensuring MEEB requirements are met. It is expected to take a considerable length of time for the oyster bed to become sufficiently established to potentially support a commercial fishery (i.e. +25 years), indeed if this happens at all. As such, it is not considered appropriate to specify the particulars of any potential arrangement for the purpose of this application.

8.6 Funding

104. In order to deliver this MEEB, the Applicant would commission specialists in oyster restoration to develop the MEEB Implementation and Monitoring Plan post consent, as well as funding all costs (see [Appendix 5 Without Prejudice Derogation Funding Statement \[APP-076\]](#) of the [Habitats Regulations Derogation: Provision of Evidence \[APP-063\]](#) associated with sourcing and planting oyster, and monitoring the bed. The Applicant would also fund appropriate resources for stakeholders contributing to the MEEB steering group.

8.7 Indicative Programme

105. The establishment of a native oyster restoration project requires a series of steps to be completed before active works can commence. [Table 8.2](#) sets out the approximate timeline. When planning and delivering the proposed MEEB, there are time dependencies (e.g. weathering of cultch to meet biosecurity requirements) that would be factored into the programme.

Table 8.2: Indicative timeline for native oyster restoration key tasks

Year from consent	Indicative calendar year based on current project timeline	Oyster Restoration Task	2021	2022	2023	2024	2025	2026	2027	2028
Pre-consent	2021 onwards (ongoing - further engagement required throughout development of the MEEB proposals).	Engage with stakeholders and partners (e.g. Natural England, EIFCA, MMO, other experts in native oyster reef restoration).								
Pre-consent	Complete	Conduct initial desk-based feasibility study to establish the possibility of oyster habitat restoration and to identify the key restoration requirements, such as monitoring surveys, candidate restoration locations and desired size of reintroduced oyster reefs.								
Year 0	Q1 2024	Anticipated granting of the SEP and DEP DCO								
Year 0	Q1/Q2 2024	Establishment of the MEEB Steering Group								
Year 0	2024	Submission and approval of MEEB Implementation and Monitoring Plan to the Secretary of State.								
Year 0	Q1 2024	Apply for permissions and licences for a pilot introduction of 300-1000 oysters within the initial oyster restoration site search area (Figure 8.1). Allow 19.5 weeks for this (1.5 x MMO's target licensing period of 13 weeks).								

Year from consent	Indicative calendar year based on current project timeline	Oyster Restoration Task	2021	2022	2023	2024	2025	2026	2027	2028
Year 0	Q1 2024	Create a biosecurity protocol for the translocation of oysters from the supplier. Creation of protocol will be done in consultation with the relevant licensing body (e.g. MMO) and with reference to the latest guidance (e.g. zu Ermgassen et al. (2020)).								
Year 0	Q2 2024	Source oysters and/or shell substrate/cultch and pre-order from suppliers.								
Year 0	Q3/4 2024	Install 300-1000 oysters in bags / cages on sea bed as a pilot study to assess survivability as well as undertaking larval dispersal and settlement rate studies. Monitor survival after 12 months.								
Year 0/1	Planning: Q2/3 2024 Surveys: Q3/4 2024 Analysis: Q1 2025 Final reports: Q2 2025.	Conduct baseline surveys to collect fine-scale information on e.g. sediment type, current speeds to inform the micro-siting of the reintroduced reef. Allow 12 months for survey planning, data collection, analysis and reporting.								
Year 1	Q2 2025	Subject to detailed feasibility studies confirming the suitability of the identified restoration area, apply for permissions and licences for the larger-scale oyster restoration (if additional licences are needed beyond those acquired for the pilot study in Q3/4 2024). Allow 19.5 weeks for this (1.5 x MMO's target licensing period of 13 weeks).								



Year from consent	Indicative calendar year based on current project timeline	Oyster Restoration Task	2021	2022	2023	2024	2025	2026	2027	2028
Year 1	Q2 2025	Receive and store cultch in an outdoor area for weathering. Allow 12 months for weathering before cultch is placed on the sea bed.								
Year 1	Q3/4 2025	Monitor the survival of the 300-1000 oysters placed on site in the pilot trial in Q3/4 2024. The survival rate can inform and refine larger-scale restoration effort.								
Reef restoration phase 1										
Year 2	Q2 2026	Phase 1: Deploy 1,000m ³ cultch on the sea bed across half of the 10,000m ² restoration area.								
Year 2	Q2 2026	Phase 1: Deploy 52,500 oysters on the cultch at the restoration site (size and age of oysters to be finalised pending further consultation with suppliers and experts). 52,500 oysters over approximately half of the 10,000m ² restoration area, gives an initial density of approximately 10.5 oyster per m ² , which allows for a long term survival of 48% whilst still achieving the OSPAR definition of native oyster reef (5 oysters per m ²).								
Year 2	Q2 2026	Ongoing monitoring plan commences. See Section 8.5 .								



Year from consent	Indicative calendar year based on current project timeline	Oyster Restoration Task	2021	2022	2023	2024	2025	2026	2027	2028
Reef restoration phase 2										
Year 3	Q1 2027	Phase 2: Deploy 1,000m ³ cultch on the seabed within the remaining 5,000m ² of the restoration area.								
Year 3	Q2 2027	Phase 2: Deploy 52,500 oysters on the cultch at the restoration site (size and age of oysters to be finalised pending further consultation with suppliers and experts). 52,500 oysters over the remaining 5,000m ² restoration area, gives an initial density of approximately 10.5 oyster per m ² , which allows for a long term survival of 48% whilst still achieving the OSPAR definition of native oyster reef (5 oysters per m ²).								
Adaptive management										
Year 4	Q2 2028	Whether further deployment of cultch or oyster (e.g. Phase 3) is required will be determined by the outcomes of the ongoing monitoring (e.g. can successful larval settlement on the reintroduced reef be demonstrated – if so, no further work may be required, other than continued (e.g. annual) health-checks of the reef.								
Year 4	Q2 2028	Anticipated earliest installation of removable external cable protection within the CSCB MCZ.								

8.8 Confidence

106. A number of oyster restoration projects are underway around the UK at various stages of development (discussed in **Section 2.1** of **Annex C**). These examples show that planting of native oyster beds in the UK has been successful to date. Native oyster beds are known to have been historically present within the region and oyster farming is undertaken along the Norfolk coast which suggests that conditions are favourable for restoration.
107. As discussed in **Annex C**, it is highly likely that suitable habitat and environmental conditions within the CSCB MCZ are present which would support native oyster.

8.9 Consultation

8.9.1 MEEB Steering Group

108. An ETG has been established during the pre-consent Evidence Plan Process. The members of this group, including MMO, Natural England, EIFCA and The Wildlife Trusts (TWT) (as well as any other interested stakeholders who the Applicant considers to be appropriate participants) would be invited to join the post-consent MEEB steering group.
109. The steering group would be engaged during the development of the detailed MEEB Implementation and Monitoring Plan post-consent and to review future monitoring and any adaptive management requirements for the MEEB.

9. Conclusions

110. This In-Principle MEEB Plan is provided on a precautionary basis, and without prejudice of the conclusions of the **Stage 1 CSCB MCZA** [APP-077] which state that there is no significant risk of hindering the conservation objectives of the MCZ as a result of SEP and DEP.
111. Should MEEB be required, the planting of a native oyster bed within the CSCB MCZ would be progressed as the preferred measure.
112. In the unlikely event that development of an oyster bed within the CSCB MCZ is unsuccessful, an alternative MEEB would become necessary. The onus would be on the Applicant to find an alternative MEEB, in consultation with the MEEB steering group.
113. This document demonstrates that there is a feasible MEEB available for impacts on the CSCB MCZ as a result of the deployment of external cable protection for SEP and DEP, should the Secretary of State conclude that there is a significant risk of the conservation objectives of the MCZ being hindered.

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<p>Natural England (2018) Natural England Conservation Advice for Marine Protected Areas; Cromer Shoal Chalk Beds MCZ; Site Information. [Online] Available at: https://designatedsites.naturalengland.org.uk/Marine/MarineSiteDetail.aspx?SiteCode=UKMCZ0031&SiteName=MCZ&countyCode=&responsiblePerson=&SeaArea=&IFCAAArea=&HasCA=1&NumMarineSeasonality=0&SiteNameDisplay=Cromer%20Shoal%20Chalk%20Beds%20MCZ#SiteInfo. Accessed February 2021</p>
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Annex A Review of Potential MEEB

10. Review of Potential MEEB

10.1 Introduction

1. The following sections provide a review of all potential MEEB which have been considered to date to provide equivalent benefit to the features potentially impacted by SEP and DEP (see **Section 6** of the **In-Principle MEEB Plan** for a summary).
2. This review has been informed by the consultation outlined in **Section 4** of the **In-Principle MEEB Plan** and **Annex B**. Following consultation, planting of a native oyster bed in the CSCB MCZ is the preferred measure being developed, as discussed in the **In-Principle MEEB Plan** above.

10.2 Approach

3. The review considered the feasibility of a range of potential measures, taking on board the stakeholder feedback outlined in **Annex B**. Each measure was considered in terms of:
 - The environmental benefit it would provide to the value and function of the MCZ;
 - The mechanism for the Applicant to deliver the MEEB;
 - The spatial scale required for the measure to provide equivalent benefit and to be functioning and contributing to the network;
 - The location of the in-principle measure;
 - Timescale;
 - The impact of undertaking the MEEB;
 - Options for monitoring the effectiveness of the MEEB; and
 - The level of confidence in delivering the MEEB successfully.
4. All measures are focussed on pressures within the CSCB MCZ, although it is noted in **Section 2.2** of the **In-Principle MEEB Plan** that broader ecosystem benefits of relevance to any of the commitments the UK has made on MPAs at a national and international level may be considered in accordance with MMO (2013).
5. The review considered a range of measures aimed at alleviating existing pressures on the MCZ (discussed below) or providing biological enhancement.

10.3 Review of Existing Pressures on the Cromer Shoal Chalk Beds MCZ

6. Green *et al.* (2015) shows evidence of anthropogenic pressures on the site based on dedicated sea bed surveys undertaken between 2012 and 2014⁵, including fishing by trawling, numerous pipelines to the Bacton Gas Terminal (including one disused pipeline).
7. There are also existing electrical cables from SOW and SOW installed in 2010 and 2016 respectively, and KIS-ORCA (2019) shows a disused telecom cable, all of which make landfall near Weybourne.
8. Natural England (2020) states that *“Potting...was considered by Natural England at the time of designation to be selective, small scale and low impact based on the best available evidence at the time. In December 2018 compelling evidence was submitted to Natural England which suggested damage to areas of elevated chalk bed, possibly caused from rope abrasion and impact strikes.”* Therefore, it is considered that potting fisheries represent an existing pressure on the CSCB MCZ.
9. In addition, the invasive non-native species (INNS) *Crepidula fornicata* was recorded in samples within the MCZ during the site-specific survey (see ES **Chapter 8 Benthic Ecology** [APP-094]) which has potential to impact the native species of the MCZ.
10. In-Principle MEEB within the MCZ (i.e. measures at the same location; outlined in **Section 10.3** and **10.6 of this Annex**) are focussed on reducing these existing pressures in the MCZ, with the exception of the INNS. No in-principle measures to remove *C. fornicata* are proposed as there is limited evidence of successful removal of the species once it becomes established.

10.4 Measures to Address Same Ecological Function at the Same Location

10.4.1 Removal of Anthropogenic Features – Marine Litter/Debris

10.4.1.1 Overview

11. Removal of marine debris would provide a like-for-like benefit to offset the placement of external cable protection, should the debris be located within the sediment features of the MCZ. The measure requires survey(s) to identify anthropogenic features/debris and then removal of any identified features/debris.
12. This measure was first adopted as Habitats Regulations Assessment (HRA) compensation by HOW03 to compensate the deployment of external cable protection on the sandbank feature of a Special Area of Conservation (SAC). HOW03 is required to deliver the following:
 - Sandbanks Implementation Plan:
 - Survey an area of 41.80ha (418,000m²) which will be subject to marine debris removal;

⁵ Surveys include the Environment Agency in March 2012 (Godsell and Fraser, 2013), by Titan Environmental Surveys Ltd in March and April 2012 (Jenner, 2012), by Cefas in January 2013 (Ware, 2013), by Gardline Geosurvey in February and March 2014 (Januszewski, 2014), and by the Environment Agency in August and September 2014 (Miller and Godsell, 2014).

- Engagement with fishermen through marine debris awareness events and measures to facilitate the rapid recovery of lost fishing gear;
 - A Steering Group to oversee the Sandbanks Implementation Plan.
13. Mira Veiga *et al.* (2016) identifies sources of marine debris, including fisheries, shipping, coastal tourism, sewage and landfills. **Section 10.4.1.5** below provides a review of key potential sources within and adjacent to the CSCB MCZ.

10.4.1.2 Value and Function

14. Marine litter causes the following impacts:
- A footprint on the sea bed causing habitat loss and potential abrasion through any movement caused by natural processes. Natural England (2020) shows fishing pots and rope can cause physical damage to the chalk feature of the MCZ. Abandoned/lost fishing gear and other marine debris may impact the MCZ more widely if it is moved around by the local current regime;
 - Marine litter can be consumed by marine fauna causing malnutrition;
 - Breakdown of some marine litter can contribute to microplastic concentration in the water column and in the sea bed, in turn leading to a reduction in water and sediment quality, as well as the potential for bioaccumulation within marine fauna; and
 - Entanglement/entrapment of marine fauna causing injury or death.
15. Therefore, the removal of debris could provide direct environmental benefit to the value of the MCZ by removing a pressure on the feature(s) affected by SEP and DEP, as well as reducing pressures on the wider ecosystem which are supported by the MCZ.
16. A survey would be required to understand the impact of litter and debris in the MCZ to fully determine the value this MEEB would provide.

10.4.1.3 Delivery Mechanism

17. A similar approach to the HOW03 compensation could be adopted to deliver this MEEB for SEP and DEP. This would entail survey of an area to be agreed with Natural England (see **Section 10.4.1.4** below) and recovery of anthropogenic debris found. The methodology for removal would also be agreed with Natural England. Methods could include dredging, Remotely Operated Vehicles (ROV) and/or divers subject to the nature and size of debris to be removed.
18. The Applicant would be responsible for arranging the re-use, recycling, recovery or disposal of all debris recovered in line with the waste hierarchy.
19. The lifting of debris/litter would be subject to health and safety risk assessment to ensure potentially degrading materials are lifted safely and any potential contaminants are appropriately managed with protective measures in place for all personnel.

20. As with the HOW03, engagement with fishermen could be undertaken, aimed at minimising abandoned fishing gear in the future, provided these were different fishermen to those included in the HOW03 compensation.
21. In addition, the CSCB MCZ is adjacent to a number of tourist beaches which can provide a significant source of marine litter. Investment in bins and refuse collection, as well as education and patrolling of the beaches could significantly reduce the levels of marine litter entering the MCZ.

10.4.1.4 Spatial Scale

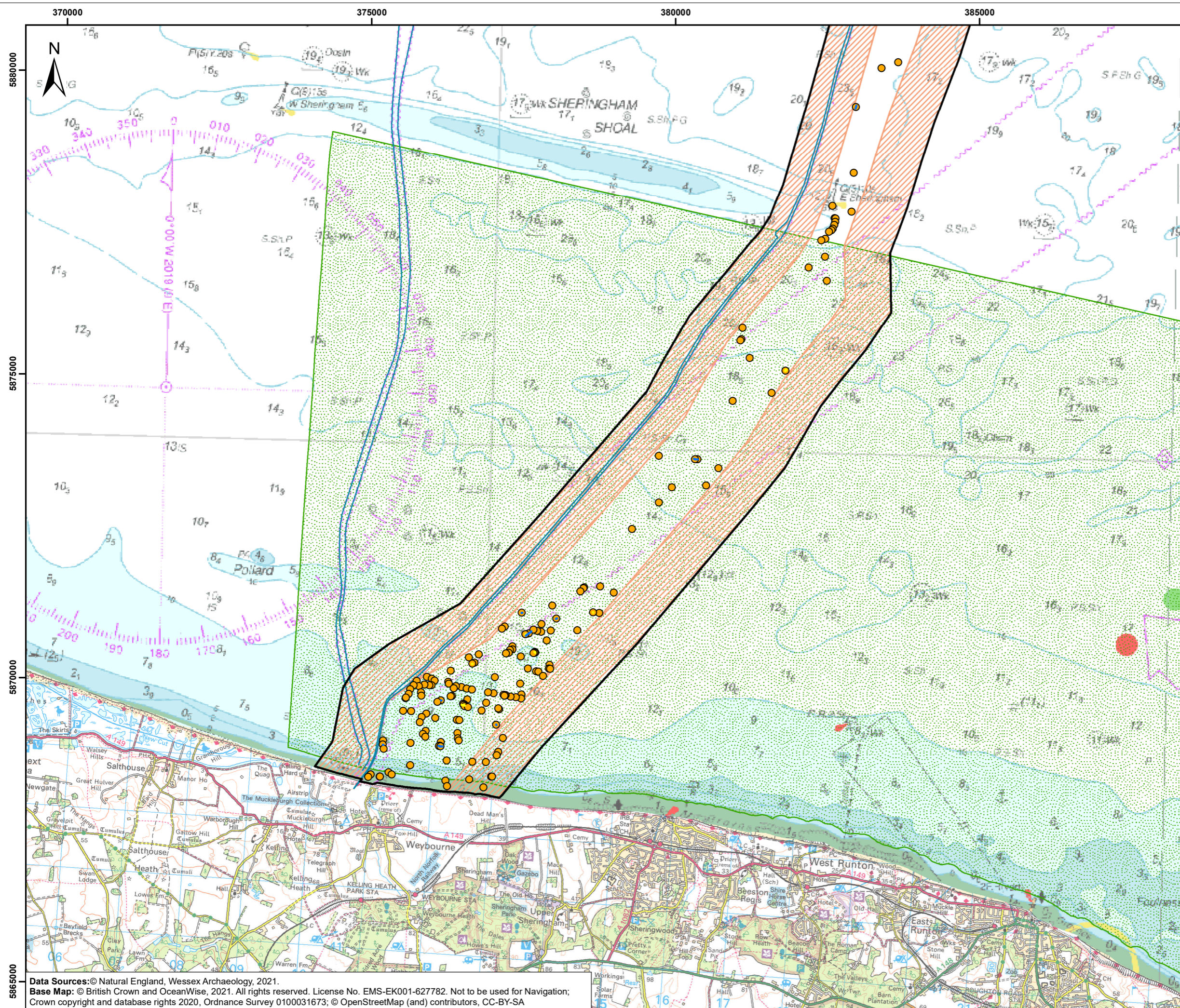
22. Consultation would be undertaken with Natural England to understand the areas where marine debris removal could deliver equivalent benefit to the placement of external cable protection.
23. As an example, HOW03 is required to survey an area of 44.57ha (445,700m²) and clear debris within this area which is a 1:1 ratio with the area of external cable protection for that project which may be required within SACs. Based on this precedent a survey area of 1,800m² would be required for SEP and DEP.

10.4.1.5 Location

24. The location to target for debris removal would be subject to a detailed site selection exercise and consultation with a range of stakeholders. A review of available data has been undertaken to provide an indication of the potential for debris to be present in the CSCB MCZ and identify potential locations.
25. As discussed in **Section 10.4.1.1**, key sources of marine debris include:
 - Fisheries;
 - Shipping;
 - Coastal tourism;
 - Sewage; and
 - Landfills.
26. Analysis of the SEP and DEP geophysical data has identified a number of anomalies. Items which are not of archaeological interest could be debris which is suitable for removal and could therefore be explored further during detailed site selection and survey.
27. The following sections outline areas which could be considered in a detailed site selection exercise.

10.4.1.5.1 Geophysical survey data

28. **Figure 10.1** shows anomalies identified during the archaeological analysis of the geophysical data (ES **Appendix 14.1 Archaeological Assessment of Geophysical Data** [APP-199]) as 'A2 - uncertain origin of possible archaeological interest'.



Sheringham Shoal and Dudgeon Extension Projects

Title:
Figure 10.1 Anomalies of Uncertain Origin (Possible Archaeological Interest)

Document:
Measures of Equivalent Environmental Benefit
Preliminary Environmental Information Report (PEIR)

Application Doc. no.: 5.7.1

- Legend:
- Offshore Cable Corridors
 - Offshore Temporary Work Area
 - Existing Offshore Wind Farm Export Cable
 - Cromer Shoal Chalk Beds Marine Conservation Zone
 - A2 - Uncertain Origin of Possible Archaeological Interest
 - Linear Seabed Feature
 - Seabed Feature Extent



Coordinate Reference System: WGS 1984 UTM Zone 31N
Transformation WGS84: OSGB_1936_To_WGS_1984_7

0 4 km
0 1 Nautical Miles

Scale: 1:60,000 Scale at size: A3

Equinor Doc. no.: C282-RH-Z-GA-00164
RHDHV Doc. no.: PB8164-RHD-ZZ-OF-DR-Z-0187

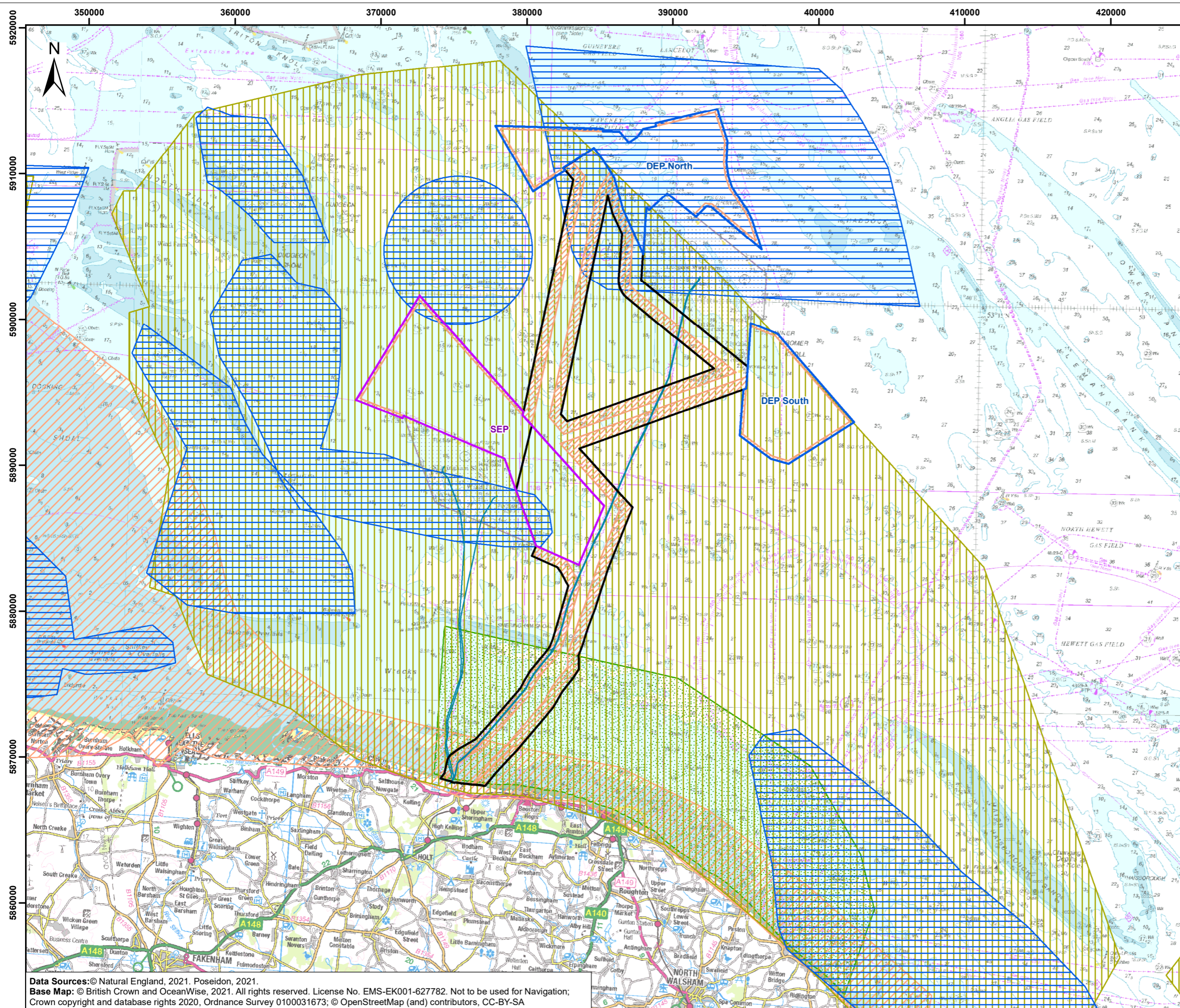
REV	DATE	STATUS	DRW	CHK	APR
A	02/08/2022	First Issue	JT	AP	PM

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10.4.1.5.2 Fisheries

29. A mapping project undertaken by the EIFCA in 2010 described the spatial coverage of fishing for shellfish species for all vessels in the UK fleet. **Figure 10.2** shows the MCZ is subject to whelk, crab/lobster and shrimp fishing. **Plate 10.1** and **Plate 10.2** show the types of pots typically used in the whelk and crab/lobster fisheries. The shrimp fishery typically uses beam trawls.
30. A detailed site selection process would be undertaken, in consultation with Natural England, EIFCA and local fishermen, to identify an appropriate area(s) to target for the survey and removal of lost/abandoned fishing gear. High resolution geophysical survey of the target area(s) would be undertaken in order to identify the types of gear shown below.



Sheringham Shoal and Dudgeon Extension Projects

Title: Figure 10.2 EIFCA Mapping Project - Shellfish Fishing Grounds (Source: Figure 4-5 of ES Chapter 14)

Document: Measures of Equivalent Environmental Benefit Preliminary Environmental Information Report (PEIR)

Application Doc. no.: 5.7.1

- Legend:
- Dudgeon Offshore Wind Farm Extension Project Wind Farm Site
 - Sheringham Shoal Offshore Wind Farm Extension Project Wind Farm Site
 - Offshore Cable Corridors
 - Offshore Temporary Work Area
 - Existing Offshore Wind Farm
 - Existing Offshore Wind Farm Export Cable
 - Cromer Shoal Chalk Beds Marine Conservation Zone
 - Whelk Fishing Grounds
 - Crab and Lobster Fishing Grounds
 - Shrimp Fishing Grounds



Coordinate Reference System: WGS 1984 UTM Zone 31N
Transformation WGS84: OSGB_1936_To_WGS_1984_7



Scale: 1:250,000 Scale at size: A3

Equinor Doc. no.: C282-RH-Z-GA-00164
RHDHV Doc. no.: PB8164-RHD-ZZ-OF-DR-Z-0184

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Plate 10.1 Whelk pots

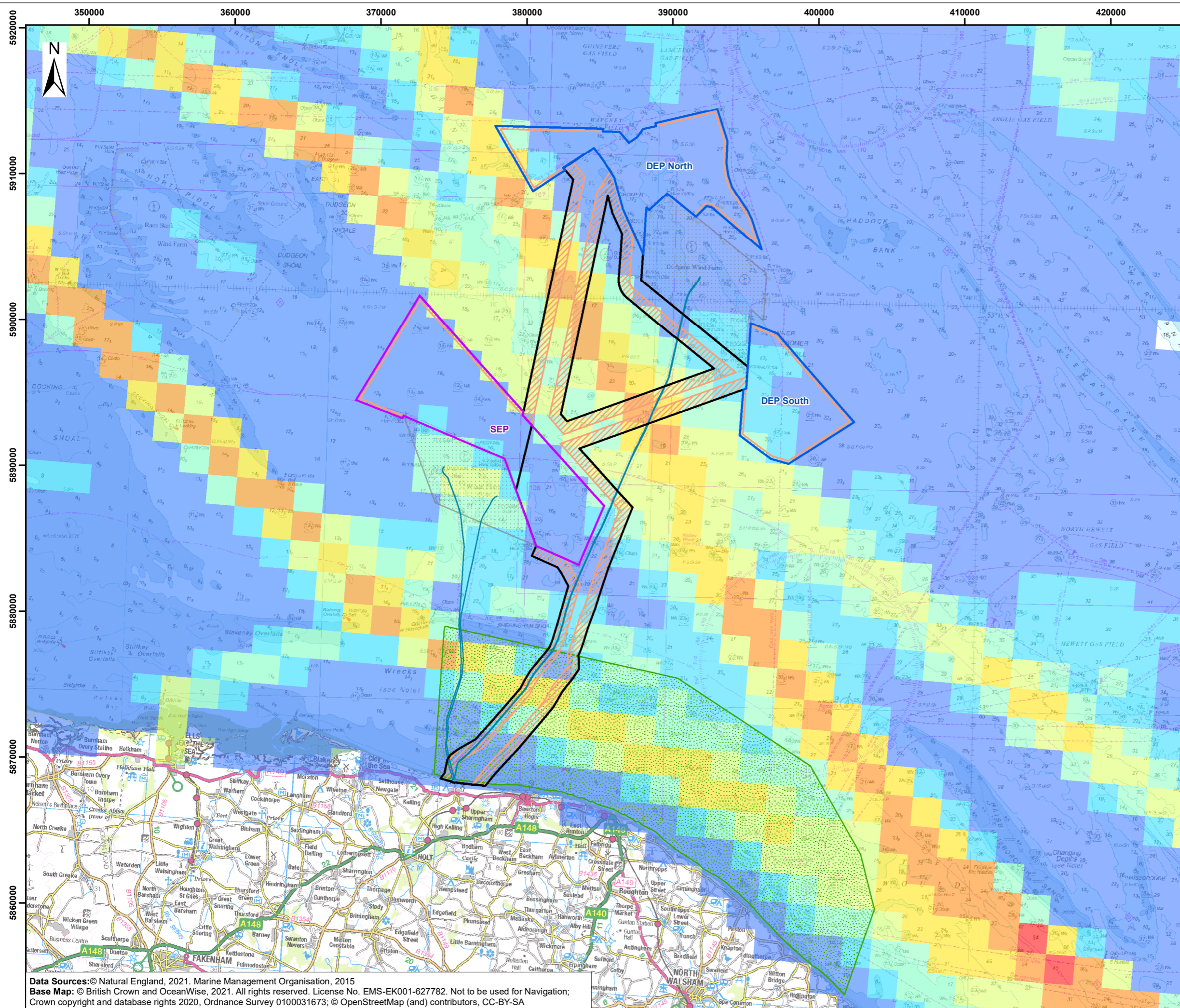


Plate 10.2 Lobster / crab pots⁶

10.4.1.5.3 Shipping

31. Shipping, including recreational activities, is a potential source of marine litter/debris through the loss or disposal of items overboard.
32. **Figure 10.3** shows a key shipping route through the MCZ. Whilst the presence of relatively high levels of shipping in the MCZ identifies the potential for debris/litter to be present, it would be difficult to confirm sufficiently precise locations of marine debris/litter through the use of this data due to the likelihood the debris/litter deposited on the water surface being transported by marine physical processes before reaching the sea bed. The detailed site selection exercise would therefore be informed by a review of available data, to inform potential areas where debris/litter may accumulate.

⁶ Source: Bing Images - [This Photo](#) by Unknown Author is licensed under [CC BY-SA-NC](#)



Sheringham Shoal and Dudgeon Extension Projects

Title:
Figure 10.3 Shipping in the MCZ

Document:
Measures of Equivalent Environmental Benefit
Preliminary Environmental Information Report (PEIR)

Application Doc. no.: 5.7.1

- Legend:
- Dudgeon Offshore Wind Farm Extension Project Wind Farm Site
 - Sheringham Shoal Offshore Wind Farm Extension Project Wind Farm Site
 - Offshore Cable Corridors
 - Offshore Temporary Work Area
 - Existing Offshore Wind Farm
 - Existing Offshore Wind Farm Export Cable
 - Cromer Shoal Chalk Beds Marine Conservation Zone

- AIS Shipping Density 2015 - All Vessels (Estimated Weekly Average)**
- 0 - 10
 - 11 - 25
 - 26 - 50
 - 51 - 75
 - 76 - 100
 - 101 - 150
 - 151 - 200



Coordinate Reference System: WGS 1984 UTM Zone 31N
Transformation WGS84: OSGB_1936_To_WGS_1984_7

0 4 8 12 16 km
0 2 4 6 Nautical Miles

Scale: 1:250,000 Scale at size: A3

Equinor Doc. no.: C282-RH-Z-GA-00164
RHDHV Doc. no.: PB8164-RHD-ZZ-OF-DR-Z-0185

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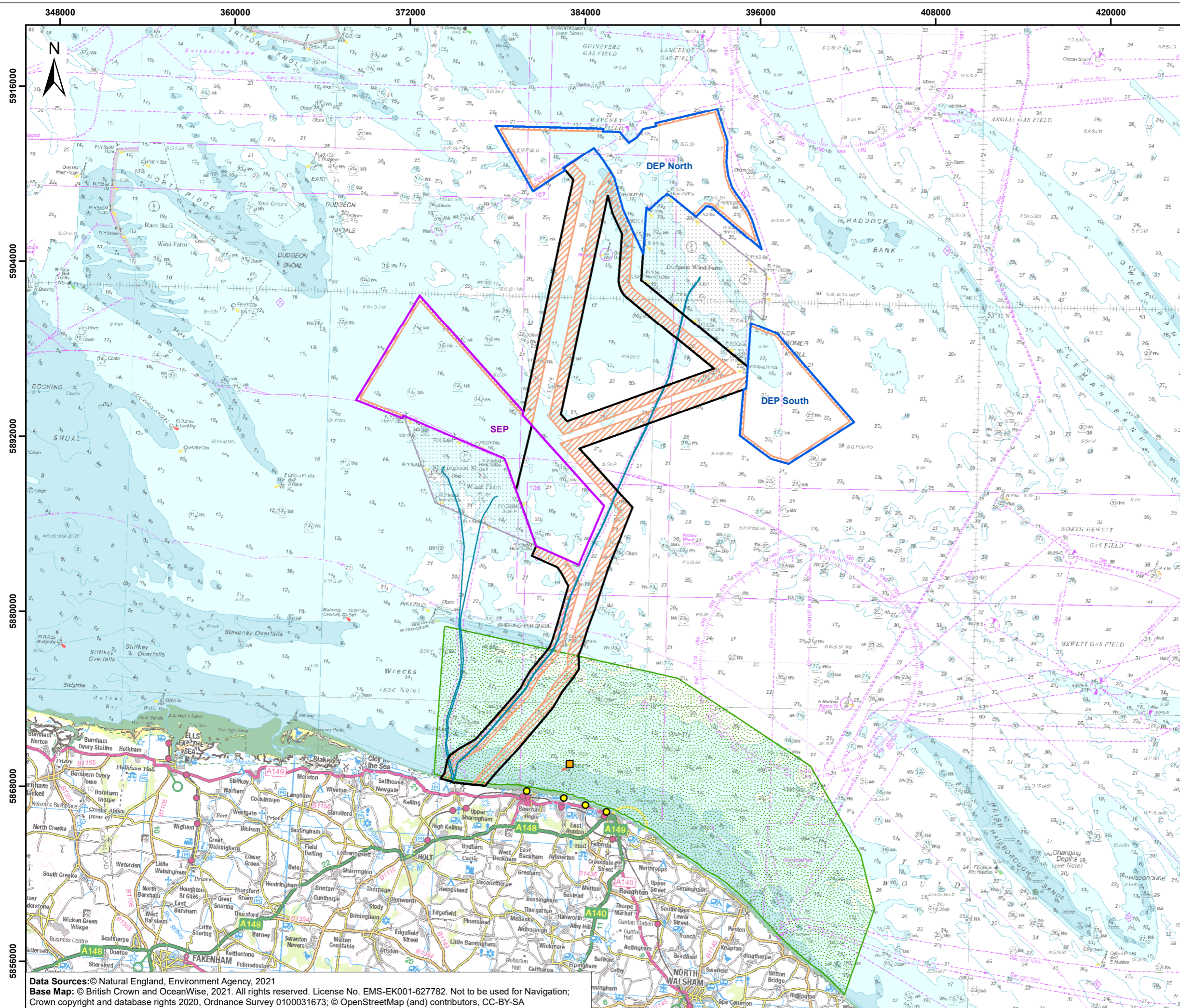


10.4.1.5.4 Coastal tourism

33. A series of tourist beaches are present along the coast of Norfolk, adjacent to the CSCB MCZ, including Weybourne, Sheringham, West Runton, East Runton, Cromer, Overstrand, Trimingham, Mundesley and Walcott. A review of the use of these beaches and current levels of littering could be undertaken through site walkover surveys and questionnaires to identify areas that could be targeted for additional refuse management measures.
34. During the 1st ETG meeting (see **Annex B**), it was noted that there is currently no evidence that litter on the beach will impact the MCZ. Further survey would therefore be required to understand whether litter is impacting the MCZ.

10.4.1.5.5 Sewage

35. **Figure 10.4** shows the location of a number of sewage outfalls within the CSCB MCZ. Storm overflows have a high probability of contributing sources of marine debris/litter as the overflow sewage is subject to less, or potentially no processing, in order to rapidly release the excess volume required to mitigate flooding during periods of high rainfall. These could present additional areas to target for survey and litter/debris removal.



Sheringham Shoal and Dudgeon Extension Projects

Title: Figure 10.4 Sewage Outfalls in the CSCB MCZ

Document: Measures of Equivalent Environmental Benefit Preliminary Environmental Information Report (PEIR)

Application Doc. no.: 5.7.1

- Legend:
- Dudgeon Offshore Wind Farm Extension Project Wind Farm Site
 - Sheringham Shoal Offshore Wind Farm Extension Project Wind Farm Site
 - Offshore Cable Corridors
 - Offshore Temporary Work Area
 - Existing Offshore Wind Farm
 - Existing Offshore Wind Farm Export Cable
 - Cromer Shoal Chalk Beds Marine Conservation Zone
 - Sewer Storm Overflow
 - Treated Sewage Discharge



Coordinate Reference System: WGS 1984 UTM Zone 31N
 Transformation WGS84: OSGB_1936_To_WGS_1984_7

0 4 8 12 16 km
 0 2 4 6 Nautical Miles

Scale: 1:250,000 Scale at size: A3

Equinor Doc. no.: C282-RH-Z-GA-00164
 RHDHV Doc. no.: PB8164-RHD-ZZ-OF-DR-Z-0183

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10.4.1.5.6 Landfill/ Recycling centres

36. A review of the landfill/recycling centres along the coast adjacent to the CSCB MCZ has shown no evidence of specific sources of debris/litter entering the environment and therefore this pathway is not considered further at this stage. However, any litter arising from landfill or public bins (subject to further evidence) could be removed through street sweeping and litter picking, which would not otherwise occur, to prevent entry into the marine environment in order to provide MEEB.

10.4.1.6 Timescale

37. It is anticipated that the survey and removal of debris could be undertaken in the period between consent award and commencement of external cable protection works within the MCZ.

10.4.1.7 Potential Impacts from the Removal of Marine Litter/debris

38. The worst case scenario impact as a result of removal of marine debris is likely to be as a result of dredging, which would cause temporary physical disturbance. As discussed in **Section 10.4.1.3**, the methodology for removal would be subject to agreement with Natural England and is likely to depend on the water depths and habitats present at the location where debris is identified, as well as the nature and size of the debris. It is expected that the impacts would be highly localised and targeted on areas identified during surveys. These areas would already be subject to habitat loss as a result of the marine litter, although it is recognised that the temporary disturbance of removal would be on an area larger than the footprint of the debris. Alternative methods of removal may include diver or ROV, subject to the nature and scale of debris to be lifted and associated safety/practicality of lifting using these methods.
39. The measures aimed at reducing litter entering the marine environment would have no adverse impacts.

10.4.1.8 Options for Monitoring

40. The monitoring of this MEEB would be focussed on identifying the debris but there would be no ongoing monitoring requirements once the debris was removed.

10.4.1.9 Confidence in Feasibility

41. The feasibility of securing debris removal as a MEEB is expected to be high due to the precedent set by HOW03, Norfolk Boreas and Norfolk Vanguard and owing to the broad range of potential sources of marine debris/litter (described in the sections above) which could be explored further if this MEEB is required. As discussed above this would be subject to evidence that marine debris/litter is impacting the relevant features of the MCZ.

10.4.2 Removal of Anthropogenic Features – Disused Cables and Pipelines

10.4.2.1 Overview

42. As discussed in **Section 10.3**, there is a disused telecom cable and a disused pipeline in the MCZ. As with removal of marine debris discussed above, removal of the disused cable or pipeline could provide a MEEB, if the cable or pipeline is providing an impact on the MCZ.
43. In addition, during the October 2021 ETG, Natural England advised that there are additional pipelines around Bacton, within the CSCB MCZ, that are likely to be decommissioned *in situ* in the next 5 to 10 years. It is noted that legislation for oil and gas and the associated permits for pipelines means there is no requirement for operators to remove them.

10.4.2.2 Value and Function

44. The potential benefits of removing existing disused infrastructure such as cables and pipelines would provide a like-for-like benefit in relation to removal of infrastructure to offset the placement of external cable protection.
45. In relation to any potential infrastructure which is soon to become disused, it may be the responsibility of the owner to decommission this infrastructure and therefore this would not provide an additional measure, however decommissioning of the pipelines is not expected to involve removal, as current legislation for Oil and Gas includes no requirement for operators to remove pipelines. The focus of the MEEB would be on any cables and pipelines which are not otherwise proposed to be removed.
46. The focus would also be on any cable and/or pipeline exposed on the surface of the sea bed or covered with protection which is present on the sea bed. If the infrastructure is sufficiently buried, the existing impact on the MCZ may be minimal and therefore the benefit of removal would be low.

10.4.2.3 Delivery Mechanism

47. In order to deliver this MEEB the Applicant would need to secure agreement from the owner of the disused cable or pipeline.
48. In addition, the method for removal would need to be agreed with Natural England to ensure that it did not have a greater impact on the MCZ feature(s) and the Applicant would be required to secure a marine licence to undertake the removal.

10.4.2.4 Spatial Scale

49. The extent of the required area of cable or pipeline removal in comparison to the area lost to external cable protection would be agreed with NE. A 1:1 ratio is proposed, on the basis that this would be a direct like-for-like removal of infrastructure to offset the addition of new infrastructure. Based on this, an area of 1,800m² of cable or pipeline would be required (either unburied or with the potential to become unburied).

50. The total lengths of cable and pipeline in the MCZ are 13,300m and 9,200m, respectively, however the lengths which are unburied or have potential to become unburied, due to mobile substrates, would be subject to further survey and assessment pre-construction. Consultation would also be required with the owners to understand the parameters of the cable and pipeline to ensure that sufficient area is removed to ensure this measure would provide an equivalent benefit. Should it not be possible to identify sufficient area to provide the full equivalent benefit, it is considered that this option could provide a component of a wider suite of measures.

10.4.2.5 Location

51. **Figure 10.5** shows the location of the disused cable and pipeline within the CSCB MCZ.

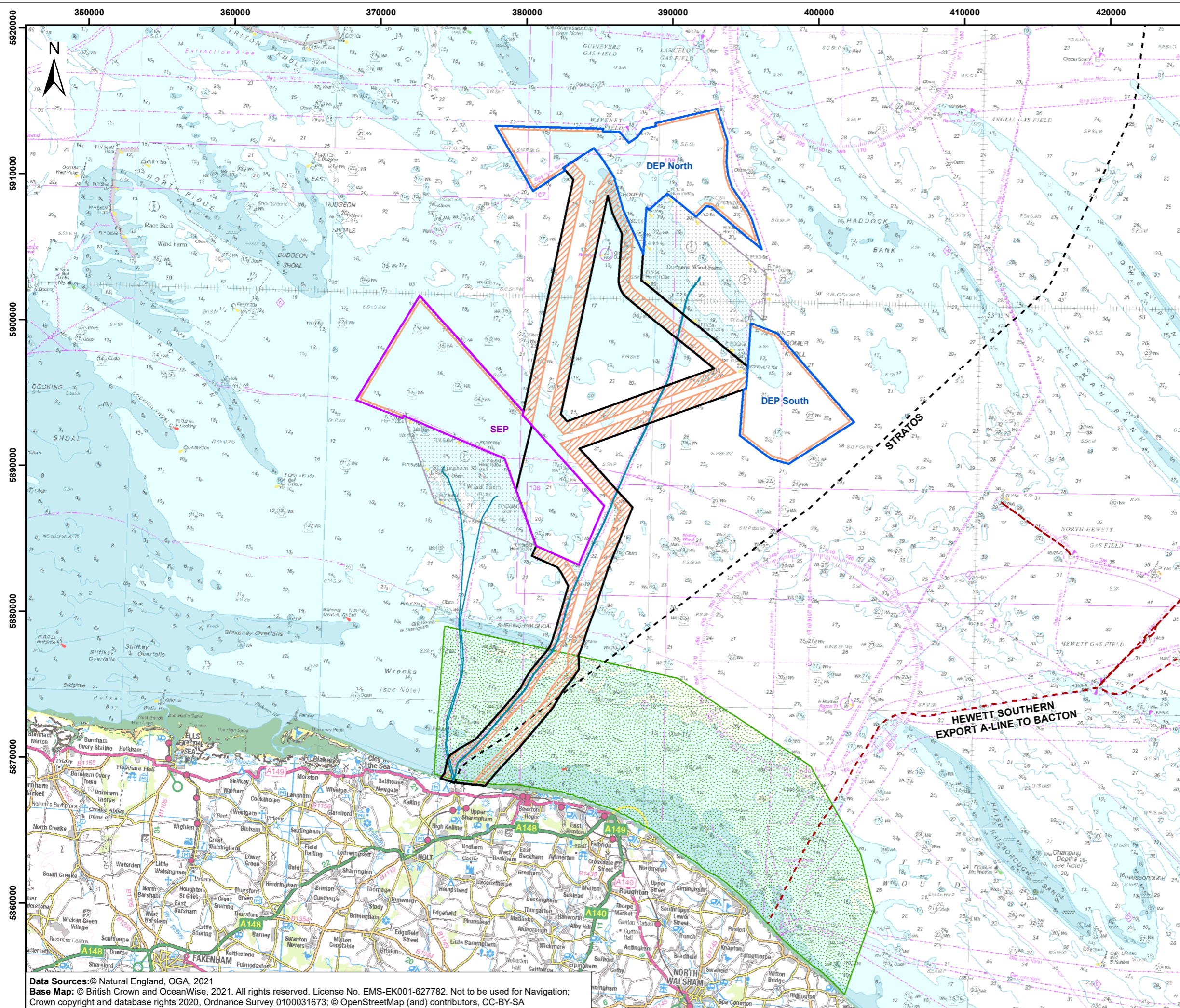
Sheringham Shoal and Dudgeon Extension Projects

Title:
Figure 10.5 Disused Cable and Pipeline in the CSCB MCZ

Document:
Measures of Equivalent Environmental Benefit
Preliminary Environmental Information Report (PEIR)

Application Doc. no.: 5.7.1

- Legend:
- Dudgeon Offshore Wind Farm Extension Project Wind Farm Site
 - Sheringham Shoal Offshore Wind Farm Extension Project Wind Farm Site
 - Offshore Cable Corridors
 - Offshore Temporary Work Area
 - Existing Offshore Wind Farm
 - Existing Offshore Wind Farm Export Cable
 - Cromer Shoal Chalk Beds Marine Conservation Zone
 - Disused Telecommunications Cable
 - Disused Pipeline



Coordinate Reference System: WGS 1984 UTM Zone 31N
Transformation WGS84: OSGB_1936_To_WGS_1984_7

0 4 8 12 16 km
0 2 4 6 Nautical Miles

Scale: 1:250,000 Scale at size: A3

Equinor Doc. no.: C282-RH-Z-GA-00164
RHDHV Doc. no.: PB8164-RHD-ZZ-OF-DR-Z-0188

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10.4.2.6 Timescale

52. Provided that an agreement could be reached with the owners of disused infrastructure, it is expected that removal could be implemented between consent award and commencement of external cable protection works within the MCZ .
53. With regard to pipelines that are due to be decommissioned in the next 5-10 years, Natural England advised that although the MEEB could not be delivered prior to construction of SEP and DEP, if there is a net benefit over the project lifetime, this could still deliver MEEB. This is in accordance with the Defra (2021a) draft compensation guidance which recognises that it may not always be possible to implement compensation prior to the effect taking place, and notes that as a minimum, MEEB should be legally and financially secured prior to construction.

10.4.2.7 Potential Impacts from the Removal of Disused Infrastructure

54. Removal of the disused infrastructure would cause temporary disturbance, suspended sediments and smothering. As illustrated by the assessments provided in relation to cable installation activities (e.g. ES **Chapter 6 Marine Geology, Oceanography and Physical Processes** and **Chapter 8 Benthic Ecology**), there is a high degree of confidence that the effects will be both temporary and localised around the area of the cable/pipeline that is subject to the removal works.

10.4.2.8 Options for Monitoring

55. The monitoring of this MEEB would be focussed on identifying areas of exposed cable and/or pipeline. As with marine debris there would be no ongoing monitoring requirements once the cable/pipeline was removed.

10.4.2.9 Confidence in Feasibility

56. There is precedent for the removal of disused cables during the construction of offshore wind farms and therefore there is high confidence in the technical feasibility of this measure. As discussed above, the key limitation for this in-principle measure is the availability of sufficient areas of surface laid or exposed cable or pipeline within the MCZ in order to provide an equivalent benefit.
57. The feasibility of pipeline removal would be subject to additional challenges associated with potential contamination and ongoing obligations associated with risk management. Consultation undertaken by Norfolk Boreas Limited with relevant stakeholders of the pipelines around Bacton identifies concerns with the removal of pipelines as a compensatory measure; for example, the Offshore Petroleum Regulator for Environment and Decommissioning (OPRED) state the following⁷:

⁷ Shown in Table 1.1. of the Norfolk Boreas Offshore Wind Farm In Principle Habitats Regulations Derogation, Provision of Evidence Appendix 3 Haisborough, Hammond and Winterton SAC In Principle Compensation. Available at: <https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/projects/EN010087/EN010087-002829-8.25%20In%20Principle%20Habitats%20Regulations%20Derogation,%20Provision%20of%20Evidence%20Appendix%203%20Haisborough,%20Hammond%20and%20Winterton%20SAC%20In%20Principle%20Compensation.pdf>

58. *“Decommissioning of oil and gas infrastructure (including pipelines) is highly regulated in terms of liability and environmental impact. The practicalities of decommissioning pipelines are also complex and each pipeline goes through a comparative assessment to determine the best options available for each pipeline e.g. this may mean the best option is to leave in situ with or without the need for protective material; it could mean leaving in situ with the intention of re-use or it could mean full or partial removal etc. In terms of pipeline protection material, whether associated with a ‘live’ or decommissioned pipeline, protection is used for two main reasons (a) to protect pipeline integrity and (b) to protect other users of the sea, and therefore the removal of protection material is not an option.*
59. *For decommissioned pipelines in situ, liability is for perpetuity to make sure they are not a risk to other users of the sea. Pipeline monitoring is undertaken periodically to make sure they are safe. If it is possible to do so this liability would need to be transferred from the oil and gas operators under the Petroleum Act and the windfarm developer would need to acknowledge the risk that pipeline removal for existing decommissioned pipelines in-situ may not be achievable in practice – and therefore liability will remain with the windfarm developer and the compensatory measure has not been accomplished.*
60. *The risks of pipeline removal are assessed at the comparative assessment stage and bearing in mind many pipelines have been in place for many years – the base case is always full removal, but generally full removal is not an option for many practical and environmental reasons.”*
61. In addition, the feasibility of cable or pipeline removal would be subject to agreement with the owners. It is noted that Natural England supports this measure due to the environmental benefits to be achieved from removing anthropogenic pressures for which there is no clear existing mechanism for removal.

10.4.3 Planting of Native Oyster Beds

10.4.3.1 Overview

62. Creation of sediment habitat is not considered possible given the potential for existing marine conditions to rapidly erode any artificially created banks. Furthermore, any attempts to create sediment is likely to impact upon other protected features. However, historically, a large area of native oyster beds was present around the coast of Norfolk, including the area of the CSCB MCZ (see **Annex C**). Therefore, native oyster beds could provide a natural biogenic feature within the MCZ which provides an enhanced function to the sedimentary features of the MCZ in the form of increased biodiversity (see **Section 10.7.1.2**).
63. Following consultation, planting of a native oyster bed in the CSCB MCZ is the preferred measure being developed. Details of the value, delivery mechanism, size, location, timescale, impacts and monitoring of an oyster bed are discussed in the **In-Principle MEEB Plan** above.

10.5 Measures to Provide the Same Ecological Function at a Different Location

10.5.1 Removal of Anthropogenic Features

10.5.1.1 Overview

64. As discussed in **Section 10.4.1** and **10.4.2**, the removal of marine litter/debris and/or disused infrastructure that would not otherwise be removed provides a potential like-for-like benefit to offset the placement of external cable protection. In this scenario, however, the removal of marine litter/debris or disused infrastructure would be from similar habitats to the ones impacted by SEP and DEP, but at another location, e.g. an alternative MCZ.
65. This measure would require support from external organisations, such as Natural England, MMO and IFCAs, to aid in identification of a suitable site, followed by a survey to identify anthropogenic features/debris from within this site prior to its removal.
66. **Section 10.4.1** and **10.4.2** should be referred to for further information, as the process for delivery of this measure, and the consequences of it, are the same.

10.5.2 Site Extension/Designation

10.5.2.1 Overview

67. This measure would entail designation of an area not yet designated which contains the relevant feature, in order to provide additional protection of the feature to compensate for the loss of habitat within the CSCB MCZ.
68. In relation to HRA, amendments to the National Site Network to provide compensation under HRA Derogation is supported in theory, as shown in Defra (2021). It is expected that this guidance would be equally applicable to MCZs, and states: *“The appropriate authorities must adapt the network where necessary given that the abundance and distribution of habitats and species within the network might evolve over time. They may need to designate new SACs or SPAs to achieve the network objectives. They may also need to amend existing SACs or SPAs. For example, ...to include an area which compensates for the loss of other areas within the network as a result of a plan or project proceeding for IROPI [Imperative Reasons of Overriding Public Interest] reasons”*.
69. It is also noted that the Nature Recovery Green Paper (Defra, 2022), released for consultation in March 2022 indicates that reforms are likely to be implemented which could influence the designation process for nature conservation sites.

10.5.2.2 Value and Function

70. The environmental benefits of designating an alternative suitable area of habitat would be equivalent to the benefit provided by the CSCB MCZ.

10.5.2.3 Delivery Mechanism

71. An extension to the CSCB MCZ or designation of habitat at an alternative location would have to be delivered by the Joint Nature Conservation Committee (JNCC) or Natural England, with Defra. The Applicant could provide financial support and/or technical assistance and surveys to support the site selection and designation process in order to deliver MEEB for SEP and DEP.
72. This measure would be subject to the statutory designation process, including consultation with stakeholders and analysis of the socio-economic impacts of designation, including on commercial fisheries. It is therefore not certain that a recommended designation would be successful.
73. Defra (2013) shows the stages that were adopted during designation of the existing MCZs, following the processes set out in **Plate 10.3** and **Plate 10.4**:

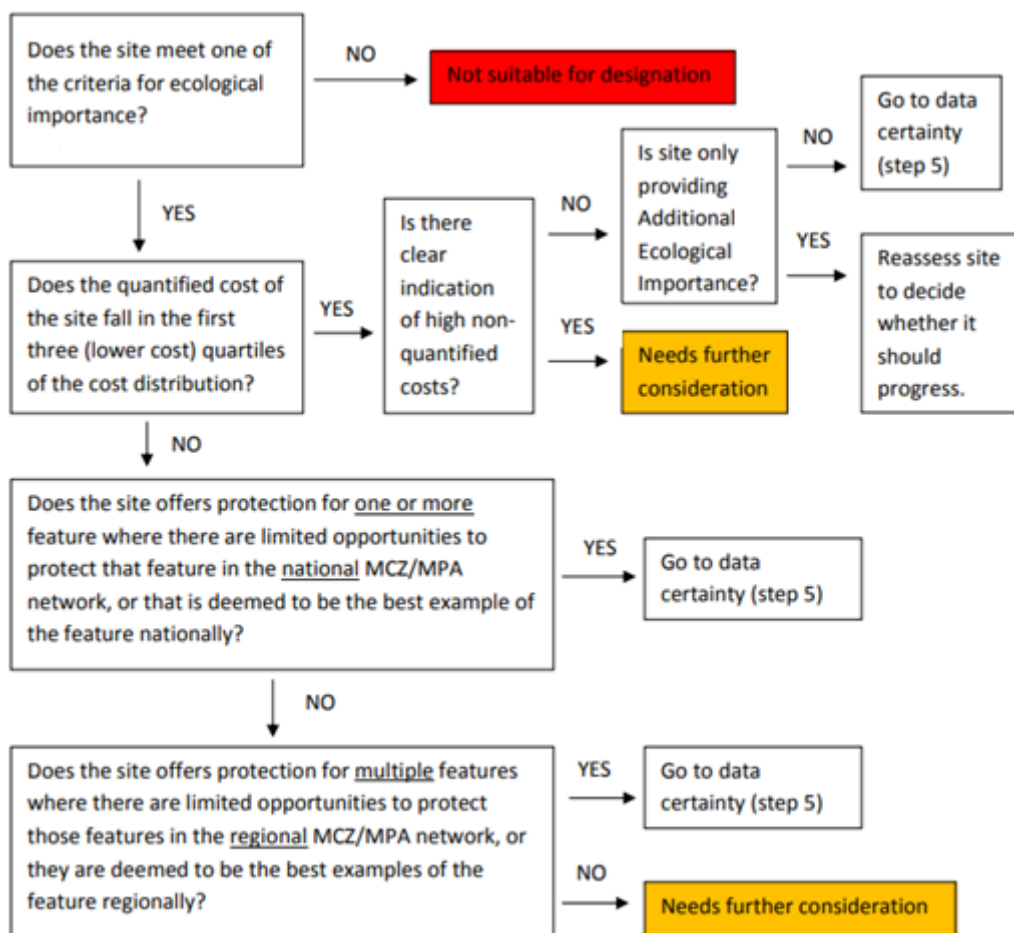


Plate 10.3: Example Flow chart - Ecological contribution and socio-economic considerations in designating an MCZ (source: Defra, 2013)

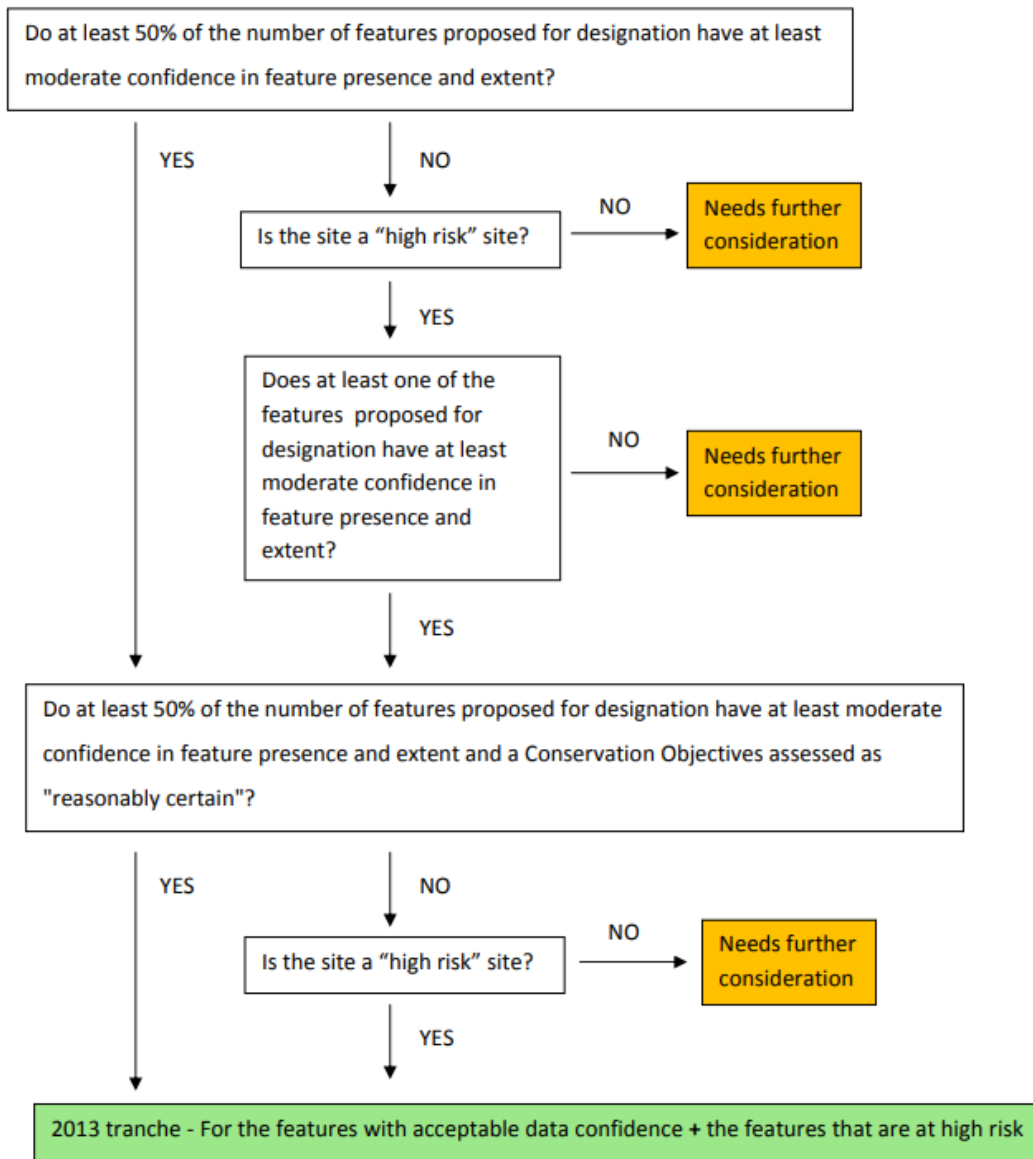


Plate 10.4: Example Flow chart - Data certainty (step 5) considerations in designating an MCZ (source: Defra 2013)

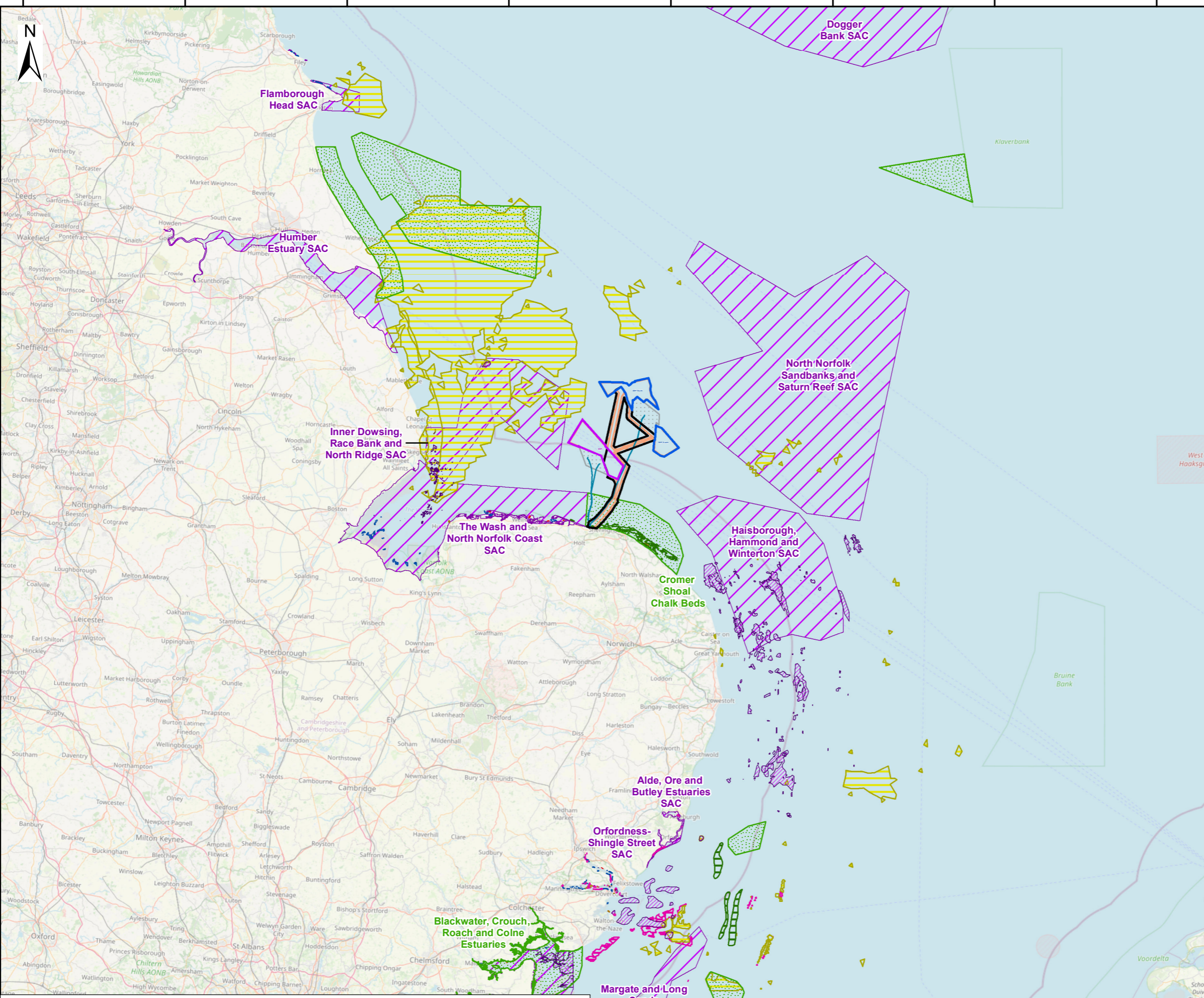
10.5.2.4 Spatial Scale

74. The extent of the area to be designated in comparison to the area lost to external cable protection would be agreed with Natural England. It is recognised that a ratio approach may not be relevant to this measure. For example, a relatively large 10:1 ratio of new designation may be appropriate to recognise the fact that the addition of protection to existing habitat has a lesser value than direct habitat creation. In this example, this would require 18,000m² (0.018km²) of additional designation, however consideration should be given to developing an area of an appropriate scale that could deliver meaningful conservation of the designated feature. This would likely be subject to the extent and condition of the habitat selected for designation and would therefore require agreement post consent, through the site selection process.

10.5.2.5 Location

75. Previous MCZ site selection processes have identified areas which were subsequently not taken forward to designation. These may present areas which could be targeted for further consideration, subject to advice from Natural England and JNCC as to why they were previously discounted. For example, during the Tranche 2 MCZ designation process in 2016, 37 sites were put forward for consideration, of which 23 sites were selected and designated. The aim of this tranche was to designate broadscale habitats to fill the gaps where there was not currently enough representation within the MPA network (Northumberland IFCA, 2021). The discounted sites may therefore have been surplus rather than unsuitable.
76. **Figure 10.6** shows various areas which have been mapped by Natural England as habitats of conservation importance which are not currently designated.

200000 250000 300000 350000 400000 450000 500000 550000



Sheringham Shoal and Dudgeon Extension Projects

Title:
Figure 10.6 Features of Conservation Importance Outside Existing MCZs

Document:
Measures of Equivalent Environmental Benefit Preliminary Environmental Information Report (PEIR)

Application Doc. no.: 5.7.1

Legend:

Dudgeon Offshore Wind Farm Extension Project Wind Farm Site	Honeycomb worm (Sabellaria alveolata) reefs (HOCl 8)
Sheringham Shoal Offshore Wind Farm Extension Project Wind Farm Site	Intertidal under boulder communities (HOCl 10)
Offshore Cable Corridors	Littoral chalk communities (HOCl 11)
Offshore Temporary Work Area	Peat and clay exposures (HOCl 15)
Existing Offshore Wind Farm	Ross worm (Sabellaria spinulosa) reefs (HOCl 16)
Existing Offshore Wind Farm Export Cable	Seagrass beds (HOCl 17)
Marine Conservation Zones (MCZ)	Sheltered muddy gravels (HOCl 19)
Special Area of Conservation (SAC)	Subtidal chalk (HOCl 20)
Blue Mussel Beds (HOCl 1)	Tide-swept channels (HOCl 22)
Estuarine rocky habitats (HOCl 5)	



Coordinate Reference System: WGS 1984 UTM Zone 31N
Transformation WGS84: OSGB_1936_To_WGS_1984_7

0 10 20 30 40 50 60 km
0 6 12 18 24 30 Nautical Miles

Scale: 1:1,175,000 Scale at size: A3

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77. The SEP and DEP wind farm sites are comprised of coarse sediment (SS.SCS), sand (SS.SSa) and mixed substrate (SS.SMx) as shown by the site characterisation surveys (**Figure 10.7**). Subject to the site selection process outlined above, a proportion of the habitat in the wind farm sites could be protected to provide MEEB.

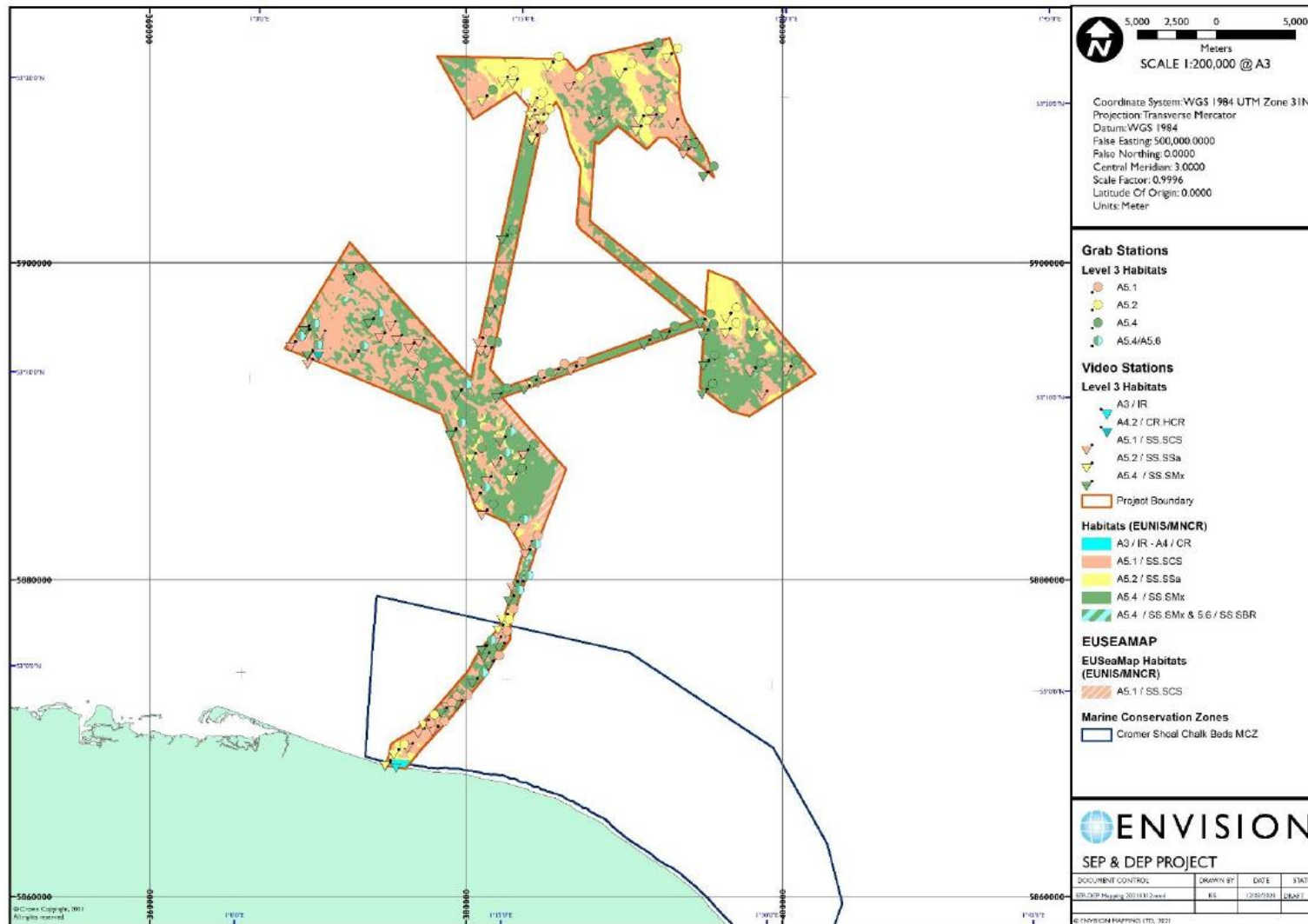


Figure 10.7 Habitats within the SEP and DEP wind farm sites

10.5.2.6 Timescale

78. Previous designations of MCZs have taken approximately two years between the provision of a recommendation from Natural England or JNCC and the finalisation of the designation by Defra (JNCC, 2019). It is estimated that the site selection process and development of site documentation would take an additional two years prior to the submission of the recommended MCZ. The Applicant would aim to implement this measure prior to the impact occurring however based on indicative timescales it is possible that finalisation of this measure would occur post installation of the export cables.

10.5.2.7 Potential Impacts from Site Extension / Designation

79. As discussed in **Section 10.5.2.3**, the site selection process would be required to consider socio-economic impacts of a designation, including on commercial fisheries.

10.5.2.8 Options for Monitoring

80. The designation of an MCZ requires reporting every six years by Defra, in accordance with the MCAA 2009. The reporting must provide an assessment of whether the MCZ is achieving its objectives individually and collectively as part of the network of marine protected areas. This may be supported by monitoring, usually undertaken by the relevant SNCB. The Applicant would provide financial, technical and/or survey support towards this process over the lifetime of SEP and DEP, or until MEEB measures have been signed off as successfully delivered. Governance of this measure would be required from Defra and Natural England.

10.5.2.9 Confidence in Feasibility

81. The feasibility of this MEEB is primarily limited to the identification of a suitable alternative area to designate. As discussed above, consultation with Natural England and Defra is required to understand whether potentially suitable areas are available, such as those previously identified but not taken forward for designation. However, it is recognised that formal designation of a new site or extension to an existing site cannot be guaranteed and is a complex process requiring detailed assessment work to show the new site will maintain the domestic integrity of the network and provide an equivalent ecological function to that lost in the CSCB MCZ.

10.6 Measures to Provide Comparable Ecological Function at the Same Location

10.6.1 Management of fisheries

10.6.1.1 Overview

82. As discussed in **Section 10.3**, a key existing pressure on the CSCB MCZ is fishing by potting. This MEEB would involve reducing the impact of fishing on the features of the MCZ through fisheries management measures. Fishing is predominantly located on the chalk bed feature of the MCZ and would therefore represent a non like-for-like measure. However, as the chalk beds provide important nursery areas for juvenile species as well as being important in the food chain (Defra, 2016) the measure would deliver equivalent (or enhanced) value to the sediment feature affected by SEP and DEP.
83. Based on stakeholder feedback (**Section 4**) this measure is not being taken forward as MEEB, however it is recognised that there is potential for fisheries management to be delivered, should Government support become available, and therefore the Applicant would be willing to consider this further.

10.6.1.2 Value and Function

84. Fishing pots have a static footprint of approximately 0.25m² to 1m², however the deployment and retrieval activities, movement of pots on the sea bed as a result of waves and tides, anchor drag and rope abrasion can cause a significantly larger recurring disturbance to the sea bed. During experimental deployments in the Berwickshire and North Northumberland Coast SAC, some pot deployments were reported to have an area of sea bed impact of up to 115m² (Stephenson *et al.*, 2015, cited in Southern IFCA, 2015). Lewis *et al.* (2009) reported mean sea bed disturbance areas per pot of 4.66m², 2.88m², and 1.06m² at water depths of 4m, 8m and 12m respectively in the Florida Keys.
85. As discussed in **Section 10.3** potting is an existing pressure on the CSCB MCZ and therefore management of the lobster and crab fishery could reduce the impact on the protected features to the desired level.

10.6.1.3 Delivery Mechanism

86. As discussed above, the development of this measure would be subject to Government level intervention to enable fisheries management, for the purposes of MEEB. Therefore, this measure is not being considered further at the project level at this stage.

10.6.1.4 Spatial Scale

87. The extent of recurring disturbance by potting, which should be removed to provide equivalent benefit to the habitat lost long term as a result of external cable protection, would be agreed with the SNCB. A ratio of 2:1 is proposed, recognising the difference between the recurring disturbance of fishing and the long term habitat loss due to external cable protection. This would require up to 3,600m² (0.0036km²) of disturbance as a result of potting to be reduced within the MCZ.

10.6.1.5 Location

88. The location of any potential MEEB would be within the MCZ however specific locations within the MCZ are unknown at this stage.

10.6.1.6 Timescale

89. As discussed above, the IFCA deem that they do not currently have the authority to deliver fisheries management areas for the purposes of compensation (or MEEB) and therefore the timescales are highly uncertain.

90. However, if a measure is deemed to be feasible at Government level, the process would require a detailed selection process, working with Natural England and the EIFCA to determine the appropriate management measure, followed by informal and formal consultation with relevant stakeholders and approval from the MMO and Defra (as demonstrated by the byelaw designation process shown in **Plate 10.5**). This may take approximately two to three years.

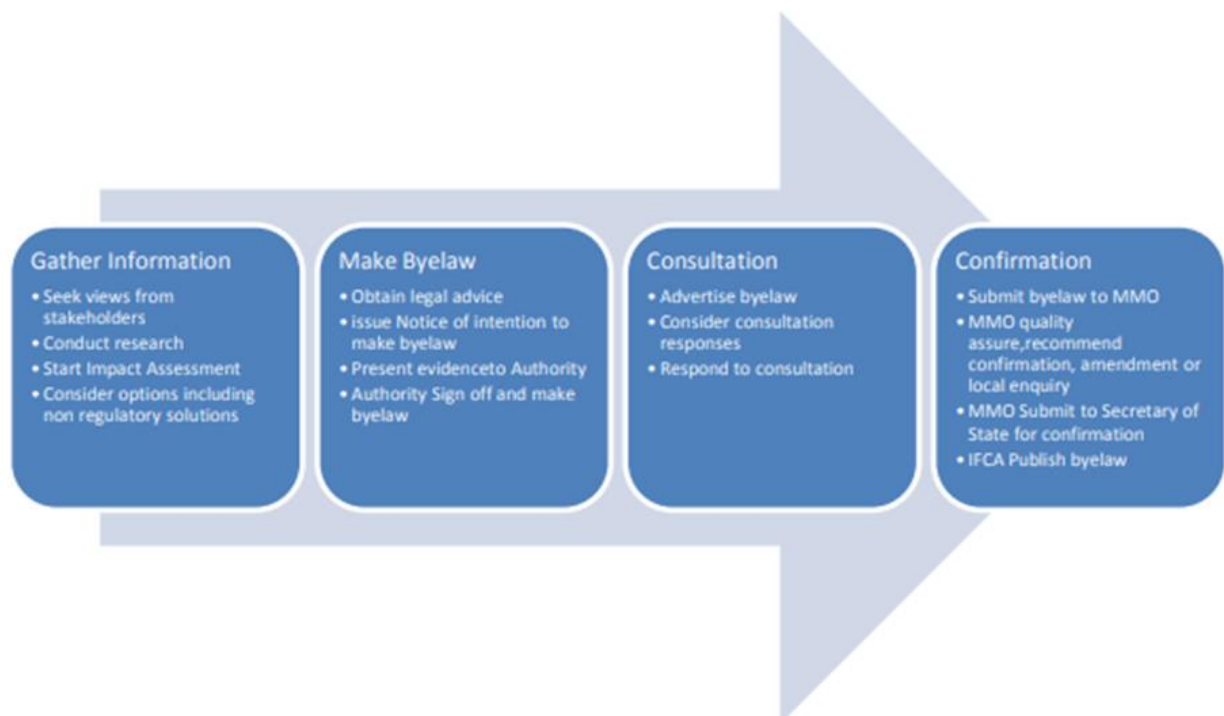


Plate 10.5: Byelaw Procedure (source: Defra, 2011)

10.6.1.7 Potential Impacts of Fisheries Management Measures

91. This measure would impact the local inshore fisheries. The quantification of this impact would be subject to the nature of a strategic measure and is therefore not known at this stage.

10.6.1.8 Options for Monitoring

92. The monitoring of the MEEB would be subject to the nature of the measure and is therefore unknown at this stage.

10.6.1.9 Confidence in Feasibility

93. The overall feasibility of this potential MEEB is primarily limited by the current uncertainty in the availability of an Authority to deliver management measures for MEEB. As discussed above, based on the stakeholder feedback (**Section 4**) this measure is not being taken forward as project level MEEB, however it is recognised that there is potential for fisheries management to be delivered, should Government support become available, for the purposes of MEEB.

10.7 Measures to Provide Comparable Ecological Function at a Different Location

10.7.1 Planting of Native Oyster Beds in the SEP and DEP Wind Farm Sites

10.7.1.1 Overview

94. As discussed in **Section 10.4.3**, planting of native oyster could provide a comparable (enhanced) ecological function. This potential MEEB considers planting of native oyster outside the CSCB MCZ, within the SEP and DEP wind farm sites. This option represents the Applicant's main backup MEEB measure.

10.7.1.2 Value and Function

95. As discussed in **Section 8.1** of the **In-Principle MEEB Plan**, native oyster beds support increased biodiversity and would therefore provide enhanced value and function to the sediment features of the CSCB MCZ.

10.7.1.3 Delivery Mechanism

96. Blue Marine Foundation published a report in 2021, conducted in collaboration with Ørsted on the Gunfleet Sands offshore wind farm, which reviewed the potential for *O.edulis* seeding (Robertson *et al.* 2021). While the report concluded that due to a variety of human (e.g. questions around ability to scale and subsequent concerns around financial investment) and physical factors (e.g. a narrow window of opportunity when hydrodynamic conditions would permit larval transport to the protected areas being seeded), seeding would likely not be successful at the Gunfleet Sands site, findings from the study identified fifty (unspecified) UK wind farm sites for further study in their potential for habitat restoration.
97. Should planting of oyster beds within the wind farm sites be taken forward, areas around the wind turbine and/or offshore substation platform (OSP) foundations could provide an opportunity for planting native oyster beds, with the potential to work with fishermen to develop a voluntary marine reserve in parallel with advisory safety zones around the wind turbines.

10.7.1.4 Spatial Scale

98. Should this measure be deemed to be appropriate, the extent of the area to be planted, in comparison to the 1,800m² lost to cable protection within the MCZ would be in line with that for planting within the MCZ (**Section 8.3** of the **In-Principle MEEB Plan**) 10,000m² as described in **Annex C**.

10.7.1.5 Location

99. In line with the approach for the MCZ, a 1km² area, within which the 10,000m² reef could be planted would be defined if native oyster restoration within the MCZ is unsuccessful. This 1km² area would be surveyed post-consent and would be considered alongside detailed wind farm design to confirm the suitability of the site for native oyster, the exact location for the reef restoration works and whether wind farm infrastructure could potentially be utilised to optimise restoration efforts.
100. As discussed above, areas around the wind turbine and/or OSP foundations could provide an opportunity for planting native oyster beds.

10.7.1.6 Timescale

101. If the planting is to occur around infrastructure foundations within SEP and DEP, this would have to be delivered post construction (i.e. after the effect has taken place). As discussed in **Section 2.2**, Defra (2021a) recognises that it may not always be possible to implement compensation prior to the effect taking place, and notes that as a minimum MEEB should be legally and financially secured prior to construction.

10.7.1.7 Potential Impacts from Planting of Native Oyster Beds in the Wind Farm Sites

102. Subject to the identification of a suitable area, this measure would be aimed at returning the habitat to a historical condition, prior to the over exploitation of native oyster and would therefore have beneficial impacts on the marine habitat/ecosystem.
103. As the success of the measure would be dependent on limiting fishing in the location of the planted oyster bed, there would be small scale impacts on fishermen using these areas. As discussed in **Section 10.7.1.3**, the effects of this could potentially be minimised by developing the oyster beds within advisory safety zones around the wind turbines and/or OSP.

10.7.1.8 Options for monitoring

104. As discussed in **Section 8.5** of the **In-Principle MEEB Plan**, monitoring of the oyster bed could be undertaken using drop down video and/or diver surveys to monitor the extent and health of the bed(s). The frequency of monitoring would be in accordance with that outlined for oyster bed restoration within the MCZ and agreed with the MEEB steering group.

10.7.1.9 Confidence in Feasibility

105. Trials within offshore wind farms in the Netherlands (e.g. Gemini Wind Farm and Eneco Luchterduinen Wind Farm (Wageningen University, 2022)) in planting native oyster to date have been successful and it is likely that suitable habitat could be identified which would support native oyster due to its historical presence in the region.

Annex A References

<p>Defra (2022). Nature Recover Green Paper. Available at https://consult.defra.gov.uk/nature-recovery-green-paper/nature-recovery-green-paper/supporting_documents/Nature%20Recovery%20Green%20Paper%20Consultation%20%20Protected%20Sites%20and%20Species.pdf</p>
<p>Defra (2013) Steps for assessing Marine Conservation Zone proposals. [Online] Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/221041/pb13896-mcz-selection-process.pdf</p>
<p>Defra (2021). Changes to the Habitats Regulations 2017. [Online] Available at: https://www.gov.uk/government/publications/changes-to-the-habitats-regulations-2017/changes-to-the-habitats-regulations-2017 Accessed February 2021</p>
<p>JNCC (2019). Marine Conservation Zones. [Online] Available at: https://jncc.gov.uk/our-work/marine-conservation-zones/#designation-process. Accessed February 2021.</p>
<p>Northumberland IFCA (2021). Marine Conservation Zones. [Online] Available at: https://www.nifca.gov.uk/marine-protected-areas/marine-conservation-zones-3/. Accessed February 2021</p>
<p>Robertson, M., Locke S., Uttley M., Helmer L., Hammerson, J. (2021). Exploring the role of offshore wind in restoring priority marine habitats.</p>
<p>Mira Veiga, J., Fleet, D., Kinsey, S., Nilsson, P., Vlachogianni, T., Werner, S., Galgani, F., Thompson, R.C., Dagevos, J., Gago, J., Sobral P. and Cronin R. (2016). Identifying Sources of Marine Litter. [Online] Available at: [REDACTED] [REDACTED]</p>
<p>Wageningen University (2022). Offshore wind energy: Opportunities for nature restoration and biodiversity. Available at [REDACTED] [REDACTED] [REDACTED]</p>

Annex B MEEB Consultation Responses

Stakeholder	Section	Comment	Applicant Response
Written Responses on Draft Outline In-Principle MEEB Plan (April 2021)			
The Wildlife Trusts	Paragraph 28	Please could Natural England confirm when a condition assessment will be available.	N/A
The Wildlife Trusts	Table 3.1	<p>Is evidence available to confirm that the length of the HDD cabling section will avoid any outcropping chalk?</p> <p>Detail should be provided as part of the assessment on the impact of the HDD exit pit on MCZ features.</p>	<p>As described in the Outline CSCB MCZ CSIMP [APP-291], HDD will be used to install the export cables at the landfall, with the HDD exit point located approximately 1,000m offshore in an area identified by the SEP and DEP characterisations surveys as sand. Therefore, there will be no direct impacts on the outcropping chalk feature in the nearshore.</p> <p>Further detail and an assessment of the potential impact of cable protection installed at the HDD exit pit is provided in the Stage 1 CSCB MCZA [APP-077].</p>
The Wildlife Trusts	Paragraph 32	It will be important to consider this as part of the cumulative impact assessment.	The Stage 1 CSCB MCZA [APP-077] considers potential cumulative impacts . This is beyond the scope of the MEEB Plan.
The Wildlife Trusts	Paragraph 35	Is this [area of cable protection] just for installation or does this include operational requirements? If not, this will need to be	The Stage 1 CSCB MCZA [APP-077] considers potential operational impacts.

Stakeholder	Section	Comment	Applicant Response
		<p>included in the application to assess the long-term impacts on the MCZ.</p> <p>Please note, TWT would expect evidence to be included on the confidence of decommissioning of cable protection and the ability of the protected feature to recover following decommissioning.</p>	<p>This is beyond the scope of the MEEB Plan.</p>
The Wildlife Trusts	Section 5.1	<p>Whilst TWT support the reduction of existing human pressures such as fishing to allow a balance between new activities such as renewable energy projects, unfortunately we do not support this measure. This is because the fishing pressure is within the protected subtidal chalk area whereas MEEB is required due to habitat loss impacts from cable protection in subtidal coarse, mixed and sand sediment. Therefore, we cannot support this measure.</p>	<p>The Applicant notes that TWT support the reduction of existing human pressures on the MCZ but because this would not represent a like-for-like measure, TWT are not able to support it in this instance.</p> <p>In response to stakeholder feedback on the draft Outline In-Principle MEEB Plan, fisheries management is not being progressed further at a project level at this stage.</p>
The Wildlife Trusts	Paragraph 38	<p>What is the proposal for the artificial reef? Please note that in general, TWT is not supportive of the installation of artificial reefs.</p>	<p>Noted, this is not being progressed further at this stage and was discounted during the very early stages of the MEEB review based on stakeholder feedback and is therefore not considered further in the In-Principle MEEB Plan.</p>
The Wildlife Trusts	Paragraph 53	<p>If offshore wind farm development is to become a priority policy area for UK seas, then all mechanisms for delivering compensation</p>	<p>Agreed.</p>

Stakeholder	Section	Comment	Applicant Response
		must be explored. This is a priority area of Defra's Offshore Wind Enabling Actions Programme.	
The Wildlife Trusts	Paragraph 60	Monitoring would need to be in place for the lifetime of the project, or until MEEB measures have been signed of as a success, delivering against the conservation objectives. Governance on how MEEB will be overseen by multiple organisations would need to be outlined in the draft MEEB plan.	Further information added to Section 10.4.2.8 of Annex A .
The Wildlife Trusts	Section 5.2	Whilst we believe this proposal [Reduction in Fisheries Pressures – Innovative Potting Methods] would have benefit to the MCZ, it is not related to the habitat loss impact on subtidal mixed, coarse and sand sediment from cable protection. In addition, this measure is part of Eastern IFCA's remit, and therefore not additional. Therefore, we cannot support this measure.	<p>The Applicant notes that TWT support the reduction of existing human pressures on the MCZ but because this would not represent a like-for-like measure TWT are not able to support it in this instance.</p> <p>In response to stakeholder feedback on the draft Outline In-Principle MEEB Plan, fisheries management is not being progressed further at a project level at this stage.</p>
The Wildlife Trusts	Paragraph 66	We welcome that Equinor is proposing a strategic approach to the delivery of MEEB and we agree that approach similar to the Aggregates Lev Sustainability Fund would be valuable. We also support the development and delivery of strategic approaches as currently undertaken by all offshore wind farms in Scotland which have to participate in one of two Regional Advisory Groups. There is merit of considering this approach in the southern North Sea.	Noted.

Stakeholder	Section	Comment	Applicant Response
		<p>We suggest that this proposal is discussed with Defra and BEIS to demonstrate that there is appetite from industry to deliver this approach.</p>	
The Wildlife Trusts	Section 5.3	<p>TWT does not support [marine debris removal] as MEEB. It will not equate to the damage and loss caused by cabling activity and therefore will not provide MEEB.</p>	<p>Further information on the potential sources of debris and therefore potential for this measure to provide equivalent benefit is provided in Section 10.4.1 of Annex A.</p>
The Wildlife Trusts	Section 5.4	<p>Whilst we do not discount that in the right circumstances [disused infrastructure removal] could provide a positive benefit to the marine environment, it is not within the gift of Equinor to deliver this measure. Under the principle of Polluter Pays, the owner of the asset is responsible for the decommissioning of this asset. Therefore, TWT does not support this measure.</p>	<p>This measure would only apply where the owner is not going to remove the infrastructure as is the case in many circumstances.</p>
The Wildlife Trusts	Section 5.5	<p>TWT is not supportive of [a site extension/designation] as MEEB for the following reasons:</p> <p>The process to extend or create new designated sites is lengthy and we question if there are statutory resources available to undertake this work.</p> <p>By extending or designating new sites, it allows for the chipping away and deterioration of existing sites. This is not acceptable as a mechanism, especially considering the scale of offshore wind farm development planned.</p> <p>Extending or creating new sites will create further problems in the future for offshore wind farm development, complicating the consenting process and further putting the UK MPA network at risk.</p>	<p>The resources to undertake this process could be funded/provided by SEP and DEP. The Applicant is not currently proposing to progress a site extension/designation as MEEB. If alternative MEEB becomes necessary, the mechanism and timing would be reviewed in consultation with the MEEB steering group.</p>

Stakeholder	Section	Comment	Applicant Response
Natural England	(3.3) Existing Pressures on the Cromer Shoal Chalk Beds MCZ	Point 32 states that <i>'evidence has subsequently been obtained that damage to areas of elevated chalk beds may be caused by potting activities'</i> . Please could this evidence be referenced?	The reference is the Natural England (2020) reference provided (Section 10.3 of Annex A).
Natural England	(3.3) Existing Pressures on the Cromer Shoal Chalk Beds MCZ	We do note that this is another sector impacting a different feature of the MCZ, namely elevated chalk. We consider that the focus of the forthcoming MCZ assessment should be on those features of the site which would be impacted by the project, namely subtidal sand, subtidal coarse sediment and the subtidal mixed sediment.	A hierarchy approach is now being adopted in line with Defra (2021a).
Natural England	(4) Potential Impacts on the Cromer Shoal Chalk Beds MCZ	The draft Outline In-Principle MEEB Plan is based on anticipated habitat loss within the Cromer MCZ due to external cable protection. The worst case scenario (WCS) for this habitat loss, due to external cable protection (rock berm), is equivalent to an area of 600m ² (based on 100m length x 3m wide rock bag x 2 cables). This could be installed anywhere along the length of the export cable route inside the MCZ up to the approach to the HDD exit point. Natural England welcomes the project's commitment to using HDD at the landfall.	Noted
Natural England	(4) Potential Impacts on the Cromer Shoal Chalk Beds MCZ	We also appreciate that the MCZ Assessment (MCZA) has not yet been carried out, however, we would envisage that in addition to placement of rock protection on the MCZ seabed, the activities associated with the export cable corridor (ECC) through the lifetime of the project would also have the potential to hinder the conservation objectives of the site. These include maintenance of cable protection or remedial burial, cable repair and replacement, new landfall HDD etc. Pressures from these features includes temporary seabed disturbance, increase in suspended sediments and/or deposition, temporary habitat loss, and	Noted, this is included in the Stage 1 CSCB MCZA [APP-077].

Stakeholder	Section	Comment	Applicant Response
		ultimately permanent habitat loss. Therefore, we would expect the MCZA to evaluate the full range of pathways between features and all pressures.	
Natural England	(4) Potential Impacts on the Cromer Shoal Chalk Beds MCZ	Lastly, when considering MEEB, it is worth remembering that Cromer Shoal Chalk Beds MCZ was selected and designated for its biodiversity conservation, and its contribution to an ecologically coherent network. We would seek to ensure that with any development there is no net loss of biodiversity and that the ecological coherence of the network is maintained.	Noted.
Natural England	(5.1) Reduction in Fisheries Pressure – Displacement of Potting outside the MCZ	<p>Fisheries management: Natural England does not agree with the mechanism proposed for reducing impacts on the features of the MCZ through reduction in pressures due to one industry (i.e. fishing) in order to compensate for the impacts/pressures of another industry (i.e. marine renewables). This would transfer the burden from one party (developer who benefits from the development) onto another party (fishermen, recreational users who lose the benefit they currently have in accessing the site).</p> <p>Moreover, Natural England is currently working with the Eastern IFCA and fishery stakeholders to develop fisheries management measures to reduce the impact of the potting fishery on the MCZ. Therefore, this measure would not provide additional environmental benefit to the MCZ.</p>	In response to stakeholder feedback on the draft Outline In-Principle MEEB Plan, fisheries management is not being progressed further at a project level at this stage.
Natural England		Artificial Reef creation: Natural England welcomes consideration of opportunities for biodiversity net gain (BNG) that might be attained through the creation of an artificial reef and the potential for reducing fishing pressures within Cromer MCZ. However, there is the risk of not only losing sand, coarse and mixed sediment habitats	Fisheries management supported by artificial reef creation was discounted during the very early stages of the MEEB review based on stakeholder feedback and is therefore not



Stakeholder	Section	Comment	Applicant Response
		<p>within the MCZ as a result of the cable protection, but also that the artificial reef might fail and be detrimental to the conservation objectives of other designated sites surrounding Cromer MCZ. Therefore , the identification, design and monitoring of a potential artificial reef site would require careful forward planning, backed up by robust scientific evidence, which we would wish to consider and discuss at the earliest opportunity.</p>	<p>considered further in the In-Principle MEEB Plan.</p>
<p>Natural England</p>	<p>(5.2) Reduction in Fisheries Pressure – Innovative Potting Methods</p>	<p>We welcome innovation in offshore wind farm developments and novel techniques which are aimed at lessening or possibly removing the impacts. However, we would wish to refer you to our comments above, regarding our ongoing collaboration with the Eastern IFCA and fishery stakeholders. That work is aimed at improving the quality of the MCZ habitat through development of fisheries management measures to reduce the impact of potting fishery on MCZ seabed.</p> <p>Therefore, we question the additional ecological benefit this option would provide, especially as the USA work is focused on reducing marine mammal entanglement rather than reef impacts. It is also worth noting that whilst this measure is aimed at reducing abrasion impact on the MCZ seabed, it would not address the loss of subtidal sand, subtidal coarse sediment, and subtidal mixed sediments habitat.</p>	<p>In response to stakeholder feedback on the draft Outline In-Principle MEEB Plan, fisheries management through innovative methods is not being progressed further at a project level at this stage.</p>
<p>Natural England</p>	<p>(5.3) Removal of Anthropogenic Features – Marine Litter / Debris Removal</p>	<p>Whilst we welcome the opportunity to improve the condition of a feature within the MCZ through the removal of marine litter/debris, we do not consider that this measure alone would be adequate to offset habitat loss. To provide a more comprehensive view on this, we would require more specific information regarding the scale of the debris to be removed, and the location/extent of the area from</p>	<p>Further information added to Section 10.4.1 of Annex A.</p>

Stakeholder	Section	Comment	Applicant Response
		which the debris is to be removed. The feasibility of removing debris/marine, the effectiveness of its removal, potential additional impacts to designated site features from removal, and the means of its disposal would also need to be assessed.	
Natural England		However, please be advised that the mostly likely marine litter will be ghost fishing gear located in the elevated chalk areas, which is currently being addressed as part of the fisheries management measures. Therefore, again there is the question of additionality of this proposal , and also whether this measure provides any real ecological benefit to subtidal sand, subtidal coarse sediment, and subtidal mixed sediment habitats.	A review of potential sources of marine debris is provided in Section 10.4.1 of Annex A .
Natural England		There is, however, potential for this measure to be broadened to include the removal of third party assets (as proposed in Section 5.4 Removal of Anthropogenic Features – Disused Cables below), or pipelines.	Further information added in Section 10.4.2 of Annex A to include pipelines.
Natural England	(5.4) Removal of Anthropogenic Features – Disused Cables	Natural England is broadly supportive of the removal of redundant third party assets within the site to offset habitat loss, but only where they are surface laid. Whilst it is unclear whether this is the case with the proposed telecom cable, we are aware of this being the case for some sections of oil and gas pipelines located with Cromer MCZ. While the ‘polluter pays’ is an accepted principle in such situations, our understanding is that there is currently no requirement for such assets to be removed during decommissioning.	Further information added in Section 10.4.2 of Annex A to include pipelines.
Natural England		We acknowledge consideration of this option is not without its challenges i.e. there may not be an immediate benefit to the MCZ prior to the operation of DEP and SEP. However, by removing third	In order to demonstrate the measure could be legally secured at the time of the impact occurring, Section 10.4.2

Stakeholder	Section	Comment	Applicant Response
		<p>party assets which are reaching the end of their operational life (next ~10 years), we believe that there could be the potential to more than offset habitat loss in the longer term. Therefore, there is merit in exploring the logistics and deliverability of this measure over the life time of the extension projects with regulators and legal advisers.</p>	<p>focuses on cables and pipelines which are currently disused. However, the Applicant is not currently proposing to progress removal of anthropogenic features as MEEB. If alternative MEEB becomes necessary, available options would be reviewed in consultation with the MEEB steering group.</p>
Natural England	Site Extension/ Designation	<p>The permanent loss of habitat within an MCZ should ideally be balanced by a like-for-like replacement of habitat within the same site, potentially with an increased area of replacement to allow for any delay or uncertainty in the habitat reaching the quality of the habitat being lost.</p> <p>However, if this is not possible, then the project could potentially explore the option of 'off-site' habitat creation or restoration, provided that environmental improvements to that 'off-site' area were also carried out and suitable management secured for the lifetime of the project. For example, could an area of the array be used to create an area of mixed sediment habitat where optimal long-term management was guaranteed, and in the future support the coherence of the MPA network? We would encourage you to discuss potentially feasible mechanisms with regulators.</p>	<p>Further information added to Section 10.5.1 of Annex A to include management of an area of the array of sediment habitat.</p> <p>Section 10.7 of Annex A added to consider development of a new off-site feature.</p>
Natural England	N/A	<p>Natural England is working towards publishing the condition assessment for Cromer Shoal MCZ in the next couple of months, which will highlight pre-existing pressures to the site that will provide context for the MCZ assessment.</p>	Noted.

Stakeholder	Section	Comment	Applicant Response
Natural England	N/A	Natural England continues to liaise with Defra in relation to producing updated MCZ guidance.	Noted.
Marine Management Organisation (MMO)	Section 3.2 Designated Features	In regard to Paragraph 29: the MMO note that there appears to be a minor presentational issue, as it states that features in bold in Table 3-1 are potentially relevant due to spatial overlap with the export cable corridor, however, no items in Table 3-1 are bold.	Amended.
MMO	Section 5.1 Reduction of fisheries pressures: displacement of potting outside the MCZ	In regard to Paragraph 37: EIFCA has highlighted that they are already working closely with fishery stakeholders and Natural England (NE) to develop fisheries management measures to reduce the impact of the potting fishery industry on chalk in the MCZ. Given the current information provided the MMO cannot conclude that the current proposal of reducing the impact of fishing on the features of the Marine Conservation Zone (MCZ) is suitable for potential Measures of Equivalent Environmental Benefit (MEEB).	In response to stakeholder feedback on the draft Outline In-Principle MEEB Plan, fisheries management is not being progressed further at a project level at this stage.
MMO	Section 5.1 Reduction of fisheries pressures: displacement of potting outside the MCZ	In regard to Paragraph 37: It is the MMO's understanding that potting is not hindering the conservation objectives of the subtidal sand, subtidal coarse sediment and subtidal mixed sediment features of the MCZ. These subtidal features are the ones which may be impacted by the project therefore, Equinor need to consider how the removal of potting activities is beneficial. The MMO defer to NE for further comment as the Statutory Nature Conservation Body (SNCB).	In response to stakeholder feedback on the draft Outline In-Principle MEEB Plan, fisheries management is not being progressed further at a project level at this stage.
MMO	Section 5.1 Reduction of fisheries pressures: displacement of potting outside the MCZ	In regard to Paragraph 38: In principle the MMO welcome the suggestion of enhancing lobster habitat outside the MCZ through the deployment of an artificial reef seeded with juvenile lobster, but this must be subject to full environmental and socio-economic assessment. The MMO would like to emphasise that this measure	In response to stakeholder feedback on the draft Outline In-Principle MEEB Plan, fisheries management is not being progressed further at a project level at this stage.

Stakeholder	Section	Comment	Applicant Response
		<p>may not reduce the impact of management measures for inshore fishermen operating small, beach-launched vessels (the majority of potting vessels are around 8m long or less) as the seaward boundary of the MCZ is beyond their safe working range.</p> <p>Furthermore, the placement of an artificial reef structure may result in permanent exclusion from a fishing ground and the displacement of commercial fishing activity from the area meaning that vessels may have to travel further afield to reach alternative fishing grounds. These impacts should be included as topics for discussion with the local commercial fishing fleet and EIFCA to establish the potential impacts and effects on the local fishing fleet.</p>	
MMO	Section 5.1 Reduction of fisheries pressures: displacement of potting outside the MCZ	<p>In further regard to Paragraph 38: the MMO suggest the proposal to create an artificial reef structure seeded with juvenile lobsters outside the MCZ requires careful consideration in terms of the suitability of its location. Creation of an artificial reef structure involves the modification of existing fish habitat. The placement of artificial structures will result in a permanent loss of benthic habitat that may serve as a spawning or nursery ground habitat and a foraging habitat for fin-fish species. Therefore, consideration should be given to the fin-fish species that are known to use the area proposed for the artificial reef structure, to determine whether any of the species are dependent on the site for part or all of their life stages e.g. benthic dwelling or benthic spawning fish species. Additionally, the creation of an artificial reef may attract fish, shellfish and benthic invertebrate species to the site, which would not naturally form part of the ecosystem in this location. Evidence from studies of artificial reef placement should be used to help inform on the likely changes to the habitat and ideally any changes</p>	<p>In response to stakeholder feedback on the draft Outline In-Principle MEEB Plan, fisheries management is not being progressed further at a project level at this stage.</p>

Stakeholder	Section	Comment	Applicant Response
		<p>in the composition of species at the site should be monitored once the reef structure is in place.</p>	
MMO	<p>Section 5.1 Reduction of fisheries pressures: displacement of potting outside the MCZ</p>	<p>In regard to Paragraph 38: The MMO would welcome sight of the type of artificial reef proposed as this could be considered an impact in itself, however, it is recognised that this will not be placed within the MCZ.</p>	<p>In response to stakeholder feedback on the draft Outline In-Principle MEEB Plan, fisheries management is not being progressed further at a project level at this stage.</p>
MMO	<p>Section 5.1 Reduction of fisheries pressures: displacement of potting outside the MCZ</p>	<p>In regard to Paragraph 42: The MMO and its consultees were unable to access the document 'David Tyldesley and Associates, 2020'. The EIFCA have re- confirmed their September 2020 position on compensatory measures (for SACs, SPAs) or MEEB (for MCZs) is:</p> <p><i>Eastern IFCA will actively engage in exploring opportunities for environmental compensatory measures but will not be supportive of measures that will have an overall adverse impact upon fishing activities and opportunities.</i></p> <p>The MMO wish to comment that Equinor need to consider the impact of their proposals in relation to how they may affect fishing businesses e.g. viability. EIFCA have advised that in their opinion restricting potting may be disproportionate and not necessary when taking into account the other ongoing work to protect raised chalk features and potential future work to maintain stock sustainability.</p>	<p>In response to stakeholder feedback on the draft Outline In-Principle MEEB Plan, fisheries management is not being progressed further at a project level at this stage.</p>
MMO	<p>Section 5.1 Reduction of fisheries pressures: displacement of potting outside the MCZ</p>	<p>In regard to Paragraph 43: In consultation with EIFCA the MMO have been advised that EIFCA seek a balance between fisheries and conservation by managing the impacts of fisheries to promote their compatibility with marine protected area objectives. Equinor should consider whether the restriction of fishing activities to</p>	<p>In response to stakeholder feedback on the draft Outline In-Principle MEEB Plan, fisheries management is not</p>

Stakeholder	Section	Comment	Applicant Response
		<p>compensate for the impacts of a non-fishing sector activity to be an equitable balance between fisheries and conservation, and therefore, be regarded as sustainable development.</p>	<p>being progressed further at a project level at this stage.</p>
MMO	<p>Section 5.1 Reduction of fisheries pressures: displacement of potting outside the MCZ</p>	<p>In regard to Paragraph 45-49: In consultation with EIFCA it has been highlighted that the list of potential fisheries management measures was from an EIFCA supporting document for discussions with fishing industry about crab and lobster stock sustainability. The MMO has been advised that the focus of this supporting document was on biological sustainability of crab and lobster populations, not management relating to potential impacts on potting on seabed habitats. EIFCA have advised that this document was not intended to be used as a list of potential fisheries management measures for MEEB.</p>	<p>In response to stakeholder feedback on the draft Outline In-Principle MEEB Plan, fisheries management is not being progressed further at a project level at this stage.</p>
MMO	<p>Section 5.1 Reduction of fisheries pressures: displacement of potting outside the MCZ</p>	<p>In regard to Paragraph 47: The MMO notes that the MEEB document refers to a "byelaw area" although this is not in the EIFCA document referenced. Use of the phrase "byelaw area" is considered confusing as byelaws are used by IFCA's for delivering a range of management measures, not just closure areas; most management requires the statutory provisions of a byelaw. In all cases, non- statutory measures should be explored before byelaws are considered. The EIFCA have advised the MMO that they have no intention to introduce a closure area to displace potting fishing from the MCZ. Their current work is seeking to manage potting (if necessary including small closure areas over the vulnerable raised chalk feature) in the part of the MCZ where an impact has been identified. The MMO recommend direct engagement with EIFCA on this matter.</p>	<p>In response to stakeholder feedback on the draft Outline In-Principle MEEB Plan, fisheries management is not being progressed further at a project level at this stage.</p>

Stakeholder	Section	Comment	Applicant Response
MMO	Section 5.2 Reduction in Fisheries Pressures – Innovative Potting Methods	Further to matters discussed above, the MMO note that damage reported by NE (2020) relates only to raised chalk areas of the MCZ, not the sand/sediment habitats affected by the Equinor project. It is worth noting that EIFCA and NE, with the fishing industry, are working collaboratively to better understand the problem and develop appropriate management solutions. The EIFCA have suggested that Equinor could contribute to the exploration of innovative fishing gears that may reduce environmental impacts of fishing. This could include feasibility assessments as well as commitments to appropriate monitoring to measure effectiveness. The MMO recommend direct engagement with EIFCA on this matter.	In response to stakeholder feedback on the draft Outline In-Principle MEEB Plan, fisheries management is not being progressed further at a project level at this stage.
MMO	Section 5.2 Reduction in Fisheries Pressures – Innovative Potting Methods	In regard to Paragraph 66: the MMO note Equinor's comments and advise that this will need to be considered at a strategic level.	This has been revised to reflect that, if required, this would be a strategic measure.
MMO	Section 5.3 Removal of Anthropogenic Features – Marine Litter / Debris Removal	The MMO have been advised by EIFCA that they are currently considering ways to manage the location and removal of lost fishing pots in the MCZ. This is being explored as a mitigation measure to reduce potential impacts of potting on subtidal chalk, where lost or stored pots could impact the MCZ. Therefore, the MMO would support exploration of marine litter/debris removal that reduces environmental impacts of fishing. See Section 3.1 for related comments.	Further information on litter/debris removal added in Section 10.4.1 of Annex A .
MMO	Section 5.4 Removal of Anthropogenic Features – Disused Cables	In regard to Paragraph 84: The MMO suggest that the potential for effects relating to the removal of disused cables should be weighed against the potential benefits of removal (e.g. removal of colonised structures vs removal of structures which may degrade and cause	This measure would be subject to the availability of surface infrastructure to ensure a benefit can be proven. The Applicant is not currently proposing to



Stakeholder	Section	Comment	Applicant Response
		<p>contamination). The act of removal may have more physical processes impacts than if buried cables remain in situ. For example, removal may result in localised changes to the seabed morphology or generation of sediment plumes if jetting or trenching is required. Whilst the benefit of removal may exceed such effects, this should be carefully considered before this option is selected as an appropriate MEEB. The MMO would welcome further sight of the proposed methods for removal of the debris and will seek to defer to NE over potential impacts to the MCZ.</p>	<p>progress removal of anthropogenic features as MEEB. If alternative MEEB becomes necessary, available options would be reviewed in consultation with the MEEB steering group.</p>
MMO	Section 5.4 Removal of Anthropogenic Features – Disused Cables	<p>In regard to Paragraph 88: If the disused cable is buried in the seabed, the MMO consider that the approach of calculating the footprint of the cable as a product of its length and diameter may not necessarily be meaningful from an effects perspective. Its current “footprint” may effectively be zero if the cable is buried in stable sediment.</p>	<p>This measure would be subject to the availability of surface infrastructure to ensure a benefit can be proven. The Applicant is not currently proposing to progress removal of anthropogenic features as MEEB. If alternative MEEB becomes necessary, available options would be reviewed in consultation with the MEEB steering group.</p>
MMO	Section 5.5 Site Extension / Designation	<p>The MMO understand through consultation with the EIFCA, that their district is already highly designated as an Special Area of Conservation (SAC), Special Protection Area (SPA) or MCZ and inshore fisheries are already subject to restrictions to ensure they are compatible with conservation objectives. The EIFCA has highlighted concerns for impacts to inshore fishing compared with offshore areas where smaller proportions of potential fishing grounds are restricted. The EIFCA have highlighted that they would not be supportive of any inshore MPA site extension or new designation in inshore areas as MEEB, as these would be likely to</p>	<p>This would be a factor in the selection of a suitable site, discussed in Section 10.5.2 of Annex A. However, the Applicant is not currently proposing a site extension/designation as MEEB. If alternative MEEB becomes necessary, available options would be reviewed in consultation with the MEEB steering group.</p>

Stakeholder	Section	Comment	Applicant Response
		require further restrictions on fishing activities in areas already heavily affected. The MMO recommend Equinor engage directly with EIFCA.	
MMO	Section 5.5 Site Extension / Designation	It could be beneficial to include a subsection detailing the potential secondary impacts of the delivery mechanism for each proposed MEEB in Section 5, to ensure that potential benefits are considered in the context of any impacts that may occur because of their implementation.	Added within Section 10 of Annex A and see Appendix 4 Potential Impacts on CSCB MCZ Features from Plating of Native Oyster Beds (Revision B) [REP1-010] of the Stage 1 CSCB MCZA [APP-077].
MMO	N/A	The MMO are encouraged by early engagement from Equinor. As highlighted throughout our response, the MMO consider further thought and justification is required into the potential for effects from the proposals outlined within the MEEB, which should be weighed against the potential benefits. The MMO recommends further discussions are held and that the Applicant seeks early engagement with both NE and EIFCA on the proposal.	Further information added within Section 10 of Annex A . Consultation will continue through the DCO Examination period.
EIFCA	Section 5.1 Reduction of fisheries pressures: displacement of potting outside the MCZ Para. 37 As discussed in Section 3.2, a key existing pressure on the CSCB MCZ is fishing by potting. This potential MEEB proposal considers reducing the impact	Specifically, Natural England has identified that potting impacts raised chalk in the MCZ. Eastern IFCA is already working closely with fishery stakeholders and Natural England to develop fisheries management measures to reduce the impact of the potting fishery on raised chalk in the MCZ. This work is already happening so would not constitute additional environmental benefit to the MCZ if adopted as compensation for impacts of the Equinor project. Potting fishing is not hindering the conservation objectives of the subtidal sand, subtidal coarse sediment and subtidal mixed sediment features of the MCZ that will be impacted by the Equinor	In response to stakeholder feedback on the draft Outline In-Principle MEEB Plan, fisheries management is not being progressed further at a project level at this stage.

Stakeholder	Section	Comment	Applicant Response
	<p>of fishing on the features of the MCZ by seeking to work with the Eastern Inshore Fisheries and Conservation Authority (EIFCA) to put in place fisheries management measures to reduce the impact of fishing within the MCZ.</p>	<p>project. EIFCA therefore considers it is not appropriate to restrict potting over the non-chalk features of the MCZ.</p>	
EIFCA	<p>Para. 38 The Applicant recognises the importance of this fishery and therefore proposes that impacts on the fishery could be minimised by enhancing lobster availability in an area outside the MCZ through the deployment of an artificial reef seeded with juvenile lobster.</p>	<p>Whilst EIFCA would cautiously welcome the suggestion of enhancing lobster habitat outside the MCZ through the deployment of an artificial reef seeded with juvenile lobster – subject to full environmental and socio-economic assessment – we emphasize that this measure would not reduce impacts for inshore fishermen operating small, beach-launched vessels (the majority of potting vessels are around 8m long or less) as the seaward boundary of the MCZ is beyond their safe working range.</p>	<p>In response to stakeholder feedback on the draft Outline In-Principle MEEB Plan fisheries management is not being progressed further at a project level at this stage.</p>
EIFCA	<p>Para. 40 As discussed in Section 3.2 potting is an existing pressure on the CSCB MCZ and therefore management of the lobster and crab fishery could reduce the impact on the protected features.</p>	<p>See comment above.</p> <p>Potting has only been recognised as a potential risk to a part of the subtidal chalk feature, (i.e. raised chalk) in a small area of the MCZ. Management of this pressure is already in development. There is no requirement to further manage the lobster and crab fishery in the MCZ to reduce impact on protected features.</p>	<p>In response to stakeholder feedback on the draft Outline In-Principle MEEB Plan, fisheries management is not being progressed further at a project level at this stage.</p>



Stakeholder	Section	Comment	Applicant Response
EIFCA	<p>Para. 42 During consultation on previous projects and through the January 2020 Crown Estate Derogation workshop (David Tyldesley and Associates, 2020), the IFCA stated that they do not have the authority to designate fisheries management measures for the purpose of HRA compensation (which would apply equally to MEEB).</p>	<p>Please advise how this reference (David Tyldesley and Associates 2020) can be found? The link in the references section does not work.</p> <p>EIFCA's position (agreed September 2020) in relation to compensatory measures (for SACs, SPAs) or MEEB (for MCZs) is:</p> <p><i>Eastern IFCA will actively engage in exploring opportunities for environmental compensatory measures but will not be supportive of measures that will have an overall adverse impact upon fishing activities and opportunities.</i></p> <p>As stated above, EIFCA believe that restricting potting in the MCZ for MEEB purposes would disproportionately affect inshore fishing businesses (in many cases making their continuation unviable) and – other than ongoing work to protect raised chalk features and potential future work to maintain stock sustainability – is not necessary.</p>	<p>Hyperlink added to References list in the In-Principle MEEB Plan.</p> <p>In response to stakeholder feedback on the draft Outline In-Principle MEEB Plan, fisheries management is not being progressed further at a project level at this stage.</p>
EIFCA	<p>Para. 43 By promoting an enhanced fishery outside the MCZ, the Applicant would not be in conflict with the IFCA's remit of seeking a balance between fisheries and conservation. In addition, Section 153(2)(c) could be considered to facilitate a broader remit around achieving sustainable development, recognising the</p>	<p>Eastern IFCA seeks a balance between fisheries and conservation by managing the impacts of fisheries to promote their compatibility with marine protected area objectives. The Authority (EIFCA) does not consider restricting fishing activities in an area to compensate for the impacts of a non-fishing sector in that area to be an equitable balance between fisheries and conservation – and therefore would not be regarded by the Authority as contributing to sustainable development.</p> <p><i>Section 153(2)(c) take any other steps which in the authority's opinion are necessary or expedient for the purpose of making a contribution to the achievement of sustainable development...</i></p>	<p>In response to stakeholder feedback on the draft Outline In-Principle MEEB Plan, fisheries management is not being progressed further at a project level at this stage.</p>

Stakeholder	Section	Comment	Applicant Response
	importance of renewable energy in delivering sustainability and therefore this may benefit from further guidance from the Secretary of State (in this case Defra).	<p>... highlights that steps must be necessary or expedient in the Authority's opinion.</p> <p>For reasons stated above, EIFCA do not consider that an enhanced fishery outside the MCZ would provide benefits to fishers displaced from the MCZ.</p>	
ETG meeting 1st October 2021 on revised draft In-Principle MEEB Plan version 1 – key comments, see meeting minutes (Consultation Report Appendix 1 Evidence Plan [APP-030]) for full discussion			
NE/TWT	All	A higher ratio than 1:1 is required for MEEB	There is legal precedent for a 1:1 ratio based on the Hornsea Three (HOW03) compensation and therefore the Applicant suggests this would be a matter for the Secretary of State to determine, however the Applicant notes that the preferred MEEB is oyster planting which would deliver on a greater than 1:1 ratio (see Section 8.1 of the In-Principle MEEB Plan).
EIFCA	Removal of marine debris/litter from CSCB MCZ	EIFCA are actively working with fishermen to set up a campaign to locate and remove lost fishing gear in the CSCB MCZ. The focus of the campaign is lost gear on the rugged chalk, however, even if not currently on the chalk it could move onto the chalk under natural processes. It is a complicated area as there are already obligations and a legal requirement for fishermen in relation to this, therefore there is a question of additionality. However, the EIFCA are not proposing to carry out litter removal from the beaches, only fishing gear at sea.	Noted, this is not currently the preferred MEEB however if alternative measures become necessary further consideration would be given to the extent of debris/litter beyond that which the EIFCA are proposing to remove.

Stakeholder	Section	Comment	Applicant Response
TWT	Removal of marine debris/litter from CSCB MCZ	In relation to ghost fishing gear, that would be specific to chalk features, therefore would not have an impact on the area SEP and DEP is impacting. TWT do not support this measure.	This is not currently the preferred MEEB however if alternative measures become necessary further consideration would be given to the existing impacts of debris/litter on the MCZ.
TWT	Removal of marine debris / litter from CSCB MCZ	TWT would not support beach clean-up adjacent to the MCZ as the debris/litter is not having an impact on the MCZ currently	
TWT	All	TWT do not think any of the options are viable for MEEB. The only alternative TWT consider is no cable protection within the CSCB MCZ.	NE confirmed that they do not agree with TWT's view that none of the options presented are viable for MEEB. Until detailed project design and site investigation (which will be finalised post-consent) is undertaken, the exact quantities of cable protection required in the MCZ are unknown. The Applicant has refined down the realistic worst case scenario as far as possible however in order to manage uncertainties in cable protection requirements, allowance for up to 1,800m ² of cable protection within the MCZ is being sought within the draft DCO.
NE	Removal of marine debris / litter from CSCB MCZ	Considering the fact of additionality, NE does not agree with marine litter as a compensation measure in isolation however, it could be part of a package of several measures, but with a lot of caveats. At the moment it is unlikely to provide MEEB. A survey of marine litter could be undertaken in the MCZ to demonstrate it is definitely an	This is not currently the preferred MEEB however if alternative measures become necessary further consideration would be given to the existing impacts of debris/litter on the

Stakeholder	Section	Comment	Applicant Response
		<p>issue, however this should not include ghost fishing as this is already being addressed. There is no certainty that it will not just be in the chalk area as the chalk feature is rugged and coarse. Additionally, there is the potential that removing the litter may have a greater impact than just leaving it there.</p> <p>Removal of the litter would have to be within the MCZ rather than on the beach.</p>	MCZ and the potential impacts of removal.
MMO	Removal of marine debris / litter from CSCB MCZ	No evidence beach litter would end up in the MCZ and therefore beach clean-up could provide biodiversity net gain but not MEEB	Noted.
NE	Removal of infrastructure	NE is in general supportive of removal of disused infrastructure. It would need to be exposed, on the surface and having an impact on the MCZ to provide MEEB. In relation to needing agreements it would be advisable to start discussions with the owners soon and not post consent.	This is not currently the preferred MEEB however if alternative measures become necessary further consideration would be given to the removal of anthropogenic features.
Cefas	Removal of infrastructure	Comparability of the hydrodynamics of cable removal compared to cable installation would have to be considered in assessing the impacts of the MEEB	
EIFCA	Removal of infrastructure	Disruption to fishing activity during removal of infrastructure should be assessed	
NE/EIFCA	Planting of native oyster	Support further consideration of this MEEB	Further information on the approach to delivering this MEEB (if required) is provided in Section 8 .
EIFCA	Planting of native oyster	EIFCA interested in looking at this from an ecological and a potential fisheries opportunity. An example similar to this is happening in the Blackwater estuary where Zoological Society of	Examples of oyster restoration projects, including in the Blackwater Estuary are considered in Section 10.4.3 of Annex

Stakeholder	Section	Comment	Applicant Response
		London (ZSL) is working with fisheries to establish oyster beds ecologically but also commercially.	A and Section 8 of the In-Principle MEEB Plan.
NE	Planting of native oyster	In response to EIFCA suggestion that oyster beds could become a fisheries opportunity, NE would have concerns about the impacts of fishing on the MEEB	This is discussed in Section 8.5.2 of the In-Principle MEEB Plan.
NE/EIFCA	Planting of native oyster	Planting of oyster within the CSCB MCZ is likely to be the preference, rather than within the SEP and DEP array areas	Noted, planting of oyster in the CSCB MCZ has been considered further in Section 8 of the In-Principle MEEB Plan.
NE	Site designation	Has potential but not preferred option	This is not currently the preferred MEEB however if alternative measures become necessary further consideration would be given to the potential for protection of a comparable feature (see Section 8.1 of the In-Principle MEEB Plan). This would include a detailed site selection exercise which would assess all impacts, including on existing fisheries.
EIFCA	Site designation	EIFCA does not support this option and would require guidance from Defra if it were to be progressed	
EIFCA	Site designation	Creation of a new designated site or extending an existing site would impact fisheries and any impacts would need to be considered.	
Natural England Written Responses on Draft In-Principle MEEB Plan (17th February 2022)			
Natural England	High level comments	Natural England continues to be supportive of the removal of anthropogenic site pressures such as the BT cable if it is surface laid as potential MEEB.	Noted, however there is currently no evidence of a sufficient area of surface laid disused cable in the CSBC MCZ and therefore this is not the preferred measure.

Stakeholder	Section	Comment	Applicant Response
	Detailed comments (general)	We also believe that the restoration of a native oyster bed within the Cromer Shoal MCZ would provide increased biodiversity associated with mixed sediment that wouldn't happen naturally.	The Applicant notes and agrees with this point.
	Detailed comments (general)	Natural England welcomes DEP and SEP taking account of the DEFRA Best Practice compensation guidance 2021 when developing their MEEB for the Cromer Shoal Chalk Beds Marine Conservation Zone (Cromer MCZ).	Noted
	Detailed comments (general)	Natural England advises that whilst some stakeholders may disagree, there is an expectation when considering MEEB that potential impacts from operation and maintenance activities associated with the projects over their lifetimes are also taken into account at the consenting phase to future proof the project.	The Applicant's primary MEEB measure of oyster bed restoration within the MCZ would be at least 2km from the SEP and DEP (and Hornsea Three) export cable and therefore outside the zone of influence of increases in suspended sediment concentrations caused during any export cable installation repair or reburial.
	Paragraph 22	Natural England can confirm that the condition assessment is expected to be published by the end of March 2022.	At the time of writing (June 2022), the feature condition status of the MCZ has not been updated.
	Paragraph 34	Para 34. Natural England advises that this reference/para. is irrelevant to the discussion on MEEB for this project and could cause confusion.	Paragraph 8 of Annex A has been amended.
	Paragraph 37	Natural England advises that every effort should be made to avoid, reduce and mitigate the impacts including a project design which enables any cable protection to be removed at the time of	The Applicant understands the paper referenced by Natural England to be: <i>Peritus International Ltd. 2022. Scour</i>

Stakeholder	Section	Comment	Applicant Response
		decommissioning. Natural England advises that we are in the final stages of publishing a paper which identifies the cable protection where the removal has been proven and will circulate this document when available.	<i>and Cable Protection Decommissioning Study. NECR403. Natural England</i> which has been considered in Appendix 3 Cable Protection Decommissioning Feasibility [APP-294] of the Outline CSCB MCZ Cable Specification and Installation Monitoring Plan (CSIMP) [APP-291]. The Applicant has committed to, if required, installing removable external cable protection within the MCZ.
	Paragraph 43	Natural England advises against comparisons to the whole MCZ as there are several different features with different conservation objectives.	Noted however this has been retained for information purposes to put into context the extents of required protection across the entire MCZ. Stage 1 assessment conclusions are considered against the extents of specific features.
	Paragraph 46	Natural England notes that there is a commitment for the rock berm to be <0.5m proud of the seabed. We therefore advise if this is considered to be mitigation then it must be secured in the DCO/dML.	The Applicant does not consider there is a requirement to secure this as mitigation since the requirement for compensation is based on the area of sea bed potentially affected rather than the volume of any installed cable protection.
	Section 6.1.1 Para. 48 and 60	Natural England refers Equinor to our recent advice to the Secretary of State on Hornsea Project Three (HP3) dated 21st January 2022	Noted. This measure is not being taken forward as the preferred MEEB



Stakeholder	Section	Comment	Applicant Response
		<p>which highlights that we do not believe that the removal of marine litter can provide the equivalent environmental benefit to those habitats which will have a lasting change from cable protection. Please also note the change in requirements made for the Boreas decision which is indicating that adopting HP3 requirements may not be fit for purpose.</p>	<p>measure for SEP and DEP. However, the Applicant notes that this measure was accepted as appropriate HRA compensation for HOW03, Norfolk Vanguard and Norfolk Boreas and is therefore considered to potentially provide equivalent environmental benefit.</p> <p>If alternative MEEB becomes necessary, available options would be reviewed in consultation with the MEEB steering group.</p>
	Paragraph 58	<p>Natural England advises that there is no evidence provided to demonstrate that coastal/beach litter is a source for litter in Cromer MCZ. In addition, please note that North Norfolk District Council in partnership with stakeholders and local residences are currently undertaking a 'citizen science' project to clean Norfolk beaches and therefore we do not believe that this proposal provides sufficient additionality. Our previous advice in relation to litter removal within the MCZ remains unchanged as there is a mechanism in place with local fishermen to undertake its removal.</p>	Noted
	Paragraph 75	<p>Please be advised that Natural England would not support the use of dredging to remove marine litter from the MCZ.</p>	Noted. Removal of marine litter is not proposed as the preferred MEEB measure for SEP and DEP.
	Paragraph 77	<p>Natural England advises that monitoring should be a requirement of any MEEB to demonstrate that the aim and objectives have been successfully met.</p>	Monitoring of native oyster bed restoration would be undertaken as described in Section 8.5 of the In-

Stakeholder	Section	Comment	Applicant Response
			<p>Principle MEEB Plan. Further details would be provided in the MEEB Implementation and Monitoring Plan.</p>
	Paragraph 78 and 92	<p>Natural England highlighted that as a statutory undertaker with a DCO there is a responsibility on Equinor to not only maintain, but to enhance the designated site features i.e. do more than offset the impacts.</p> <p>Should the SoS decide that the requirement for MEEB is not necessary we would strongly encourage Equinor to consider undertaking the proposal as a biological Net Gain project.</p>	Noted
	Paragraph 107	There would need to be ongoing monitoring to check that the oyster bed maintains its ecological function over the lifetime of the projects.	Monitoring of native oyster bed restoration would be undertaken as described in Section 8.5 of the In-Principle MEEB Plan.
	Section 6.2.2	Natural England agrees that there is currently no ecological evidence to support the extension of Cromer MCZ. In addition, if this is to be taken forward the area would need to have no operational activities and/or infrastructure so finding a suitable location will be challenging.	Site extension is not proposed to be taken forward as MEEB.
	Paragraph 124	Natural England notes that the process [for site designation/extension] will take 5 years to deliver and therefore questions how any ecological debt between cable installation and delivery will be managed?	The Applicant is not currently proposing to progress a site extension/designation as MEEB. If alternative MEEB becomes necessary, the mechanism and timing would be discussed with the MEEB steering group during review of alternative MEEB options.

Stakeholder	Section	Comment	Applicant Response
			However, it should be noted the draft Defra compensation guidance recognises that it may not always be possible to implement measures prior to the impact occurring.
	Paragraph 137	Natural England recognises that agreeing a fisheries byelaw area will be challenging and voluntary agreements may be more appropriate.	The Applicant would seek voluntary agreements with local fishermen to avoid the oyster bed.
	Section 6.4	Natural England advises that in a different location comparable ecological function with the required protection and ongoing management is required.	The Applicant's preferred measure would be oyster bed planting in the MCZ (Section 8.1 of the In-Principle MEEB Plan). If alternative MEEB becomes necessary, the mechanism and timing would be discussed with the MEEB steering group during review of alternative MEEB options.
	Section 7.2	Natural England advises that the location of the oyster bed within the Cromer Shoal MCZ can be agreed now and should be located where there is indication of a previous bed. Please see Figure 1. Therefore, the area of search post consent can be targeted and experts could be brought in now to outline how to restore an Oyster bed in this location.	Annex C provides a site selection exercise which has identified a location in the north west of the MCZ as being suitable for native oyster bed restoration (Figure 8.1 of the In-Principle MEEB Plan). This area correlates well with the area proposed by Natural England.
	Paragraph 167	Having consulted with national colleagues, Natural England advises that a sustainable fisheries on an oyster bed established for MEEB will be challenging due to the length of time it takes to provide the	Noted. Consideration of potential future sustainable exploitation of the bed is



Stakeholder	Section	Comment	Applicant Response
		required ecological function. Therefore, fisheries will require further consideration potentially post installation when more is known about the ecological functionality of the established bed.	provided in Section 8.5.2 of the In-Principle MEEB Plan .
	Section 7.2.3	It is Natural England's understanding that a seabed lease from the Crown Estate is not require for restoring a designated site feature and similarly we believe that an oyster bed is exempt from requiring a marine licence.	See below MMO response with regard to licensing.
	Section 7.2.4	Because suitable cultch is required, we advise that this could be done in partnership with local fishermen who have provided cultch for other projects.	Noted.
<p>ETG meeting 21st February 2022 on revised draft In-Principle MEEB Plan version 2 – key comments, see meeting minutes (Consultation Report Appendix 1 Evidence Plan [APP-030]) for full discussion. Discussion focussed on preferred MEEB, oyster planting.</p>			
Natural England	Minutes pg3	Native oyster was historically located off the Norfolk Coast and restoration would replace the ecological function which could be lost along the export cable corridor if protection used.	Agreed.
MMO	Minutes pg3	Marine licence may be required for deployment of cultch, although the deployment of live oyster may be exempt.	Licensing or licence exemption would be progressed with the MMO post consent once it is determined by the Secretary of State whether MEEB is required.
EIFCA	Minutes pg4	The size of oyster bed and MEEB management measures are required.	Section 8.3 of the In-Principle MEEB Plan provides information on the proposed size and management measures are discussed in Section 8.5 .

Stakeholder	Section	Comment	Applicant Response
Natural England	Minutes pg4	The size of oyster bed should be confirmed pre-consent,	Section 8.3 of the In-Principle MEEB Plan provides information on the proposed size.
Natural England and EIFCA	Minutes pg5	There needs to be some requirement or criteria as to what success looks like in terms of aims and objectives of MEEB. Following on from that, through monitoring you could look at what would be needed to build a sustainable fishery.	Section 8.5 of the In-Principle MEEB Plan considers how success of the native oyster bed could be measured and how and when the bed could potentially be sustainably fished.
Natural England	Agreement log section 4.2	Specialists should be engaged to support the development plans pre-consent.	The Applicant's consultants Royal HaskoningDHV have marine specialists who have undertaken the initial site selection and in-principle design however collaboration with experts in oyster restoration projects as well as local companies involved in oyster farming has been initiated and the Applicant aims to be able to provide a further update during DCO examination on how this ongoing collaboration may progress.
Natural England	Agreement log section 4.6	Monitoring should be undertaken over the life of the project	Section 8.5.1 of the In-Principle MEEB Plan describes the frequency and duration of proposed monitoring.
Natural England	Minutes pg5	The location of previous native oyster records (map provided by Natural England) would be the preferred location for restoration	A site selection exercise has been undertaken (see Annex C) which

Stakeholder	Section	Comment	Applicant Response
EIFCA	Minutes pg11	The locations identified by Natural England may be where people who were processing oyster onshore used to go and dump the shells.	considers the CSCB MCZ as a whole, rather than focussing on the locations provided by Natural England. Due to the environmental conditions preferred by native oyster (described in Annex C), an area in the north west of the MCZ has been identified as the preferred location. This area correlates well with the area proposed by Natural England.
EIFCA	Minutes pg12	Recommend asking the True's Yard local fisheries museum if they have the equivalent [chart of historic oyster reefs in The Wash] for the Cromer area	True's Yard were contacted however no maps were available of the CSCB MCZ area.
Email from EIFCA 21st February 2022			
EIFCA	N/A	Provided paper regarding the decline of historical native oyster beds	Reference has been included in Section 2.1 of Annex C and considered in the site selection process.

Annex C European Native Oyster Restoration: Site Selection and In-Principle Design

**Sheringham Shoal and Dudgeon Offshore
Wind Farm Extension Projects**

**In-Principle Measures of Equivalent
Environmental Benefit Plan**

Annex C European Native Oyster Restoration: Site
Selection and In-Principle Design

Title: Sheringham Shoal and Dudgeon Offshore Wind Farm Extension Projects DCO Submission – In-Principle Measures of Equivalent Environmental Benefit Plan Annex C European Native Oyster Restoration: Site Selection and In-Principle Design	
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Glossary of Acronyms

BLUE	Blue Marine Foundation
CIC	Community Interest Company
CSCB	Cromer Shoal Chalk Beds
CE	Current Era
CIC	Community Interest Company
DEEP	Dornoch Environmental Enhancement Project
DEP	Dudgeon Offshore Wind Farm Extension Project
DOW	Dudgeon Offshore Wind Farm
EIA	Environmental Impact Assessment
ENORI	Essex Native Oyster Restoration Initiative
ES	Environmental Statement
EU	European Union
FLO	Fisheries Liaison Officer
GIS	Geographical Information System
HAP	Humber Aquaculture Partnership
JNCC	Joint Nature Conservation Committee
km	Kilometre
kn	Knot
MCZ	Marine Conservation Zone
MEEB	Measures of Equivalent Environmental Benefit
NORA	Native Oyster Restoration Alliance
OSPAR	Convention for the Protection of the Marine Environment of the North-East Atlantic
OWF	Offshore Wind Farm
SE	Standard Error
SEP	Sheringham Offshore Wind Farm Extension Project
SOW	Sheringham Offshore Wind Farm

Glossary of Terms

Dudgeon Offshore Wind Farm Extension Project (DEP)	The Dudgeon Offshore Wind Farm Extension onshore and offshore sites including all onshore and offshore infrastructure.
DEP offshore site	The Dudgeon Offshore Wind Farm Extension consisting of the DEP wind farm site, interlink cable corridors and offshore export cable corridor (up to mean high water springs).
DEP North array area	The wind farm site area of the DEP offshore site located to the north of the existing Dudgeon Offshore Wind Farm
DEP South array area	The wind farm site area of the DEP offshore site located to the south of the existing Dudgeon Offshore Wind Farm
DEP wind farm site	The offshore area of DEP within which wind turbines, infield cables and offshore substation platform/s will be located and the adjacent Offshore Temporary Works Area. This is also the collective term for the DEP North and South array areas.
Infield cables	Cables which link the wind turbine generators to the offshore substation platform(s).
Interlink cables	<p>Cables linking two separate project areas. This can be cables linking:</p> <ol style="list-style-type: none"> 1) DEP South array area and DEP North array area 2) DEP South array area and SEP 3) DEP North array area and SEP <p>1 is relevant if DEP is constructed in isolation or first in a phased development.</p> <p>2 and 3 are relevant where both SEP and DEP are built.</p>
Interlink cable corridor	This is the area which will contain the interlink cables between offshore substation platform/s and the adjacent Offshore Temporary Works Area.
Offshore cable corridors	This is the area which will contain the offshore export cables or interlink cables, including the adjacent Offshore Temporary Works Area.
Offshore export cable corridor	This is the area which will contain the offshore export cables between offshore substation platform/s and landfall, including the adjacent Offshore Temporary Works Area.
Offshore export cables	The cables which would bring electricity from the offshore substation platform(s) to the landfall. 220 – 230kV.

Offshore substation platform (OSP)	A fixed structure located within the wind farm site/s, containing electrical equipment to aggregate the power from the wind turbine generators and convert it into a more suitable form for export to shore.
Sheringham Shoal Offshore Wind Farm Extension Project (SEP)	The Sheringham Shoal Offshore Wind Farm Extension onshore and offshore sites including all onshore and offshore infrastructure.
SEP offshore site	Sheringham Shoal Offshore Wind Farm Extension consisting of the SEP wind farm site and offshore export cable corridor (up to mean high water springs).
SEP wind farm site	The offshore area of SEP within which wind turbines, infield cables and offshore substation platform/s will be located and the adjacent Offshore Temporary Works Area.
The Applicant	Equinor New Energy Limited

1 Introduction

1. This annex supplements Equinor New Energy Limited's (the Applicant) **In-Principle Measures of Equivalent Environmental Benefit (MEEB) Plan** for the Cromer Shoal Chalk Beds (CSCB) Marine Conservation Zone (MCZ) in relation to the Sheringham Shoal Offshore Wind Farm Extension Project (SEP) and Dudgeon Offshore Wind Farm Extension Project (SEP).
2. The **In-Principle MEEB Plan** is provided on a precautionary basis, and without prejudice to the conclusions of the **Stage 1 CSCB MCZ Assessment** (document reference 5.6) which concludes that the conservation objective of maintaining the protected features of the CSCB MCZ in a favourable condition will not be hindered by the construction, operation and decommissioning of SEP or DEP, SEP and DEP, or cumulatively with any other plan, project or activity.
3. As noted in the **In-Principle MEEB Plan**, if MEEB is deemed to be required by the Secretary of State, the planting of native oyster *Ostrea edulis* beds within the CSCB MCZ would be progressed as the preferred MEEB. The CSCB MCZ is therefore the study area used in **Section 5.4.2**.
4. This annex provides further information related to the deliverability of this MEEB, covering site selection, scale, estimated numbers of oyster and cultch required and delivery timescales.

2 Native Oyster Habitat

2.1 Historical Extent

5. Native oyster once formed extensive beds across the North-East Atlantic (**Plate 2.1**). These reefs covered large parts of the English Channel, many estuarine areas of the British coast and approximately 20% of the Dutch part of the North Sea floor (over 25,000 km²) (Olsen, 1883). These once abundant beds contributed to food security, by providing a cheap and readily available source of protein to coastal communities since pre-historic times (Gonther, 1897; Pogoda, 2019). During the 19th century, with the invention of steam-powered trawlers, native oyster began to be heavily exploited commercially to meet high demand (Pogoda, 2019), with approximately 700 million oysters consumed in London during 1864 alone (Philpots, 1890). Consistent overexploitation combined with habitat degradation, water pollution and disease led to major declines in native oyster throughout its range and functional extinction¹ in Belgian, German and Dutch waters (Airoldi and Beck, 2007; Gercken and Schmidt, 2014; Pogoda, 2019). Evidence from a fossil oyster bed in the southern North Sea that declined and became extinct around 700CE, suggests that native oyster populations can decline rapidly in the absence of intense fishing pressure, if other habitat conditions, such a sedimentation and numbers of parasites are no longer optimal (Sander et al., 2021). Indeed, Buckland (1875) describes a

¹ A species population that is no longer viable. This occurs when the number of individuals within the population are so greatly reduced that one or more of the following is true: 1) successful breeding cannot occur; 2) genetic diversity is so low that the population cannot maintain itself; 3) the population plays a negligible role in ecosystem functioning.

potential reason for the disappearance of native oyster off the north Norfolk coast as being due to mobile sand waves smothering oysters.

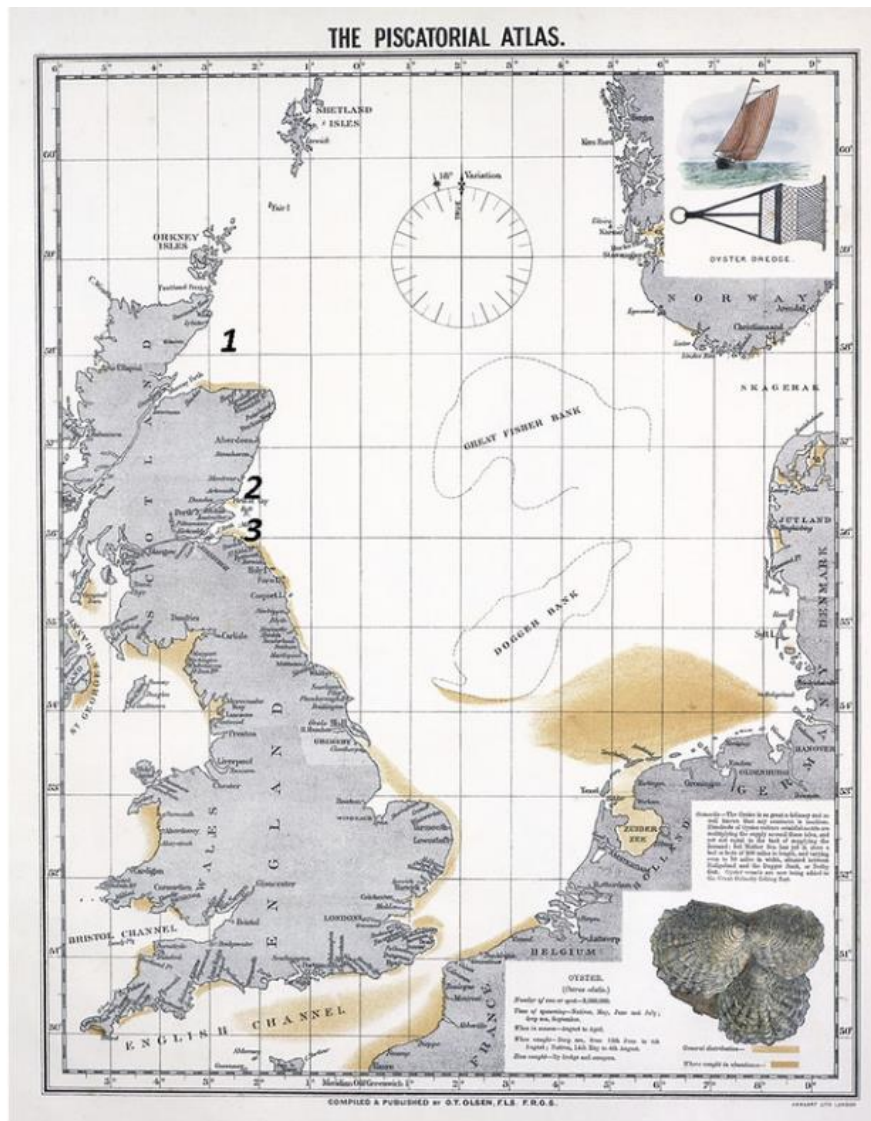


Plate 2.1 Piscatorial Atlas Map showing the spatial distribution of native oyster *Ostrea edulis* (L.) in the North Sea in 1883 (Olsen, 1883).

2.2 Current Extent

6. Today, the temperate biogenic reefs once formed by native oyster rank among some of the most threatened habitat types globally, with native oyster being functionally extinct over most of its historical extent. (Airoldi and Beck, 2007; Low et al., 2007; Gercken and Schmidt, 2014). However, there remain some remnant populations of native oysters in the Thames Estuary, the Solent, River Fal, the west coasts of Scotland and Ireland, the western part of the Swedish Kattegat region of the Baltic, the Limfjord region of Denmark, the Adriatic Sea, and the Black Sea (Airoldi and Beck, 2007).

2.3 What is a Reef?

7. Records of what a ‘pristine’ native oyster biogenic habitat looked like: how densely oysters were clustered together and the species they supported, are extremely rare for native oysters. The earliest scientific descriptions of native oyster reefs refer to reefs that would have already been subject to some form of physical alteration for decades or even centuries before (with native oysters having been cultivated and fished since at least Roman times). The early descriptions of density that do exist vary widely and almost certainly reflect impoverished populations, for example, in 1877 Möbius stated that *“oysters growing together in clumps are rare”*. An average of 1 live oyster per m² was recorded in the Fal oyster fishery in 1924, while just 0.001 live oysters per m² were recorded in a relic oyster population in northern Strangford Lough, Northern Ireland (Preston et al., 2020). On the other hand, fishery records suggest high densities of oysters were available on new fishing grounds (Buckland, 1875).
8. Due to this lack of historical data, and the present-day degraded status of native oyster habitat across its range, there is no widely accepted definition of what constitutes a ‘native oyster reef’ in Europe. Despite this, it is important to take into account a definition of this habitat prior to any restoration work, as this will inform the aims and success metrics of said work.
9. A simple definition from the Native Oyster Restoration Alliance (NORA) is as follows (Preston et al., 2020):
“A substrate with a veneer of living oysters, providing a habitat with high surface complexity, on a substrate which may be dominated by dead oyster shell.”
10. Whilst OSPAR define a Native oyster bed as (OSPAR, 2009):
“Ostrea edulis occurring at densities of 5 or more per m² on shallow mostly sheltered sediments (typically 0–10 m depth, but occasionally down to 30 m). There may be considerable quantities of dead oyster shell making up a substantial portion of the substratum.”
11. The EU Habitat manual defines a ‘Reef’ and ‘Biogenic concretions’ as (EU, 2013):
Reef: *“Either biogenic concretions or of geogenic origin. They are hard compact substrata on solid and soft bottoms, which arise from the sea floor in the sublittoral and littoral zone. Reefs may support a zonation of benthic communities of algae and animal species as well as concretions and corallogenic concretions.”*
Biogenic concretions: *“concretions, encrustations, corallogenic concretions and bivalve beds originating from dead or living animals, i.e. biogenic hard bottoms which supply habitats for epibiotic species.”*
12. The Joint Nature Conservation Committee (JNCC) Marine Habitat Classification biotope description for ‘Ostrea edulis beds on shallow sublittoral muddy mixed sediment’ (SS.SMx.IMx.Ost) describes the characteristic species that can be found in association with native oyster reefs, with key species including the sea squirts *Ascidiella aspersa* and *Ascidiella scabra*, the sponge *Halichondria bowerbanki*, and the polychaetes *Chaetopterus variopedatus*, *Myxicola infundibulum* and *Sabella pavonina* (JNCC, 2015).

3 Native Oyster Reproduction

13. Native oysters are characterised by slow growth rate and sporadic recruitment success. This can partly be explained by their reproductive cycle. As protandrous hermaphrodites, juvenile native oysters begin to develop as male but then alternate between genders after each breeding attempt.
14. Native oyster spawning typically begins when the surrounding water temperature reaches between 15-18°C. In the UK this is typically around May to June, however, the time of year will vary with biogeographic range, climate change and annual fluctuations. Reproduction starts when sexually mature adult males release spermatozeugmata, a structure containing multiple sperm connected by a matrix, into the water column (**Plate 3.1**). This formation of sperm allows it to be retained closer to the seafloor, where it is more likely to encounter a female. If successful, a receptive mature female will draw in the sperm, and will rapidly release her unfertilised eggs into brood chambers in their mantle cavity, where they are fertilised internally and are brooded for up to 15 days prior to release.
15. The released 'veliger' larvae spend one to two weeks in the water column, after which they metamorphose into pediveliger larvae. At this stage, the larvae start to actively seek a suitable settlement site in the form of a hard substrate. Pediveliger larvae have a visible foot, which upon finding a suitable site, secretes a liquid cement that secures the oyster. The oyster then undergoes further metamorphosis, whereby the foot is reabsorbed. Oysters become immobile once they have settled on a hard substrate. Within 48 hours of settlement, the oyster spat begins filter feeding and then will grow to a size of 1-2cm in the first year.
16. The settlement of pediveliger larvae can be delayed in the absence of favourable settlement conditions (Cole and Jones, 1939; Cole and Knight-Jones, 1949; Rodriguez-Perez et al., 2019)
17. This reproductive strategy places great importance on the close proximity of male native oyster to provide sperm to adjacent females. This means that native oyster can suffer from 'Allee effects', where individual oysters in a bed that is below a critical size and density experience reduced fitness (through inability to fertilise gametes), leading to reduced recruitment to the bed as a whole (Low et al., 2007). For long-term persistence, an oyster bed must therefore be of a sufficient density and size to enable successful broadcast fertilisation and larval production for settlement within the parental bed.

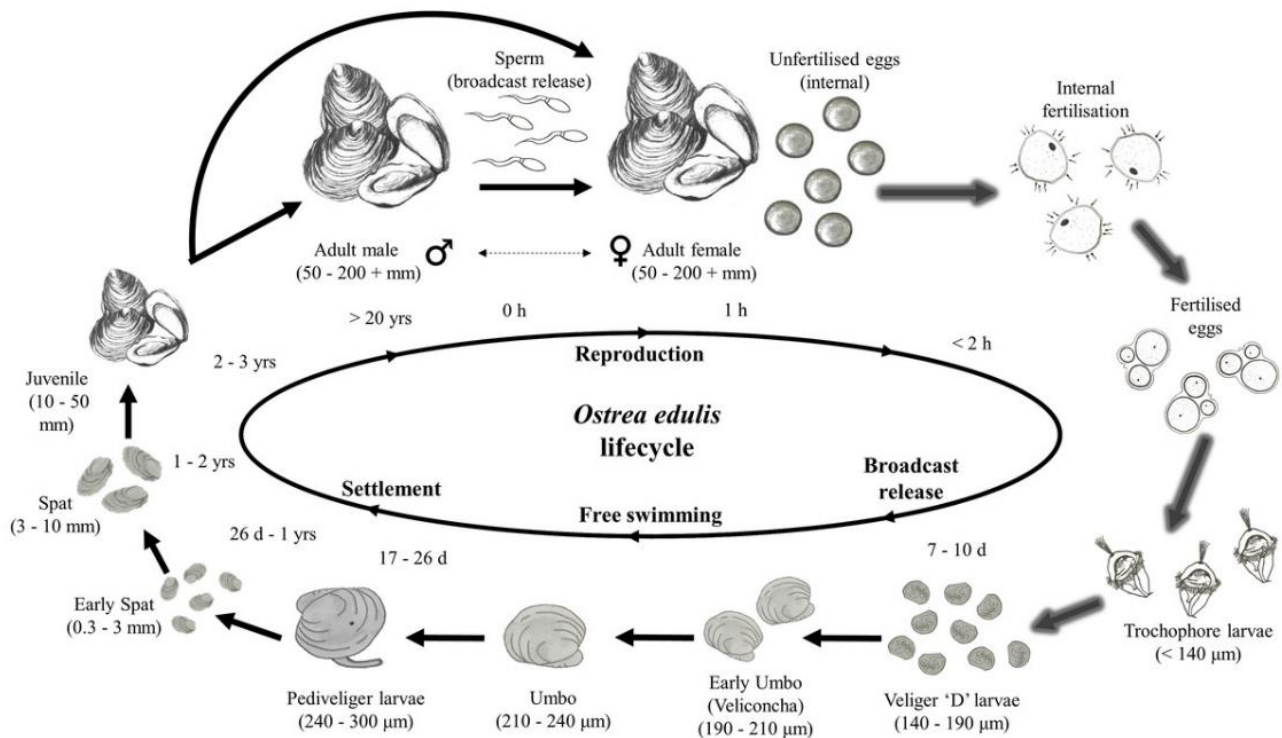


Plate 3.1 Lifecycle of *Ostrea edulis*. Arrows with a shadow effect indicate stages that occur internally within the female oyster pallial (mantle) cavity, plain arrows indicate stages that occur externally. Image source: Helmer et al., 2019.

4 Current Restoration Projects

18. In 2017, the Native Oyster Restoration Alliance (NORA) was set up as a European information sharing network with representatives from the UK, Germany, Holland, Denmark, Ireland, France, Spain, Belgium, Sweden, Norway, Italy and Croatia (Pogoda et al., 2019). A number of active native oyster restoration projects across Europe have been formed from NORA (Plate 4.2). The UK has also recently formed The Native Oyster Network – UK & Ireland, which aims to provide support to regional initiatives (Plate 4.3) and facilitate an ecologically coherent and collaborative approach to native oyster restoration.



Plate 4.2 Active native oyster restoration projects across Europe associated with NORA. Source: Native Oyster Restoration Alliance [REDACTED]



The Native Oyster Network

Map showing Native Oyster restoration projects in the UK & Ireland:

- 1) Essex Native Oyster Restoration Initiative (ENORI)
- 2) Solent Oyster Restoration project
- 3) The Wales Native Oyster Restoration Project
- 4) Galway Bay
- 5) Loch Craignish Native Oyster Restoration
- 6) The Durnoch Environmental Enhancement Project (DEEP)
- 7) The Humber Aquaculture Partnership (HAP)

Plate 4.3 Active native oyster restoration projects in the UK and Ireland associated with the Native Oyster Network. Source: Native Oyster Network [REDACTED]

5 Proposals to Achieve Successful Native Oyster Reef Restoration

5.1 Aims and Process

19. When planning a native oyster restoration project, it is important to identify the focus of the project from the outset, in order to facilitate clear communication with licensing and permitting authorities, resource users and community groups.
20. For the purposes of the **In-Principle MEEB Plan**, the aim would be to deploy and maintain an oyster bed of 10,000m² with an average density of 5 live oysters per m². This would provide a greater than 1:5 ratio of MEEB, offering long term enhanced ecological function to the habitat being lost and restoring a historic feature of the region. The **Strategic and Collaborative Approaches to Compensation and Measures of Equivalent Environmental Benefit** (document reference 5.8) describes the Applicant's proposed approach to potential collaboration with third parties on MEEB.
21. In addition to the area required for MEEB, a further aim would be to restore the status of native oyster in the CSCB MCZ to that of a healthy, self-sustaining native oyster population
22. Given that little to no native oyster beds are extant in CSCB MCZ, the process described in **Plate 5.1** below would be followed to achieve this overarching aim.

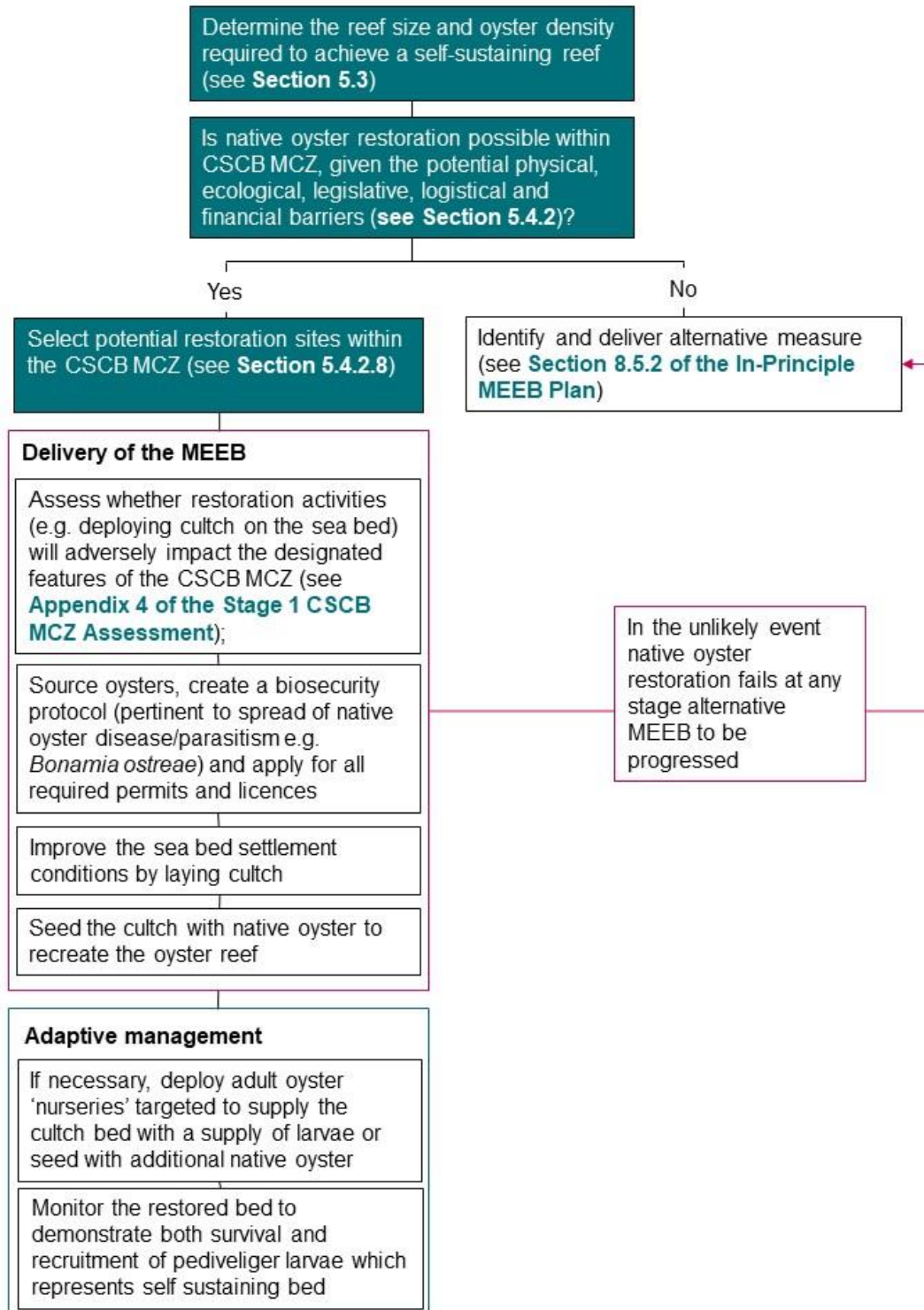


Plate 5.1 Process that will be undertaken to restore the status of native oyster for the purposes of MEEB

23. Whilst the above process (**Plate 5.1**) will require careful consideration, and to be discussed and agreed with relevant stakeholders, the purpose of this document is to focus on the steps in the blue boxes, namely the consideration of barriers to reintroduction, the potential sites for restoration within the CSCB MCZ; and the likely number of oysters and scale of restoration required to achieve a self-sustaining reef. The remaining steps are outlined in the **In-Principle MEEB Plan** and would be developed further in the detailed MEEB Implementation and Monitoring Plan post consent.

5.2 Density of Oysters Required

24. There is no consensus as to the number of adult oyster required in an oyster bed to ensure that the bed is productive and self-sustaining (Preston et al., 2020). This is largely due to a lack of reference baselines to work with.
25. In addition, any target density of oysters on the bed must take into account the loss of introduced oysters through mortality and redistribution due to prevailing or tidal currents.
26. Surveys in the Solent showed that as few as 5% (initial density of 7.5 oysters/m²) may be retained after one year when re-laying juvenile oysters (25-30mm in size) directly onto the sea bed, although this method used individual juveniles which were not attached to shell, therefore more vulnerable to being re-distributed by currents. In the Dornoch Firth, densities of 10-15g oysters reduced by more than 50% in three months due to tidal redistribution in a 2 knot tide, however, when contained in bags, up to 86% survival was reported on one site. In Loch Craignish, longer-term (multi-annual) survival of 40% is reported. Long term survival of Pacific oyster *Crassostrea gigas* of 60% has been reported in the vicinity of the CSCB MCZ (Pers. Comm. William Athill 25/05/2022). It is likely that the use of shell or stone material, to create stable reef structures, in combination with larger oysters, can increase the rugosity of the sea bed and therefore retention on the target area.
27. It is recommended therefore, that the restoration work takes into account a long-term retention rate of 48% (The mean of all survival rates discussed in above paragraph), although this may be modified following analysis of the survival rate of oysters within the initial oyster restoration site search area in the proposed pilot study (see **Section 5.3.2**). It is also recommended that an oyster density of at least 5 oysters/m² should be the long-term goal, which meets the OSPAR definition of oyster reef (OSPAR, 2009).

5.3 Oyster Reef Size and Mass

5.3.1 Reef Size of Other Restoration Projects

28. Due to the uncertainty around the 'critical mass' of native oysters required for long term restoration success, it is useful to draw from the experiences and methods used by other restoration projects.

29. Re-stocking is considered an effective strategy for native oyster restoration and broodstock programmes are integral to many restoration projects in Europe and the UK. In the Solent, Blue Marine Foundation (BLUE) has introduced 23,000 broodstock oysters into cages suspended below pontoons at marinas through the Solent Oyster Restoration Project (Helmer, 2019). The purpose of a broodstock site within a restoration initiative is to re-seed other 'downstream' protected or restoration areas. As a result, sites do not have to be designed to create or promote oyster habitat on the sea bed. Using hydrodynamic modelling, broodstock have been placed in areas where larvae will be able to reach other prepared and protected sites. In the Blackwater, the Essex Native Oyster Restoration Initiative (ENORI) has also released 45,000 broodstock oysters (with cultch) into a 2km² Restoration Box within the Blackwater, Crouch, Roach and Colne MCZ. A single mature oyster is capable of releasing 1 to 2 million larvae a year (Helmer, 2019). These projects can be considered as 'larval supply' projects rather than habitat restoration, as is being considered for SEP and DEP.
30. The Dornoch Firth Environmental Enhancement Project (DEEP) reintroduced a total of 20,000 oysters, grown by suppliers across the UK, onto cultch. The intention is to increase numbers to 200,000 within three years and to some four million, over around 40 hectares, in five years. Prior to the reintroduction of 20,000 oysters, 300 adult oyster were installed on the sea bed in bags to confirm that they could survive there. The DEEP project is aiming for initial restocking density of 10 oysters/m² to account for mortality.
31. ENORI have deployed approximately 45,000 mature oysters (40-50 mm) to date.
32. The Solent Oyster Restoration Project, run by BLUE have recently (2021) restored an oyster reef in Langstone Harbour, using 361m³ of cultch spread across a 2,000m² area and seeded with 15,000 oysters.
33. Loch Craignish Native Oyster Restoration project is installing an initial 1000 young native oysters (10-15g) in bags at the shoreline. Due to the small scale this can be considered a pilot project rather than habitat restoration.
34. The Humber Aquaculture Partnership (HAP) is installing intertidal oyster trestle tables, so cannot be considered to be a habitat restoration project at this stage.
35. The Saving Ester project, run by the Fal Fishery Cooperative Community Interest Company (CIC) is aiming to hatch and release 1,000,000 Cornish Native Oysters into the Fal Estuary. Efforts are currently focused on developing a successful onshore hatchery.
36. The native oyster restoration projects of relevance to the SEP and DEP MEEB are summarised in **Table 1**.

Table 1: Summary of native oyster restoration projects relevant to SEP and DEP MEEB

Project Name	Life stage of oysters reintroduced	Number of individuals	Area (m ²)	Density of individuals (oysters / m ²)	Reintroduction Method
Wales Native Oyster Restoration Project	Juvenile	25,000	Unknown	Unknown	Placed on cultch
Dornoch Firth Environmental Enhancement Project	Juvenile	20,000 (4 million planned)	Unknown (40 Hectares planned)	Unknown (10 planned)	Placed on cultch
Solent Oyster Restoration Project	Adult	A) 90,000; and B) 15,000	A) N/A B) 2,000	A) N/A B) 7.5	A) Cages below pontoons/marinas; and B) On cultch in Langstone Harbour
Essex Native Oyster Restoration Initiative	Adult	45,000	22,500	2	Placed on cultch within a MCZ
Loch Craignish Native Oyster Restoration	Young post-larval (10-15g)	300,000	Unknown	Unknown	80,000 Placed in bags in intertidal zone and 220,000 placed on the sea bed

5.3.2 Pilot Project

37. As discussed above, whilst there are wide-ranging ambitions and methods for native oyster restoration, there is a common practice of conducting pilot projects involving the translocation of 300-1000 adult oysters to site, to establish whether adult oysters can survive in the conditions specific to the initial oyster restoration site search area. These pilot phases often involve the installation of adult oyster in cages or bags to facilitate the monitoring needed to determine survival rates and to reduce losses to predation. Once survival has been demonstrated over 1 year, the project can be scaled-up, with efforts usually involving 10,000's of oysters with associated cultch. This approach is proposed to be adopted as part of delivering the MEEB.

5.3.3 MEEB Reef Size

38. It has been estimated that at least 50,000 oysters would be needed to maintain a sufficient effective population size over the long term, to have enough genetic diversity to adapt to changing stressors e.g. climate change-induced temperature rises (Low et al., 2007). At a density of 5 oysters/m² (to comply with the OSPAR definition for oyster reef) this results in an area of 10,000m². It should be noted that given a survival estimate of 48% (see [Section 5.2](#)), an initial stocking of 105,000 oysters over the 10,000m² area (so an initial density of 10.5 oysters m⁻²) should be aimed for (subject to the survival rates recorded in the pilot project).
39. It is recommended that due to the reproductive strategy of native oysters, reef density is the primary focus (to avoid Allee effects), rather than reef size and therefore a phased deployment could be undertaken to enable the production of seed oyster for deployment of a 10,000m² reef in appropriate increments.
40. In summary, the restoration of native oyster reef is required to deliver equivalent environmental benefit to 1,800m² habitat loss of subtidal coarse sediment, subtidal mixed sediments and subtidal sand features of the MCZ. For the purposes of the In-Principle MEEB Plan, the aim would be to deploy and maintain an oyster bed of 10,000m² with an average density of 5 live oysters per m². The 10,000m² reef would provide a greater than 1:5 ratio of MEEB, offering long term enhanced ecological function to the habitat being lost and restoring a historic feature of the region.

5.4 Restoration Site Selection

5.4.1 Overview of Selection Parameters

41. There is a suite of environmental, biological, ecological, anthropogenic and logistical factors that need to be considered to determine if restoration is possible or realistic within a location. These include determining the presence and extent of a range of threats, such as fishing pressure, pollution, invasive species, diseases or pests and taking steps to manage or mitigate if required. Understanding the physiological requirements and tolerances of the native oyster is important, as the physio-chemical characteristics of the site need to fall within these (e.g. salinity, current speed), or be improved to do so by active restoration interventions (such as improving substrate).
42. A summary checklist for site selection parameters is stated in [Table 2](#), and the key factors for restoration success are displayed in [Plate 5.2](#).

43. Following consultation with Natural England and the Eastern Inshore Fisheries and Conservation Authority, a location within the CSCB MCZ is preferred for the restoration of oyster and therefore the MCZ boundary provides the starting point for the site selection exercise described in the following sections.

Table 2: The key abiotic and biotic parameters for native oyster habitat suitability, the life-cycle stages they affect, and their desired ranges. Table adapted from Preston et al. (2020).

ABIOTIC AND BIOTIC CHARACTERISTIC	SURVIVAL	GROWTH	REPRODUCTION	RECRUITMENT	RANGE
Sediment composition				X	Fine sand (> 63µm) and firm silty sand or silty gravel. All with shells and stones.
Suspended sediment (mg/l)		X			< 60
Temperature winter, Tmin (°C)	X				> 3
Temperature summer, Tmax (°C)			X		< 30
Oxygen conditions (mg/l)	X				> 3.5
Salinity	X				25-35
Food concentration (chl a in µg/l)		X			Growth > 0.5, Gonad development > 1.68
Larval retention				X	Larvae must remain near point of release.
Predation	X				High numbers of predators can decimate a population.
Competition		X			Competition for food can reduce growth and reproduction.
Water Depth	X				Intertidal - 80m
Current velocity (m/s)				X	0.25-0.8
Bed shear stress (tau N/m ²)	X				Average < 1, Max < 10
Sea Bed mobility (cm/day)	X				< 0.8



Plate 5.2 Essential factors for consideration in native oyster habitat restoration site selection. Exclamation marks indicate the most important of these factors, which either pose a direct threat to oyster survival, or prohibit project establishment. Image adapted from Preston et al. (2020).

5.4.2 Native Oyster Restoration Site Selection in the CSCB MCZ

44. Firstly, it is important for native oyster restoration projects to establish, wherever possible, whether the prospective restoration site supported natural native oyster populations historically (Preston et al., 2020). Whilst many baseline biotic and abiotic conditions have changed considerably over the previous centuries, a record of historical populations (see [Section 2.1](#) and [Plate 2.1](#)) at least provides some indication of the suitability of the area for native oyster survival, particularly with regard to current regimes and water depth. In 1872, a significant native oyster fishery operated out of The Wash, approximately 40km west of the CSCB MCZ, with approximately 700,000 oysters dredged over a single season (March – June). Of the seven major natural beds in The Wash, the largest was seven miles long and half a mile wide (Buckland, 1875). It is clear therefore, that whilst the exact locations of the historical oyster beds are unknown, the area of Norfolk coast in the vicinity of the CSCB MCZ supported healthy native oyster populations historically. It is therefore justified to move onto consideration of present day biotic and abiotic factors for selection of an initial oyster restoration site search area. For the purposes of the following site selection process, the area of search was confined to the CSCB MCZ.

5.4.2.1 Current Velocity

45. The first parameter considered was tidal flow, with a preferred range of 0.25 – 0.8m/s for oyster restoration. When considering [Plates 6.9 to 6.12](#) of [Chapter 6 Marine Geology, Oceanography and Physical Processes](#), reproduced in [Plate 5.3](#) it can be seen that the inshore and westerly sections of the CSCB MCZ have peak spring tide current speeds which are low enough to be considered suitable for oyster restoration and larval retention. In some areas of the westerly section of the CSCB MCZ, peak spring tide current speeds reach 1m/s, which is above the desired range. Whilst this is not a barrier to restoration, it does highlight that measures to promote the retention of larvae within the restored reef will likely be needed. This will likely be in the form of cultch deployment on site, to maximise the complexity of benthic 3D structuring, which captures and retains larvae and reduces loss to current movements. The tidal flow is of importance primarily for larval retention post-spawning. It should be noted that these peak spring tide current speeds can be considered a worst-case. Tidal speeds will be significantly lower for most of the tidal cycle. Given this, only the inshore and western sections of the CSCB MCZ are currently considered for restoration.

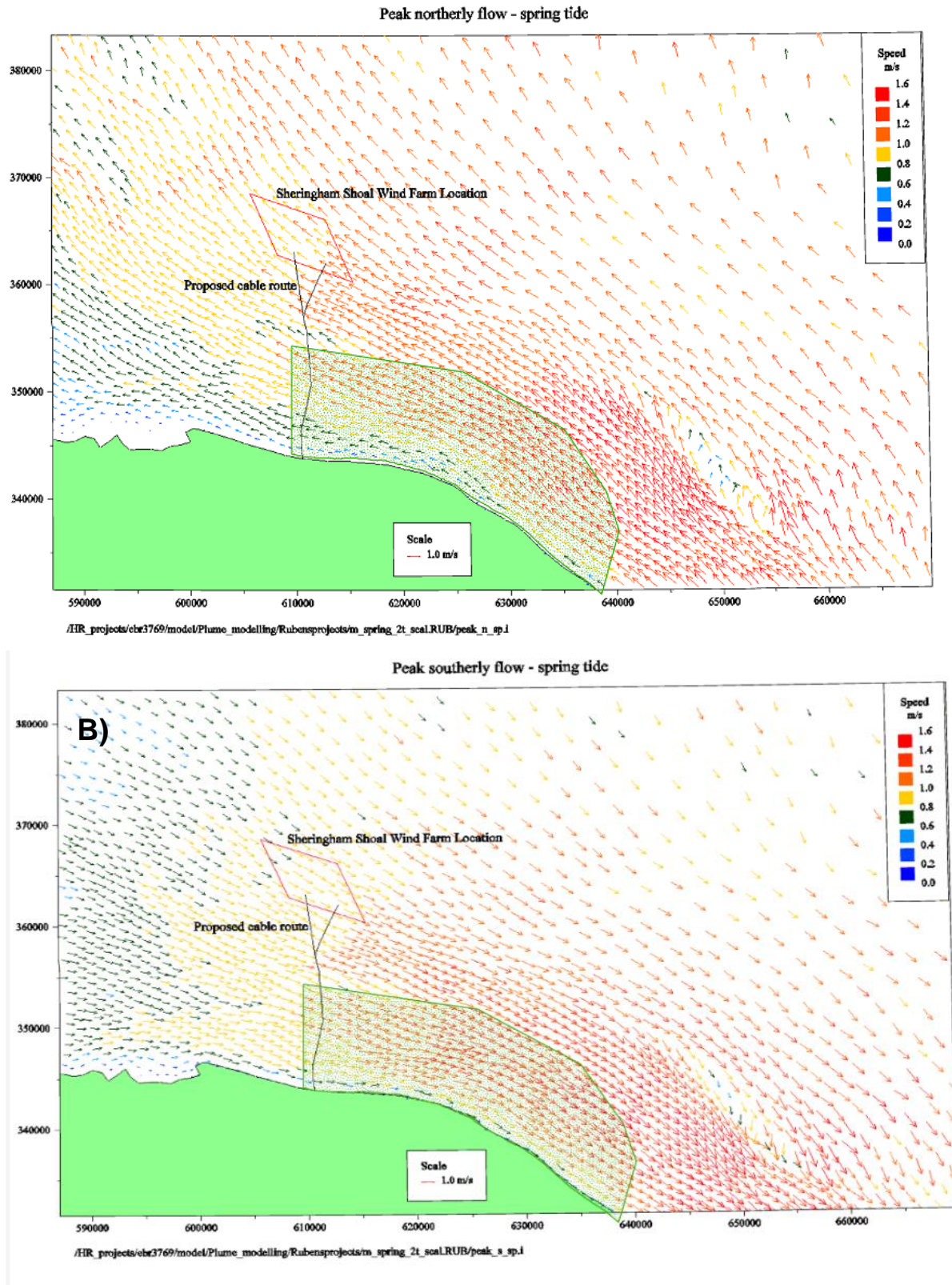


Plate 5.3 Peak flood and ebb low vectors for spring tide at SOW (Scira, 2006)

5.4.2.2 Sea Bed Mobility

46. Sea bed motility in the western section of the CSCB MCZ is low. As discussed in **Chapter 6 Marine Geology, Oceanography and Physical Processes, Section 6.5.8.1**, surveys carried out between 2008 and 2018 along the Sheringham Shoal Offshore Wind Farm (SOW) export cable corridor found bathymetric changes no greater than 0.25m indicating a non-mobile sea bed. The vertical accuracy of the multibeam echosounder is +/-0.2m. Sea bed motility is therefore not considered to be a constraining factor in the westerly section of the CSCB MCZ.

5.4.2.3 Water Depth

47. Native oyster can tolerate a wide range of depths, from intertidal to 80m. The entire area of search (the CSCB MCZ for this section) falls within this range, so water depth is therefore not considered to be a constraining factor in the westerly section of the CSCB MCZ.

5.4.2.4 Suspended Sediment

48. As discussed in **Chapter 6 Marine Geology Oceanography and Physical Processes** (document reference 6.1.6), although suspended sediment concentrations will be elevated during offshore export cable installation, they are likely to be lower than concentrations that would develop in the water column during storm conditions.
49. Modelling simulations undertaken for SOW and Dudgeon Offshore Offshore Wind Farm (DOW), which are in a similar area and with similar sediment type, determined the following:
- Sand and gravel-sized sediment (which represents most of the disturbed sediment) would settle out of suspension rapidly in the immediate vicinity of the offshore export cable corridor. Fine sand will most likely remain in the bottom 1-2 m of the water column, and with settling velocities of around 10mm/s, is expected to become part of the ambient near bed transport within half an hour or less.
 - The majority of disturbed sediment will initially resettle within 20m of the export cable, with almost no sand being transported further than 100m from the cable.
 - Mud-sized material (which represents only a very small proportion of the disturbed sediment) would be advected a greater distance up to 2km and persist in the water column for hours to days.
50. It is therefore recommended that the prospective restoration site is conservatively located outside of a 2km buffer zone around the SEP and / or DEP offshore export cable corridor, to avoid any negative impacts of suspended sediment associated with cable laying on the reintroduced oyster reef.

5.4.2.5 Other Pressures

51. It is important that the prospective restoration site is not subject to physical disturbance from mobile fishing gear, aggregate extraction or dumping. As discussed in **Chapter 12 Commercial Fisheries** (document reference 6.1.12), shrimp fishing, using beam trawls, occurs in the inshore section of the CSCB MCZ; this is incompatible with native oyster restoration. As can be seen in **Figure 1**, shrimp fishing is restricted to the inshore 5km section of the CSCB MCZ, therefore prospective oyster restoration siting is restricted to the offshore 5km of the western section of the CSCB MCZ.
52. Crab and lobster potting occurs over the entirety of the MCZ. The evidence for impacts of potting fishing on bivalve beds (mussel beds in this case) have been reviewed by DEFRA (Walmsley, 2015). It was found that there was no primary evidence for impacts of potting on mussel beds, regardless of whether the beds were situated on hard or soft substrate (Walmsley, 2015). However, whilst bivalve shells provide resistance to physical impacts, it is of course possible to damage or break these shells through direct pressure (Roberts et al., 2010), therefore high intensity potting fishing may have some adverse impact on restoration efforts via direct damage to the oyster shells. Sensitivity assessments undertaken by Hall et al. (2008) indicate that stable species in rich mixed sediment habitats, as well as oyster beds which occur on mixed subtidal sediments, both had a medium sensitivity to heavy levels of potting and low sensitivity to all other levels of potting activity. In summary, static pot fishing in the MCZ is not considered to be a hard constraint for native oyster reef restoration providing that the intensity of potting on the reef is sufficiently low. Monitoring of the oyster bed would inform whether management measures on potting activity is potentially required (see **Section 8.5.3** of the **In Principle MEEB Plan**).

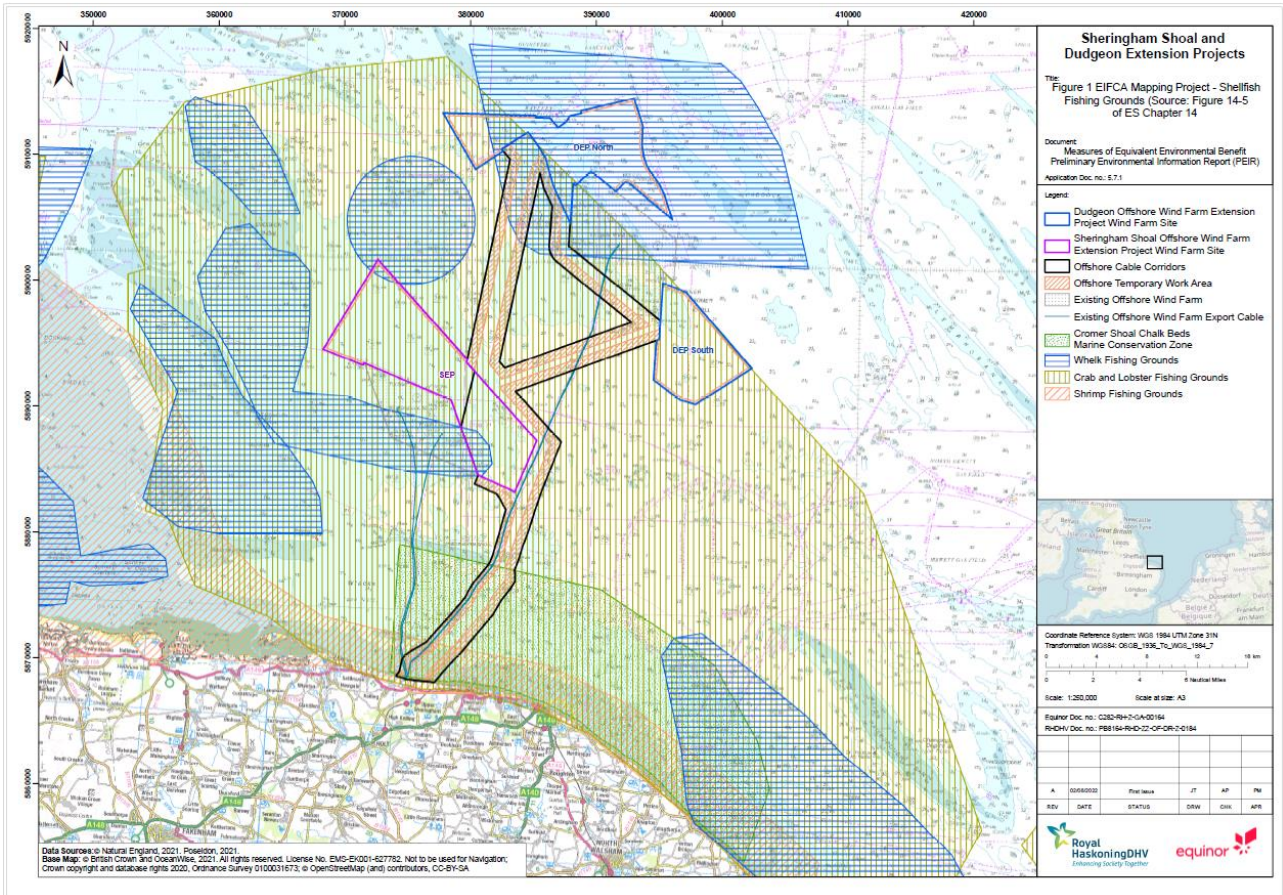


Figure 1 EIFCA Mapping Project - shellfish fishing grounds

5.4.2.6 Sediment Composition

53. Native oyster settlement is most appropriately promoted by firm silty sand or silty gravel with shells and stones (Preston et al., 2020)). The north-western CSCB MCZ area of search contains sublittoral coarse sediment, sublittoral mixed sediment and sublittoral sand (**Figure 2**). As sublittoral mixed sediment is more appropriate for native oyster larval settlement (and therefore long-term persistence of the reintroduced reef), only areas containing this sediment type are currently taken forward as candidates for restoration.

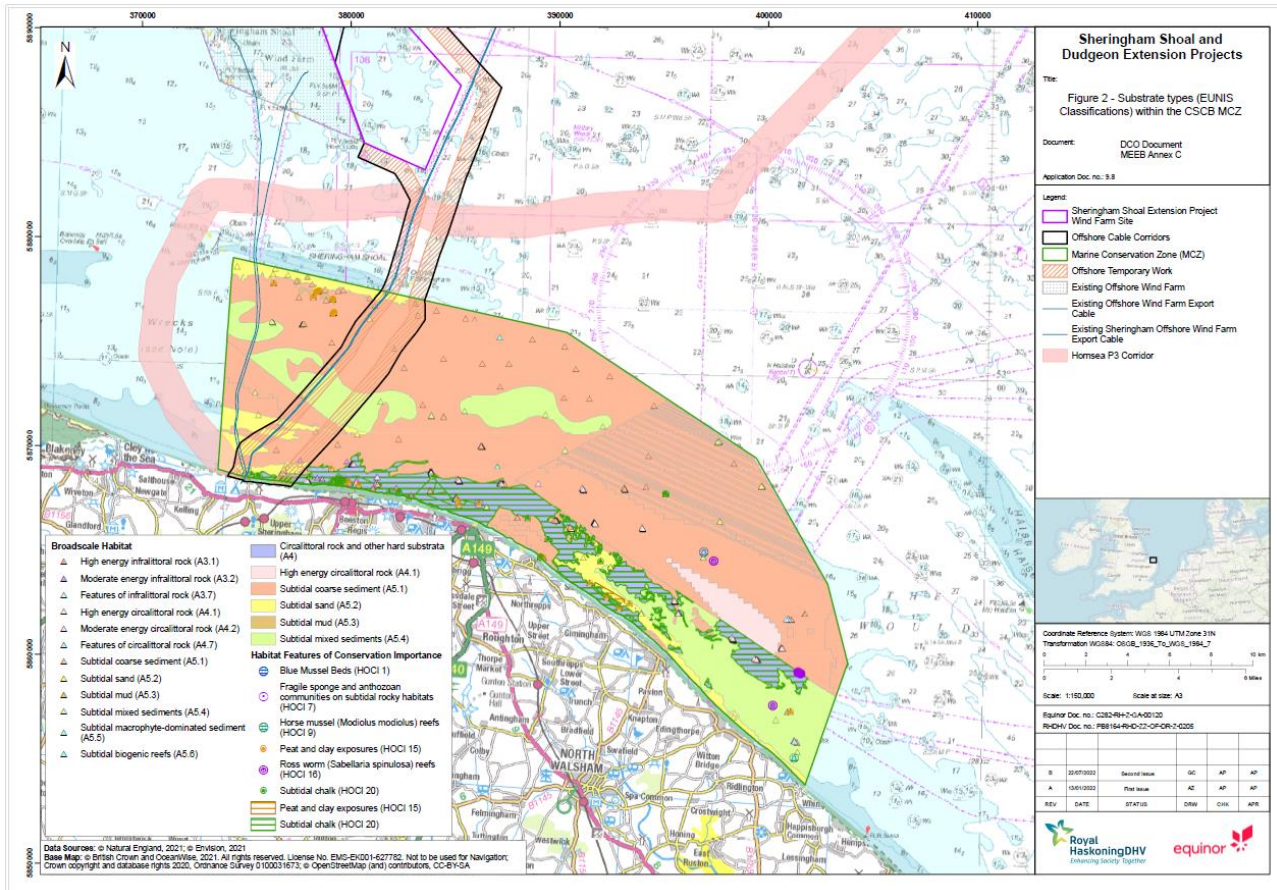


Figure 2 Substrate types (EUNIS Classifications) within the CSCB MCZ

5.4.2.7 Important Parameters Requiring Site-Specific Data

54. Detailed datasets for some important restoration factors (see **Table 2** for full list) are not available. Based on professional judgement, none of these factors are expected to constrain oyster restoration in the area of search, however this will need to be confirmed by site-specific surveys prior to reintroducing any native oysters. Factors requiring site-specific data include: suspended sediment, temperature, oxygen saturation, salinity, food concentration, predation, competition and bed shear stress. Given the 'open sea' location of the area of search (as opposed to an estuarine or closed inlet environment), oxygen, temperature, salinity, and food concentration levels are expected to be in-line with average North Sea conditions. Given the mixed substrate types found in the area of search, with coarser sediment found in combination with more silty particle sizes, the bed shear stress is expected to fall within the required range. Given the low interannual sea bed motility, suspended sediment levels are also expected to be below the desired threshold. Finally, given the fact that reintroduction is confined to an area of sublittoral mixed sediment, significant numbers of competing bivalves (and the bivalve predators associated with them) are not expected to be at the prospective restoration site, although this should be confirmed using drop-down cameras or divers when the site survey is carried out.

5.4.2.8 Conclusion

55. Based on this constraints analysis, the area (blue polygon) shown in **Figure 3** is proposed as the site with the best potential for native oyster restoration. As the area is composed of sublittoral mixed sediment, it is not only suitable for native oyster settlement, but also avoids the chalk bed feature of the CSCB MCZ.
56. This provides a 1km² initial oyster restoration site search area, within which the 10,000m² reef (see **Section 5.3**) could be planted. This 1km² initial oyster restoration site search area would be surveyed post-consent to confirm the suitability of the site for native oyster and to confirm the exact location for the reef restoration works.

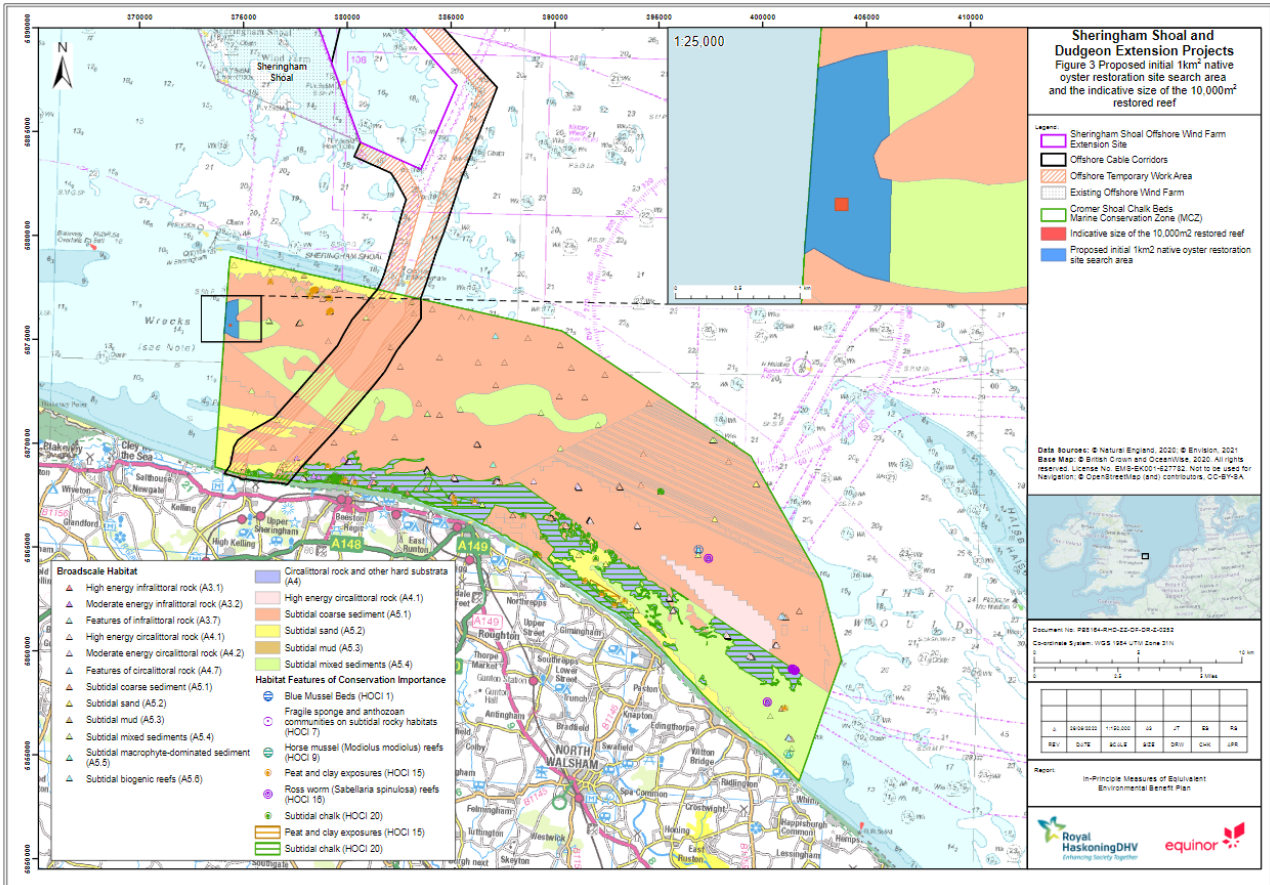


Figure 3 The proposed initial 1km² (light blue polygon) native oyster restoration site search area and the indicative size of the 10,000m² restored reef (red square within blue polygon) in the north-western section of the CSCB MCZ

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