Sheringham Shoal and Dudgeon Offshore Wind Farm Extension Projects

Stage 1 Cromer Shoal Chalk Beds (CSCB) Marine Conservation Zone (MCZ) Assessment (Revision B) (Clean)

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Glossary of Acronyms

AoO	Advice on Operations
BAP	Biodiversity Action Plan
BEIS	Business, Energy and Industrial Strategy
BWM	Ballast Water Management
Cefas	Centre for Environment, Fisheries and Aquaculture Science
CIA	Cumulative Impact Assessment
CSBC	Cromer Shoal Chalk Beds
CSIMP	Cable Specification, Installation and Monitoring Plan for the MCZ
CSQC	Canadian Sediment Quality Guidelines
DBT	Dibutyltin
DCO	Development Consent Order
DECC	Department for Energy and Climate Change
DEFRA	Department for the Environment and Rural Affairs
DEP	Dudgeon Extension Project
DOW	Dudgeon Offshore Wind Farm
EAC	Environmental Assessment Criteria
EIA	Environmental Impact Assessment
EIFCA	Eastern Inshore Fisheries and Conservation Authority
EPP	Evidence Plan Process
ER-Ls	Effects Range Lows
EQS	Environmental Quality Standards
ES	Environmental Statement
ETG	Expert Topic Group
EUNIS	European Nature Information System
FOCI	Features Of Conservation Interest
HRA	Habitats Regulations Assessment
HDD	Horizontal Directional Drilling
HVAC	High-Voltage Alternating Current
INIS	Invasive Non-Indigenous Species
INNS	Invasive Non Native Species

JNCC	Joint Nature Conservation Committee
km	Kilometre
MARPOL	International Convention for the Prevention of Pollution from Ships
MBT	Monobutyltin
MCAA	Marine and Coastal Access Act
MCZ	Marine Conservation Zone
MCZA	Marine Conservation Zone Assessment
MEEB	Measures of Equivalent Environmental Benefit
MMO	Marine Management Organisation
MW	Megawatts
NERC	Natural Environment & Rural Communities
NP	National Park
O&G	Oil and Gas
O&M	Operation and Maintenance
OSP	Offshore Substation Platform
PAH	Polycyclic Aromatic Hydrocarbons
PEIR	Preliminary Environmental Information Report
PEL	Probably Effect Levels
PEMP	Project Environmental Management Plan
PINS	Planning Inspectorate
PLGR	Pre-lay Grapnel Run
RPP	Risk Profiling of Pressures
rMCZ	Recommended Marine Conservation Zone
SACO	Supplementary Advice on Conservation Objectives
SEP	Sheringham Shoal Extension Project
SNCB	Statutory Nature Conservation Bodies
SoS	Secretary of State
SOW	Sheringham Shoal Offshore Wind Farm
SSC	Suspended Sediment Concentrations
TBT	Tributyltin
TEL	Threshold Effect Level
THC	Total hydrocarbons

TWT	The Wildlife Trusts
UK	United Kingdom
UXO	Unexploded Ordnance

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 array area of the DEP offshore site located to the north of the existing Dudgeon Offshore Wind Farm
DEP South array area	The wind farm array 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.
Export cable corridor	This is the area which will contain the offshore export cables between offshore substation platform/s and landfall.
Evidence Plan Process (EPP)	A voluntary consultation process with specialist stakeholders to agree the approach, and information to support, the EIA and HRA for certain topics.
Grid option	Mechanism by which SEP and DEP will connect to the existing electricity network. This may either be an integrated grid option providing transmission infrastructure which serves both of the wind farms, or a separated grid option, which allows SEP and DEP to transmit electricity entirely separately.
Horizontal directional drilling (HDD) zones	The areas within the onshore cable route which would house HDD entry or exit points.
Infield cables	Cables which link the wind turbine generators to the offshore substation platform(s).
Interlink cables	Cables linking two separate project areas. This can be cables linking: 1) DEP South array area and DEP North array area 2) DEP South array area and SEP

	3) DEP North array area and SEP 1 is relevant if DEP is constructed in isolation or first in a phased development. 2 and 3 are relevant where both SEP and DEP are built.
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.
Landfall	The point at the coastline at which the offshore export cables are brought onshore, connecting to the onshore cables at the transition joint bay above mean high water
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 area, 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 Revision B Updates at Deadline 7

1. This document has been updated at Deadline 7 to include additional detail within the Stage 1 cumulative effects assessment (**Section 9.4**) on the quantities of gas pipeline protection that has been installed within the Cromer Shoal Chalk Beds (CSCB) Marine Conservation Zone (MCZ) between 2016-2021 (i.e. potentially after the SEP and DEP site-specific surveys were undertaken and therefore which requires consideration in the cumulative long term habitat loss effects assessment – **Section 9.4.4.3**). This information has come to light following the release of the updated supplementary advice on conservation objectives in May 2023 (SACOs) and this document has therefore been updated to seek to address the following Natural England position as provided within the **Draft Statement of Common Ground Natural England (Offshore)** [REP2-044].

> *Natural England advises that projects that were built at the time of CSCB MCZ being officially proposed and designated are likely to be part of the baseline depending upon the time of the supporting surveys. However, for CSCB MCZ there has been subsequent lawful decisions where the assessment hasn't fully taken account of the predicted and/or as built impacts. Therefore, these ongoing impacts are thought to be hindering the conservation objectives for the site and must be taken into consideration in terms of the on-going carrying capacity of the site for further sustainable development. Therefore, Natural England doesn't agree with the cumulative assessments for the MCZ.*

2. The long term cumulative habitat loss assessment (**Section 9.4.4.3**) has therefore been updated to include this additional information, however the conclusions of the assessment remain the same i.e. that maintaining the protected features of the CSCB MCZ in a favourable condition or restoring them to favourable condition will **not be hindered**, either alone or on a cumulative basis.

2 Introduction

3. The purpose of this Stage 1 CSCB Marine Conservation Zone Assessment (MCZA) is to provide information so it can be determined whether the Sheringham Shoal Offshore Wind Farm Extension Project (SEP) and the Dudgeon Offshore Wind Farm Extension Project (DEP) could have a potential impact on the features and conservation objectives of the CSCB MCZ, within which part of the SEP and DEP offshore export cable corridor is situated.

4. The MCZA is a requirement of Section 126 of the Marine and Coastal Access Act (2009) (MCAA), which places specific duties on the regulating authority (i.e., the Marine Management Organisation (MMO) for marine licence applications and the Secretary of State (SoS) for Development Consent Order (DCO) applications) which require consideration of MCZs when determining consent applications. As such, the MMO and SoS have incorporated the need to include a MCZA into their decision-making processes, where any MCZ has the potential to be impacted by a marine licensable activity.

5. This document is informed by guidance (see **Section 3**) published by the MMO (2013) on how such assessments should be undertaken and by advice from the Statutory Nature Conservation Bodies (SNCBs) during consultation in the pre-

application phase of SEP and DEP. The MCZA has been undertaken based on the description of SEP and DEP provided within **Section 6** of this report and the Environmental Statement (ES) **Chapter 4 Project Description** (Revision C) [REP5-021].

6. The MCZA will be undertaken by the MMO with this document intended to provide the information required for that assessment. This document is therefore structured to match the approach that will be taken by the MMO. This document is a 'shadow MCZA' but for simplicity will be referred to as the MCZA throughout. The structure of this MCZA is as follows:

- **Section 1**: (this section): Introduction to the document and the structure of the assessment;
- **Section 3**: Legislation, Policy and Guidance – This section provides the legislative context and details the policy and guidance given by a number of Governmental, statutory and industry bodies in relation to the MCZA process;
- **Section 4**: Overview of the MCZ assessment process – Provides an overview of the MCZA Process and the approach taken by Equinor New Energy Limited (The Applicant);
- **Section 5**: Consultation – Provides a summary of the consultation undertaken with respect to the MCZA including stakeholder comments and the Applicant's responses;
- **Section 6**: Project Description – An outline of SEP and DEP is given with regard to the location of infrastructure and its construction, operation and maintenance (O&M), and decommissioning;
- **Section 7**: Screening Conclusions – This section summarises the screening process and outcomes that have been consulted on through the Evidence Plan Process (EPP). The MCZA screening report is provided in **Appendix 1 Screening Report** [APP-060][APP-078] (as updated to take account of consultation comments received);
- **Section 8**: Cromer Shoal Chalk Beds MCZ – A description of the CSCB MCZ including the protected features and conservation objectives. A description of the location of protected features within the offshore export cable corridor is also provided, incorporating the site specific survey data that has been collected;
- **Section 9**: Stage 1 assessment – This section provides the stage 1 assessment for the CSCB MCZ, the only MCZ screened into the assessment. An assessment of cumulative impacts with other plans and projects is also provided; and
- **Section 10**: Conclusion – A conclusion to the MCZA is provided with respect to the conservation objectives of the CSCB MCZ.

3 Legislation, Policy and Guidance

3.1 Marine & Coastal Access Act (2009)

7. The MCAA establishes a range of measures to manage the marine environment including establishing MCZs. The Marine Conservation Zone Project was established in 2008 by the Joint Nature Conservation Committee and Natural England to work with regional stakeholder led projects to identify and recommend MCZs to Government. The designation of MCZs is now complete.

8. Sections 125 and 126 of the MCAA place specific duties on the MMO relating to MCZs and marine licence decision making. This is because Section 126 applies where;

- (a) a public authority has the function of determining an application (whenever made) for authorisation of the doing of an act, and
- (b) the act is capable of affecting (other than insignificantly)
  - (i) the protected features of an MCZ;
  - (ii) any ecological or geomorphological process on which the conservation of any protected feature of an MCZ is (wholly or in part) dependent.

9. Natural England has responsibility under the MCAA to give advice on how to further the conservation objectives for the MCZ, identify the activities that are capable of affecting the designated features and the processes which they are dependent upon.

3.2 Guidance

10. The MCZA gives consideration to the following guidance:

- MMO 2013. Marine Conservation Zones and Marine Licensing guidance.
- Natural England 2020a. Guidance on how to use Natural England's Conservation Advice Packages for Environmental Assessments (Draft).
- Planning Inspectorate (PINS) 2019. Advice Note Seventeen: Cumulative effects assessment.

11. The approach to the screening assessment has also been informed by advice from Natural England and other stakeholders provided through the EPP as well as Advice on Operations (AoO) and Supplementary Advice on Conservation Objectives (SACO) for the CSCB MCZ (Natural England, 2020a).

4 Overview of MCZ Assessment Process

12. Guidance published by the MMO (2013) describes how MCZAs should be undertaken in the context of marine licensing decisions (note: there is no PINS guidance or advice on MCZ Assessments for DCO applications). To undertake its marine licensing function, the MMO has introduced a three stage sequential assessment process for considering impacts on MCZs, in order for it to deliver its duties under Section 126 of the MCAA. Section 126 places specific duties on all public bodies in undertaking their licensing activities where they are capable of

hindering the conservation objectives of an MCZ. The MCZA process is similar to, but separate from, the Habitats Regulations Assessment (HRA) process. The stages of MCZA are presented below.

4.1 Screening (Appendix 1)

13. The screening process is required to determine whether Section 126 of the MCAA should apply to the application. All applications go through an initial screening stage to determine whether:

- the plan, project or activity is within or near to a MCZ;
- the plan, project or activity is capable of significantly affecting (without mitigation) (i) the protected features of a MCZ, or (ii) any ecological or geomorphological processes on which the conservation of the features depends.

14. Where it has been determined through screening that Section 126 applies, the application is assessed further to determine which subsections of Section 126 should apply through Stage 1 assessment and Stage 2 assessment. The MCZA screening stage is summarised in **Figure 4-1**.

n.b this process will be integrated into the marine licensing process

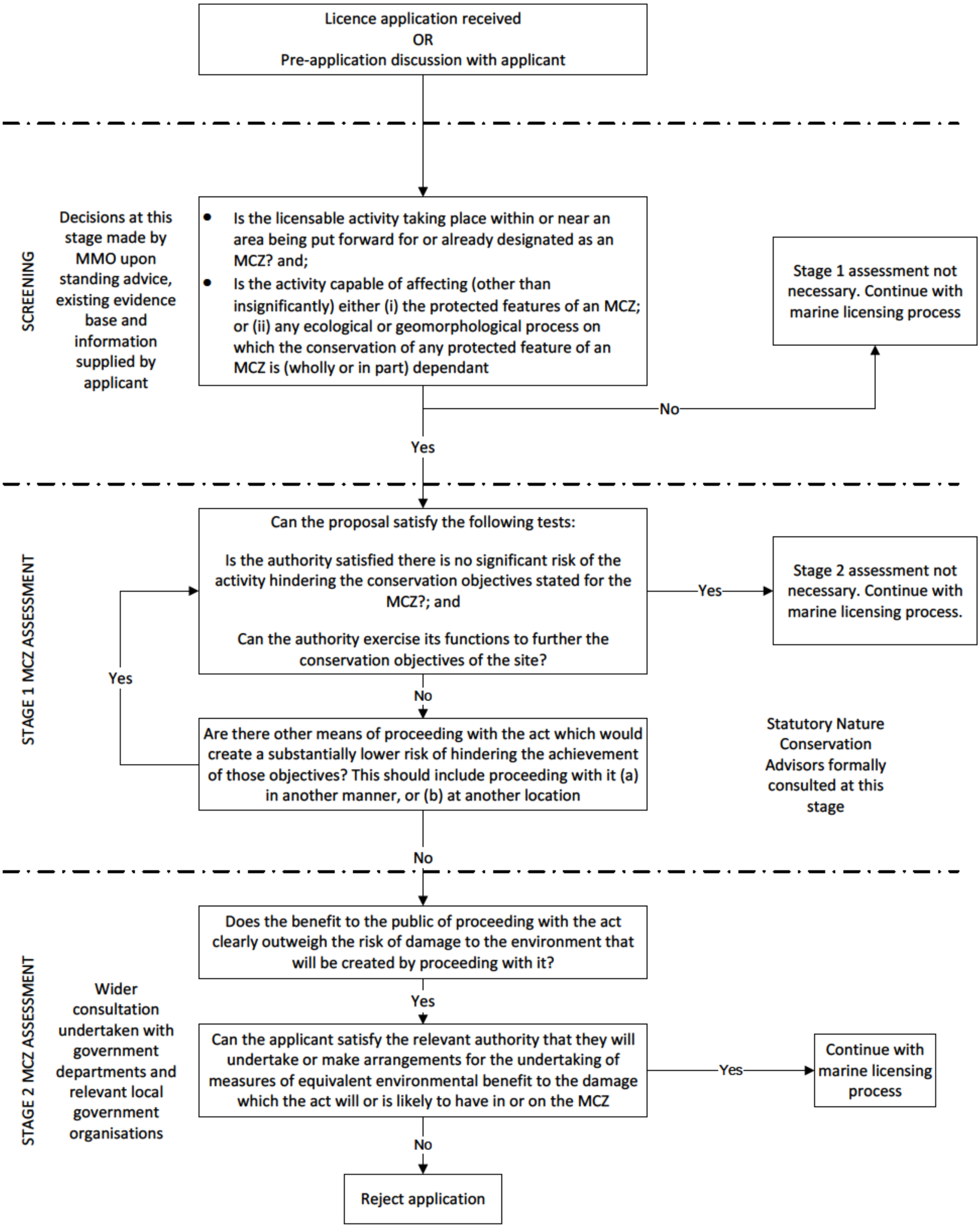

Figure 4-1 Flow chart summary of the MCZ Assessment process used by the MMO during marine licence determination (MMO, 2013)

4.2 Stage 1 Assessment (this report)

15. This Stage 1 Assessment will consider whether the conditions in s.126(6) of the MCAA can be met, to determine whether:

- there is no significant risk of the activity hindering the achievement of the conservation objectives stated for the MCZ; and
- the MMO can exercise its functions to further the conservation objectives stated for the MCZ (in accordance with s.125(2)(a)).

16. This Stage 1 Assessment considers the extent of the potential impact of the project on the MCZ in more detail. The Stage 1 Assessment looks at whether the plan or project could potentially affect the conservation objectives for the site, that is, impact the site so that the features are no longer in favourable condition, or prevent the features from recovering to a favourable condition. If mitigation to reduce identified impacts cannot be secured, and there are no other alternative locations, then the project will be considered under Stage 2 of the assessment process. More information on the Stage 2 assessment is provided in **Section 4.3**.

17. Within the Stage 1 Assessment "hinder" will be considered as any act that could, either alone or in combination:

- in the case of a conservation objective of "maintain", increase the likelihood that the current status of a feature would go downwards (e.g. from favourable to degraded) either immediately or in the future (i.e. they would be placed on a downward trend); or
- in the case of a conservation objective of "recover", decrease the likelihood that the current status of a feature could move upwards (e.g. from degraded to favourable) either immediately or in the future (i.e. they would be placed on a flat or downward trend).

18. In order to determine if there is 'no significant risk of the activity hindering the achievement of the conservation objectives stated for the MCZ' the MMO (2013) guidance states "*this should take into account the likelihood of an activity causing an effect, the magnitude of the effect should it occur, and the potential risk any such effect may cause on either the protected features of an MCZ or any ecological or geomorphological process on which the conservation of any protected feature of an MCZ is (wholly or in part) dependant*." The SEP and DEP approach to determining no significant risk of the activity enabling achievement of the conservation objectives is set out below.

4.2.1 Assessment of risk to conservation objectives

4.2.1.1 Magnitude of effect

19. For each effect, a magnitude has been assigned, providing a definition of the spatial extent, duration, frequency and reversibility of the effect considered (where applicable). The definitions of magnitude for the purpose of the MCZA are provided in **Table 4-1**.

Table 4-1: Definitions of Magnitude

Magnitude	Definition
High	Fundamental, permanent / irreversible changes, over the whole receptor, and / or fundamental alteration to key characteristics or features of the particular receptors character or distinctiveness.
Medium	Considerable, permanent / irreversible changes, over the majority of the receptor, and / or discernible alteration to key characteristics or features of the particular receptors character or distinctiveness.
Low	Discernible, temporary (throughout project duration) change, over a minority of the receptor, and / or limited but discernible alteration to key characteristics or features of the particular receptors character or distinctiveness.
Negligible	Discernible, temporary (for part of the project duration) change, or barely discernible change for any length of time, over a small area of the receptor, and/or slight alteration to key characteristics or features of the particular receptors character or distinctiveness.

4.2.1.2 Sensitivity of receptors

20. In order to determine the sensitivity of the protected features of CSCB MCZ, Natural England's AoO has been utilised which indicates the sensitivity of each receptor to relevant pressures. Specifically, the sensitivity range of the biotopes associated with each protected feature has been determined in relation to relevant pressures, taking the highest sensitivity as a worst case scenario. The sensitivity ranges relevant to this assessment are available in **Appendix 2 CSCB MCZ Biotope Sensitivity Ranges** [APP-079].

4.2.1.3 Assessment against conservation objectives

21. Following determination of effect magnitude and receptor sensitivity the Stage 1 assessment considers the risk that SEP and/or DEP could hinder the conservation objectives for the MCZ with consideration of Natural England's SACOs.

22. SACOs present attributes which are ecological characteristics or requirements of the designated species and habitats within a site. The listed attributes are considered to be those which best describe the site's ecological integrity and which, if safeguarded, will enable achievement of the Conservation Objectives. These attributes have a target which is either quantified or qualified depending on the available evidence (Natural England, 2023). A summary of the consideration or pressures against the relevant attributes is provided in **Section 9, Table 9-1**.

4.3 Stage 2 Assessment

23. Where it is required, the Stage 2 assessment considers the socio-economic impact of the plan or project together with the risk of environmental damage. There are two parts to the Stage 2 assessment process:

- Does the public benefit in proceeding with the project clearly outweigh the risk of damage to the environment that will be created by proceeding with it? If so,
- Can the Applicant satisfy that they can secure, or undertake arrangements to secure, measures of equivalent environmental benefit (MEEB) for the damage the project will have on the MCZ features?

4.3.1 Measures of Equivalent Environmental Benefit

24. If Stage 1 identifies a significant risk of hindering the conservation objectives of the CSCB MCZ, an assessment of MEEB must also be included in the MCZA.

25. The Applicant has taken note of the outcome of the recent Hornsea Project Three decision, specifically the Secretary of State's decision letter which states that "*It is therefore important that potential adverse impacts on the integrity of designated sites are identified during the pre-application period and full consideration is given to the need for derogation of the Habitats Regulations during the examination. He expects Applicants and statutory nature conservation bodies ("SNCBs") to engage constructively during the pre-application period and provide all necessary evidence on these matters, including possible compensatory measures, for consideration during the examination.*" Whilst in the case of Hornsea Project Three the Secretary of State was able to rule out beyond reasonable scientific doubt significant risk of the activity hindering the achievement of the conservation objectives for the MCZ in the Stage 1 assessment, the Applicant considers that the potential need for derogation under the MCAA should also be addressed, as appropriate, during the pre-application period.

26. It is possible that SEP and DEP activities could be capable of significantly affecting the protected features of the CSCB MCZ. As set out in this report this site has been screened in for further consideration in this Stage 1 CSCB MCZA. The MCZA has not yet been completed and while the Applicant does not wish to pre-empt the conclusions of that assessment, it is anticipated that if there is a significant risk of hindering the conservation objectives of the MCZ, the Secretary of State will expect Stage 2 of the MCZA process (**Figure 4-1**) to be considered pre-application.

27. With the above in mind the Applicant gave early consideration to these matters, so that constructive engagement on the issues could be undertaken during the pre-application period. Discussions with Natural England and other relevant stakeholders were held prior to-Preliminary Environmental Information Report (PEIR) in terms of the process to be followed at the pre-application stage, as well as the identification of the designated sites for consideration. Following submission of the PEIR, engagement on MEEB was undertaken. Appendix 3 of the **MCAA Derogation Provision of Evidence** [APP-092] provides the **Appendix 1 In-Principle Cromer Shoal Chalk Beds (CSCB) Marine Conservation Zone (MCZ) Measures of Equivalent Environmental Benefit (MEEB) Plan** (Revision C) [REP2-020]. A number of iterations of the MEEB proposals have been consulted on throughout the pre-application process which has culminated in the identification of a preferred 'without prejudice' measure, namely, oyster reef planting within the MCZ. See **MCAA Derogation Provision of Evidence** [APP-092] and appendices for further information, including on the pre-application consultation process undertaken for MEEB.

28. **Appendix 1 In-Principle CSCB MCZ MEEB Plan** (Revision C) [REP2-020] is entirely without prejudice to the Applicant's current position that there will be no significant risk of the activity hindering the achievement of the conservation objectives of the CSCB MCZ.

4.4 Cumulative Effects

29. The MCAA does not provide any legislative requirement for explicit consideration of cumulative effects on the protected features of MCZs. However, the MMO guidelines (MMO, 2013) state that the MMO considers that in order for the MMO to fully discharge its duties under section 69 (1) of the MCAA, cumulative effects must be considered.

30. PINS Advice Note Seventeen (PINS, 2019a) provides guidance on plans and projects that should be considered in the Cumulative Impact Assessment (CIA) including:

- Projects that are under construction;
- Permitted applications, not yet implemented;
- Submitted applications not yet determined;
- Projects on the PINS Program of Projects where a Scoping Report has been submitted;
- Projects on the PINS Program of Projects where a Scoping Report has not been submitted;
- Development identified in relevant Development Plans, with weight being given as they move closer to adoption and recognising that much information on any relevant proposals will be limited; and
- Sites identified in other policy documents as development reasonably likely to come forward.

31. Only projects which are reasonably well described and sufficiently advanced to provide information on which to base a meaningful and robust assessment are included in the cumulative assessment.

32. Projects that are sufficiently implemented during the site characterisation for SEP and DEP are considered as part of the baseline. Offshore cumulative impacts may come from interactions with the following activities and industries:

- Other offshore wind farms;
- Aggregate extraction and dredging;
- Licensed disposal sites;
- Navigation and shipping;
- Subsea cables and pipelines;
- Potential port/harbour development;
- Oil and gas activities; and
- Fisheries management areas.

33. The assessment presents relevant cumulative effects of projects based on their stage of development using the tiered approach as devised by Natural England (JNCC and Natural England, 2013) and presented in **Table 4-2**.

Table 4-2: Tiers for Undertaking Cumulative/In-combination Assessment (based on JNCC and Natural England, 2013)

Tier	Consenting or Construction Phase	Data Availability
Tier 1	Built and operational projects should be included within the cumulative assessment where they have not been included within the environmental characterisation survey, i.e., they were not operational when baseline surveys were undertaken, and/or any residual impact may not have yet fed through to and been captured in estimates of "baseline" conditions e.g. background" distribution or mortality rate for birds.	Pre-construction (and possibly post-construction) survey data from the built project(s) and environmental characterisation survey data from proposed project (including data analysis and interpretation within the Environmental Statement (ES) for the project).
Tier 2	Tier 1 + projects under construction	As Tier 1 but not including post construction survey data
Tier 3	Tier 2 + projects that have been consented (but construction has not yet commenced)	Environmental characterisation survey data from proposed project (including data analysis and interpretation within the ES for the project) and possibly pre-construction
Tier 4	Tier 3 + projects that have an application submitted to the appropriate regulatory body that have not yet been determined	Environmental characterisation survey data from proposed project (including data analysis and interpretation within the ES for the project)
Tier 5	Tier 4 + projects that the regulatory body are expecting an application to be submitted for determination (e.g. projects listed under the PINS programme of projects), including projects where a Preliminary Environmental Information Report (PEIR) has been undertaken and submitted	Possibly environmental characterisation survey data (but strong likelihood that this data will not be publicly available at this stage).
Tier 6	Tier 5 + projects that have been identified in relevant strategic plans or programmes (e.g., projects identified in Round 3 wind farm ZAP documents)	Historic survey data collected for other purposes/by other projects or industries or at a strategic level.

34. Projects classified under Tiers 1 to 4 and Tier 5 projects that have submitted a PEIR are included in the MCZA. Tier 5 projects where a PEIR has not yet been submitted and Tier 6 projects will be considered where sufficient information is available.

35. For this MCZA, SEP and DEP activities and associated pressures are reviewed to determine whether they are capable of significantly affecting MCZs when combined with equivalent activities and associated pressures from other plans and projects. The potential for projects to act cumulatively on MCZs is considered in the context of the likely spatial and temporal extent of pressures.

5 Consultation

36. Consultation of relevance to the MCZA process has been undertaken with SNCBs and other stakeholders through scoping and an ongoing EPP.

5.1 Scoping

37. Consultation has been undertaken with the appropriate authorities and stakeholders as part of the scoping stage of the EIA process. The Scoping Report (Royal HaskoningDHV, 2019) was submitted to the Planning Inspectorate on 8th October 2019 and a Scoping Opinion (PINS, 2019b) was received on 18th November 2019. Scoping established the potential impacts of SEP and DEP to be assessed by the EIA (and by association the MCZA).

5.2 Evidence Plan

38. The EPP is a non-statutory, voluntary process that aims to encourage upfront agreement on what information an applicant needs to supply to the Planning Inspectorate as part of a DCO application. It aims to ensure EIA, HRA and MCZA requirements are met and to reduce the risk of major infrastructure projects being delayed at (or before) the examination phase of the DCO application process.

39. The EPP includes consultation through a Sea bed Expert Topic Group (ETG) which focuses on issues related to marine geology, oceanography and physical processes; benthic ecology; and fish and shellfish ecology. The Sea bed ETG aims to agree the relevance, appropriateness and sufficiency of baseline data, key issues for the EIA, and the impact assessment approach (including MCZA). Stakeholders represented on the Sea bed ETG are:

- Natural England;
- MMO;
- Cefas;
- Eastern Inshore Fisheries and Conservation Authority (EIFCA);
- The Wildlife Trusts (TWT); and
- Joint Nature Conservation Committee (JNCC) (via Natural England).

40. A record of the ETG meeting minutes and agreement logs can be found in the **Evidence Plan** [APP-030] appendix of the **Consultation Report** [APP-029].

41. A draft of the MCZA Screening Report was made available for consultation through the Sea bed ETG on 21st April 2020. The MCZA screening assessment has been updated based on the comments received (**Appendix 1 Screening Report** [APP-078]).

5.3 Summary of relevant consultation responses

42. The consultation responses relevant to the MCZA which have been received to date are summarised in **Table 5-1** below.

Table 5-1: Consultation Responses Relevant to the MCZA

Consultee	Date	Comment	Response
TWT Scoping Opinion Response			
TWT	November 2019	Please be advised that TWT is currently entering a holding objection to the Dudgeon and Sheringham Offshore Wind Farm Extensions. This is due to proposed routing of the cable through Cromer Shoal Chalk Beds Marine Conservation Zone (MCZ). Cromer Shoal Chalk Beds MCZ is unique and protects features rare within English waters. Cabling could cause damage and loss of habitat within the MCZ which could put the conservation status of the MCZ at risk. The impacts from cabling are twofold. Firstly, the siting of the cable in the wrong location, such as in the chalk reef area, would cause irreparable damage to this habitat. Secondly, due to the location of chalk bedrock along the north Norfolk coast, cable burial may be difficult or impossible in some locations, increasing the need for rock protection. This would result in a loss of habitat. In addition, repeated cable burial works due to cable burial failure during the lifetime of the project could result in disturbance and damage to habitats within the MCZ. TWT will consider withdrawing the objection to the projects provided the questions and issues identified in Appendix A can be resolved. TWT will continue to work with Equinor during the evidence plan process to ensure the correct data is gathered and assessed in order to address our concerns.	Embedded mitigation through the use of HDD (see **Table 6-3**) will ensure avoidance of areas of chalk reef by locating the HDD exit point in an area of subtidal sand beyond the extent of A3 infralittoral rock which represents potential areas of chalk reef shown on **Figure 8-2**. **Section 4** of the **Outline Cromer Shoal Chalk Beds (CSCB) Marine Conservation Zone (MCZ) Cable Specification, Installation and Monitoring Plan (CSIMP)** (Revision B) [document reference 9.7] describes the mitigation that will be implemented to ensure reasonable endeavours are made to avoid the need for external cable protection within the MCZ with reference to experience from Sheringham Shoal Offshore Wind Farm (SOW) and Dudgeon Offshore Wind Farm (DOW). The Applicant will make reasonable endeavours to bury the offshore export cable, minimising the requirement for cable protection measures and thus effects on sediment transport. Use of external cable protection would be minimised in all cases and in the nearshore is only included for potential use at the HDD exit point.
TWT	November 2019	**Cabling through Cromer Shoal Chalk Beds MCZ: Questions and queries** **1. Are alternative cable routes available?**	The grid connection point was defined through the National Grid Connection and Infrastructure Options Note (CION) Process. National Grid is responsible for operating the electricity transmission network in England

Consultee	Date	Comment	Response
		TWT is disappointed that there has been no SNCB engagement in the identification of the grid connection for Sheringham and Dudgeon Offshore Wind Farm Extensions. The alternatives test in section 126(7) and (8) of the Marine and Coastal Access Act is an important consideration in the MCZ assessment process. If alternatives are available that could deliver the projects in a different manner or different location which would result in reduced impacts, these must be considered.	and Wales. The CION process is the mechanism used by National Grid to evaluate potential transmission options to identify the connection point in line with their obligation to develop and maintain an efficient, coordinated and economical system of the electricity transmission network. As part of the economic assessment, the CION considers the total life cost of the connection – assessing both the capital and projected operational costs to the onshore network (over a project's lifetime) to determine the most economic and efficient design option. Following the completion of the CION process, National Grid made a grid connection offer to the Applicant in April 2019 for connection at Norwich Main National Grid Substation, which would accommodate both SEP and DEP. The Applicant accepted this offer in May 2019. As described in **Section 4.8.3.1** of ES **Chapter 3 Site Selection and Assessment of Alternatives** (Revision B) [APP-089], the Applicant was advised by Natural England to route the offshore export cable corridor to avoid The Wash and North Norfolk Coast SAC in order to avoid Annex I habitats within it and therefore the route through the MCZ was the preferred option. The chosen route presents the shortest cable route overall (and so minimises the footprint of cable installation) and has the additional and distinct advantage of being close and parallel to the existing DOW export cable route, for which Equinor has first-hand experience of undertaking successful cable burial works.

[redacted]

Consultee	Date	Comment	Response
TWT	November 2019	TWT requests a summary report on the range of grid connections which were considered and discounted and the justification for this decision. We also request a summary of the justification as to why the Norwich Main grid connection was chosen. Once this information is available, TWT will consider if any alternative grid connections discounted as part of the process are viable. If we conclude that viable alternatives are available, we will request this to be considered.	See above response and ES **Chapter 3 Site Selection and Assessment of Alternatives** (Revision B) [APP-089] for further details.
TWT	November 2019	The potential for a cable route through The Wash and North Norfolk SAC was discussed at the Expert Topic Group meeting. TWT does not support cabling through the SAC or MCZ. However, if this route is to be explored, data gathering to inform assessment should commence as soon as possible. Questions 3-5 below would also apply to the SAC if this route is chosen.	See above. The route through the MCZ was deemed to be the preferred export cable route option.
TWT	November 2019	**2. Can the cable route avoid exposed chalk?** Geophysical surveys will be required to identify any exposed chalk within or near to the proposed cable routes. This includes both chalk reef and exposed chalk bedrock. Following the assessment of survey information, TWT will require confirmation that impacts on exposed chalk will be avoided.	Geophysical surveys were undertaken to inform assessments. **Figure 8-2** shows areas of A3 infralittoral rock which represents potential areas of chalk reef that will be avoided through the use of HDD.
TWT	November 2019	**3. What is the risk of cable burial failure during initial cable laying and during the lifetime of the project?** In order to address this question, evidence will need be gathered on: • Location and depth of bedrock	The **Outline CSCB MCZ CSIMP** (Revision B) [document reference 9.7] provides further information on these matters.

Consultee	Date	Comment	Response
		• Thickness of sediment veneer over the bedrock • Change in sediment veneer patterns over the lifetime of the project	
TWT	November 2019	Once the initial geophysical data has been presented to the Expert Topic Group, further discussions should take place on the need for geotechnical surveys to ground truth the evidence collected.	In Q4 2021, the Applicant undertook a geotechnical survey (cone penetrometer testing and vibrocores), including within the export cable corridor as it passes through the MCZ. A survey of this type would usually be undertaken post-consent nearer to the point of construction but has been brought forward in this case in order to provide further information to inform the cable burial studies and the associated environmental considerations. Interpretation of the geotechnical survey results is ongoing. Details of the finalised export cable corridor and any necessary micro-siting within the CSCB MCZ will be provided in the final CSIMP, informed by the pre-construction surveys, including the 2021 geotechnical investigations. Details of the finalised export cable corridor and any necessary micro-siting within the CSCB MCZ will be provided in the final CSIMP, informed by pre-construction surveys. Information describing the potential for micro-siting of the export cables is provided in the **Interim Cable Burial Study (ICBS)** [APP-292] of the **Outline CSCB MCZ CSIMP** (Revision B) [document reference 9.7].

Consultee	Date	Comment	Response
TWT	November 2019	TWT agrees with Natural England, that detailed documents on cable installation will be required as part of the planning application, including a cable burial risk assessment and installation plan. Information contained in cabling documents will be important in undertaking the MCZ assessment. When discussing the existing Dudgeon Offshore Wind Farm cable installation at the recent Expert Topic Group, the project team seemed confident that the cable burial was successful resulting in little rock protection. TWT requests to see evidence to support this assertion.	An **Outline CSCB MCZ CSIMP** (Revision B) [document reference 9.7] and **ICBS** [APP-292] have been submitted with the DCO application. The **Outline CSCB MCZ CSIMP** (Revision B) [document reference 9.7] provides reference to experience from export cable installation at SOW and DOW which did not require external cable protection.
TWT	November 2019	**4. How much rock protection will be applied for as part of the planning application?** The cable burial risk assessment/cable installation plan should provide evidence to determine the amount of cable protection required for the lifetime of the projects. An assessment will be required to determine what impact rock protection will have on the conservation objectives of the MCZ and to determine if rock protection will hinder the achievement of the conservation objectives.	Use of external cable protection would be minimised in all cases and in the nearshore is only included for potential use at the HDD exit point. However, an allowance of up to 1,800m^2 within the MCZ has been assessed in order to provide flexibility in case cable burial cannot be achieved. The **Outline CSCB MCZ CSIMP** (Revision B) [document reference 9.7] and **ICBS** [APP-292] provide detail on the expectations around burial of export cables including the potential for cable exposure with reference to experience from SOW and DOW.
TWT	November 2019	**5. What alternative cable installation and protection is available that would reduce the risk of hindering the conservation objectives for the MCZ?** 5.1. No rock protection The idea of no rock protection was discussed at the Expert Topic Group meeting. This is something which TWT is open to exploring but would need to be confident that:	

Consultee	Date	Comment	Response
		• Equinor was able to take on the risk of no cable protection within the MCZ • The future Offshore Transmissions Operator would take on the risk of no cable protection during the lifetime of the project. To understand the risk of cable exposure, it will be important to understand the potential for cable exposure during the lifetime of the project including the dynamics of the sediment veneer within the MCZ.	
Natural England – ETG 2 (02/06/2020)			
Natural England	June 2020	Natural England does not agree with the statement 'Cromer Shoal Chalk Beds MCZ Subtidal Chalk FOCI is restricted to the areas identified by the geophysical survey?' We would agree that areas of current outcropping chalk are likely to have been identified. However, across much of the site there are areas of subtidal chalk lying underneath a thin veneer of sand/sediment which we also consider should be protected as outcropping chalk. This is in accordance with our advice on fishing activities.	It was agreed at Sea bed ETG 2 following presentation of evidence contained in ES **Appendix 6.3 Sedimentary Processes in the Cromer Shoal Chalk Beds MCZ** [APP-182] that sea bed sediments in the offshore export cable corridor within the CSCB MCZ are static, with the exception of Holocene sand / subtidal sand, which is mobile under some conditions. Therefore, the potential for subtidal chalk to be exposed in the future is restricted to the subtidal sand areas identified by the geophysical survey. Further information on the extent of the subtidal chalk FOCI is available in **Section 8**.
Natural England	June 2020	Natural England does not agree that the effects on bedload sediment transport impacts should be screened out.	Effects on bedload sediment transport are assessed in relation to the operational phase in **Section 9.2.4**.

Consultee	Date	Comment	Response
Natural England	June 2020	Please note, we expect that the final MCZ assessment, as a minimum, will follow the Hornsea Project Three MCZ assessment submitted to the Secretary of State on 14th February 2020.	The assessment has followed the Hornsea Project Three MCZ assessment submitted February 2020 (RPS, 2020).
Natural England	June 2020	Wind Farm Extensions Natural England welcomes the consideration of array and offshore cable impacts.	The SEP and DEP wind farm sites are located 6.3km and 16.8km from the CSCB MCZ respectively, at their closest points. Therefore, impacts from infield and interlink cables have been scoped out of this assessment.
Natural England	June 2020	Natural England advises the Applicant to continue to making use of the Advice on Operations within the Conservation Advice to inform this assessment. This advice identifies pressures associated with the most commonly occurring marine activities, and provides a detailed assessment of the feature/sub feature or supporting habitat sensitivity to these pressures. Advice on Operations should be used in conjunction with the specific details of a proposed plan or project (e.g. indirect and/or additive impacts, activity duration, time of year, scale etc.) and the site-specific Supplementary Advice on Conservation Objectives (SACO) in order to develop assessments of impacts to features within the site.	Natural England's AoO has been used in order to identify the relevant pressures associated with export cable activities associated with construction, operation and decommissioning (**Stage 1 CSCB MCZ Assessment - Appendix 1 Screening Report** [APP-078] and **Section 9**). AoO has also been used to identify the sensitivities of biotopes associated with the CSCB MCZ features in order to inform the Stage 1 assessment (**Appendix 2 CSCB MCZ Biotope Sensitivity Ranges** [APP-079]). The SACO has also been used to assess the impacts against the relevant attributes of each CSCB MCZ, where applicable (**Table 9-1**).
Natural England	June 2020	Please be advised that fisheries management areas specifically will need to be considered as a plan or project.	The cumulative effects section of the Stage 1 assessment considers fisheries management areas as a plan (**Section 9.4**)
Natural England	June 2020	Please be advised that the following site preparations works need to be included in any MCZ assessment: Sandwave levelling/clearance, UXO sea bed impacts, boulder clearance and grapnel run.	The extent of impacts from boulder clearance, the pre-lay grapnel run (PLGR) and construction of HDD exit pits are described in **Table 6-2** and impacts are assessed in the construction phase impact assessment (**Section 9.1**).

Consultee	Date	Comment	Response
		Also the creation of exit pits are not mentioned.	No sandwave levelling will occur in the CSCB MCZ. UXO clearance is a pre-construction activity, and if required would be consented with a separate marine licence application at that time, once details of the proposed works are available. However, as agreed at the Sea Bed ETG on the 16th August 2021, an assessment of the potential impacts of UXO clearance on the MCZ features has been included in **Appendix 3 Assessment of Sea Bed Disturbance Impacts from UXO Clearance** [APP-080] for information purposes only.
Natural England	June 2020	Within **section 2.2.2** of the Geophysical survey document it is stated that …[] An interpreted cable intersects the Weybourne Export Cable Route at KP16.75 with a NE/SW orientation. However in **Section 5.1.1**, para 67 of the Marine Conservation Zone Assessment Screening Report it states: The export cables will not cross any other cables or pipelines inside the MCZ. Could this discrepancy please be clarified? Natural England notes that this may no longer be required, at least in part, given the chosen export cable route.	The MCZA **Appendix 1 Screening Report** [APP-078] has been updated to include reference to the disused Stratos telecommunications cable which crosses the SEP and DEP offshore export cable corridor inside the CSCB MCZ.
Natural England	June 2020	Operation Please note under the conservation objectives there would be a 'lasting change' in the habitat.	The Applicant has committed to removal of any surface cable protection in the MCZ at decommissioning (**Section 6.7**). Therefore, habitat loss associated with this cable protection will be lasting but not permanent, as assessed in **Section 9.2.2**.
Natural England	June 2020	Decommissioning Natural England welcomes consideration of remove of cable protection at the time of decommissioning and if removal could be achieved, then whilst the impacts would no longer be permanent,	

Consultee	Date	Comment	Response
		they would still last for the lifetime of the infrastructure (25 years) and potentially longer as a residual impact. Therefore, because this impact is lasting/long term and site recovery wouldn't be assured, Natural England's view is that reasonable scientific doubt would likely remain regarding the impact of the proposals on the conservation objectives for the site. Accordingly a precautionary approach is required. Please also be advised that if it is considered that certain types of cable protection could be modified to enable a greater success of recovery/removal at decommissioning, whilst reducing wider designated site impact, then we advise that this would need to be reflected in the DCO/DML to ensure this mitigation is secured.	Removal of any external cable protection installed within the CSCB MCZ is secured through the **Outline CSCB MCZ CSIMP** (Revision B) [document reference 9.7]. Note that the operational period for SEP and/or DEP is 40 years.
Natural England	June 2020	Cumulative Effects If cumulative effects are still having an impact i.e., not recovered then this cannot be screened out. Dudgeon and Sheringham Shoal Offshore Wind Farms - Please note, Natural England does not agree with the conclusion undertaken for the assessments for Dudgeon and Sheringham Shoal OWFs activities would not have an adverse effect alone or cumulatively with other projects, plans and activities.	SOW and DOW are considered in the cumulative assessment in **Section 9.4**.
Natural England	June 2020	Cumulative Effects - Bacton Gas Terminal Coastal Defence Scheme Please note you will also need to consider how Dudgeon and Sheringham Shoal Extension Projects would impact on the effectiveness of the sand engine.	Potential cumulative effects are assessed in **Section 9.4**.
MMO – ETG 2 (02/06/2020)			

Consultee	Date	Comment	Response
MMO	June 2020	While the MCZ screening approach seems appropriate, the MMO have some specific comments on both the Advice on Operations (AoO) sensitivity assessment (Table 5-4 of report in paragraph 4), and the pressures scoped in/out of the assessment; Please provide further information on the reason for including subtidal sand as sensitive to changes in suspended solids (water clarity). This type of habitat/associated species would be used to increased suspended sediment.	The sensitivities have been taken from Natural England's AoO guidance, Appendix 2 Biotope Sensitivity Ranges [APP-079] and were not changed in the screening assessment.
MMO	June 2020	Please provide further information on why moderate energy infralittoral rock was assessed as sensitive to three of the pressures associated with direct impact when the habitat does not coincide with either of the cable corridors according to Table 6-2.	
MMO	June 2020	Please provide further information on why high energy infralittoral rock was assessed as 'not relevant' to the pressure 'habitat structure changes' and 'penetration and physical change' as this habitat is present within the Weybourne cable corridor according to Table 6-2.	
MMO	June 2020	Please provide further information on why high energy infralittoral rock and subtidal chalk were assessed as not sensitive to 'smothering and siltation rate changes'.	
MMO	June 2020	As noted in point 1.8 TBT contamination (mobilisation of contaminated sediments) has been screened out. It is the MMO's recommendation that TBT contamination should be screened in due to nearby shellfisheries sensitivity.	Re-mobilisation of contaminated sediments has been screened into the assessment (Section 9.1.3).
MMO	June 2020	It appears that sediment contamination sampling will be conducted in support of a Stage 1 MCZ assessment. There is mention of	Sediment samples for chemical analysis have been collected throughout the SEP and DEP offshore sites,

Consultee	Date	Comment	Response
		trenching and/or horizontal direction drilling (HDD), but the sampling proposed does not relate to this and the information provided does not state whether any at sea disposal will be required. The MMO cannot provide further opinion of the proposed sampling as it is not clear what it is designed to support. The MMO have confirmed that Cefas do not hold sedimentation contamination sampling data for the area of the proposed works. Further clarification on dredging and disposal aspects should be given for the Project.	including from the offshore export cable corridor inside the CSCB MCZ. Locations of sample sites are shown in **Figure 7.4** of ES **Chapter 7 Marine Water and Sediment Quality** [APP-093]. Potential impacts are assessed in **Section 9.1.3**. In addition, the **Disposal Site Characterisation Report** (Revision B) [REP1-019] submitted with the DCO application is intended to provide the necessary information for the SEP and DEP offshore export cable corridor to be licensed as a disposal site.
Section 42 Comments			
Natural England	June 2021	Please note that Natural England has undertaken a condition assessment for some features of the Cromer Shoal Chalk Beds (CSCB) MCZ, which have been found to be in unfavourable condition. This will be published by July 2021.	Noted.
Natural England	June 2021	As per above, whilst the Oil and Gas (O&G) pipelines and associated protection are part of the baseline, they are one of the reasons the site is in unfavourable condition.	Noted.
Natural England	June 2021	**Table 4-2**: This should be updated as the PEIR is considered sufficient to enable an in-combination/cumulative assessment to be undertaken	The text below **Table 4-2** has been amended.
Natural England	June 2021	General: Natural England consider that given the adjacent Race Bank offshore windfarm encountered numerous UXO, for SEP and DEP this should be dealt with through the Application process and not by	As agreed at the marine mammals ETG on the 20th July 2021, UXO clearance will be assessed through a separate marine licence post-consent once greater detail

Consultee	Date	Comment	Response
		a separate marine licence. Cable protection during the operational phase is broadly the same scenario and that is considered as part of the application	on the locations and extent of UXO to be cleared is known. An assessment of potential sea bed disturbance impacts from UXO clearance is provided in **Appendix 3 Assessment of Sea Bed Disturbance Impacts from UXO Clearance** [APP-080] for information purposes only.
Natural England	June 2021	General: How will the Applicant secure the removal of protection at the time of decommissioning?	If deemed to be required at the time of decommissioning, any external cable protection systems that are installed within the MCZ will be removed. This is secured through the **Outline CSCB MCZ CSIMP** (Revision B) [document reference 9.7].
Natural England	June 2021	**Section 6.4.1** | Para 58: 20 boulders are estimated along the export cable corridor. Are these identified from geophysical surveys, as the surveys suggest a low density. How many of these are located within the MCZ?	Boulders that present an obstacle to the export cable installation process will be confirmed by the pre-construction surveys. The existing geophysical data suggests a relatively low number of boulders that could need to be relocated and it is likely that micro-siting around many of these will be possible. Micro-siting around boulders is the preferred option. Where this is not possible, large boulders (in the order of 5m diameter and 1m height) will be relocated to an adjacent area of sea bed within the offshore export cable corridor boundaries where they do not present an obstacle to the works, and where possible to an area of sea bed with similar sediment type and avoiding any known sensitive habitats such as Annex I reef. Boulder clearance will be undertaken by subsea grab. Clearance of an estimated 20 boulders in the offshore export cable corridor, each of

Consultee	Date	Comment	Response
			up to 5m in diameter, has been included in the assessments in order to be conservative. Temporary disturbance footprints are included in Table 6-2.
Natural England	June 2021	Section 6.4.3 | Para 79: The impacts from cable protection should be noted as being 600m^2 per cable and 300m^2 per cable at the exit pit.	The permanent sea bed footprint of external cable protection (an overall total of 1,800m^2 within the MCZ) has been expressed in terms of area throughout the document.
Natural England	June 2021	Section 6.4.3.1 | Para 82: Please be advised that whilst we welcome the use of bags for cable protection as these have been shown to be successfully decommissioned; we query what they will be made from as the use of plastics should be minimised in the marine environment.	Initial market research has suggested that external cable protection systems may be available on the market that are manufactured from non-plastic material and would be recoverable where necessary after the lifetime of the wind farm. Selection of the appropriate system for use at SEP and DEP will be completed at the pre-construction stage once the requirements are better understood.
Natural England	June 2021	Section 6.5 | Para 85: Check if the title should read DEP or SEP built in isolation rather than "....DEP and SEP...."	Figure title has been amended as suggested.
Natural England	June 2021	Section 6.6 | Table 6-2: Temporary Habitat Loss: 10 boulders are assumed, are these each identified on geophysical data? SEP column - Sea bed preparation boulder clearance - change DEP to SEP.SEP & DEP together states DEP only, this should be amended to SEP & DEP, and the number of boulders remains at 10, should this be doubled to 20?	See above response regarding identification of boulders through geophysical data. Table 6-2 has been updated. Up to 20 boulders are assumed for SEP and DEP (10 each for SEP or DEP).
Natural England	June 2021	Section 6.6 | Table 6-2:	

Consultee	Date	Comment	Response
		Transparency in calculations either within each column or using the notes section would be beneficial for the scenarios, to ensure these are logical to follow.	
Natural England	June 2021	**Table 6-2**: This doesn't take account of the recent high volume of marine licence variation consultations requesting increases to O&M cable repairs and replacements requirements, due to predictions being found to be insufficient.	The estimates for cable repair and reburial are based on lessons learnt from operation and maintenance requirements at SOW and DOW (including adequate contingency) and are therefore considered to be appropriate in defining the worst case scenario for the purposes of the assessment Further details on the anticipated operation and maintenance requirements are provided in the **Outline CSCB MCZ CSIMP** (Revision B) [document reference 9.7] and appendices.
Natural England	June 2021	**Section 6.7** | **Table 6-3**: External Cable protection. It is stated that the allowance for external cable protection will be minimised. Natural England would welcome further information how this will be achieved, for example by avoiding areas of hard substrate within the cable corridor. Sediment disposal - it is stated that "*Any sediment excavated as part of the works at the HDD exit will be used as backfill once the works are complete i.e. sediment will be returned to the same location and will not be disposed of outside of the MCZ boundaries*." Further detail is required to ensure that even within the MCZ, given the heterogeneity in sediment type, sediment will be returned within an area of similar sediment type.	**Section 4** of the **Outline CSCB MCZ CSIMP** (Revision B) [document reference 9.7] describes the mitigation that will be implemented to ensure reasonable endeavours are made to avoid the need for external cable protection within the MCZ. Cables would be buried where ground conditions allow and micro-siting of the export cables, to avoid areas where burial is more likely to be challenging, ensure the amount of external cable protection required is minimised. Cable burial will always be the preferred method of protection. The **ICBS** [APP-292] describes how the amount of external cable protection has been derived.

Consultee	Date	Comment	Response
Natural England	June 2021	Section 6.4.2.5 | Para 75 & 76: We note the Applicant considers the best option (para 69) from an engineering perspective is for cable protection in the transition zone at the HDD exit in the subtidal, 1000m from the coastline. However, Natural England's preference is not for cable protection to be taken forward, but for the option, as detailed in paragraph 68, where cables will be buried within the transition zone, at the HDD exit point within the MCZ. This will reduce habitat loss due to external cable protection by 50% of the WCS. For each point please provide clarification within these paragraphs regarding whether the assessments referring to offshore or landfall HDD exit, for avoidance of any doubt.	Noted. Where appropriate, the text in Section 6.4.2.5 has been amended to indicate that the reference to the HDD exit point is in relation to the offshore area.
Natural England	June 2021	Section 6.4.3 | Para 78: We note that neither the Sheringham Shoal (SOW) nor Dudgeon(DOW) projects required cable protection because of additional passes of the trenching tools. The reference to Table 6-2 where the sea bed footprints for SEP and DEP are outlined is omitted –please update.	Noted. Reference to Table 6-2 has been added.
Natural England	June 2021	Section 9.4.4 | Para 274: Natural England welcomes the commitment to removal of all external cable protection at the decommissioning stage. However, Natural England consider impacts over 35 years to be long lasting with the potential to hinder the conservation objectives of the site.	Noted. The operational life of SEP and DEP has been updated to 40 years.
Natural England	June 2021	Section 8.1.1.3 | Para 107 / Figure 8-2:	The Applicant can confirm that this is an artefact of the layer presentation and that this area is represented by A5.4 subtidal mixed sediment. The Benthic Habitat

Consultee	Date	Comment	Response
		The polygon for the area of circalittoral rock A4 towards the northern seaward edge of the MCZ is not included in the legend.	Mapping Report (Envision, 2021) [APP-188] is provided in **Appendix 8.5 SEP and DEP Benthic Habitat Mapping** [APP-188] of ES **Chapter 8 Benthic Ecology** [APP-094] which provides further detail on the interpretation of the data used to produce the habitat maps.
Natural England	June 2021	**Section 8.1.1.3** | Para 107 / **Figure 8-2**: Within areas of mixed sediments, the biotope '*Sabellaria spinulosa* on stable circalittoral mixed sediment' (A5.611) is recorded. As stated by the Applicant, mixed sediment is a conservation feature of the Cromer MCZ. However, please note, *Sabellaria spinulosa* is protected under the NERC, 2006 Act.	Noted.
Natural England	June 2021	**Section 8.2.2** | Para 116: In Appendix 10.1 and 10.2 Benthic report (**Section 4.5.2.1**), Stations EC-03 and EC-24 within the Export Cable Corridor section of the MCZ, seawards side of the HDD exit pit, are described as 'low resemblance' to stony reef habitat. The overall habitat classification of the video transects at these stations classifies the habitat at these locations as coarse and mixed sediment respectively and therefore the representation of subtidal rock is not included within extrapolation of data at these stations within Appendix 10.3. Natural England do not have sight of the habitat report to further evaluate the assessment of stony reef at these stations and would welcome inclusion of this as an additional appendix	The SEP and DEP Habitat Reports (Fugro, 2020a; 2020b) are now provided as **Appendix 8.3 DEP Benthic Habitat Report** [APP-186] and **Appendix 8.4 SEP Benthic Habitat Report** [APP-187] respectively of ES **Chapter 8 Benthic Ecology** [APP-094]. In addition, **Section 5.2** of **Appendix 8.5 SEP and DEP Benthic Habitat Mapping** [APP-188] provides further detail on the presence of subtidal chalk and rock. The video samples from EC-03 were classified as sublittoral coarse sediment with a low reefiness score because of 10-40% cobble coverage which was patchy in distribution with other nearby samples showing only sediment.

Consultee	Date	Comment	Response
			The area is not picked up as a mappable habitat class because the habitat for the sample is defined as sublittoral coarse sediment and therefore this is the class that is mapped. Even if the 'low reef' sample points were to be brought into the mapping process there would be too much confusion between the sublittoral coarse sediment (not reef) and sublittoral coarse sediment (low reef) as the samples are on the same sea bed type as identified by the geophysics data. It is anticipated that there are small patches of 'low reef' within some areas of sublittoral coarse sediment, but the extent is limited and most likely ephemeral as sediment movement is likely to expose and rebury cobble areas. It is also important to note that a classification of 'low reef' does not constitute Annex I reef (Irving, 2009) [original author's emphasis]: *"When determining whether an area of the sea bed should be considered as Annex I stony reef, if a 'low' is scored in any of the four characteristics (composition, elevation, extent or biota), then a **strong** justification would be required for this area to be considered as contributing to the Marine Natura site network of qualifying reefs in terms of the EU Habitats Directive."*
Natural England	June 2021	Section 8.2.2 | Para 116:	See above response to this point.

Consultee	Date	Comment	Response
		Seaward of HDD exit point also includes the area of High energy circalittoral rock A4 at the northern boundary of the MCZ, and so this should be included in this list of direct pathway impacts.	
Natural England	June 2021	Section 9.1.1.1 | Para 142: Natural England welcome that sediments will be backfilled, avoiding long term removal of substratum.	Noted. Further detail on sediment disposal requirements is provided in the Disposal Site Characterisation Report (Revision B) [REP1-019]
Natural England	June 2021	Section 9.1.1.1 | Para 142: Please note that the assessment should be for the specific feature and not the extent of the whole site.	Table 9-2 provides the spatial extents of the features within the MCZ alongside the proportion of these areas potentially impacted by the project activities with respect to temporary habitat loss and disturbance. These spatial extents are presented in and form the basis of the conclusions for the assessment however the proportion of disturbance across the whole site is provided for context.
Natural England	June 2021	Section 9.1.1.2.3 | Para 149: *Sabellaria spinulosa* on stable circalittoral mixed sediment' (A5.611) Is identified within the export cable corridor. Although this sub biotope is not listed as a feature of the CSCB MCZ, we do note that mixed sediment is a feature of the MCZ. In any event, regardless of sensitivity, *Sabellaria spinulosa* reef habitat is a UKBAP priority habitat and afforded protected status under Section 40 and 41 of the NERC (2006) Act.	Baseline surveys for SOW, DOW, SEP and DEP (which included ground-truthing drop-down video surveys) and the pre- and post-construction monitoring surveys for SOW and DOW, found no UK BAP priority habitat / Annex I habitat *S. spinulosa* reef. Based on this, the Applicant considers that it is unlikely that UK BAP priority habitat / Annex I *S. spinulosa* reef is present within export cable corridors (and wind farm sites). Pre-construction surveys would identify any potential UK BAP priority habitat / Annex I *S. spinulosa* reef that may have formed and, if required, the export cables could be micro-sited to ensure avoidance of sensitive features.

Consultee	Date	Comment	Response
Natural England	June 2021	Section 9.1.1.2.3 | Para 149: Natural England welcomes that techniques will be utilised to avoid persistent trenches to avoid any longer recovery of benthic habitats than necessary and would welcome specific details of the methodology to be utilised for this.	The **Outline CSCB MCZ CSIMP** (Revision B) [document reference 9.7] provides further detail on how persistent trenches will be avoided using lessons learnt from SOW and DOW.
Natural England	June 2021	Section 9.1.1.2.3 | Para 151: Natural England will wait to see the updated documents before providing advice on the significance of the impacts.	Noted.
Natural England	June 2021	Section 9.1.3 | Para 176: Please see comments to Chapter 9 Sediment and Water Quality. Although Whalley *et al*. (1999) refers to the cited range for uncontaminated arsenic concentrations by Neff, 1997, the paper also considers the reasons for the regionally elevated concentrations for Arsenic, which should also be included in this paragraph.	Section 9.1.3 has been updated to provide additional detail on arsenic concentrations from Whalley *et al.* (1999).
Natural England	June 2021	Section 9.2.1 | Para 187-190: Can the Applicant provide evidence that the burial and repair required will be minimal, for example drawing on the level of maintenance or repair required for the existing DOW and SOW? By their nature, the operations resulting in temporary habitat loss and physical disturbance, both spatially and temporally, have the potential to hinder the conservation objectives of the site and therefore we cannot agree to the conclusion. This is particularly the case in mixed sediment areas.	The SOW and DOW export cables have not had to undergo any reburial or repair operations to date. However, the Applicant is aware that such works have been required for other North Sea OWFs in operation. Information from SOW and DOW has helped to inform the O&M requirements for SEP and DEP, however an allowance for reburial and repair is required for contingency purposes during the lifetime of the projects. The **Outline CSCB MCZ CSIMP** (Revision B) [document reference 9.7] provides further detail on the anticipated

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			maintenance and repair requirements using experience from SOW and DOW.
Natural England	June 2021	Section 9.2.2 | Para 194: Physical change to (another sediment type)	Physical change (to another sediment type) is not relevant because external cable protection will be a hard substratum rather than a sediment. Nonetheless, the pressure justification is identical between 'another sea bed' and 'another sediment' types and on that basis the sensitivity of features to the pressure is the same.
Natural England	June 2021	Section 9.2.2 | Para 196 / Table 9-2: As comments above, the mapped area of rock habitat at the seaward northern boundary of the MCZ is not considered, along with the areas of low resemblance stony reef at Stations EC-03 and EC-04, closer to shore.	See comments above regarding the area at the northern seaward boundary of the MCZ. As above, the video samples from EC_03 were classified as sublittoral coarse sediment with a low reefiness score because of 10-40% cobble which was patchy in distribution with other nearby samples showing only sediment. EC_04 was also classified as sublittoral coarse sediment. The area is not picked up as a mappable habitat class because the habitat for the sample is defined as sublittoral coarse sediment and therefore this is the class that is mapped. Even if the 'low reef' sample points were to be brought into the mapping process there would be too much confusion between the sublittoral coarse sediment (not reef) and sublittoral coarse sediment (low reef) as the samples are on the same sea bed type as identified by the geophysical data.

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			These areas are therefore considered in Table 9-3 within the extents of subtidal coarse sediment (A5.1).
Natural England	June 2021	Section 9.2.2.1 | Para 199: Natural England disagrees with the conclusion of this paragraph. Any loss of the broadscale sediment habitat types identified will be detrimental to the maintenance of these features of the MCZ.	Noted. The Applicant maintains that, given the overall low areal extent affected by long term habitat loss, the extent, distribution and structure of sediment features will largely be maintained across the CSCB MCZ following the installation of cable protection, if required.
Natural England	June 2021	Section 9.2.2.1 | Para 200: There is a typo here -'5m' should read '0.5m'	This has been amended to 0.5m.
Natural England	June 2021	Section 9.2.2.2 | Para 205: How is 'insignificant' defined here in terms of reduction in the extent of the biological attributes of the habitat features?	Section 9.2.2.2 has been updated.
Natural England	June 2021	Section 9.2.2.3 | Para 206: *It is concluded "The extent, distribution and structure of habitat features and presence and spatial distribution of associated biological communities will be largely maintained despite some localised long term habitat loss."* This is justified by the Applicant as "long lasting" by commitment to decommissioning. However, we disagree and question the additional justification drawing on spatial extent in comparison to the SoS conclusion of no significant effect for HP3 in setting a precedence as an acceptable threshold for spatial extent of habitat loss.	Noted. The reference to the Hornsea Project Three SoS decision was provided in order to contextualise and compare the extents assessed for that project and SEP and DEP however this has now been removed.

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Natural England	June 2021	Section 9.3.1 | Para 243: Whilst Natural England supports the commitment to decommissioning for removal of external cable protection, any intention to remove buried infrastructure, such as cables, would result in further disturbance / temporary habit loss.	Current decommissioning guidance (BEIS, 2019) states that full removal will be the default position unless there are strong reasons for any exception. Section 9.3.1 has been updated. The appropriate course of action would be confirmed at the time of decommissioning based on the latest available information and requirements.
Natural England	June 2021	Section 9.4 | Para 247-252: Please note that the ongoing impacts from O&G which are contributing to the site being in unfavourable condition should be considered further in the assessment, to provide an important context that should inform the conclusion drawn.	Section 9.4 has been updated to include reference to existing oil and gas assets in the area. As noted, these assets are considered part of the baseline and are screened out of the cumulative assessment. All pipelines traversing the CSCB MCZ are operational. No detail on the planned timescales or nature of decommissioning activities is available at the time of writing and therefore the potential impacts from decommissioning are not assessed.
Natural England	June 2021	Section 9.4.1 | Para 256: Following Natural England's advice through the Sea bed ETG (2020), can the Applicant provide further justification as to why it is still considered that the SOW and DOW will not have a cumulative effect on the conservation objectives of the CSCB MCZ.	SOW and DOW O&M activities are assessed in the cumulative assessment in Section 9.4. The assessments undertaken as part of the SOW and DOW O&M marine licence applications concluded that these activities would not have a significant effect on the conservation objectives of the CSCB MCZ, alone or cumulatively with other projects, plans and activities. As a worst case it is assessed that SOW, DOW or Hornsea Project Three O&M sea bed disturbance could have a cumulative impact on the MCZ features if full recovery of the sea bed and associated biological communities had not taken place between the activities of

Consultee	Date	Comment	Response
			these projects and construction of SEP and DEP. However, any resulting sea bed disturbance would be intermittent with impacts in small discrete locations. As described in **Section 9.1.1**, partial recovery due to colonisation of impacted areas by species representative of pre-existing biological communities should occur rapidly with full recovery in many areas occurring within two years and possibly less than four years in some coarse and mixed sediment areas (based on DOW post-construction monitoring). Therefore, any cumulative impacts would be temporary and short term and the assessment concludes that the conservation objective of maintaining the protected features of the CSCB MCZ in a favourable condition will not be hindered by cumulative temporary habitat loss and physical disturbance impacts. **Section 9.4.4.2** has been updated to consider the potential increases in suspended sediment concentration during SOW and DOW O&M activities.
Natural England	June 2021	**Section 9.4.2** | Para 261: Please be advised that Natural England considered the significance of the HP3 impacts to the MCZ features to be of a similar scale to that of the Wash and North Norfolk Coast SAC. Therefore, our view is that there is no distinction between the rationale for requiring compensation for impacts in the SAC to that of requiring MEEB in the MCZ.	Noted.
Natural England	June 2021	**Section 9.4.4.1** | Para 268:	Noted. Potential temporary habitat loss / physical disturbance and temporary increases in suspended

Consultee	Date	Comment	Response
		Natural England considers the O&M phase activities for DEP (and or) SEP, DOW, SOW and HP3 may result in habitat loss / physical disturbance. Thus, could potentially result in cumulative impacts thus hindering the conservation objectives of the CSCB MCZ. Any such mitigation to avoid or reduce impacts should be detailed within an O&M plan.	sediment concentration from Hornsea Project 3, SOW and DOW O&M activities has been assessed in **Section 9.4.4**. An **Outline Offshore Operations and Maintenance Plan (OOMP)** (Revision C) [REP3-058] has been submitted with the DCO application.
Natural England	June 2021	**Section 9.4.4.3** | Para 274: The cumulative long-term habitat loss is compared and assessed by the Applicant to the SoS decision for HP3. How is the Applicant assured the cumulative effect of SEP and DEP will be considered above the threshold for which the conservation objectives of the CSCB MCZ will be hindered? Please define 'very small' habitat loss. Natural England consider any habitat loss regardless of size, including long term and temporary, has the potential to hinder the conservation features of the CSCB MCZ.	The reference to the Hornsea Project Three SoS decision was provided in order to contextualise and compare the extents assessed for that project and SEP and DEP however this has now been removed.
Natural England	June 2021	**Section 10** | Para 276-278: Based on the above comments Natural England cannot agree with the Stage 1 conclusion that *"the conservation objectives 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 DEP and/or SEP in isolation, together or cumulatively with any other plan, project or activity."*	Noted.
TWT	June 2021	**Section 4.3.1** | Para 24: TWT welcome the early consideration of MEEB.	Noted.

Consultee	Date	Comment	Response
TWT	June 2021	Table 5-1: TWT agree with Natural England, that UXO impacts must be assessed as part of the MCZ assessment. It is TWTs position that permission for UXO clearance should be included within the DCO. UXO clearance has the potential to have an adverse effect and therefore mitigation or MEEB maybe required, which must be secured within the DCO to meet the requirements of the Marine and Coastal Access Act 2009. The precedent of including UXO clearance within a DCO has been set by East Anglia One North and East Anglia Two.	As agreed at the marine mammals ETG on the 20th July 2021, UXO clearance will be assessed through a separate marine licence post-consent once greater detail on the locations and extent of UXO to be cleared is known. However, as agreed at the Sea bed ETG on the 16h August 2021, an assessment of the potential impacts of UXO clearance on the MCZ features has been included in Appendix 3 [APP-080] for information purposes only.
TWT	June 2021	Section 6.4.1.2 | Para 60 / 61: The removal of any disused infrastructure will must not result in an adverse impacts. Please could this be confirmed.	The removal of any disused infrastructure (if required) would be within the footprint of the required works, the worst case extents of which are described in Table 6-2. The assessment of temporary habitat loss / disturbance (Section 9.1.1) concludes that the conservation objectives of maintaining the protected features of the CSCB MCZ in a favourable condition will not be hindered.
TWT	June 2021	Section 6.4.2 | Para 65: TWT welcome that a CSIMP will be produced and look forward to reviewing a draft.	The Outline CSCB MCZ CSIMP (Revision B) [document reference 9.7] has been submitted with the DCO application and was shared with the Sea bed ETG for pre-application consultation on the 3rd February 2022.
TWT	June 2021	Section 6.4.2 | Para 66: Is bundle lay possible with HVDC cables?	HVDC cables are not being considered within the project design envelope for the SEP and DEP export cables.
TWT	June 2021	Section | Para 63:	Natural England note above that a condition assessment for some features of the CSCB MCZ has been

Consultee	Date	Comment	Response
		Is site condition information likely to be available in the near future?	undertaken however at the time of writing information on this has not yet been released.
TWT	June 2021	**Section 9.1.2.1** | Para 165: Rock bags: TWT would like to see evidence to support the use of rock bags as the cable protection method which will a) cause minimal habitat loss and b) can be confidently decommissioned. Are alternatives available?	See **Appendix 9.7.3 Decommissioning Feasibility Study** [APP-294] of the **Outline CSCB MCZ CSIMP** (Revision B) [document reference 9.7].
TWT	June 2021	**Section 9.1.2.2** | Para 168: TWT would welcome further information on the pinning of cables to the sea bed as an alternative to cable protection. We would like to explore this as an option alongside an anchoring and fishing exclusion zone to ensure the protection of the cable. TWT believes that Lynn and Lincs offshore wind farms have non-buried cables with marker buoys to identify the location to other sea users.	Unprotected surface laid cables, including pinning to the sea bed, is no longer included in the project design envelope. This is primarily due to snagging concerns with fishing vessels, as well as the additional disturbance to fishing activity through the presence of surface marker buoys. The Applicant does not have the necessary authority to implement anchoring and fishing exclusion zones and this option is understood to be not supported by the MMO, Natural England or EIFCA.
TWT	June 2021	**Section 9.2.2** | Para 191-197: Long term habitat loss (alone and in-combination): We welcome that Equinor has recognised that cable protection will cause long term habitat loss. However, TWT do not agree with the conclusion that long term habitat loss will not hinder the achievement of the conservation objectives for Cromer Shoal Chalk Beds MCZ.	Noted.
TWT	June 2021	We do not think it is reasonable to place such emphasis on the extent of loss in the overall assessment summary. Habitat extent	Noted. The Applicant has submitted **Appendix 1 In-Principle Cromer Shoal Chalk Beds (CSCB) Marine**

Consultee	Date	Comment	Response
		loss from cable protection for Hornsea Three was less than 1% for The Wash and North Norfolk SAC (0.09% of the subtidal sandbank feature)[1] and no adverse effect could not be ruled out. To ensure a coherent network of Marine Protected Areas (MPAs), SACs and MCZs must be treated the same and therefore the conclusions by the Secretary of State with regards to long term habitat loss from cable protection must be applied to this project.	**Conservation Zone (MCZ) Measures of Equivalent Environmental Benefit (MEEB) Plan** (Revision C) [REP2-020] which, in the event they are deemed to be required by the SoS, will be taken forward by the Applicant. It should be noted however that with regards to the Hornsea Project Three CSCB MCZ assessment (RPS, 2020), the Secretary of State was satisfied that the lasting or permanent loss of up to 0.016% of the subtidal sand broadscale habitat feature within the CSCB MCZ (or 0.0009% of the total area of the MCZ) due to placement of offshore export cable protection would not lead to a significant impact due to the small proportion of the site that will be impacted and the long-term but temporary loss to the extent and distribution of the feature (BEIS, 2020). Although the Applicant notes that this would not necessarily apply to SEP and DEP and that there is no information available on the threshold at which impacts are likely to be significant.
TWT	June 2021	The conclusion for the SAC states that habitats subjected to cable protection: • will experience the effects of habitat loss, habitat modification and changes in epifauna communities	1. Noted. The sensitivities of biological communities to the installation of external cable protection is considered within the assessment in line with Natural England's AoO. 2. See **Appendix 3 Decommissioning Feasibility** [APP-294] of the **Outline CSCB MCZ CSIMP** (Revision B) [document reference 9.7]. 3. Further detail on the recovery of the benthic and physical processes environment following cable installation at SOW and DOW is provided in **Section**

Consultee	Date	Comment	Response
		• As the cable protection will be in place for 35 years, this is considered a long-term effect[1] It is TWTs view that the hindering of the conservation objectives for the MCZ cannot be ruled out for the following reasons: 1. It is important to take into account Natural England advice as outlined in paragraph 191, that the presence and spatial distribution of biological communities, and the species composition of component communities, may be vulnerable to the installation of any infrastructure that is likely to result in a change to the nature or extent of the feature (for example the addition of rock armouring to protect cables or pipelines). **Potentially having a significant impact on the attribute and triggering a 'recover' target.** This combined with Natural England advice outlined in paragraph 190 is of serious concern to TWT, especially in-combination with the HO3 cable alongside operation and maintenance activities from the existing Sheringham and Dudgeon offshore wind farms. 2. We do not have confidence that rock bags can be decommissioned. We would welcome further evidence to increase our confidence. 3. We are not confident on the recovery of the feature following decommissioning. We would welcome further evidence to increase our confidence.	9.1.1. Whilst this is not a direct comparison to recovery following removal of any external cable protection installed (since no external cable protection was required at SOW and DOW), it is considered to provide a useful proxy for determining recoverability. 4. Unprotected surface laid cables, including pinning to the sea bed, is no longer included in the project design envelope. This is primarily due to snagging concerns with fishing vessels, as well as the additional disturbance to fishing activity through the presence of surface marker buoys. The Applicant does not have the necessary authority to implement anchoring and fishing exclusion zones and this option is understood to be not supported by the MMO, Natural England or EIFCA. 5. Noted

[1] BEIS (2020). Hornsea Three - Secretary of State Decision Letter https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010080/EN010080-003265-EN010080%20Hornsea%20Three%20-%20Secretary%20of%20State%20Decision%20Letter.pdf. [Accessed 20/08/2022]

Consultee	Date	Comment	Response
		4. Alternatives have not been fully explored. We would welcome further information on cable pinning alongside an anchoring and exclusion zone and the viability of this as an option. In addition, the BEIS Offshore Transmission Network Review[2] is considering early opportunities for coordination, which we encourage Equinor to explore. 5. The scale of grid and offshore wind farm development planned to meet net zero by 2050 will put the MPA network under further pressure. Therefore, all efforts should be made now to minimise impacts on individual MPAs to ensure a resilient and healthy MPA network. This will also contribute to the achievement of Good Environmental Status (GES) as part of the UK Marine Strategy. Please note that the UK is currently failing to achieve GES.	
TWT	June 2021	Due to the above points, the precautionary approach must be employed. A stage 2 assessment must be undertaken and Measures of Equivalent Environmental Benefit (MEEB) provided to ensure that Cromer Shoal Chalk Beds MCZ will not be subject to decline. Decision making which would result in decline would be contrary to the conservation objectives for the site and Section 125 and 126 of the Marine and Coastal Access Act 2009. In addition, this would also mean that UK would not meet the requirements under Section 123 of the Marine and Coastal Access Act 2009 and commitment under OSPAR to achieve an ecological	See response to point 1 in above row.

[2] UK Government (2022). Offshore transmission network review. Available at: https://www.gov.uk/government/groups/offshore-transmission-network-review [Accessed 20/08/2022]

[redacted]

Consultee	Date	Comment	Response
		coherent Marine Protected Area network. This would also be contrary to objective 8 of the East Marine Plan: "To support the objectives of Marine Protected Areas (and other designated sites around the coast that overlap, or are adjacent to the East marine plan areas), **individually and as part of an ecologically coherent network.**" The provision of MEEB would also be in line with Objective 6, 7 and 8 and Policy BIO1 and BIO2 of the East Marine Plan. We welcome that Equinor has consulted the ETG at an early stage on MEEB and we look forward to continuing to explore options. TWT will provide separate comments on the in-principle MEEB document, which will make reference to governance and monitoring requirements.	
Sea bed ETG 4 16th August 2021			
Natural England, MMO, EIFCA	August 2021	The Sea bed ETG agreed that sea bed disturbance from UXO detonation to be included in the Cromer Shoal Chalk Beds MCZ assessment, following the same approach and assumptions as adopted for the marine mammals assessment for consistency.	An assessment of sea bed disturbance impacts from UXO clearance is provided in **Appendix 3** [APP-080]
Natural England, MMO, EIFCA	August 2021	The Sea bed ETG agreed that only SOW and DOW operation impacts to be included in the MCZ cumulative assessment. It is not appropriate to include SOW and DOW construction impacts however detail from SOW and DOW monitoring to be considered as appropriate.	SOW and DOW operation impacts have been screened in and assessed in the cumulative assessment (**Section 9.4**). Reference to SOW and DOW monitoring results is provided in **Section 9.1.1**.

6 Project Description

43. This project description provides further details about the key parameters and activities that will be undertaken during the construction, operation and decommissioning of SEP and DEP and focuses on information of relevance to MCZA. Project design development / refinement has been ongoing throughout the environmental impact assessment (EIA) process and will continue through the pre-construction phase. Therefore, the description of SEP and DEP provided here is indicative at this stage and is designed to provide context for the wider document. A more detailed description is available in ES **Chapter 4 Project Description** (Revision C) [REP5-021].

6.1 Development Scenarios

44. The Applicant is seeking to coordinate the development of SEP and DEP as far as possible. The preferred option is a development scenario with an integrated transmission system, providing transmission infrastructure which serves both of the wind farms, where both Projects are built concurrently. However, given the different commercial ownerships of each Project, alternative development scenarios such as a separated grid option (i.e. transmission infrastructure which allows each Project to transmit electricity entirely separately) will allow SEP and DEP to be constructed in a phased approach, if necessary. Therefore, the DCO application seeks to consent a range of development scenarios in the same overall corridors to allow for separate development if required, and to accommodate either sequential or concurrent build of the two Projects.

45. Reasons for the requirement to retain separate and phased (sequential) development scenarios alongside more coordinated approaches are further described in the **Scenarios Statement** [APP-314].

46. The range of development scenarios considered 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.

47. Whilst SEP and DEP are the subject of a single DCO application (with a combined Environmental Impact Assessment (EIA) process and associated submissions), the assessment considers both Projects being developed in isolation, sequentially and concurrently, so that mitigation is specific to each development scenario.

48. Under each scenario where SEP and DEP are both constructed it is possible that the electrical infrastructure could be integrated as described above which would offer benefits to the operation of the electrical infrastructure system.

49. An integrated transmission system would also offer the opportunity to reduce from two OSPs (one for SEP, one for DEP) to a single OSP serving both wind farms (located in SEP).

50. Each of the development scenarios offer a range of benefits, with the preferred option (integrated transmission system built concurrently) particularly benefitting the planning and construction of the Projects, being likely to reduce the overall environmental impact and disruption to local communities, and responding to concerns regarding the lack of a holistic approach to offshore wind development in general. For example, the preferred option would only require one haul road for construction activities, half the number of work fronts, a smaller onshore substation and only one OSP.

6.2 Offshore Scheme Summary

51. SEP and DEP consist of two extension assets and thus Agreement for Lease areas. The DEP wind farm site is divided into two array areas – DEP North array area and DEP South array area.

52. DEP will consist of between 17 and 30 wind turbines, each having a rated capacity of between 14MW and 26MW and therefore with a total export capacity of up to 448MW. SEP will consist of between 13 and 23 wind turbines, each having a rated capacity of between 14MW and 26MW and therefore with a total export capacity of up to 338MW. Taken together, there will be between 30 and 56 wind turbines in total, with a total generating capacity of up to 786MW. The key elements of each project are summarised in **Table 6-1**.

Table 6-1: SEP and DEP Overview

Parameter	Details		
	DEP	SEP	Combined
Lease period (years)	50	50	50
Indicative construction duration (years) (excluding landfall works)	2	2	4 (max. gap of 4 years between SEP and DEP, start to start)
Anticipated design life (years)	40	40	40
Number of wind turbines	17-30	13-23	30-53
Wind farm site area (array) (km^2)	114.75	97.0	211.75
Closest point from wind farm site to coast (km)	15.8	26.5	N/A
Length of export cable SEP to landfall (per cable) (km)	N/A	40	N/A

Parameter	Details		
	DEP	SEP	Combined
Length of export cable DEP to landfall[3] (per cable) (km)	62	n/a	62
Approximate length of export cable within the MCZ	11km	11km	22km
Maximum number of export cables and trenches	1 & 1	1 & 1	2 & 2
Maximum total length of all interlink cables[4] (km)	N/A	N/A	154
Maximum infield cable length (not incl. interlink cables) (km)	135	90	225
Wind turbine foundation type options	• Piled monopile; • Suction bucket monopile; • Piled jacket; • Suction bucket jacket; and • Gravity base structure (GBS).		
Maximum number of OSPs	1	1	2
OSP foundation type options	Piled jacket; or Suction bucket jacket.		

53. Depending on the development scenario, the wind farm sites will be connected to one another via interlink cables, with either a single OSP in the SEP wind farm site serving both SEP and DEP, or one OSP in the SEP wind farm site and a second in the DEP North array area. An offshore export cable corridor will link the wind farm site/s with the cable landfall at Weybourne. An onshore cable corridor will link the landfall with the grid connection point at the existing Norwich Main substation, via a new High Voltage Alternating Current (HVAC) onshore substation. An HVAC transmission system will be used for the transmission of the power from the wind farm site/s to the onshore substation.

54. The offshore export cable/s make landfall at Weybourne, where they will be connected to the onshore cables in transition joint bays, having been installed under the intertidal zone by Horizontal Directional Drilling (HDD). The SEP and DEP

[3] Applies either to a DEP in isolation development scenario, or for SEP and DEP with a separate OSP in the DEP North array area

[4] Applies to the scenario with 1 OSP in the SEP wind farm site and assuming only the DEP North array area is developed – see **Section 4.4.7.2** for further details

offshore components of relevance to the MCZA are the offshore export cables and the subtidal HDD exit point, for which further details are provided below.

6.3 Offshore Export Cables

55. There will be up to two HVAC offshore export cables, with each forming a circuit consisting of a 3-core power cable with an integrated fibreoptic cable. The power cable voltage will be between 220kV and 230kV, with an indicative external cable diameter of 235mm to 300mm.

56. Each offshore export cable will be installed in a separate trench with a spacing of up to 100m between the cables, where two export cables are installed in parallel. For the purpose of the DCO application and environmental assessment, an offshore export cable corridor has been defined with a temporary works area either side in order to encompass both cables and the adjacent area of sea bed that may be subject to temporary works, such as anchoring or the use of jack-up vessels. The offshore export cable corridor provides space for the installation works and any future operation and maintenance activities such as cable reburial or repairs. The offshore export cable corridor is up to approximately 2,500m wide but funnels out to up to approximately 3,200m on approach to the landfall and through the CSCB MCZ. However, the area within which the export cables will be installed is up to 1,000m wide, funnelling out to approximately 1,700m wide on approach to the landfall and through the CSCB MCZ. The greater width of offshore export cable corridor on approach to landfall is designed to provide greater flexibility in the detailed routeing/micro-siting of the export cable/s at the pre-construction stage.

57. There is no planned jointing of cables along the export cable route as the required length of cable can be manufactured without the need for offshore joints and can be loaded onboard several installation vessels in the market with sufficient cable loading capacity.

6.4 Cable Installation Methods

6.4.1 Pre-lay works

58. Pre-construction surveys, UXO clearance and boulder clearance (where required) will be undertaken.

6.4.1.1 Boulder clearance

59. Existing geophysical data suggests a relatively low number of boulders that could need to be relocated and it is likely that micro-siting around many of these will be possible, as the preferred option. However, clearance of an estimated 20 boulders for both SEP and DEP in the export cable corridor, each of up to 5m in diameter, has been included in the assessment in order to be conservative. All boulders would be relocated within the project boundaries by subsea grab and where possible to an area of sea bed with similar sediment type and avoiding any known sensitive habitats such as Annex I reef.

6.4.1.2 Removal of existing out of service cables

60. The disused Stratos telecommunications cable makes landfall near Weybourne and is inside the offshore export cable corridor as it approaches the landfall.

61. Where the cable routes cross any such cable, depending on the length of cable and burial depth, these will either be recovered from the sea bed by grapple hook or similar method prior to the start of installation, or cut at an appropriate distance either side of the cable and the free ends secured to the sea bed by clump weights.

6.4.1.3 Pre-lay grapnel run

62. Before cable-laying operations commence, it must be ensured that the route is free from obstructions such as discarded fishing gear, anchors or abandoned cables, wires and ropes that may be identified as part of the pre-construction surveys. A survey vessel would be used to undertake a PLGR to clear all such identified debris.

63. The width of sea bed disturbance along the PLGR is estimated to be up to 3m, which would be encompassed by the maximum footprint of cable installation works.

6.4.2 Cable Burial

64. The portion of the export cable corridor crossing the CSCB MCZ is approximately 11 km long. The purpose of cable burial is to ensure that the cables are protected from damage, either from other activities such as fishing and shipping, or from naturally occurring physical processes acting on the sea bed. Typical burial depth for SEP and DEP export cables, excluding in areas of sand waves, is expected to be up to 1m, but in challenging ground conditions the cables may not be buried at all. In this event, the installation of external cable protection would be considered.

65. Cable burial requirements for the purpose of the environmental assessment have been informed through the completion of a draft export cable burial risk assessment (Pace Geotechnics; 2020, 2021) which has been produced by the Applicant at an early stage to inform the design and environmental impact assessment processes on advice from relevant stakeholders. These studies have drawn on the data and lessons learnt from the cable burial process for the nearby SOW and DOW. The burial requirements will be finalised based on an assessment of the risks posed to the project in specific areas, following the completion of detailed pre-construction geotechnical and geophysical investigations and the subsequent finalisation of the cable burial risk assessment prior to the start of construction. Geotechnical investigations (vibrocores and cone penetrometer testing) were undertaken in 2021 across the wind farm sites and cable corridors to provide further data to help inform the cable installation campaign.

66. Specifically in relation to the export cable corridor, an **Outline CSCB MCZ CSIMP** (Revision B) [document reference 9.7] is submitted alongside the DCO application. The **Outline CSCB MCZ CSIMP** demonstrates how the proposed export cable installation works in the MCZ will be controlled by the DCO and explains the key assumptions that underpin the assessments, such as the amount of external cable protection that might be required (**Section 6.4.3**). Burial of the offshore export cables will be through any combination of ploughing, jetting or mechanical cutting.

The dimensions of the cable trenches (where applicable) and the overall sea bed footprint affected by the burial process will depend on the installation method.

67. The two export cables (assuming both SEP and DEP are developed) will be installed in separate installation campaigns as the installation vessel can only install one cable at a time (bundle lay is not possible with HVAC cables).

6.4.2.1 Ploughing

68. A plough uses a forward blade to cut through the sea bed, while burying the cable behind it. Ploughs can be used as a pre-trench tool (i.e. the cables are laid into a trench for later backfilling), a post-lay burial tool (i.e. the cable is first laid in position on the sea bed before being ploughed in) or, more commonly, as a simultaneous lay and burial tool. Ploughing tools can be pulled directly by a surface vessel or can be mounted onto self-propelled caterpillar tracked vehicles which run along the sea bed taking power from a surface vessel. The plough inserts the cable into the sea bed as it moves.

69. There are two types of plough: displacement and non-displacement. The difference is important in terms of understanding the effect on the sea bed. Displacement ploughs are typically used to pre-cut a trench in hard ground conditions, creating a trench that remains open for subsequent cable installation. A second backfilling pass of the plough is then undertaken to bury the cable.

70. By contrast, a non-displacement plough is designed to trench and bury the cable in a single pass, consequently causing less disturbance on the sea bed as part of either a simultaneous or post lay and burial process. The plough may be fitted with additional equipment to help improve performance in certain soils, for example water jets for burying in sand.

71. A non-displacement plough was used with good results for the installation and burial of the nearby DOW offshore export cables. In environmental terms, the year 1 post-construction monitoring report for Dudgeon (MMT, 2019) has demonstrated little temporary impact to the sea bed along the export cable route (see **Section 9.1.1**). This experience has been taken into account, alongside the outcomes of the SEP and DEP export cable burial risk assessment (Pace Geotechnics, 2020). As a result, should a plough be selected as the appropriate burial tool for SEP and DEP, a non-displacement type will be used to minimise environmental impact.

72. There may be locations where other methods to bury and protect the cable are required even where ploughing is used as the primary burial tool e.g. for any jointing loops, corner areas and where ploughing would be unable to negotiate obstacles or cable crossings.

6.4.2.2 Jetting

73. Jetting uses high powered jets of water to fluidise the sea bed sediments and lower the cable to the required depth. Jetting may be undertaken either as a separate operation on a cable that has been pre-laid on the sea bed, or by simultaneously laying and jetting. As with a plough, the jetting tool can either be pulled directly by a surface vessel or mounted onto self-propelled caterpillar tracked vehicles.

6.4.2.3 Mechanical cutting

74. This method involves the excavation of a trench (either by pre-trenching or simultaneously with cable laying), with the excavated material placed alongside. The cable is then laid in the trench and the sediment returned to the trench to complete the burial of the cable, either mechanically or by natural processes. This is a challenging and time consuming process (indicative burial rate is 30-80m/h) and while it will not be used as the primary burial method, it may be required for particular sections where the other methods are not feasible.

6.4.2.4 Width of Temporary Disturbance

75. The maximum temporary disturbance width for export cable installation would be up to 15m, encompassing the PLGR and trenching works.

6.4.2.5 HDD exit pit

76. The HDD exit pit will be located within the deep infilled channel cut through the chalk to 17m below the seabed, filled with Weybourne Channel deposits (see **Appendix 6.3 Sedimentary Processes in the Cromer Shoal Chalk Beds MCZ** [APP-182] - also visible on **Figure 8-2**), located across the export cable corridor from approximately 750m to 1.5km offshore. Given the depth of overlying sediment deposits there is no potential for exposure of chalk in this area (the depth of the excavation is only up to 1m). This gives further certainty that the subtidal chalk feature will be avoided. This commitment is secured through the **Outline CSCB MCZ CSIMP (Revision C)** (Revision B) [document reference 9.7]. At the HDD exit point in the subtidal there is a requirement for a 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. There are two options for the transition zone and both options need to be retained in the project envelope pending detailed design studies. The first option would involve the excavation of an initial trench up to 20m wide, 30m long and 1m deep (600m^3 excavated material, allowing for up to two cables), with a further transition zone trench of up to 50m in length, 1m wide and up to 1m deep per cable (100m^3 excavated material in total), at the end of which the burial tool would be able to take over the cable burial process. With this option there would be no requirement for external cable protection. This option also provides some flexibility should the Projects be restricted in terms of any potential reduction in navigable water depth (the water depth at this location is expected to be approximately 8.5m, although the exact location and corresponding depth will not be confirmed until prior to the start of construction).

77. Alternatively, rock bags or concrete half shells would be used for cable protection purposes in the offshore transition zone. This is considered to be the best option from an engineering perspective, provided that any restrictions on the reduction of water depth can be met (see **Section 6.4.3.1**). Rock bags have been used successfully by Equinor for the same purpose at DOW.

6.4.3 External Cable Protection

78. There are certain situations where the use of external cable protection may be required. These are:

- Where an adequate degree of protection has not been achieved from the burial process. This may be as a result of challenging ground conditions, or unforeseen circumstances with the burial process, such as breakdown of the burial tool/s.
- At cable crossings (there are no cable crossings required inside the CSCB MCZ)
- At the HDD exit pit.
- In the event that cables become unburied as a result of sea bed mobility during the operation of the wind farms or (where necessary) in the event of making a cable repair. If these works were required, they would be the subject of a separate marine licence application and therefore are not included in the project design envelope.

79. In all cases, the amount of external cable protection will be minimised as far as is possible. It should be noted that none has been used on either of the existing SOW and DOW export cable corridors, with the exception of the HDD exit location at DOW. At SOW, where satisfactory burial depth of the export cables was not achieved in the first instance, remedial work was performed by additional passes of the trenching tools. Ploughing performed on the DOW export cables was considered to be satisfactory without any remedial work. The sea bed footprints of external cable protection requirements for SEP and DEP are summarised below and in **Table 6-2**.

80. The use of external cable protection creates a footprint on the sea bed for the lifetime of SEP and DEP, dependent on the subsequent need and/or ability to remove the cable protection on decommissioning (see below). In addition to minimising the amount of external cable protection within the offshore order limits, given the sensitivity of the CSCB MCZ, the allowance for external protection within the MCZ boundaries has been further restricted by the Applicant as follows:

- For unburied cables, no more than 100m of external cable protection per export cable, up to 6m in width (i.e. a sea bed footprint of 600m^2 per export cable totalling 1,200m^2 for a maximum of 2 cables), and up to 0.5m in height.
- At the HDD exit pit transition zone, no more than 100m of external cable protection per export cable, up to 3m in width (i.e. a sea bed footprint of 300m^2 per export cable totalling 600m^2 for a maximum of 2 cables).
- No use of loose rock type systems.

81. All external cable protection used within the CSCB MCZ will be designed to be removable on decommissioning, although the requirement for removal will be agreed with stakeholders and regulators at the time. Details 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**.

6.4.3.1 HDD exit pit cable protection

82. Where the offshore export cables exit onto the sea bed from the HDD at the landfall, 100m of cable protection may be placed in the transition zone along each of the

cables i.e. a total length of 200m for both cables, from the HDD duct sections on the sea bed to the start position for cable burial, as described above in **Section 6.4.2.5**.

83. The cable protection would likely be in the form of removable 8 tonne rock bags or concrete half shells. Rock bags would be up to 3m wide and 0.8m high (accounting for the cables underneath), although some settling into the sea bed after installation would be expected to reduce this over time. The sea bed footprint of the installed rock bags would therefore be up to 600m^2, for both cables combined. Loose rock type systems will not be used in order to facilitate the possibility of removal on decommissioning.

84. It is possible that external cable protection systems may be available on the market that are manufactured from non-plastic material and would be recoverable where necessary after the lifetime of SEP and DEP. Selection of the appropriate system for use at SEP and DEP will be completed at the pre-construction stage once the requirements are better understood.

6.5 Offshore Construction Programme

85. A high-level indicative construction programme including the offshore works is presented in **Plate 4-23** and **Plate 4-24** of **Chapter 4 Project Description** (Revision C) [REP5-021]. The earliest any construction works would start is assumed to be 2025, however there would be a two-year period of onshore construction prior to the start of offshore construction. Offshore construction works would require up to two years per Project (excluding pre-construction activities such as surveys), assuming SEP and DEP were built at different times. If built at the same time, offshore construction could be completed in two years. Accounting for the development scenarios described in **Section 6.1**, there could be a gap of up to three years between the completion of offshore construction works on the first Project and the start of offshore construction works on the second Project.

86. It should be noted that the construction programme is dependent on numerous factors including consent timeframes and funding mechanisms. The final design of SEP and DEP (including for example which development scenario is taken forward, the number and type of turbines, OSP/s, cables, etc.) will also affect the construction programme, as well as weather conditions once construction starts. As such, details of the construction programme are indicative at this stage in order to provide a reasonable and realistic basis for undertaking the environmental assessments.

87. Offshore (seaward of mean low water) working hours during construction are assumed to be 24/7.

6.6 Worst Case Scenario

88. The final design of SEP and DEP will be confirmed through detailed engineering design studies that will be undertaken post-consent to enable the commencement of construction. In order to provide a precautionary but robust impact assessment at this stage of the development process, realistic worst case scenarios have been defined in terms of the potential effects that may arise. This approach to EIA, referred to as the Rochdale Envelope, is common practice for developments of this nature, as set out in Planning Inspectorate Advice Note Nine (2018). The Rochdale Envelope for a project outlines the realistic worst case scenario for each individual

impact, so that it can be safely assumed that all lesser options will have less impact. Further details are provided in **Chapter 5 EIA Methodology** [APP-091] of the ES.

89. The realistic worst case scenarios for sea bed disturbance and habitat loss, used for Stage 1 assessment are summarised in **Table 6-2**. These are based on the project parameters described in **Chapter 4 Project Description (Revision C)** [REP5-021] of the ES which provides further details regarding specific activities and their durations.

Table 6-2: Worst Case Scenario for Sea Bed Disturbance, Sediment Suspension and Redeposition, and Habitat Loss within the Cromer Shoal Chalk Beds MCZ

Impact	SEP or DEP in Isolation	SEP and DEP	Notes and Rationale
Construction			
Impact 1: Temporary habitat loss / physical disturbance	**Sea bed Preparation** Boulder clearance: assumes 10 boulders to be cleared within the DEP export cable corridor = **392.7m²** **Export Cable Installation** Length of export cable within the MCZ = 10,996.6m x up to 15m disturbance width from the jetting tool = **164,949m²** **Temporary Moorings** Export cable installation vessel anchoring = **660m²** **HDD Exit Point** • Initial trench (600m²) • Transition zone (50m²) • Jack up footprint (128m²) • Deposited material on sea bed (200m²)	**Sea bed Preparation** Assumes 20 boulders to be cleared within the SEP & DEP export cable corridor = **785.40m²** **Export Cable Installation** Length of export cable within the MCZ = 21,993.3m x up to 15m disturbance width from the jetting tool = **329,899.5m²** **Temporary Moorings** Export cable installation vessel anchoring = **1,320m²** **HDD Exit Point** • Initial trench (600m²) • Transition zone (100m²) • Jack up footprint (256m²) • Deposited material on sea bed (400m²)	Boulders that present an obstacle to installation of infrastructure will be confirmed by the pre-construction surveys. Calculations assume boulders of 5m diameter and an equivalent disturbance footprint at the origin boulder location and at the location to which it is moved. Pre-lay Grapnel Run (PLGR) footprint is within the footprint of cable installation, therefore a separate footprint has not been provided for PLGR as a part of sea bed preparation. The worst case scenario for cable installation is jetting. Horizontal Directional Drilling (HDD) beneath intertidal zone with offshore exit point approximately 1,000m offshore. For the SEP and DEP scenario, the initial trench assumes both export cables are within the same initial trench, meaning the area of disturbance is the same as SEP or DEP in isolation scenarios. However, for the transition zone it assumes two

Impact	SEP or DEP in Isolation	SEP and DEP	Notes and Rationale
		Total HDD exit point disturbance = **1,356m^2**	trenches therefore the area of disturbance is double SEP or DEP in isolation scenarios.
	Total disturbance in the MCZ Worst case scenario total temporary disturbance footprint for SEP in isolation in the CSCB MCZ due to cable installation = **0.167km^2**	**Total disturbance in the MCZ** Worst case scenario total temporary disturbance footprint for SEP and DEP in the CSCB MCZ due to cable installation = **0.333km^2**	
Impact 2: Temporary increases in suspended sediment concentrations (SSC) and deposition	**Export cable sediment displacement volume** Export cable length within MCZ as above for Impact 1 x 1m burial depth x 1m width of displaced sediment with a v-shaped trench = **5,498.3m^3** **HDD exit** HDD exit initial trench and transition zone trench displaced sediment = **650m^3**	**Export cable sediment displacement volume** Export cable length within MCZ as above for Impact 1 x 1m burial depth x 1m width of displaced sediment with a v-shaped trench = **10,996.7m^3** **HDD exit** HDD exit initial trench and transition zone trench displaced sediment = **650m^3**	The worst case scenario represents the greatest potential for increased SSC across the study area as a result of changes to physical processes which could result in impacts on benthic ecology receptors. The worst case scenario for increased SSC during the construction period assumes jetting for export cable installation.
	Total increases in SSC in the MCZ	**Total increases in SSC in the MCZ**	

Impact	SEP or DEP in Isolation	SEP and DEP	Notes and Rationale
	Worst case scenario for total temporary increases in SSC for SEP in isolation in the CSCB MCZ due to export cable installation= **6148.33m^3**	Worst case scenario for total temporary increases in SSC for SEP and DEP in the CSCB MCZ due to export cable installation= **11,646.7m^3**	
Impact 3: Re-mobilisation of contaminated sediments	See Impact 2 above	See Impact 2 above	Mobilisation of any sediment-bound contaminants.
Operation			
Impact 1: Temporary habitat loss / disturbance	**Cable repair replacement and reburial** • Disturbance footprint per 10 year period = **1,500m^2** • Disturbance footprint for the operational lifetime (40 years) = **6,000m^2**	**Cable repair replacement and reburial** • Disturbance footprint per 10 year period = **3,600m^2** • Disturbance footprint for the operational lifetime (40 years) = **14,400m^2**	Disturbance is shown on average per 10 year period, however maintenance could vary across years during the operational stage. Extents assume that all the estimated cable repair, replacement and reburial activities for the offshore export cables occur inside the MCZ which is extremely unlikely. An approximate total disturbance is also shown for the operational lifetime, which is expected to be 40 years. Repair / replacement estimates assume 400m per cable pair within the MCZ per 10 year period, with a disturbance width of 3m. If reburial is required, this would be for up to 100m per cable pair per 10 year period with a disturbance width of 3m within the CSCB MCZ.

Impact	SEP or DEP in Isolation	SEP and DEP	Notes and Rationale
			For SEP and DEP, total repair and reburial footprint per 10 year period = 2,400m^2 + 1,200m^2 = 3,600m^2
Impact 2: Long term habitat loss	**Cable protection** • HDD exit transition zone (100m x 3m) = **300m^2** • External cable protection (100m x 6m) = **600m^2**	**Cable protection** • HDD exit transition zone (2 cables) = **600m^2** • External cable protection (2 cables) = **1,200m^2**	The worst case scenario assumes cable protection will be removed at decommissioning therefore the impact of habitat loss is long lasting rather than permanent habitat loss.
	Total long term habitat loss in the MCZ Worst case scenario total long term habitat loss footprint for SEP in isolation in the CSCB MCZ = **900m^2**	**Total long term habitat loss in the MCZ** Worst case scenario total long term habitat loss footprint for SEP and DEP in the CSCB MCZ = **1,800m^2**	
Impact 3: Increased SSCs	**Cable repair or replacement** • One export cable repair every 10 years, up to 800m = **800m^3** **Cable reburial** • Up to 200m of export cable subject to reburial works every 10 years, 1m width of sediment displacement with jetting and 1m maximum burial depth = **200m^3**.	**Cable repair or replacement** • One export cable repair every 10 years, up to 800m = **800m^3** **Cable reburial** • Up to 200m of export cable subject to reburial works every 10 years, 1m width of sediment displacement with jetting and 1m maximum burial depth = **400m^3**.	As a precautionary worst case it has been assumed that any export cable repair, replacement or reburial would be within the MCZ 1m width of sediment displacement with jetting and 1m maximum burial depth is assumed for export cable repair, replacement or reburial.

Impact	SEP or DEP in Isolation	SEP and DEP	Notes and Rationale
	Total = 10,000m^3 per 10 year period	**Total = 12,000m^3 per 10 year period**	
Impact 4: Effect on bedload sediment transport	See Operation Impact 2.	See Operation Impact 2.	The worst case scenario represents obstructions to bedload sediment transport caused by infrastructure on the sea bed, which is set out under long term habitat loss impact.
Impact 5: Invasive Species	**Construction vessels** Maximum number of construction vessels: **16** **O&M vessels** Maximum number of O&M vessels on site at any one time = **6** See also long term habitat loss for infrastructure that may be colonised.	**Construction vessels** Maximum number of construction vessels: **25** **O&M vessels** Maximum number of O&M vessels on site at any one time = **7** See also long term habitat loss for infrastructure that may be colonised.	For the purposes of this assessment, the risks of introduction and spread of INNS are assessed for the operational phase when INNS may become established. However, measures to minimise the risk of introduction apply to all project phases. Impacts from INNS may occur during and after the construction phase if INNS introduced by SEP and DEP activities establish on project infrastructure and in the surrounding marine environment. The risk of introducing INNS during construction is primarily related to vessel activities should vessels come from other marine bioregions. The worst case scenario represents construction and O&M vessels for the entire SEP and DEP site not just the offshore export cable within the MCZ. However, all vessels have the potential to transit through the MCZ.

Impact	SEP or DEP in Isolation	SEP and DEP	Notes and Rationale
Decommissioning			
Impacts 1 and 2: Temporary habitat loss / disturbance; increased SSC and deposition; and Long term habitat loss	No final decision has yet been made regarding the final decommissioning policy for the offshore project infrastructure. It is also recognised that legislation and industry best practice change over time. However, all cable protection within the MCZ will be removed at decommissioning. The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and will be agreed with the regulator. For the purposes of the worst case scenario, it is anticipated that the impacts will be no greater than those identified for the construction phase. Decommissioning arrangements will be detailed in a Decommissioning Programme, which will be drawn up and agreed with the Department for Business, Energy and Industrial Strategy (BEIS) prior to construction.		

6.7 Embedded Mitigation

90. This section outlines the embedded mitigation relevant to the impacts on benthic receptors in the CSCB MCZ which have been incorporated into the design of SEP and DEP (**Table 6-3**).

Table 6-3: Mitigation Measures

Parameter	Mitigation Measures
Site selection	The offshore cable corridor takes the shortest, most direct route possible from the SEP and DEP wind farm sites to landfall, whilst avoiding as many known sensitive benthic species and habitats as possible therefore reducing impacts to benthic and intertidal ecology. However, it has not been possible to avoid the CSCB MCZ (as detailed in ES **Chapter 3 Site Selection and Assessment of Alternatives** (Revision B) [APP-089]). Additionally, the offshore cable corridor has been sited to avoid cable crossings where possible and there are no cable crossings in the CSCB MCZ. Finally, the cable route being parallel to the existing DOW route increases confidence and certainty in the installation process (and consequently the predicted environmental effects of cable installation).
Landfall and HDD exit pit location	A long HDD will be used to install the export cables at the landfall, with the HDD exit point located approximately 1,000m offshore. This will reduce the extent of sea bed impacts in the CSCB MCZ and completely avoid direct impacts on subtidal chalk feature located close to the shore (**Section 8.2.2**). The HDD exit pit will be located within the deep infilled channel cut through the chalk to 17m below the seabed, filled with Weybourne Channel deposits (see **Appendix 6.3 Sedimentary Processes in the Cromer Shoal Chalk Beds MCZ** [APP-182] - visible on Figure 3.4), located across the export cable corridor from approximately 750m to 1.5km offshore. Given the depth of overlying sediment deposits there is no potential for exposure of chalk in this area (the depth of the excavation is only up to 1m). This gives further certainty that the subtidal chalk feature will be avoided. This commitment is secured through the **Outline CSCB MCZ CSIMP** (Revision B) [document reference 9.7].
Export Cable	The Applicant will make reasonable endeavours to bury offshore cables, minimising the requirement for external cable protection measures and thus minimising habitat loss impacts on benthic ecology receptors.
External cable protection	The allowance for external cable protection within the CSCB MCZ boundary is minimised through for example avoidance of hard substrate within the export cable corridor (see the **Outline CSCB MCZ CSIMP** (Revision B) [document reference 9.7]). As secured through the **Outline CSCB MCZ CSIMP** (Revision B) [document reference 9.7], all external cable protection used within the CSCB MCZ will be designed to be removable (i.e. no loose rock) with a commitment to remove, if required, at decommissioning.
Sediment disposal	All sea bed material arising from the CSCB MCZ during cable installation (namely at the HDD exit point) will be placed back within the MCZ at or close to the

Parameter	Mitigation Measures
	source, using an approach, to be agreed with the MMO in consultation with the relevant SNCB. Sediment would not be disposed of in or nearby known sensitive benthic habitats and where possible will be redeposited within areas of similar sediment type.
Invasive Non-Native Species	Use of best practice measures including appropriate vessel maintenance following International Convention for the Prevention of Pollution from Ships (MARPOL) Guidance will be used to minimise the potential for the spread of INNS.

7 Screening

91. The SEP and DEP MCZ Screening process has been undertaken in consultation with relevant stakeholders through the Sea bed ETG. The MCZA **Appendix 1 Screening Report** [APP-078] was issued to the Sea bed ETG for comment on 21st April 2020 and comments were received from Natural England on 4th June 2020 and from the MMO on 15th July 2020. The MCZA **Appendix 1 Screening Report**, as a ‘point in time’ document, is submitted for reference purposes only.

92. The CSCB MCZ is screened in for further assessment because the SEP and DEP offshore export cable corridor routes through the site. No other MCZs are screened in, primarily on account of their distance from SEP and DEP and the range of potential effects.

93. The MCZA screening assessment proposed that all of the CSCB MCZ protected features be screened into the Stage 1 Assessment subject to the results of the site benthic characterisation surveys. Further information on the results of the characterisation surveys is provided in **Section 8**. The benthic characterisation surveys show that one CSCB protected feature, ‘peat or clay exposures’, is absent from offshore export cable corridor within the MCZ. However, based on the potential for indirect impacts, all protected features are considered in the Stage 1 Assessment.

94. **Table 7-1** below identifies all of the pressures (derived from Natural England’s AoO) associated with SEP and DEP that have been screened into the Stage 1 Assessment, aligned with the relevant impact identified during EIA scoping.

95. It should be noted that since MCZA screening, the Applicant has committed to removal of any external cable protection from within the MCZ at the decommissioning stage, therefore habitat loss is considered long term / lasting rather than permanent, and is assessed during the operational stage only. Similarly, effects of external cable protection on bedload sediment transport are assessed during operation only.

Table 7-1: Summary of Pressures Screened in, and Relationship to Impacts Identified through EIA Scoping

Potential Pressure (Scoping)	Pressure Name (AoO)	Construction	Operation	Decommissioning	Cumulative
Temporary physical disturbance / temporary habitat loss	Abrasion/disturbance of the substrate on the surface of the sea bed	✓	✓	✓	✓
	Habitat structure changes - removal of substratum (extraction)	✓	✓	✓	✓
	Penetration and/or disturbance of the substratum below the surface of the sea bed, including abrasion	✓	✓	✓	✓
Long term / lasting habitat loss	Physical change (to another sea bed/sediment type)	×	✓	×	✓
Increased suspended sediment concentrations	Changes in suspended solids (water clarity)	✓	✓	✓	✓
	Smothering and siltation rate changes (Light)	✓	✓	✓	✓
Re-mobilisation of contaminated sediments	Introduction of other substances (solid, liquid or gas) Transition elements & organo-metal (e.g. TBT) contamination (There is no directly equivalent risk profiling of pressures (RPP). Advice on Operations for this pressure relates to contamination by other sources).	×	✓	×	✓
Effects on bedload sediment transport	Water flow (tidal current) changes, including sediment transport considerations	×	✓	x	✓
Invasive species	Introduction or spread of invasive non-indigenous species (INIS)	×	✓	✓	✓

8 Cromer Shoal Chalk Beds MCZ

96. The CSCB MCZ is located approximately 200m off the low water mark of the North Norfolk Coast projecting up to 10km offshore and extending from east of Weybourne to Happisburgh (**Figure 8-1**). The MCZ encloses an area of 321km^2. The MCZ protects important geological features including the best examples of subtidal chalk beds in the North Sea, as well as subtidal exposures of clay and peat (Natural England, 2023)

97. A large area of infralittoral rock extends for almost the entire length of the site from east to west, but is generally restricted to shallow inshore waters (up to 10m depth) (**Figure 8-1**). This wide area of hard, stable substrate provides a suitable habitat for attached and mobile epifauna among a site mostly dominated by gravel interspersed with fine sediments. Extending beyond this infralittoral rock into deeper water is a band of circalittoral rock with more epifauna and, as a result of less light penetration, a marked decrease in macroalgae (Green, 2015). Areas of infralittoral and circalittoral rock within the site are comprised of subtidal chalk, as well as other rock types. At the time the MCZ was designated, it was not possible to accurately differentiate between different types of rock by using geophysical data, therefore areas mapped as the subtidal chalk feature overlap with areas mapped as the circalittoral and infralittoral rock features across the site.

98. Subtidal chalk occurs quite close to the intertidal zone, but extends further offshore in the southeast portion of the site. Further offshore, beyond the chalk beds, the site is dominated by subtidal coarse sediments, with a thin band of subtidal mixed sediments running from east to west (**Figure 8-1**). To the northwest, the coarse sediments transition to finer material, with a mixture of subtidal mud and sand. Further offshore, along the outer border of the site, isolated outcrops of clay occur on the sea bed. However, it should be noted that this area of the southern North Sea is a dynamic environment with vast quantities of sediment constantly moved around the site by tides and currents (HR Wallingford *et al.* 2002), so these sediment distributions and rock exposures are subject to change. New areas of chalk may become exposed and others become covered by sediment when there are tidal surges or storms (JNCC, 2004).

99. The CSCB MCZ is designated for seven broadscale marine habitat features, two habitat features of conservation interest (FOCI) and one feature of geological interest, shown in **Table 8-1** along with the spatial extents as reported by the MCZ Verification Survey (Green, 2015). Whereas broadscale marine habitats represent a range of similar habitats and associated species grouped together, FOCI are specific habitats and species that are known to be threatened, rare or declining in our seas. Protecting examples of broadscale habitats across the Marine Protected Area network aims to ensure that the full range of marine biodiversity in our seas is conserved. FOCI species and habitats may be more sensitive to pressures and hence need targeted protection.

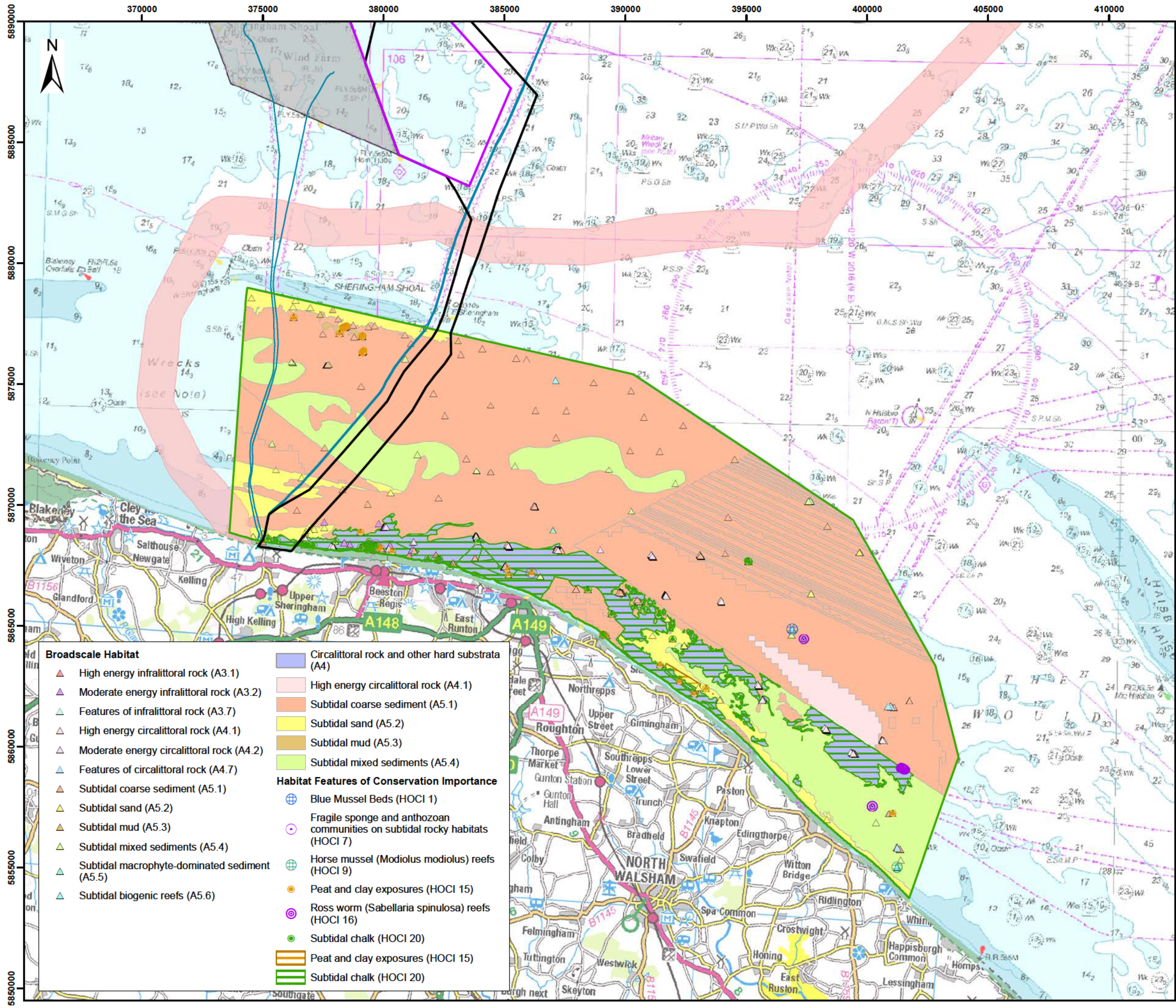
100. The CSCB MCZ broadscale marine habitat features were identified at, and are equivalent to, EUNIS Level 3 habitats (Green, 2015). The EUNIS code for each broadscale marine habitat feature is provided in **Table 8-1**.

Table 8-1: CSCB MCZ Designated Features (Natural England, 2020a; Green, 2015).

Protected feature	Type of feature	Spatial extents
High energy circalittoral rock (A4.1)	Broadscale marine habitat	30km^2 *
Moderate energy circalittoral rock (A4.2)	Broadscale marine habitat	
High energy infralittoral rock (A3.1)	Broadscale marine habitat	0km^2
Moderate energy infralittoral rock (A3.2)	Broadscale marine habitat	0km^2
Subtidal coarse sediment (A5.1)	Broadscale marine habitat	148km^2
Subtidal mixed sediments (A5.4)	Broadscale marine habitat	49km^2
Subtidal sand (A5.2)	Broadscale marine habitat	18km^2
Peat and clay exposures	Marine habitat (FOCI)	60 points records
Subtidal chalk	Marine habitat (FOCI)	30km^2
North Norfolk Coast Assemblage of Subtidal Sediment Features and Habitats (subtidal)	Feature of geological interest	Combination of extents above
* Insufficient evidence (Green, 2015) to refine the classification of the EUNIS biotope 'A4 Circalittoral rock'.		

101. It should be noted that Natural England's SACO for the subtidal chalk FOCI states that this feature is estimated to cover 190.43km^2 but the boundaries of the feature may become indistinct when covered by a thin layer of sediment (Natural England, 2023). Subtidal chalk mapped by the MCZ Verification Survey (Green, 2015) covered approximately 30km^2 (**Table 8-1**), the majority of which was found to occur in water <10m deep. It is suggested that the majority of the remainder of this is covered by subtidal coarse and mixed sediments (Natural England, 2023). It could be the case that these sediments have formed a veneer overlying a chalk bedrock, which may be become exposed in places.

102. This section provides a baseline description of the CSCB MCZ, its protected features and conservation objectives. This section has been informed by a number of data sources, described below.



Sheringham Shoal and Dudgeon Extension Projects

Figure 8-1

Cromer Shoal Chalk Beds MCZ Feature Map

Legend:

- Sheringham Shoal Offshore Wind Farm Extension Site
- Offshore Cable Corridors
- Existing Offshore Wind Farm Export Cable
- Existing Offshore Wind Farm
- Cromer Shoal Chalk Beds Marine Conservation Zone (MCZ)
- Hornsea P3 Corridor

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

Document No: PB8164-RHD-ZZ-OF-DR-Z-0173

Co-ordinate System: WGS 1984 UTM Zone 31N

0 5 10 km

0 2.5 5 Miles

A	26/04/2021	1:150,000	A3	AZ	ES	RS
REV	DATE	SCALE	SIZE	DRW	CHK	APR

Report:
Draft Information for Marine Conservation Zone (MCZ) Assessment Report

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8.1 SEP and DEP Surveys in the MCZ

103. In order to provide site specific and up to date information on which to base the impact assessment and MCZA, surveys have been completed to characterise the sea bed in the SEP and DEP offshore sites, including in the offshore export cable corridor inside the CSCB MCZ.

8.1.1.1 Project geophysical surveys

104. Site specific geophysical surveys (using a multibeam echosounder, side scan sonar sub-bottom profiler and magnetometer) were undertaken, in part to inform the design of benthic site characterisation surveys and to feed into the habitat mapping process. The surveys undertaken were:

- Geophysical survey of the offshore export cable corridor options, September to December 2019 (Gardline, 2020a); and
- Geophysical survey of the SEP and DEP wind farm sites and interconnector cable corridors, March to May 2020 (Gardline, 2020b).

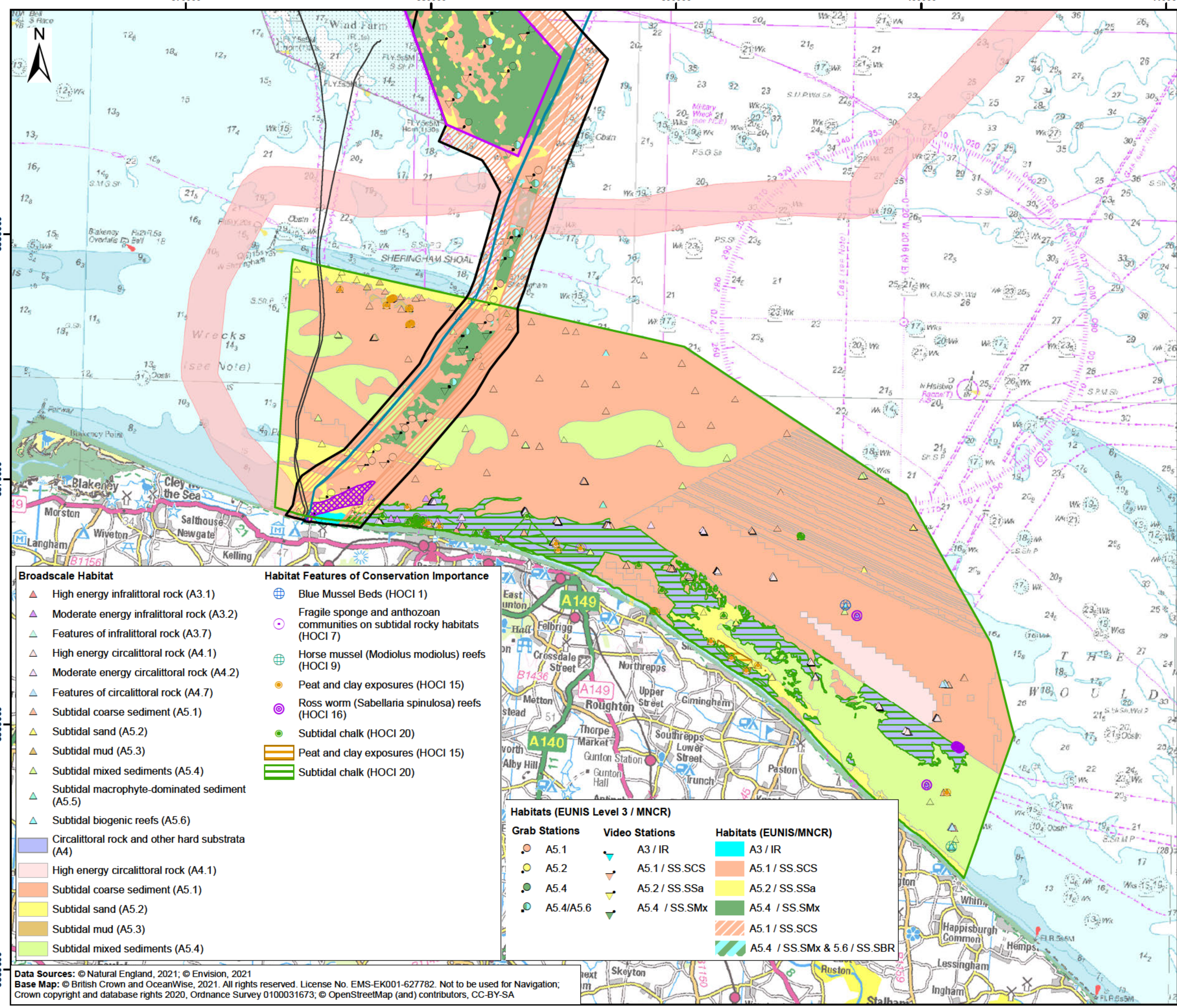
8.1.1.2 Projects benthic characterisation surveys

105. A benthic site characterisation survey was conducted, split into separate reports for SEP and DEP. The site characterisation reports are available in **Appendix 8.1 DEP Benthic Characterisation Report** [APP-184] and **Appendix 8.2 SEP Benthic Characterisation Report** [APP-184] of the ES.

106. The benthic characterisation survey was conducted in August 2020 and covered the SEP and DEP wind farm sites and the offshore cable corridors. The survey included 18 stations in the export cable corridor within the CSCB MCZ. The sampling consisted of drop down video and still photography at all stations, and grab sampling for macrofaunal and Particle Size Distribution (PSD) analysis at the majority of stations, some with triplicate grabs. At a subset of stations additional sediment grabs were taken for chemical analysis to determine levels of sediment contamination. The distribution of this sampling is illustrated in **Figure 8-2**.

8.1.1.3 Benthic habitat mapping

107. Benthic habitat maps have been produced for the SEP and DEP offshore sites, defining the distribution of habitats between survey sample stations, by combining the geophysical data sets and benthic sample data (grab and drop down video imagery) using geostatistical processing and spatial statistical analysis. A technical report summarising the benthic habitat mapping method and results is provided in **Appendix 8.5 SEP and DEP Habitat Mapping** [APP-188] of the ES. The spatial distribution of the EUNIS Level 3 main habitats (equivalent to Marine Habitat Classification for Britain and Ireland 'habitat complexes') identified in the offshore export cable corridor are presented in **Figure 8-2**.



Data Sources: © Natural England, 2021; © Envision, 2021

Sheringham Shoal and Dudgeon Extension Projects

Title:

Figure 8-2 - Cromer Shoal Chalk Beds MCZ Protected Features

Document: SStage 1 MCZA

Application Doc. no.: 5 66

Legend:

- Sheringham Shoal Extension Project Wind Farm Site
- Offshore Cable Corridors
- Marine Conservation Zone (MCZ)
- Offshore Temporary Work
- Existing Offshore Wind Farm
- Existing Offshore Wind Farm Export Cable
- Existing Sheringham Offshore Wind Farm Export Cable
- Hornsea P3 Corridor
- HDD Exit Location

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

0 2 4 6 8 10 km
0 2 4 6 Miles

Scale: 1:150,000 Scale at size: A3

Equinor Doc. no.: C282-RH-Z-GA-00120
RHDHV Doc. no.: PB8164-RHD-ZZ-OF-DR-Z-0205

REV	DATE	STATUS	DRW	CHK	APR
C	07/07/2023	Third Issue	SB	PM	AP
B	22/07/2022	Second Issue	GC	AP	AP
A	13/01/2022	First Issue	AZ	AP	AP

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8.2 Protected Features

8.2.1 Sediment Habitats

108. The MCZ feature map indicates that three broadscale marine sediment habitats are expected to occur within the SEP and DEP offshore export cable corridor. These are:

- Subtidal coarse sediment (A5.1)
- Subtidal sand (A5.2)
- Subtidal mixed sediments (A5.4)

8.2.1.1 Subtidal coarse sediment

109. The CSCB MCZ feature map indicates that subtidal coarse sediment comprises most of the area within the SEP and DEP offshore export cable corridor. This was confirmed by project-specific surveys (**Figure 8-2**). Some of the benthic characterisation survey stations in the area were classified as A5.13 Infralittoral coarse sediment (EUNIS Level 4) with the remainder only able to be identified as subtidal coarse sediment. None of the subtidal coarse sediment stations in the CSCB MCZ could be classified to the biotope level.

8.2.1.2 Subtidal sand

110. The CSCB MCZ feature map indicates that areas of subtidal sand are present in the offshore export cable corridor close to landfall but offshore of an area of circalittoral rock, and at the seaward boundary of the MCZ associated with the Sheringham Shoal sandbank feature (**Figure 8-1**). Project surveys confirmed the presence of subtidal sand habitats in these areas (**Figure 8-2**), including the biotope complex A5.23 Infralittoral fine sand and the biotope A5.233 *Nephtys cirrosa* and *Bathyporeia* spp. in infralittoral sand.

8.2.1.3 Subtidal mixed sediments

111. The band of subtidal mixed sediments running from east to west identified in the MCZ feature map (**Figure 8-1**) is confirmed to be present where it is within the SEP and DEP offshore export cable corridor. However, mixed sediment areas form a mosaic with subtidal coarse sediment areas for much of the offshore export cable corridor within the CSCB MCZ (**Figure 8-2**). There is generally a low percentage of fine material with a mean fraction of 1.7% for grab samples in the MCZ. However, there are some mismatches between biological communities and physical habitats recorded in the benthic sample data on which the habitats maps are based. This suggests there is sufficient fine material in some areas to support species associated with mixed sediment habitats. As such, some stations have been modified from subtidal coarse sediment habitat (A5.1) to subtidal mixed sediment (A5.4) habitat based on their biological community. Biological groupings often do not adhere to exact sediment classes and the two habitats could be considered to be variations of each other (Envision, 2021). In summary, it is difficult to delineate subtidal coarse and subtidal mixed sediment habitats in the offshore export cable corridor due to their similarity, with mixed sediment areas being close the coarse

sediment areas with a relatively low percentage of fines, but sufficient fine material to influence benthic communities.

112. Survey stations in these mixed sediment areas were classified as the biotope complex 'Infralittoral mixed sediment' (A5.43). Sediments primarily comprised sandy gravels with a variable mud content. The macrofaunal and epifaunal assemblages present at these stations were typical of mixed sediments with low to moderate levels of exposure to tide and wave action. The infaunal community showed similarities to the biotope '*Crepidula fornicata* with ascidians and anemones on infralittoral coarse mixed sediment' (A5.431) mixed with areas of the biotope '*Sabellaria spinulosa* on stable circalittoral mixed sediment' (A5.611).

8.2.2 Subtidal Rock

113. The MCZ feature map indicates that circalittoral rock and other hard substrata (A4) is expected to occur within the SEP and DEP offshore export cable corridor close to landfall, extending up to approximately 600m from shore. Within this area at least two broadscale marine rock habitats are thought to be present:

- High energy circalittoral rock (A4.1)
- Moderate energy circalittoral rock (A4.2)

114. The MCZ feature map also indicates that this subtidal rock feature also qualifies as the subtidal chalk FOCI.

8.2.2.1 Subtidal chalk

115. Subtidal chalk is listed as an Annex 1 Habitat under the Habitats Directive as a reef habitat, a priority habitat under UK Biodiversity Action Plan (BAP), and is included on the Natural Environment & Rural Communities (NERC) Act as a habitat of principal importance. However, it is not listed under the Wildlife and Countryside Act 1981 or on the OSPAR list of threatened or declining habitat.

116. A single video transect (EC_26) was completed by the SEP and DEP benthic characterisation survey in an area close to landfall identified as outcropping rock by the project-specific geophysical survey of the export cable corridor (Gardline, 2020a) and within the area on the MCZ feature map identified as subtidal chalk / circalittoral rock and other hard substrata (A4). Locations on the transect were classified to EUNIS level 2 only, as infralittoral rock (A3). It is likely that these are part of the subtidal chalk FOCI MCZ feature as well as moderate or high energy infralittoral rock. The area of 'A3 Infralittoral rock' delineated by project habitat mapping is also likely to include circalittoral rock (A4) (Envision, 2021). The spatial extent of the nearshore subtidal rock feature interpreted from SEP and DEP surveys aligns closely with the MCZ feature map (**Figure 8-2**).

117. The potential for new areas of chalk to become exposed when there are tidal surges or storms has been discussed through the Sea bed ETG. ES **Appendix 6.3 Sedimentary Processes in the Cromer Shoal Chalk Beds MCZ** [APP-182] assessed sediment transport within the MCZ. A layer of gravelly sand/sandy gravel is interpreted as a lag deposit on top of the chalk bedrock. The transport potential of this sediment layer is zero or very low. In areas characterised by Holocene sand (identified as subtidal sand in **Figure 8-2**) the surface of the sand unit is mobile

under existing tidal conditions, and so can erode, transport and deposit depending on the physical processes. The mobility of the Holocene sand is supported by the existence of megaripples across its surface in places. This indicates that there is a possibility that movement of this sediment may result in exposure or burial of the underlying geological units, including chalk.

118. Given the thickness of the Holocene sands (generally up to 3m where it occurs from 500m to 4.5km offshore, and up to 2m, locally to 6m, in the seaward 2km of the cable corridor inside the MCZ), it would only be possible for movement of the feather edges (where the sediment is thin and could all move), to generate new sea bed substrate, including the potential to expose previously buried chalk if present directly below the sand layer without a static gravelly sand/sandy gravel layer in between. There is a deep infilled channel cut through the chalk to -17m LAT filled with Weybourne Channel deposits (**Appendix 6.3** of the ES [APP-182]) located across the export cable corridor from approximately 750m to 1.5km offshore (Gardline, 2020a). As noted in **Section 6.4.2.5**, the offshore HDD exit location will be in this channel and therefore, given the depth of overlying sediment deposits there is no potential for exposure of chalk in this area.

119. Survey data indicates that areas where there is potential for subtidal chalk to be exposed are of very limited extent within the offshore export cable corridor, and it is unknown if any such exposures would meet the criteria to be classified as the subtidal chalk habitat FOCI (e.g. criteria provided by Natural England for the Hornsea Project Three (RPS, 2020), or how persistent they would be. Therefore the MCZA is based on the known locations of subtidal chalk restricted to the outcropping subtidal rock feature in the inshore area of the CSCB MCZ only.

8.2.3 Peat and Clay Exposures

120. Peat and clay exposures occur when strata composed of clay or peat break the surface sediment layers. Exposures may become covered by fine sediments, but are regularly uncovered again. These patches of alternative substrate provide suitable burrowing material for boring bivalves such as piddocks (bivalves that can bore into wood or soft rock). The shells of these borers provide a hard substrate for potential colonisation of algae and epifauna. The remaining burrows can provide a refuge for small crabs or anemones (Conner *et al.* 2004). Peat and clay exposures with piddocks is listed as a priority habitat under the UK BAP and may be component parts of habitats in Annex I of the Habitats Directive.

121. The CSCB rMCZ post-survey site report (Green, 2015) indicated that there are small isolated patches of exposed clay in the northwest of the site, within the transition zone between subtidal coarse sediment and sand. These patches of clay appear scattered, but regularly occur where the sea bed topography is uneven and discontinuous. These exposures have been confirmed by a dedicated survey of the chalk reef at two offshore locations in the northwest of the site, with a total surface area of 0.5km^2 (Cefas, 2016).

122. No peat or clay exposures were recorded by SEP and DEP benthic characterisation surveys within the part of the offshore export cable corridor inside the CSCB MCZ. The nearest record of a peat and clay exposure is 1.8km to the west of the export

cable corridor, in the north west corner of the MCZ, with another nearby record close to shore 1.9km from the export cable to the south east (**Figure 8-2**).

8.2.4 Summary

123. Direct sea bed impacts from SEP and DEP offshore export cable installation will only occur at, and offshore of, the HDD exit pits which will be located approximately 1,000m from the coastline. Therefore, direct impacts on the nearshore MCZ rock features will be completely avoided. **Table 8-2** summarises the CSCB MCZ features that, based on project survey information, may be directly impacted by SEP and DEP offshore export cable activities. Note that the potential for indirect impacts on other MCZ features are also assessed in the Stage 1 Assessment (**Section 9**).

Table 8-2: MCZ Protected Features that Spatially Coincide with the Export Cable Installation, Maintenance and Decommissioning Activities

Protected feature (EUNIS Code)	Possible direct impact
High energy circalittoral rock (A4.1)	×
Moderate energy circalittoral rock (A4.2)	×
High energy infralittoral rock (A3.1)	×
Moderate energy infralittoral rock (A3.2)	×
Subtidal coarse sediment (A5.1)	✓
Subtidal sand (A5.2)	✓
Subtidal mixed sediments (A5.4)	✓
Peat and clay exposures	×
Subtidal chalk	×
North Norfolk Coast assemblage of subtidal sediment features and habitats	✓

8.3 Conservation Objectives

124. The site's conservation objectives apply to the MCZ and its individual protected features. The CSCB MCZ conservation objective is that the protected habitats:

1. are maintained in favourable condition if they are already in favourable condition
2. be brought into favourable condition if they are not already in favourable condition

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

1. its extent is stable or increasing
2. 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

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

1. its extent, component elements and integrity are maintained
2. its structure and functioning are unimpaired

3. its surface remains sufficiently unobscured for the purposes of determining whether the conditions in paragraphs (1) and (2) are satisfied.

127. An updated condition assessment was released in May 2023 (Natural England, 2023).

8.3.1 Supplementary Advice on Conservation Objectives (SACOs)

128. Natural England has provided SACOs for the CSCB MCZ (Natural England, 2023). The SACOs provide further detail about the protected features' extent and distribution, structure, function and supporting processes. For these attributes, targets are provided and where possible quantified.

129. The implications of SEP and DEP on the specific attributes for the CSCB MCZ protected features has been used to inform the MCZA Stage 1 Assessment presented in this report.

9 Stage 1 Assessment

130. This section presents the MCZA Stage 1 Assessment of the effects of the construction, operation and decommissioning of SEP and DEP on the protected features of the CSCB MCZ. Each of the impacts and corresponding pressures (derived from Natural England's AoO) identified during MCZA Screening (**Appendix 1 Screening Report** [APP-078]) are discussed individually. The assessment of each impact has considered the effects on the attributes and targets of each protected feature as provided by Natural England's SACOs (Natural England, 2021). The attributes for each protected feature of the CSCB MCZ are listed in **Table 9-1** below, in the order they appear in Natural England's SACOs, along with signposts to the relevant sections of the Stage 1 Assessment where the assessment of that feature and attribute is provided. Attributes are categorised as either physical or biological to support the assessment, which first addresses impacts on the physical attributes of features, and then the biological attributes of broadscale habitat features and FOCI (which are largely dictated by physical attributes).

131. Following the assessment of each impact screened into the assessment in relation to each protected MCZ feature and corresponding attributes, an assessment is made as to whether the impact has the potential to hinder the achievement of the CSCB MCZ conservation objectives.

132. The Stage 1 Assessment assesses all scenarios, including SEP or DEP being developed in isolation or SEP and DEP both being developed. The SEP and DEP scenario represents the worst case scenario with regard to the offshore export cable, as there will be a larger sea bed footprint from the two offshore export cables which will pass through the CSCB MCZ, when compared to the one offshore export cable for the SEP or DEP in isolation scenarios.

133. Both direct and indirect impacts are considered during the Stage 1 Assessment. As stated in **Section 8.2.4** the only protected features which have the potential to be directly impacted by SEP and DEP are those found inside the offshore export cable corridor and seaward of the HDD exit point. These are:

- Subtidal coarse sediment (A5.1)
- Subtidal sand (A5.2)
- Subtidal mixed sediments (A5.4)
- North Norfolk Coast assemblage of subtidal sediment features and habitats

134. Natural England is in the process of developing Conservation Advice for the North Norfolk Coast Geological Feature of the CSCB MCZ and therefore habitat features are used as a proxy.

Table 9-1: Pressures Assessed in Relation to the Relevant Attributes during the CSCB MCZ Stage 1 Assessment. Grey - No Impact Pathway, Pink - Assessment Undertaken

MCZ Feature Attributes		Impacts									
Attribute type	Attribute	Construction				Operation				Decommissioning	
		Temporary habitat loss / physical disturbance	Increase SSC and deposition	Re-mobilisation of contaminated sediment	Temporary habitat loss / physical disturbance	Long term habitat loss	Increase SSC and deposition	Effects on bedload sediment transport	INNS	Temporary habitat loss / physical disturbance	Increase SSC and deposition
High energy circalittoral rock (A4.1), Moderate energy circalittoral rock (A4.2), High energy infralittoral rock (A3.1), Moderate energy infralittoral rock (A3.2), Subtidal chalk											
Biological	Distribution: presence and spatial distribution of biological communities	N/A	Section 9.1.2.2	N/A	N/A	N/A	Section 9.2.3	N/A	N/A	Section 9.3.1	Section 9.3.2
Physical	Extent and distribution	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Biological	Structure and function: presence and abundance of key structural and influential species	N/A	Section 9.1.2.2	N/A	N/A	N/A	Section 9.2.3	N/A	N/A	N/A	Section 9.3.2
Biological	Structure: non-native species and pathogens	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Section 9.2.5	N/A	N/A
Physical	Structure: physical structure of rocky substrate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Biological	Structure: species composition of component communities	N/A	Section 9.1.2.2	N/A	N/A	N/A	Section 9.2.3	N/A	N/A	N/A	Section 9.3.2
Physical	Supporting processes energy / exposure	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Supporting processes:	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

MCZ Feature Attributes		Impacts									
Attribute type	Attribute	Construction				Operation				Decommissioning	
		Temporary habitat loss / physical disturbance	Increase SSC and deposition	Re-mobilisation of contaminated sediment	Temporary habitat loss / physical disturbance	Long term habitat loss	Increase SSC and deposition	Effects on bedload sediment transport	INNS	Temporary habitat loss / physical disturbance	Increase SSC and deposition
	physico-chemical properties										
	Supporting processes: sedimentation rate	N/A	Section 9.1.2.1	N/A	N/A	N/A	Section 9.2.3	N/A	N/A	N/A	Section 9.3.2
	Supporting processes: water quality - contaminants	N/A	N/A	Section 9.1.3.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Supporting processes: water quality - dissolved oxygen	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Section 9.3.2
	Supporting processes: water quality - nutrients	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Supporting processes: water quality - turbidity	N/A	Section 9.1.2.1	N/A	N/A	N/A	Section 9.2.3	N/A	N/A	N/A	Section 9.3.2
Subtidal coarse sediment (A5.1), Subtidal sand (A5.2)' Subtidal mixed sediments (A5.4)											
Biological	Distribution: Presence and spatial distribution of biological communities	Section 9.1.1.2	Section 9.1.2.2	N/A	Section 9.2.1	Section 9.2.2.2	Section 9.2.3	Section 9.2.4.2	N/A	Section 9.3.1	Section 9.3.2
Physical	Extent and distribution	Section 9.1.1.1	Section 9.1.2.1	N/A	N/A	Section 9.2.2.1	Section 9.2.3	Section 9.2.4.1	N/A	N/A	Section 9.3.2
Biological	Structure and function: presence and abundance of	Section 9.1.1.2	Section 9.1.2.2	N/A	Section 9.2.1	Section 9.2.2.2	Section 9.2.3	Section 9.2.4.2	N/A	Section 9.3.1	Section 9.3.2

MCZ Feature Attributes		Impacts									
Attribute type	Attribute	Construction				Operation				Decommissioning	
		Temporary habitat loss / physical disturbance	Increase SSC and deposition	Re-mobilisation of contaminated sediment	Temporary habitat loss / physical disturbance	Long term habitat loss	Increase SSC and deposition	Effects on bedload sediment transport	INNS	Temporary habitat loss / physical disturbance	Increase SSC and deposition
	key structural and influential species										
Biological	Structure: non-native species and pathogens	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Section 9.2.5	N/A	N/A
Physical	Structure: sediment composition and distribution	Section 9.1.1.1	Section 9.1.2.1	N/A	N/A	Section 9.2.2.1	Section 9.2.3	N/A	N/A	Section 9.3.1	Section 9.3.2
Biological	Structure: species composition of component communities	Section 9.1.1.2	Section 9.1.2.2	N/A	Section 9.2.1	Section 9.2.2.2	Section 9.2.3	Section 9.2.4.2	N/A	Section 9.3.1	Section 9.3.2
Physical	Supporting processes: physico-chemical properties	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Supporting processes: sediment contaminants	N/A	N/A	Section 9.1.3.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Supporting processes: sediment movement and hydrodynamic regime	N/A	N/A	N/A	N/A	N/A	N/A	Section 9.2.4.1	N/A	N/A	Section 9.3.2
	Supporting processes: water quality - contaminants	N/A	N/A	Section 9.1.3.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A

MCZ Feature Attributes		Impacts									
Attribute type	Attribute	Construction				Operation				Decommissioning	
		Temporary habitat loss / physical disturbance	Increase SSC and deposition	Re-mobilisation of contaminated sediment	Temporary habitat loss / physical disturbance	Long term habitat loss	Increase SSC and deposition	Effects on bedload sediment transport	INNS	Temporary habitat loss / physical disturbance	Increase SSC and deposition
	Supporting processes: water quality - dissolved oxygen	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Section 9.3.1	Section 9.3.2
	Supporting processes: water quality - nutrients	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Supporting processes: water quality - turbidity	N/A	Section 9.1.2.1	N/A	N/A	N/A	Section 9.2.3	N/A	N/A	Section 9.3.1	Section 9.3.2
Peat and clay exposures											
Biological	Distribution: Presence and spatial distribution of biological communities	N/A	Section 9.1.2.2	N/A	N/A	N/A	Section 9.2.3	N/A	N/A	N/A	Section 9.3.2
Physical	Extent and distribution	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Biological	Structure and function: presence and abundance of key structural and influential species	N/A	Section 9.1.2.2	N/A	N/A	N/A	Section 9.2.3	N/A	N/A	N/A	Section 9.3.2
Biological	Structure: non-native species and pathogens	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Physical	Structure: sediment composition and distribution	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

MCZ Feature Attributes		Impacts									
Attribute type	Attribute	Construction				Operation				Decommissioning	
		Temporary habitat loss / physical disturbance	Increase SSC and deposition	Re-mobilisation of contaminated sediment	Temporary habitat loss / physical disturbance	Long term habitat loss	Increase SSC and deposition	Effects on bedload sediment transport	INNS	Temporary habitat loss / physical disturbance	Increase SSC and deposition
Biological	Structure: species composition of component communities	N/A	Section 9.1.2.2	N/A	N/A	N/A	Section 9.2.3	N/A	N/A	N/A	Section 9.3.2
Physical	Supporting processes: physico-chemical properties	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Supporting processes: sediment contaminants	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Supporting processes: sediment movement and hydrodynamic regime	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Section 9.3.2
	Supporting processes: water quality - contaminants	N/A	N/A	Section 9.1.3.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Supporting processes: water quality - dissolved oxygen	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Section 9.3.2
	Supporting processes: water quality - nutrients	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

MCZ Feature Attributes		Impacts									
Attribute type	Attribute	Construction				Operation				Decommissioning	
		Temporary habitat loss / physical disturbance	Increase SSC and deposition	Re-mobilisation of contaminated sediment	Temporary habitat loss / physical disturbance	Long term habitat loss	Increase SSC and deposition	Effects on bedload sediment transport	INNS	Temporary habitat loss / physical disturbance	Increase SSC and deposition
	Supporting processes: water quality - turbidity	N/A	Section 9.1.2.1	N/A	N/A	N/A	Section 9.2.3	N/A	N/A	N/A	Section 9.3.2
North Norfolk Coast Assemblage of Subtidal Sediment Features and Habitats (subtidal)											
Physical	Distribution: distribution of geomorphological feature	Section 9.1.1.1	Section 9.1.2.1	N/A	Section 9.2.1	Section 9.2.2.1	Section 9.2.3	Section 9.2.4.1	N/A	Section 9.3.1	Section 9.3.2
Physical	Extent: extent of geomorphological feature	N/A	N/A	N/A	N/A	Section 9.2.2.1	N/A	Section 9.2.4.1	N/A	N/A	N/A
Physical	Structure: structure of geomorphological feature	Section 9.1.1.1	Section 9.1.2.1	N/A	Section 9.2.1	Section 9.2.2.1	Section 9.2.3	N/A	N/A	Section 9.3.1	Section 9.3.2
Physical	Supporting processes: Energy/Exposure	N/A	N/A	N/A	N/A	Section 9.2.2.1	N/A	N/A	N/A	N/A	N/A
Physical	Supporting processes: Sediment transport pathways and connectivity with wider environment	N/A	N/A	N/A	N/A	Section 9.2.2.1	N/A	Section 9.2.4.1	N/A	N/A	N/A

9.1 Potential Impacts during Construction

9.1.1 Impact 1: Temporary Habitat Loss / Physical Disturbance from Export Cable Installation

136. Temporary habitat loss and physical disturbance will occur as a result of pre-cable installation sea bed preparation including a PLGR and boulder clearance, excavation at the HDD exit point, cable installation, and indents from jack-up vessels at the HDD exit point. Cable burial will occur within the footprint of temporary habitat loss and physical disturbance associated with sea bed preparation. Therefore, whilst there will be potential for repeat disturbance to these areas, the footprint will remain the same. Some activities will result in disturbance of surface sediments, and some will result in temporary habitat loss (removal of substratum and subsequent deposition).

137. Three broadscale marine habitat features and one geological feature have the potential to be affected by temporary habitat loss and physical disturbance during construction:

- Subtidal coarse sediment (A5.1)
- Subtidal sand (A5.2)
- Subtidal mixed sediments (A5.4)
- North Norfolk Coast assemblage of subtidal sediment features and habitats

138. The impact of temporary habitat loss and physical disturbance has been defined using the following pressures identified by Natural England's AoO for the CSCB MCZ (**Table 7-1**):

- Abrasion/disturbance of the substrate on the surface of the sea bed;
- Habitat structure changes - removal of substratum (extraction); and
- Penetration and/or disturbance of the substratum below the surface of the sea bed, including abrasion.

139. Sediment extracted by cable installation will be backfilled into the trench, therefore there will be no long term removal of substratum. Removal of substratum (extraction) is classed by AoO as a low risk pressure for cable installation and given that material will be returned in the same area with similar sediment type, sensitivity to this pressure is likely to be less than for activities that permanently extract substratum.

140. **Table 6-2** presents the worst case extent of these impacts during construction. The worst case maximum area of sea bed within the CSCB MCZ which could be disturbed during cable installation activities would be 0.167km^2 for the SEP or DEP in isolation and 0.333km^2 for SEP and DEP. These equate to 0.05% of the MCZ area for SEP or DEP in isolation and 0.10% for SEP and DEP.

141. The remainder of this section assesses the impact of temporary habitat loss and physical disturbance during construction against the attributes and targets of each protected feature as provided by Natural England's SACOs.

9.1.1.1 Physical attributes

142. The following physical attributes of protected features are relevant to temporary habitat loss and physical disturbance impacts:

- Extent and distribution
- Structure: sediment composition and distribution

143. As discussed, the worst case maximum area of sea bed within the CSCB MCZ which could be impacted during cable installation activities would be 0.167km^2 for SEP or DEP in isolation and 0.333km^2 for SEP and DEP (**Table 6-2**). These equate to 0.05% of the MCZ area for SEP or DEP in isolation and 0.10% for SEP and DEP. **Table 9-2** provides the extent of CSCB MCZ features that will be potentially impacted by temporary habitat loss and physical disturbance.

Table 9-2: Maximum Extent of Temporary Habitat Loss and Physical Disturbance of CSCB MCZ Features (SEP and DEP)

Protected feature	Spatial extents	Area	%
High energy circalittoral rock (A4.1)	30km^2	N/A	0
Moderate energy circalittoral rock (A4.2)		N/A	0
High energy infralittoral rock (A3.1)	0km^2	N/A	0
Moderate energy infralittoral rock (A3.2)	0km^2	N/A	0
Subtidal coarse sediment (A5.1)	148km^2	0.333km^2	0.225
Subtidal mixed sediments (A5.4)	49km^2	0.333km^2	0.680
Subtidal sand (A5.2)	18km^2	0.333km^2	1.850
Peat and clay exposures	60 points records	N/A	0
Subtidal chalk	30km^2	N/A	0
North Norfolk Coast Assemblage of Subtidal Sediment Features and Habitats (subtidal)	Combination of extents above (245km^2)	0.333km^2	0.14
CSCB MCZ	321km^2	0.333km^2	0.103

144. Subtidal coarse sediment, sand and mixed sediments disturbed will not be removed or relocated. Sediment disturbance has the potential to suspend fine sediments which will disperse more widely than coarse sediments, reducing the proportion of fine sediment in the disturbed area. However, as discussed in **Section 8.2.1** there is a low percentage of fine material along the export cable corridor. Post construction monitoring undertaken at DOW in August and September 2018, less than one year after the wind farm became operational, was compared to a pre-construction survey undertaken in 2014. Particle size analysis showed no significant differences between the pre-construction survey and the post-construction survey, indicating that the sediment composition has remained unaffected by the development of the wind farm and the installation of the associated export cables in the CSCB MCZ (MMT, 2019).

9.1.1.2 Biological attributes

145. The following biological attributes of protected features are relevant to temporary habitat loss and physical disturbance impacts:

- 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

146. Construction temporary habitat loss and physical disturbance is likely to result in localised mortality of macrofauna and reductions in species richness and biomass.

9.1.1.2.1 Subtidal coarse sediment (A5.1)

147. Areas of subtidal coarse sediment in the offshore export cable corridor were defined to EUNIS level 4 as A5.13 Infralittoral coarse sediment in some areas but not to the biotope level. Natural England's AoO identifies five biotopes that may be represented within this feature. Their sensitivity to relevant pressures ranges from Not Sensitive to Medium, with the highest sensitivity being to penetration or removal of substratum (extraction) and disturbance of the substratum subsurface (both medium sensitivity) (**Appendix 2 Biotope Sensitivity Ranges** [APP-079]). Resilience ranges from medium to high, equating to full recovery within 2-10 years or within 2 years respectively.

9.1.1.2.2 Subtidal sand (A5.2)

148. Areas of subtidal sand in the offshore export cable corridor were identified as including the biotope complex A5.23 Infralittoral fine sand and the biotope A5.233 *Nephtys cirrosa* and Bathyporeia spp. in infralittoral sand. The sensitivity of this biotope to relevant pressures ranges from Low to Medium, with the highest sensitivity being to penetration or removal of substratum (extraction). Sensitivity to abrasion/disturbance of the substrate on the surface of the sea bed and disturbance of the substratum subsurface is Low (**Appendix 2 Biotope Sensitivity Ranges** [APP-079]). Resilience to all pressures is high with full recovery within 2 years.

9.1.1.2.3 Subtidal mixed sediments (A5.4)

149. Areas of mixed sediments in the offshore export cable corridor were classified as the biotope complex 'Infralittoral mixed sediment' (A5.43), showing similarities to the biotope '*Crepidula fornicata* with ascidians and anemones on infralittoral coarse mixed sediment' (A5.431) mixed with areas of the biotope '*Sabellaria spinulosa* on stable circalittoral mixed sediment' (A5.611). The sensitivity of these biotopes to relevant pressures ranges from Low to Medium. These biotopes are not listed under AoO as representative of the CSCB MCZ subtidal mixed sediments feature. However, all biotopes listed against the feature have Medium sensitivity to relevant pressures with medium resilience, equating to full recovery within 2-10 years.

150. Post-construction monitoring undertaken at DOW in August and September 2018, was compared to a pre-construction survey undertaken in 2014. No significant differences in the benthic communities between the surveys were identified, including those impacted by DOW export cables in the CSCB MCZ (MMT, 2019).

As discussed in **Section 6.4.2.1** a non-displacement plough which avoids persistent trenches was used to install the DOW offshore export cables, and this method will be used for SEP and DEP export cable burial should a plough be used. Similarly, year 1 and 2 post construction surveys of the SOW site showed recovery of the sea bed and benthic communities within two years in most areas (Fugro, 2013; 2014). However, the offshore export cable trenches in coarse sediment areas still represented a disturbed benthic habitat by the time of the second post-construction monitoring survey. By the time of a third post-construction benthic survey of the export cable in the CSCB MCZ in August 2020, epifaunal community structure had recovered such that it was not significantly different to unimpacted areas (Fugro, 2020c). Recovery of benthic communities in localised areas impacted by SOW export cable installation took longer than recovery of benthic communities impacted by DOW export cable installation (up to 10 years compared to up to 2 years). It is understood that this was due to the cable trenching technique used by SOW, which left a trench that persisted in coarse sediment areas. However, as discussed, SEP and DEP export cable installation will use techniques that avoid creating persistent trenches. Further detail on cable installation within the MCZ is provided in the **Outline CSCB MCZ CSIMP** (Revision B) [document reference 9.7].

9.1.1.3 Summary

151. Disturbed subtidal coarse sediment, sand and mixed sediments will not be removed or relocated and based on the effects of similar activities in adjacent areas the composition and distribution of sediments will not change. Therefore, the extent, distribution and structure of these habitat features will not change as a result of temporary habitat loss and physical disturbance. The presence and spatial distribution of associated biological communities will be maintained despite some localised mortality of macrofauna and reductions in species richness and biomass in the disturbed areas, representing a worst case 1.85% of the subtidal sand feature of the CSCB MCZ or 0.103% of the CSCB MCZ area in total (see **Table 9-2** for a breakdown by CSCB MCZ feature). Recovery of these communities will take place rapidly with full recovery expected within two years in many areas based on the resilience of most biotopes and partial recovery due to colonisation of impacted areas by species representative of pre-existing biological communities occurring sooner. Recovery may take longer in some coarse and mixed sediment areas but based on DOW post-construction monitoring, full recovery is expected in less than four years.

152. Based on the relevant pressures, receptor sensitivity, and assessment of impacts against the attributes of affected CSCB MCZ features it can be concluded that the conservation objective of maintaining the protected features of the CSCB MCZ in a favourable condition or restoring them to favourable condition **will not be hindered** by temporary habitat loss and physical disturbance impacts related to the construction of SEP and DEP (either in isolation or if SEP and DEP are both built).

9.1.2 Impact 2: Increased Suspended Sediment Concentrations

153. Temporary increases in SSC within the water column, and subsequent deposition onto the sea bed may occur as a result of cable pre-installation activities including PLGR, export cable burial and at the HDD exit pit and transition zone. Deployment

of jack-up vessels at the HDD exit point and placement of external cable protection are not expected to increase the SSC to an extent at which it would cause an impact to benthic ecology receptors. ES **Chapter 6 Marine Geology, Oceanography and Physical Processes** [APP-092] provides details of changes to suspended sediment concentrations and subsequent sediment disposition.

154. The installation of the export cables has the potential to disturb the sea bed down to a sediment thickness of up to 1.0m (depending on the area) with a trench width of up to 1.0m. Excavation of the HDD pit and transition zones will also disturb and potentially mobilise sediment into suspension. **Table 6-2** summarises the worst case volume of sediment displaced.

155. Sand and gravel-sized sediment (which represents most of the disturbed sediment) would settle out of suspension rapidly to the bed in the immediate location of the export cable corridor. Fine sand will most likely remain in the bottom 1-2m of the water column, and with settling velocities of around 10mm/s, this will ensure the fine sand settles within half an hour or less or become part of the ambient near bed transport (Soulsby, 1997). The majority of disturbed sediment will initially resettle within 20m of the export cable, with almost no sand being transported further than 100m of the cable. Deposition of sediment is expected to be localised to the point of disturbance, with deposits of up to approximately 3cm (see **Chapter 6 Marine Geology, Oceanography and Physical Processes** [APP-092] for further details).

156. Mud-sized material (which represents only a very small proportion of the disturbed sediment) would be advected a greater distance and persist in the water column for hours to days. It is anticipated that under the prevailing hydrodynamic conditions, this sediment would be readily re-mobilised, especially in the shallow inshore area where waves would regularly agitate the bed. Accordingly, outside the immediate vicinity of the offshore export cable route, sediment deposition and any changes to sea bed character are not expected to be measurable in practice. In the unlikely event that chalk plumes are generated, modelling undertaken for the DOW shows they may extend some distance (up to 10km) but will not redeposit or have any impact on marine habitats or species (DOW, 2009).

157. Although SSC will be elevated they are likely to be lower than concentrations that would develop in the water column during storm conditions. Also, once installation is completed, tidal currents are likely to rapidly disperse the suspended sediment (i.e. over a period of a few hours) in the absence of any further sediment input.

158. It is likely that the increase in concentrations would be greatest in the shallowest sections of the offshore cable corridor, but in these locations the background concentrations are also greater than in deeper waters, with values up to 170mg/l recorded in the vicinity of the coast at Great Yarmouth (ABPmer, 2012). Therefore, suspended sediment concentrations are likely to remain within the range of background nearshore levels and lower than those concentrations that would develop during storm conditions. Upon cessation of construction activities, the high energy nearshore zone is likely to rapidly disperse the suspended sediment (i.e. over a period of a few hours) in the absence of any further sediment input.

159. SEP and DEP overlap the following broadscale marine habitat features and geological feature, and will therefore be affected by temporary increases in SSC and subsequent deposition during construction:

- Subtidal coarse sediment (A5.1)
- Subtidal sand (A5.2)
- Subtidal mixed sediments (A5.4)
- North Norfolk Coast assemblage of subtidal sediment features and habitats

160. Tidal currents close to the north Norfolk coast and in the CSCB MCZ are approximately parallel to the coast in an east-west direction. Given that almost no sediment will be transported further than 100m from the cable installation area, primarily to the east and west, the following CSCB MCZ features are unlikely to be impacted due to their distance from, and/or distribution inshore, of construction activities (**Figure 8-2**):

- High energy circalittoral rock
- Moderate energy circalittoral rock
- High energy infralittoral rock
- Moderate energy infralittoral rock
- Peat and clay exposures (nearest record located approximately 1.8km to the west)
- Subtidal chalk

161. The impact of temporary increases in SSC and subsequent deposition has been defined using the following pressures identified by Natural England's AoO for the CSCB MCZ (**Table 7-1**):

- Changes in suspended solids (water clarity)
- Smothering and siltation rate changes (light)

162. The pressure 'Smothering and siltation rate changes (light)' has been used for the sensitivity assessment because 'Light' deposition is defined as "of up to 5cm of fine material added to the habitat in a single, discrete event", as opposed to 'Heavy' deposition "of up to 30cm of fine material added to the habitat in a single discrete event". Therefore, 'Light' is the more accurate pressure in relation to cable installation activities given that localised deposits of up to approximately 3cm are expected.

163. The remainder of this section assesses the impact of construction temporary increases in SSC and subsequent deposition against the attributes and targets of each protected feature as provided by Natural England's SACOs.

9.1.2.1 Physical attributes

164. The following physical attributes of protected features are relevant to temporary increases in SSC and subsequent deposition impacts:

- Structure: sediment composition and distribution
- Supporting processes: sedimentation rate (for subtidal rock features)
- Supporting processes: water quality – turbidity

165. As described above, redeposition of suspended sediments will be local to the construction activity and is unlikely to change sediment composition and distribution.

Changes to the sedimentation rate will be within the natural range and given the distribution of subtidal rock features in relation to the extent of effects, no impact is anticipated. Similarly, increases in SSC will be localised, short term and within the natural range of turbidity. Therefore, there will be no impact on the physical attributes and targets of CSCB MCZ features.

9.1.2.2 Biological attributes

166. The following biological attributes of protected features are relevant to temporary increases in SSC and subsequent deposition impacts:

- Distribution: presence and spatial distribution of biological communities
- Structure: species composition of component communities
- Structure and function: presence and abundance of key structural and influential species

167. Increased suspended sediments have the potential to affect benthic ecology receptors by blocking feeding apparatus as well as by smothering sessile species upon deposition of sediment.

168. Natural England's AoO states that the biotopes recorded in the SEP and DEP offshore export cable corridor within the CSCB MCZ have either Low sensitivity to the pressures associated with temporary increases in SSC and subsequent deposition or are Not Sensitive (**Appendix 2 Biotope Sensitivity Ranges** [APP-079]). Biotopes that are represented within the subtidal mixed sediments feature according to AoO (A5.432 *Sabella pavonina* with sponges and anemones on infralittoral mixed sediment, and A5.445 *Ophiothrix fragilis* and/or *Ophiocomina nigra* brittlestar beds on sublittoral mixed sediment), have Medium sensitivity but were not recorded in the SEP and DEP export cable corridor. Circalittoral rock habitats and high energy infralittoral rock are assigned Medium sensitivity, whereas subtidal chalk has Low sensitivity to increased suspended sediment. However, as discussed, based on their location relative to construction activities, impacts on these features are unlikely. The resilience for all biotopes has been determined to be high to medium (recovery in <2 years or less than 10 years respectively).

9.1.2.3 Summary

169. Most of the sediment mobilised by construction activities would settle out of suspension rapidly to the bed, redepositing within 20m of the works, with almost all the remainder (fine sand fraction) settling within 100m. Deposits would be up to a depth of approximately 3cm. Fine material (which represents only a very small proportion of the disturbed sediment) would disperse further and persist in the water column for hours to days, but at a SSC that is not expected to be measurable. Elevated SSC will be within the range of background nearshore levels and will be lower than those concentrations that would develop during storm conditions. Once installation is completed, tidal currents are likely to rapidly disperse the suspended sediment.

170. Biological communities recorded in the SEP and DEP offshore export cable corridor within the CSCB MCZ have either Low sensitivity to the pressures associated with temporary increases in SSC and subsequent deposition or are Not Sensitive. Other

biotopes which, according to AoO, are represented within the CSCB MCZ designated features have Medium sensitivity, but these have not been recorded within the spatial extent of impacts. Therefore, the biological communities that may be affected by temporary increases in SSC and subsequent deposition will either not be impacted or would recover fully within two years.

171. Based on the relevant pressures, receptor sensitivity, and assessment of impacts against the attributes of affected CSCB MCZ features, it can be concluded that the conservation objective of maintaining the protected features of the CSCB MCZ in a favourable condition or restoring them to favourable condition **will not be hindered** by temporary increases in SSC and subsequent deposition impacts related to the construction of SEP and DEP (either in isolation or if SEP and DEP are both built).

9.1.3 Impact 4: Re-mobilisation of Contaminated Sediments

172. The re-suspension of sediment during the offshore export cable installation activities could lead to the release of sediment-bound contaminants which may impact benthic biological communities associated with the protected features of the CSCB MCZ.

173. As for **Section 9.1.2**, three broadscale marine habitat features would be the most likely to be impacted by re-mobilisation of contaminated sediments during construction, due to their proximity to construction activities:

- Subtidal coarse sediment (A5.1)
- Subtidal sand (A5.2)
- Subtidal mixed sediments (A5.4)

174. Given their distance from the source of any contaminant remobilisation, and subsequent redeposition, dilution and dispersal, a pathway for impact on other CSCB MCZ features is unlikely.

175. The impact of re-mobilisation of contaminated sediments has been defined using the following pressures identified by Natural England's AoO for the CSCB MCZ (**Table 7-1**):

- Introduction of other substances (solid, liquid or gas)
- Transition elements & organo-metal (e.g. TBT) contamination

176. To inform the baseline for sediment quality, seven grab samples were taken for chemical analysis during benthic surveys of the SEP and DEP offshore survey areas (**Appendix 8.1** and **Appendix 8.2** of the ES [APP-184 and APP-185 respectively), three inside the offshore export cable corridor and CSCB MCZ. Analysis was undertaken for the following contaminants:

- Heavy metals (arsenic, mercury, cadmium, chromium, copper, lead, nickel and zinc);
- Polycyclic Aromatic Hydrocarbons (PAHs);
- Organotins (Monobutyltin (MBT), Dibutyltin (DBT) and Tributyltin (TBT)); and
- Total hydrocarbons (THC).

177. The context of the contaminants found within sediments is established through the use of recognised guidelines and action levels, in this case Cefas Action Levels have been applied because they provide good coverage of contaminants, across a broad range of contaminant types (MMO, 2018). These levels are used to indicate general contaminant levels in the sediments. If, overall, levels do not generally exceed the lower threshold values of these guideline standards, then contamination levels are not considered to be of significant concern and are low risk in terms of potential impacts on the marine environment.

178. The comparison of the sediment quality data against Cefas Action Levels has been undertaken within **Chapter 6 Marine Water and Sediment Quality** [APP-093] of the ES and is not repeated here. However, the comparison showed that no samples exceed the lower Cefas Action Level 1 and therefore sediment contamination levels are low. Six samples had levels of arsenic marginally exceeding Canadian Sediment Quality Guidelines for the Protection of Aquatic Life (CSQC) Threshold Effect Level (TEL) (7.24mg/kg) concentrations, ranging from 8.73 to 14.3mg/kg. However, these are well below the CSQC arsenic Probable Effect Levels (PEL) (41.6mg/kg). Furthermore, Whalley *et al*. (1999) state that uncontaminated nearshore marine and estuarine sediments contain from about 5 to about 15mg/kg dry weight total arsenic found primarily in the form of arsenate which is less toxic than in its inorganic forms (Neff, 1997). Whalley *et al.* (1999) analysed archived samples from historical surveys and combined the data with results for the Dogger Bank to examine the distribution of total arsenic in sediments from the western North Sea and Humber Estuary. This identified a range of concentrations falling between 14 and 70mg/kg. Historically, the Humber has been subjected to large point discharges of arsenic from industrial sources and samples collected during various North Sea surveys have identified numerous areas with high raw arsenic concentrations, particularly off north Yorkshire and the Humber Estuary.

179. However, the same study demonstrated that after normalisation against iron, the levels of arsenic in these historical samples were much reduced in significance but that there were elevated arsenic concentrations present in sediments from the outer Thames and off north east Norfolk. Although arsenical waste disposal could explain the high arsenic concentrations in sediments from the outer Thames, the causes for those off north east Norfolk were considered to be unclear. The authors hypothesize that the circulation pattern of the North Sea might lead to the suggestion that arsenic from the Humber is being transported to this area but evidence to support this theory is not available. An alternative explanation offered by the authors is that drilling could have brought arsenic-rich marine shales to the surface, since the affected area coincides with the main group of English North Sea gas fields.

180. The arsenic concentrations within sediments in the SEP and DEP offshore sites (range between 5 and 15mg/kg) are considerably below those reported by Whalley *et al*. (1999) and therefore do not represent excessive levels for the region.

181. Therefore, sediment arsenic concentrations are well below any likely biological effects concentrations and are within the range of uncontaminated marine sediment concentrations.

182. Following consultation through the Sea bed ETG, sediments were analysed for organotin contamination because of a link between these compounds and the disruption of the reproductive capabilities of a number of gastropod mollusc species.

All recorded organotin (TBT) concentrations were below the levels expected to affect the reproductive capability of sensitive gastropod species (Fugro, 2020a, 2020b).

183. Therefore, there is considered to be no risk in relation to re-mobilisation of contaminated sediments due to there being no concentrations of contaminants at levels of concern.

184. The following attributes of protected features are relevant to re-mobilisation of contaminated sediments impacts:

- Supporting processes: sediment contaminants
- Supporting processes: water quality – contaminants

185. However, given that there is no risk in relation to re-mobilisation of contaminated sediments due to there being no concentrations of contaminants at levels of concern, further assessment against these attributes is unnecessary.

9.1.3.1 Summary

186. Based on the absence of contaminants at levels of concern recorded within the SEP and DEP offshore export cable corridor, it can be concluded that the conservation objective of maintaining the protected features of the CSCB MCZ in a favourable condition or restoring them to favourable condition **will not be hindered** by re-mobilisation of contaminated sediments related to the construction of SEP and DEP (either in isolation or if SEP and DEP are both built).

9.2 Potential Impacts during Operation

9.2.1 Impact 1: Temporary Habitat Loss / Physical Disturbance

187. Temporary habitat loss and physical disturbance within the CSCB MCZ will occur as a result of any requirement for cable repair, replacement and reburial during the operational phase. The worst case footprint of temporary habitat loss and physical disturbance impacts is presented in **Table 6-2**. Extents, presented as ten year averages and operation phase totals, make the highly precautionary assumption that all the estimated cable repair, replacement and reburial activities for the offshore export cables occur inside the MCZ. In reality, the extent of operational phase temporary habitat loss and physical disturbance would be a fraction of that during the construction phase (**Section 9.1.1**), intermittent and restricted to discrete locations. It should be noted that the SOW and DOW export cables have not had to undergo any repair or reburial operations at the time of writing.

188. The habitat features and attributes impacted, and the sensitivities of those habitats will be the same as those identified for construction in relation to this impact (**Section 9.1.1**).

189. Disturbed subtidal coarse sediment, sand and mixed sediments will not be removed or relocated and, based on similar activities in adjacent areas, the composition and distribution of sediments will not change. Therefore, the extent, distribution and structure of these habitat features will not change as a result of temporary habitat loss and physical disturbance. The presence and spatial distribution of associated biological communities will be maintained despite some localised mortality of

macrofauna and reductions in species richness and biomass in the disturbed areas, representing a worst case 14,400m^2 in total over the full operational period (for SEP and DEP) representing 0.005% of the CSCB MCZ area. Recovery of these communities will take place rapidly with full recovery expected within two years in many areas based on the resilience of most biotopes and partial recovery due to colonisation of impacted areas by species representative of pre-existing biological communities occurring sooner. Recovery may take longer in some coarse and mixed sediment areas but based on DOW post-construction monitoring full recovery is expected in less than four years.

190. Based on the relevant pressures, receptor sensitivity, and assessment of impacts against the attributes of affected CSCB MCZ features it can be concluded that the conservation objective of maintaining the protected features of the CSCB MCZ in a favourable condition or restoring them to favourable condition will **not be hindered** by temporary habitat loss and physical disturbance impacts related to the operation of SEP and DEP (either in isolation or if SEP and DEP are both built).

9.2.2 Impact 2: Long Term Habitat Loss

191. Long term habitat loss will occur within the CSCB MCZ during the operational phase where external export cable protection is required in locations where an adequate degree of protection has not been achieved from the burial process, and at the HDD exit pit transition zone. As discussed in **Section 6.4.3**, the Applicant has committed to only using external cable protection within the CSCB MCZ that is designed to be removable on decommissioning. Removal at the decommissioning stage would avoid permanent impacts to MCZ benthic habitats. Therefore, the habitat loss due to cable protection would be long term / lasting for the duration of the operational phase (40 years), rather than permanent.

192. The Applicant considers that external cable protection will only be used as a last resort inside the CSCB MCZ to ensure the integrity of export cable assets is maintained. Burial of cables is the preferred protection solution, but where initial cable burial is not successful, the Applicant will seek to undertake remedial burial operations prior to resorting to cable protection measures.

193. Three broadscale marine habitat features and one geological feature have the potential to be affected by long term habitat loss:

- Subtidal coarse sediment (A5.1)
- Subtidal sand (A5.2)
- Subtidal mixed sediments (A5.4)
- North Norfolk Coast assemblage of subtidal sediment features and habitats

194. The impact of long term habitat loss has been defined using the following pressure identified by Natural England's AoO for the CSCB MCZ (**Table 7-1**):

- Physical change (to another sea bed type)

195. Physical change (to another sediment type) is not relevant because external cable protection will be a hard substratum rather than a sediment.

196. **Table 6-2** presents the worst case extent of these impacts during operation. The maximum area of sea bed within the CSCB MCZ which could be subject to long

term / lasting habitat loss would be 900m^2 for SEP or DEP in isolation and 1,800m^2 for SEP and DEP. These equate to 0.0003% of the MCZ area for SEP or DEP in isolation and 0.0006% for SEP and DEP. **Table 9-3** shows the maximum proportion of each potentially impacted broadscale marine habitat feature that could be temporarily lost in the unlikely event that all long term habitat loss is located within one feature. However, as illustrated in **Figure 8-2** it is likely that the impact will be spread across more than one broadscale marine sediment habitat feature.

Table 9-3: Maximum Extent of Long Term Loss of CSCB MCZ Features (SEP and DEP)

Protected feature	Spatial extents	Area	%
High energy circalittoral rock (A4.1)	30km^2	N/A	0
Moderate energy circalittoral rock (A4.2)		N/A	0
High energy infralittoral rock (A3.1)	0km^2	N/A	0
Moderate energy infralittoral rock (A3.2)	0km^2	N/A	0
Subtidal coarse sediment (A5.1)	148km^2	1,800m^2	0.0012
Subtidal mixed sediments (A5.4)	49km^2	1,800m^2	0.0037
Subtidal sand (A5.2)	18km^2	1,800m^2	0.01
Peat and clay exposures	60 points records	N/A	0
Subtidal chalk	30km^2	N/A	0
North Norfolk Coast Assemblage of Subtidal Sediment Features and Habitats (subtidal)	Combination of extents above (245km^2)	1,800m^2	0.0007
CSCB MCZ	321km^2	1,800m^2	0.0006

197. The remainder of this section assesses the impact of long term habitat loss against the attributes and targets of each protected feature as provided by Natural England's SACOs.

9.2.2.1 Physical attributes

198. The following physical attributes of protected features are relevant to long term habitat loss:

- Extent and distribution
- Structure: sediment composition and distribution
- Supporting processes: energy / exposure

199. 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. In these locations this would change the subtidal sediment habitats to artificial hard substratum, creating areas of habitat closer to circalittoral rock (A4), or possibly infralittoral rock (A3). Therefore, there would be a lasting, but not permanent, reduction in the extent and distribution of the subtidal coarse sediment, subtidal sand, or subtidal mixed sediment broadscale marine habitat features; or a lower magnitude impact on more than one (two or all three) of the CSCB MCZ features. Long term loss could occur to approximately 0.0007% of

the estimated spatial extent of broadscale marine sediment and habitats features in the MCZ, with a worst case loss of 0.01% of the subtidal sand feature if all habitat loss were to this feature (**Table 9-3**).

200. 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 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 .

9.2.2.2 Biological attributes

201. The following biological attributes of protected features are relevant 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

202. 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.

203. All sediment biotopes, including those recorded in the SEP and DEP offshore export cable corridor, and the biotopes Natural England's AoO identifies 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.

204. Natural England (2023) states that the presence and spatial distribution of biological communities, and the species composition of component communities, may be vulnerable to the installation of any infrastructure that is likely to result in a change to the nature or extent of the feature (for example the addition of rock armouring to protect cables or pipelines). Potentially having a significant impact on the attribute and triggering a 'recover' target.

205. Given the very small area of long term sediment habitat loss, the presence, spatial distribution and characteristics of biological communities, which form a mosaic of similar coarse sediment, mixed sediment and sand biotopes, will largely be maintained across the CSCB MCZ. There will be a not significant reduction (up to 0.01% of the subtidal sand feature and associated biological communities as a worst case) in the extent of the habitat features that are impacted (see **Table 9-3**), which will last until decommissioning, after which recovery of biological communities typical of the original habitats is expected in less than four years based on DOW post-construction monitoring (**Section 9.1.1.2**).

9.2.2.3 Summary

206. The extent, distribution and structure of habitat features and presence and spatial distribution of associated biological communities will be largely maintained despite some localised long term habitat loss of an area of up to 1,800m^2. This reduction equates to 0.0007% of the estimated spatial extent of broadscale marine sediment and habitat features, with a worst case loss of 0.01% of the subtidal sand feature if all losses were to this feature (**Table 9-3**). This habitat loss will be temporary, lasting until SEP and DEP decommissioning when removal will reinstate the original sea bed habitat. Therefore, it can be concluded that the conservation objective of maintaining the protected features of the CSCB MCZ in a favourable condition or restoring them to favourable condition **will not be hindered** by long term habitat loss impacts related to the operation of SEP and DEP (either in isolation or if SEP and DEP are both built) based on the very limited spatial extent, and the temporary, albeit long lasting, nature of the impacts.

9.2.3 Impact 3: Increased Suspended Sediment Concentrations

207. Increases in SSC within the water column, and subsequent deposition onto the sea bed may occur as a result of O&M activities that require the use of jack-up vessels, as well as cable repair, replacement and reburial activities. It should be noted that the SOW and DOW export cables have not had to undergo any repair or reburial operations at the time of writing.

208. **Table 6-2** summarises the worst case volume of sediment displaced. Volumes, presented as annual averages and operation phase totals, make the highly precautionary assumption that all the estimated cable repair, replacement and reburial activities for the offshore export cables occur inside the MCZ. In reality, the extent of operational phase temporary increases in SSC and subsequent deposition would be a fraction of that during the construction phase.

209. As described in **Section 9.1.2** most of the sediment mobilised by O&M activities would settle out of suspension rapidly to the bed, redepositing within 20m of the works, with almost all the remainder (fine sand fraction) settling within 100m, to a maximum height of approximately 3cm. Elevated SSC will be within the range of background nearshore levels and will be lower than those concentrations that would develop during storm conditions. Once installation is completed, tidal currents are likely to rapidly disperse the suspended sediment.

210. Biological communities recorded in the SEP and DEP offshore export cable corridor within the CSCB MCZ have either Low sensitivity to the pressures associated with temporary increases in SSC and subsequent deposition or are Not Sensitive, therefore, they will either not be impacted or would recover fully within two years.

211. Based on the relevant pressures, receptor sensitivity, and assessment of impacts against the attributes of affected CSCB MCZ features, it can be concluded that the conservation objective of maintaining the protected features of the CSCB MCZ in a favourable condition or restoring them to favourable condition **will not be hindered** by temporary increases in SSC and subsequent deposition impacts related to the operation of SEP and DEP (either in isolation or if SEP and DEP are both built).

9.2.4 Impact 4: Effects on Bedload Sediment Transport

212. Sedimentary habitats are often influenced by tide and wave-driven water flow that drives the movement or stability of sediment on and in areas surrounding the feature. These flow regimes can control both the shape and size of the feature, in addition to its sedimentary characteristics and biological composition. Supply of sediment through bedload sediment transport could be interrupted due to the presence external cable protection within the CSCB MCZ. Where the export cables are buried there would be no effect on bedload sediment transport. However, if cable protection is required there is potential for it to create an obstacle that interrupts bedload sediment transport.

213. As described in **Section 9.2.2**, burial of cables is the preferred protection solution, but where initial cable burial is not successful, the Applicant will seek to undertake remedial burial operations prior to resorting to cable protection measures.

214. Subtidal rock features, including subtidal chalk and peat and clay exposures, are not reliant upon a supply of sediment. Therefore, any interruption in sediment supply would not impact these features. Three broadscale marine habitat features and one geological feature have the potential to be affected by effects on bedload sediment transport during operation:

- Subtidal coarse sediment (A5.1)
- Subtidal sand (A5.2)
- Subtidal mixed sediments (A5.4)
- North Norfolk Coast assemblage of subtidal sediment features and habitats

215. The impact of effects on bedload sediment transport has been defined using the following pressures identified by Natural England's AoO for the CSCB MCZ (**Table 7-1**):

- Water flow (tidal current) changes, including sediment transport considerations

216. Interruption of bedload sediment transport processes during the operational phase are likely to be a different depending on whether the cable protection is in 'nearshore' or 'offshore' areas within the offshore cable corridor. Any works in areas closest to the coast have the potential to affect alongshore sediment transport processes and circulatory pathways across any nearshore banks. The seaward limit which marks the effective boundary of wave-driven sediment transport is called the 'closure depth' and this would typically be located in around 5m of water or the sea bed offshore from the landfall. There would be a range of sediment transport potentials across the export cables. A study of the sedimentary processes within the CSCB MCZ (**Appendix 6.3 Sedimentary Processes in the Cromer Shoal Chalk Beds MCZ** [APP-182] of the ES) confirmed that only the subtidal sand feature is naturally mobile, and that subtidal coarse sediment and subtidal mixed sediment are essentially static due to the particle size composition of these sediments and have zero transport potential (see also **Chapter 6 Marine Geology, Oceanography and Physical Processes** [APP-092] of the ES). Given these features are not reliant upon sediment supply in order to maintain their distribution or extent, they will not be impacted by any interruptions to bedload sediment transport due to cable protection in the CSCB MCZ.

217. **Figure 8-2** illustrates that the subtidal sand feature in the offshore export cable corridor is located close to landfall but offshore of an area of circalittoral rock, and at the seaward boundary of the MCZ.

218. The remainder of this section assesses the impact of bedload sediment transport against the attributes and targets of each protected feature as provided by Natural England's SACOs.

9.2.4.1 Physical attributes

219. The following physical attributes of protected features are relevant to bedload sediment transport impacts:

- Extent and distribution
- Supporting processes: sediment movement and hydrodynamic regime

220. Natural England's SACO states that at Weybourne, there is an area of zero net transport, where there is no prevailing sediment movement in either direction. To the east of Weybourne, sediments are transported eastwards, past Cromer and towards Great Yarmouth (HR Wallingford *et al.* 2002). Given the SEP and DEP offshore export cable corridor makes landfall slightly to the east of Weybourne it is likely that sediment transport is limited and in a net easterly direction. Similarly, offshore of the North Norfolk coast sediment transport is tidally driven, with tidal currents moving sediments in a net direction of transport to the south-east.

221. The maximum length of protection would be up to 200m for SEP or DEP in isolation and 400m for SEP and DEP (two cables).

222. Should the external cable protection present an obstruction to bedload transport the sediment would first accumulate one side or both sides of the obstacle (depending on the gross and net transport at that location) to the height of the protrusion (up to 0.5m in most cases). With continued build-up, it would then form a 'ramp' over which sediment transport would eventually occur by bedload processes, thereby bypassing the protection. The gross patterns of bedload transport across the export cables would therefore not be affected significantly and any interruptions to bedload sediment transport it would be short term and temporary.

223. The majority of the extent of the subtidal sand feature is distributed to the west of the export cable corridor (**Figure 8-2**). Any interruptions would be to sediment transport in an easterly or south-easterly direction, therefore there would be no impact to features located to the west. The area of subtidal sand identified approximately 13km to the east close to shore on Natural England's feature map, starting offshore of Overstrand and continuing to the eastern limit of the CSCB MCZ is disconnected from subtidal sand areas to the west and therefore small scale temporary interruptions of bedload sediment transport are not expected to impact this feature. Spatially limited areas of subtidal sand directly to the east of the offshore cable corridor identified on the MCZ feature map (**Figure 8-2**) have the potential to be impacted by interruptions to the net easterly sediment transport. These areas cover approximately 0.88km^2 and represent approximately 5% of the entire CSCB subtidal sand feature. Therefore, there may be a short term temporary interruption to a small portion of the subtidal sand broadscale marine habitat feature, with bedload transport expected to return to baseline conditions. However, given the

limited extents of external cable protection any bedload sediment transport effects will be localised. No significant changes to the extent of this feature, or to sediment movement and the hydrodynamic regime within the feature, are predicted due to cable protection within the CSCB MCZ.

9.2.4.2 Biological attributes

224. The following biological attributes of protected features are relevant to bedload sediment transport impacts:

- 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

Subtidal sand (A5.2)

225. Natural England's AoO states that the biotopes which have the potential to be associated with the subtidal sand feature are not sensitive to the 'water flow (tidal current) changes, including sediment transport considerations' pressure (**Appendix 2**) and have a high resistance and resilience. This includes the biotope '*Nephtys cirrosa* and *Bathyporeia* spp. in infralittoral sand' which has been recorded in the offshore export cable corridor within the CSCB MCZ.

9.2.4.3 Summary

226. The extent, distribution and structure of habitat features and presence and spatial distribution of associated biological communities will be maintained despite the potential for short term temporary interruption to a small portion of the subtidal sand broadscale marine habitat feature to the east of any external export cable protection.

227. Based on the relevant pressures, receptor sensitivity, and assessment of impacts against the attributes of affected CSCB MCZ features it can be concluded that the conservation objective of maintaining the protected features of the CSCB MCZ in a favourable condition or restoring them to favourable condition **will not be hindered** by temporary sediment transport impacts related to the operation of SEP and DEP (either in isolation or if SEP and DEP are both built).

228. Given the extent, structure, function, quality and biological composition of the protected habitat features of the CSCB MCZ will not be affected, the conservation objectives of the North Norfolk Coast Geological Feature will also **not be hindered**.

9.2.5 Impact 5: Invasive Species

229. For the purposes of this assessment, the risks of introduction and spread of INNS are assessed for the operational phase when INNS may become established. However, measures to minimise the risk of introduction apply to all project phases.

230. Non-native species may become invasive and displace native organisms by preying on them or out-competing them for resources such as food, space or both. The primary pathway for the potential introduction of INNS is from the use of vessels and infrastructure that have originated from regions that are distinctly different, such as from other seas or oceans. **Table 6-2** presents the maximum number of

construction, and operation and maintenance vessels, that will be used for SEP and DEP noting that these represent vessel use across the entirety of the SEP and DEP offshore areas and are therefore an overestimate of activity within the CSCB MCZ.

231. Although ship ballast water appears to be the largest single vector for INNS, bio-fouling communities on ships and petroleum platforms and the placement of human-made structures that provide new habitat are also identified as contributors and could act as potential 'stepping stones' or vectors for INNS (Glasby *et al*. 2007).

232. Although the pathway for introduction of INNS is from the use of foreign vessels and the introduction of infrastructure, which will be greatest during the construction phase, the operational phase has more potential for establishment and spread of INNS due to the vector capability of introduced artificial hard substrate which is most pronounced during the operational lifetime. It should however be noted that there is an existing baseline of vessel activity within the CSCB MCZ including fishing, cargo, recreational and wind farm support vessels, and therefore the small increase in vessel traffic in the MCZ associated with SEP and DEP will not represent a significantly increased risk of introduction of INNS.

233. The risk of spreading INNS will be mitigated by the following relevant regulations and guidance:

- International Convention for the Prevention of Pollution from Ships (MARPOL). The MARPOL sets out appropriate vessel maintenance;
- The Environmental Damage (Prevention and Remediation (England) Regulations 2015, which set out a polluter pays principle where the operators who cause a risk of significant damage or cause significant damage to land, water or biodiversity will have the responsibility to prevent damage occurring, or if the damage does occur will have the duty to reinstate the environment to the original condition;
- The International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWM Convention), which provide global regulations to control the transfer of potentially invasive species.

234. These commitments are secured in the **Outline Project Environmental Management Plan (PEMP)** (Revision D) [document reference 9.10] which has been submitted with the DCO application.

235. Artificial hard substrates introduced by SEP and DEP including cable protection could act as potential 'stepping stones' or vectors for INNS, as well as supporting species non-native to otherwise soft substrate habitats. This assessment considers the effects of placement of external cable protection and resulting colonisation by faunal communities on the ecological attributes and targets for the three broadscale marine habitat features are most likely to be affected by the introduction of INNS because they have been identified as present where SEP and DEP activities and cable infrastructure are located:

- Subtidal coarse sediment (A5.1)
- Subtidal sand (A5.2)
- Subtidal mixed sediments (A5.4)

236. INNS have the potential to affect ecological attributes only and therefore the conservation objectives of the North Norfolk Coast Assemblage of Subtidal Sediment Features and Habitats feature of geological interest will not be affected.

237. The impact of invasive species has been defined using the following 'low risk' pressure identified by Natural England's AoO for the CSCB MCZ (**Table 7-1**):

- Introduction or spread of invasive non-indigenous species (INIS)

9.2.5.1 Biological attributes

238. The following biological attributes of protected features are relevant to temporary habitat loss and physical disturbance impacts:

- Structure: non-native species and pathogens (habitat)

239. Although the attributes 'Distribution – presence and spatial distribution of biological communities', 'Structure and function: presence and abundance of key structural and influential species' and 'Structure: species composition of component communities' are relevant to colonisation by INNS, impacts on these attributes are already assessed under the biological impacts of long term habitat loss (**Section 9.2.2**).

240. Natural England's AoO states that the biotopes recorded in the SEP and DEP offshore export cable corridor that have the potential to be impacted by invasive species are either not sensitive to introduction or spread of invasive non-indigenous species, or the impact is Not Relevant in the case of 'A5.431 *Crepidula fornicata* with ascidians and anemones on infralittoral coarse mixed sediment' because the characterising species, *C. fornicata*, its itself an established INNS. Some biotopes that are thought to be represented within the subtidal coarse sediment, subtidal sand, and subtidal mixed sediments features according to AoO have High sensitivity to the pressure but were not recorded in the SEP and DEP export cable corridor by the site surveys.

9.2.5.2 Summary

241. INNS may be introduced through the use of vessels and the installation of infrastructure, however the risk of introduction and spread of INNS will be mitigated through adherence to the relevant regulations and guidance and secured through the **PEMP** (Revision D) [document reference 9.10]. The introduction of artificial hard substrates, namely external export cable protection, could act as potential 'stepping stones' or vectors for INNS, as well as supporting species non-native to otherwise soft substrate habitats. Natural England's AoO suggests that the biotopes that have been recorded in the SEP and DEP export cable corridor have a low sensitivity to INNS. Furthermore, sea bed habitats exist in a mosaic of mixed, coarse and sandy sediments across much of the offshore export cable corridor within the CSCB MCZ (**Figure 8-2**), therefore the use of external cable protection across small and localised areas along the cable route is not anticipated to change the existing potential for the spread of INNS.

242. Based on the relevant pressures, receptor sensitivity, and assessment of impacts against the attributes of affected CSCB MCZ features it can be concluded that the conservation objective of maintaining the protected features of the CSCB MCZ in a

favourable condition or restoring them to favourable condition **will not be hindered** by the risks of introduction and spread of INNS related to the development of SEP and DEP, either in isolation or if SEP and DEP are both built.

9.3 Potential Impacts during Decommissioning

9.3.1 Impact 1: Temporary Habitat Loss / Physical Disturbance

243. As a worst case scenario, temporary habitat loss and physical disturbance within the CSCB MCZ during the decommissioning phase will be as a result of cable removal activities if deemed to be required at the time of decommissioning based on up to date guidance and consultation with the regulator. Impacts would be no greater than, and are expected to be less than, those of the construction phase (**Section 9.1.1**), and will affect the same features and attributes.

244. Based on the relevant pressures, receptor sensitivity, and assessment of impacts against the attributes of affected CSCB MCZ features it can be concluded that the conservation objective of maintaining the protected features of the CSCB MCZ in a favourable condition or restoring them to favourable condition will **not be hindered** by temporary habitat loss and physical disturbance impacts related to the decommissioning of SEP and DEP (either in isolation or if SEP and DEP are both built).

9.3.2 Impact 2: Increased Suspended Sediment Concentrations and Deposition

245. Temporary increases in SSC within the water column, and subsequent deposition on to the sea bed may occur during the decommissioning phase as a result of cable removal activities. Impacts would be no greater than, and are expected to be less than those of the construction phase (**Section 9.1.2**), and will affect the same features and attributes.

246. Based on the relevant pressures, receptor sensitivity, and assessment of impacts against the attributes of affected CSCB MCZ features it can be concluded that the conservation objective of maintaining the protected features of the CSCB MCZ in a favourable condition or restoring them to favourable condition will **not be hindered** by temporary increases in SSC and subsequent deposition impacts related to the decommissioning of SEP and DEP (either in isolation or if SEP and DEP are both built).

9.4 Cumulative Effects

247. Projects, plans and activities that exist at the time of SEP and DEP data collection (field surveys etc.) are considered part of the baseline and are screened out of the cumulative assessment. With respect to the CSCB MCZ, this includes commercial fishing activity within the MCZ.

248. A review of the other currently planned projects in the vicinity of the CSCB MCZ has identified projects and plans that have the potential to interact with the proposed SEP and DEP activities. These are:

- DOW (operation and decommissioning only);
- SOW (operation and decommissioning only);

- Hornsea Project Three Offshore Wind Farm;
- Fisheries management within the CSCB MCZ:
    - EIFCA Marine Protected Areas Byelaw 2019 – closure to bottom towed gear (within an area of the CSCB MCZ which overlaps the SEP and DEP offshore export cable corridor);
    - Eastern IFCA Byelaw 12: Inshore Trawling Restriction (between Blakeney and Mundesley);
    - Eastern IFCA Byelaw 15: Towed gear restriction for bivalve molluscs (the same area as Byelaw 12); and
    - Eastern IFCA Byelaw 3: Molluscan shellfish methods of fishing (prohibits dredging for molluscan shellfish in the majority of the Eastern IFCA district, including the entire CSCB MCZ, without written authorisation from Eastern IFCA. Before granting any authorisation for dredging, officers would assess potential impacts on the MCZ and only authorise the activity if it did not prevent the conservation objectives being furthered).

249. The projects are screened with reference to their likely spatial and temporal extent and potential for interaction with effects arising from SEP and DEP.

250. The southern North Sea is a mature area of O&G development with wells and production platforms producing from primarily gas reservoirs and exporting via pipelines to onshore terminals, such as the Bacton Gas Terminal on the Norfolk Coast. Some of this infrastructure is now undergoing decommissioning as hydrocarbon fields reach the end of their economic life and the rate of new field development declining. However, it is acknowledged that the Oil and Gas Authority continues to award new licences.

251. There is a concentration of pipelines to the east of SEP and DEP linking southern North Sea gas fields to the Bacton Gas Terminal. These pipelines traverse through the CSCB MCZ on route to Bacton Gas Terminal. The pipelines relevant to this assessment are the Perenco operated Lancelot to Bacton gas export pipeline (PL876), the Bacton to Lancelot chemical pipeline (PL877), and the Shell operated Shearwater to Bacton gas pipeline (PL1570), all of which run parallel to each other (**Figure 16.1** of ES **Chapter 16 Petroleum Industry and Other Marine Users** [APP-102]).

252. The aforementioned pipelines are all in operation and no detail on the planned timescales or nature of decommissioning activities is available at the time of writing. Therefore, the potential impacts from decommissioning are not assessed. In terms of potential ongoing impacts, as noted above these assets are considered part of the baseline and are screened out of the cumulative assessment. However, within the updated SACOs for the site, quantities of external pipeline protection installed between 2016 and 2021 within areas of subtidal coarse and subtidal mixed sediment broadscale habitat features and within the subtidal chalk feature are provided. It is stated: *'The estimated area of impact from rock protection installed between 2016 and 2021 has resulted in a cumulative loss of approximately 18,610m^2 of [mixed sediment] habitat'*. For the coarse sediment feature, the estimated area of impact is 864m^2 and for the subtidal chalk feature the estimated area is 9,534m^2.

253. With respect to the subtidal chalk feature, as noted in **Section 8.2.2.1**, survey data indicates that areas where there is potential for subtidal chalk to be exposed are of very limited extent within the SEP and DEP offshore export cable corridor. Therefore, the MCZA is based on the known locations of subtidal chalk restricted to the outcropping subtidal rock feature in the inshore area of the CSCB MCZ only. Furthermore, as noted in **Table 6-3**, there is a commitment to a long HDD technique to install the export cables at the landfall, with the HDD exit point located approximately 1,000m offshore. This will completely avoid direct impacts on the subtidal chalk feature located close to the shore and given that SEP and DEP's external cable protection, if required, will be restricted to the subtidal sand, subtidal coarse and subtidal mixed sediment features, a cumulative long term habitat loss effect on the subtidal chalk feature can be screened out.

254. In recognition that at least some of this protection could have been installed after the collection of the SEP and DEP project-specific survey data, it has been included and assessed within the cumulative assessment of long term habitat loss with respect to subtidal coarse and subtidal mixed sediment broadscale habitat features (**Section 9.4.4.3**).

9.4.1 Dudgeon and Sheringham Shoal Offshore Wind Farms

255. The SOW and DOW offshore export cables route through the CSCB MCZ to the west of the SEP and DEP offshore export cable corridor (**Figure 8-1**) with the DOW export cable immediately west of the western boundary of the cable corridor on approach to landfall and the SOW export cable approximately 0.1km further west. Although the currently installed SOW and DOW infrastructure is considered part of the baseline, cumulative impacts on the CSCB MCZ from maintenance and decommissioning activities require consideration.

256. Both SOW and DOW have submitted marine licence applications for certain works to be undertaken during the O&M phase. There are separate marine licence applications for the generation assets (wind farms and infield cables) and transmission assets (OSPs and export cables). Only the works relating to the transmission assets (specifically the export cables) are relevant here since it is the export cables that pass through the MCZ. The SOW and DOW wind farm sites are 7km and 21.9km from the MCZ respectively and therefore there will be no impacts on the MCZ from works within the offshore wind farm sites themselves.

257. A summary of the works that would be permitted through the marine licences for both offshore wind farms, as relevant to the MCZA, is provided in **Table 9-4** below. Since the location of the works is not known at this stage, this makes the highly precautionary assumption that all works are undertaken in the MCZ. For context, it is noted that, at the time of writing, in the period since the applications were submitted (2020 and 2018 for SOW and DOW respectively), none of the activities have been undertaken. The applications are designed to cover the possibility of certain O&M works being required, such that they can be undertaken without undue delay. For these reasons, inclusion of the works described in **Table 9-4** represents an absolute worst case scenario for assessment purposes.

Table 9-4: Proposed SOW and DOW O&M Considered in the CIA

Project	Activity	Potential impacts	Details	Sea bed footprint (m^2), over remaining project lifetime
DOW (MCZA dated August 2020)	Export cable repair and replacement	Temporary sea bed disturbance Increase in SSC and deposition	Maximum footprint of sea bed disturbance from repair and replacement: 50km total over the lifetime of the project (assumed 25 years)	350,000
	Export cable remedial burial	As above	Maximum footprint of sea bed disturbance from jetting for remedial burial: 50km total over the lifetime of the project (assumed 25 years)	350,000
SOW (MCZA dated January 2020)	Export cable repair and replacement	As above	Maximum footprint of sea bed disturbance from repair and replacement over remaining 15 year lifetime	262,500
			Maximum footprint of sea bed disturbance from jack up legs (200m^2 per leg x 4 = 800m^2) over remaining 15 year lifetime	2,000
	Export cable remedial burial	As above	Maximum footprint of sea bed disturbance from jetting for remedial burial over remaining 15 year lifetime	525,000
			All export cable maintenance activities sea bed disturbance over remaining 15 year lifetime	789,500

258. The assessments (Royal HaskoningDHV, 2020a; 2020b) identified the following effects as having potential to negatively impact the conservation objectives of the MCZ:

- Temporary habitat loss / physical disturbance; and
- Increased SSC and deposition.

259. The assessments (Royal HaskoningDHV, 2020a; 2020b) concluded that these activities would not have a significant effect on the conservation objectives of the CSCB MCZ, alone or cumulatively with other projects, plans and activities, although Natural England has stated through the Sea bed ETG that it does not agree with this conclusion (Natural England, 2020b).

9.4.2 Hornsea Project Three Offshore Wind Farm

260. The Hornsea Project Three OWF offshore export cable corridor is located approximately 325m to the west of the SEP and DEP offshore export cable corridor at its closest point, and is also inside the CSCB MCZ. An MCZA was submitted as part of the DCO application which assessed the impact of cable installation within the MCZ (RPS, 2020).

261. The assessment identified the following effects as having potential to negatively impact the conservation objectives of the CSCB MCZ (RPS, 2020):

- Construction phase:
    - Temporary habitat loss/disturbance due to export cable installation; and
    - Increases in SSC and associated deposition due to export cable installation.
- Operation and maintenance phase:
    - Placement of cable protection in the Cromer Shoal Chalk Beds MCZ leading to long term habitat loss;
    - Maintenance operations during the operational phase, resulting in temporary sea bed disturbances;
    - Colonisation of export cable protection; and
    - Increased risk of introduction or spread of INNS due to presence of subsea infrastructure and vessel movements.
- Decommissioning phase:
    - Temporary habitat loss/disturbance due to export cable removal;
    - Increases in SSC and associated deposition due to export cable removal; and
    - Permanent habitat loss due to presence of export cable protection left *in situ* post decommissioning.

262. The MCZA considers the potential for cumulative effects from operation and maintenance activities associated with the DOW or SOW export cables within the MCZ, and from the Bacton Gas Terminal Coastal Defence Scheme but does not make an assessment, citing a lack of detailed information for these projects (RPS, 2020).

263. Given that the Applicant has committed to the removal of external cable protection in the CSCB MCZ at the decommissioning stage (if required) to avoid permanent impacts to MCZ benthic habitats, cumulative permanent habitat loss is not assessed (although long term habitat loss is). Similarly, given the localised extent of effects, and the mitigation to avoid the introduction of INNS, cumulative impacts from colonisation of export cable protection, and increased risk of introduction or spread of INNS due to presence of subsea infrastructure and vessel movements, are also not considered further.

9.4.3 EIFCA Fisheries Management within the CSCB MCZ

264. EIFCA fisheries management measures including byelaws and fisheries closures within the CSCB MCZ have been established in order to protect the features of the CSBC MCZ from the pressures of commercial fishing. The successful operation of the byelaw will lead to a reduction in pressure on the features of the CSCB MCZ and will result in an overall positive effect on the protected features and by extension the conservation objectives with regard to feature extent, structure and function and quality. Therefore, there will be no cumulative effect between the EIFCA byelaws and SEP and DEP as the byelaws will result in removal of pressures, meaning there is no pathway for interaction with the pressures generated by SEP and DEP.

9.4.4 Cumulative Impact Assessment

265. As illustrated in **Figure 8-2** SOW and DOW offshore export cables route through the same three broadscale marine habitat features (and one geological feature) as the SEP and DEP offshore export cable corridor:

- Subtidal coarse sediment (A5.1)
- Subtidal sand (A5.2)
- Subtidal mixed sediments (A5.4)
- North Norfolk Coast assemblage of subtidal sediment features and habitats

266. The Hornsea Project Three offshore export cable corridor routes through an area of subtidal sand characterised by the biotope A5.233 *Nephtys cirrosa* and *Bathyporeia* spp. in infralittoral sand, the same biotope as recorded in subtidal sand areas in the SEP and DEP offshore export cable corridor.

9.4.4.1 Temporary Habitat Loss / Physical Disturbance

267. The earliest commencement of Hornsea Project Three offshore export cable construction is 2023, with a possible second offshore construction phase beginning in 2028. The earliest date of SEP and/or DEP offshore construction is expected to be 2027. As stated in **Section 9.1.1.2** resilience of the subtidal sand biotope recorded in both areas (A5.233) to all temporary habitat loss and physical disturbance pressures is high with full recovery within 2 years. Therefore, no construction phase cumulative impacts are expected between SEP and DEP, and Hornsea Project Three, should development programmes proceed as expected. Even if there is temporal overlap, given the high resilience of the habitat significant cumulative impacts are unlikely.

268. O&M works resulting in sea bed disturbance would be intermittent with impacts in small discrete locations. SOW, DOW, and Hornsea Project Three decommissioning is unlikely to take place over the same period as SEP and/or DEP decommissioning. As a worst case it is possible that SOW, DOW or Hornsea Project Three O&M sea bed disturbance could have a cumulative impact on the MCZ features if full recovery of the sea bed and associated biological communities had not taken place between the activities of these projects and SEP and DEP. As described in **Section 9.1.1**, partial recovery due to colonisation of impacted areas by species representative of pre-existing biological communities should occur rapidly with full recovery in many

areas occurring within two years and possibly less than four years in some coarse and mixed sediment areas based on DOW post-construction monitoring. Therefore, any cumulative impacts would be temporary and short term.

269. It can therefore be concluded that the conservation objective of maintaining the protected features of the CSCB MCZ in a favourable condition or restoring them to favourable condition **will not be hindered** by cumulative temporary habitat loss and physical disturbance impacts.

9.4.4.2 Increased Suspended Sediment Concentrations

270. As described in **Section 9.1.2** most of the sediment mobilised by SEP and DEP activities would settle out of suspension rapidly to the bed, redepositing within 20m of the works, with almost all the remainder (fine sand fraction) settling within 100m, to a maximum height of approximately 3cm. Elevated SSC will be within the range of background nearshore levels and will be lower than those concentrations that would develop during storm conditions. Suspended sediment from O&M activities at SOW and DOW would redeposit in a similar manner to SEP and DEP and would be in discrete locations within the CSCB MCZ. The overall volumes of sediment disturbed would be spread across the operational lifetimes of SEP, DEP, SOW and DOW and therefore while there is potential for increased temporal disturbance, the individual areas affected by O&M activities would be minimal. It should also be noted that at the time of writing no export cable repair or reburial works have been undertaken at SOW and DOW. Once activities are completed, tidal currents are likely to rapidly disperse the suspended sediment. Biological communities recorded in the SEP and DEP offshore export cable corridor within the CSCB MCZ have either Low sensitivity to the pressures associated with temporary increases in SSC and subsequent deposition or are Not Sensitive.

271. Given the short term and localised extent of effects, cumulative impacts with the activities of other projects are not anticipated and it can therefore be concluded that the conservation objective of maintaining the protected features of the CSCB MCZ in a favourable condition or restoring them to favourable condition **will not be hindered** by cumulative increases in suspended sediment concentration.

9.4.4.3 Long Term Habitat Loss

272. It is noted that within the updated SACOs for the MCZ, the potential installation of up to 2,900m^2 of external cable protection within the subtidal sand broadscale habitat feature by Hornsea Project Three is considered by Natural England to *'result in lasting habitat change/loss of subtidal sand feature with no guarantee that the protection can be satisfactorily removed and/or the habitat will ever return to its original state.'*

273. This is reflected in the Hornsea Project Three MCZA which states that there may be lasting or permanent loss of up to 0.016% (i.e. from 2,900m^2 of external cable protection) of the subtidal sand broadscale habitat feature within the CSCB MCZ (or 0.0009% of the total area of the MCZ) due to placement of offshore export cable protection (if required) (RPS, 2020). Whilst the MCZA concludes that the presence of cable protection following decommissioning would not have resulted in a significant risk of hindering the achievement of the conservation objectives, Hornsea

Project Three has a requirement to remove any external cable protection that is installed, at the time of decommissioning (BEIS, 2020).

274. As noted in **Section 9.4**, it is estimated that up to 18,610m^2 (mixed sediment) and 864m^2 (coarse sediment) of gas pipeline protection has been installed within the MCZ between 2016 and 2021 (Natural England, 2023). This represents up to 0.04% of the subtidal mixed sediment feature, up to 0.0006% of the subtidal coarse sediment feature and up to 0.006% of the entire CSCB MCZ area.

275. As discussed in **Section 9.2.2**, long term habitat loss due to cable protection for SEP and DEP will represent up to 0.0006% of the total CSCB MCZ area. The cumulative habitat loss from both Hornsea Project Three, gas pipeline protection and SEP and DEP represents up to 0.0075% of the CSCB MCZ. For the majority of the estimated 40 year SEP and/or DEP operational phase there will be cumulative long term habitat loss impacts in combination with Hornsea Project Three and gas pipeline protection (although it is anticipated that these gas pipelines and their protection would at least be partly decommissioned within this 40 year period which would be expected to remove or reduce the effect of this pressure). However, the spatial extent of this habitat loss remains very small in the context of the total area of long term habitat loss of up to 0.026% of the subtidal sand feature (relevant to SEP and DEP and Hornsea Project Three cable protection only since no gas pipeline protection is installed in the subtidal sand feature), up to 0.05% of the subtidal mixed sediment feature, up to 0.016% of the subtidal coarse sediment feature or (as above) up to 0.0075% of total area of the CSCB MCZ and, although long lasting, will be temporary at Hornsea Project Three (BEIS, 2020), SEP and DEP (see **Section 6.7**) and gas pipeline protection. Therefore, on the basis that the proportion of the site that will be impacted is very small and that loss to the extent and distribution of the features will be long-term but temporary, it is concluded that the conservation objective of maintaining the protected features of the CSCB MCZ in a favourable condition or restoring them to favourable condition **will not be hindered**.

10 Stage 1 Assessment Conclusion

276. Based on the information presented in the preceding sections, which include assessments on the relevant broadscale habitats, habitat FOCI and feature of geological interest, it can be concluded that the conservation objective of maintaining the protected features of the CSCB MCZ in a favourable condition or restoring them to favourable condition will **not be hindered** by the construction, operation and decommissioning phases of SEP or DEP in isolation, SEP and DEP, or cumulatively with any other plan, project or activity.

277. Given the extent, structure, function, and quality of the physical attributes of the protected habitat features of the CSCB MCZ will not be affected, the conservation objectives of the North Norfolk Coast Geological Feature will also **not be hindered**.

278. Based on the outcome of this Stage 1 Assessment, no further stages of MCZA are required.

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